CSC | COMPUTER SCIENCE AND COMMUNICATIONS RESEARCH UNIT

UNIVERSITÉ DU LUXEMBOURG

FACULTY OF SCIENCES, TECHNOLOGY AND COMMUNICATION

Computer Science and Communications Research Unit

Activity Report 2015

CSC | COMPUTER SCIENCE AND COMMUNICATIONS RESEARCH UNIT

Computer Science and Communications Research Unit

Activity Report 2015

Keywords:
Activity Report, University of Luxembourg, Computer Science and Communications Research Unit, UL, CSC

Computer Science and Communications Research Unit
Activity Report 2015

Address:
Computer Science & Communication (CSC) Research Unit
University of Luxembourg
Faculty of Science, Technology and Communication
6, rue Richard Coudenhove-Kalergi
L-1359 Luxembourg
Luxembourg

Administrative Contact:
Isabelle Glemot-Schroeder and Fabienne Schmitz
Email: csc@uni.lu

http://csc.uni.lu

Editor:	Christian Glodt
Release date:	2016
Document Version:	Final v20161216101702
	Compiled at: 2016-12-16 10:26
Note:	This report was created using LaTeX with a template based on previous work by Sebastien Varrette.

Preface

Dear reader,

as head of the CSC for 2015, I am delighted to invite you to have a look at this report.

This annual report is meant to synthesize the progress and activities of the Computer Science & Communications (CSC) Research Unit in 2015. It gives an overview of most of the many activities conducted in the CSC.

In this report, you will find the most significant facts of 2015, concerning our research projects, organized events, awarded papers, visiting researchers and publications. The CSC RU works intensively towards the University priorities in Security, Reliability and Trust but also in Systems Biomedicine. By providing a strong disciplinary knowledge in computer science, telecommunications and applied mathematics, CSC serves as one of the fundamental bricks to enable interdisciplinary research through the University of Luxembourg's interdisciplinary centres.

In closing, I hope that you will find this report stimulating and inspiring. On behalf of the CSC research unit, I invite you to contact any one of us if you have any questions regarding the research we conduct in the CSC.

Best regards,

Yves Le Traon

Professor of Computer Science

Head of the Computer Science and Communications Research Unit

Contents

1 Computer Science and Communications Research Unit 1

2 Executive Summary 3

3 Research Areas 5

4 Research Groups 13

5 Projects in 2015 27

5.1 COST Action Projects 28
5.2 Directorate-General for Education and Culture (EC) Projects . . 29
5.3 EC - FP7 Projects 33
5.4 European Defence Agency - EDA Projects 39
5.5 External organisation funding Projects 40
5.6 FNR - AFR PhD Projects 44
5.7 FNR - AFR PostDoc Projects 59
5.8 FNR - AFR Projects 63
5.9 FNR - CORE Projects 67
5.10 FNR - INTER Projects 86
5.11 FNR - Other Projects 104
5.12 Horizon 2020 (EU) Projects 112
5.13 SES-ASTRA Projects 119
5.14 UL Funding Projects 120
5.15 Unfunded Projects 128

6 Representational Activities 133

6.1 Conferences and Committee Memberships 133

6.2 Doctoral Thesis Defenses 174
6.3 Awards 179
6.4 Media Appearances 181
6.5 Guests 185
6.6 Visits 199

7 Software Developments **205**

8 Publications in 2015 **225**
8.1 Book 226
8.2 Book Chapter 227
8.3 Journal 228
8.4 Thesis 235
8.5 Conference 235
8.6 Technical Report 252
8.7 Miscellaneous 253

Appendix **254**

A Statistics for 2015 **255**
A.1 Number of CSC Staff by Category 255
A.2 List of CSC Members by Category 256

B Acronyms used **261**

Chapter 1

Computer Science and Communications Research Unit

The primary mission of the research unit is to conduct fundamental and applied research in the area of computer, communication and information sciences. The goal is to push forward the scientific frontiers of these fields. Additionally, support for the educational tasks at the academic and professional Bachelor and Master levels is provided as well as for the PhD program.

CSC is active in different research areas (Communicative Systems, Information Security, Intelligent and Adaptive Systems, Software and Systems) and supports the Interdisciplinary Centers LCSB and SnT.

Chapter 2

Executive Summary

The Computer Science and Communications Research Unit, also known as CSC (http://csc.uni.lu), includes a staff of more than 130 persons involved in both teaching and research activities.

Two hundred students are currently registered in the study programmes at Bachelor and Master levels. The scope of the lectures includes topics covering fundamental aspects of computer science as well as practical ones. Close supervision and guidance are ensured by an open door policy and project based lecturing. The CSC is also involved in life-long learning by organising a master degree in Information Systems Security Management in collaboration with LIST, the Luxembourg Institute of Science and Technology.

The CSC doctoral school (Doctoral School in Computer Science and Computer Engineering – DSCSCE) is now running under the direction of Professor Pascal Bouvry.

Many of CSC faculty staff members, as well as their research groups, are involved in SnT and LCSB research, thus forging a tighter connection between the computer science research unit and the interdisciplinary research centers. Five laboratories of the interdisciplinary centre in security, reliability and trust (SnT) are also headed by CSC professors and several of our professors are involved personally as fellows in the two interdisciplinary centres of the University (LCSB and SnT).

The CSC is thus very involved in the development of the Interdisciplinary Centre of Security and Trust (SnT) research center. As a matter of fact, a majority of the research projects of the SnT have Principal Investigators from the CSC and most of the PhD students from SnT are supervised by CSC faculty members. The CSC thus counts among its major achievements its continued support of the SnT.

The CSC is currently the largest research unit of the University and is cooperating in a large set of international as well as regional projects.

The CSC (http://csc.uni.lu) is divided into 4 themes:

- Advanced Software Systems (http://lassy.uni.lu),
- Communicative Systems (http://comsys.uni.lu),
- Intelligent and Adaptive Systems (http://ilias.uni.lu),
- Algorithmics, Cryptography and Security (http://lacs.uni.lu).

Head

- Yves Le Traon, professor

Academic Staff

- Alex Biryukov, professor, head of LACS
- Raymond Bisdorff, professor
- Pascal Bouvry, professor
- Lionel Briand, professor
- Jean-Sébastien Coron, associate professor
- Theo Duhautpas, senior lecturer
- Thomas Engel, professor, head of COMSYS
- Dov Gabbay, guest professor
- Nicolas Guelfi, professor
- Pierre Kelsen, professor, head of LASSY
- Franck Leprévost, professor
- Yves Le Traon, professor, head of CSC
- Sjouke Mauw, professor
- Volker Müller, associate professor
- Nicolas Navet, associate professor
- Björn Ottersten, professor
- Peter Ryan, professor
- Steffen Rothkugel, associate professor
- Jürgen Sachau, professor
- Christoph Schommer, associate professor, head of ILIAS
- Ulrich Sorger, professor
- Bernard Steenis, associate professor
- Leon van der Torre, professor
- Denis Zampunieris, professor

Links

Full list of publications: http://orbilu.uni.lu/simple-search?query=CSC

More information: http://csc.uni.lu

Since CSC counts among its major achievements the continued support of the SnT, please look at the SnT 2015 annual report to get a complementary overview of CSC activities in the area of Security, Reliability and Trust.

Chapter 3

Research Areas

This chapter lists the research areas investigated by the research unit.

Communicative Systems

Embracing the end-to-end arguments in system design, the ”Communicative Systems” research area focuses on integrated research in the areas of Information transfer and communicating systems. Information transfer is concerned with information transmission over potentially complex channels and networks. Communicating systems in turn are the composition of multiple distributed entities employing communication networks to collaboratively achieve a common goal.

The following research topics are investigated:

- Information Transmission
- Wireless Communication Systems
- Secure communication protocols
- Network and systems security
- Network Management
- Mobile operating systems and applications
- Parallel and Distributed Systems
- Reliable Distributed Energy-Systems
- Energy efficient and secure cloud infrastructures
- Management and Mining of Data, Big Data Analysis

Current research projects propagate technologies for:

- Cloud Computing
- Hybrid Wireless Networks
- Information Dissemination and authentication in distributed networks
- Mobile communication
- Mobile learning

- Network Traffic Analysis and Protection
- Internet of Things (IoT)
- Network Traffic Management and Coordination
- Secure Satellite Communication
- Reliable Power Networks with Distributed Generation
- Cognitive software defined networks

The research theme on communicative systems is managed by Communicative Systems Laboratory (ComSys).

Research Topic	Last Name	First Name
Computer Networks	Bouvry	Pascal
Applications of Graph Transformation Techniques	Engel	Thomas
Computer Networks	Engel	Thomas
Network Forensics	Engel	Thomas
Network and System Security	Engel	Thomas
Platforms for Big Data Analysis and Machine Learning	Engel	Thomas
Security, Reliability and Privacy in Distributed Environments	Engel	Thomas
Cloud Applications Testing and Development	Ibrahim	Abdallah Ali Zainelabden Abdallah
Cloud Computing SLA, Cloud Data Centers and Cloud Services Providers	Ibrahim	Abdallah Ali Zainelabden Abdallah
Networking Systems	Ibrahim	Abdallah Ali Zainelabden Abdallah
Performance Evaluation, QoS and QoE	Ibrahim	Abdallah Ali Zainelabden Abdallah
Cloud Computing	Kliazovich	Dzmitry
Distributed Systems	Kliazovich	Dzmitry
Energy Efficiency	Kliazovich	Dzmitry
High Performance Computing	Kliazovich	Dzmitry
Performance Evaluation	Kliazovich	Dzmitry
Wireless Communications	Kliazovich	Dzmitry
Wireless and Ad hoc Networks	Kliazovich	Dzmitry
Image and Signal Processing	Ottersten	Björn
Wireless Communications	Ottersten	Björn
Document Engineering	Rothkugel	Steffen
Interactive Distributed Systems	Rothkugel	Steffen
Mobile and Ubiquitous Computing	Rothkugel	Steffen
Coding Theory	Sorger	Ulrich
Information Theory	Sorger	Ulrich
Transmission over Time Variant Channels	Sorger	Ulrich

Research Topic	Last Name	First Name

Table 3.1: Topics within Research Area “Communicative Systems”

Information Security

The Information Security Research Area covers research on cryptography and information security. The following topics are covered:

- Symmetric and public key cryptography
  - Design and analysis of crypto schemes
  - Authenticated encryption
  - Provable security, fully homomorphic encryption
- Efficient software and hardware implementation of cryptograhy
- Side-channel analysis of smartcards and embedded devices
- Security protocols
- Network, mobile and embedded systems security
  - Security and dependability of embedded components
  - Sensors and RFID security
  - Design and analysis of lightweight cryptography
  - Internet and web-security, mobile code security
- Privacy and anonymity
  - Privacy enhancing technologies
  - Privacy on the Internet
  - Private information retrieval and privacy preserving data mining
  - Economics of privacy
  - Information flow and access control policies
  - Privacy of health and bio-bank data
- Verifiable voting systems, E-democracy
- Cloud computing, reputation based systems
- Cirtual and crypto currencies
  - Anonymity of Bitcoin
  - Design of proof of work functions
  - Economics of mining

The research theme on information security is managed by Laboratory of Algorithmics, Cryptology and Security (LACS).

Research Topic	Last Name	First Name
Cryptanalysis	Biryukov	Alex
Cryptography	Biryukov	Alex
Hardware and Software Security	Biryukov	Alex
Network, Mobile and Embedded Systems Security	Biryukov	Alex
Privacy and Anonymity	Biryukov	Alex
Virtual and Crypto Currencies	Biryukov	Alex
Computational Number-Theory	Coron	Jean-Sébastien
Public-Key Cryptography	Coron	Jean-Sébastien

Research Topic	Last Name	First Name
Side-Channel Attacks	Coron	Jean-Sébastien
Data Privacy and Integrity in Highly Sensitive Sectors	Esteves-Veríssimo	Paulo
Automated implementation of security mechanisms	Le Traon	Yves
Malware detection and prevention	Le Traon	Yves
Model-Driven Security	Le Traon	Yves
Attack Trees	Mauw	Sjouke
Formal Methods	Mauw	Sjouke
Location-based Services	Mauw	Sjouke
Network Security	Mauw	Sjouke
Privacy	Mauw	Sjouke
RFIDs	Mauw	Sjouke
Security Assessment	Mauw	Sjouke
Security Protocols	Mauw	Sjouke
Computational Number-Theory	Müller	Volker
Security Primitives in Business Applications	Müller	Volker
Analysis of Information Flow	Ryan	Peter
Cryptographic Protocols	Ryan	Peter
Cryptographic Voting Schemes	Ryan	Peter
Cryptography	Ryan	Peter
Information Assurance	Ryan	Peter
Modelling and Analysis of Secure Systems and Security Policies	Ryan	Peter
Quantum Cryptography	Ryan	Peter
Socio-technical Aspects of Security	Ryan	Peter
Distributed Systems	Varrette	Sébastien

Table 3.2: Topics within Research Area “Information Security”

Intelligent and Adaptive Systems

The ”Intelligent and Adaptive Systems” research area is concerned with - the theoretical foundations and the algorithmic realization of - information processing and reasoning in complex and dynamic environments given limited resources and incomplete or uncertain information. It encompasses three overlapping subthemes and their corresponding topics:

- Intelligent agents:

  Computational techniques for autonomous problem solving and decision making in complex environments populated by humans and/or artificial agents.
  – Normative Multi-Agent Systems, Cognitive Agents/Robots, Decision Systems, Computational Social Choice and Agreement Technologies.

- Computational Intelligence:

  Adaptive systems exploiting learning, flexible probabilistic, or nature-inspired computing models to deal with opaque, dynamic contexts, and big data.
  – Bio-inspired Computing, Data Science, Text/Data Mining, Knowledge Discovery, Information Theory.

- Computational/Applied Logic:

  Logic-based methods for analyzing/specifying computational systems, providing advanced knowledge representation and reasoning techniques for intelligent agents.
  – Agent logics, Normative Reasoning, Knowledge Representation, Uncertain Inference, Foundations of Reasoning.

Research Topic	**Last Name**	**First Name**
Algorithmic decision theory	Bisdorff	Raymond
Multiple criteria decision aid for selecting, ranking, sorting and clustering	Bisdorff	Raymond
Cloud Computing	Bouvry	Pascal
Parallel and evolutionary computing	Bouvry	Pascal
Data Mining and Knowledge Discovery	Danilava	Sviatlana
Cloud Computing	Danoy	Grégoire
High Performance Computing	Danoy	Grégoire
Parallel and evolutionary computing	Danoy	Grégoire
Data Mining and Knowledge Discovery	Höhn	Winfried
Data Mining and Knowledge Discovery	Kampas	Dimitrios
Cloud Computing	Muszynski	Jakub
Distributed Systems	Muszynski	Jakub
High Performance Computing	Muszynski	Jakub
Network Security	Muszynski	Jakub
Network and System Security	Muszynski	Jakub
Parallel and evolutionary computing	Muszynski	Jakub
Cloud Computing	Plugaru	Valentin
Distributed Systems	Plugaru	Valentin
Energy Efficiency	Plugaru	Valentin
High Performance Computing	Plugaru	Valentin
Parallel and evolutionary computing	Plugaru	Valentin
Performance Evaluation	Plugaru	Valentin

Research Topic	Last Name	First Name
Platforms for Big Data Analysis and Machine Learning	Plugaru	Valentin
Artificial Companions	Schommer	Christoph
Computational Intelligence	Schommer	Christoph
Data Mining and Knowledge Discovery	Schommer	Christoph
Data Science	Schommer	Christoph
Information Retrieval and Learning	Schommer	Christoph
Machine Learning	Schommer	Christoph
Information Exchange	Sorger	Ulrich
Learning and Evolutionary Algorithms	Tantar	Alexandru-Adrian
Cloud Computing	Varrette	Sébastien
Distributed Systems	Varrette	Sébastien
Energy Efficiency	Varrette	Sébastien
High Performance Computing	Varrette	Sébastien
Performance Evaluation	Varrette	Sébastien
Foundations of Formal Sciences and AI	Weydert	Emil
Logic and Knowledge Representation	Weydert	Emil
Uncertain and Nonmonotonic Inference	Weydert	Emil
Agreement Technologies and Cognitive Dynamics	van der Torre	Leon
Foundations of Reasoning and AI	van der Torre	Leon
Knowledge Representation and Natural Language Semantics	van der Torre	Leon
Logics for Intelligent Agents/Robots	van der Torre	Leon
Normative Multi-Agent Systems and Deontic Reasoning	van der Torre	Leon
Uncertain and Nonmonotonic Inference	van der Torre	Leon

Table 3.3: Topics within Research Area “Intelligent and Adaptive Systems”

Software and Systems

The Software and Systems Research Area covers research on methods and tools for mastering the development of complex software systems. The following tasks are tackled:

- To develop new engineering processes.
- To investigate the use of model driven development.

- To perform research on the foundations of software engineering.
- To study verification and validation techniques.
- To assist in the development and in the use of e-learning tools.

The following application domains stand out: industry-critical systems, e-learning systems, web-based distributed systems, enterprise architectures.

The research theme on software and systems is managed by Laboratory for Advanced Software Systems (LASSY).

Research Topic	Last Name	First Name
Automated Software Testing	Briand	Lionel
Model-Driven Software Engineering	Briand	Lionel
Requirements Engineering	Briand	Lionel
Run-Time Verification	Briand	Lionel
Internet and Cloud Infrastructure Resilience	Esteves-Veríssimo	Paulo
Resilience of Cyber-Physical System Infrastructures	Esteves-Veríssimo	Paulo
Security and Dependability of Embedded Components	Esteves-Veríssimo	Paulo
Model-Driven Software Development	Glodt	Christian
Web-based Systems	Glodt	Christian
Dependability	Guelfi	Nicolas
Formal Methods	Guelfi	Nicolas
Requirements Engineering	Guelfi	Nicolas
Software Engineering	Guelfi	Nicolas
Domain-Specific Modeling Languages	Kelsen	Pierre
Formal Methods	Kelsen	Pierre
Model-Driven Software Development	Kelsen	Pierre
Software Engineering	Kim	Dongsun
Big Data at Runtime	Le Traon	Yves
Modeling at Runtime	Le Traon	Yves
Software Testing	Le Traon	Yves
Integration of Verification Activity into Model-Driven Engineering	Navet	Nicolas
Probabilistic Risk Analysis	Navet	Nicolas
Timing Verification of Real-time Systems	Navet	Nicolas
Systems and Control Engineering	Sachau	Jürgen
Proactive Computing	Zampunieris	Denis
Proactive Engines	Zampunieris	Denis
e-Learning	Zampunieris	Denis

Table 3.4: Topics within Research Area “Software and Systems”

Chapter 4

Research Groups

This chapter details the research groups within the CSC research unit.

ADT – Algorithmic Decision Theory (team Bisdorff)

http://charles-sanders-peirce.uni.lu/bisdorff/research.html

Today's decision makers in fields ranging from engineering to psychology to medicine to economics to homeland security are faced with remarkable new technologies, huge amounts of information to help them in reaching good decisions, and the ability to share information at unprecedented speeds and quantities. These tools and resources should lead to better decisions. Yet, the tools bring with them daunting new problems: the massive amounts of data available are often incomplete or unreliable or distributed and there is great uncertainty in them; interoperating/distributed decision makers and decision making devices need to be coordinated; many sources of data need to be fused into a good decision; information sharing under new cooperation/competition arrangements raises security problems. When faced with such issues, there are few highly efficient algorithms available to support decisions. The objective of Algorithmic Decision Theory (ADT) is to improve the ability of decision makers to perform in the face of these new challenges and problems through the use of methods of theoretical computer science, in particular algorithmic methods. The primary goal of ADT is to explore and develop algorithmic approaches to decision problems arising in a variety of applications areas. Examples include, but are not limited to:

- Computational tractability/intractability of consensus functions;
- Improvement of decision support and recommender systems;
- Development of automatic decision devices including on-line decision procedures;

- Robust Decision Making;
- Learning for Multi-Agent Systems and other on-line decision devices.

Role	Last Name	First Name
Head	Bisdorff	Raymond

Table 4.1: List of members of the ADT research group

APSIA – Applied Security and Information Assurance Group

http://wwwfr.uni.lu/snt/research/apsia

The Applied Security and Information Assurance Group - APSIA - is headed by Prof. Dr. Peter Y. A. Ryan, Professor of Applied Security. The group is part of SnT and is associated with LACS of the Computer Science and Communications Research Unit - CSC.

The APSIA Group is concerned with the design and analysis of secure systems:

- Cryptographic Protocols (classical and quantum)
- Cryptographic Algorithms and Primitives
- Information Flow
- Verifiable Voting Schemes
- Socio-Technical Analysis of Security

Role	Last Name	First Name
Head	Ryan	Peter
Senior Research Scientist	Lenzini	Gabriele
Researcher	Ferreira	Ana
Researcher	Lancrenon	Jean
Researcher	Tang	Qiang
Researcher	Wu	Yining
Doctoral Candidate	Atashpendar	Arash
Doctoral Candidate	Chenal	Massimo
Doctoral Candidate	Delerue Arriaga	Afonso
Doctoral Candidate	Giustolisi	Rosario
Doctoral Candidate	Huynen	Jean-Louis
Doctoral Candidate	Lopez Becerra	José Miguel
Doctoral Candidate	Pejo	Balazs
Doctoral Candidate	Perez Urquidi	Jose Miguel
Doctoral Candidate	Pierina Brustolin Spagnuelo	Dayana
Doctoral Candidate	Skrobot	Marjan
Doctoral Candidate	Tabatabaei	Masoud

Role	Last Name	First Name
Doctoral Candidate	Wang	Jun

Table 4.2: List of members of the APSIA research group

CAIN – Communication and Information Theory

Role	Last Name	First Name
Head	Sorger	Ulrich
Research Scientist	Franck	Christian
Researcher	Suchanecki	Zdzislaw
Doctoral Candidate	Li	Yu

Table 4.3: List of members of the CAIN research group

CORON – Team Coron

Role	Last Name	First Name
Head	Coron	Jean-Sébastien
Doctoral Candidate	Vadnala	Praveen Kumar
Doctoral Candidate	Venkatesh	Srinivas Vivek

Table 4.4: List of members of the CORON research group

CRTES – Critical Real-Time Embedded Systems

The CRTES group headed by Professor Nicolas Navet studies how to build provably safe critical embedded systems in a time and cost efficient manner. The focus of this group is on software-intensive real-time systems having strong dependability constraints and a significant societal impact, such as transportation systems (road vehicles, aircrafts, etc) or production lines. The aim of this group is to contribute to the techniques, tools and computing platforms to develop provably safe and optimized Critical Real-Time Embedded Systems (CRTES).

Role	Last Name	First Name
Head	Navet	Nicolas
Research Scientist	Altmeyer	Sebastian
Doctoral Candidate	Brau	Guillaume
Doctoral Candidate	Sundharam Manikandan	Sakthivel

Role	Last Name	First Name

Table 4.5: List of members of the CRTES research group

CRYPTOLUX – CRYPTOLUX

http://www.cryptolux.org/

Role	Last Name	First Name
Head	Biryukov	Alex
Research Scientist	Le Corre	Yann
Researcher	Derbez	Patrick
Researcher	Groszschädl	Johann
Researcher	Khovratovich	Dmitry
Researcher	Velichkov	Vesselin
Doctoral Candidate	Dinu	Dumitru-Daniel
Doctoral Candidate	Perrin	Léo Paul
Doctoral Candidate	Pustogarov	Ivan
Doctoral Candidate	Udovenko	Aleksei

Table 4.6: List of members of the CRYPTOLUX research group

FMDE – Foundations of Model-Driven Engineering

The FMDE group headed by Professor Pierre Kelsen studies the fundamental concepts underlying model-driven engineering. Current research focuses on approaching model-driven engineering from a software language engineering perspective. In this context the main objective is to put the engineering of domain-specific languages on a sound theoretical basis. Limitations of the current crop of formal methods are tackled so that the methods grounded in theory become indeed applicable to industrial case studies.

Besides research in model-driven engineering (MDE) other research interest include applications of MDE in enterprise architecture as well as the design of efficient algorithms.

Role	Last Name	First Name
Head	Kelsen	Pierre
Research Scientist	Glodt	Christian
Researcher	De Kinderen	Sybren
Researcher	Ma	Qin
Doctoral Candidate	Gammaitoni	Loïc

Role	Last Name	First Name

Table 4.7: List of members of the FMDE research group

ICR – Individual and Collective Reasoning

http://icr.uni.lu/

The Individual and Collective Reasoning Group (ICR) is an interdisciplinary research team at the University of Luxembourg which is driven by the insight that intelligent systems (like humans) are characterized not only by their individual reasoning capacity, but also by their social interaction potential. Its overarching goal is to develop and investigate comprehensive formal models and computational realizations of individual and collective reasoning and rationality.

ICR is anchored in the Lab for Intelligent and Adaptive Systems (ILIAS) of the Computer Science and Communications unit (CSC), and involved in the Interdisciplinary Centre for Security, Reliability and Trust (SnT). The group, which is led by Leon van der Torre, currently counts more than 15 researchers and is strongly engaged in international cooperation.

Our research areas are normative multi-agent systems, autonomous cognitive agents, computational social choice, and the foundations of logic-based knowledge representation and reasoning.

Role	Last Name	First Name
Head	van der Torre	Leon
Research Scientist	Weydert	Emil
Researcher	Casini	Giovanni
Researcher	Cramer	Marcos
Researcher	Doder	Dragan
Researcher	Parent	Xavier
Researcher	Robaldo	Livio
Doctoral Candidate	Ambrossio	Diego Agustin
Doctoral Candidate	Colombo Tosatto	Silvano
Doctoral Candidate	Humphreys	Llio
Doctoral Candidate	Podlaszewski	Mikolaj Jan
Doctoral Candidate	Rienstra	Tjitze
Doctoral Candidate	Sun	Xin
Doctoral Candidate	Van Zee	Marc
Doctoral Candidate	Ziafati	Pouyan

Table 4.8: List of members of the ICR research group

LEPREVOST – Team Leprévost

Role	Last Name	First Name
Head	Leprévost	Franck
Research Scientist	Bernard	Nicolas

Table 4.9: List of members of the LEPREVOST research group

MESSIR – Research Group on Scientific Development Methods and Tools for Dependable Software Product Line Engineering

Our group focuses on modeling languages adapted to the engineering of dependable software product lines. Those languages are developed using sound scientific basis. They introduce new concepts that have a direct impact on mastering the dependability attributes of engineered systems.

An important attention is given to requirements specification for which We consider that operational semantics is a mandatory quality.

Our semantics is defined in order to allow for efficient specification verification using tests or model checking.

We develop open source tools to support our languages and to allow for research collaboration or technology transfer with industrial partners.

Role	Last Name	First Name
Head	Guelfi	Nicolas
Research Scientist	Capozucca	Alfredo
Research Scientist	Ries	Benoît
Doctoral Candidate	Khan	Yasir Imtiaz

Table 4.10: List of members of the MESSIR research group

MINE – Data Mining and Knowledge Discovery

http://wiki.uni.lu/mine

MINE is a member of the Intelligent and Adaptive Systems Research Laboratory. We are a group of researchers, who are interested in Data Science, in finding information about data and understanding its contents

Current research is related to Text Analytics (Topic Identification, Sentiment

Analysis, Feature Detection), Artificial Companions, and Anomaly Detection.

Our teaching activities implies DataBase Management I-III (Bachelor), Information Retrieval and Learning, Knowledge Discovery and Data Mining, and Machine Learning (Master), and a selected course within the Doctoral School in Compute Science and Computer Engineering.

Contact: Prof. Dr. Christoph Schommer.

Role	Last Name	First Name
Head	Schommer	Christoph
Doctoral Candidate	Danilava	Sviatlana
Doctoral Candidate	Höhn	Winfried
Doctoral Candidate	Kampas	Dimitrios

Table 4.11: List of members of the MINE research group

MÜLLER – Team Müller

Role	Last Name	First Name
Head	Müller	Volker

Table 4.12: List of members of the MÜLLER research group

PCOG – Parallel Computing and Optimisation Group

http://pcog.uni.lu/

The Parallel Computing & Optimisation group led by Prof. Pascal Bouvry is conducting research on parallel computing and optimization techniques, in particular new research topics include decentralized optimization techniques that nevertheless lead to a good global behavior of the system.

The main application domains of the team fit the University of Luxembourg priorities:

- security, trust and reliability, for example, cryptology, intrusion detection, and reliable scheduling and routing on new generations of networks such as p2p, ad-hoc, and hybrids.
- sustainable development, for instance, Energy Efficient Data Centers
- systems biomedecine, for example, genomic sequencing, proteine folding, genomic modeling

Role	Last Name	First Name
Head	Bouvry	Pascal

Role	Last Name	First Name
Research Scientist	Danoy	Grégoire
Research Scientist	Varrette	Sébastien
Researcher	Emeras	Joseph
Researcher	Guzek	Mateusz
Researcher	Kliazovich	Dzmitry
Researcher	Muszynski	Jakub
Researcher	Tantar	Alexandru-Adrian
Technical Support Staff Member	Cartiaux	Hyacinthe
Technical Support Staff Member	Plugaru	Valentin
Doctoral Candidate	Fiandrino	Claudio
Doctoral Candidate	Ibrahim	Abdallah Ali Zainelabden Abdallah
Doctoral Candidate	Nguyen	Anh Quan
Doctoral Candidate	Nielsen	Sune Steinbjorn
Doctoral Candidate	Simionovici	Ana-Maria

Table 4.13: List of members of the PCOG research group

ROTH – Team Rothkugel

Role	Last Name	First Name
Head	Rothkugel	Steffen
Research Scientist	Botev	Jean
Doctoral Candidate	Klein	Johannes
Doctoral Candidate	Muller	Christian

Table 4.14: List of members of the ROTH research group

SaToSS – Security and Trust of Software Systems

http://satoss.uni.lu/

The Security and Trust of Software Systems (SaToSS) group, led by Professor Sjouke Mauw, is focused on formalizing and applying formal reasoning to real-world security problems and trust issues. The group was established on January 1st, 2007 within the Computer Science and Communications (CSC) research unit of the Faculty of Science, Technology and Communication (FSTC) of the University of Luxembourg. It is part of the laboratories LACS and ComSys, and has a strong connection to the Interdisciplinary Centre for Security, Reliability and Trust (SnT).

The group has common projects with the APSIA group led by Prof. Peter Ryan, with the ICR group headed by Prof. Leon van der Torre, and with Prof. Thomas Sauter from the Life Sciences research unit. SaToSS also collaborates closely with other units and scientists from the University of Luxembourg, as well as with several academic and industrial partners from Luxembourg and from abroad, including itrust Luxembourg, Cybernetica Estonia, EDF France, Thales R&D France, IBM Switzerland, Royal Holloway University of London, amongst others.

Role	Last Name	First Name
Head	Mauw	Sjouke
Researcher	Gadyatskaya	Olga
Researcher	Jhawar	Ravi
Researcher	Mizera	Andrzej
Researcher	Ouchani	Samir
Researcher	Pang	Jun
Researcher	Trujillo Rasua	Rolando
Technical Support Staff Member	Kordy	Piotr
Doctoral Candidate	Lounis	Karim
Doctoral Candidate	Toro Pozo	Jorge Luis
Doctoral Candidate	Yuan	Qixia
Doctoral Candidate	Zhang	Yang

Table 4.15: List of members of the SaToSS research group

SCE – Systems & Control Engineering

http://www.sce.uni.lu/

Role	Last Name	First Name
Head	Sachau	Jürgen
Doctoral Candidate	Bilibin	Ilya
Doctoral Candidate	Brühl	Manuel
Doctoral Candidate	Jostock	Markus
Doctoral Candidate	Margossian	Harag
Doctoral Candidate	Neshvad	Surena
Doctoral Candidate	Norta	David Peter Benjamin

Table 4.16: List of members of the SCE research group

SECAN-Lab – Security and Networking Lab

http://secan-lab.uni.lu/

The Security and Networking Lab (SECAN-Lab) is headed by Prof. Dr. Thomas Engel who is Professor for Computer Networks and Telecommunications at the University of Luxembourg since 2003. SECAN-Lab addresses both fundamental and applied research activities in computer networking and security. The main research activities of our group cover the following areas:

- Privacy and security by distribution
- SCADA and cyber security
- Vehicular and multimodal traffic management
- Privacy in data communications, protection against network traffic analysis
- Internet of Things, Quality of Service, IPv6 integration
- Wireless networks and mobile security
- Financial technologies including smart contracts and block chains
- Network and systems security including machine learning for big data analysis, malware detection and IT forensics
- Interaction, games and novel interface technologies and their application to vehicular communication
- Software Defined Networks.

Role	Last Name	First Name
Head	Engel	Thomas
Head Personal Assistant	Edwardsdottir	Helga
Senior Research Scientist	State	Radu
Research Scientist	Frank	Raphaël
Research Scientist	Panchenko	Andriy
Researcher	Avanesov	Tigran
Researcher	Castignani	German
Researcher	Dolberg	Lautaro
Researcher	Faye	Sébastien
Researcher	Gheorghe	Gabriela
Researcher	Hermann	Frank
Researcher	Kantor	Miroslaw
Researcher	Lanze	Fabian
Researcher	Louveton	Nicolas
Researcher	Machalek	Aurel
Researcher	McCall	Roderick
Researcher	Melakessou	Foued
Researcher	Naveh	David
Researcher	Palattella	Maria Rita
Researcher	Popleteev	Andrei
Researcher	Sasnauskas	Raimondas
Researcher	Tantar	Emilia
Program Coordinator	Ladid	Latif
Technical Support Staff Member	Dunlop	Dominic

Role	Last Name	First Name
Doctoral Candidate	Boechat	Andre
Doctoral Candidate	Bronzi	Walter
Doctoral Candidate	Codeca	Lara
Doctoral Candidate	Derrmann	Thierry
Doctoral Candidate	Du	Manxing
Doctoral Candidate	Falk	Eric
Doctoral Candidate	Fiz Pontiveros	Beltran
Doctoral Candidate	Forster	Markus
Doctoral Candidate	Glauner	Patrick
Doctoral Candidate	Gottmann	Susann
Doctoral Candidate	Hammerschmidt	Christian
Doctoral Candidate	Jafarnejad	Sasan
Doctoral Candidate	Marchal	Samuel
Doctoral Candidate	Mouton	Maximilien
Doctoral Candidate	Nachtigall	Nico
Doctoral Candidate	Signorello	Salvatore
Doctoral Candidate	Steichen	Mathis
Administrative Aid	Ochsenbein	Anne
Administrative Aid	Östlund	Stefanie

Table 4.17: List of members of the SECAN-Lab research group

SERVAL – Security Design and Validation Research Group

https://sites.google.com/site/servalteam/

SERVAL conducts research on software engineering, and more specifically on modelling and design for security, as well as on validation of functional/security mechanisms for systems and software. Among the issues addressed by the group, we can mention (1) the use of Model Driven Engineering for designing secure systems, (2) model composition and aspect weaving to develop adaptive security and testable mechanisms, (3) the definition of security policies and dedicated testing techniques (mutation, evolutionary algorithms, static analysis) to ensure that functional and security mechanisms (privacy, access control, usage control, encryption) are correctly implemented and deployed. The domains of application concern Ambient Assisted Living using sensor networks, information systems, distributed systems, web-applications, SOA, mobile apps.

Research topics include:

- Model Driven Engineering
- Android Security
- Software Testing
- Access Control
- Conviviality vs Privacy

Role	Last Name	First Name
Head	Le Traon	Yves
Senior Research Scientist	Klein	Jacques
Researcher	Allix	Kevin
Researcher	Bissyande	Tegawendé François D Assise
Researcher	Fouquet	François
Researcher	Henard	Christopher
Researcher	Kim	Dongsun
Researcher	Kubler	Sylvain
Researcher	Lucas Filho	Edson Ramiro
Researcher	Papadakis	Mike
Researcher	Robert	Jérémy
Researcher	Sirres	Raphaël
Doctoral Candidate	Hartmann	Thomas
Doctoral Candidate	Hurier	Médéric
Doctoral Candidate	Jimenez	Matthieu
Doctoral Candidate	Li	Daoyuan
Doctoral Candidate	Li	Li
Doctoral Candidate	Martinez	Jabier
Doctoral Candidate	Moawad	Assaad
Doctoral Candidate	Mouline	Ludovic
Doctoral Candidate	Rubab	Iram
Doctoral Candidate	Sanchez Guinea	Alejandro

Table 4.18: List of members of the SERVAL research group

SVV – Software Verification and Validation Research Group

http://wwwen.uni.lu/snt/research/software_verification_and_validation_lab

Role	Last Name	First Name
Head	Briand	Lionel
Research Scientist	Nejati	Shiva
Research Scientist	Sabetzadeh	Mehrdad
Researcher	Bianculli	Domenico
Researcher	Göknil	Arda
Researcher	Lucia	Lucia
Researcher	Nguyen	Duy Cu
Researcher	Pastore	Fabrizio
Researcher	Sannier	Nicolas
Researcher	Shar	Lwin Khin
Doctoral Candidate	Appelt	Dennis

Role	Last Name	First Name
Doctoral Candidate	Arora	Chetan
Doctoral Candidate	Ben Fadhel	Ameni
Doctoral Candidate	Di Nardo	Daniel
Doctoral Candidate	Dou	Wei
Doctoral Candidate	Hajri	Ines
Doctoral Candidate	Helali	Raja
Doctoral Candidate	Jan	Sadeeq
Doctoral Candidate	Le	Ha Thanh
Doctoral Candidate	Liu	Bing
Doctoral Candidate	Maddouri	Sami
Doctoral Candidate	Matinnejad	Reza
Doctoral Candidate	Soltana	Ghanem
Doctoral Candidate	Thome	Julian
Doctoral Candidate	Wang	Chunhui

Table 4.19: List of members of the SVV research group

ZAMP – Team Zampuniéris

Role	Last Name	First Name
Head	Zampunieris	Denis
Research Scientist	Reis	Sandro
Doctoral Candidate	Dobrican	Remus-Alexandru
Doctoral Candidate	Neyens	Gilles

Table 4.20: List of members of the ZAMP research group

Chapter 5

Projects in 2015

This chapter lists the research projects running during 2015. This chapter is structured to summarize the projects by funding source:

- COST Action Projects
- Directorate-General for Education and Culture (EC) Projects
- EC - FP7 Projects
- European Defence Agency - EDA Projects
- External organisation funding Projects
- FNR - AFR PhD Projects
- FNR - AFR PostDoc Projects
- FNR - AFR Projects
- FNR - CORE Projects
- FNR - INTER Projects
- FNR - Other Projects
- Horizon 2020 (EU) Projects
- SES-ASTRA Projects
- UL Funding Projects
- Unfunded Projects

The following pages summarize the projects operated in the CSC Research Unit for the year 2015.

5.1 COST Action Projects

Runtime Verication beyond Monitoring

Acronym:	ARVI
PI:	
Funding:	COST Action
Budget:	not given
Duration:	Dec. 12, 2014 – Dec. 11, 2018
Member:	Jun Pang (Collaborator)
Area:	Information Security
Description:	Runtime verification (RV) is a computing analysis paradigm based on observing a system at runtime to check its expected behavior. RV has emerged in recent years as a practical application of formal verification, and a less ad-hoc approach to conventional testing by building monitors from formal specifications. There is a great potential applicability of RV beyond software reliability, if one allows monitors to interact back with the observed system, and generalizes to new domains beyond computers programs (like hardware, devices, cloud computing and even human centric systems). Given the European leadership in computer based industries, novel applications of RV to these areas can have an enormous impact in terms of the new class of designs enabled and their reliability and cost effectiveness. This Action aims to build expertise by putting together active researchers in different aspects of runtime verification, and meeting with experts from potential application disciplines. The main goal is to overcome the fragmentation of RV research by (1) the design of common input formats for tool cooperation and comparison; (2) the evaluation of different tools, building a growing sets benchmarks and running tool competitions; and (3) by designing a road-map and grand challenges extracted from application domains.
Results:	The project started in December 2014.

CRYPTACUS - COST Action IC1403

Acronym:	CRYPTACUS - COST Action IC1403
PI:	

Funding:	COST Action
Budget:	not given
Duration:	Dec. 12, 2014 – Nov. 12, 2018
Member:	Sjouke Mauw (Administrator)
Area:	Information Security
Description:	Recent technological advances in hardware and software have irrevocably affected the classical picture of computing systems. Today, these no longer consist only of connected servers, but involve a wide range of pervasive and embedded devices, leading to the concept of ”ubiquitous computing systems”. The objective of the Action is to improve and adapt the existent cryptanalysis methodologies and tools to the ubiquitous computing framework. Cryptanalysis, which is the assessment of theoretical and practical cryptographic mechanisms designed to ensure security and privacy, will be implemented along four axes: cryptographic models, cryptanalysis of building blocks, hardware and software security engineering, and security assessment of real-world systems. Researchers have only recently started to focus on the security of ubiquitous computing systems. Despite the critical flaws found, the required highly-specialized skills and the isolation of the involved disciplines are a true barrier for identifying additional issues. The Action will establish a network of complementary skills, so that expertise in cryptography, information security, privacy, and embedded systems can be put to work together. The outcome will directly help industry stakeholders and regulatory bodies to increase security and privacy in ubiquitous computing systems, in order to eventually make citizens better protected in their everyday life.
Results:	The project organized a number of scientific and managerial meetings.

5.2 Directorate-General for Education and Culture (EC) Projects

Future Education and Training in Computing: How to meet our students where they are

http://fetch.ecs.uni-ruse.bg/index.php?cmd=gsIndex

Acronym:	FETCH
Reference:	I2R-NET-PEU-13FTCH
PI:	Thomas Engel
Funding:	Directorate-General for Education and Culture (EC)
Budget:	1,127,000 €
Duration:	Oct. 1, 2013 – Sept. 30, 2016
Members:	• Thomas Engel (Principal Investigator) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partners:	• Aalborg University • Academy of Economic Studies • BIKEMA • Comhard Gesellschaft für Computer Kommunikation Bildung mbH • Czech Technical University • Dublin City University • GFai tech GmBH • HTW Berlin • Heriot-Watt University • IEEE Bulgaria Section • IIEF Integrierte Informationssysteme für Engineering und Facility Management GmbH • Institute of Mathematics and Informatics • Izmir University of Economics • Kaunas University of Technology • Lappeenranta University of Technology • Linnaeus University • Liverpool John Moores University • Molde University College • Musala Soft • Ostfold University College • Polytechnic University of Tirana • Reykjavik University • Riga Technical University • Selcuk University • Slovak University of Technology • Sofia University “St. Kliment Ohridski” • South East European University • Tallinn University of Technology • Technical University of Gabrovo • Technical University of Sofia • Technical University of Varna • Technische Universitaet Wien • Technische Universität Ilmenau • Tellus Ltd • Temida Ltd

- University Ss Cyril & Methodiuous, Skopje
- University of Bahcesehir
- University of Calabria
- University of Coimbra
- University of Cyprus
- University of Delft
- University of Ioannina
- University of La Laguna
- University of Library Science and Information Technologies
- University of Liechtenstein
- University of Luxembourg
- University of Malaga
- University of Malta
- University of Napoli Parthenope
- University of Nova Gorica
- University of Novi Sad
- University of Palermo
- University of Pavia
- University of Pitesti
- University of Plovdiv
- University of Rijeka
- University of Russe
- University of Szeged
- University of Tampere
- University of Veliko Turnovo
- University of Versailles
- VARTEC NV
- Vilnius Gediminas Technical University
- Vilnius University
- Warsaw University of Technology

Description: Future Education and Training in Computing: How to support learning at anytime anywhere?

The project aims at the achievement of intelligent growth, and building a knowledge and innovation based computer society through raising the quality of computing education, introducing modern innovative technologies in education, sharing knowledge, discussing methodologies, promoting exchange of good practice between all parties.

In order to respond to:

- ET2020 - the consortium will develop a European Strategic Framework for Computing Education and Training 2020 (ESFCET 2020), which will form a solid, global strategic framework that leverages local and transnational competences to enhance Computing Education in Europe.
- European Qualification Framework - ETN FETCH will develop a European Evaluation Framework in Computing Education and Training 2020 (EEFCET 2020), which will evaluate the three factors: Knowledge, Skills and Competences

gained from Computing Education and Training.
- The Tuning Methodology - the project will prepare recommendations for future Digital Curricula in Computing Education and Training 2020 (DCCET 2020).
- Introducing modern innovative technologies in education - new didactical theories and learning models for using social media in education will be developed.

Main project outcomes and products:

- ETN FETCH "Future Education and Training in Computing: How to support learning at anytime anywhere".
- European Strategic Framework for Computing Education and Training 2020 (ESFCET 2020).
- European Evaluation Framework in Computing Education and Training 2020 (EEFCET 2020).
- A set of recommendations for future Digital curricula in Computing Education and Training 2020.
- New didactical theories and learning models for using social media in education.
- Six conferences with co-event workshops in the field of computing.
- Publications of the results in journals, newspapers, magazines, brochures and web sites.
- Internal and external evaluation reports.

Impact:

- The project products will be of benefit for all actors in Computing education like
  - University and national policy-makers in the field of Computing education;
  - University academic staff who are lecturers/trainers in Computing;
  - Bachelor, Master & Doctoral Students;
  - Research institutes and centres in Computing;
  - Companies and SMEs in the field of Computing.
- The project will change the methodology of training computer specialists, will apply most modern technologies in education, and will promote closer cooperation between universities, research institutes and industry.

Results:

ETN FETCH "Future Education and Training in Computing: How to support learning at anytime anywhere".

- Creation of European Strategic Framework for Computing Education and Training 2020 (ESFCET 2020)
- Preparing a European Evaluation Framework in Computing Education and Training 2020 (EEFCET 2020)
- Finding out and writing down set of recommendations for future Digital curricula in Computing Education and Training 2020
- Inventing new didactical theories and learning models for

using social media in education
- Six conferences with co-event workshops in the field of computing (of which 2 in 2015)
- Publications of the results in journals, newspapers, magazines, brochures and web sites (one for UL in 2015 with best paper award in e-learning 2015 conference)
- Internal and external evaluation reports

5.3 EC - FP7 Projects

EU China Fire

Acronym:	ECIAO
PI:	Thomas Engel
Funding:	EC - FP7
Budget:	588,947 €
Duration:	Oct. 1, 2013 – Sept. 30, 2015
Members:	• Thomas Engel (Principal Investigator) • Latif Ladid (Collaborator)
Area:	Communicative Systems
Partners:	• BII Group Holdings • China Academy of Telecommunication Research of Ministry of Information Industry • Easy Global Market • Fujian Ruijie Networks • Martel Consulting • Sigma Orionis • University of Luxembourg
Description:	In 2010 an EU-China expert group was established. The main area studied by this group was the “Internet of the Future”, the “Internet of Things” and also the protocols to be defined and deployed. Particular attention was dedicated to IPv6 deployment as difficulties have been identified, both in Europe and in China. Societal aspects and cooperation in research were also addressed. The expert group met twice in July and September 2010 and had regular exchanges which led to recommendations in important areas such as future internet including FIRE and IPv6. The ECIAO project partners were all partners of the EU-China Future Internet, IPv6 and IoT (F3I) expert group and were very honoured to see that the objectives of the call for the part of the EU-China cooperation are addressing exactly the recom-

mendations of the expert group. The ECIAO project is therefore the seamless response to the current call as the continuation and implementation of the EU-China F3I expert group work carried out in 2010 and implementing the F3I expert group recommendations as consolidated by open workshops and roundtables (September 2010) and discussed at the EU-China regular policy dialogues with MIIT and MoST in 2010 and early 2011. The ECIAO experts, who made the studies and proposed these recommendations accepted for the EU-China policy dialogues, are very pleased and highly motivated to develop this project to implement the recommendations in interoperability and standards, in strengthening collaboration in FIRE research between EU and China as well as on best practices and pilots for IPv6 deployment.

Results: Project outcomes:

- 9 Articles on EU-China FI cooperation top priorities - IoT, NFV, an IPv6 routing scheme for a performant IoT – among other very interesting issues.
- Improvement of Interoperability between EU and China - The EU-China SDN Interoperability Testing event, co-organised by the European Advanced Networking Test Center (EANTC) and the EU-China FIRE project, was held in Berlin and Beijing on February 2 - 6, 2015. This event was hosted by EANTC and Beijing University of Post and Telecommunications (BUPT) in two different locations.
- Successful EU-China IPv6 pilot - The EU-China FIRE IPv6 IoT common pilot comprised four partner sites in Beijing (BII, BUPT) and Paris (Mandat International and France Telecom/Orange) participating in the joint pilot.
- Increased Awareness on Testbed Federation Techniques - The EU-China FIRE project has contributed to increased awareness on testbed federation techniques, thus preparing the ground for worldwide federation between GENI (US), Fed4FIRE (EU) and CENI (China). The EU-China Future Internet Testbed Federation Workshop organised by the consortium in Beijing on January 13-15, 2015, notably provided a 2-day training on how to use worldwide federation techniques, and a 1-day Workshop drawing more than 40 attendees from the Chinese and European Future Internet testbed research community. About 8 Chinese testbeds learned and discussed how to join the worldwide federation as promoted by Fed4FIRE.
- Promotion of important Standards for AFI - Through the organisation of an open Workshop and two Webinars, the EU-China FIRE project has supported the promotion of important standards and cooperation in standardisation in Autonomic Future Internet (AFI), facilitating dialogue between ETSI NTECH and CCSA (China Communication Standardisation Institute).

- The creation of an ETSI industry specification group - The EU-China FIRE consortium set up the ETSI “IPv6 integration” Industry Specification Group (IP6 ISG), a new pre-standardisation working group to focus on investigation and study of requirements and use cases identifying thereby what and where pre-standardisation consensus and harmonisation could be reached. The IP6 ISG has the ambition to define some best practices, garner support and create awareness of the impact of IPv6 on critical infrastructure in the first round and then on hot topics such as Cloud Computing, IoT, SDN/NFV and 5G, which are making abstraction of IPv6.
- Important contribution to specifications - Project report on China contribution to Fed4FIRE specifications has been released. This project deliverable introduces CENI (China Environment for Network Innovations) and IIU (Internet Innovation Union), two key projects in China related to the concept of federation of testbeds, and considers the extent to which those two initiatives, currently attempting to federate with EU testbeds, can contribute to the Fed4FIRE specifications and foster international collaboration.
- The launch of the IPv6 education programme - The EU-China FIRE project worked on stimulating and promoting the IPv6 Education Program in both China and Europe – where only a few training centers offer dedicated IPv6 trainings – and introducing European experience and best practices into China. Launched in 2010 by the IPv6 Forum, the worldwide IPv6 Education Program aims at encouraging and accelerating the education on IPv6 in Europe and beyond, and promoting thereby swifter adoption of IPv6 in the education curriculum and programs of the universities, research institutes, vendors and training specialists. Since 2010, many IPv6 experts and laboratories received this logo certification, and the Program has been adopted by Cisco worldwide for its own v6 Education program.
- Two eBooks on IPv6 best practices - Written by core experts in the field offering deployment recommendations (1st eBook) and providing an IPv6 Roadmap exploring the transition process (2nd eBook).

Emergency responder data interoperability network

http://www.redirnet.eu/

Acronym: ReDIRNET

Reference: I2R-NET-PEU-14RNET

PI: Thomas Engel

Funding: EC - FP7

Budget: 4,311,000 €

Duration: March 1, 2014 – Aug. 30, 2016

Members:
- Thomas Engel (Principal Investigator)
- Aurel Machalek (Researcher)
- Stefanie Östlund (Project Coordinator)

Area: Communicative Systems

Partners:
- Ardaco
- British Association of Public Safety Communication Officers
- ITTI Sp. z o.o.
- Ministry of Interior of the Slovak Republic
- Ministère d'Etat
- NEXTEL S.A.
- Nadony bezpecnostny urad
- Pramacom Prague spol. s r.o.
- World Consult

Description: Over the past 5 years the majority of the REDIRNET consortia have participated in Projects SECRICOM and FREESIC; this has involved partners engaging significantly with a wide range of public safety officers across the EU. A benefit of this engagement has been the recognition that in addition to agency interoperability of communications a pressing need exists for agency interoperability of additional IT systems such as databases, sensor systems and cameras. REDIRNET provides a framework for addressing this need with detailed mapping of user preferences and related legal requirements using innovative technologies.

The consortium is aware that frequently it is non-technical issues that hinder agency interoperability regardless of the quality of technical solutions. Consequently user engagement across a range of agencies EU-wide will be ongoing throughout the duration of REDIRNET. This will lead to the first of two elements of the REDIRNET framework - a quality repository of user identified interoperability issues and proposals for their resolution.

The second element of REDIRNET will be technology. REDIRNET will provide a decentralized framework for interoperability for first responders' systems based on a public meta-data gateway controlled by the agencies themselves via a REDIRNET socio-professional web. Agencies will be able link up to partner agencies of their choice and operational need; they will also be able to manage the scope of such interoperability. To help set up these link-up arrangements REDIRNET will

be enhanced with semantic web methods in accordance with the vocabulary and processes of the user community. Interoperating agencies will need only to develop one gateway (to REDIRNET) leading to a cost effective solution; agent technologies will also be developed to facilitate the integration of user systems into REDIRNET.

Aspects of REDIRNET will address not only current but future challenges. Published project results being timely for 2016 development.

Results: In 2015 the work on Emergency Responder Data Interoperability Network (ReDIRNET) was mainly focused on implementation, integration, validation and verification of project findings from first half of project and, in parallel, discussion undertaken with relevant public authorities in different EU member states were used to design procedures and guidelines. REDIRNET has achieved its intended objectives bringing a contribution to the state-of-the-art particularly increasing general understanding of interoperability issues and needs and developing widely applicable conceptual, methodological and procedural guides, recommendations and technology standards aimed at facilitating interconnection of public safety organizations' communication systems and information exchange.

University of Luxembourg (UL) as dissemination leader were presented the REDIRNET results at several conferences in 2015 and the consortium has also developed effective cooperation with other four EU-funded research projects facing similar topics as REDIRNET. In the field of standartisation UL contribute in to the standartisation work under the frame of ETSI - European Telecommunications Standards Institute.

Technology-supported Risk Estimation by Predictive Assessment of Socio-technical Security

http://www.trespass-project.eu/

Acronym: TREsPASS

Reference: FP7 Grant Agreement No. 318003

PI: Sjouke Mauw

Funding: EC - FP7

Budget: 13,568,381 €

Duration: Nov. 1, 2012 – Oct. 31, 2016

Members:
- Sjouke Mauw (Principal Investigator)
- Olga Gadyatskaya (Researcher)
- Rolando Trujillo Rasua (Researcher)
- Gabriele Lenzini (Collaborator)

Partners:
- Aalborg University
- BiZZdesign
- Consult Hyperion
- Cybernetica
- Deloitte Netherlands
- GMV SGI
- GMVIS SKYSOFT
- Goethe-Universität
- Hamburg University of Technology
- IBM Switzerland
- LUST
- Royal Holloway University London
- Technical Unversity of Denmark
- University of Delft
- University of Twente
- itrust Luxembourg

Description: Information security threats to organizations have changed completely over the last decade, due to the complexity and dynamic nature of infrastructures and attacks. Successful attacks cost society billions a year, impacting vital services and the economy. Examples include StuxNet, using infected USB sticks to sabotage nuclear plants, and the DigiNotar attack, using fake certificates to spy on website traffic. New attacks cleverly exploit multiple organizational vulnerabilities, involving physical security and human behavior. Defenders need to make rapid decisions regarding which attacks to block, as both infrastructure and attacker knowledge are constantly evolving. Current risk management methods provide descriptive tools for assessing threats by systematic brainstorming. In today's dynamic attack landscape, however, this process is too slow and exceeds the limits of human imaginative capability. Emerging security risks demand an extension of established methods with an analytical approach to predict, prioritize, and prevent complex attacks. The TREsPASS project develops quantitative and organization- specific means to achieve this in complex socio-technical environments. The iterative, tool-supported framework:

- Represents the structure of complex organizations as socio-technical security models, integrating social and technical viewpoints;
- Predicts socio-technical attacks, prioritizes them based on their risk, and assesses the aggregated effect of preventive measures;
- Presents results to enable quick understanding and updat-

ing of the current security posture.

By integrating European expertise on socio-technical security into a widely applicable and standardized framework, TREsPASS will reduce security incidents in Europe, and allow organizations and their customers to make informed decisions about security investments. This increased resilience of European businesses both large and small is vital to safeguarding the social and economic prospects of Europe. All public information about the project can be found at http://www.trespass-project.eu/. TREsPASS is executed jointly by members of SnT and CSC.

Results:
- Publication of the paper entitled ”Security Analysis of Socio-Technical Systems”
- Publication of the paper entitled ”Attack trees with sequential conjunction”

5.4 European Defence Agency - EDA Projects

Aid to SItuation Management based on MUtlmodal, MultiUAVs, Multi-level acquisition Techniques

Acronym: ASIMUT

Reference: R-AGR-0548-10-Z

PI: Pascal Bouvry

Funding: European Defence Agency - EDA

Budget: 640,000 €

Duration: March 5, 2015 – March 4, 2017

Members:
- Pascal Bouvry (Principal Investigator)
- Grégoire Danoy (Researcher)

Area: Intelligent and Adaptive Systems

Partners:
- FLY-N-SENSE
- FRAUNHOFER IOSB
- THALES SYSTEMES AEROPORTES SAS
- Université de Bordeaux I

Description: The ASIMUT Project aims at developing innovating algorithms based on learning techniques dedicated to fusion of data provided by airborne sensors embedded in a swarm of UAVs so as to improve the quality and significance of the pieces of information provided to an operator through Detection and Identification processes.

Results: The kick-off meeting of the ASIMUT project took place on March 6 in the European Defense Agency premises in Brussels.

The first 10 months of the project have focused on the:

- Operational Analysis and Use Cases;
- Functional Analysis of the System;
- Definition of hte software interfaces;
- Survey of relevant results of modern artificial intelligence, advanced statistical and machine learning and reasoning techniques with regard to the generation of high level information by data fusion.

5.5 External organisation funding Projects

Study and Optimisation of Inter and Intra-Vehicular Communications through Bluetooth Low Energy

http://www.vehicularlab.uni.lu/projects/enser/

Acronym: BluVeC

PI: Thomas Engel

Funding: External organisation funding

Budget: not given

Duration: April 1, 2013 – April 1, 2017

Members:
- Thomas Engel (Principal Investigator)
- Walter Bronzi (Doctoral Candidate)
- Raphaël Frank (Scientific Contact)

Area: Communicative Systems

Partner: Telindus

Description: Bluetooth Low Energy (BLE) is quickly and steadily gaining importance for a wide range of applications.

In this research we investigate the potential of BLE for Inter and Intra-Vehicular Communications (IVC). This work is motivated by the fact that the deployment of specifically designed IVC technologies such as Dedicated Short Range Communications (DSRC) based on IEEE 802.11p, is taking longer than initially expected.

It is our belief that the ubiquity of BLE enabled mobile devices would allow a fast deployment of new Intelligent Transporta-

tion Systems (ITS) in a near future. This is especially true as more and more car manufacturers provide interfaces to tightly integrate mobile devices within new vehicles (e.g. Apple CarPlay, Android Auto) and that by 2018, 90 percent of mobile devices are expected to support the low energy standard.

BLE advantageous low energy requirements allow services to run in the background on battery powered mobile devices without limiting the usage of other applications.

Although this technology has originally been designed for short-range single hop communications, we plan on optimizing its use in a vehicular context with possible deployment alongside other technologies (DSRC/5G).

Results: My work during 2015 focused on transitioning from an active usage of Bluetooth Low Energy for vehicular communications to a passive approach aimed at using Bluetooth traces to profile different driving characteristics such as environment or/and traffic. The scope of this research was also to find possible use cases for this technology such as vehicular communications with VRUs (Vulnerable Road Users - Pedestrians, Bicycles, etc). Moreover I conducted towards the end of the year multiple internal (within the VehicularLab) data collection campaigns to validate this research direction with an initial statistical analysis. Further implementation for a public data collection campaign was ongoing at this point in preparation for a mid 2016 release.

Automating Cyber Defense Responses: Games on Attack-Defense Trees

Acronym: Games on ADTs

PI: Sjouke Mauw

Funding: External organisation funding

Budget: 75,000 €

Duration: Jan. 1, 2015 – June 30, 2015

Members:
- Sjouke Mauw (Principal Investigator)
- Ravi Jhawar (Collaborator)

Description: Attack Defence Trees (ADTs) are a graphical notation for describing attacks and defences on cyber infrastructures. They are intuitive and easy to understand, but expressive enough for complex cyber security problems; ADTs are ideal for capturing situational awareness information about on-going attacks and defence options, and for enabling human interven-

tion. Currently, ADTs do not support automated response generation.

In this project, we will develop game-theoretic tools to calculate responses to on-going cyber incidents, as described by ADTs. Game theory is especially suitable because it inherently captures the competitive nature of cyber incidents; variable risk appetite is naturally catered for, since the goals of attackers and defenders can be easily adjusted in the game. We also expect that current ADT formats will need enhancement to meet the complex requirements of this call. The proposed work is joint with the SaToSS group and Noumena Research Ventures, UK. This project will build upon the expertise of ADTrees, which was gained within the ADT2P project.

Partners: Noumena Research, UK

Results: The project started in January 2015

Huawei Security Magazine

Acronym: Huawei

PI: Sjouke Mauw

Funding: External organisation funding

Budget: 56,295 €

Duration: April 1, 2015 – March 30, 2016

Members:
- Sjouke Mauw (Principal Investigator)
- Olga Gadyatskaya (Collaborator)
- Ravi Jhawar (Collaborator)
- Jun Pang (Collaborator)

Area: Information Security

Description: This project aims for establishment of a joint bimonthly magazine of Huawei and the University of Luxembourg. The goal of this magazine is to serve as a comprehensive reference guide which will not only allow Huawei to kick-start its security research but also design both short and long term security research strategies. To achieve this goal, the magazine will provide a succinct review of the on-going academic and industrial research, and identify the latest technological advancements and provide useful insights on their bene ts and potential future impact on ICT security. The review of the state-of-the-art and analysis of promising technological trends will be performed on the topics that might be of interest to Huawei.

Partners: Huawei Technologies Co. Ltd., China

Results: The project started in January 2015.

A Compositional Approach of Building Security Verified System

Acronym: Securify

PI:

Funding: External organisation funding

Budget: not given

Duration: Jan. 1, 2015 – Jan. 1, 2020

Member: Sjouke Mauw (Collaborator)

Area: Information Security

Description: More and more we embrace the convenience and effectiveness of the advancement of IT and the Internet in our business and personal lives. With this convenience, we have been also subjected to new dangers: cyber-attacks. Cyber-attack detection, defense and recovery are important topics in cybersecurity, but the ultimate goal of cybersecurity is to build attack-free systems. Security verification and building attack-free systems are very challenging tasks in view of the size and the complexity of the systems. This is mainly because a well-developed system consists of several layers in its execution stack: hardware layer, OS/micro kernel layer, library layer and program layer. Attacks in any of the layers will lead to security breach of the system.

In this proposal, we aim to develop an approach that would allow us to build secure and verifiable (KT: systems ground-up, which has never been done before. First, we plan to develop an execution stack from hardware layer (LEON4 processor), OS layer (XtratuM hypervisor) to library layer (security libraries), named Securify, where each layer is formally proved to implement the specification and only the specification (to prevent the attacks like backdoor) and the system is verified to be free from vulnerabilities (to prevent advanced persistent threats (APT) and 0-Day attacks). Secondly, we will look into software security verification and secure software development. Particularly, we plan to establish a formal framework based on Securify and develop an automatic security reasoning tool so that developers can build applications on top of Securify, use third-party untrusted components and still be able to reason about the security of the overall system.

This project aims at a complete coverage of the security at each level of the execution stack. The deliverables include theoretical results, individual security analysis tool for each layer,

and most importantly a completely verified execution stack Securify, which provides a ready platform for our collaborators to develop secure systems. In this project, we are going to work close with ST Electronics (Info-Security) for security device development, Wincor Nixdorf Singapore to develop secure thin client computing architecture for ATM and POS Terminals, Deloitte and Clault to build security systems. We will continue work with Singapore Defence (DSTA and DSO) to provide R&D for secure system development. Doubtlessly, Securify will be the world first verified execution stack; and we have a vision to commercialize the Securify and the tool chain with the help of NTU Venture.

Partners: NTU, NUS, ETH Zurich, Oxford University, etc.

Results: The project kicked off in January 2015.

5.6 FNR - AFR PhD Projects

Model Translation and Model Visualisation

PI: Thomas Engel

Funding: FNR - AFR PhD

Budget: 111,000 €

Duration: Jan. 15, 2012 – Jan. 14, 2016

Members:
- Thomas Engel (Principal Investigator)
- Susann Gottmann (Doctoral Candidate)
- Raimondas Sasnauskas (Scientific Contact)

Area: Communicative Systems

Partner: SES

Description: Model transformations define how to transform a model into another model. Model transformation is executed using transformation rules. A transformation rule consists of the following parts: A left-hand-side (LHS) which defines a pattern, which shall be found in a model and a right-hand side (RHS) which defines the target pattern. During rule application, it is checked if the LHS of the rule can be found in the model. Then, this pattern is replaced by the pattern of the RHS in the model, i.e., the model is transformed according to the specification of the transformation rule. Model transformations can be executed either unidirectional, i.e., from a model to another model, or bidirectional, which includes also the backward direction. Model synchronisations describe a bidirectional model transformation approach. In this case, par-

ticular problems arise with regard to concurrency.

In this thesis, we applied formal concepts on model transformations on an industrial prototype case study with our partner company SES in the field of generating a visual representation (which we call SPELL-Flow) of satellite control procedures written in the language SPELL. The source code of the satellite control procedures and also the concrete visual representation are called concrete syntax. We also discovered new theoretical research problems and solved them formally.

Results: The results and outcomes of the thesis are in detail:

We introduced general concepts for the translation of concrete syntax of language L1 to concrete syntax of language L2 (unidirectional) and also vice versa (bidirectional). We have shown that both concepts are applicable in practice by means of a prototype case study with our industrial partner SES.

We developed an extension of the theoretical framework in the domain of concurrent model synchronisations. In the past, concurrent model synchronisations was based on a deterministic set of model transformation rules. We extended this framework, so that is it possible to treat a non-deterministic set of transformation rules. In detail, we extended the concurrent model synchronisation framework by filter NACs. So, we reduced the backtracking steps for conflicting rule applications, that arise by a non-deterministic set of rules, and therefore improved the efficiency of the concurrent model synchronisation framework.

We developed our new solution for answering the question: ”If a model update in one view is performed, then how is it possible to consistently propagate this model update to all other views and also to the other domain?” We introduced our derived propagation framework which is able to propagate a model update in one domain to the other domain, and also to other elements in the same domain which repeat themselves in the same domain or which are strongly interweaved with elements that are modified by the domain model update and therefore need to be updated, too. In the thesis, we use the terms ”views” or ”layers” to describe depending elements in the same domain. In the framework of the industrial case study we developed a prototype of an automated translation of satellite procedures written in SPELL into their visual representations, called SPELL-Flow. The applicability of the backward direction is shown in theory, but not applied in practice. We discussed the steps which need to be done in order to apply the backward direction in practice.

Refactoring and Semantical Correctness

PI:	Thomas Engel
Funding:	FNR - AFR PhD
Budget:	111,000 €
Duration:	Jan. 15, 2012 – Jan. 14, 2016
Members:	• Thomas Engel (Principal Investigator) • Stefanie Östlund (Project Coordinator) • Nico Nachtigall (Doctoral Candidate) • Raimondas Sasnauskas (Scientific Contact)
Area:	Communicative Systems
Partner:	SES
Description:	None
Results:	The results are focused in the field of model-driven software and systems engineering, more concretely, in the fields of model transformations and synchronisations, where visual models are respresented by graphs and transformed by applying graph transformations. Prominent graph-based visual models are UML diagrams, relational database models, Petri Nets and transition systems (state charts) - A relevant model transformation in software engineering is the object-relational mapping, i.e., the transformation from UML class diagrams in the source domain to relational database models in the target domain. A graph is transformed by applying transformation rules. Each rule has a left-hand side (LHS) and a right-hand side (RHS). When applying a rule to a graph G, the LHS graph pattern in G is replaced by RHS. A set of rules together with a start graph is called a graph grammar and its language is given by all graphs that can be created from the start graph by applying the rules successively. Apart from graph grammars, the structure of graphs may also be restricted by graph constraints of the form premise->conclusion with the following semantics: A graph G satisfies a constraint, if there exists (for all) occurences of the premise in G there does not (does also) exist the conclusion. Given a set of constraints, its language is given by all graphs that satisfy the constraints. The core results if this thesis are: (1) Proving the undecidability of the language inclusion problem between languages of constraints and graph grammars. Thus, there does not exist a computable solution that can decide for all cases of graph constraints and graph grammars, if all graphs that satisfy the given set of graph constraints can also be created via the given graph grammar. (2) This led to the development of an under-approximation approach for verifying the language inclusion in general. (3) Extension of the approach

of result (2) to verify the domain completeness and partial domain completeness of model transformations and synchronisations. A model transformation is domain complete, if all models that satisfy the graph constraints of the source domain can be transformed to the target domain. A model transformation is partial domain complete, if for a given subset of the source-domain, all models that satisfy the graph constraints of the subset can be transformed to the target domain. Analogously, the completeness of model synchronisations comprises the "full" propagation of model updates from the source to the target domain. (4) Extension of the results of (3) for verifying the domain completeness of software transformations and synchronisations. The extension allows to verify if all programs (source code) over a given context-free grammar (or their updates) can be transformed (or propagated) to the target language. This involves the translation of programs between different programming languages but also the transformation of source code to visual models like UML class diagrams, etc.. (5) Informally bot not technically defined nor proven, it is discussed how the previous results can be used to verify the completeness of static and operational semantics that are given by sets of transformation rules over graphs.

Stream Mining for Predictive Authentication Under Adversarial Influence

PI:	Radu State
Funding:	FNR - AFR PhD
Budget:	138,000 €
Duration:	Nov. 11, 2014 – Nov. 14, 2017
Members:	• Radu State (Principal Investigator) • Stefanie Östlund (Project Coordinator) • Christian Hammerschmidt (Doctoral Candidate) • Thomas Engel (Scientific Contact)
Area:	Communicative Systems
Partner:	neXus
Description:	None
Results:	The PhD candidate's work during the first year centered around addressing the specific requirements from the industrial partner neXus and the establishment of a collaboration with Prof. Sicco Verwer from Technical University Delft. The AFR-PPP project itself relates to predictive authentication under adversarial influence, where user interactions are observed and

leveraged using abstractions of the world. This is used to establish a framework allowing to permanently authenticate users and authorize their actions. The candidate proposed the use of automation models, which can be learned from data. These models can include timing constraints and output probabilities. The main research question addressed the finding of the smallest automation that is consistent with the data.

After designing and implementing an interactive mock-up prototype into the neXus Hybrid Access Gateway using the partner's developer API, the project itself was showcased during the neXus Developer Day in Stockholm and SNT's Partnership Day. Log data obtained from an operational neXus Hybrid Access Gateway was anonymized and given to the candidate for further requirement analysis.

After identifying additional requirements needed to enable automaton learning algorithms to deal with mixed data from sensors and IT production systems, the PhD candidate instantiated the algorithms for two specific tasks: The task of numeric regression, and the task of handling higher dimensional data. Each task required an extension of the current state-of-the-art algorithms to deal with a specific shortcoming of the state-of-the-art algorithms.

New Approaches to Parameter Estimation of Gene Regulatory Networks

Acronym:	AFR: NAPEGRN
PI:	
Funding:	FNR - AFR PhD
Budget:	not given
Duration:	March 1, 2014 – Jan. 14, 2017
Members:	• Qixia Yuan (Doctoral Candidate) • Sjouke Mauw (Scientific Contact) • Jun Pang (Scientific Contact)
Area:	Information Security
Description:	Systems biology is a new, emerging and rapidly developing, multidisciplinary research field. The topics associated with systems biology attract interest of researchers having their background in a wide range of field of expertise, e.g., biology, chemistry, computer science, mathematics, physics or engineering. Systems biology aims to study biological systems from a holistic perspective, with the goal to provide a com-

prehensive, system-level understanding of cellular behaviour. The research in this field involves identification, modelling and analysis of biochemical networks (e.g., metabolic pathways, regulatory networks or signal transduction networks), in close linkage to experiments with the focus on understanding the system's structure and dynamics. Such comprehensive approach enables the capturing of complex properties of a system such as robustness, emergence or adaptation, which are ubiquitous features of biological systems.

Computer science plays a prominent role in the field of systems biology. One of the main reasons is that the key concepts in systems biology, such as component, network, robustness, efficiency, regulation, control, signalling, synchronisation, parallelism, etc., have been studied for a long time in computer science (albeit from different perspectives). A key contribution brought to systems biology by computer science is the formal means for manipulation, analysis, and reasoning about system-level concepts and structures. For example, formal system specifications, control design, mathematical modelling belong to the mainstream techniques utilised in systems biology. Over the last decade concepts and approaches from computer science, and software engineering in particular, have started to penetrate the field of systems biology in an increasing pace. In this project, we focus on the application of model-checking, which is a mathematically based technique for the specification, development and verification of computer systems, to the analysis of biological systems. More specifically, our goal in this project is to develop and apply model-checking algorithms and tools which are tailored for the modelling and analysis of biological systems.

Research context: this is a research project on applying formal methods.

Coevolutionary HybRid Bi-level Optimization

Acronym:	CARBON
Reference:	I2R-DIR-PFN-11AFRT
PI:	Pascal Bouvry
Funding:	FNR - AFR PhD
Budget:	not given
Duration:	Jan. 3, 2015 – Jan. 3, 2018
Members:	• Pascal Bouvry (Principal Investigator) • Grégoire Danoy (Collaborator)

- Emmanuel Kieffer (Doctoral Candidate)

Area: Intelligent and Adaptive Systems

Description: Multi-level problems are problems involving several different decision makers. In particular, bi-level problems engage two types of decision makers "playing" iteratively. The first decision maker is referred to as the leader while the second is the follower. Bi-level programs found their root in Game theory (Stakelberg equilibrium) and have a wide range of applications. They have been proved NP-hard even for convex leader and follower problems. Convexity gave us resolution tools in the single-level case but now we have to face this problem without this set of tools. When convexity cannot be assumed, metaheuristics are employed. Coevolutionary algorithms are well adapted to the structure of bi-level problems. They are a special kind of evolutionary metaheuristics designed to use collaborative or competitive metatheurisrtics working in parallel to find the optimal solution. We propose a novel approach which consists of hybridizing coevolutionary algorithms with exact approaches to take advantage of the research results made in exact decomposition techniques. According to these new hybrid and coevolutionary algorithms, we want to tackle the Cloud Pricing Problem. The latter is nowadays a real need for Cloud providers (and brokers) where optimal prices could be deduced by applying bi-level models.

The research will thus focus on:

- The development of a set of hybrid and coevolutionary bi-level algorithms
- The Cloud Pricing problem will be modeled as a bi-level problem (Cloud provider – customer) and solved by using the hybrid and coevolutive set mentioned before.

Symbolic verication of distance-bounding and multiparty authentication protocols

Acronym: DBMP

PI: Sjouke Mauw

Funding: FNR - AFR PhD

Budget: 119,943 €

Duration: June 1, 2015 – May 31, 2018

Members:
- Sjouke Mauw (Principal Investigator)
- Rolando Trujillo Rasua (Collaborator)
- Jorge Luis Toro Pozo (Doctoral Candidate)

Area: Information Security

Description: Formal methods are the most reliable approach to exhaustively verify the security of cryptographic protocols. As new applications arise, new security goals and protocols may be required and ultimately, new formal approaches aimed at verifying those protocols ought to be proposed. With the boom of wireless technologies, distance bounding protocols have gained in popularity as a countermeasure against different types of distance-based attacks, such as mafia fraud, distance fraud, terrorist fraud, and distance hijacking. That is why recent efforts have been made on the development of formal approaches for the security analysis of distance bounding protocols. All these approaches have in common that distance is modeled by introducing either timestamps or a global clock into the model. We claim that most (or maybe all) distance-based attacks proposed up-to-date can be modeled in a symbolic partially-ordered approach, that is to say, in a model that does not explicitly introduce time or location in absolute terms. In this project we will extend the security model and operational semantics of the protocol verification tool Scyther in order to capture different types of distance-based attacks. Differently to previous models, we plan to define the notion of proximity as an ordering predicate on the trace of messages during a protocol session. We will thus study the relation between classical security properties, e.g., aliveness and agreement, and distance-based attacks. The extended model will be used for the formal analysis of both distance bounding and multiparty authentication protocols. Finally, we will design and implement model-checking algorithms so as to provide the Scyther tool with the ability to verify distance-based attacks.

Results: Publication of a scientific article at Euro S&P 2016 title ”A class of precomputation-based distance-bounding protocols”

Dynamic MixVoip

Acronym: DYMO

Reference: 4105139

PI: Pascal Bouvry

Funding: FNR - AFR PhD

Budget: not given

Duration: Nov. 1, 2012 – Oct. 31, 2015

Members:
- Pascal Bouvry (Principal Investigator)

- Steffen Rothkugel (Collaborator)
- Ana-Maria Simionovici (Doctoral Candidate)

Area: Intelligent and Adaptive Systems

Partner: MixVoIP

Description: The aims and context of this research project are built on a collaboration between the Computer Science and Communications (CSC) Research Unit, University of Luxembourg, and MixVoIP, a Luxembourg based company specialized in VoIP services. The solutions currently deployed by MixVoIP, while executed inside clouds, are monolithic and not natively designed for such environments. As such, the nature of the operations carried by MixVoIP is deeply static and does not allow coping with the highly dynamic evolution of requests, load or other stochastic events. Therefore, in an effort of addressing those problems, several axes of research will be investigated, including dynamic optimization based on incoming load analysis and prediction, resource allocation, load balancing or energy-efficient optimization and management. The study will hence investigate and propose novel solutions that effectively combine evolutionary computing algorithms, exact methods, learning and anticipation techniques (expert systems, neural networks and auto-regressive models) as well as resource allocation and load balancing methods. All proposed approaches will be first tested on synthetic data, benchmarks designed out of MixVoIP logs for the cloud-based environment currently in use, and last, inside the real-life actual platform. Expected outcomes and implications consider a significant extension of he state of the art (with respect to dynamic, predictive driven optimization) and our knowledge on how dynamic systems can be modeled and dealt with in the presence of high magnitude stochastic factors. At a practical level, as a direct application of those paradigms, it is expected to attain an improvement in voice quality and energy efficiency, with a direct connection to infrastructure management costs and performance.

Games and Information Algebras in Analysis of Voting Systems

Acronym: GAIVS

PI:

Funding: FNR - AFR PhD

Budget: not given

Duration: Nov. 1, 2012 – Oct. 31, 2015

Members:
- Peter Ryan (Researcher)
- Masoud Tabatabaei (Doctoral Candidate)

Area: Information Security

Description: It was recognised early on in the history of voting that ballot privacy is an essential property of voting systems to counter threats of coercion or vote buying. More recently, cryptographers and security experts have been looking at using cryptographic mechanisms to provide voter-verifiability, i.e. the ability for voters to confirm that their votes are correctly registered and counted. However if voter-verifiability is not implemented carefully it can introduce new threats to ballot secrecy. This lead to the introduction of related security properties, namely ballot privacy, receipt-freeness and coercion-resistance.

Application of game theory and game logics to the analysis and design of security protocols and to the definition of novel security properties is a new and promising approach. In this project, we aim at combining the ideas from algebraic information theory and game theory in order to improve analysis of security in protocols – in particular, of information-related properties of interaction, such as privacy, receipt-freeness, and coercion resistance. The main hypothesis in this project is that game-theoretic analysis can expose important features of voting protocols, and help to improve security of the protocols by focusing on feasible threats, rather than ones that are unattractive to potential attackers. We pose that algebraic information theory can provide a handle on notions like information gain and information leakage, and help to make better decisions in games where information security is at stake. Moreover, it can help to design games – voting protocols, among others – that preserve information security optimally.

Information Extraction from Legislative Texts

Acronym: IELT

PI:

Funding: FNR - AFR PhD

Budget: not given

Duration: March 1, 2012 – Feb. 28, 2015

Members:
- Leon van der Torre (Researcher)
- Llio Humphreys (Doctoral Candidate)

Area: Intelligent and Adaptive Systems

Partner: Università di Torino

Description: With the growth of the internet, laws can now be easily accessed by most citizens, but with normative production increasing at European, national and regional levels, citizens and organisations need more advanced tools to understand the law within their domain of interest. Legal informatics is a growing field of research. Legislative XML, legal ontologies and reasoning for normative systems have reached a point of maturity. However, building such resources beyond narrow applications involves a prohibitively expensive level of manual effort. Advances in natural language processing tools such as part-of-speech taggers and parsers, the growing usage of statistical algorithms for handling uncertainty and the availability of semantic resources such as WordNet and FrameNet, has resulted in robust information extraction tools. Information extraction for law is an under-researched area. Legal text, particularly legislative text, has particular features that pose significant challenges - long sentences with several clause dependencies; lists, where each item are usually not standalone sentences; and references to other articles, the content of which is not quoted within the referring article. This research investigates the transformation of legislative text into normalized sentences, representation in formal logic and information extraction for ontologies.

Logical Approaches for Analyzing Market Irrationality; computational aspects

Acronym: LAAMICOMP

Reference: I2R-DIR-AFR-090000

PI:

Funding: FNR - AFR PhD

Budget: 117,840 €

Duration: April 1, 2011 – March 31, 2015

Members:
- Leon van der Torre (Researcher)
- Mikolaj Jan Podlaszewski (Doctoral Candidate)

Area: Intelligent and Adaptive Systems

Partner: Luxembourg School of Finance

Description: The proposed PhD project is to be carried out in close cooperation with the recently approved LAAMI (CORE) project (Logical Approaches for Analyzing Market Irrationality), which aims to apply the paradigm of agent-based computational

economics (Tesfatsion and Judd, 2006) to model complex reasoning processes in a market setting. Basically we assume a market in which the main product is information and complex analysis, on an issue that does not provide immediate feedback from the objective world. We are interested in examining under which conditions the information providers (consultants) have sufficient incentives to provide good quality analysis to their clients. The preliminary results of a prototype software simulator (Staab and Caminada, 2010) as well as other research (Mathis et al, 2009) indicate that these incentives are not always strong enough to rule out providing low quality information. If such becomes the pervasive strategy of the consultants, there are consequences regarding the informedness not only of individual information consumers (clients) but also for the system as a whole, since unfounded collective beliefs can easily lead to various forms of market imperfections. In essence, we would like to explain these market imperfections by examining how markets can become ill-informed. For this, we use the technique of agent-based simulation. The specific role of the PhD student will be to focus on implementation aspects, as well as on aspects of computability and bounded rationality of individual agents.

Urban Travel Time Estimation from Cooperative Data Gathering

Acronym:	OUTREACH
Reference:	I2R-DIR-AFR-090000
PI:	Thomas Engel
Funding:	FNR - AFR PhD
Budget:	120,000 €
Duration:	June 5, 2013 – Dec. 18, 2016
Members:	• Thomas Engel (Principal Investigator) • Stefanie Östlund (Project Coordinator) • Lara Codeca (Doctoral Candidate) • Raphaël Frank (Scientific Contact)
Area:	Communicative Systems
Partner:	UCLA (non contracting)
Description:	None
Results:	The main contribution of 2015 is the Luxembourg SUMO Traffic (LuST) Scenario. The scenario is built with information from a real mid-size city, with a typical European road topology and mobility patterns. The traffic demand is based on

real information provided by various data sources. Two different mobility traces are shared in order to provide both the static optimized mobility with the best-case scenario, and a next-best option based on dynamic rerouting. The realism provided by this general-purpose traffic scenario has been evaluated and validated using real floating car data collected in 2015. We have showed that the speed distributions from the mobility traces in the simulations are similar to the real dataset, where the major differences are due to the lack of pedestrian mobility, and not the changes to the road topology. In addition, the results show that the use of the dynamic rerouting provides an interactive scenario that behaves realistically and closely matches the precomputed optimized mobility. The LuST Scenario is already being used by the vehicular community and plans for future work are mostly driven by the needs expressed by the community itself.

Practical Lattice-Based Public-Key Cryptosystems Secure Against Quantum Computers

Acronym:	PLAyBACk
PI:	
Funding:	FNR - AFR PhD
Budget:	not given
Duration:	Feb. 1, 2013 – Jan. 31, 2016
Members:	• Peter Ryan (Collaborator) • Qiang Tang (Collaborator) • Massimo Chenal (Doctoral Candidate)
Area:	Information Security
Partner:	Technische Universität Darmstadt
Description:	Public-key cryptosystems, such as encryption and signature, are playing an ever-increasing role in our information society. For example, online banking, e-mail, and tele-communication all rely on public-key cryptosystems to ensure their security. The concept of public-key cryptosystem traces back to the Diffie-Hellman key exchange protocol from 1976, following which a large number of schemes have been proposed. Most of these schemes rely on either of the following two families of intractable mathematical problems. One is factorization-related problems (e.g. RSA), and the other is discrete logarithm related problems (e.g. elliptic curve cryptography, in particular pairing-based cryptosystems). In 1984, Shor showed that, given a Quantum computer, all

cryptosystems based on the above assumptions can be broken. Regardless the fact that Quantum computers are underway, cryptographers have already started exploring cryptosystems based on alternative hardness assumptions. Among all, lattice-based crypto has attracted the most attention, in particular after Gentry proposed the first fully homomorphic encryption scheme in 2009. Despite of the efforts in the past few years, we still know very little about this field today. For example, we do not know how to choose the appropriate security parameters and how to design a practical fully homomorphic encryption scheme. In this project, we aim at investigating lattice-related hardness assumptions and then designing practical lattice-based public-key cryptosystems.

Practical Searchable Encryption Design through Computation Delegation

Acronym: RAPID

PI:

Funding: FNR - AFR PhD

Budget: not given

Duration: Jan. 1, 2013 – Dec. 31, 2015

Members:
- Peter Ryan (Collaborator)
- Qiang Tang (Collaborator)
- Afonso Delerue Arriaga (Doctoral Candidate)

Area: Information Security

Description: In the cloud computing era, outsourcing data and operations to third-party service providers has become a trend. By doing so, the data owners can significantly reduce operational cost while still provide high-quality services to their customers through the third-party service providers. On the other hand, there exists a wide range of privacy risks for the data owners, as surveyed by the Cloud Computing Alliance.

How to mitigate the privacy risks has become an urgent issue and attracted attentions from not only industry but also academia. In industry, the most common measure is for data owners to sign a Service Level Agreement (SLA) with the third-party service providers. Mitigating the potential privacy risks will be made part of the SLA. Despite of its popularity, SLA does not really solve the problem. Firstly, the data storage of service providers may be compromised due to a lot of reasons. Secondly, the service providers have full access to the data. In many application scenarios, this may be undesirable

and the data owners may want to hide the data from the service providers. In academia, security researchers have investigated various types of encryption schemes, which allow the data owners to encrypt their data but still allow the service providers to operate on the encrypted data. With this approach, both utility and privacy of the outsourced data are preserved.

In this project, we are interested in searchable encryption schemes, which allow third-party service providers to search in encrypted data. Despite of the abundance of literature, there is a gap between the theory (theoretical schemes) and practice (practical requirements of application scenarios). The main objective of this project is to bridge this gap by designing new searchable encryption schemes, which provide rigorous security guarantees, support flexible search queries, and remain efficient in practical application scenarios.

Transparent Yet Private Access to Medical Data

Acronym:	TYPAMED
PI:	
Funding:	FNR - AFR PhD
Budget:	not given
Duration:	Dec. 1, 2014 – Nov. 30, 2017
Members:	• Gabriele Lenzini (Collaborator) • Peter Ryan (Collaborator) • Dayana Pierina Brustolin Spagnuelo (Doctoral Candidate)
Description:	Several pilot tests show that patients who are allowed to access their medical data commit more seriously to therapies and health programs. This finding is particularly relevant in medical research programs aiming at cross-sectional and longitudinal studies on patient cohorts (Luxembourg has recently established one of such programs to monitor the stratification of Parkinson's disease.) For the success of such programs, the commitment of patients and of patient organizations are of pivotal importance. However, letting patients accessing medical records raises many security concerns and creates tension among conflicting requirements. This research project (for a Ph.D.) has the objective to understand precisely such conflicts, and to study and design access control mechanisms that are socio-technically secure, that is secure not only at the technical level, where data management and communication protocols run, but also

at a non-technical level, where richer human protocols and behavioural factors are in place.

So, for instance, if on one hand patients' access should be controlled so that unauthorised disclosure and modifications are not allowed within the data they are entitled to access, on the other hand, patients should have control over their own data, who accesses it and for what purpose - a right that EU regulations are already trying to enforce.

The challenge comes from the fact that patients are not ICT (Information and Communication Technologies) experts. Access control mechanisms should be effective, but not hard to use or this will compromise a patient's active participation. But the same mechanisms should be transparent to let patients know what happens to their data, how secure they are, and be informed that their data are handled appropriately, reassuring them that their involvement in sensitive research programs will not cost them higher prices in terms of intrusions into their lives.

This Ph.D. project, a collaboration between SnT and LCSB, the Univ. Federal de Santa Catarina (BR), and Univ. of Porto (PT) intends to look at the socio-technical security problems concerning a secure access and use of medical data from patients.

It will study access control and data confidentiality mechanisms and implementations, with the specific perspective that those solutions should be usable by inexpert patients and should inspire an honest sense of trust. In so doing, this research goes beyond understanding the security requirements of the technical protocols that realize a secure and confidential remote access to data, requirements widely studied elsewhere. Instead, it advocates studying the human-scale ceremonies in which those protocols are integrated.

It will use both traditional expertise and knowledge in the design of secure systems and protocols, and more advanced methodologies suitable for a socio-technical analysis of security and trust.

5.7 FNR - AFR PostDoc Projects

Probabilistic reliability management and its applications in argumentation theory and tracking objects

Acronym: PRIMAT

PI: Dragan Doder

Funding: FNR - AFR PostDoc

Budget: not given

Duration: June 1, 2014 – June 1, 2016

Members:
- Dragan Doder (Principal Investigator)
- Leon van der Torre (Scientific Contact)

Areas:
- Information Security
- Intelligent and Adaptive Systems

Description: The project proposes two applications of probabilistic logic, one in the field of probabilistic argumentation, and the other in the field of probabilistic spatio-temporal reasoning. My first goal is to provide uniform logical formalization for different semantics for probabilistic argumentation frameworks in terms of probabilistic logic. The second goal is to develop a formal system in which one can interpret uncertainty of some systems for tracking moving objects. The central issue is to develop a complete axiomatic system for the appropriate spatio-temporal logic

Results: Development of proof-theoretical and model-theoretical approaches to a probabilistic logic which allows reasoning about uncertain temporal information, upper and lower probabilities, probabilistic common knowledge and independence (papers 1, 2, 4, 5)

Development of different techniques for measuring inconsistency of a knowledge base, proposing different ways of comparing knowledge bases in terms of inconsistency and for measuring distance between knowledge bases (paper 3).

Development of a modal logic for revision of temporal beliefs about actions. The main results are Katsuno-Mendelzon and the Darwiche-Pearl representation theorems and a complete axiomatization for this logic (papers 6, 7)

1. A Probabilistic Logic for Reasoning about Uncertain Temporal Information. Doder, Dragan; Ognjanovic, Zoran. In: Uncertainty in Artificial Intelligence: Proceedings of the Thirty-First Conference (2015)
2. Probabilistic logics with independence and probabilistic support. Doder, Dragan; Ognjanovic, Zoran. In: Progic symposium (2015)
3. How to Decrease and Resolve Inconsistency of a Knowledge Base? Doder, Dragan; Vesic, Srdjan. In ICAART 2015, Proceedings of the International Conference on Agents and Artificial Intelligence, Volume 2 (2015)

4. A logic with Upper and Lower Probability Operators. Savic, Nenad; Doder, Dragan; Ognjanovic, Zoran. In ISIPTA '15: Proceedings of the 9th International Symposium on Imprecise Probability: Theories and Applications (2015)

5. Probabilistic Common Knowledge Among Infinite Number of Agents. Tomovic, Sinisa; Ognjanovic, Zoran; Doder, Dragan. In Symbolic and Quantitative Approaches to Reasoning with Uncertainty, 13th European Conference, ECSQARU 2015, Compiègne, France, July 15-17, 2015. Proceedings (2015)

6. AGM Revision of Beliefs about Action and Time. Van Zee, Marc; Doder, Dragan; Dastani, Mehdi; van der Torre, Leon. In Proceedings of the International Joint Conference on Artificial Intelligence (2015)

7. Consistency Conditions for Beliefs and Intentions. Van Zee, Marc; Doder, Dragan; Dastani, Mehdi; van der Torre, Leon. In Logical Formalizations of Commonsense Reasoning, the 2015 AAAI Spring Symposium

Subjective and Objective Uncertainty in Description Logics

Acronym:	SOUL
PI:	Giovanni Casini
Funding:	FNR - AFR PostDoc
Budget:	not given
Duration:	July 1, 2015 – June 30, 2017
Member:	Giovanni Casini (Principal Investigator)
Area:	Intelligent and Adaptive Systems
Description:	Description Logics (DLs) are a major application-oriented research topic in Knowledge Representation and AI. They are used for modeling ontologies in many different domains (e-commerce, e-science, medicine, ...). Whereas in the past, research has focused on strict taxonomies, there are a number of areas where uncertainty has to be taken into account. The present proposal plans to investigate uncertainty in DLs on a very general level. Because detailed and reliable quantitative information is not always available, it is necessary to consider not only probabilistic knowledge, but also more qualitative uncertain information. It may be represented by defeasible rules interpreted

by suitable plausibility measures (possibilistic/Spohn's ranking functions), which have been investigated in nonmonotonic reasoning, but hardly applied to DLs. Particular attention will be paid to the DL-specific separation between general conditional information (TBox), and the agent's information about specific individuals (ABox). This approach becomes more challenging when dealing with uncertainty, since the objective level, presenting general shared defeasible conditional information, may conflict with the subjective level, modeling the conditional beliefs of an agent. The intermediate expressivity of DLs is an appropriate context to investigate the interaction between both levels.

The goal is to develop, analyze, and evaluate methods and implementable algorithms for attributing in a justifiable and rational way degrees of plausibility/belief to A-Box assertions about specific individuals, which amounts to complete the A-Box inductively based on defeasible/uncertain information from the T-Box.

Results:

In the first months of the project the investigation has been focused on the re-elaboration in the framework of description logics (DLs) of some main proposals for modelling qualitative uncertain reasoning, starting from well-known systems developed in the framework of propositional logic (e.g., Rational Closure and Lexicographic Closure), and newly proposed systems (Relevant Closures and Inheritance-based Closure). The work has focused on the dissemination of experimental results regarding previously developed systems ([3]), the adaptation of such systems to low-complexity DLs (at the end of 2015 the results had still to be published), the investigation (at the moment in the framework of propositional logic) of new reasoning tools, based on the already developed systems, that would be relevant in the field of Formal Ontologies ([1] and other material that was still unpublished at the end of 2015).

1. Booth R., Casini G., Meyer T., Varzinczak I. (2015), On the Entailment Problem for a Logic of Typicality, in Proceedings of the TwentyFourth International Joint Conference on Artificial Intelligence (IJCAI 2015), pp.2805-2811.

2. Ruttkamp-Bloem E., Casini G., Meyer T. (2015), A non-classical logical foundation for naturalised realism, in Arazim P.,Dančák M. (Eds.), The Logica Yearbook, College Publications, pp.249-266.

3. Casini G., Meyer T., Moodley K., Sattler U., Varzinczak I. (2015), Introducing Defeasibility into OWL Ontologies, in Proceedings of the 14th International Semantic Web Conference (ISWC 2015) - Part II, LNCS 9367, pp.409-426.

5.8 FNR - AFR Projects

Integration of distributed controllable renewable generators in the Luxembourgish electricity system including innovative micro-hydrokinetic turbines

PI:	Jürgen Sachau
Funding:	FNR - AFR
Budget:	not given
Duration:	March 1, 2013 – March 31, 2017
Members:	• Jürgen Sachau (Principal Investigator) • David Peter Benjamin Norta (Doctoral Candidate)
Area:	Communicative Systems
Partner:	RWTH Aachen University
Description:	Development of a hydrokinetic turbine prototype. Based on the oscillating hydrofoil approach a turbine will be built in Luxembourg and tested in a canal in Aachen at the RWTH Aachen University. Additionally, an energy economic analysis for the turbine prototype for Luxembourg will be done for Luxembourg for different renewable energy scenarios.
Results:	The turbine prototype was built and an energy model of Luxembourg was implemented. Additionally, computational fluid dynamics simulations with the software CFX were done to understand the forces on the foil of the turbine.

Programming Cognitive Robots

Acronym:	ProCRob
Reference:	F1R-CSC-LAB-05ILIA
PI:	
Funding:	FNR - AFR
Budget:	not given
Duration:	May 20, 2011 – May 20, 2017
Members:	• Leon van der Torre (Researcher) • Pouyan Ziafati (Doctoral Candidate)
Areas:	• Intelligent and Adaptive Systems • Software and Systems
Partner:	Utrecht University

Description: Today's service robots have emerging applications in domestic, military, health-care and entertainment domains. These applications demand ever increasing levels of intelligence and autonomy forming challenges of cognitive robotics. This is a branch of robotics that aims at studying and developing robots with reasoning capabilities needed to achieve complex goals in dynamic environments. Such robots require a processing architecture that allows them to perform high-level reasoning and deliberation about their information (i.e., beliefs and knowledge) and objectives (i.e., goals to achieve) in order to decide which actions to perform. Various agent programming languages have been proposed to support the implementation of similar cognitive architectures. However, these programming languages lack necessary supports for the management of a robot's sensory data and the execution control of its plans. The aim of this research is to address how existing agent programming languages can be extended to deal with the sensory and action components of robotic systems in a systematic and modular way. The expected result of the thesis is software libraries to extend agent programming languages such as 2APL with an interface, a sensory and an action components. The interface component facilitate the integration of these languages with robotic frameworks such as ROS. The sensory component facilitates the processing and management of heterogeneous and asynchronous sensory events and reasoning on high-level events. The action component facilitates the representation of complex plans and the coordination of parallel execution of plans. A demo application for one or more NAO robots is to be demonstrated.

Results: Ziafatia, P., Dastanib, M., Meyerb, J. J., van der Torrea, L., & Voosa, H. (2015). Retalis Language for Information Engineering in Autonomous Robot Software. IfCoLog Journal of Logics and their Applications 2 (2), 85.

ProCRob Project (Aug 2015, May 2016): funded by FNR under Proof-of-Concept scheme along with SnT and CSC, the project built the QT social robot for education and therapy of children with autism. QT is socially a very expressive robot and provides a graphical user interface that is programmable by everyone. Following the successful results of the ProCRob project, the spinoff LuxAI (www.luxai.eu) was created in 2016.

Methods for Measuring and Predicting the Security; Performance Reputation of Public Networks

Acronym: SCoPeMeter

Reference: 12R-NET-PAU-11MSRP

PI:	Thomas Engel
Funding:	FNR - AFR
Budget:	80,000 €
Duration:	March 22, 2011 – March 21, 2015
Members:	• Thomas Engel (Principal Investigator) • Fabian Lanze (Collaborator) • Andriy Panchenko (Collaborator)
Area:	Communicative Systems
Partners:	• Interdisciplinary Centre for Security, Reliability and Trust /UL • Red Dog Communications s.a.
Description:	In recent years the usage of Internet based services shifted from fixed workplaces to mobile environments. Wireless access points are available almost everywhere and users tend more and more to carry out online activities on mobile devices such as smart phones or tablets. This attracts potential attackers since most users neglect the risk of eavesdropping, data manipulation, or the possibility of an access point being controlled by a malicious entity. Besides, the performance of hotspots can differ significantly, making it difficult for users to chose an intermediary fulfilling his/her particular requirements. The goal of this project is to build a security and performance barometer system that provides long-term judgment of hotspots regarding their performance and security reputation. Information will be contributed to this system by data automatically collected and derived from a user's mobile device application and user's experiences. Several research challenges arise from this. A technique for uniquely identifying wireless devices without trusting any third party is essential to make sure that connection is established to an authentic device. Metrics for measuring performance and trustworthiness have to be defined in order to analyze quality of service and reputation of public networks. This will be done in a way that protects privacy of the clients reporting the values and, at the same time, guards from malicious clients trying to subvert the system. Finally, we will study the possibility to offer privacy-preserving location based services using the available data. In the proposal we describe the methodology how we plan to reach our research objectives and to develop a practically usable security and performance barometer for public wireless networks.
Results:	The thesis deals with the evil twin attack in 802.11 networks. It is a severe security problem that neither the industry nor the research community has found appropriate solutions for. Motivated by this threat, we develop novel fingerprinting methods. We address this challenge from two angles. In our first

approach we exploit minuscule yet observable inaccuracies in crystal-oscillator-driven computer clocks. We show that several conclusions drawn in the related research about the efficacy of this fingerprinting feature are false. We then enhance state-of-the-art approaches and for the first time provide a solution for remote physical device fingerprinting performed by typical off-the-shelf client devices that is able to mitigate the evil twin threat in practice. The second approach focuses on fingerprinting the behavioral characteristics of software tools that have been developed or can be misused to mount the attack. As we show, our fingerprinting methods, which primarily exploit unavoidable low-level characteristics, allow the reliable detection of such an attack strategy within a few seconds.

Topology and Parameter Estimation in Power Systems through Inverter Based Broadband Stimulations

Acronym:	TPEPSIBBS
PI:	Jürgen Sachau
Funding:	FNR - AFR
Budget:	not given
Duration:	Nov. 1, 2012 – June 30, 2016
Members:	• Jürgen Sachau (Principal Investigator) • Surena Neshvad (Doctoral Candidate)
Area:	Communicative Systems
Partner:	CREOS
Description:	This thesis will propose a solution several power network challenges encountered with increasing Distributed Generation (DG) penetration. The three problems that will be addressed are islanding detection, online transmission line parameter identification and system topology identification. These tasks will be performed by requesting the DGs to provide ancillary services to the network operator. A novel and intelligent method will be developed for reprogramming the DGs Pulse Width Modulator, requesting each DG to inject a uniquely coded Pseudo-Random Binary Sequence along with the fundamental.
Results:	Surena has devised a reliable and precise method for online equivalent grid impedance estimation based on Pseudo-Random-Binary-Sequences (PRBS), which has been extensively used in system identification, communication and information theory. It allows real time computation of complete spectrum of

grid impedance at the Point of Common Coupling (PCC) by injecting broad spectrum identification patterns of harmonics and inter-harmonics. The impedance spectrum thus, can be used for filter design, power quality evaluations, grid status determination and inverter tuning. In this paper, a PRBS-based active identification method is tested and implemented on an off-grid system consisting of a 3 phase inverter prototype developed in the lab and has been used to identify the grid impedance spectrum of a 3 phase purely inductive load connected at the output of the inverter. The results obtained confirm that the method estimates the grid impedance spectrum over a significant frequency range with high resolution on real time basis. The outcomes of his research have been presented at Creos Strassen in March and in November 2015 to the Creos steering committee.

Additionally, a method has been developed to aggregate the effects of the the stimuli at different locations in the distribution grid through cross correlation between the received distorted signal and the sequence. Through this, the parameters of the propagation channel can be estimated. Simulations in typical grid situations have shown that the proposed algorithm is robust to a realistic environment and would represent a promising grid monitoring and diagnostic tool.

5.9 FNR - CORE Projects

Sentiment Classification in Financial Texts

Reference:	F2R-LSF-PFN-11ESCA
PI:	
Funding:	FNR - CORE
Budget:	500,000 €
Duration:	June 1, 2012 – May 31, 2015
Member:	Dimitrios Kampas (Collaborator)
Partners:	• Dept. of Computer Science • Luxembourg School of Finance • University of Athens
Description:	The work is part of the FNR CORE project ESCAPE: ESCAPE applies Data Mining and Machine Learning methods on publicly available news sources to document in a measurable way the structure and evolution of Europe's financial policy to address the on-going threat to the Euro-zone stability. How do the im-

portant euro policy players present themselves in the pallet of the policies map? Are there subgroups with similar positions? How coherent are these groups among themselves? Are there dominant players in each group? How different are the different group positions? One expects that the euro players eventually will reach a consensus policy to stem the risk threatening the EURO. Documenting in a measurable way how the different policy positions converge over time should provide additional insights into the complex process of (financial) policy evolution. Financial policy ultimately affects capital markets but, as the recent crisis has highlighted, capital markets may force or extract policy concessions. Understanding the interplay of financial policy formulation and capital market ex-pectations, therefore, is extremely important for the effectiveness of policy responses and eventually for the stability of the financial system. ESCAPE provides statistical evidence on whether capital markets lead or react concurrently to the financial policy evolution. It is expected to shed light on the powerful role of the "invisible hand" of capital markets in extracting desired policies from politicians. The research topic that Mrs. Bersan is addressing is sentiment analysis, namely identifying subjective information in the financial news. We analyze a specific topic and assign this subjective information to a mathematical index in order to reflex its polarity orientation. The techniques used are from the research fields of machine learning, text analytics and natural language processing.

Applied Cryptography for the Internet of Things

Acronym:	ACRYPT
PI:	Alex Biryukov
Funding:	FNR - CORE
Budget:	not given
Duration:	June 30, 2013 – Dec. 31, 2016
Members:	• Alex Biryukov (Principal Investigator) • Johann Groszschädl (Researcher) • Yann Le Corre (Collaborator) • Dumitru-Daniel Dinu (Doctoral Candidate) • Léo Paul Perrin (Doctoral Candidate)
Area:	Information Security
Partner:	Fonds National de la Recherche
Description:	The project ACRYPT aims at securing the so-called Internet of

Things (IoT) by researching the design and implementation of lightweight cryptographic primitives for RFID tags, wireless sensor nodes, and other ”smart” objects.

Attack-Defence Trees: Theory Meets Practice

Acronym:	ADT2P
Reference:	C13/IS/5809105
PI:	Sjouke Mauw
Funding:	FNR - CORE
Budget:	494,000 €
Duration:	Sept. 1, 2014 – Aug. 31, 2017
Members:	• Sjouke Mauw (Principal Investigator) • Ravi Jhawar (Collaborator)
Area:	Information Security
Partners:	• Sintef • THALES Research & Technology
Description:	Threat and risk analysis are crucial steps in developing secure and usable ICT solutions. An optimal security assessment methodology should combine sound, mathematical foundations with practical and user friendly criteria, which explains their increasing popularity over the last decade. Attack–defense trees (ADTrees) augment attack trees by including defensive measures into the model. They provide the means to qualitatively and quantitatively assess security. The extended formalism allows for an improved analysis, without however requiring additional computational power. The objective of the ADT2P project is to elevate the attack–defense tree methodology to an industrially applicable security analysis framework and to integrate it with standard risk assessment tools. In order to achieve this goal, fundamental research as well as practical validation will be performed. ADTrees will be extended with additional features that are necessary to model real-life scenarios. This will include introducing the notions of actors and objects as well as defining dedicated security measures, such as risk and impact. New algorithms that can cope with large-scale models as well as methods to construct ADTrees from generic attack and defense patterns will be designed. For this, the automatic composition of models will be investigated. Finally, a new version of ADTool, a software tool supporting the ADTree formalism, will be released.

The ADT2P project will build upon the expertise of ADTrees, which was gained within the FNR CORE project ATREES (http://satoss.uni.lu/projects/atrees/). Collaboration with the industrial partners SINTEF and THALES will ensure that the proposed methodology will be highly usable and practical. By integrating the project results into existing security and risk assessment solutions, ADT2P will assist small and mid-size auditing and consulting companies in providing better and more accurate security assessment.

A Theory of Matching Sessions

Acronym:	AtoMS
PI:	Peter Ryan
Funding:	FNR - CORE
Budget:	not given
Duration:	March 1, 2015 – Feb. 28, 2019
Members:	• Peter Ryan (Principal Investigator) • Jean Lancrenon (Researcher)
Area:	Information Security
Description:	Authenticated Key Exchange protocols (AKEs) are cryptographic protocols that allow two or more parties to jointly compute a shared session key over an insecure public channel. This key can subsequently be used as input to other algorithms in order to provide various secure services for and between said parties. Ever since the advent of provable security, an enormous amount of research has been done to define ever-stronger complexity-theoretic security models to capture desirable AKE properties. However, consensus has yet to be established over which models are the most suitable, both in theory and practice. Several modelling artefacts are at the heart of this problem. First of all, provable security has not yet yielded a unified definition for what it means for parties running a protocol to have established matching sessions. Many different ad hoc avenues have been proposed to deal with this (matching conversations, pre-established or post-established sessions identities, matching functions, etc.) but they often introduce artificial subtleties that yield incompatibility results between models that seem otherwise acceptable. Secondly, a fundamental definition of internal state information is also lacking; this introduces even more difficulties in comparing models that authorize the attacker to obtain various forms of this in-

ternal state (unerased internal state revealing, session state revealing, ephemeral key revealing, etc.). Furthermore, internal state revealing seems to be widely more-or-less hard to deal with depending on the model's underlying flavor, i.e., whether it is indistinguishability-based or simulation-based.

We strongly believe that the above-mentioned discrepancies rest on something that is fundamentally unified, and with this proposal we wish to undertake the tasks of 1) discovering and studying this mathematical lowest common denominator and 2) using the outcome of this study to find some order in the vast landscape that is AKE security modelling, and uncover the core governing observed incompatibility results. Our goal is to conduct this study 1) independently of the authentication mechanism used (PKI-based, password-based, attribute-based, etc...) and 2) independently the underlying intractability assumption (group-based, lattice-based, quantum-based etc.).

Incorporating quantum key distribution to the study is particularly promising because the interface between the quantum phase and the classical phase within such protocols is highly under-investigated. Furthermore, the threat models in which quantum proofs of security are established are not clearly defined. How to solve these problems will certainly bring further insight to AKE security modelling as a whole.

Dynamics of Group Belief and Trust

Acronym:	DYNGBAT
Reference:	I2R-DIR-PFN-12DYNG
PI:	Leon van der Torre
Funding:	FNR - CORE
Budget:	198,000 €
Duration:	March 1, 2013 – May 31, 2015
Members:	• Leon van der Torre (Principal Investigator) • Tjitze Rienstra (Doctoral Candidate)
Area:	Intelligent and Adaptive Systems
Description:	Dynamics of group beliefs is an important research topic in knowledge representation and artificial intelligence. Trust management systems on the one hand aggregate individual judgments into group judgments, and on the other hand constantly update the trust and reputation over time. We develop a logical framework for dynamics of group beliefs to study the

interaction between aggregation and revision, using insights from both computational social choice and belief change. The project will establish qualitative properties of the dynamics of group beliefs and trust, and will yield new insights on belief diffusion in social networks.

Energy-Efficient Communications in Cloud Computing

http://ecocloud.gforge.uni.lu/

Acronym:	ECO-CLOUD
PI:	Dzmitry Kliazovich
Funding:	FNR - CORE
Budget:	400,000 €
Duration:	Jan. 1, 2013 – Nov. 30, 2015
Members:	• Dzmitry Kliazovich (Principal Investigator) • Pascal Bouvry (Collaborator) • Claudio Fiandrino (Doctoral Candidate)
Area:	Intelligent and Adaptive Systems
Partners:	• The University of Sydney • Tri-ICT
Description:	The ECO-CLOUD project aims to provide an integrated solution to the autonomous energy-efficient management of communication networks and processes in a cloud computing environment. Current research on cloud computing has evolved from, and is dominated by, cluster and grid computing domains where communication aspects are secondary. However, cloud computing systems and cloud applications are fundamentally different from cluster and grid computing, and communications must be considered to unveil their full potential. To address this gap, the ECO-CLOUD project will develop a framework of novel techniques and to deliver efficient solutions, in the form of prototype software, for optimisation of performance and energy-efficiency in (a) network hardware (switches, routers and links), (b) data center communication systems, and (c) communication protocols. Furthermore, ECO-CLOUD aims to develop new metrics for assessing the energy efficiency and performance of cloud computing communication systems. It will be proposed that these met-

rics be included in future standards and it is projected that it will impact the whole cloud computing industry, and guide the design of future data centers.

Another important outcome of the ECO-CLOUD project will be the release of a cloud computing simulation platform to offer fine-grained modelling of communication processes. This will be used for performance evaluation and for comparison of the techniques developed which will be further benchmarked in an operational cloud computing facility.

By aiming at energy efficiency and the performance of cloud computing communication systems, the ECO-CLOUD project will become a significant step towards bridging two major ICT research domains, namely a) communication systems and b) distributed and cloud computing.

In the Luxembourg R&D setting, the ECO-CLOUD project aims to contribute to the "green" computing research initiative, creating knowledge and practice related to communications for the benefit of the cloud computing community and future research. Furthermore, the project will provide practical solutions that can be commercialized with the support of the 15 major data centers that operate out in Luxembourg.

Automated Program Repair using Fix patterns Learned from Human-written Patches

Acronym:	FIXPATTERN
PI:	Dongsun Kim
Funding:	FNR - CORE
Budget:	499,000 €
Duration:	Dec. 1, 2015 – Nov. 30, 2018
Member:	Dongsun Kim (Principal Investigator)
Area:	Software and Systems
Description:	Patch generation is one of the important tasks in software maintenance. However, it is the least explored area while a large number of research work have been conducted for other debugging activities such as fault localization and prioritization . In practice, debugging cannot be completed without patch generation even if a fault is accurately localized or efficiently prioritized. In addition, patch generation is recognized as an essential task in software development since most contemporary software systems inevitably contain bugs that need to be fixed.

As the size and complexity of software systems get larger and higher, significantly more number of bugs are found and reported. Naturally, the corresponding cost for resolving the bugs is rapidly increasing.

To minimize time and cost spent fixing bugs, an automated program repair technique must be devised. Even if this approach may fix a certain portion of bugs, it can largely mitigate burden for debugging so that developer can focus on more creative activities. In addition, the quality of software can be improved as the number of bugs is reduced. This strongly motivates the project, FIXPATTERN, an automated technique for patch generation.

The FIXPATTERN project aims at presenting new approaches to automated program repair. First, the project devises a novel pattern-based repair technique learned from human-written patches. This technique can outperform existing techniques based on random mutation with respect to patch quality and readability. Second, this project proposes an semantic-based approach to fix pattern mining for supporting the pattern-based repair technique. Third, a bug classification method is presented by this project. The method is essential since the efficiency of the repair technique can be improved if it can figure out the type of a given bug upfront. Fourth, this project provides the result of a large empirical study on open source projects. One of the main reasons that only few practitioners adopted existing automated repair techniques is that only few evaluation results in practice are available. Thus, it is necessary to provide empirical results studied on a large set of real bugs in practice.

Indoor Navigation with Ambient Radio Signals

Acronym:	INDOORS
Reference:	I2R-NET-PFN-14INDO
PI:	Andrei Popleteev
Funding:	FNR - CORE
Budget:	381,000 €
Duration:	Jan. 1, 2015 – Dec. 31, 2017
Members:	• Andrei Popleteev (Principal Investigator) • Stefanie Östlund (Project Coordinator) • Thomas Engel (Collaborator)
Area:	Communicative Systems

Partner: Microsoft Research

Description: The aim of the project is to explore indoor positioning based on ambient radio signals, such as FM and TV broadcasts, cellular network signals. While GPS has practically solved the problem of outdoor navigation, indoor localization remains an open challenge. Existing systems require dedicated localization infrastructure and work only within instrumented buildings. Broadcasted radio signals, in contrast, are tailored for indoor reception and are widely available even in less populated areas. Pioneering works have already demonstrated feasibility of indoor localization with FM, TV and GSM signals. However, they only proved the concept and more research is required to evaluate practical benefits and limitations of indoor localization based on ambient radio signals.

The following research questions will be addressed: 1) What is the localization performance of ambient radio based systems over a long time span, in terms of accuracy, time stability and robustness to environment dynamics? 2) Which signals properties apart from signal strength can be used for localization? 3) What signal types/bands, signals features and localization methods, or their combinations, provide best performance, stability and robustness?

The project will focus on real-world experimental approach. Firstly, a multi-band radio signal acquisition and localization platform will be created, leveraging the flexibility of software-defined radio (SDR) approach. The SDR platform will be employed to systematically collect raw multi-band signal samples in multiple locations across several indoor testbeds, over the course of two years. In parallel with data collection, the project will develop relevant signal processing methods and localization algorithms; the latter will include both basic and advanced methods derived from state-of-the-art indoor localization systems. Analysis of the collected data with developed algorithms will provide insights to the research questions.

As a result, the project will provide understanding of practical bounds of ambient radio based indoor localization. Collected data will be released to scientific community, thus providing a common reference for evaluation of novel localization algorithms. All of the above will facilitate further research of this relatively young approach to indoor localization, potentially leading to cost-efficient widely available indoor localization, which will in turn boost the development of indoor location-based services.

The project aligns with the research directions of the host institution by addressing an enabling indoor positioning technology for ongoing projects which require location sensing. In particular, the results of this project will extend the scope

of such projects as LOCALE (location-based storytelling), eGlasses (augmented reality) and SnT's Vehicular Lab projects (driver behavior monitoring) to GPS-deprived environments (such as office buildings, warehouses, underground parking lots, shopping malls).

Results: The INDOORS project explores indoor localization based on ambient radio signals broadcasted by FM, TV and cellular stations (also known as "infrastructure-free localization"). While not initially designed for localization, ambient radio signals are transmitted with high power, in different frequency bands and from multiple locations, and thus provide coverage and indoor reception in all populated areas. The feasibility of indoor localization with FM, TV and GSM signals has already been demonstrated in pioneering works; however, they focused on the best achievable localization accuracy and spanned only few days. The INDOORS, in turn, explores the realistic long-term stability of infrastructure-free positioning and its robustness to environmental dynamics (such as weather, population mobility).

In the first year, the project focused on building the tools and preparing the experimental testbeds for the main project stages planned for 2016. The created tool (data acquisition platform – DAQ) is currently employed for building a georeferenced dataset of multi-band radio samples in several indoor environments, for the duration of one year. Three testbeds have been selected and added to the DAQ along with their floorplans. Also, a number of signal feature extraction methods (such as signal strength, signal-to-noise ratio) and basic localization algorithms have been implemented for FM and started for GSM and Wi-Fi bands, and tested on early prepilot data. The collected data will enable addressing the following research challenges:

- studying the impact of weather conditions and environment dynamics on localization performance,
- exploring advanced radio signal features potentially suitable for positioning, and
- releasing an open reference dataset of georeferenced ambient radio signals and thus facilitating further research in the area.

Localised Legacies

Acronym: LOCALE

Reference: I2R-DIR-PFN-13LOCA

PI: Thomas Engel

Funding:	FNR - CORE
Budget:	815,000 €
Duration:	May 1, 2014 – April 30, 2017
Members:	• Thomas Engel (Principal Investigator) • Gabriela Gheorghe (Researcher) • Nicolas Louveton (Researcher) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partners:	• Amiperas a.s.b.l. • Centre National de l'Audiovisuel • Centre Virtuel de la Connaissance sur l'Europe • LIST • konviktsgaart
Description:	The Locale project aims at a collaborative mobile and web-based platform for authoring and sharing multi-media historical heritage content about the period 1945 - 1960: from the end of WWII to the dawn of Europe, in the context of their respective 70th (2015) - 60th (2017: EEC) anniversaries. Targeted users are on the one hand (quasi-)witness people who keep direct or indirect memories of the period, and on the other hand all people who have historical interest or knowledge in the period. Emphasis will be put on location-based storytelling and sharing experiences that are designed to allow elderly people to share their stories in an intuitive and easy way with younger members of the population. The Locale project will thus foster the sharing of personal historical accounts that may not be included in the standard historical literature. The platform will include advanced functionalities to explore multidimensional data using various human analyses and data mining strategies, based on metadata, tags, attributes entered by the user, as well as browsing history (e.g. relation between a place and queries about a given historical fact). Interaction between users of the platform will allow to follow discussions based on data contributed as well as to verify, complete, and put in perspective pieces of historical information.
Results:	In collaboration with List, we have released a data model based on the Gustafson Model of place, and worked-out an authoring prototype, after studying related state of the art (notably the tool Storyscope from FP7 project Decipher). Next, we have released a model of privacy. A study of existing content management systems complemented by specific tests of potential useful technologies have led first to the specifications of the authoring platform and the design of essential mock-up screens, and later to a prototype implementation relying on Drupal technology. Complementarily, a flexi-

ble database solution for the documentation database based on MongoDB technology has been proposed. The progress on analytics functionalities has started with the conceptual work based on categories and metadata from the data model, whereas the implementation of customized functionalities has been postponed in order to allow first the release of an elaborated platform with sufficient content.

A framework for the mobile application has been designed, relying on technologies compatible with the backend system. After the release of a first prototype, an updated version, based on HTML5 technologies, is being implemented and tested on some mobile devices. In parallel, several workshops have been held to involve contributors with different profiles (experts from CVCE and public at large from Amiperas), and formalise the specifications and the test content of the authoring system. From the conceptual study and these workshops, consolidated requirements have been collected and practical approaches have been selected in view of the desktop and mobile platforms.

MultimodAl MoBility Assistance

Acronym:	MAMBA
Reference:	I2R-NET-PFN-13MAMB
PI:	Thomas Engel
Funding:	FNR - CORE
Budget:	886,000 €
Duration:	April 1, 2014 – March 31, 2017
Members:	• Thomas Engel (Principal Investigator) • German Castignani (Researcher) • Sébastien Faye (Researcher) • Raphaël Frank (Researcher) • Stefanie Östlund (Project Coordinator) • Thierry Derrmann (Doctoral Candidate) • Maximilien Mouton (Doctoral Candidate)
Area:	Communicative Systems
Partner:	UCLA (non contracting)
Description:	In Luxembourg, mobility has over the years become a socio-economical issue due to the large number of foreign commuters that cross the border everyday causing significant travel delays on the transportation network. Recently, a lot has been done to reduce traffic congestions and improve public trans-

portation services, especially in urban environments where the road network cannot be easily extended. Traffic jams can now be detected with the help of mobile phones that act as traffic sensors. The location of buses and trains are monitored in real time to inform the passengers about possible delays. What is still missing is a holistic mobility concept that spans the entire ecosystem of transportation possibilities and tries to optimize its usage based on the demand.

The MAMBA project envisions to propose and validate a multimodal mobility platform that relies on new Internet technologies to interconnect different mobile services with the aim to provide relevant travel advice based on the users' context. Taking into account real time traffic conditions, the status of the public transportation services (e.g. buses, trains, parking slots) and the users' preferences, the individual travel assistant will proactively suggest the best transportation mode to reach a desired destination.

The key to the success of such a mobility concept is to have real time and relevant data of all the actors that are part or make use of the transportation network. Luxembourg, due to its size and geographical location, is the ideal candidate to showcase such a service on a countrywide scale. Local transport operators have already mentioned their interest to collaborate with the project, as they will benefit from its outputs such as better planning their schedules and resources.

Optimizing urban transportation services may be achieved in different ways. For example, by limiting or avoiding unnecessary journeys, one can significantly disencumber the road network. Providing drivers with incentives not to take the car during rush hour, if possible, is currently investigated by a partnering FNR CORE iGear project1. The results of those studies will be used as an input in this project. Similarly, the tangible outputs of the still running FNR CORE MOVE project2 will provide important building blocks to achieve the holistic mobility framework.

By taking into account all those sources of information, we will be able to optimize the already existing public transportation network and influence the itinerary of the users and by suggesting new multimodal routes based on their preferences. This concept will also help develop new means of transportation i.e. public electrical vehicles that can be used as last mile transportation to reduce the vehicular traffic going in and out the city. Ultimately, by exactly knowing all travel plans in advance, such a concept will lead to demand-driven transportation services avoiding unnecessary trips and thus reduce the overall energy footprint.

The system architecture will be divided into three distinct lay-

ers as depicted in Figure 1. The first being the data collection layer, which is composed of all the relevant information sources that are needed to provide the multimodal mobility services. In a first phase, the sources have to be identified and a common middleware has to be specified and implemented in order to efficiently retrieve real time data. The second layer is the communication network, which is used to make the data available trough ubiquitous network technologies i.e. 3G/4G mobile networks and metropolitan or community WiFi networks. The third and last layer implements the travel optimizer and stores the data received by the participating agents.

Results:

We developed a model that computes aggregate, privacy-neutral statistics CDRs (Call Detail Records), with the aim of enabling network operators to share data from their network without the privacy risk.

Complementary to the cell dwell time model, we developed a new demand generation and distribution prediction model based on call detail records. The model uses a Markov Chain approach to calculate the probability that demand will be generated from a zone, and will move to another traffic zone.

Using the road traffic counting infrastructure, new methods have been developed to analyse the mobility of commuters in Luxembourg, and more especially the impact between the road network and the daily load distribution of drivers.

Implementation of a Web-based itinerary planner for Luxembourg: The first prototype allowed users to plan trips using several intermediate location points. In particular, users could choose between different modes of transport or a combination of several modes, including those with time-dependent availability (i.e. bike-sharing). The system automatically computed interesting trips and suggested the best ones to the user. Current modes of transportation include car, bicycle, Veloh, public transport and walking.

As part of the Telecom Italia Big Data Challenge, we proposed a novel methodology that provided a representative and easy to compute “Happiness Index” (H-Index) by considering multiple data sources, including call detail records. Our proposal gained us a place in the finals of the challenge (one of the top 10 of 500+ teams).

Rational Architecture

http://www.ee-team.eu/projects/rational-architecture

Acronym:	RATARCH
Reference:	I2R-DIR-PFN-12RAAR
PI:	Leon van der Torre
Funding:	FNR - CORE
Budget:	178,637 €
Duration:	Jan. 1, 2013 – Dec. 31, 2015
Members:	• Leon van der Torre (Principal Investigator) • Marc Van Zee (Doctoral Candidate)
Area:	Intelligent and Adaptive Systems
Partners:	• Khaled Gaaloul (LIST) • Diana Marosin (LIST) • Henderik Proper (Radboud University Nijmegen)
Description:	The project will result in a logic-based framework to capture the rationalization of architecture related design decisions, and to reason about the relationship between these decisions and their underlying assumptions. The framework will cater for uncertainties of the underlying assumptions, as well as negotiation between different stakeholders involved in the creation and implementation of architectures. The framework will be specialized further towards two classes of properties of enterprises and their IT: security and modifiability, while the relevance of the results will have been validated in terms of a number of real-world case studies.
Results:	In the third year of the Rational Architecture project we have worked futher on the logic-based formalism that is based on a BDI logic. We have also conducted several case studies with large non-profit organisations from the Netherlands in order to validate the logic-based frameworks we have developed in the previous years. Several papers on this are currently under submission and will be added to the report of next year. Marc van Zee has been on an exchange to Stanford University in order to cooperate with Prof. Thomas Icard, who is an expert in intention revision. We have corrected several technical mistakes in Icard's formalism and published the results with Dr. Doder in IJCAI2015 and COMMONSENSE2015. We have also set out a research agenda on how to use the formalisms we have been developing in the last years for our case studies, which has been accepted at BNAIC2015. Finally, we combined argumentation with goal modeling, which was accepted at RENext 2015.

Reliable and Efficient Distributed Electricity Generation in Smart-Grids

Acronym:	REDESG
PI:	Jürgen Sachau
Funding:	FNR - CORE
Budget:	not given
Duration:	Nov. 1, 2011 – Dec. 31, 2015
Members:	• Jürgen Sachau (Principal Investigator) • Ilya Bilibin (Doctoral Candidate) • Harag Margossian (Doctoral Candidate)
Area:	Communicative Systems
Partner:	CREOS
Description:	The objective of the research is to improve on inverter based power systems. The purpose is to provide solutions and staregies for the partner Creos, to enable the integration of large amount of DG and provide insight in policy issues and technical challenges that might arise with large amount of DG integration. By having distributed generators provide ancillary services through innovative control techniques, they contribute to the stability and observability of the power networks. System-wide control techniques, as well as decentral and power electronic-based innovations are considered in order to optimize DG's power delivery and harmonize their integration in the distribution network. In addition, DG's impact on the reliability of the systems is studied. The increased volume of electricity trade can also put an additional stress on the existing grids and lead to congestions. Market regulators can discourage transactions causing congestions by imposing additional fees on transmission of electricity over heavy loaded power lines. If transmission cost allocation were to change, the balance between local and central electricity production, electricity storage and electricity transmission would be distorted as well. Changes in the future mix of electricity suppliers can affect the power supply adequacy and should be studied.
Results:	The project is completed in 2015. Both PhD candidates Harag Margossian and Ilya Bilibin have defended end 2015, and their research outcomes have been communicated in publications and at seminars at Creos. Below are two main contributions of the project in 2015: • Innovative algorithms for short circuit power protection have been devised and implemented in PSSE. With increasing levels of penetration of Distributed Generation (DGs) and the introduction of smart grid functionalities, the distri-

bution network is evolving from a passive grid to an active one. The varying fault current levels associated with network reconfiguration and the unpredictable status of DGs complicate the behavior of the protection relays traditionally designed for radial networks with unidirectional power flows. A novel framework for adaptive protection has been devised, that uses a modified state estimation to identify the current network configuration and the status of DGs and adjust the relay settings accordingly. A case study was done in order to show the advantages of using such a scheme in both reducing the operation times of the relays and ensuring their proper coordination.

- A study has been done to examine how the DG hosting capacity of active distribution systems can be increased by means of network reconfiguration, both static, i.e., grid reconfiguration at planning stage, and dynamic, i.e., grid reconfiguration u sing remotely controlled switches as an active network management (ANM) scheme. The problem has formulated as a mixed-integer, nonlinear, multi-period optimal power flow (MP-OPF) which aims to maximize the DG hosting capacity under thermal and voltage constraints. The effectiveness of the approach and the significant benefits obtained by static and dynamic reconfiguration options in terms of DG hosting capacity were demonstrated using a modified benchmark distribution system.

Socio-Technical Analysis of Security and Trust

Acronym:	STAST
Reference:	C11/IS/1183245
PI:	Peter Ryan
Funding:	FNR - CORE
Budget:	765,864 €
Duration:	May 1, 2012 – April 30, 2015
Members:	• Peter Ryan (Principal Investigator) • Ana Ferreira (Collaborator) • Jean-Louis Huynen (Collaborator) • Gabriele Lenzini (Collaborator) • Sjouke Mauw (Collaborator)
Partners:	• Newcastle University • Norwegian University of Science and Technology • Royal Holloway University London • University College London • Università degli Studi di Catania

Description: Over the last 20-30 years, the security community has made major strides in the design and (semi-automated) analysis of security protocols. Nevertheless, security critical systems continue to be successfully attacked. There appear to be two main explanations of this situation: (1) the implementation of the protocol designs introduce flaws that are not present at the design level, and (2) attackers target and exploit the, usually more vulnerable, non- technical aspects of the system.Information security systems are typically complex, socio-technical systems and the role of humans in either maintaining or undermining security is crucial. Often system designers fail to take proper account of human characteristics resulting in vulnerabilities at the interface between the humans and the purely technical components. Attackers often target such vulnerabilities rather than attempt to break the technical security mechanisms. Despite this, the socio-technical aspects of security have been largely neglected by the information security community. Addressing these socio-technical aspects is very challenging and highly inter-disciplinary. This project focuses on this most urgent and critical aspect of security. It will build on the existing knowledge, expertise and tools for the analysis of security protocols but extend and enrich it to capture the human and social dimension. Key elements of our approach are:

- To enrich existing models to encompass the role of the users and enhanced attacker models.
- To develop tools and methodologies to analyze system designs against these enriched models.

STAST is executed jointly by members of SnT and CSC.

Partners:

- Dr. G. Bella (University of Catania)
- Dr. L. Coles-Kemp (Royal Holloway University London)
- Dr. Y. Yan (Newcastle University)
- Prof. Dr. A. Sasse (University College London)
- Dr. K. Gjsteen (Norwegian University of Science and Technology)

iGear

Acronym: iGear

PI: Thomas Engel

Funding: FNR - CORE

Budget: 640,670 €

Duration: May 1, 2014 – April 30, 2016

Members:
- Thomas Engel (Principal Investigator)
- Tigran Avanesov (Researcher)
- Nicolas Louveton (Researcher)
- Roderick McCall (Researcher)
- Martin Kracheel (Doctoral Candidate)

Area: Communicative Systems

Description: Traffic congestion is a problem in many countries and with government budgets being squeezed, large road infrastructure projects and roadside assistance systems are no longer feasible. The I-GEAR project specifically addresses these problems by looking at new ways to change driver behaviour through the use of incentives, social networking and pervasive gaming concepts.

Starting with the premise that sitting in a traffic jam is lost time and money, the I-GEAR project will explore how we can best channel the motivations of drivers in a way that will optimize traffic flow. For example, by encouraging counter intuitive driving strategies such as driving more slowly or taking a seemingly longer route. It will also explore social driving approaches such as car sharing or driving in a platoon (or convoy) to specific destinations. Our underlying idea is the people would rather do something else than sit in a traffic jam but that in order to encourage this behaviour we need to provide them with social, economic or personal incentives.

The project raises a number of challenges, which range from identifying the motivations of drivers and relevant incentives though to how to design in-car information systems that do not distract the driver. In order to support these areas the project will utilize a contextual design approach that places the driver from the outset at the very heart of the process which will include extensive fieldwork coupled with detailed laboratory and in-situ studies.

I-GEAR is also developing a testing platform that will allow companies and researchers to conduct human-factors tests under simulation and real world conditions using the same system. The system allows developers to test in-car applications using a range of devices including tablet PCs, mobile phones and eye trackers. The system provides tools to log behaviours and trigger specific interactions.

Results: The iGear project finished on April the 30th, 2015. The project consisted of two primary objectives. First, the development and testing of persuasive approaches to reduce traffic congestion in Luxembourg (a set of mobile applications), and second, the development and testing of in-car user interfaces (user tests under laboratory conditions, including testing platform).

Those two objectives, along with the concerned deliverables, have been tackled successfully. Indeed, the project lead to three driving simulation studies, including a comparison with real driving on Colmar-Berg test-track, a 3D model of Kirchberg usable in the driving simulator, and three application prototypes for a gamified mobility experience. The findings of those studies were submitted and published in leading international journals and conferences and were disseminated towards national media such as RTL, Radio 100.7 or IT One.

5.10 FNR - INTER Projects

INTER/CNRS/14/10367986 Algorithmic Decision Theory

http://leopold-loewenhein.uni.lu/bisdorff/research.html

Acronym:	Algodec 2
Reference:	F1R-CSC-PFN-14ALG2
PI:	Raymond Bisdorff
Funding:	FNR - INTER
Budget:	10,000 €
Duration:	Jan. 1, 2015 – Dec. 31, 2019
Members:	• Raymond Bisdorff (Principal Investigator) • Pascal Bouvry (Researcher) • Ulrich Sorger (Researcher) • Emil Weydert (Researcher) • Leon van der Torre (Researcher)
Area:	Intelligent and Adaptive Systems
Partners:	• Yves De Smet (Université Libre de Bruxelles) • Eyke Hüllermeier (Universität Paderborn) • Pierre Marquis (Université d'Artois, France) • Brice Mayag (Université Paris-Dauphine) • Patrice Perny (Université Pierre et Marie Curie) • Marc Pirlot (Université de Mons, Belgique) • Bernard Ries (Université Paris-Dauphine) • Fred S. Roberts (DIMACS (USA)) • CNRS
Description:	The CNRS-GDRI Algodec 2 is expected to be involved in the following activities:

1. Contribute to the organization International Conference

on AlgorithmicDecision Theory (ADT), to be held in 2015 in Lexington, Kentucky (US) and in 2017 (Luxembourg). The ADT conference series was created with the support of the ALGODEC GDRI.

2. Contribute to the workshop series From Multicriteria Decision Aid to Preference Learning (DA2PL), to be organized on even years (2016 and 2018). The themes of preference analytics and learning are central in DA2PL.

3. Organize one or two summer doctoral schools during the span of the four years addressing the whole of the PhD students enrolled with the partners and beyond.

4. Contribute to the organization of workshops on the themes of the GDRI co-located in highly rated international conferences such as AAAI, IJCAI, ICML, ECML. A number of workshops on topics related to preferences and preference learning has been organized in the past by the participants of the proposed GDRI on Preference Analytics (such as the NIPS workshop on Choice models and Preference Learning in 2011, and the series of workshops on Preference Learning organized by Eyke Hullermeier). We will consider the possibility of establishing a new workshop venue, but perhaps given the number of already established venues, we will focus on continuing these series, with possibly a larger thematic scope. We also plan to keep contributing to the successful series of Multi-disciplinary Workshop on Advances in Preference Handling (MPREF), held annually since 2004, that allows possibility of interaction with researchers interested in preferences from other fields (databases processing, algorithmic, theoretical computer science).

5. Organize joint seminars among the participating (research centres) laboratories/institutes as well as further dissemination activities.

6. Promote mobility of early stage and experienced researchers as well as for the permanent academic staff. In particular, we will support research visits of members of the GDRI in the lab of another partner, with the goal of undertaking collaborative research leading to joint publications.

7. Establish a website for the GDRI where activities will be described. A person, among the researchers implicated in the project, will be responsible for the website so that it will be updated regularly. A blog-like interfaces will allow to keep tracks of project meetings, but also to present abstracts of seminars given at the universities involved, announce recent publications on the subject,

advertise call for papers. We will consider the possibility of a forum or a dedicated page on social networks, so that young PhD students can discuss with practitioners and other senior (or junior) researchers with whom develop new research ideas or practical support activities, not necessarily within the principal axis of the PhD.

8. Promote the co-tutoring of each PhD student by at least two senior researchers from two different partner laboratories.

Cognitive Software Defined Network

https://cosdn.uni.lu/

Acronym:	CoSDN
Reference:	I2R-NET-PFN-12COSD
PI:	Thomas Engel
Funding:	FNR - INTER
Budget:	799,000 €
Duration:	Jan. 1, 2013 – March 31, 2016
Members:	• Thomas Engel (Principal Investigator) • Miroslaw Kantor (Researcher) • Maria Rita Palattella (Researcher) • Radu State (Researcher) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partner:	Warsaw University of Technology
Description:	CoSDN stands for Cognitive Software Defined Networks, whose conceptualization is part of the diverse global activities around the design of the Future Internet. The CoSDN concept exploits the possibility of programming network behaviour that is enabled by the Software Defined Network (SDN) paradigm. It allows personalized network services, uses cognitive algorithms with learning in order to optimize the overall network performance and security. The CoSDN research and implementation is based on autonomic network management and control concepts. Such a combination of SDN with autonomic frameworks and cognitive algorithms is very novel. Even though there were significant research contributions in the past re-

lated to mentioned areas, but no research activities have been trying to combine the concepts together, since all the areas individually, are still experiencing a lot of research.

The CoSDN concept has the following novelties:

- exploits the possibility of programming of network behaviour that is enabled by the SDN paradigm;
- using SDN, it enables personalized (personalized QoS and security on per flow basis) and advanced network services (multicast with QoS, ...);
- uses real-time cognitive algorithms with learning in order to optimize the overall network performance (including energy efficient approach (though this is not likely to be covered)) and to improve security;
- decomposition of network multi-criterion optimization problem into a set of quasi separated single criterion problems by 'cognitive interaction';
- network nodes exhibit some degree of self-configuration, and their re-configuration (including AAA), will be done in real-time during network operations in order to achieve better user experience ability to cope with dynamic topology changes;
- provides proactive fault management based on anomaly detection using machine learning approaches;
- implementations are based on autonomic network management and control frameworks.

The main innovation of the CoSDN concept is integration of SDN with autonomic network management and cognitive algorithms. From the scientific point of view the focus is put on the algorithmic side whereas SDN and Autonomic Network Management (ANM) concepts are used as tools/instruments. We would like to emphasise the seamless integration of security mechanisms and features. The main expected result of the project is a set of innovative algorithms and implementations for the CoSDN networks, with potential impact on standards related to Autonomics and OpenFlow-based SDN.

Results: As one of the main outcomes of the project, the UL team has developed SDN-RADAR, a trouble shooting application which integrates cutting edge SDN technology (i.e., the OpenDayLight controller, and the OpenFlow-enabled Mininet simulator) with the v6Sonar quality assurance tool (v6Sonar agents and controller platform). By combining the passive measurements (statistics) collected by the ODL controller, with the active ones, performed by the v6Sonar Agents, SDN-RADAR is able to operate fault domain isolation, identifying underperforming links, which affect network performance, and thus the QoS perceived by end users.

Another main achievement of the CoSDN project consisted in the definition of a generic cognitive SDN architecture for security enforcement, based on two components: (i) a cognitive mechanism, and (ii) a control loop component. Gaussian Processes (GPs) were chosen as cognitive algorithms, mainly due to their no-parametric nature, high flexibility, and interesting training-prediction trade-off. The proposed scheme has been implemented in the Learn2Defend framework, which interface Weka with Defense4all, and OpenDayLight, allowing the integration of state-of-art machine learning techniques in a SDN testbed, to perform DoS attack detection.

Formal Models for Uncertain Argumentation from Text

Acronym:	FMUAT
PI:	Leon van der Torre
Funding:	FNR - INTER
Budget:	99,850 €
Duration:	March 1, 2015 – Feb. 28, 2018
Member:	Leon van der Torre (Principal Investigator)
Area:	Intelligent and Adaptive Systems
Partner:	Beishui Liao (Zhejiang University)
Description:	The topic of this project is formal models for uncertain argumentation from natural language text. Based on Dung's argumentation theory, integrating uncertainty into argumentation is gaining momentum. However, to the best of our knowledge, little attention has been paid to the modelling of uncertain argumentation in which the uncertainty of arguments is obtained mainly from text (e.g. biological papers). The aim of this project is to develop theory and algorithms to formalize and evaluate the uncertain argumentation from natural language text, such that uncertain arguments represented by natural language can be formalized and their status be properly and efficiently evaluated. The project is carried out by the cooperation between the Individual and Collective Reasoning (ICR) group at the University of Luxembourg and the group of Beishui Liao of the Center for Study of Language and Cognition (CSLC) at Zhejiang University.

Game Logics for Open IT Environments

Acronym:	GaLOT
Reference:	F1R-CSC-PFN-12GALO
PI:	Leon van der Torre
Funding:	FNR - INTER
Budget:	325,000 €
Duration:	Feb. 1, 2013 – Jan. 31, 2015
Members:	• Leon van der Torre (Principal Investigator) • Sjouke Mauw (Researcher)
Areas:	• Information Security • Intelligent and Adaptive Systems
Partners:	• Nils Bulling (Technical University of Clausthal) • Juergen Dix (Technical University of Clausthal) • Pietro Galliani (Technical University of Clausthal) • Valentin Goranko (Technical University of Clausthal) • Michael Köster (Technical University of Clausthal) • Matei Popovici (Technical University of Clausthal)
Description:	Game theory provides basic conceptual tools to assess abilities of players in scenarios involving interaction. On the other hand, mathematical logic has proved useful when addressing qualitative properties of systems. A number of strategic logics (or game logics) have been studied intensively in the last 15 years, that allow to specify properties of games in an abstract way. Unfortunately, most of them are based on models of perfect information. Such an assumption is unrealistic when it comes for distributed IT environments. Moreover, it makes the study of information security impossible because the notions of information and knowledge are not properly defined. A multitude of semantic variants were proposed in the recent years to combine knowledge and strategies in a single logical framework, but many questions remain open. In this project, we address some of the questions. First, there are many different semantics for ability under uncertainty, but their exact relationship is still unclear. Secondly, there is no unifying framework. Thirdly, verification of abilities under uncertainty is known to be computationally hard, but little work has been done on tractable fragments of the logics. Fourthly, combining knowledge and strategies for stochastic models is almost untouched. We are going to investigate these basic threads by rigorous theoretical analysis. On a more practical level, we plan to provide a preliminary toolbox that allows for verification of information-related properties in open IT environments of relatively small scale. Partners: Clausthal University of Technology, Technical Uni-

versity of Denmark

Multi-Objective Metaheuristics for Energy-Aware Scheduling in Cloud Computing Systems

http://greenatcloud.gforge.uni.lu/

Acronym:	Green@Cloud
Reference:	R-AGR-0450-10-V
PI:	Pascal Bouvry
Funding:	FNR - INTER
Budget:	1,092,235 €
Duration:	July 1, 2012 – June 30, 2015
Members:	• Pascal Bouvry (Principal Investigator) • Grégoire Danoy (Researcher) • Alexandru-Adrian Tantar (Researcher) • Sébastien Varrette (Researcher) • Valentin Plugaru (Collaborator) • Mateusz Guzek (Doctoral Candidate) • Anh Quan Nguyen (Doctoral Candidate)
Area:	Intelligent and Adaptive Systems
Partner:	Université Lille
Description:	The project Green@Cloud aims at developing an energy-aware scheduling framework able to reduce the energy needed for high-performance computing and networking operations in large-scale distributed systems (data centers, clouds, grids). With the advent of new petaflops data centers and the next-generation Internet ("Internet of Things", "High-Performance Internet"), energy consumption is becoming a major challenge for the IT world. To build up this new energy-aware scheduling framework, the project Green@Cloud will first develop multi-criteria mathematical optimization models (e.g. makespan, energy, robustness) and then design multi-objective optimization methods to solve the problem. These techniques along with statistical and machine learning components will be used to provide autonomous fault-tolerant and robust scheduling paradigms for virtual machines running inside a dynamic environment. A series of time-varying deterministic and stochastic factors will be considered as part of the environment, e.g. renewable energy supply, computational demand or activity of users. Experimentation and validation will be carried on a real test bed using large-scale equipments (e.g. Grid'5000)

while relying on distributed scenarios.

Results: At the highest problem analysis and abstraction level we have shown that it is possible to efficiently deal with a large number of objectives. Regardless of the algorithm used, distort transforms led (almost in all cases, when going above 2 objectives) to an improvement of the results, with respect to the hypervolume and the epsilon quality indicators. This is not exactly the case for the spread indicator, from a numerical point of view. This needs however to be correlated with the hypervolume and epsilon indicators. These two last ones clearly show that we are 'approaching' the optimal front. At the same time, convergence may imply a degradation in terms of spread, depending on the structure of the optimal front. The results open a whole new area where one may want to look at how different transforms can be combined or even constructed automatically. The same approach can furthermore be used to incorporate preference for one specific area in the objective space or for defining constraints.

For the cloud resource management problem, we have provided

1. A comprehensive literature study regarding optimisation or resource management in cloud computing, including their classification and taxonomy, with a special focus on computational intelligence approaches;

2. A holistic model for power estimation and resource allocation in virtualized environments has been provided and the release of the GreenCloud2 simulator, including the aforementioned power model;

3. Heterogenous, energy-, processing- and network-conscious load balancer for cloud data centers, taking advantage of start-stop mechanisms or Dynamic Voltage & Frequency Scaling, including:

- Three energy-aware low computational complexity scheduling algorithms are proposed, designed, and evaluated to exploit the heterogeneity of the resources and applications emphasize in performance, complexity, energy consumption, and scalability in HCS. The algorithms are evaluated and compared with the best reported in the literature. The set of experimental results shows that low computational complexity heuristics perform as efficiently as known ones considering the makespan criterion, and outperform them in terms of flowtime, runtime execution, memory used, and number of best solution found criteria. Detail analysis show that low computational complexity heuristics are the best performing heuristics in the original-consistency cases showing similar behavior in the partial-consistency scenarios for makespan.

- Different sets of meta-heuristics have been proposed such a simulated Annealing, Genetic Algorithm, and hybrid Evolutionary Algorithm. The experimental evaluation over instances accounting for workloads and scenarios using real data from cloud providers, indicates that the parallel hybrid Evolutionary Algorithm is the best method to solve the problem, computing solutions with huge profit improvement over greedy heuristics results while accounting for accurate makespan and flowtime values.
- A self-organized critical approach for dynamically load-balancing computational workloads. The proposed model is based on the Bak-Tang-Wiesenfeld sandpile: a cellular automaton that works in a critical regime at the edge of chaos. In analogy to grains of sand, tasks arrive and pile up on the different processing elements or sites of the system. When a pile exceeds a certain threshold, it collapses and initiates an avalanche of migrating tasks, i.e. producing load-balancing. We show that the frequency of such avalanches is in power-law relation with their sizes, a scale-invariant fingerprint of self-organized criticality that emerges without any tuning of parameters. Such an emergent pattern has organic properties such as the self-organization of tasks into resources or the self-optimization of the computing performance. The conducted experimentation also reveals that the system has a critical attractor in the point in which the arrival rate of tasks equals the processing power of the system. Taking advantage of this fact, we hypothesize that the processing elements can be turned on and off depending on the state of the workload as to maximize the utilization of resources. An interesting side effect is that the overall energy consumption of the system is minimized without compromising the quality of service.

4. ParaMoise, a new multi-agent organisational model based on workflows and dynamic reorganisations has been proposed to model the dynamics of large scale distributed systems. An illustration of its usage for specifying a Cloud Computing management system has been proposed. The ParaMoise model was then implemented in the KAAPI distributed execution environment, resulting in ParaMASK. ParaMASK is able to execute KAAPI-compatible programs and to dynamically reorganise the middleware modelled as a ParaMoise MAS. ParaMASK was experimented in a real environment. Its scalability and energy efficiency, have been validated, where ParaMASK autonomous reorganisation permits to consume significantly less energy while ensuring the same execution time.

5. A a prediction model for a uncertainty of VM execution

time for the cloud broker. The proposed method is based on the truncated normal distribution to deal with the stochastic VM execution time. This information is helpful for the decision-making of the cloud broker regarding the resource allocation for VMMP optimization. The prediction model that based on the truncated normal distribution in our work employs different meta-heuristic algorithms will be used as an reference for a future work of prediction model to deal with uncertainty factor from the point of view of the cloud broker. The prediction model implementations for the VM execution time by itself can achieve two main goals: the decrease of costs for the cloud users is expected together with the improvement of resource allocation optimization for the cloud broker.

The GreenCloud simulator has been highly enhanced through the project. The new release V2 relies on a holistic model of cloud computing platforms, including cutting-edge autonomic resource management using nature- inspired optimization and multi-agent systems developed in the cloud computing-related projects of the team, including Green@cloud.

The platform is delivered as run-time in the cloud, as a virtual machine or as open source: https://greencloud.gforge.uni.lu/

Greencloud features around 1018 website visits and 223 downloads monthly.

ID-based Secure Communications system for unified access in IOT

Acronym:	IDSECOM
Reference:	I2R-NET-PFN-13IDSE
PI:	Thomas Engel
Funding:	FNR - INTER
Budget:	692,000 €
Duration:	April 1, 2014 – March 31, 2017
Members:	• Thomas Engel (Principal Investigator) • Miroslaw Kantor (Researcher) • Radu State (Researcher) • Stefanie Östlund (Project Coordinator) • Salvatore Signorello (Doctoral Candidate)
Area:	Communicative Systems
Partner:	Warsaw University of Technology
Description:	The project IDSECOM aims to build a secure platform for self-

management of the Things and services in the Internet of Things environment. The proposed platform brings the functionalities of the so-called ID layer to the network structure and integrates selfmanagement, mobility and security/privacy functionalities in order to create a network infrastructure that offers an easier (and intuitive) access to the IoT (Internet of Things) services. As referred in the project CASAGRAS, "Internet of Things (IoT) is a global network infrastructure, linking physical and virtual objects through the exploitation of data capture and communication capabilities" [Cas09]. Briefly speaking, IoT will be a huge connectivity platform for self-managed devices. A key-challenging question in IoT research is how to identify and access the objects. This issue is solved in the so-called ID layer, which is the common layer for communicating Things. The current solutions for ID layer [Sou09, Swi10, Kos10, IoT@W] are performed by additional protocols, overlay services or infrastructures that need a lot of configuration, have a limited support or may suffer incompatibility between solutions in different networks. In the same way, the current solutions for discovering and accessing the services in IoT are limited to overlay systems. The efforts of this project are directed to build an extended secure ID layer, which solves object and service access in the network itself. Moreover, IDSECOM system extends the current ID layer solutions by (1) addressing not only objects but also services, (2) distributing and facilitating general process as registration and publication of objects/services, (3) adding enhanced security and privacy mechanisms, (4) introducing ID layer self-management functionalities in network level, (5) improving flexibility in multicast/anycast communications at different levels and (6) optimizing information forwarding.

The following proposal is based on the architecture that we presented mainly in [Mon13], and extends its functionalities by providing a self-managed and secure network that is capable of registering, publishing, discovering and managing IDentifiers (ID) attached to objects and services in the IoT. In fact, in [Mon13] we developed the low level operations, i.e., IoT CCNspecific packet forwarding but operations related with IoT services (registration, publication and so on) that are specific of ID layer were discussed superficially. We grouped together challenges and requirements rather than solutions for ID layer operations. This proposal will centre in ID layer-specific operations.

Over ID layer proposed in IDSECOM it will be possible to present primitive services of sensors/actuators or composed services for sharing the resources of different sensor networks. Each service may acquire a public context and location-aware ID (with appropriate hierarchy), by which the service can be easily discovered by remote applications. For building the

platform we consider the Software Defined Networking approach and, specifically, OpenFlow, which is widely extended in modern network devices. OpenFlow allows for separation of control and data plane in the devices. This way, dedicated traffic can be processed with appropriate routing rules, which are different than the IP based routing and, on the other hand, the network devices are able to fulfil high level IoT-specific operations. The project partners will investigate new solutions in OpenFlow to ensure IoTspecific operations and ID-based routing into the IoT domain. These solutions may cover new controller functionalities, new OpenFlow rules for treating the ID header and extensions of the OpenFlow protocol, if needed.

At last, for assuring security in the communications inside of the ID layer, we will analyse how switches and controllers can directly collaborate in anomalies discovery (ID layer specific security issue) taken benefit from the efficient organization and routing. On the other hand, we will deal with security in specific modules of ID layer architecture.

Results: During 2015, both research and implementation tasks were provided. On the one hand, research tasks resulted in a number of good publications in international conferences (both at Rank A and Rank B) and journals (Rank B). On the other hand, the first round of implementation tasks should result in the deployment of the first prototype of IDSECOM. Thanks to this implementation, we will be able to present more papers with results showing how the system works or providing that the system works. The research provided by IDSECOM partners during the report period focused on two main aspects: self-management of ID layer and security & privacy mechanisms. The objective of self-management tasks was to define self-managed IoT operations for ID layer architecture including the detailed definition of functional elements, interfaces between them and protocol stack for the communication. Moreover, interaction with routing elements was considered. In 2015 we also compiled the work related with security and privacy issues and provided an analysis of the security vulnerabilities in some specific enabling technologies for the Internet of Things (IoT).

Internet Shopping Optimisation Project

http://www.cs.put.poznan.pl/ishop/

Acronym: IShOP

Reference:	R-AGR-0453-10-V
PI:	Pascal Bouvry
Funding:	FNR - INTER
Budget:	1,029,639 €
Duration:	March 1, 2014 – Feb. 28, 2017
Members:	• Pascal Bouvry (Principal Investigator) • Grégoire Danoy (Researcher) • Mateusz Guzek (Researcher) • Sébastien Varrette (Researcher) • Raymond Bisdorff (Collaborator)
Area:	Intelligent and Adaptive Systems
Partners:	• Jacek Blazewicz (Poznan University of Technology) • Maciej Drozdowski (Poznan University of Technology) • Mikhail Kovalyov • Jakub Marszalkowski (Poznan University of Technology) • Jedrzej Musial (Poznan University of Technology) • Kamil Sedlak (Poznan University of Technology) • Malgorzata Sterna (Poznan University of Technology)
Description:	This project proposes innovative and realistic models for different typical online shopping operations, supported by strong mathematical and operational research fundamentals, and well balanced with lightweight computational algorithms. These models are designed in order to allow the optimization of such transactions. Finding accurate solutions to the defined problems implies both lowering customer expenses and favouring market competitiveness. One of the main aims of this project is to model and formulate new advanced and realistic flavours of the Internet Shopping Optimization Problem (ISOP), considering discounts and additional conditions like price sensitive shipping costs, incomplete offers from shops, or the minimization of the total realization time, price, and delivery time functions, among others. The models will be mathematically and theoretically well founded. Moreover, the challenge of defining and addressing a multi-criteria version of the problem will be addressed too. Other important contributions will be the mapping of ISOP to other new challenges. One of them is the design of a novel business model for cloud brokering that will benefit both cloud providers and consumers. Providers will be able to easily offer their large number of services, and to get a fast answer from the market to offers (e.g., when infrastructure is under-utilized). Additionally, customers will easily benefit from offers and find the most appropriate deals for his/her needs (according to service level agreements, pricing, performance, etc.). Modelling some of these aspects and coupling it

with an optimization tool for the brokering of cloud services among various providers would be a key contribution to the field.

A wide set of optimization algorithms will be designed and developed for the addressed problems. They include from fast lightweight specialized heuristics to highly accurate parallel and multi-objective population-based metaheuristics. They all will be embedded in a software framework for their practical applications, and validation.

IShOP is an INTER POLLUX project, cofunded by Luxembourg National Research Funds (FNR) and the Polish National Research Centre for Research and Development (NCBiR).

This project is a collaboration between the Laboratory of Algorithm Design and Programming Systems of the Institute of Computing Science, Poznan University of Technology, Poland, and the Interdisciplinary Center of Security, Reliability and Trust (SnT) of the University of Luxembourg, Luxembourg.

Results:

WP2 - Work was focused on the Budgeted-IShOP version of the problem with incomplete orders. It included preparation of problem definition, mathematical modelling and work on algorithms solving the problem. Moreover, authors finished work on “Exact and Heuristic Approaches to Solve the Internet Shopping Optimization Problem with Delivery Costs”. It has been submitted for publication in ISI journal. Part of the group also tackled problem on Scheduling on Parallel Identical Machines with Late Work Criterion which founds to have some common attributes to ISOP. Publication in ISI journal was accepted for printing in the Journal of Scheduling.

WP3 - The work package was advanced by definition of novel Software-as-a-Service cloud brokering problems, with underlying objectives to be optimized: cost, performance, energy-efficiency, security, reliability, trust etc. The theoretical analysis proves that the problem is NP-hard and it is related to the ISOP problem. An exact solutions for the single-objective version of the problem was proposed using the commercial CPLEX solver. CPLEX was also used to find the Pareto front for the bi-objective version of the problem using a dichotomic approach. A multi-objective version of the problem with more than two objectives was tackled using evolutionary algorithms. Additionally, problems arising in the internal data-center management were considered, complementing the previous work on the Infrastructure-as-a-Service environment, leading to design highly-effective and efficient heuristics. The work included also research on energy consumption problem in cloud systems where the novelty was consideration of hierarchical memory in the systems. Results are published in an ISI journal publication.

WP4 - The software framework work package is under development using the inputs from WP3. The simulation environment together with the benchmarks are organically developed, using standardized format for instances description. The formats are also compatible with commonly used solvers and software, e.g. CPLEX. To ensure realistic results, the instances are generated using models derived from the observation of prices and performance of real cloud service providers. The prepared benchmark set of instances is also analyzed to determine the impact of the parameters of the instances on its hardness, defined as the time and resources needed to obtain the optimal solution or set of Pareto-optimal solutions. The results of the algorithms from the framework were presented in 1 ISI journal publication.

WP5 - Dissemination of the project results is done using multiple channels. The scientific articles are published in high-quality journals (6 ISI journal publications and another 5 publications in sources that are currently not indexed by ISI), and conference papers are presented during international, renown conferences (11 presentations). The results of the projects were disseminated to industrial users via the "Smart ICT for Business Innovation" certificate organized with ILNAS/ANEC and by practical cooperation with LuxCloud SARL.

MAintaining Driving Skills in Semi-Autonomous Vehicles

Acronym:	MaDSAV
Reference:	I2R-NET-PFN-14MADS
PI:	Thomas Engel
Funding:	FNR - INTER
Budget:	903,000 €
Duration:	April 1, 2015 – March 31, 2018
Members:	• Thomas Engel (Principal Investigator) • Gabriela Gheorghe (Researcher) • Nicolas Louveton (Researcher) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partners:	• LIST • University of Salzburg, Austria
Description:	Semi-Autonomous Vehicles present a major challenge for drivers, namely the risk that their driving skills will decline. This problem is further compounded by the fact that while the number

of semi-autonomous vehicles will increase there will for the foreseeable future still remain a large number of vehicles with no or little autonomous control. This combination of the decline in driving skills plus the complicated mix of vehicles on the road will raise a number of safety challenges. For example, drivers of semi-autonomous vehicles may be forced to take control under certain circumstances but may not possess the skills which would enable them to react quickly enough or to take the right decision. Also they will not be able to rely on other vehicles taking the right course of action. As a result there needs to be methods employed which can encourage people to maintain their driving skills which are turned to the needs of particular drivers. This project will specifically explore how to profile driver performance and the development of tools which will focus on safe driving within semi-autonomous vehicles.

Results: The project MaDSAV started in 2015 and the kick-off meeting have been done in May (Salzburg, Austria). Main work undertaken was the preparation of driving simulator study, including the choice of underlying technologies for 3D simulation engine and mock car cockpit. In this context, software developed for iGear, the DriveLab platform for building studies with automotive interfaces, has been placed under an open source licence in order to enhance code sharing between the two projects. One publication have been produced at one of the major conference in the domain Automotive UI 2015.

Security Properties, Process Equivalences, and Automated Verification

Acronym: SEQUOIA

PI: Peter Ryan

Funding: FNR - INTER

Budget: not given

Duration: March 1, 2015 – Feb. 28, 2019

Member: Peter Ryan (Principal Investigator)

Area: Information Security

Partners:
- ENS Cachan
- Université de Lorraine

Description: Modern society is becoming ever-more digitalized. In particular, electronic services provided over the internet are now standard tools for individuals to network, manage their bank accounts, and even vote in important elections. It is there-

fore critical to deploy strongly secure systems to accomplish these tasks, which present the dual challenge of being both of socio-economic importance, and highly complex.

While cryptographic protocols are implemented to attempt securing these procedures, design errors remain abundant, as recent examples of practical attacks on such systems demonstrate. It is thus important to further refine the necessary tools to verify the correctness of these protocols. A highly successful technique to accomplish this is to use symbolic analysis. Two particularly important features of this technique stand out: 1) it is well-suited to analyze complex systems and 2) it is amenable to automation.

The aim of this project is to extend the capabilities of symbolic analysis so as to capture the subtle security properties of modern-day cryptographic protocols. Many of these properties can be expressed in terms of indistinguishabilty of processes, a notion that symbolic analysis currently lacks the necessary theoretical foundations to fully understand, and automated tools to verify. The technical objective is to begin filling this gap.

Examples of concrete security properties that indistinguishability naturally captures include anonymity, unlinkability, maximal protection of weak secrets such as passwords, and more. The main practical objective of the project is to provide an automated tool (using AKISS – Active Knowledge In Security protocolS - as a starting point) allowing the verification of indistinguishability, and therefore of the above-mentioned properties. We plan to illustrate our findings by performing an analysis on an e-voting protocol that actually relies on several of these properties.

Specification logics and Inference tools for verification and Enforcement of Policies

http://icr.uni.lu/SIEP/

Acronym:	SIEP
Reference:	I2R-DIR-PFN-11SIEP
PI:	Leon van der Torre
Funding:	FNR - INTER
Budget:	450,000 €
Duration:	June 1, 2012 – May 31, 2017

Members:
- Leon van der Torre (Principal Investigator)
- Marcos Cramer (Collaborator)
- Diego Agustin Ambrossio (Doctoral Candidate)

Areas:
- Information Security
- Intelligent and Adaptive Systems
- Software and Systems

Partners:
- Guillaume Aucher (Université de Rennes)
- Marc Denecker (Katholieke Universiteit Leuven)
- Dov Gabbay (King's College)
- Pieter van Hertum (Katholieke Universiteit Leuven)

Description: The aim of SIEP is to develop an expressive logic for specifying distributed authorization policies and to implement various forms of inference suitable for verification tasks (e.g., compliance) as well as for enforcing such policies. There are three objectives.

Objective 1 is to develop an expressive modular logical framework suitable for specifying complex composite distributed access control policies, which allow for delegation and revocation of access rights, dynamic aspects such as evolving policies, trust, and the representation of the beliefs of agents.

Objective 2 is to develop tools for verification, checking compliance, experimentation, simulation and analysis of access control and privacy policies.

Objective 3 is the creation of a prototype system to enforce distributed access control policies.

Results: We have developed a distributed (multi-agent) version of autoepistemic logic, and shown that it can function as a says-based access control logic [3]. We have adapted various semantics of autoepistemic logic to the distributed case, and have demonstrated the suitability of the well-founded semantics for the access control application.

We finished and published two papers that we started working on in 2014 (see publications below):

- A paper on complex authorization strategies arising in online social networks[1]
- A paper that logically analyzes the reasons for revoking delegated authorizations and describes a revised delegation-revocation framework[2]

Furthermore, we have shown that determining access in the revised framework mentioned in the second bullet point is NP-complete, and have studied methods to reduce this computational cost in practice[4].

Publications that we worked on in 2015:

1. Marcos Cramer, Jun Pang and Yang Zhang: A Logical Approach to Restricting Access in Online Social Networks. ACM Symposium on Access Control Models and Technologies (SACMAT) 2015.
2. Marcos Cramer, Diego Agustín Ambrossio and Pieter Van Hertum: A Logic of Trust for Reasoning about Delegation and Revocation. ACM Symposium on Access Control Models and Technologies (SACMAT) 2015.
3. Marcos Cramer, Pieter Van Hertum, Bart Bogaerts and Marc Denecker: Distributed Autoepistemic Logic and its Application to Access Control. International Joint Conference on Artificial Intelligence (IJCAI) 2016.
4. Marcos Cramer, Pieter Van Hertum, Ruben Lapauw, Ingmar Dasseville and Marc Denecker: Resilient Delegation Revocation with Precedence for Predecessors is NP-Complete.
5. Joint paper for the Computer Security Foundations Symposium (CSF) 2016.

5.11 FNR - Other Projects

Understanding the Return on Modelling Effort

Acronym:	ASINE
Reference:	F1R-CSC-PFN-0902AS
PI:	Pierre Kelsen
Funding:	FNR - Other
Budget:	143,000 €
Duration:	Sept. 15, 2013 – April 30, 2015
Members:	• Pierre Kelsen (Principal Investigator) • Sybren De Kinderen (Researcher)
Area:	Software and Systems
Partners:	• Qin Ma (LIST) • Henderik Proper (Radboud University Nijmegen)
Description:	In the context of enterprise architecture the collaboration between Professor Henderik Proper (CRP Henri Tudor) and the group of Professor Kelsen will take the notion of Return on Modelling Effort (RoME) as its starting point, in particu-

lar in the context of the natural tension between formal and informal languages. Here informal languages refer to languages used in stakeholder communication, whereas formal languages refer to languages that are typically used for computational tasks (e.g., code generation, analysis, simulation, etcetera). On the short term, we will in particular focus on the following questions:

1. What is, in specific situations, the added value of informal languages?
2. What is, in specific situations, the added value of formal languages?
3. What is, in specific situations, the added value of maintaining relationships between formal languages and informal languages?

Exploring the added value of formal and informal languages is also fully in line with one of the core objectives of the ASINE project: creating a coherent modeling landscape.

Furthermore, the relationship between formal and informal languages also plays a crucial role in application areas such as compliance management, where informal/intentional descriptions of new regulations need to be transferred to (automatic) checkable and well-defined rules.

Results: 2015 marked the end of ASINE, with the contract of the CSC ASINE research associate ending end of February. The goal of the CSC ASINE position is fulfilled in the sense of having a continuity of the LIST-UniLux collaboration concretely expressed in:

- collaborative supervision of a PhD project, between LIST, UniLux, and an additional research partner: the University of Duisburg-Essen.
- Continuing research ties as well, on model driven analysis in the smart grid domain, now under the extended consortium of LIST (concretely in terms of Dr. Ivan Razo-Zapata), UniLux (in terms of Dr. Qin Ma) and the University of Duisburg-Essen (in terms of Dr. Sybren de Kinderen).

Black Swan

Acronym: Black Swan

Reference: I2R-NET-PFN-15BLSW

PI: Thomas Engel, Miroslaw Kantor

Funding: FNR - Other

Budget: 181,000 €

Duration: July 1, 2015 – Feb. 29, 2016

Members:
- Thomas Engel (Principal Investigator)
- Miroslaw Kantor (Principal Investigator)
- Anne Ochsenbein (Project Coordinator)

Area: Communicative Systems

Partner: Hitec

Description: The scope of this project is to provide a set of tools that allow identifying in what situation decision and disaster management policies fail. Instead of finding what plan fits perfectly a set of designed 'catastrophic events', we construct events that stress and break the perfect plan. This allows understanding how disruptive events, i.e. with respect to what is planed given a specific critical infrastructure, unfold and what additional measures one needs to put in place. Existing solutions, now on the market, do not offer such an option and focus almost exclusively on simulating pre-defined disaster scenarios.

The core of the project is constructed around rare event simulation techniques. Rare event techniques are ways to efficiently construct an out-of-the-charts event. Simulation remains a main component of how events are built and later analyzed. For this particular solution however, rare event techniques are used to construct disaster scenarios, subsequently analyzed via simulation. A set of scenarios is first proposed and simulated. Based on the results, i.e. stress put on a given disaster management plan, most difficult cases are selected and extended. The process is continued until disruptive effects can be observed. These effects are quantified as part of a post-analysis phase and show where and how the given plan fails.

The outcome of such a technique can be expressed in terms of occurrence and pathways. The spread of different (independent) events indicates what are the weak points of, in this case, a critical city infrastructure. Pathways, with respect to a single case, allow understanding how an event starts and subsequently unfolds. This provides, in turn, information about thresholds, critical levels or points where additional specific measures are needed.

Results: The milestone corresponds with the achievement of the deliverables of the first workpackage. It consists in building the core infrastructure for mobile environments, dedicated to Android. The achievement of the milestone supposed several steps:

- Implementation of an online raw sensor data collector, scal-

able for a multitude of Android devices.
- Adaptation for mobile platforms (translation in Java) of online learning mechanisms.
- Asynchronous access provided to both the learning and data collector components, without interrupting any of the processes or causing delays.
- Coupling and contextual semantic addition on the data.

The main challenge raised by this milestone consists in the portability and efficacy of integrating of powerful learning mechanisms on mobile devices and the technological challenge raised by the mobile world technical specificities, as the mobile interface was started from scratch.

The milestone has been achieved and several steps were necessary for the achievement, in line with the foreseen tasks:

- collecting sensor data from Android smartphones in a generic manner, in order to allow scalability to a large panoply of Android devices,
- tunning and calibrating the learning mechanisms as to fit the technical constraints of a smartphone,
- consolidate by acquiring the accuracy of the provided readings.

The entire process allowed us to asses also the relevance of specific sensors. GPS readings are a good example. Our initial tests, but also several existing studies acknowledge the lack of accuracy of GPS readings while indoors, when compared with RFID.

Based on Android technology we first interfaced sensor readings and processing of the input data as to detect the scenario to which the user behaviour corresponds. A data collection and context detection library has been developed as to have a clear contextual understanding. Although most of the mobile devices provide specific SDKs in order to allow access to sensor data, a general framework was the needed element.

A second challenge is that sensor data are regularly sent to the producer's server.

The interface with the sensors foreseen for this phase has been constructed, including GPS, accelerometer and gyroscope. We used for this purpose Samsung Galaxy S6, for the initial tests. Although not foreseen for this project phase, we succeeded in providing full sensor readings and integrate the additional information in order to construct contextual models.

Acronym:	SenseFleet
PI:	Thomas Engel
Funding:	FNR - Other
Budget:	400,000 €
Duration:	May 1, 2014 – Oct. 31, 2015
Member:	Thomas Engel (Principal Investigator)
Area:	Communicative Systems
Partner:	Blaise
Description:	Over the last few years, there has been an increasing interest in monitoring driving activities. Information about drivers and the way they drive is useful for several organizations, including car-insurers, fleet managers and traffic safety administrations. Moreover, new smartphones and mobile devices had enabled advance monitoring by embedding different motion sensors, GPS and data connectivity. Due to the increasing market penetration of smartphones, there is a potential for a reliable and distributed sensing platform. In particular, they can be used to identify risky driving maneuvers and compute accurate driver profiles. Such profiles can then be used by insurance companies to provide tailored premiums to their customers. This concept, known as Pay As You Drive (PAYD) or Usage Based Insurance (UBI), is currently undergoing a paradigm shift as the traditional black boxes telematics systems are being replaced, respectively extended by mobile devices. To this end, we developed SenseFleet, a novel driver monitoring system that makes use of embedded smartphone sensors (e.g., GPS, motion sensors) to compute a set of metrics including an overall score that reflects the driving characteristics of a user and thus can be used to identify risky driving maneuvers. The system can optionally be augmented by an additional car-to-device interface that allows retrieving vehicle specific information that can be used as additional input by the system. As opposed to existing systems, SenseFleet is able to provide reliable scores independently from the smartphone model and vehicle used by implementing a novel dynamic profiling algorithm. After a small-scale evaluation study that showed promising results, we aim to validate our system on a much larger scale to demonstrate the reliability of the scoring technique under real and continuous constraints. The result of this validation project will provide evidence on the reliability of the SenseFleet system and open new perspectives and business oppor-

tunities in the telematics market.

Results: Over the last few years, there has been an increasing interest in monitoring driving activities. Information about drivers and the way they drive is useful for several organizations, including car-insurers, fleet managers and traffic safety administrations. Moreover, new smartphones and mobile devices had enabled advance monitoring by embedding different motion sensors, GPS and data connectivity. Due to the increasing market penetration of smartphones, there is a potential for a reliable and distributed sensing platform. In particular, they can be used to identify risky driving maneuvers and compute accurate driver profiles. Such profiles can then be used by insurance companies to provide tailored premiums to their customers. This concept, known as Pay As You Drive (PAYD) or Usage Based Insurance (UBI), is currently undergoing a paradigm shift as the traditional black boxes telematics systems are being replaced, respectively extended by mobile devices.

To this end, we developed SenseFleet, a novel driver monitoring system that makes use of embedded smartphone sensors (e.g., GPS, motion sensors) to compute a set of metrics including an overall score that reflects the driving characteristics of a user and thus can be used to identify risky driving maneuvers. The system can optionally be augmented by an additional car-to-device interface that allows retrieving vehicle specific information that can be used as additional input by the system.

As opposed to existing systems, SenseFleet is able to provide reliable scores independently from the smartphone model and vehicle used by implementing a novel dynamic profiling algorithm. After a small-scale evaluation study that showed promising results, we aim to validate our system on a much larger scale to demonstrate the reliability of the scoring technique under real and continuous constraints. The result of this validation project will provide evidence on the reliability of the SenseFleet system and open new perspectives and business opportunities in the telematics market.

Virtual Security Operation Center as a Service

Acronym: VSOC

Reference: I2R-NET-PFN-14VSOC

PI: Radu State

Funding: FNR - Other

Budget:	122,000 €
Duration:	Jan. 15, 2015 – Jan. 14, 2016
Members:	• Radu State (Principal Investigator) • Fabian Lanze (Researcher) • Raimondas Sasnauskas (Researcher)
Area:	Communicative Systems
Partner:	Telindus
Description:	Virtual Security Operation Center as a Service (VSOCS) is the result of a FNR PoC project aiming at an easy-to-deploy, cloud-based security analytics engine. Supporting various data sources, VSOC uses machine learning, big data processing, and integrates existing SIEM with advanced analytical capabilities, which have been developed by the Secan-Lab / ComSys research group. VSOC coexists smoothly with existing technologies and operates at a significantly increased speed with reduced investment requirements.
Results:	According to the project plan the VSOC team developed a fully functional demonstrator. This demonstrator was a key precondition to address potential clients and introduce advantages and product / service options in first client-meetings. As a result, the majority of the work was spent on the GUI, testing, and validation. The demonstrator shows the automation, service orchestration and data visualization. In the last period we introduced a new API for automatic import of data to VSOC. It allows users to easily collect log data from multiple sources, parse them to a readable format and export them to VSOC for further analysis. We designed this API to be as automated as possible to make it easy to use for VSOC users. When using the Data Source feature of VSOC, the user does not need to create any scripts or install anything on his remote machines to start transmitting data to VSOC. Everything is done through a couple of GUI clicks and Ansible roles in the backend.

The interactive eyeglasses for mobile, perceptual computing

Acronym:	eGlasses
Reference:	I2R-NET-PFN-12CHIS
PI:	Thomas Engel
Funding:	FNR - Other
Budget:	344,000 €
Duration:	Jan. 1, 2014 – Dec. 31, 2016

Members:
- Thomas Engel (Principal Investigator)
- Sébastien Faye (Researcher)
- Gabriela Gheorghe (Researcher)
- Nicolas Louveton (Researcher)
- Stefanie Östlund (Project Coordinator)

Area: Communicative Systems

Partners:
- Gdansk University of Technology
- University of Applied Sciences Upper Austria

Description: The eGlasses project is focused on the development of an open platform in the form of multisensory electronic glasses and on the integration and designing of new intelligent interaction methods using the eGlasses platform. This is an initial development focused on long-term research and technological innovation in perceptual and super-perceptual (e.g. heart rate, temperature) computing. It is an emerging technology that is also focused on the creation of mobile, perceptual media. Perceptual media refers to multimedia devices with added perceptual user interface capabilities. These devices integrate human-like perceptual awareness of the environment, with the ability to respond appropriately. This can be achieved by using automatic perception of an object's properties and delivering information about the object's status as a result of reasoning operations. For example, using the eGlasses, it will be possible to control a device, which is recognized within the field of view using the interactive menu, associated with the identified device. Other examples include presentation of a recognized person name, recognition of people with abnormal physiological parameters, protection against possible head injuries, etc.

The platform will use currently available user-interaction methods, new methods developed in the framework of this project (e.g. a haptic interface) and will enable further extensions to introduce next generation user-interaction algorithms. Furthermore, the goal of this project is to propose and evaluate new and intelligent user interactions, which are particularly useful for healthcare professionals, people with disabilities or at risk of exclusion, and to create and evaluate behavioural models of these mobile users. The main scientific and technological objectives of the project are to design and evaluate the following:

- eye-tracking hardware and algorithms for a user, who is mobile in a noisy real world environment,
- algorithms for perceptual media and for super perceptual computing,
- methods for locating objects and guiding vision towards the identified objects,
- methods of interactions with users and objects (menu of

activities for the identified person or object),
- a haptic interface in a form of a peripheral proximity radar,
- methods for the recognition of the user's own gestures and recognition of gestures of the observed person,
- methods for context-aware behavioural studies,
- methods for reference applications.

The result of the project will be an open platform in the form of multisensory electronic multimedia glasses and a set of new methods for intelligent user interactions, especially in the context of perceptual media.

Results: Realisation of a user study and collaboration on several articles with the members of the consortium, published in an international conference. The study we realised in collaboration with Université de Lorraine (France) was assessing the usability of different text entry methods. Synergies with other projects from SnT have been created, notably by reusing software components (SWIPE software) for context-awareness which gave rise to one submitted publication (accepted early 2016).

5.12 Horizon 2020 (EU) Projects

FIRE+ online interoperability and performance test tools to support emerging technologies from

Acronym: F-INTEROP

PI: Thomas Engel

Funding: Horizon 2020 (EU)

Budget: 2,998,000 €

Duration: Nov. 1, 2015 – Sept. 30, 2018

Members:
- Thomas Engel (Principal Investigator)
- Maria Rita Palattella (Researcher)
- Stefanie Östlund (Project Coordinator)

Area: Communicative Systems

Partners:
- Device Gateway SA
- EANTC AG
- IMINDS
- INRIA
- Institut europeen des normes de telecomminication
- Mandat International (International Cooperation Foundation)
- The connected digital economy catapult limited

- Universite Pierre et Marie Curie
- University of Luxembourg

Description: F-Interop will develop and provide remotely accessible tools to support and accelerate standardization processes and products developments, by offsetting several cost and time barriers. It will research and develop a new FIRE experimental platform to support the development of new technologies and standards, from their genesis to the market for: online interoperability tests and validation tools, remote compliance and conformance tests, scalability tests, Quality of Service (QoS) tests, SDN/NFV interoperability tools, Online privacy test tools, energy efficiency tools.

F-Interop gathers standardization partners together with 3 FIRE federations (Fed4FIRE, IoT Lab, OneLab) to build a common experimental platform as a service. Following an end-user driven methodology, it will directly address the needs of 3 emerging standards: oneM2M led by ETSI, 6TiSCH (IETF) chaired by our Inria partner, Web of Things WG (start Feb 2015) led by W3C, our advisory board member. The open call will extend the platform to other standardization activities, as well as to additional tools extensions and SME products validations. F-Interop will: - Provide online interoperability tools enabling research and development teams to test their products development and implementations at any time, without having to wait until the next face-to-face interop meeting. - Provide an online platform for standards compliance and labelling to be used by the IPv6 Forum Ready Logo Program and other similar labelling bodies, including ETSI, IETF and W3C. - Enable SME to accelerate interoperability and the development of their products and services. - Extend FIRE testbeds and bring them closer to the market. To achieve this ambitious objective, F.-Interop gathers a formidable combination of leading industry experts form standardization bodies, research centres, FIRE testbeds and SMEs from Europe and Japan. The F-Interop Ecosystem will enable sustainable impact, commercial uptake and synergies at EU level.

Results: The H2020 F-Interop project aims to research and develop online testing tools for the Internet of Things, including interoperability, conformance, scalability, Quality of Service (QoS), and privacy tools, among others. During the first year, UL has contributed to integrate security and privacy in the design of the F-Interop Architecture. UL team has also designed SDN-based QoS tools, and privacy tools, levering on traffic analysis, which will be developed in the coming years.

Enabling Crowd-sourcing based privacy protection for smartphone applications, websites and internet of Things deployments

http://www.privacyflag.eu/

Acronym:	Privacy Flag
Reference:	I2R-NET-PEU-15PFLG
PI:	Thomas Engel
Funding:	Horizon 2020 (EU)
Budget:	4,000,000 €
Duration:	May 1, 2015 – April 30, 2018
Members:	• Thomas Engel (Principal Investigator) • Fabian Lanze (Researcher) • Andriy Panchenko (Researcher) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partners:	• Archimede Solutions • CTI - Computer Technology Institute and Press ”Diophantus” • Dunavnet • HWC • Internationak Association of IT Lawyers • Istituto Italiano per la Privacy • Mandat International (International Cooperation Foundation) • OTE • University of Lulea • Velti
Description:	Privacy Flag combines crowd sourcing, ICT technology and legal expertise to protect citizen privacy when visiting websites, using smart-phone applications, or living in a smart city. It will enable citizens to monitor and control their privacy with a user friendly solution provided as a smart phone application, a web browser add-on and a public website. It will: 1. Develop a highly scalable privacy monitoring and protection solution with: • Crowd sourcing mechanisms to identify, monitor and assess privacy-related risks; • Privacy monitoring agents to identify suspicious activities and applications; • Universal Privacy Risk Area Assessment Tool and methodology tailored on European norms on personal data

protection;
- Personal Data Valuation mechanism;
- Privacy enablers against traffic monitoring and finger printing;
- User friendly interface informing on the privacy risks when using an application or website.

2. Develop a global knowledge database of identified privacy risks, together with online services to support companies and other stakeholders in becoming privacy-friendly, including: - In-depth privacy risk analytical tool and services; - Voluntary legally binding mechanism for companies located outside Europe to align with and abide to European standards in terms of personal data protection; - Services for companies interested in being privacy friendly; - Labelling and certification process.

3. Collaborate with standardization bodies and actively disseminate towards the public and specialized communities, such as ICT lawyers, policy makers and academics. 11 European partners, including SMEs and a large telco operator, bring their complementary technical, legal, societal and business expertise; strong links with standardization bodies and international fora; and outcomes from over 20 related research projects. It will build a privacy defenders community and will establish a legal entity with a sound business plan to ensure longterm sustainability and growth.

Results: The project Privacy Flag started in May 2015. Secan-Lab joined the Privacy Flag consortium as an academic partner to conduct research in the area of privacy and anonymity in networks. The outcome will be part of the privacy enablers that are used in Privacy Flag to build well-researched privacy enablers.

In 2015, Secan-Lab carried out research in the area of traffic analysis in Privacy Enhancing Systems. As a first step, a study analyzed the possibilities of website fingerprinting in Tor. The outcome showed that traffic analysis on Tor traffic is a non-neglectable threat, so further research will explore possible countermeasures while providing acceptable quality-of-service.

Processing legal language for normative Multi-Agent Systems

Acronym: ProLeMAS

Reference: I2R-DIR-PEU-15PLMS

PI: Livio Robaldo

Funding: Horizon 2020 (EU)

Budget: 160,800 €

Duration: June 1, 2015 – May 31, 2017

Members:
- Livio Robaldo (Principal Investigator)
- Leon van der Torre (Researcher)

Area: Intelligent and Adaptive Systems

Description: The ProLeMAS project reconnects the textual representation of norms in legal documents with the logical representation of their meaning, in order to improve acceptability by legal practitioners of automatic reasoning on norms. It makes a bridge between deontic logic and natural language semantics, focusing on the modalities and the defeasible conditionals conveyed by norms. More generally, ProLeMAS develops a framework with a natural language processing pipeline able to computationally obtain explicit representations from legal text that is effective and acceptable to lawyers. ProLeMAS opens a new research trend in normative Multi-Agent systems, along three dimensions. First, ProLeMAS enhances the expressive power of deontic logic to formalize the meaning of the phrases constituting sentences, including a wide range of fine-grained intra-sentence linguistic phenomena. Natural language semantics is not part of the NorMAS roadmap, although it has been identified as a critical issue by the current scientific community in deontic logic and normative systems, as witnessed by the special focus on "deontic modalities in natural language" at the DEON 2014 conference. Secondly, ProLeMAS defines a first-order decision theory able to make inferences on norms from legislation as well as agents' goals and attitudes. Third, ProLeMAS will develop a prototype able to extract obligations from laws and codify them in the chosen object logic. No system developed so far by members of the NorMAS community is capable of processing legal documents available on the Web. The prototype that will be implemented in ProLeMAS will use and extend two specific tools: the TULE parser and the Tacitus system.

Results: The project ProLeMAS started on the 1st of June 2015. ProLeMAS aims at (1) filling the gap between the current formalizations in deontic logics and the richness of natural language semantics and (2) Implementing a pipeline from legal text to ProLeMAS formulae, passing through parsing and reasoning. The project is coordinated with the Bulgarian company APIS JSC Europe. As planned in the GAANT chart of the project, the PI of the project spent three months (from Sept 2015 to Dec 2015) in Sofia working with APIS JSC Europe on NLP techniques and methodologies applied to the legal domain, for

mining named entities and other relevant info from legal documents. In the remaining months, the project has been carried out at Luxembourg university and mostly devoted to the achievement of objective (1). The ProLeMAS logic has been preliminary defined in:

[Robaldo et al, 2015] L. Robaldo, L. Humphreys, X. Sun, L. Cupi, C. Santos and R. Muthuri: The ProLeMAS project: representing natural language norms in Input/Output logic, in Proc. of the 9th International Workshop on Juris-informatic (JURISIN 2015). Lecture Noted in Artificial Intelligence. Tokyo, Japan, 2015.

The PI of the project offered his contribution in related research activities, among which it is worth noticing the mapping of recitals to normative provisions. The results of these parallel activities have been described in:

[Humphreys et al, 2015] L. Humphreys, C. Santos, L. di Caro, G. Boella, L. Robaldo, L. van der Torre: Mapping Recitals to Normative Provisions in EU Legislation to Assist Legal Interpretation, in Proc. of the 28th International Conference on Legal Knowledge and Information Systems (JURIX2015). Braga, Portugal, 2015.

Training Augmented Reality Generalized Environment Toolkit

http://www.target-h2020.eu/

Acronym:	TARGET
Reference:	I2R-NET-PEU-15TARG
PI:	Thomas Engel
Funding:	Horizon 2020 (EU)
Budget:	6,000,000 €
Duration:	May 1, 2015 – April 30, 2018
Members:	• Thomas Engel (Principal Investigator) • Nicolas Louveton (Researcher) • Aurel Machalek (Researcher) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partners:	• ATRISc • Arttic • Cleveland Fire Authority • Ecole Nationale Superieure de Police

- Estonian Academy of Security Sciences
- Fachhochschule der Polizei des Landes Brandenburg
- Fraunhofer Institute for Transportation and Infrastructure Systems
- German Police University
- Guardia Civil
- ISCC International Security Competence Centre
- Inconnect
- Institut de Seguretat Pública de Catalunya
- International Security and Emergency management Institute
- Oslo Centre of Science in Society (OCSS)
- VectorCommand LtD

Description: TARGET will deliver a pan-European serious gaming platform featuring new tools, techniques and content for training and assessing skills and competencies of SCA (Security Critical Agents - counterterrorism units, border guards, first responders (police, firefighters, ambulance services civil security agencies, critical infrastructure operators).

Mixed-reality experiences will immerse trainees at task, tactical and strategic command levels with scenarios such as tactical firearms events, asset protection, mass demonstrations, cyber-attacks and CBRN incidents. Trainees will use real/training weaponry, radio equipment, command & control software, decision support tools, real command centres, vehicles. Social and ethical content will be pervasive. Unavailable real-source information will be substituted by AVR (Augmented/Virtual Reality - multimedia, synthetic role players). Near-real, all-encompassing and non-linear experiences will enable high degrees of dynamics and variability.

The distributed Open TARGET Platform will provide extensible standards driven methods to integrate simulation techniques and AVR technology with existing SCA training equipment and be customisable to local languages, national legal contexts, organisational structures, established standard operational procedures and legacy IT systems. At key training points realtime benchmarking of individuals and teams will be instrumented. TARGET will support inter-agency SCA exercising across the EU and act as a serious gaming repository and brokerage facility for authorised agencies to share training material and maximize reuse and efficiency in delivering complex exercises. TARGET, combining training, content and technology expertise, will be co-led by users and technologists, mainly SMEs. 2 successively developed and trialled versions of the TARGET Solution will support user-technologist dialogue. The TARGET Ecosystem will enable sustainable impact, commercial uptake and synergies at EU level.

Results: The mission of TARGET is to develop trial and assess a com-

prehensive open distributed pan-European Platform for serious gaming leveraging state-of-the-art decision support tools, for the training and competence assessment of Security Critical Agents (SCA) including counterterrorism units, border guards and first responders (police, firefighters, ambulance services, civil security agencies or critical infrastructure operators). TARGET favours joint development of serious gaming Training Content (TC) and collaborative transnational training. TARGET will trigger the emergence of a marketplace for sharing, licensing and paying for serious TC between SCA, leveraging the existing European wealth of exercises.

In 2015 the project reached the stage for technology development. Some key decisions had to be made in the case of:

- The identification of Research Ethics compliance issues with the TNA process highlighted in the data collection process; accordance with the rules set by the EC,
- Mixed reality environments - making technologies relevant and applicable to the user, and how the technology being developed will be made commercially exploitable.

5.13 SES-ASTRA Projects

PIL to SPELL conversion

Acronym:	Pil to SPELL
Reference:	I2R-NET-PAU-11PS2C
PI:	Thomas Engel
Funding:	SES-ASTRA
Budget:	not given
Duration:	Jan. 28, 2011 – Jan. 27, 2015
Members:	• Thomas Engel (Principal Investigator) • Stefanie Östlund (Project Coordinator) • Frank Hermann (Collaborator)
Area:	Communicative Systems
Partner:	SES
Description:	Until now, satellite vendors operate their satellites in their own satellite control languages which are restrictive, proprietary, dependent on 3rd party software, and very heterogeneous. As a consequence, SES developed SPELL (Satellite Procedure Execution Language and Library) as a unified and open-source satellite control language usable for each satel-

lite vendor. In order to migrate the existing procedures delivered by the manufacturer Astrium, SES requested for an automated translation that takes Astrium PIL procedures as input and generates equivalent SPELL procedures. This translation has to guarantee a very high standard regarding correctness and reliability in order to minimize the need for revalidation of the generated SPELL procedures.

Results: The industrial partner SES operates a fleet of over 50 satellites in space. Today, most of them are operated using the powerful and efficient open source standard for satellite control software - namely SPELL (satellite procedure execution language and library), for which SES is a driving partner. Parts of this success are based on the joint project PIL2SPELL with SnT.

At the beginning of the project, most of the satellites of SES were operated based on different software languages depending on the various satellite manufacturers, which caused high complexity and costs for operation. SES was faced with the need to convert the existing control software of their satellites into SPELL software - and this in an automated way with a maximal level of precision and correctness. During the project, SnT scientists developed a fully automated translation software that converts satellite control software written in the language PIL (the language of the manufacturer Airbus Space and Defence) into SPELL. In 2012, the satellite Astra2F was the first to be equipped with the converted procedures and was launched in the same year. SnT supported SES engineers with success to adapt the converter software for other satellite manufacturers, such as BOEING and THALES.

In order to meet the strict needs of SES, SnT researchers adapted and extended the formal concepts of graph transformation and the used open source tool called Henshin. The formal results were published at different international conferences on model transformation and the tool received a first prize in an associated tool contest. The formal results have been defined in a general way and can be applied in other research contexts for model transformation as well.

5.14 UL Funding Projects

Secure and Trustworthy Electronic Exam Systems

PI: Peter Ryan

Funding: UL Funding

Budget: not given

Duration: April 1, 2012 – March 31, 2015

Members:
- Peter Ryan (Principal Investigator)
- Gabriele Lenzini (Researcher)
- Rosario Giustolisi (Doctoral Candidate)

Area: Information Security

Description: When, by adopting new technologies, we renew certain established procedures we should evaluate carefully the risks and the threats that may come along. The shift to new technologies should be performed in such a way that the security and trust on those procedures is maintained or improved. This situation is happening for exams systems. Schools and universities are interested in anticipating the publication of results and in offering courses to a larger number of outsiders. Thus, they are offering exam systems that are not any more paper-based but computer or Internet-based. This shift is likely to allow new frauds and collusion which nobody has deeply considered so far. This research project studies the security aspects of exam systems of new generation, that is, electronic exam (e-exam) systems.

CAESAREA

Acronym: CAESAREA

PI: Alex Biryukov

Funding: UL Funding

Budget: not given

Duration: April 15, 2015 – April 14, 2017

Members:
- Alex Biryukov (Principal Investigator)
- Vesselin Velichkov (Researcher)

Area: Information Security

Description: Evaluation and Analysis of Authenticated Encryption Schemes

Collaborative Compound Document Authoring and Annotation

Acronym: CoCoDA^2

PI: Steffen Rothkugel

Funding: UL Funding

Budget: 169,825 €

Duration: Feb. 1, 2014 – Jan. 31, 2017

Members:
- Steffen Rothkugel (Principal Investigator)
- Jean Botev (Collaborator)
- Johannes Klein (Doctoral Candidate)

Areas:
- Communicative Systems
- Intelligent and Adaptive Systems
- Software and Systems

Description: The CoCoDA^2 project focuses on collaboration in compound document systems based on a flexible and more fine-grained document handling than the one provided by existing file abstractions. Taking an interdisciplinary perspective, the efficient collaborative authoring as well as the intra- and inter-item annotation of compound documents particularly for geographically remote users will be investigated. This involves areas of research ranging from network science over concurrency control with operational transformation to the social sciences. The CoCoDA^2 project thus aims at contributing to the general understanding of how the structure of compound documents and collaborative aspects – such as the simultaneous multi-user authoring process itself or the concomitant sharing of semantic data – interact and integrate.

Evolutionary Computing and Performance Guarantees

https://evoperf.gforge.uni.lu/

Acronym: EvoPerf

Reference: F1R-CSC-PUL-11EVOP

PI: Pascal Bouvry

Funding: UL Funding

Budget: 370,000 €

Duration: Sept. 1, 2011 – Aug. 31, 2015

Members:
- Pascal Bouvry (Principal Investigator)
- Grégoire Danoy (Researcher)
- Jakub Muszynski (Researcher)
- Emilia Tantar (Researcher)
- Sébastien Varrette (Researcher)
- Valentin Plugaru (Collaborator)
- Sune Steinbjorn Nielsen (Doctoral Candidate)

Area: Intelligent and Adaptive Systems

Partners:
- Roland Krause (University of Luxembourg)

- Marek Ostaszewski (LCSB)
- Reinhard Schneider (University of Luxembourg)
- Franciszek Seredynski (Cardinal Stefan Wyszynski University Warsaw)
- El-Ghazali Talbi (Université Lille)
- Samee U. Khan (North Dakota State University)

Description: Evoperf aims at providing the bases for robust and performance guaranteed evolutionary computations. Such methods have a large spectrum of applications. By choosing a system biomedicine application, Evoperf aims at performing interdisciplinary research. Many of the real world problems are intractable (NP-Hard), whereas different approaches exist, including problem relaxation or local approaches. However most techniques rely on stochastics to explore different starting points (iterated gradient) or diversify the search (metaheuristics). More than 15 years ago proof of convergences of stochastic based approaches were provided, e.g. in [Kirley2007] for simulated annealing and [Perseus] for genetic algorithms. But, most of the research on genetic type particle algorithms, evolutionary computation and/or Monte Carlo literature seems to be developed with no visible connections to the physical or the mathematical sides of this field. We mention that the design and the mathematical analysis of genetic type and branching particle interpretations of Feynman-Kac semigroups, and vice versa (cf. for instance [Nebro:4122]) has been started by Prof. Del Moral and his collaborators and acknowledged important advances [DelMoral2004feynman, DelMoral2006]. These nice theoretical results are however under-exploited. In the current project we intend to extend the approach to cutting edge parallel and robust multiobjective particle algorithms (differential evolution, cellular genetic algorithms), both at a theoretical and implementation level. Validation will be carried on cutting edge system biomedicine issues, providing new models/tools for gene/protein interaction networks. Where appropriate a set of solvers will be used as part of a multi player game. Based on non-cooperative game theory, it was proved that these games converge to Nash equilibrium. We will also include a decision-theory based approach that will regulate when and how the different players exchange information and share the global cost function by decomposition as to make Nash equilibrium correspond to global optima.

Results: EvoPerf provides the bases for robust and performance-guaranteed evolutionary computations on large-scale distributed platforms. These methods offer a large spectrum of applications in various domains such as systems biomedicine. We adopted a multi-layered approach including: algorithmics (and the corresponding theoretical proofs), platform/middleware and application levels.

At the Algorithmics and theoretical proofs level: A set of tools has been proposed for classifying dynamic multi-objective optimisation problems and analysing their performance. These include the Optimal Subpattern Assignment (OSPA) metric and the online dynamic multi-objective NK-landscape benchmark. The Algorithm-Based-Fault-Tolerance (ABFT) aspects of parallel and distributed EAs against cheating and crash faults have also been characterized. Whereas the inherent resilience of EAs has been previously observed in the literature, this work offered for the first time a formal analysis of the impact of the considered faults over the executed EA.

At the Platform/Middleware level: An in-depth investigation of existing platforms has been conducted, including HPC clusters, P2P solutions, Cloud computing platforms. The overhead of the various solutions has been measured in order to determine the granularity of parallelism that could be achieved. Some evolutionary algorithms have been specifically designed for such platforms. These include a cloud-computing based evolutionary algorithm using a synchronous storage service as pool for exchange information among population of solutions. Also, a P2P EA whose population is structured using the Newscast gossip protocol has been extensively analysed due to its adaptation to all considered distributed and parallel computing platform. The complete theoretical runtime analysis of this new parallel EA permitted to improve the state-of-the-art results proposed in the literature - we improved the previous asymptotic upper bound for the expected parallel running time was from $O(d\sqrt{n})$ to $O(d \log n)$. Volunteer platforms have also been considered. Scalable and fault-tolerant evolutionary algorithms have been designed specifically for both peer-to-peer systems and master-slave platforms. The speed of convergence of such massively parallel evolutionary algorithms has been analysed and efficient policies to overcome the algorithmic loss of quality when the system undergoes high rates of transient failures have been investigated.

At the Application level: In collaboration with the LCSB (Luxembourg Center of Systems Biomedicine), a state-of-the-art protein structure similarity problem has been defined as an optimization one, referred to as the IFP Problem hereinafter. The evaluation of solutions being computationally expensive, a novel benchmark mimicking the properties of the original problem was proposed. The latter was used to conduct large sets of experiments to fine-tune the algorithms. In order to efficiently tackle these hard optimization problems, several contributions have been made in the EAs field. The IFP problem motivated the development of novel diversity preservation techniques, such as the usage of multi-objectivisation with diversity as objective (DAO) and quantile constraints (QC). The latter were evaluated on a set of proteins and the found solu-

tions were validated using extensive molecular structure prediction experiments. Other diversity preserving approaches have also been proposed: preference-based genetic algorithms (PBGAs) and a cooperative selection operator for genetic algorithms able to find best trade-offs between speed of convergence and diversity preservation. In addition, an automated algorithm for the visualization and classification of enzymatic proteins based on self-organising maps was proposed in order to examine whether the functionality is correlated to the secondary structure.

Norm based deontic logic

Acronym: NORM

PI:

Funding: UL Funding

Budget: not given

Duration: July 1, 2012 – July 1, 2015

Members:
- Leon van der Torre (Researcher)
- Xavier Parent (Collaborator)
- Xin Sun (Doctoral Candidate)

Area: Intelligent and Adaptive Systems

Description: A recent trend of Deontic logic is the move from truth-based to norm-based. Several norm-based approach to deontic logic appeared in literature: input/output logic, Hansen's logic of imperatives, and Horty's default logic. The theme of this project will further develop the theories and applications of these three approaches and unify them.

Results:

1. Xin Sun. Input/Output STIT Logic for Normative Systems. In Rule Technologies: Foundations, Tools, and Applications - 9th International Symposium, RuleML 2015, Berlin, Germany, August 2-5, 2015

2. Xin Sun and Diego Agustin Ambrossio. Computational Complexity of Input/Output Logic. In Multi-disciplinary Trends in Artificial Intelligence - 9th International Workshop, MIWAI 2015, Fuzhou, China, November 13-15, 2015

3. Xin Sun. Boolean Games with Norms. In Multi-disciplinary Trends in Artificial Intelligence - 9th International Workshop, MIWAI 2015, Fuzhou, China, November 13-15, 2015

4. Xin Sun and Diego Agustin Ambrossio. On the Complexity of Input/Output Logic. In Logic, Rationality, and In-

teraction - 5th International Workshop, LORI 2015 Taipei, Taiwan, October 28-31, 2015

5. Xin Sun. Boolean Game with Prioritized Norms. In Logic, Rationality, and Interaction - 5th International Workshop, LORI 2015 Taipei, Taiwan, October 28-31, 2015

6. Xin Sun and Livio Robaldo. Logic and Games for Ethical Agents in Normative Multi-agent Systems. In Multi-Agent Systems and Agreement Technologies - 13th European Conference, EUMAS 2015, and Third International Conference, AT 2015, Athens,Greece, December 17-18, 2015

7. Xin Sun and Beishui Liao. Probabilistic Argumentation, a Small Step for Uncertainty, a Giant Step for Complexity. In Multi-Agent Systems and Agreement Technologies - 13th European Conference, EUMAS 2015, and Third International Conference, AT 2015, Athens,Greece, December 17-18, 2015

Reconciling the Uneasy Relationship between the Economics of Personal Data and Privacy

Acronym:	REQUISITE
PI:	Peter Ryan
Funding:	UL Funding
Budget:	not given
Duration:	June 1, 2015 – May 31, 2018
Members:	• Peter Ryan (Principal Investigator) • Qiang Tang (Researcher)
Areas:	• Information Security • Intelligent and Adaptive Systems
Description:	Personal data is nowadays a common commodity in the web space, yet our understanding of cost–benefit trade-offs that individuals undertake when getting involved in digital transactions and disclosing personal data is far from complete. On the one hand, users benefit from personalisation of products and contributing to the societal good, but, on the other hand, might be locked into services and suffer from severe privacy risks, e.g. that data may be compromised once disclosed to a service provider. We focus on healthcare-related personal data and mainly consider two scenarios. One is *public medical research*, where personal data will be used by third-party

organizations (e.g. by various medical labs) to conduct research, such as studying the trend of a disease. The other is *medical recommender systems*, where patients interact with each other and third-party professionals (e.g. doctors, and people from pharmaceutical and insurance companies) for a variety of purposes. These two scenarios only represent a small segment of the whole ecosystem, but they vividly illustrate the dilemma of utility and privacy of sensitive personal data.

In this project, we carry out interdisciplinary research to bridge the theory-practice gap in tackling the privacy issues associated with personal data. We (economists and information security researchers) will investigate the economic incentives behind users' participation in the systems, and subsequently establish models for gains and costs in the two application scenarios. Then, we will apply the concept of *mechanism design* to our scenarios, and propose mechanisms for safeguarding users' utility and privacy against rational attackers (e.g. legitimate participants in the systems). Finally, to complement the developed mechanisms, we will propose new cryptographic protocols to safeguard privacy against potential malicious and irrational attackers (e.g. outside attackers). The task of this project is essentially twofold: economic understanding and modelling, and realization of (rational) cryptographic protocols.

High Performance Computing @ UL

http://hpc.uni.lu/

Acronym:	UL HPC
Reference:	CRC-VRS-COM-11HPCR
PI:	Pascal Bouvry, Sébastien Varrette
Funding:	UL Funding
Budget:	not given
Duration:	July 1, 2007 – Dec. 31, 2020
Members:	• Pascal Bouvry (Principal Investigator) • Sébastien Varrette (Principal Investigator) • Hyacinthe Cartiaux (Collaborator) • Valentin Plugaru (Collaborator)
Description:	The intensive growth of processing power, data storage and transmission capabilities has revolutionized many aspects of

science. These resources are essential to achieve high- quality results in many application areas.

In this context, the University of Luxembourg (UL) operates since 2007 an High Performance Computing HPC facility and the related storage. The aspect of bridging computing and storage is a requirement of UL service – the reasons are both legal (certain data may not move) and performance related.

Nowadays, people from the three faculties and/or the two Interdisciplinary centers within the UL, are users of this facility. Obviously, many CSC members are relying on the platform to perform their research, as highlighted on the corresponding list of publications. More specifically, key research priorities such as Systems Bio-medicine (by LCSB) and Security, Reliability & Trust (by SnT) require access to such HPC facilities in order to function in an adequate environment.

At the end of 2013, the UL HPC facility consists of 4 clusters, featuring a total of 368 nodes (i.e. 3880 computing cores – 43.204 TFlops) and 1996.4 TB of shared raw storage which are all configured, monitored and operated by 2. In addition, a total of 129 servers are operated to pilot the HPC platform and the other deployed services such as Gforge.

In these exciting times, the role of university-based HPC is more critical than ever in providing the foundation for a healthy HPC "ecosystem" for Luxembourg, where computational scientists and HPC-service providers work together in a highly collaborative community. Through their locality to today's research base, and the students who will become our next generation of computational scientists, universities such as the UL are uniquely positioned to deliver excellent return on investment in HPC as a platform for future economic growth.

5.15 Unfunded Projects

Active Learning on Streaming Time Series for Cyber-Physical Security Appliances

PI:	Radu State
Funding:	Unfunded
Budget:	600,000 €
Duration:	Jan. 1, 2015 – Jan. 1, 2018
Members:	• Radu State (Principal Investigator) • Stefanie Östlund (Project Coordinator)

	• Eric Falk (Doctoral Candidate)
Area:	Communicative Systems
Partner:	neXus
Description:	None

Anomaly Detection and Machine Learning with Big Data Systems

PI:	Radu State
Funding:	Unfunded
Budget:	600,000 €
Duration:	Oct. 1, 2015 – Oct. 1, 2017
Members:	• Radu State (Principal Investigator) • Lautaro Dolberg (Researcher) • Stefanie Östlund (Project Coordinator)
Area:	Communicative Systems
Partner:	Choice
Description:	None

Doctoral Thesis: Integrating Compositional and Annotative Approaches for Feature Implementation (working title)

PI:	Steffen Rothkugel
Funding:	Unfunded
Budget:	not given
Duration:	Jan. 1, 2013 – Dec. 31, 2017
Member:	Steffen Rothkugel (Principal Investigator)
Partner:	Benjamin Behringer (Hochschule für Technik und Wirtschaft des Saarlandes)
Description:	Compositional and annotative approaches are two competing yet complementary candidates for implementing feature-oriented software product lines. While the former provides real modularity, the latter excels concerning expressiveness. To combine the respective advantages of compositional and annotative approaches, we aim at unifying their underlying representations by leveraging the snippet system instead of directories and files. In addition, to exploit this unification, we propose different editable views.

This is a collaboration between the University of Luxembourg and the Hochschule für Technik und Wirtschaft des Saarlandes (HTW) with Benjamin Behringer as external PhD student on the project.

Doctoral Thesis: Towards an Integration of Collaborative and Crowd Computing (working title)

PI:	Steffen Rothkugel
Funding:	Unfunded
Budget:	not given
Duration:	Jan. 1, 2015 – Dec. 31, 2019
Members:	• Steffen Rothkugel (Principal Investigator) • Christian Muller (Doctoral Candidate)
Description:	The need to collaborate is omnipresent, both in the physical world as well as in terms of online software. Domains such as learning and work are still treated mostly separately, although their tight integration is effectively required. While each individual person is the main target of that integration, it is beneficial to harness the power of communities of people to perform tasks which are hard to impossible to do by a single person. The main objective of this dissertation is to elaborate on concepts, strategies, and techniques to incorporate both learning as well as work in collaborative software systems in a seamless fashion, and to integrate them with crowd computing.

Self-learning predictive algorithms: from design to scalable implementation

PI:	Radu State
Funding:	Unfunded
Budget:	150,000 €
Duration:	Nov. 1, 2015 – Nov. 1, 2018
Members:	• Radu State (Principal Investigator) • Stefanie Östlund (Project Coordinator) • Manxing Du (Doctoral Candidate)
Area:	Communicative Systems
Partner:	Olamobile

Description: The PhD project focuses on designing prediction algorithms for real-time bidding system. With the support from OLAmobile, our industrial partnering company, we will investigate how to accurately predict user's purchase intention and adjust bidding strategies adaptively in real time for the mobile advertising market, in which less research has been done. We will not only tackle with online analysis of the developed algorithms but also conduct field trails in online mode for evaluation and optimization on the real-time bidding (RTB) platform provided by OLAmobile. The developed algorithms can be further applied to other large-scale real-time applications.

Results: The state-of-the-art of different research problems in computational advertising has been studied, ranging from click through rate (CTR) prediction, bidding strategies design, and auction winning price modeling. CTR prediction is the core task of online advertising monetization. Thus, the basic models like Logistic Regression, Naive Bayes, and Decision Trees are selected to test the prediction performance. We have one week data from our partner company: OLAmobile which contain the clicks and conversions logs. The first test of comparing the performance of the basic models has been done. Logistic regression model yields the highest AUC score so far.

Software Defined Network Service Chaining through Network Analytics

PI: Radu State

Funding: Unfunded

Budget: 90,000 €

Duration: Oct. 1, 2015 – Oct. 1, 2018

Members:
- Radu State (Principal Investigator)
- Stefanie Östlund (Project Coordinator)
- Beltran Fiz Pontiveros (Doctoral Candidate)

Area: Communicative Systems

Partner: Telindus

Description: None

Dependable Systems

Acronym: DepSys

Reference: N/A

PI:	
Funding:	Unfunded
Budget:	not given
Duration:	Oct. 1, 2012 – Feb. 29, 2016
Member:	Alfredo Capozucca (Researcher)
Area:	Software and Systems
Description:	DEPSYS is a project of the Laboratory for Advanced Software Systems at the University of Luxembourg. The aim of this project is to develop tools meant for supporting the software development life cycle of dependable systems. These tools (along with their related material) are used in the course Dependable Systems of the Master in Information and Computer Sciences at the University of Luxembourg.

Chapter 6

Representational Activities

6.1 Conferences and Committee Memberships

Second workshop on Defeasible and Ampliative Reasoning (DARe-15

http://dare2015.yolasite.com/

Location: Buenos Aires, Argentina, July 27, 2015.

Participating CSC Members:

- Giovanni Casini (Organising Committee)

20th IEEE International Conference on Emerging Technologies and Factory Automation (ETFA'2015)

Location: Luxembourg, Luxembourg, Sept. 8, 2015 – Sept. 11, 2015.

Participating CSC Members:

- Nicolas Navet (Programme Chair)
- Lionel Briand (Keynote speaker)

ICAIL 2015 The 15th International Conference on Artificial Intelligence & Law

Location: San Diego, United States, June 8, 2015 – June 12, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

The Joint Ontology Workshops (JOWO-15)

Location: Buenos Aires, Argentina, July 25, 2015 – July 27, 2015.

Participating CSC Members:

- Giovanni Casini (PC Member)

10th IEEE/ACM International Workshop on Automation of Software Test (AST 2015)

http://tech.brookes.ac.uk/AST2015/

Location: Florence, Italy, May 23, 2015 – May 24, 2015.

Participating CSC Members:

- Lwin Khin Shar (Invited Speaker)

10th Workshop on Embedded Systems Security (WESS 2015)

http://www.wess-workshop.org/

Location: Amsterdam, Netherlands, Oct. 8, 2015.

Participating CSC Members:

- Johann Groszschädl (Program Committee Member)

11TH EUROPEAN DEPENDABLE COMPUTING CONFERENCE (EDCC 2015)

http://edcc2015.lip6.fr/

Location: Paris, France, Sept. 7, 2015 – Sept. 11, 2015.

Participating CSC Members:

- Peter Ryan (Program Committee Member)

11th IEEE International Workshop on Factory Communication Systems (WFCS'2015)

Location: Palma de Mallorca, Spain, May 27, 2015 – May 29, 2015.

Participating CSC Members:

- Nicolas Navet (Program Committee Member)

11th International Conference on Information Security Practice and Experience (ISPEC 2015)

Location: Beijing, China, May 5, 2015 – May 8, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

11th International Conference on Innovations in Information Technology (IIT'15)

http://www.it-innovations.ae/iit2015/papers.html

Location: Dubai, United Arab Emirates, Nov. 1, 2015 – Nov. 3, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)
- Grégoire Danoy (Program Committee Member)

11th International Workshop on Security and Trust Management (STM 2015)

Location: Viena, Austria, Sept. 21, 2015 – Sept. 22, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

11th Metaheuristics International Conference (MIC 2015)

http://www.lifl.fr/MIC2015/

Location: Agadir, Morocco, June 7, 2015 – June 10, 2015.

Participating CSC Members:

- Grégoire Danoy (Publicity Chair)
- Grégoire Danoy (Track / Working Group Chair)
- Pascal Bouvry (Program Committee Member)

11th Workshop on Advances in Model Based Testing (A-MOST 2015)

http://www.wikicfp.com/cfp/servlet/event.showcfp?eventid=41954&copyownerid=58591

Location: Graz, Austria, April 17, 2015.

Participating CSC Members:

- Shiva Nejati (Program Committee Member)

12th IEEE International Conference on Fuzzy Systems and Knowledge Discovery (FSKD).

Location: Zhangjiajie, China, Aug. 15, 2015 – Aug. 17, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

13th International Conference on Applied Cryptography and Network Security (ACNS 2015)

http://acns2015.cs.columbia.edu/

Location: New York, United States, June 2, 2015 – June 5, 2015.

Description: The annual ACNS conference focuses on innovative results in applied cryptography and network and computer security. Both academic research works as well as developments in industrial and technical frontiers fall within the scope of the conference.

Participating CSC Members:

- Alex Biryukov (Program Committee Member)

13th International Conference on Service Oriented Computing (ICSOC 2015)

http://icsoc.in/

Location: Goa, India, Nov. 16, 2015 – Nov. 19, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)

13th International Conference on Software Engineering and Formal Methods (SEFM 2015)

http://www.cs.york.ac.uk/sefm2015/

Location: York, United Kingdom, Sept. 7, 2015 – Sept. 11, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)
- Domenico Bianculli (Workshop Organiser / Co-Organiser)

15th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid)

http://cloud.siat.ac.cn/ccgrid2015/

Location: Shenzhen, China, May 4, 2015 – May 7, 2015.

Participating CSC Members:

- Pascal Bouvry (Steering Committee Member)

15th International Conference on Algorithms and Architectures for Parallel Processing (ICA3PP 2015)

http://trust.csu.edu.cn/conference/ICA3PP2015/

Location: Zhangjiajie, China, Nov. 18, 2015 – Nov. 20, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

15th International Conference on Web Engineering (ICWE 2015)

http://icwe2015.webengineering.org/

Location: Rotterdam, Netherlands, June 23, 2015 – June 26, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)
- Duy Cu Nguyen (Program Committee Member)

18th Annual International Conference on Information Security and Cryptology (ICISC 2015)

Location: Seoul, South Africa, Nov. 25, 2015 – Nov. 27, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

18th Information Security Conference 2015 (ISC 2015)

http://isc2015.item.ntnu.no/

Location: Trondheim, Norway, Sept. 9, 2015 – Sept. 11, 2015.

Participating CSC Members:

- Alex Biryukov (Program Committee Member)

18th International ACM Sigsoft Symposium on Component-Based Software Engineering (CBSE 2015)

http://cbse-conferences.org/2015/

Location: Montréal, QC, Canada, May 4, 2015 – May 8, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)

18th International Workshop on Nature Inspired Distributed Computing (NIDISC 2015)

https://nidisc2015.gforge.uni.lu/

Location: Hyderabad, India, May 25, 2015 – May 29, 2015.

Description: Techniques based on metaheuristics and nature-inspired paradigms can provide efficient solutions to a wide variety of problems. Moreover, parallel and distributed metaheuristics can be used to provide more powerful problem solving environments in a variety of fields, ranging, for example, from finance to bio- and health-informatics.

This workshop seeks to provide an opportunity for researchers to explore the connection between metaheuristics and the development of solutions to prob-

lems that arise in operations research, parallel computing, telecommunications, and many others. Topics of interest include, but are not limited to:

- Nature-inspired methods (e.g. ant colonies, GAs, cellular automata, DNA and molecular computing, local search, etc) for problem solving environments.
- Parallel and distributed metaheuristics techniques (algorithms, technologies and tools).
- Applications combining traditional parallel and distributed computing and optimization techniques as well as theoretical issues (convergence, complexity, etc).
- Other algorithms and applications relating the above mentioned research areas.

Participating CSC Members:

- Pascal Bouvry (Programme Chair)
- Grégoire Danoy (Programme Chair)

19th Asia Pacific Symposium on Intelligent and Evolutionary Systems (IES 2015)

http://www.ies-2015.org/

Location: Bangkok, Thailand, Nov. 22, 2015 – Nov. 25, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)
- Grégoire Danoy (Program Committee Member)

19th International Conference on Evaluation and Assessment in Software Engineering (EASE 2015)

http://emse.nju.edu.cn/ease2015/

Location: Nanjing, China, April 27, 2015 – April 29, 2015.

Participating CSC Members:

- Duy Cu Nguyen (Organising Committee)
- Mehrdad Sabetzadeh (Organising Committee)

1st International Workshop on Security Aspects of Cyber-Physical Systems

http://satoss.uni.lu/sacps2015/index.html

Location: London, United Kingdom, June 2, 2015 – June 5, 2015.

Participating CSC Members:

- Samir Ouchani (Co-Chair)

1st International Workshop on UML Consistency Rules (WUCOR 2015)

https://wucor.wordpress.com/program/

Location: Ottawa, Canada, Sept. 28, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)

1st Workshop on the Security of Cyber-Physical Systems (WOS-CPS 2015)

Location: Viena, Austria, Sept. 21, 2015 – Sept. 25, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

20th Australasian Conference on Information Security and Privacy 2015 (ACISP 2015)

http://acisp2015.qut.edu.au/

Location: Brisbane, Australia, June 29, 2015 – July 1, 2015.

Description: ACISP is a key forum for international researchers and industry experts to discuss the latest trends, breakthroughs and challenges in information security and cryptography.

Participating CSC Members:

- Alex Biryukov (Program Committee Member)

20th European Symposium on Research in Computer Security (ESORICS 2015)

http://esorics2015.sba-research.org/

Location: Vienna, Austria, Sept. 21, 2015 – Sept. 25, 2015.

Participating CSC Members:

- Peter Ryan (Co-Chair)

21st Annual International Conference on the Theory and Application of Cryptology and Information Security (ASIACRYPT 2015)

https://www.math.auckland.ac.nz/~sgal018/AC2015/index.html

Location: Auckland, New Zealand, Nov. 29, 2015 – Dec. 3, 2015.

Participating CSC Members:

- Vesselin Velichkov (Program Committee Member)

21st IEEE Pacic Rim International Symposium on Dependable Computing (PRDC 2015)

Location: Zhangjiajie, China, Nov. 18, 2015 – Nov. 20, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

22nd ACM Conference on Computer and Communications Security (ACM CCS 2015)

http://www.sigsac.org/ccs/CCS2015/

Location: Denver, United States, Oct. 12, 2015 – Oct. 16, 2015.

Description: The ACM Conference on Computer and Communications Security (CCS) is the flagship annual conference of the Special Interest Group on Security, Audit and Control (SIGSAC) of the Association for Computing Machinery (ACM). The conference brings together information security researchers, practitioners, developers, and users from all over the world to explore cutting-edge ideas and results. It provides an environment to conduct intellectual discussions. From its inception, CCS has established itself as a high standard research conference in its area.

Participating CSC Members:

- Alex Biryukov (Program Committee Member)

23rd IEEE International Requirements Engineering Conference (RE 2015)

http://re15.org/

Location: Ottawa, Canada, Aug. 24, 2015 – Aug. 28, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)
- Lionel Briand (Invited Speaker)

23rd International Conference on Real-Time and Network Systems (RTNS'2015)

Location: Lille, France, Nov. 4, 2015 – Nov. 6, 2015.

Participating CSC Members:

- Nicolas Navet (Program Committee Member)

24th IEEE International Symposium on Rapid System Prototyping (RSP'2015)

Location: Amsterdam, Netherlands, Oct. 8, 2015 – Oct. 9, 2015.

Participating CSC Members:

- Nicolas Navet (Program Committee Member)

24th IJCAI - International Joint Conference on Artificial Intelligence. Buenos Aires, Argentina. July 25 - 31, July.

Location: Buenos Aires, Argentina, July 25, 2015 – July 31, 2015.

Participating CSC Members:

- Giovanni Casini (PC Member)
- Marcos Cramer (PC Member)
- Christoph Schommer (PC Member)
- Emil Weydert (PC Member)
- Leon van der Torre (PC Member)

27th Benelux Conference on Artificial Intelligence (BNAIC 2015)

http://bnaic2015.org/

Location: Hasselt, Belgium, Nov. 5, 2015 – Nov. 6, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

28th IEEE International Symposium on Computer-Based Medical Systems (CBMS)

Location: Sao Paulo, Brazil, June 22, 2015 – June 25, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

29th annual conference of the Belgian Operational Research Society

http://www.orbel29.be/

Location: Antwerp, Belgium, Feb. 5, 2015 – Feb. 6, 2015.

Description: ORBEL29 is the 29th conference on Operations Research (OR), reuniting the Belgian research community on OR-related topics. ORBEL29 is about exchanging ideas and insights, by stimulating interaction and discussion. The host institution of this year's conference is the University of Antwerp. The organization of ORBEL29 is in the hands of the ANT/OR research group, headed by Prof. Kenneth Sörensen.

Participating CSC Members:

- Raymond Bisdorff (Program Committee Member)

30th ACM/SIGAPP Symposium On Applied Computing (SAC 2015)

http://www.acm.org/conferences/sac/sac2015/

Location: Salamanca, Spain, April 13, 2015 – April 17, 2015.

Participating CSC Members:

- Barbara Kordy (Program Committee Member)
- Mehrdad Sabetzadeh (Program Committee Member)

34th International Conference on Conceptual Modeling (ER 2015)

http://er2015.dsv.su.se/

Location: Stockholm, Sweden, Oct. 19, 2015 – Oct. 22, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)

37th CogSci - Annual Conference of the Cognitive Science Society. Mind, Technology, and Society.

Location: Pasadena, United States, July 23, 2015 – July 25, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

37th International Conference on Software Engineering (ICSE 2015)

http://2015.icse-conferences.org/

Location: Florence, Italy, May 16, 2015 – May 24, 2015.

Participating CSC Members:

- Domenico Bianculli (Publicity Chair)
- Lionel Briand (Program Committee Member)
- Fabrizio Pastore (Invited Speaker)

3rd FME Workshop on Formal Methods in Software Engineering (FormaliSE 2015)

http://www.formalise.org/

Location: Florence, Italy, May 18, 2015.

Participating CSC Members:

- Domenico Bianculli (Invited Speaker)

3rd IEEE WiMoB Workshop on Internet of Things Communications and Technologies 2015 (IOT-CT 2015)

Location: Abu Dhabi, United Arab Emirates, Oct. 19, 2015 – Oct. 21, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

3rd International Conference on Future Internet of Things and Cloud (2015)

Location: Rome, Italy, Aug. 24, 2015 – Aug. 26, 2015.

Participating CSC Members:

- Sylvain Kubler (Track / Working Group Chair)

3rd International Workshop on Security in Cloud Computing (AsiaCCS-SCC 2015)

https://conference.cs.cityu.edu.hk/asiaccsscc/15/

Location: Singapore, Singapore, April 14, 2015.

Participating CSC Members:

- Peter Ryan (Program Committee Member)

3rd International Workshop on Self-Adaptive and Self-Organising Socio-Technical Systems (SASO^ST 2015)

Location: Cambridge, MA, United States, Sept. 25, 2015.

Participating CSC Members:

- Steffen Rothkugel (Program Committee Member)
- Jean Botev (Workshop Organiser / Co-Organiser)

3rd International Workshop on Self-Optimisation in Organic and Autonomic Computing Systems (SAOS 2015)

Location: Porto, Portugal, March 24, 2015.

Participating CSC Members:

- Jean Botev (Program Committee Member)

3rd Workshop on Hot Issues in Security Principles and Trust (HotSpot 2015)

http://www.lucavigano.com/HotSpot2015/

Location: London, United Kingdom, April 18, 2015.

Participating CSC Members:

- Peter Ryan (Program Committee Member)

3rd Workshop on Large-Scale Distributed Virtual Environments (LSDVE 2015)

Location: Vienna, Austria, Aug. 24, 2015.

Participating CSC Members:

- Jean Botev (Program Committee Member)

4th International Conference on Connected Vehicles & Expo (ICCVE 2015)

http://www.iccve.org/2015/

Location: Shenzhen, China, Oct. 19, 2015 – Oct. 23, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

4th International Workshop on Engineering Safety and Security Systems (ESSS 2015)

Location: Oslo, Norway, June 22, 2015.

Participating CSC Members:

- Sjouke Mauw (Co-Chair)
- Jun Pang (Co-Chair)

4th International Workshop on Methods for Establishing Trust of (Open) Data (Method 2015)

Location: Bethlehem, United States, Oct. 11, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

4th International Workshop on Next Generation of System Assurance Approaches for Safety-Critical Systems (SASSUR 2015)

http://safecomp2015.tudelft.nl/sassur-2015

Location: Delft, Netherlands, Sept. 22, 2015 – Sept. 25, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)

5th IEEE International Workshop on Software Certification (WoSoCer 2015)

http://www.mobilab.unina.it/wosocer2015/index.html

Location: Gaithersburg, MD, United States, Nov. 2, 2015 – Nov. 5, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)

5th International Conference on E-Voting and Identity (VoteID 2015)

http://www.voteid15.org/

Location: Bern, Switzerland, Sept. 2, 2015 – Sept. 4, 2015.

Participating CSC Members:

- Peter Ryan (Program Committee Member)

5th International Joint Conference on Pervasive and Embedded Computing and Communication Systems (PECCS 2015)

Location: Angers, France, Feb. 11, 2015 – Feb. 13, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

5th Workshop on Socio-Technical Aspects in Security and Trust (STAST 2015)

Location: Verona , Italy, July 13, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)
- Peter Ryan (Program Committee Member)

7-th International Conference on Intelligent Networking and Collaborative Systems (INCoS-2015)

http://voyager.ce.fit.ac.jp/conf/incos/2015/

Location: Taipei, Taiwan, Sept. 2, 2015 – Sept. 4, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

7th International Conference on Adaptive and Self-Adaptive Systems and Applications (ADAPTIVE 2015)

Location: Nice, France, March 22, 2015 – March 27, 2015.

Participating CSC Members:

- Remus-Alexandru Dobrican (Chair)
- Jean Botev (Program Committee Member)

7th International Conference on Advances in Information Technology (IAIT2015)

Location: Bangkok, Thailand, Nov. 22, 2015 – Nov. 25, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)
- Grégoire Danoy (Program Committee Member)

7th International Congress on Ultra Modern Telecommunications and Control Systems (ICUMT 2015)

http://www.icumt.info/2015/

Location: Prague, Czech Republic, Oct. 6, 2015 – Oct. 8, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)
- Grégoire Danoy (Program Committee Member)

7th International Workshop on Massively Multiuser Virtual Environments (MMVE 2015)

Location: Portland, OR, United States, March 20, 2015.

Participating CSC Members:

- Jean Botev (Program Committee Member)

7th International Workshop on Modeling in Software Engineering (MiSE 2015)

http://2015.icse-conferences.org/call-dates/workshops

Location: Florence, Italy, May 16, 2015 – May 24, 2015.

Participating CSC Members:

- Shiva Nejati (Program Committee Member)

7th International Workshop on Principles of Engineering Service-Oriented and Cloud Systems (PESOS 2015)

https://sse.uni-due.de/pesos2015/

Location: Florence, Italy, May 23, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)

7th NCTA - International Conference on Neural Computation Theory and Applications.

Location: Lissabon, Portugal, Nov. 12, 2015 – Nov. 14, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

8th IEEE International Conference on Software Testing, Verification and Validation (ICST 2015)

http://icst2015.ist.tu-graz.ac.at/

Location: Graz, Austria, April 13, 2015 – April 17, 2015.

Participating CSC Members:

- Lionel Briand (Program Committee Member)
- Dennis Appelt (Invited Speaker)
- Lionel Briand (Invited Speaker)
- Daniel Di Nardo (Invited Speaker)
- Duy Cu Nguyen (Invited Speaker)
- Fabrizio Pastore (Invited Speaker)

8th International Conference on Security of Information and Networks (SIN 2015)

http://www.sinconf.org/sin2015/

Location: Sochi, Russia, Sept. 8, 2015 – Sept. 10, 2015.

Participating CSC Members:

- Johann Groszschädl (Program Committee Member)

9th EAI International Conference on Bio-inspired Information and Communications Technologies - Special Track on Bio-inspired Wireless Network Security (BICTBWNS 2015)

Location: New York, United States, Dec. 3, 2015 – Dec. 5, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

9th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO 2015)

Location: Cambridge, MA, United States, Sept. 21, 2015 – Sept. 25, 2015.

Participating CSC Members:

- Jean Botev (Program Committee Member)

9th International Conference on Information Security, Theory and Practice (WISTP 2015)

Location: Heraklion, Greece, Aug. 24, 2015 – Aug. 25, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

9th International Conference on Network and System Security (NSS 2015)

Location: New York, United States, Nov. 3, 2015 – Nov. 5, 2015.

Description: NSS is an annual international conference covering research in network and system security. The conference seeks submissions from academia, industry, and government presenting novel research on all theoretical and practical aspects of network security, privacy, applications security, and system security. Papers describing case studies, implementation experiences, and lessons learned are also encouraged

Participating CSC Members:

- Alex Biryukov (Program Committee Member)

9thWorkshop in Information Security Theory and Practice (WISTP 2015)

http://wistp2015.wistp.org/

Location: Heraklion, Greece, Aug. 24, 2015 – Aug. 25, 2015.

Participating CSC Members:

- Johann Groszschädl (Program Committee Member)

AAAI-15

Location: Texas, United States, Jan. 25, 2015 – Jan. 30, 2015.

Participating CSC Members:

- Emil Weydert (PC Member)

AAMAS-15: International Conference On Autonomous Agents & Multiagent Systems

Location: Istanbul, Turkey, May 4, 2015 – May 8, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

ACM Conference on Data and Application Security and Privacy (CODASPY 2015)

Location: San Anotnio, United States, March 2, 2015 – March 4, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MODELS 2015)

http://www.modelsconference.org/

Location: Ottawa, Canada, Sept. 27, 2015 – Oct. 2, 2015.

Participating CSC Members:

- Lionel Briand (Steering Committee Member)
- Shiva Nejati (Program Committee Member)

ACM/IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM 2015)

http://eseiw.iscas.ac.cn/eseiw2015/esem/

Location: Beijing, China, Oct. 22, 2015 – Oct. 23, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)
- Mehrdad Sabetzadeh (Organising Committee)

Annual International Computers, Software & Applications Conference (COMPSAC 2015)

Location: Taichung, Taiwan, July 1, 2015 – July 5, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

Annual Privacy Forum (APF 2015)

Location: Luxembourg, Luxembourg, Oct. 7, 2015 – Oct. 8, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

Annual Privacy Forum (APF)

http://2015.privacyforum.eu/

Location: Luxembourg, Luxembourg, Oct. 7, 2015 – Oct. 8, 2015.

Description: Objective: providing a forum to academia, industry and policy makers.

Topic: privacy of electronic communications.

Role: Co-organizer with the European Commission Directorate General for Communications Networks, Content and Technology (DG CONNECT), the European Union Agency for Network and Information Security (ENISA).

Participating CSC Members:

- Thomas Engel (Co-Chair)
- Thomas Engel (Programme Chair)
- Andriy Panchenko (Publicity Chair)
- Andriy Panchenko (Program Committee Member)
- Helga Edwardsdottir (Organising Committee)
- Thomas Engel (Organising Committee)
- Anne Ochsenbein (Organising Committee)
- Andriy Panchenko (Organising Committee)
- Stefanie Östlund (Organising Committee)

Asia-Pacic Symposium on Internetware (Internetware 2015)

Location: Wuhan, China, Nov. 6, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

BalkanCryptSec 2015

https://conferences.matheo.si/event/16/overview

Location: Koper, Slovenia, Sept. 3, 2015 – Sept. 4, 2015.

Participating CSC Members:

- Vesselin Velichkov (Program Committee Member)

COIN-15

Location: Istanbul, Turkey, May 4, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

CORIA - Conférence en Recherche d'Information et Applications

Location: Paris, France, March 18, 2015 – March 20, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

Cybersecurity and Privacy Information Forum (CSP Forum)

Location: Brussels, Belgium, April 28, 2015 – April 29, 2015.

Participating CSC Members:

- Olga Gadyatskaya (Program Committee Member)

Dagstuhl Perspectives Workshop 15362 Present and Future of Formal Argumentation

Location: Wadern, Germany, Aug. 30, 2015 – Sept. 4, 2015.

Participating CSC Members:

- Leon van der Torre (Chair)

Dagstuhl Seminar 15131: Normative Multi-Agent Systems

Location: Wadern, Germany, March 22, 2015 – March 27, 2015.

Participating CSC Members:

- Leon van der Torre (Chair)

Doctoral Symposium at the International Conference on Engineering of Complex Computer Systems (ICECCS 2015)

Location: Gold Coast, Australia, Dec. 9, 2015 – Dec. 12, 2015.

Participating CSC Members:

- Andrzej Mizera (Program Committee Member)

Doctoral Workshop on Mathematical and Engineering Methods in Computer Science (MEMICS 2015)

Location: Madrid, Spain, Oct. 23, 2015 – Oct. 25, 2015.

Participating CSC Members:

- Andrzej Mizera (Program Committee Member)

EAPCogSci - European-Asia-Pacific Conference on Cognitive Science

Location: Torino, Italy, Sept. 25, 2015 – Sept. 27, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

ECML/PKDD. Porto, Portugal. Scientific Track. September 7 - 11.

Location: Porto, Portugal, Sept. 7, 2015 – Sept. 11, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

ECSQARU-15

Location: Compiegne, France, July 1, 2015 – July 17, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

EUMAS-15

Location: Athens, Greece, Dec. 17, 2015 – Dec. 18, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

EVOLVE - A bridge between probability, set-oriented numerics, and Evolutionary Computing

Location: Iasi, Romania, June 18, 2015 – June 24, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

Early Symmetric Crypto 2015 (ESC 2015)

https://www.cryptolux.org/mediawiki-esc2015/index.php/ESC_2015

Location: Clervaux, Luxembourg, Jan. 12, 2015 – Jan. 16, 2015.

Participating CSC Members:

- Alex Biryukov (Co-Chair)

Eighth International Workshop on Requirements Engineering and Law (RELAW 2015)

http://gaius.isri.cmu.edu/relaw/2015/

Location: Ottawa, Canada, Aug. 25, 2015.

Participating CSC Members:

- Mehrdad Sabetzadeh (Program Committee Member)

Eigth International Conference on Contemporary Computing (IC3)

http://www.jiit.ac.in/jiit/ic3/

Location: Noida, India, Aug. 10, 2015 – Aug. 14, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

Eurocrypt 2015

https://www.cosic.esat.kuleuven.be/eurocrypt_2015/

Location: Sofia, Bulgaria, April 26, 2015 – April 30, 2015.

Participating CSC Members:

- Alex Biryukov (Program Committee Member)

European Software Engineering Conference/ACM SIGSOFT Symposium on the Foundations of Software Engineering (ESEC/FSE 2015)

http://esec-fse15.dei.polimi.it/index.html

Location: Bergamo, Italy, Aug. 31, 2015 – Sept. 4, 2015.

Participating CSC Members:

- Domenico Bianculli (Programme Chair)
- Domenico Bianculli (Program Committee Member)
- Lionel Briand (Invited Speaker)

Extreme Green & Energy Efficiency in Large Scale Distributed Systems (ExtremeGreen)

http://avalon.ens-lyon.fr/extremegreen/

Location: Shenzen, China, May 4, 2015 – May 8, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)

FAB 2015 - International Symposium on Foundations and Applications of Big Data Analytics.

Location: Paris, France, Aug. 27, 2015 – Aug. 28, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

Fast Software Encryption 2015 (FSE 2015)

http://light-sec.org/fse2015/

Location: Istanbul, Turkey, March 8, 2015 – March 11, 2015.

Participating CSC Members:

- Dmitry Khovratovich (Program Committee Member)
- Vesselin Velichkov (Program Committee Member)

Fifth International Model-Driven Requirements Engineering workshop (MoDRE 2015)

http://www.modre2015.ece.mcgill.ca/

Location: Ottawa, Canada, Aug. 24, 2015.

Participating CSC Members:

- Arda Göknil (Program Committee Member)
- Mehrdad Sabetzadeh (Program Committee Member)
- Lionel Briand (Keynote speaker)

First International Akoma Ntoso Conference

http://www.akomantoso.org/akoma-ntoso-conference/

Location: Washington DC, United States, Aug. 1, 2015.

Description: With the upcoming release of the new OASIS standard called Akoma Ntoso, the digital representation in XML of legal and legislative documents is coming of age. Increasingly local and national Parliaments, Official Journals and Gazettes, and legislative bodies are adopting, including or considering to switch to Akoma Ntoso due to its completeness and flexibility. Many organizations are considering its adoption even outside of legislation, exploring document types ranging from judgments to hansards, from parliamentary orders of the day to amendment lists.

IANC enlists the participation of the main actors and stakeholders involved in this technological and cultural process with the aim of sharing experiences and building sustainable capacity and know-how in the Akoma Ntoso community.

For these reasons we encourage practitioners, public employees, academics, researchers and activists to contribute and share their experiences in searching, evaluating, adopting, adapting, providing tools and training personnel in using Akoma Ntoso for legal, legislative and other types of documents.

Participating CSC Members:

- Livio Robaldo (Program Committee Member)

First International Workshop on Security Aspects of Cyber-Physical Systems (SACPS 2015)

Location: London, United Kingdom, June 2, 2015 – June 5, 2015.

Participating CSC Members:

- Sjouke Mauw (Chair)

First North American Search Based Software Engineering Symposium (NasBASE 2015)

http://nasbase.org/

Location: Dearborn, Michigan, United States, Feb. 26, 2015 – Feb. 27, 2015.

Description:

Participating CSC Members:

- Shiva Nejati (Program Committee Member)
- Lionel Briand (Keynote speaker)

Fourth International Workshop on Hybrid Systems Biology (HSB 2015)

Location: Madrid, Spain, Sept. 4, 2015 – Sept. 5, 2015.

Participating CSC Members:

- Andrzej Mizera (Program Committee Member)

Grande Region Security and Reliability Day (GRSRD 2015)

https://infsec.uni-trier.de/grsrd2015

Location: Trier, Germany, Nov. 3, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)
- Peter Ryan (Program Committee Member)

HPC School 2015 - Newcomer Training Day

https://hpc.uni.lu/hpc-school/2015/03/index.html

Location: Luxembourg, Luxembourg, March 13, 2015.

Description: The UL HPC management team will offer instructions and practical sessions with the aim to cover the basic usage of the UL HPC platform for newcomers, on the following topics:

- Accessing and interacting with the UL HPC infrastructure

- HPC challenges, especially as regards data and storage management
- HPC workflow management
- Software environment deployment

New members of the UL or HPC beginners should not miss this opportunity to learn about the efficient usage of the HPC platform.

The sessions will take place at the Kirchberg Campus, in B13 and A02.

All tutorials proposed as practical sessions are available on GitHub.

Participating CSC Members:

- Hyacinthe Cartiaux (Track / Working Group Chair)
- Valentin Plugaru (Track / Working Group Chair)
- Sébastien Varrette (Keynote speaker)
- Hyacinthe Cartiaux (Organising Committee)
- Valentin Plugaru (Organising Committee)
- Sébastien Varrette (Organising Committee)

HPC School 2015 - Summer School

https://hpc.uni.lu/hpc-school/2015/06/index.html

Location: Luxembourg, Luxembourg, June 25, 2015 – June 26, 2015.

Description: The University of Luxembourg operates since 2007 a High Performance Computing platform which currently features a total of 518 nodes (in practice, 5316 computing cores) for a cumulative computing power estimated at 87.126 TFlops.

The total raw storage capacity shared within the clusters is currently estimated at 3598.4 TB (NFS + Lustre).

The effective usage of this complex platform is not an easy task and requires both talent and system skills to understand the impact of our personal workflow on the global performance of the system.

The UL HPC management team, together with leading computational scientists of the UL and HPC technologists will offer instructions and practical sessions on a variety of topics, including:

- Access to and interaction with the UL HPC infrastructures
- HPC challenges, especially as regards data and storage management
- HPC workflow management (for sequential and parallel tasks)
- HPC Programming and Usage of the main software available on the platform (Matlab, R, MPI, physics, chemistry, bioinformatics tools) and services (Galaxy) using the platform
- Scientific visualization
- Software environment management
- Virtualization on the clusters linked to the Grid'5000 platform

The aim is to cover basic as well as advanced usage of the platform. Whether

you have no HPC experience or are an advanced user, don't miss this unique opportunity to learn more about the efficient usage of the system.

All sessions will take place at the Limpertsberg Campus, with the main track in the BS 3.03 Auditorium.

All tutorials proposed as practical sessions will be available on GitHub. The detailed program is available here.

48 UL staff and students registered to this summer school, with the participants entitled to 1 ECTS credit offered by the Doctoral School of Computer Science and Computer Engineering (DS-CSCE) upon the successful completion of the sessions.

Participating CSC Members:

- Hyacinthe Cartiaux (Track / Working Group Chair)
- Valentin Plugaru (Track / Working Group Chair)
- Raymond Bisdorff (Invited Speaker)
- Joseph Emeras (Invited Speaker)
- Sune Steinbjorn Nielsen (Invited Speaker)
- Sébastien Varrette (Keynote speaker)
- Hyacinthe Cartiaux (Organising Committee)
- Valentin Plugaru (Organising Committee)
- Sébastien Varrette (Organising Committee)

ICAART - 7th Conference on Artificial Intelligence and Agents

Location: Lissabon, Portugal, Jan. 10, 2015 – Jan. 12, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

IETF 93 OpenWSN/6TiSCH Hackathon

https://bitbucket.org/6tisch/meetings/wiki/150719_ietf93_prague_hackathon

Location: Prague, Czech Republic, July 19, 2015.

Description: The idea of the hackathon is to bring together implementers and enthusiasts of OpenWSN/6TiSCH-related technology to give people a chance to present what they are doing/building with this technology and have some time for some joint development.

Participating CSC Members:

- Thomas Engel (Co-Chair)
- Maria Rita Palattella (Co-Chair)

IFIP International Conference on Topics in Theoretical Computer Science (TTCS 2015)

Location: Tehran, Iran, Aug. 26, 2015 – Aug. 28, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

INTERNATIONAL CONFERENCE ON Tools and Methods of Program Analysis

http://www.exactprosystems.com/conferences/tmpaconference/tmpanovember2015

Location: St Petersbourg, Russia, Nov. 12, 2015 – Nov. 14, 2015.

Participating CSC Members:

- Nicolas Guelfi (Keynote speaker)

ISSRE, 26th IEEE International Symposium on Software Reliability Engineering

http://2015.issre.net/

Location: GAITHERSBURG, United States, Nov. 2, 2015 – Nov. 5, 2015.

Participating CSC Members:

- Nicolas Guelfi (Program Committee Member)

Indocrypt 2015

http://www.crsind.com/events/indocrypt-conference

Location: Bangalore, India, Dec. 1, 2015.

Description: Indocrypt is an annual international cryptography conference held each December since 2000 in India.

Participating CSC Members:

- Alex Biryukov (Co-Chair)

International Conference on Cloud Commuting Technologies and Applications (CloudTech 2015)

http://www.macc.ma/cloudtech15/

Location: Marrakesh, Morocco, June 2, 2015 – June 4, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)
- Grégoire Danoy (Program Committee Member)
- Claudio Fiandrino (Program Committee Member)
- Dzmitry Kliazovich (Program Committee Member)

International Conference on Engineering of Complex Computer Systems (ICECCS 2015)

Location: Gold Coast, Australia, Dec. 9, 2015 – Dec. 12, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

International Conference on Formal Engineering Methods (ICFEM 2015)

Location: Paris, France, Nov. 3, 2015 – Nov. 6, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

International Conference on Future Network Systems and Security (FNSS 2015)

Location: Paris, France, Nov. 23, 2015 – Nov. 25, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

International Conference on ICT Systems Security and Privacy Protection (IFIP SEC 2015)

https://www.ifipsec.org/2015/

Location: Hamburg, Germany, May 26, 2015 – May 28, 2015.

Participating CSC Members:

- Peter Ryan (Program Committee Member)

International Conference on Networked Systems (NetSys 2015)

Location: Cottbus, Germany, March 9, 2015 – March 12, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

International Conference on Security for Information Technology and Communications (SECITC 2015)

Location: Bucharest, Romania, June 11, 2015 – June 12, 2015.

Participating CSC Members:

- Peter Ryan (Program Committee Member)

International Conference on Software Engineering 2015 (ICSE 2015), Demonstrations Track.

Location: Firenze, Italy, May 16, 2015 – May 24, 2015.

Participating CSC Members:

- Dongsun Kim (Program Committee Member)

International Symposium on Search-Based Software Engineering (SSBSE 2015)

Location: Bergamo, Italy, Sept. 5, 2015 – Sept. 7, 2015.

Participating CSC Members:

- Dongsun Kim (Program Committee Member)

International Symposium on Theoretical Aspects of Software Engineering (TASE 2015)

Location: Nanjing, China, Nov. 4, 2015 – Nov. 6, 2015.

Participating CSC Members:

- Jun Pang (Publication and Web Chair)

International Workshop on Applications in Information Technology (IWAIT-2015)

http://kspt.ftk.spbstu.ru/conf/iwait-2015/

Location: Aizu-Wakamatsu, Japan, Oct. 8, 2015 – Oct. 10, 2015.

Participating CSC Members:

- Nicolas Guelfi (Program Committee Member)

International Workshop on Machine learning, Optimization and big Data

Location: Taomino, Italy, July 21, 2015 – July 24, 2015.

Participating CSC Members:

- Christoph Schommer (PC Member)

International Workshop on Mobile, Secure and Programmable Networking (MSPN 2015)

Location: Paris, France, June 15, 2015 – June 17, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

International Workshop on Petri Nets and Software Engineering (PNSE'15)

http://www.informatik.uni-hamburg.de/TGI/events/pnse15/pnse15_eng.html

Location: Brussels, Belgium, June 22, 2015 – June 23, 2015.

Description: Development of complex systems is an everlasting challenge. The workshop addresses this by discussing the whole range of topics that belong to development approaches: theory, software engineering and modelling. With the background of the Petri net and ACSD conference it has on the one hand a strong background in any kinds of Petri nets and related formalisms. On the other hand software engineering and modelling with their much wider facets are also addressed: Formalisms and their theoretical and practical results need to be embedded. Modelling is one of the dominant topics in this perspective.

This year we explicitly invite papers beside the traditionally Petri net biased papers: In addition to more theoretical papers we look for contributions that

put the main emphasize on modelling or software engineering. Papers that aim at the cross-fertilization of applied and theoretical research in the above mentioned areas are most welcome. Especially applications and tools provide settings for empirical and practical research projects, which are of high relevance for the workshop.

Languages supporting the tasks of planning, analyzing, specifying, validation, verification, design, implementation, testing or maintaining. Fundamental concepts and aspects like causality, concurrency, distribution, time, efficiency, correctness, fairness etc. can be addressed with the means of formal modelling as well as with practical means of software engineering. During the workshop we will discuss the mutual dependencies and possibilities of improvements when applied simultaneously.

Participating CSC Members:

- Nicolas Guelfi (Keynote speaker)

International Workshop on Self-Improving System Integration (SISSY 2015)

Location: Grenoble, France, July 7, 2015.

Participating CSC Members:

- Jean Botev (Program Committee Member)

International Workshop-Conference "Tools & Methods of Program Analysis" (TMPA-2015)

http://tmpaconf.org/tmpaconfen

Location: Saint Petersburg, Russia, Nov. 12, 2015 – Nov. 14, 2015.

Description: The challenges of software efficiency and correctness are key for the majority of knowledge-intensive industries in modern economy, including IT, financial sector, transportation, medicine, high-tech industries, and many others. The development of new instruments and methods of program analysis as well as the modification of existing ones is one of the necessary prerequisites to introduce innovation.

The purpose of the conference is raising awareness of progress in the software development industry and promoting cutting edge innovations in software testing, analysis and verification.

The conference program will include plenary reports and mini-courses delivered by experts, presentations selected by the Program Committee, presentations of on-going projects, short reports about new ideas, research that is underway or new tools.

The program will include, and won't be limited to, the following topics:

- software test automation;
- static program analysis;
- verification;
- dynamic methods of program analysis;
- testing and analysis of parallel and distributed systems;
- testing and analysis of high-load and high-availability systems;
- analysis and verification of hardware and software systems;
- methods of building quality software;
- tools for software analysis, testing and verification.

Participating CSC Members:

- Nicolas Guelfi (Keynote speaker)

InternationalWorkshop on Graphical Models for Security (GraMSec 2015)

Location: Verona, Italy, July 13, 2015.

Participating CSC Members:

- Sjouke Mauw (Co-Chair)
- Olga Gadyatskaya (Program Committee Member)
- Ravi Jhawar (Program Committee Member)

JURIX

Location: Barcelona, Spain, Dec. 9, 2015 – Dec. 11, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

LORI-15

Location: Taipei, Taiwan, Oct. 28, 2015 – Oct. 31, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

MATES-15

Location: Cottbus, Germany, Sept. 28, 2015 – Oct. 2, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

Modelling, Computation and Optimization in Information Systems and Management Sciences (MCO)

http://www.lita.univ-lorraine.fr/iccsama2015/MCO/

Location: Metz, France, May 11, 2015 – May 13, 2015.

Participating CSC Members:

- Pascal Bouvry (Program Committee Member)

Ninth IFIP WG 11.11 Internation Conference on Trust Management (IFIPTM 2015)

Location: Hamburg, Germany, May 26, 2015 – May 29, 2015.

Participating CSC Members:

- Sjouke Mauw (Program Committee Member)

PRIMA-15

Location: Bertinoro, Italy, Oct. 26, 2015 – Oct. 30, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

RSA Conference Cryptographers' Track 2015 (CT-RSA 2015)

http://www.rsaconference.com/events/us15

Location: San Francisco, United States, April 20, 2015 – April 24, 2015.

Participating CSC Members:

- Dmitry Khovratovich (Program Committee Member)

RULEML-15

Location: Potsdam, Germany, Aug. 2, 2015 – Aug. 5, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

SCORE-it 2015

http://www.score-contest.it/

Location: Florence, Italy, May 16, 2015 – May 24, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)

SIEP Workshop

Location: KU Leuven, Belgium, March 2, 2015 – March 4, 2015.

Participating CSC Members:

- Marcos Cramer (Chair)

SIEP Workshop

Location: Luxembourg, Luxembourg, Oct. 12, 2015 – Oct. 13, 2015.

Participating CSC Members:

- Marcos Cramer (Chair)

Second International Workshop on Agents and CyberSecurity (ACySe 2015)

https://sites.google.com/site/acyse2015/

Location: Istanbul, Turkey, May 4, 2015 – May 8, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

Software Technologies: Applications and Foundations (STAF 2015)

http://www.disim.univaq.it/staf2015/

Location: L'Aquila, Italy, July 20, 2015 – July 24, 2015.

Description:

Participating CSC Members:

- Lionel Briand (Keynote speaker)

Software Verication and Testing ACM (SAC-SVT 2015)

Location: Salamanca, Spain, April 13, 2015 – April 17, 2015.

Participating CSC Members:

- Jun Pang (Program Committee Member)

Summer School on Verication Technology, Systems & Applications (VTSA 2015)

Location: Koblenz, Germany, Aug. 24, 2015 – Aug. 28, 2015.

Description: The fourth summer school on verification technology, systems & applications takes place at University of Koblenz-Landau in Koblenz, Germany from August 24th to 28th, 2015. All three aspects verification technology, systems & applications strongly depend on each other and that progress in the area of formal analysis and verification can only be made if all three aspects are considered as a whole. Five speakers Bernhard Beckert, Stephanie Delaune, Alberto Griggio, Tobias Schubert and Mihaela Sighireanu stand for this view in that they represent and will present a particular verification technology and its implementation in a system in order to successfully apply the approach to real world verifcation problems. There were about 30 participants for the summer school. More information can be found at http://resources.mpi-inf.mpg.de/departments/rg1/conferences/vtsa15/.

Participating CSC Members:

- Jun Pang (Organizing Chair)

TAFA-15: The 2015 International Workshop on Theory and Applications of Formal Argument

Location: Buenos Aires, Argentina, July 25, 2015 – July 31, 2015.

Participating CSC Members:

- Leon van der Torre (PC Member)

Testing: Academic & Industrial Conference - Practice and Research Techniques (TAIC PART 2015)

http://www2015.taicpart.org/

Location: Graz, Austria, April 17, 2015.

Participating CSC Members:

- Domenico Bianculli (Program Committee Member)

The 2015 IEEE International Conference on Software Quality, Reliability & Security (QRS 2015)

http://paris.utdallas.edu/qrs15/

Location: Vancouver, Canada, Aug. 3, 2015 – Aug. 5, 2015.

Participating CSC Members:

- Lionel Briand (Keynote speaker)

The 9th International Conference on Frontier of Computer Science and Technology (FCST 2015)

http://ncc.dlut.edu.cn/~fcst2015

Location: Dalian, China, Aug. 26, 2015 – Aug. 28, 2015.

Participating CSC Members:

- Grégoire Danoy (Program Committee Member)

Tutorial "Normative MAS and the Law"

http://apice.unibo.it/xwiki/bin/view/PRIMA2015/LegalTexts

Location: Bertinoro, Italy, Oct. 26, 2015.

Description: Normative MAS (NorMAS) combines model for open MAS with models for normative systems dealing, for example, with different types of norms such as constitutive norms, regulative norms, procedural norms, and coordination norms. Indeed, this is one of the most promising answers to a major challenge raised by open distributed software systems: how to make MAS efficient through social models. In this regard, the employment of normative models in MAS has, among other things, the purpose of controlling and coordinating the behaviours of individual autonomous agents and support, for instance, various forms of collaborations.

The law is relevant in NorMAS from at least two perspectives: (a) real legal norms and systems may govern agents' interaction; the design of MAS may get

inspired by the legal model, which is one of the most sophisticated normative paradigms from social science.

This tutorial will offer an introductory outline of three topics in this area that show promising research avenues for the MAS community: (a) Conceptual and formal frameworks for norm mining and reasoning with legal texts; (b) NLP techniques and norm mining; (c) Reasoning about legal norms, legal systems, and legal interpretation.

Participating CSC Members:

- Livio Robaldo (Organising Committee)
- Leon van der Torre (Organising Committee)

Wissenswerte 2015

Location: Bremen, Germany, Nov. 16, 2015 – Nov. 18, 2015.

Description: Presentation of several projects related to sustainable mobility, including the Eco-Driving application for electromobility and driver and vehicle monitoring and profiling.

Participating CSC Members:

- Walter Bronzi (Exhibitor)
- German Castignani (Exhibitor)
- Lara Codeca (Exhibitor)
- Thierry Derrmann (Exhibitor)
- Thomas Engel (Exhibitor)
- Raphaël Frank (Exhibitor)

Workshop on Language and Semantic Technology for Legal Domain (LST4LD)

http://eucases.eu/ranlp/

Location: Hissar, Bulgaria, Sept. 5, 2015 – Sept. 11, 2015.

Description: Legal domain has always been attractive to language and semantic technology because of its importance for the society with respect to globalization and common markets as well as for its challenges for formalization and specific language use. A series of workshops have been organized recently on the topic of NLP and legal domain. For example, JURIX (http://jurix.nl/), JURISIN (http://www.jaist.ac.jp/org/jurisin2014/), SPLeT: (https://sites.google.com/site/splet2014workshop/), among others.

Legal practitioners are feeling increasingly overwhelmed with the expanding set of legislation and case law available these days, which is assuming more and more of an international character. For example, European legislation, which is estimated to be 170,000 pages long, of which over 100,000 pages have been

produced in the last ten years. The European Union (EU) is aware of these difficulties and chose as one of its primary objectives to establish an integrated and standardized system of laws that applies in all member states. The achievement of harmonization is made complex by the fact that legislation is available in unstructured formats, which makes it difficult for users to cut through the information overload. As the law gets more complex, conflicting, and ever-changing, more advanced methodologies are required for analyzing, representing and reasoning on legal knowledge. Legal informatics is experiencing growth in activity, also at the industrial level. Several research projects aimed at designing platforms and web services for helping legal professionals to retrieve the information they are interested in have been approved recently by the EU commission and other institutions. Examples are Legivoc (http://www.legivoc.eu), Openlaws (http://www.openlaws.eu), EUCases (http://eucases.eu).

The development of NLP techniques and semantic technologies for automatic analysis and indexing of big data freely available on the web has created opportunities for building new approaches to improve the efficiency, comprehensibility, and consistency of legal systems. Semantic analysis aims at relating syntactic elements – which could be phrases, clauses, sentences, paragraphs, and whole documents - to their meanings in a given domain, including meanings specific to legal information. On the one hand, in recent years the EU has delivered huge amounts of resources on EU law in many languages (such as, EuroParl, JRC, etc.). On the other hand, the matured NLP and Semantic Web technology provides a good inventory: for formalizing the law data in the form of domain ontologies; for automating the process of relevant knowledge extraction from legal documents; and for representing it in form of Linked Data in RDF. This will support a better search possibilities and a better presentation of the legal information to professional and non-professional stakeholders.

The aims of the workshop is to bring together researchers in the areas of NLP, semantic technologies, legal domain modeling and reasoning as well as practitioners in the area of legal data processing, publishing, etc. to present and discuss their recent developments in this interdisciplinary area. The topics of interest are as follows, but not limited to:

- Ontological modeling of legal data
- Legal reasoning
- Language technologies for processing of legal texts
- Adaptation of language processing modules to legal domain
- Extraction of legal Named entities - legal citations, etc.
- Legal search engines - requirements, implementations, etc.
- Legislation and case law corpora in Linked Open Data

The workshop will be partially supported by the European project EUCases

Participating CSC Members:

- Livio Robaldo (Organising Committee)

Workshop on Language and Semantic Technology for Legal Domain (LST4LD)

Location: Hissar, Bulgaria, Sept. 10, 2015.

Participating CSC Members:

- Livio Robaldo (Programme Chair)

he Fourth International Conference on Smart Systems, Devices and Technologies (SMART 2015)

Location: Brussels, Belgium, June 21, 2015.

Participating CSC Members:

- Ravi Jhawar (Program Committee Member)

6.2 Doctoral Thesis Defenses

Kevin Allix, University of Luxembourg

Date: Oct. 9, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Jacques Klein (Chairman)
- Tegawendé François D Assise Bissyande (Vice-chairman)
- Yves Le Traon (Supervisor)

PhD Defense Jury External Partners:

- Lorenzo Cavallaro (Member)
- Christian Rossow (Member)

Silvano Colombo Tosatto, University of Luxembourg

Date: Jan. 15, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Leon van der Torre (Co-supervisor)
- Pierre Kelsen (Expert)

PhD Defense Jury External Partners:

- Guido Boella (Co-supervisor)
- Guido Governatori (Member)
- Marco Montali (Vice-chairman)

- Stefanie Rinderle-Ma (Chairman)

PhD Advisory Board Members:

- Pierre Kelsen (Member)

Stefano Di Alesio, University of Luxembourg

Date: March 19, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Nicolas Navet (Chairman)

PhD Defense Jury External Partners:

- Shiva Nejati (Vice-chairman)

PhD Advisory Board Members:

- Lionel Briand (Supervisor)

PhD Advisory Board External Partners:

- Arnaud Gotlieb (Expert)
- Sébastien Gérard (Member)
- Jean-Charles Régin (Member)

Donia El Kateb, University of Luxembourg

Date: Jan. 22, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Pascal Bouvry (Chairman)
- Tejeddine Mouelhi (Vice-chairman)
- Yves Le Traon (Supervisor)

PhD Defense Jury External Partners:

- Benoît Baudry (Member)
- Antonia Bertolino (Member)

Agata Grzybek, University of Luxembourg

Date: July 27, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Pascal Bouvry (Supervisor)
- Grégoire Danoy (Member)

PhD Defense Jury External Partners:

- Marcin Seredynski (Member)
- Krzysztof Szczypiorski (Vice-chairman)
- Denis Zampunieris (Chairman)

PhD Advisory Board Members:

- Grégoire Danoy (Advisor)
- Marcin Seredynski (Member)

PhD Advisory Board External Partners:

- Marcin Seredynski (Member)

Christopher Henard, University of Luxembourg

Date: May 27, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Lionel Briand (Chairman)
- Mike Papadakis (Vice-chairman)
- Yves Le Traon (Co-supervisor)

PhD Defense Jury External Partners:

- Myra Cohen (Member)
- Mark Harman (Member)
- Jean-Marc Jezequel (Member)

Yasir Imtiaz Khan, University of Luxembourg

Date: April 1, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Pascal Bouvry (Chairman)
- Raymond Bisdorff (Vice-chairman)
- Nicolas Guelfi (Supervisor)

PhD Defense Jury External Partners:

- Didier Buchs (Member)
- Matteo Risoldi (Member)

Yu Li, University of Luxembourg

Date: April 30, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Raymond Bisdorff (Chairman)
- Zdzislaw Suchanecki (Vice-chairman)
- Ulrich Sorger (Supervisor)

PhD Defense Jury External Partners:

- Fernando Gomez-Cubillo (Member)
- Zbigniew Michna (Member)

Zhe Liu, University of Luxembourg

Date: Nov. 10, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Volker Müller (Chairman)
- Alex Biryukov (Vice-chairman)
- Jean-Sébastien Coron (Supervisor)

PhD Defense Jury External Partners:

- Patrick Longa (Member)
- David Naccache (Member)

Edmundo Lopez, University of Geneva

Date: May 15, 2015
Location: Geneva, Switzerland

PhD Defense Jury Members:

- Nicolas Guelfi (Member)

Jakub Muszynski, University of Luxembourg

Date: Jan. 9, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Pascal Bouvry (Supervisor)
- Sébastien Varrette (Member)

PhD Defense Jury External Partners:

- Francisco Fernandez de Vega (Member)
- Ivan Nourdin (Chairman)
- Franciszek Seredynski (Vice-chairman)

PhD Advisory Board Members:

- Pascal Bouvry (Member)

PhD Advisory Board External Partners:

- Franciszek Seredynski (Member)
- Sebastien Varrette (Member)

Phu Nguyen, University of Luxembourg

Date: Sept. 10, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Pierre Kelsen (Chairman)
- Jacques Klein (Vice-chairman)
- Yves Le Traon (Supervisor)

PhD Defense Jury External Partners:

- Jörg Kienzle (Member)
- Riccardo Scandariato (Member)

Mikolaj Podlaszewski, University of Luxembourg

Date: March 13, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Pierre Kelsen (Chairman)
- Leon van der Torre (Supervisor)

PhD Defense Jury External Partners:

- Richard Booth (Expert)
- Martin Caminada (Member)
- Anthony Hunter (Vice-chairman)
- Mogdil Sanjay (Member)

Ivan Pustogarov, Université du Luxembourg

Date: June 12, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Volker Müller (Chairman)
- Alex Biryukov (Supervisor)

PhD Defense Jury External Partners:

- Mark Harman (Member)
- Thorsten Holz (Vice-chairman)
- Aaron Johnson (Member)

Praveen Kumar Vadnala, Université du Luxembourg

Date: May 29, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Volker Müller (Chairman)
- Jean-Sébastien Coron (Supervisor)

PhD Defense Jury External Partners:

- Louis Goubin (Vice-chairman)
- Emmanuel Prouff (Member)
- François-Xavier Standaert (Member)

Srinivas Venkatesh, Université du Luxembourg

Date: May 12, 2015
Location: Luxembourg, Luxembourg

PhD Defense Jury Members:

- Volker Müller (Chairman)
- Jean-Sébastien Coron (Supervisor)

PhD Defense Jury External Partners:

- David Galindo (Member)
- Fouque Pierre-Alain (Member)
- Martijn Stam (Vice-chairman)

6.3 Awards

The following awards were bestowed upon members of the CSC:

- Distinguished Paper Award FSE 2015 for ”Rotational Cryptanalysis of ARX Revisited”, March 11, 2015
  Recipients: Dmitry Khovratovich
  Paper ”Rotational Cryptanalysis of ARX Revisited”

- Distinguished Paper Award FSE 2015 for ”Meet-in-the-Middle Attacks and Structural Analysis of Round-Reduced PRINCE” , March 11, 2015
  Recipients: Patrick Derbez, Léo Paul Perrin
  Paper ”Meet-in-the-Middle Attacks and Structural Analysis of Round-Reduced PRINCE”

- Best Paper Award for the 3rd International Conference on Human Aspects of Information Security, Privacy and Trust, in the context of HCI International 2015, Aug. 7, 2015
  Recipients: Ana Ferreira, Jean-Louis Huynen, Gabriele Lenzini

Best Paper Award of the 3rd International Conference on Human Aspects of Information Security, Privacy and Trust conferred to Ana Ferreira, Jean-Louis Huynen, Vincent Koenig, Gabriele Lenzini and Salvador Rivas (University of Luxembourg, Luxembourg) for the paper entitled "Do Graphical Cues Effectively Inform Users? A Socio-technical Security Study in Accessing WiFi Networks".

Presented in the context of HCI International 2015 2-7 August 2015, Los Angeles, CA, USA (http://2015.hci.international/pagesmith/146, http://hdl.handle.net/10993/20782)

- Distinguished Paper Award ACM FSE 2015, Sept. 4, 2015
  Recipients: Lionel Briand, Reza Matinnejad, Shiva Nejati

- Best Reviewer Award ESEC/FSE 2015, Sept. 6, 2015
  Recipients: Domenico Bianculli

- Best Paper Award for "A study on ethical aspects and legal issues in e-learning", Sept. 12, 2015
  Recipients: Thomas Engel, Andriy Panchenko, Stefanie Östlund
  Best Paper Award of the 8th International Conference on E-Learning (e-Learning'15) conferred to Stefanie Oestlund, Andriy Panchenko and Thomas Engel (University of Luxembourg, Luxembourg) for the paper entitled

  "*A study on ethical aspects and legal issues in e-learning*"

  Presented in the context of 8th International Conference on E-Learning 11-12 September 2015, Berlin, Germany

  http://elearning-conf.eu/index.php?cmd=gsPage&pid=index

- Appointed as an ECCAI fellow, Oct. 10, 2015
  Recipients: Leon van der Torre
  Leon van der Torre was appointed as an ECCAI fellow in 2015:

  https://www.eurai.org/awards_and_grants/fellows

- Password Hashing Competition, Dec. 6, 2015
  Recipients: Alex Biryukov, Dumitru-Daniel Dinu, Dmitry Khovratovich
  Process to select the best password hashing primitive for standardization (same kind of process as NIST's AES and SHA3 competitions).

- Best Paper Award for "Luxembourg SUMO Traffic (LuST) Scenario: 24 Hours of Mobility for Vehicular Networking Research", Dec. 18, 2015
  Recipients: Lara Codeca, Thomas Engel, Raphaël Frank
  Best Paper Award of the IEEE Vehicular Networking Conference (VNC) 2015 conferred to Lara Codeca, Raphael Frank and Thomas Engel (University of Luxembourg, Luxembourg) for the paper entitled

  "*Luxembourg SUMO Traffic (LuST) Scenario: 24 Hours of Mobility for Vehicular Networking Research*"

  Presented in the context of IEEE Vehicular Networking Conference 16-18 December 2015, Kyoto, Japan (http://www.ieee-vnc.org/)

6.4 Media Appearances

Members of the CSC have made the following media appearances:

- Marketers: “#MktDay : découvrez les lauréats de l’édition 2015”
  News (Internet), Oct. 23, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://www.marketers.lu/article/mktday-decouvrez-les-laureats-de-l-edition-2015

- Letzebuerger Gemengen: “Retour sur la Journée Mondiale de la Normalisation 2015 au Grand Duché”
  Article (Magazine), Oct. 20, 2015
  Members: Pascal Bouvry

- PaperJam: “nous allons rester à la vitesse supérieure”
  Article (Internet), Oct. 17, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://paperjam.lu/questions/nous-allons-passer-a-la-vitesse-superieure

- Automotion: “sensibiliser le conducteur”
  Article (Internet), Oct. 13, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://www.automotion.lu/article/raphael-frank-unilu-sensibiliser-le-conducteur

- Science Business: “This app could lead to cheaper car insurance”
  Article (Internet), Oct. 13, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://www.sciencebusiness.net/news/77242/This-app-could-lead-to-cheaper-car-insurance

- Letzebuerger Gemengen: “Normalisation: Des enjeux importants”
  Article (Magazine), Oct. 6, 2015
  Members: Pascal Bouvry

  

  http://www.gemengen.lu/2015/10/06/normalisation-des-enjeux-importants/

- House of Training: “Certificate Smart ICT for Business Innovation”
  Article (Internet), Oct. 1, 2015
  Members: Pascal Bouvry

- Soluxions: “Formation Smart ICT for Business Innovation: c’est parti!”
  Article (Magazine), Sept. 1, 2015
  Members: Pascal Bouvry
- Paperjam: “Certificate Smart ICT for Business Innovation”
  Article (Magazine), Sept. 1, 2015
  Members: Pascal Bouvry, Grégoire Danoy
- delano.lu: “SHOW YOUR LOVE FOR ONLINE CONTENT”
  Article (Internet), Aug. 31, 2015
  Members: Alex Biryukov

  

  http://delano.lu/news/show-your-love-online-content
- Letzebuerger Gemengen: “Une innovante certification universitaire en Smart ICT”
  Article (Magazine), July 15, 2015
  Members: Pascal Bouvry
- Luxemburger Wort: “App-Idee gewinnt”
  Article (Newspaper), July 3, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://motion-s.com/app/uploads/2015/10/03.07-Journal.pdf
- Luxemburger Wort: “App ”Game of roads” gewinnt Wettbewerb”
  Article (Newspaper), July 2, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://motion-s.com/app/uploads/2015/10/02.07-Wort-3.pdf
- Letzebuerger Journal: “App-Idee gewinnt”
  Article (Internet), July 2, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  

  http://www.journal.lu/article/app-idee-gewinnt/
- science.lu: “Virtuelles Geld: Benutzeridentität lässt sich viel leichter ermitteln als bisher angenommen”
  Article (Internet), July 1, 2015
  Members: Alex Biryukov

  

  http://178.62.27.218/de/content/virtuelles-geld-benutzeridentität-lässt-sich-viel-leichter-ermitteln-als-bisher-angenommen

- Luxemburger Wort: “Premier prix symbolique”
  Article (Newspaper), July 1, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  http://motion-s.com/app/uploads/2015/10/01.07-Wort.pdf

- Chronicle.lu: “Start-up Motion-S Wins Mind & Market Competition for Game of Roads App”
  Article (Internet), July 1, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  http://www.chronicle.lu/categoriesworkingawards/item/12112-start-up-motion-s-wins-mind-market-competition-for-game-of-roads-app

- PaperJam: “Mind&Market in Luxembourg, Innovation Forum - 30/06/15”
  News (Internet), July 1, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  http://paperjam.lu/picture-report/mindmarket-luxembourg-innovation-forum-300615

- Luxemburger Wort: “Motion-S remporte le premier concours de start-ups”
  Article (Internet), June 30, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  http://www.wort.lu/fr/economie/mind-market-motion-s-remporte-le-premier-concours-de-start-ups-5592d27e0c88b46a8ce5c126

- science.lu: “Schwimmbad statt Stau: Verkehrsstudie ermöglicht kostenlose Zugang zu Freizeitaktivitäten”
  Article (Internet), June 19, 2015
  Members: Tigran Avanesov, Thomas Engel, Martin Kracheel, Roderick McCall

- Chronicle.lu: “I-GEAR Project-Incentives and Gaming Environments for Automobile Routing”
  Article (Internet), June 15, 2015
  Members: Tigran Avanesov, Thomas Engel, Martin Kracheel, Roderick McCall

  http://wwwen.uni.lu/recherche/flshase/education_culture_cognition_and_society_eccs/projects_phd_theses_and_publications/i_gear_incentives_and_gaming_environments_for_automobile_routing

- Delano: “Certificate Smart ICT for Business Innovation”
  Article (Magazine), June 1, 2015
  Members: Pascal Bouvry

- deutschlandfunk: “Gutes tun im Leerlauf”
  Interview (Radio), May 23, 2015
  Members: Johann Groszschädl

  
  http://www.deutschlandfunk.de/online-spenden-gutes-tun-im-leerlauf.684.de.html?dram:article_id=320712

- wort.lu: “Comment générer de l’argent avec «J’aime»”
  Article (Internet), May 15, 2015
  Members: Alex Biryukov

  
  http://www.wort.lu/fr/economie/universite-du-luxembourg-comment-generer-de-l-argent-avec-j-aime-555375eb0c88b46a8ce59335

- Delano: “Digital Innovation Certificate”
  Article (Magazine), May 8, 2015
  Members: Pascal Bouvry

  
  http://delano.lu/news/digital-innovation-certificate

- PaperJam: “Notre spin-off souhaite devenir incontournable”
  News (Internet), April 28, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  
  http://paperjam.lu/rendez-vous/notre-spin-souhaite-devenir-incontournable

- Telecran: “Die zündende Idee”
  Article (Newspaper), March 28, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  
  http://motion-s.com/app/uploads/2015/10/TELECRAN_03-15.pdf

- Chronicle.lu: “La Baloise Insurance Launches Game of Roads on 125th Anniversary”
  Article (Internet), March 20, 2015
  Members: German Castignani, Thomas Engel, Raphaël Frank

  
  http://www.chronicle.lu/categorieslivingmotoring/item/10764-la-baloise-insurance-launches-game-of-roads-on-125th-anniversary

- RTL: “Nei Facebook-Arnaque op Lëtzebuergesch?”
  News (TV), March 10, 2015

Members: Jean-Louis Huynen, Gabriele Lenzini

http://www.rtl.lu/letzebuerg/614951.html

- parliament.uk: “The darknet and online anonymity”
  Article (Internet), March 9, 2015
  Members: Alex Biryukov

http://researchbriefings.parliament.uk/researchbriefing/summary/POST-PN-488

- Paperjam: “Smart ICT for Business Innovation”
  Column (Magazine), March 1, 2015
  Members: Pascal Bouvry
- Solutions: “Certificat universitaire Smart ICT for Business Innovation”
  Article (Magazine), Feb. 6, 2015
  Members: Pascal Bouvry
- PaperJam: “Une spécialisation inédite en ICT”
  Column (Magazine), Feb. 1, 2015 , issue Février 2015, p. 1
  Members: Pascal Bouvry
- Paperjam: “Smart ICT for Business Innovation”
  Column (Magazine), Feb. 1, 2015
  Members: Pascal Bouvry
- www.srf.ch: “Darknet – ein Verstärker der menschlichen Natur? ”
  Article (Internet), Jan. 23, 2015
  Members: Alex Biryukov

http://www.srf.ch/news/wirtschaft/wef-2015/darknet-ein-verstaerker-der-menschlichen-natur

6.5 Guests

The following guest researchers were invited to the CSC:

- Associate Professor Alessandro Armando (University of Genova and FBK, Italy)
  Sept. 18, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: SnT Research Seminar ”Automated Analysis of Security Protocols and Multi-party Web Applications”

  Abstract: Alessandro will give a survey of the research activities he has been involved in recent years. This includes work on the automated analysis of security protocols and multi-party web applications, identity management, security of mobile apps, controlled information disclosure.

Alessandro Armando received his M.Eng. in 1988 and his PhD in Computer Engineering at the University of Genova in 1994. His appointments includes a position as research fellow at the University of Edinburgh and at INRIA-Lorraine (France). He is Associate Professor at the University of Genova where he teaches Computer Security and Head of the Security & Trust Research Unit at FBK-IRST in Trento. He has more than 80 publications in international journals and conferences, and has been program chair of conferences and workshops in the area of Automated Reasoning and Computer Security. He has been coordinator and principal investigator of several national and EU research projects. His research interests are on Automated Reasoning and its application to the modelling, design, and verification of security-critical systems. He contributed to the discovery of an authentication flaw in the SAML 2.0 Web-browser SSO Profile and of a serious man-in-the-middle attack on the SAML-based SSO for Google Apps.

- Professor Michael Backes (University of Saarland, Germany)
  Jan. 20, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: Distinguished lecture at the SnT

- Assistant Professor Davide Balzarotti (EURECOM, France)
  Oct. 27, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: SnT Research Seminar

  "Web-Application Security - Beyond Injection Attacks"

  Abstract: In the past decade, a considerable effort has been spent to improve the security of web applications, and a large fraction of this work has focused on mitigating injection flaws based on lack of input validation. In few words, an input validation vulnerability arises when a web application uses malicious input as part of a sensitive operation, without properly verifying or sanitizing the input values prior to their use. SQL Injection, Cross-site scripting, and Parameter pollution are popular examples of this category. However, other most subtle types of vulnerability did not receive as much attention.

  In this presentation we will discuss two other classes of flaws that can affect web applications: logic vulnerabilities in the control plane (i.e., the navigation between different pages) and in the data plane (i.e., the data flow that links together parameters of different pages) of a web site, and special functionalities that can be misused by attackers for malicious purposes (with a focus on data compression and server-side requests).

  Davide Balzarotti, is an Assistant Professor at EURECOM, where he is leading (together with Aurélien Francillon) the software and system security group. His research interests include most aspects of system security and in particular the areas of intrusion detection and prevention, binary and malware analysis, reverse engineering, and web security. Davide coauthored more than 60 international publications and he regularly serves as part of the technical program committees of all the top security conferences. He was program chair of RAID in 2012 and Eurosec in 2014.

  Before joining EURECOM, Davide spent almost two years in Santa Barbara as a postdoctoral researcher in the Department of Computer Science at

UCSB, working in the Computer Security Lab with professor Giovanni Vigna and professor Richard Kemmerer.

In 2007 he participated in the red team involved in testing the capability and security of the voting machines certified for use in the State of Ohio (Project Everest) and in the red team involved in the top-to-bottom review of the electronic voting machines certified for use in California. He received his PhD in Computer Engineering from Politecnico di Milano in 2006 with a dissertation on "Testing Network Intrusion Detection Systems".

- Prof. David Basin (ETH Zurich, Switzerland)
  April 28, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: SnT Distinguished Lecture

  Title: "Monitoring Policy Compliance"

  Abstract: In security and compliance, it is often necessary to ensure that agents and systems comply to complex policies. This includes data protection policies, access control policies, and general usage-control policies stipulating how data can and must not be used. For example, in banking one may have financial reporting requirements such as every transaction of a customer, who has within the last 30 days been involved in a suspicious transaction, must be reported as suspicious within 2 days.

  We present an approach to the automated monitoring of such policies either online during system execution, or offline during audit. Policies are formulated in an expressive formal language (namely metric first-order temporal logic), and monitors are automatically generated from specifications. We report on our experience using this approach in different case studies in security and compliance monitoring.

  David Basin is a professor of Computer Science at ETH Zurich where he heads the institute for Information Security. He received his Ph.D. in Computer Science from Cornell University in 1989 and his Habilitation in Computer Science from the University of Saarbrucken in 1996. From 1997–2002 he held the chair of Software Engineering at the University of Freiburg in Germany. His research areas are Information Security and Software Engineering. He is the founding director of the ZISC, the Zurich Information Security Center, which he led from 2003-2011. He is Editor-in-Chief of Springer-Verlag's book series in Information Security and Cryptography and serves on the editorial boards of numerous journals including IEEE Transactions on Information and System Security and Acta Informatica.

- Floris Bex (Utrecht University)
  June 29, 2015 – June 30, 2015, hosted by Leon van der Torre

- Prof. Xavier Blanc (Bordeaux University, France)
  Dec. 15, 2015, hosted by Domenico Bianculli, Lionel Briand
  Reason: SnT Research Seminar "Internet Speed Software Evolution"

  Abstract: The success of Internet has provoked a mess in software maintenance. All applications that are designed to run on the Internet must not

only fulfill all user requirements, which are more and more frequent and heterogeneous, but also must support the Internet evolutions. Further, they have to evolve at the Internet speed for not being deprecated and then unused.

The main problem is that internal factors that drive the maintenance of traditional applications, such as code quality for instance, becomes unpromising in front of external factors that broadly consider the evolution of Internet.

This talk addresses Internet speed software evolution. It aims to define factors and facilities that will drive the maintenance of applications designed to run on the Internet. For that purpose, it uses source code analysis coupled with statistical measures of large set of applications with the objective to exhibit evolution trends, and to leverage on them.

Xavier Blanc obtained his Ph.D degree from Paris 6 University in 2001. He worked on software modeling for E.D.F (Electricité de France). He then joined Softeam in 2001 as a software architect. In 2002, he joined University Paris 6 as associate professor. We worked on model driven engineering. He holds a Research Direction Habilitation in Computer Science from Paris 6 University in 2009.

He is currently full professor at the Bordeaux University. From 2011 to 2014 he was deputy director of the computer science laboratory (LaBRI) of the Bordeaux University. Since 2015 he is the head of the ProgResS (Software Enginering and Network computing) group of this laboratory.

His current research is about software evolution. He works on repository mining and on static analysis. He advised 10 PhD (2 are in progress). He is involved in several national and European contracts.

- Prof. Dr. Raouf Boutaba (University of Waterloo)
  May 4, 2015, hosted by Thomas Engel, Radu State
  Reason: Join supervision of a phd student.

- Dr. Benjamin Braatz (Graph-IT GmbH)
  Nov. 9, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Prof. Mats Brorsson (KTH Royal Institute of Technology, Sweden)
  Jan. 26, 2015, hosted by Yves Le Traon, Björn Ottersten
  Reason: SnT Research Seminar "Embracing diversity in Languages and Architectures"

  Abstract: Parallel computing platforms are getting more and more diverse. Specialized solutions for embedded applications have been accepted as long as they are well understood and contribute to the end goal. As of lately, this is an increasing trend also in high-performance computing. GPU accelerators are routinely used to supplement regular multicore CPU resources. At the same time, the software development environment has also become more diverse. There is a host of languages, frameworks and platforms that might be domain specific, platform dependent or in other ways incompatible with each other. At the end of the day, there is no a

critical-mass software solution that maps to a sizable fraction of either embedded platforms or HPC platforms. Current state-of-the-art in parallel programming for heterogeneous platforms is limited to singular aspects of the vast design space. Application specific languages exist but typically target particular domain specific processors or the challenges of a particular application on general purpose processors. Operating systems are not dealing with heterogeneous systems, user-mode run-times and schedulers are not yet good at dealing with the challenges and opportunities of heterogeneous hardware and complex software systems. It is difficult to analyze, debug and predict performance of parallel software composed from independently developed sub-components. Compilers and run-time systems typically do not take advantage of run-time feedback to improve on their code quality. In this talk I will outline a proposal for where I believe research and development should take to tackle these challenges. It is centered around the concept of a common intermediate language, that unifies the currently disparate programming environments and can be efficiently mapped to several of the now increasingly widespread heterogeneous platforms.

Mats Brorsson holds a Ph.D. in Computer Systems Engineering (1994) and a M.Sc. in Electrical Engineering (1985) both from Lund University, Sweden. Since 2000 he holds a chair in computer architecture at KTH and is since 2009 cross-appointed as senior researcher at SICS. Before 2000 he was associate professor at Lund University. He has been visiting scientist at IBM T.J. Watson research lab (1988-89) where he contributed to the RP3-project, visiting research associate at University of Toronto (1996) and visiting professor at Fudan University (2007). In 1999 he initiated the European Workshop on OpenMP (EWOMP) series and organized the first (1999) and the last (2004) EWOMP workshops. Prof. Brorsson has authored and co-authored numerous scientific papers in international conferences and journals (h-index 14, total citations 782 in Google scholar). His current research is in programming models, run-time systems, operating systems and the architecture of parallel computer systems in particular multi- and manycore systems. He has participated in several European and national projects and is currently coordinating the ARTEMIS-2011 project PaPP. Prof. Brorsson is a Visiting researcher at University of Luxembourg at the SnT centre from January 2015.

- A-Prof. Dr. Claudio Casetti (DET–Politecnico di Torino)
  May 12, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Dr. Mariano Ceccato (FBK (Fondazione Bruno Kessler) in Trento, Italy)
  March 1, 2015 – April 10, 2015, hosted by Lionel Briand, Duy Cu Nguyen
  Reason: Visiting Researcher

- PhD Mariano Ceccato (Fondazione Bruno Kessler, Trento, Italy)
  Sept. 10, 2015, hosted by Lionel Briand, Duy Cu Nguyen
  Reason: SnT Research Seminar: "ASPIRE - Trustworthy software execution on untrusted mobile platforms"

  Abstract: For mobile devices like smartphones and tablets, security solutions based on custom hardware like smart cards, set-top boxes, and

dongles are no longer viable. Software protection is therefore utterly important; it can be a maker and a breaker in domains like multi-screen mobile TV, software licensing, and credentials and sensitive data stored on mobile devices. Therefore many stakeholders in mobile devices need more trustworthy, cheap software security solutions and more value for the money they spend on security.

ASPIRE (Advanced Software Protection: Integration, Research and Exploitation) is a FP7 strep project funded by the EU with the objective of establishing trustworthy software execution on untrusted mobile platforms that have a persistent or occasional network connection to a trusted entity at their disposal. ASPIRE is developing software protection techniques along various, mutually strengthening lines of defense, including data hiding, algorithm hiding, anti-tampering, remote attestation, code splitting and renewability. The ASPIRE lines of defense makes the software trustworthy by leveraging the available network connection and by implementing a layered security approach, affecting both data and source/binary code.

Mariano Ceccato is tenured researcher in FBK (Fondazione Bruno Kessler) in Trento, Italy. He received the PhD in Computer Science from the University of Trento in 2006, with a the thesis « Migrating Object Oriented code to Aspect Oriented Programming ». He is author or coauthor of more than 50 research papers published in international journals and conferences/workshops. At the time of writing, the h-index reported by Google Scholar is 15 and the number of citations 1077. He was program co-chair of the 12th IEEE Working Conference of Source Code Analysis and Manipulation (SCAM 2012) held in Riva del Garda, Italy. He participated in industrial and EU projects on software analysis and source code transformation, and currently he is in the steering board of ASPIRE (FP7 n.609734). His research interests include security testing, source code analysis and transformation, software integrity and empirical studies. For more details visit http://selab.fbk.eu/ceccato/

- Dr. Ermel Claudia (Technische Universität Berlin)
  Nov. 9, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Prof. Dr. Jane Cleland-Huang (DePaul University, Chicago)
  March 20, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: Distinguished Lecture at SnT

  ”Towards Effective Software and Systems Traceability”

  Abstract: Software traceability is a sought-after, yet often elusive quality in software-intensive systems. Required in safety-critical systems by many certifying bodies, software traceability is an essential element of the software development process. However, in practice, traceability is often conducted in an ad-hoc, after-the-fact manner and, therefore, its benefits are not always fully realized. Over the past decade, researchers have focused on specific areas of the traceability problem, developing more sophisticated tooling, promoting strategic planning, applying information retrieval techniques capable of semi-automating the trace creation

and maintenance process, developing new trace query languages and visualization techniques that use trace links, and applying traceability in specific domains. In this talk Dr. Cleland-Huang will highlight the state-of-the-art in software traceability, discuss compelling areas of research need, and highlight some exciting projects in which traceability solutions are being successfully transitioned to practice.

Dr. Jane Cleland-Huang is Professor of Software Engineering in the School of Computing at DePaul University, Chicago, where she serves as the director of the Systems and Requirements Engineering Center. She also serves as the North American Director of the International Center of Excellence for Software Traceability. Her research interests emphasize the application of machine learning and information retrieval methods to tackle large-scale Software Requirements problems. Dr. Cleland-Huang serves on the Editorial Board for the Requirements Engineering Journal, and as Associate Editor for IEEE Transactions on Software Engineering and IEEE Software. She has been the recipient of the US National Science Foundation Faculty Early Career Development Award, four ACM SIGSOFT Distinguished Paper Awards and 2006 IFIP TC2 Manfred Paul Award for Excellence in Software: Theory and Practice. She is a member of the IEEE Computer Society and the IEEE Women in Engineering. She received her PhD in Computer Science from the University of Illinois at Chicago.

- Professor Anthony Cleve (Faculté d'informatique, Université de Namur)
  Jan. 7, 2015, hosted by Denis Zampunieris
  Reason: Dr Cleve took part in the 2nd CET meeting for PhD candidate M. Remus Dobrican.

- Prof. Dr.-Ing. habil. Falko Dressler (Heinz Nixdorf Institute, Paderborn University)
  July 13, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Prof. and Vice Rector Alexander Egyed (Johannes Kepler University, Linz, Austria)
  Nov. 26, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: SnT Distinguished Lecture

  "Effective Reuse across Many Variants of Software Systems - a new Paradigm for Evolvable Product Lines"

  Abstract: To keep pace with the increasing demand for custom-tailored software systems, companies often apply a practice called clone-and-own. Thereby, a company builds an initial version of a system and then copies and adapts it with every new customer. Instead of a single, configurable system the company ends up with a portfolio of multiple, similar variants. Clone-and-own has widespread industrial use because it requires no major upfront investments compared to infrastructures facilitating reuse. Yet, it lacks a methodology for systematic reuse and for addressing the resulting feature interaction problems. This talk proposes a novel approach to actively support software engineers in applying clone-and-own. A software engineer selects the desired features and the approach finds the proper software artifacts for the copying step and then guides the

software engineer during the manual completion by hinting which software artifacts may be missing or may need adaptation. We evaluated our approach on 4 case studies, covering 305 variants having up to 344KLOC, and found that precision and recall of composed products quickly reach a near optimum.

Alexander Egyed is Vice Rector for Research and Full Professor at the Johannes Kepler University (JKU) Linz, Austria. He received his Doctorate degree from the University of Southern California, USA, then worked in industry for even years before joining the University College London, UK. Dr. Egyed's work has been published at over a 150 refereed scientific books, journals, conferences, and workshops, with over 4300 citations to date. He was recognized as a Top 1% scholar in software engineering in the Communications of the ACM, Springer Scientometrics, and Microsoft Academic Search. He was also named an IBM Research Faculty Fellow in recognition to his contributions to consistency checking, received a Recognition of Service Award from the ACM, Best Paper Awards from ECSA, COMPSAC and WICSA, and an Outstanding Achievement Award from the USC. He has given many invited talks including four keynotes, served on scientific panels and countless program committees, and has served as program (co-) chair, steering committee member, and editorial board member. He is a senior member of the IEEE and ACM.

- Dr. Maged Elaasar (NASA's Jet Propulsion Laboratory)
  June 25, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: SnT Research Seminar "An Approach to Defining Operational API for MOF-Based Modeling Languages"

  The Object Management Group (OMG) defines the abstract syntax of a modeling language in terms of a metamodel. With OMG's Query/View/-Transformation architecture, a metamodel should induce a declarative API for operating on models. However, most tool vendors implement OMG metamodels outside of this QVT-based architecture. The lack of an OMG-based, vendor-neutral API for an OMG metamodel creates significant problems for practitioners: API differences across tool implementations hinder interoperability and increase development costs. This work addresses these problems by generating a tool-neutral operational API from a metamodel while delegating tool-specific implementation to an adaptation layer. This approach was applied to OMG's Unified Modeling Language (UML) 2.5 for which tool-specific adaptations were developed for MagicDraw and Eclipse Papyrus and with which a significant capability was developed: OMG Canonical XMI serialization.

  Dr. Maged Elaasar is a senior software architect at NASA's Jet Propulsion Laboratory. He is also an independent software consultant. During his 18+ years career, Maged has consulted many companies around the world. He has become a known leader in the area of model-driven software and systems engineering, where he holds several patents. He has also managed development teams and technically lead software products that are in widespread use today. In addition, Maged has been a leader of and an active contributor to open-source projects at Eclipse and open-standards at OMG for many years. He has also taught several university and corpo-

rate courses. Maged has received his Ph.D. in Electrical and Computer Engineering from Carleton University in 2012, his Master of Computer Science from Carleton University in 2003, and his Bachelor of Computer Science from the American University in Cairo in 1996. He is also actively engaged in applied research and has published in many top-tier conferences and journals.

- Prof. Dr. Olivier Festor (University of Lorraine)
  June 22, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Prof. Dr. Eric Filiol (ESIEA)
  June 22, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Dr. Hermann Frank (Carmeq GmbH)
  Nov. 9, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Dr. Jérôme François (Inria Nancy Grand Est)
  June 9, 2015, hosted by Thomas Engel, Radu State
  Reason: Join supervision of a phd student.
- Dr. Jérôme François (Inria Nancy Grand Est)
  May 4, 2015, hosted by Thomas Engel, Radu State
  Reason: Join supervision of a phd student.
- Dr. Jérôme François (Inria Nancy Grand Est)
  Feb. 11, 2015, hosted by Thomas Engel, Radu State
  Reason: Join supervision of a phd student.
- Dov Gabbay (Imperial College Londen)
  Sept. 7, 2015 – Sept. 11, 2015, hosted by Leon van der Torre
- Prof. Dr. Mario Gerla (University of California)
  June 2, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Prof. Dr. Mario Gerla (University of California)
  May 12, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Prof. Dr. Mario Gerla (University of California)
  Feb. 24, 2015 – Feb. 25, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student, discussions of ongoing research.
- Prof. Dr. Claude Godart (University of Lorraine)
  June 22, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Davide Grossi (University of Liverpool)
  May 20, 2015 – May 23, 2015, hosted by Leon van der Torre

- Prof. Mark Harman (University College London, UK)
  Oct. 8, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: SnT Distinguished Lecture

  Title: "Recent Advances in Search Based Software Testing and Genetic Improvement"

  Abstract: Search-based approaches to software testing formulate testing as an optimisation problem, which can be attacked using computational search techniques from the field of Search Based Software Engineering (SBSE). Test objectives find natural counterparts as the fitness functions used by SBSE to guide automated search, thereby facilitating SBSE formulations of many and diverse testing problems. This talk, which is an updated version of Harman's keynote at ICST 2015, will review achievements in Search Based Software Testing and will explore the question: "what could we do with software if software testing were to prove a sufficiently practical system equivalence relation?". Recent work that makes these kinds of assumption has produced breakthroughs in genetic improvement and program transplantation. A recent tutorial paper on SBSE can be found here. A extended ICST keynote paper on which this talk is based can be found here.

  Mark Harman is professor of Software Engineering in the Department of Computer Science at University College London, where he directs the CREST centre and is Head of Software Systems Engineering. He is widely known for work on source code analysis and testing and co-founded the field of Search Based Software Engineering (SBSE), the topic of this talk. SBSE research has rapidly grown over the past five years and now includes over 1600 authors, from nearly 300 institutions spread over more than 40 countries. A recent tutorial paper on SBSE can be found here.

- Professor Moshe Haviv (Hebrew University)
  Feb. 1, 2015 – Feb. 28, 2015, hosted by Yves Le Traon
  Reason: Research Goals: The main research goal was to share the mutual knowledge in decision making in queues and their relevance to computers and communication systems. In particular, to observe the distinctions between the self, or decentralized, assumed behaviors of individual users in comparison with the looked for socially optimal, centralized behavior. The mechanism design issue here is how to make customers or users act as it is socially optimal while still minding their selfish interests. This can be achieved by changing the rules in which the system operates or via charging appropriate prices so as to achieve the required behavior.

  Research Outcomes: A number of discussions on this issues took place during the research period. In particular, the guest researcher gave two 1.5 hour talks in which he shared his theoretical knowledge in the area of customer strategical behavior in congested systems. This leads to ways for formulating decision making in computer systems. The conclusion is that there is a need for a unified approach, both in modeling and in terminology. Towards the end it seems best to formulate one practical example which will help to convey all the ideas.

  Research Future Plan: The future plan is that both side will set formally their ideas in written and see how they are aligned. Once convergence is

achieved, the next step will be to draft it in a research paper.

Host Supervisor's Comment: It was a pleasure to have Prof. Moshe Haviv in our unit. He shared with us his knowledge in the application of game theoretical ideas in the area of queues. This leads to much insight and understanding in how users of computer systems behave. It is highly appreciated that Moshe agreed to give two tutorial talks in this area of research in our unit. I find his visit fruitful and hope the seeds of a joint research project in the lines he described above were sown during his short visit. I hope the momentum gained will not be wasted and look forward to the continuation of this line of research. I am not ruling out that we will invite Prof. Moshe Haviv again to our unit in the near future.

- Joris Hulstijn (Tilburg University)
  Nov. 8, 2015 – Nov. 10, 2015, hosted by Leon van der Torre

- Prof. Dr. Jérôme Härri (EURECOM)
  June 2, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Wojtek Jamroga (Polish Academy of Sciences)
  March 20, 2015 – March 23, 2015, hosted by Leon van der Torre

- Wojtek Jamroga (Polish Academy of Sciences)
  July 6, 2015 – July 10, 2015, hosted by Leon van der Torre

- Prof. Wieslaw Kaca (Jan Kochanowski University)
  June 24, 2015, hosted by Andrzej Mizera
  Reason: Research collaboration

- Professor Patrice Koehl (University of California, Davis)
  March 3, 2015, hosted by Yves Le Traon
  Reason: Prof. Koehl held a seminar in the "Big Data" series.

- Prof. Dr. Barbara König (Universität Duisburg-Essen)
  Nov. 9, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Beishui Liao (Zhejiang University)
  Aug. 3, 2015 – Sept. 14, 2015, hosted by Leon van der Torre

- Prof. David Lo (Singapore Management University)
  June 14, 2015 – June 27, 2015, hosted by Yves Le Traon
  Reason: For the following collaborative topics:

  - Topic 1: Influential Program Changes. This work is well advanced. Our FSE submission was rejected but the reviews were quite encouraging. We could discuss how we plan to improve this work for ICSE.

  - Topic 2: GitSearch code search Engine. This work, by a Master student, might also be promising. From the start, I had involved you and you suggested curation of GitHub datasets. Raphael however is working on how to answer NLP search questions with Github code snippets, using stack overflow questions/answers to reduce the search space.
  - Topic 3: Predicting the Need and Potential Location of Supplementary Fixes. This starting work was initiated by discussions with Jihun Park, a KAIST student, at ICSE 2015. We can discuss about what we are attempting to study with him, especially through recurrence of bug fixes in different categories (complete, incomplete, supplementary fixes)
  - Topic 4: Characterizing and Predicting Developer Evolution. This is a topic developed by Dongsun with GitHub data. He is trying to understand whether there are developer profiles and whether it is possible to recommend actions to a specific developer so that he can evolve from one profile to another. (Could be useful for hiring purposes) I had his permission for talking with you about this as I thought you might be interested given that it is somehow related to all the work we did on GitHub.

- Dr. Nicolas Montavont (Télécom Bretagne)
  June 2, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Prof. Dr. Cristina Nita-Roratu (College of Computer and Information Science Northeastern University)
  Dec. 1, 2015, hosted by Thomas Engel, Radu State
  Reason: Join supervision of a phd student.

- Prof. Bashar Nuseibeh (Open University, Milton Keynes, UK)
  Feb. 10, 2015, hosted by Lionel Briand, Björn Ottersten
  Reason: Distinguished lecture at the SnT

- Dr. Nuria Oliver (Telefonica Research, Barcelona)
  Feb. 20, 2015, hosted by Yves Le Traon, Björn Ottersten
  Reason: Big Data Seminar at SnT: "Human Behavior Understanding with Big Data"

  We live in a world of data, of big data. A big portion of this data has been generated by humans, and particularly through their mobile phones. In fact, there are almost as many mobile phones in the world as humans. The mobile phone is the piece of technology with the highest levels of adoption in human history. We carry them with us all through the day (and night, in many cases), leaving digital traces of our physical interactions. Mobile phones have become sensors of human activity in the large scale and also the most personal devices.

  In my talk, I will present some of the work that we are doing at Telefonica Research in the area of human behavior understanding from data captured with mobile phones, including some of our work in the area of Big Data for Social Good.

- Anton Philippov
  Feb. 1, 2015 – April 30, 2015, hosted by Olga Gadyatskaya, Sjouke Mauw
  Reason: Research collaboration

- Gabriella Pigozzi (Université Paris Dauphine)
  May 20, 2015 – May 23, 2015, hosted by Leon van der Torre

- Dr Livio Robaldo
  Jan. 12, 2015 – Jan. 16, 2015, hosted by Leon van der Torre

- Professor Bill Roscoe (University of Oxford)
  June 1, 2015 – June 30, 2015, hosted by Peter Ryan

- Asst. Prof. David Safranek (Masaryk University)
  Nov. 2, 2015, hosted by Andrzej Mizera
  Reason: Research collaboration

- Dr. Thomas Scherer (Telindus)
  Dec. 18, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Dr. Thomas Scherer (Telindus)
  May 7, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.

- Prof. Dr. Björn Scheuermann (Humboldt University of Berlin)
  Feb. 27, 2015, hosted by Thomas Engel, Andriy Panchenko
  Reason: Member of a PhD defense committee.

- Associate Professor Alexander Schliep (Rutgers University, USA)
  Jan. 28, 2015, hosted by Yves Le Traon
  Reason: SnT/CSC Research Seminar "Big Data Science with Applications in Genomics"

  The rapid advances in the quantification of the natural and the technical world in which we live, the quantification of ourselves and our actions requires effective responses both in method development and in education, particular with respect to computational thinking for non-CS majors. I will present three relevant aspects of my work. Bayesian methods for big data: High-throughput sequencing (HTS), a technology to unravel genomic sequences on a large scale, is pervasive in clinical and biological applications such as cancer research and basic science, and is expected to gain enormous momentum in future personalized medicine applications.To address this deluge of data we developed new methods which operate directly on reduced representations of the data and enable the use of advanced statistics even on very large data sets. For identifying Copy Number Variants (CNV) our approach accelerated full Bayesian methods to the point of matching Maximum-likelihood methods.

  Alexander Schliep received a PhD degree in computer science from the Center for Applied Computer Science (ZAIK/ZPR) at the Universität zu

Kön, Germany (2001), working in collaboration with the Theoretical Biology and Biophysics Group (T-10) at Los Alamos National Laboratory. From 2002-2009 he was the group leader of the Bioinformatics Algorithms Group in the Department for Computational Molecular Biology at the Max Planck Institute for Molecular Genetics in Berlin. In August 2009 he joined Rutgers University as an associate professor. The position is jointly between the Department of Computer Science and the BioMaPS Institute for Quantitative Biology. He is on the graduate faculty in Computer Science and the Program in Computational Biology and Molecular Biophysics.

- Prof. Dr. Dr. h.c. Otto Spaniol (RWTH Aachen University)
  Feb. 27, 2015, hosted by Thomas Engel, Andriy Panchenko
  Reason: Discussion of possible cooperations, research directions within the group, and join supervision of master and phd students.
- Prof. Dr. Dr. h.c. Otto Spaniol (RWTH Aachen University)
  May 5, 2015, hosted by Thomas Engel, Andriy Panchenko
  Reason: Discussion of possible cooperations, research directions within the group, and join supervision of master and phd students.
- Christian Strasser (Ruhr-Universität Bochum)
  Dec. 9, 2015 – Dec. 11, 2015, hosted by Leon van der Torre
- Prof. Dr. Eric Totel (Supélec Rennes)
  June 22, 2015, hosted by Thomas Engel
  Reason: Join supervision of a phd student.
- Paolo Turrini (Imperial College London)
  Oct. 5, 2015 – Oct. 8, 2015, hosted by Leon van der Torre
- Professor Athanasios V. Vasilakos
  Feb. 4, 2015 – Feb. 6, 2015, hosted by Yves Le Traon, Björn Ottersten
  Reason: Prof. Vasilakos gave a seminar in the ”Big Data” series.
- Dr. ir. Sicco Verwer (Delft University of Technology)
  May 15, 2015, hosted by Christian Hammerschmidt
  Reason: Dr. ir. Sicco Verwer was invited to give a scientific talk.
- Irfan Zakiuddin
  Jan. 1, 2015, hosted by Ravi Jhawar, Sjouke Mauw
  Reason: Research collaboration
- Prof. Arkady Zaslavsky (CSIRO Digital Productivity, Australia)
  June 10, 2015, hosted by Yves Le Traon, Björn Ottersten
  Reason: SnT Research Seminar ”Smart processing of disruptively big data in the Internet of Things”

  Abstract: The Internet of Things (IoT) is one of the pillars of Future Internet and will connect billions of ”things”, where things include computers, smartphones, sensors, objects from everyday life with embedded computational and communication capabilities and the list goes on and on. Each of those things will have their physical and/or virtual identity,

attributes, intelligent interfaces, componentised functionality and standardised communication protocols. The Internet of Things will be generating massive amounts of data that will have to be stored, validated, processed and communicated to relevant services, applications and systems. This talk focuses on the challenges of dealing with the IoT, disruptively big data it generates, with discovery of things along with relevant and useful data for various services and applications, representing semantics and enriching IoT data with semantics, transforming IoT data into context and integrating these into knowledge. The talk will also present various CSIRO projects in IoT, including EU FP7 OpenIoT which developed open source flexible sensor-based system middleware platform. OpenIoT brings together sensing and cloud computing and is an efficient platform for handling big IoT data.

Dr. Zaslavsky is a Senior Principal Research Scientist with CSIRO Digital Productivity (DPF) Flagship.

- Dr. Yury Zhauniarovich (University of Trento)
  Feb. 19, 2015 – Feb. 20, 2015, hosted by Olga Gadyatskaya
  Reason: Research collaboration

- Prof. Roberto Zicari (Goethe University Frankfurt, Germany)
  Jan. 29, 2015, hosted by Yves Le Traon, Christoph Schommer
  Reason: SnT/CSC Research Seminar "Big Data: A Data Driven Society?"

  In the first part of this talk, Prof. Zicari will review how Big Data is enabling a data-driven economy, look at what to do with Big Data, and look at the consequences of a society being reshaped by systematically building on data analytics. In the second part of the talk, he will outline some of the Big Data research challenges in three areas: Data, Processes, and Management. He will then conclude making a case for Big Data for Social Good: his aim is to show that Big Data can be leveraged to better serve the people who generate the data, and ultimately the society in which we live.

  Roberto V. Zicari, professor of Database and Information Systems (DBIS) at the Goethe University Frankfurt, Germany.He is an internationally recognized expert in the field of databases. His interests also expands to Innovation and Entrepreneurship. He is the Director of the Big Data Lab at the Goethe University Frankfurt, and the editor of the ODBMS.org web portal and of the ODBMS Industry Watch Blog. He is also a visiting professor with the Center for Entrepreneurship and Technology within the Department of Industrial Engineering and Operations Research at UC Berkeley.

6.6 Visits

The following visits by CSC members to external organisations took place:

- Lionel Briand

Visited: IRISA, Rennes, France (Jan. 16, 2015).
Reason: Distinguished lecture

- Lionel Briand
  Visited: University of Nebraska, Lincoln, United States (Feb. 23, 2015).
  Reason: Distinguished Lecture

- Lionel Briand
  Visited: University of Oulu, Oulu, Finland (March 24, 2015).
  Reason: Distinguished lecture

- Lionel Briand
  Visited: Jet Propulsion Laboratory, Pasadena, United States (Aug. 5, 2015 – Aug. 6, 2015).
  Reason: Distinguished lecture

- Giovanni Casini
  Visited: CAIR Research group, Pretoria, South Africa (Oct. 21, 2015 – Oct. 23, 2015).
  Reason: Collaboration with Prof. T. Meyer

- Lara Codeca
  Visited: Google, Paris, France (June 1, 2015 – Dec. 31, 2015).
  Reason: Software Engineering Internship in the YouTube Team.

- Marcos Cramer
  Visited: Institute for Logic, Language and Computation, Amsterdam, Netherlands (Feb. 10, 2015).

- Eric Falk
  Visited: neXus Group, Stockholm, Sweden (April 22, 2015 – April 23, 2015).
  Reason: Scientific meeting with the neXus team.

- Olga Gadyatskaya
  Visited: University of Padua, Padua, Italy (July 14, 2015).
  Reason: Research collaboration

- Nicolas Guelfi
  Visited: CUI, University of Geneva, Geneva, Switzerland (May 15, 2015).
  Reason: Keynote talk "Software Engineering Education: The Messir Approach", CUI, University of Geneva, Switzerland (http://cui.unige.ch/fr/nouvelles/seminarnicolasguelfi/)

- Christian Hammerschmidt
  Visited: neXus Group, Stockholm, Sweden (April 22, 2015 – April 23, 2015).
  Reason: Scientific meeting with the neXus team.

- Christian Hammerschmidt
  Visited: Delft University of Technology, Delft, Netherlands (Oct. 19, 2015 – Nov. 5, 2015).
  Reason: Research collaboration and scientific discussions.

- Pierre Kelsen
  Visited: Kyiv Polytechnic Institute, Kiev, Ukraine (Nov. 22, 2015 – Nov. 23, 2015).
  Reason: Consortium meeting of Erasmus+ project ”PARIS”.

- Gabriele Lenzini
  Visited: Debrecen University, Debrecen, Hungary (Dec. 8, 2014 – Jan. 11, 2015).
  Reason: talk: Formal Analysis of Security for Electronic Exams

- Andrzej Mizera
  Visited: Masaryk University, Helsinki, Finland (Feb. 11, 2015 – Feb. 13, 2015).
  Reason: Research collaboration

- Andrzej Mizera
  Visited: CMSB 2015, Nantes, France (Sept. 16, 2015 – Sept. 18, 2015).
  Reason: Research collaboration

- Nicolas Navet
  Visited: CEA LIST Lab., Paris Saclay, France (Oct. 29, 2015).
  Reason: Gave a presentation entitled ”Lean Model-Driven Development through Model-Interpretation”.

- Nicolas Navet
  Visited: ONERA, Toulouse, France (Dec. 14, 2015).
  Reason: Give a presentation entitled “Write Once Run Anywhere with timing-equivalent execution – the CPAL approach” at ONERA/DTIM.

- David Peter Benjamin Norta
  Visited: PSGTech Coimbatore, Coimbatore, India (Jan. 31, 2015 – Feb. 8, 2015).
  Reason: Scientific presentation and discussion of ongoing research.

- David Peter Benjamin Norta
  Visited: RWTH Aachen University, Aachen, Germany (Aug. 3, 2015 – Sept. 30, 2015).
  Reason: Scientific presentation and discussion of ongoing research.

- David Peter Benjamin Norta
  Visited: Laval University Quebec, Quebec, Canada (Nov. 6, 2015 – Nov. 16, 2015).
  Reason: Scientific presentation and discussion of ongoing research.

- Andriy Panchenko
  Visited: VDE Bezirk Saar e.V., Saarbrücken, Germany (May 28, 2015).
  Reason: Dr. Andriy Panchenko was invited to give a scientific talk. The goal of this talk and visit to VDE in Saarbrücken was to present methods for fingerprinting in different application domains and to contribute to a better understanding of fingerprinting in general.

- Jun Pang
  Visited: Huawei European Research Center, Beijing, China (May 26, 2015

– May 27, 2015).
Reason: Research collaboration

- Jun Pang
Visited: Nanjing University, Nanjing, China (Aug. 17, 2015 – Aug. 21, 2015).
Reason: Research collaboration

- Jun Pang
Visited: Huawei European Research Center, Leuven, Belgium (Dec. 2, 2015 – Dec. 4, 2015).
Reason: Research collaboration

- Jun Pang
Visited: University of Sheeld, Sheffield , United Kingdom (Dec. 2, 2015 – Dec. 4, 2015).
Reason: Research collaboration

- Mike Papadakis
Visited: UCL, London, United Kingdom (June 7, 2014 – March 7, 2015).
Reason: Mobility program

- Andrei Popleteev
Visited: CREATE-NET research center, Trento, Italy (May 25, 2015 – May 26, 2015).
Reason: Discussion of areas of possible collaboration and establishing new scientific contacts.

- Andrei Popleteev
Visited: Fondazione Bruno Kessler, Trento, Italy (May 25, 2015 – May 26, 2015).
Reason: Discussion of areas of possible collaboration and establishing new scientific contacts.

- Peter Ryan
Visited: INSA, Toulouse, France (Jan. 22, 2015).
Reason: Invited Keynote

- Peter Ryan
Visited: IFIP WG 10.4, Bristol, United Kingdom (Jan. 24, 2015 – Jan. 26, 2015).

- Peter Ryan
Visited: MAPPING Project Extraordinary Meeting, Hannover, Germany (Feb. 11, 2015 – Feb. 12, 2015).
Reason: Invited talk on surveillance.

- Peter Ryan
Visited: Systems Resilience – Bridging the Gap Between Social and Mathematical, Shonan, Japan (Feb. 22, 2015 – Feb. 27, 2015).

- Peter Ryan
  Visited: University of Pisa, Pisa, Italy (July 4, 2015 – July 10, 2015).
  Reason: Lecturing at a summer school.

- Peter Ryan
  Visited: UC Berkeley, Berkeley, United States (July 18, 2015 – Aug. 15, 2015).

- Peter Ryan
  Visited: Heidelberg Laureate Forum, Heidelberg, Germany (Aug. 22, 2015 – Aug. 26, 2015).
  Reason: Invited to lead a break out group on privacy and surveillance.

- Peter Ryan
  Visited: MIT, Boston, United States (Oct. 5, 2015 – Nov. 15, 2015).

- Peter Ryan
  Visited: University of Surrey, Surrey, United Kingdom (Nov. 30, 2015 – Jan. 17, 2016).

- Christoph Schommer
  Visited: University of Pavia, Pavia, Italy (June 17, 2015 – June 20, 2015).
  Reason: AIME 2015

- Christoph Schommer
  Visited: Goethe-University Frankfurt/Main, Frankfurt/Main, Germany (July 9, 2015).
  Reason: Invited Guest Lecture

- Christoph Schommer
  Visited: Goethe-University Frankfurt/Main, Frankfurt/Main, Germany (July 9, 2015).

- Christoph Schommer
  Visited: Tsinghua University, Beijing, Beijing, China (Aug. 23, 2015 – Sept. 5, 2015).
  Reason: Given a mandatory course ”Data Science” at the Institute for Interdisciplinary Information Sciences, Yao Institute, Tsinghua University, Beijing. The course was scheduled to 32h of lectures with an intermediate and a final examination. The course was evaluated by students; and, because of its popularity (final score: 4,0 of 5), the course will be repeated in summer 2016.

- Christoph Schommer
  Visited: Tsinghua University, Beijing, China (Aug. 24, 2015 – Sept. 5, 2015).

- Christoph Schommer
  Visited: University of Würzburg, Würzburg, Germany (Nov. 25, 2015).
  Reason: Invited Visit, Prof Wolff

- Christoph Schommer
  Visited: McGill University, Montreal, Canada (Dec. 8, 2015 – Dec. 11, 2015).
  Reason: NIPS 2015

- Rolando Trujillo Rasua
  Visited: University of Rennes, Rennes, France (Sept. 1, 2015 – Sept. 12, 2015).
  Reason: Research collaboration

- Marc Van Zee
  Visited: Stanford University, Palo Alto, United States (May 18, 2015 – June 25, 2015).
  Reason: Collaborating with Thomas Icard

- Leon van der Torre
  Visited: Stanford University, Palo Alto, United States (Jan. 17, 2015 – Jan. 31, 2015).
  Reason: Collaborating with

  Condoravdi

- Leon van der Torre
  Visited: KU Leuven, Leuven, Belgium (March 2, 2015 – March 4, 2015).
  Reason: Collaborating with Mark Denecker

- Leon van der Torre
  Visited: KU Leuven, Leuven, Belgium (March 2, 2015 – March 4, 2015).
  Reason: Collaboration with Mark Denecker.

- Leon van der Torre
  Visited: Wakayama University, Wakayama, Japan (April 6, 2015 – April 10, 2015).
  Reason: Collaboration with Sakama

- Leon van der Torre
  Visited: Lille University, Lens/Lille, France (June 8, 2015 – June 12, 2015).
  Reason: Collaboration with Vesic

Chapter 7

Software Developments

ACL-Lean

http://www.di.unito.it/~genovese/tools.html

License: Free

Description: ACL-Lean is a decidable theorem prover (written in PROLOG) for propositional access control logics with says operator. ACL-Lean implements an analytic labelled sequent calculus for conditional access control logics presented in V. Genovese, L. Giordano, V. Gliozzi and G. L. Pozzato "A Conditional Constructive Logic for Access Control and its Sequent Calculus" 20th International Conference on Automated Reasoning with Analytic Tableaux and Related Methods.

ADTool

http://satoss.uni.lu/software/adtool

License: free use

Members: Piotr Kordy (Developer), Sjouke Mauw (Analyst)

Description: The attack–defense tree language formalizes and extends the attack tree formalism. It is a methodology to graphically analyze security aspects of scenarios. With the help of attributes on attack–defense trees, also quantitative analysis can be performed. As attack–defense tree models grow, they soon become intractable to be analyzed by hand. Hence computer support is desirable. Software toll, called the ADTool, has been implemented as a part of the ATREES project to support the attack–defense tree methodology for se-

curity modeling. The main features of the ADTool are easy creation, efficient editing, and quantitative analysis of attack–defense trees. The tool is available at http://satoss.uni.lu/software/adtool. The tool was realized by Piotr Kordy and its manual was written by Patrick Schweitzer.

Changes: In 2015 we picked up the ADTool development again in order to improve its functionality (e.g., by including the sequential-AND operator) and to integrate it into the TREsPASS project process. Piotr Kordy has again joined SaToSS to work on the ADTool in December 2015 (till May 2016).

ARGULAB

http://code.google.com/p/pyafl/

License: GPL v3

Members: Mikolaj Jan Podlaszewski (Developer)

Description: We present an implementation of the recently developed persuasion dialogue game for formal argumentation theory under grounded semantics. The idea is to apply Mackenzie-style dialogue to convince the user that an argument is or is not in the grounded extension. Hence, to provide a (semi-)natural user interface to formal argumentation theory.

ASSA-PBN

http://satoss.uni.lu/software/ASSA-PBN/

License: free use

Members: Jun Pang (Analyst)

Description: ASSA-PBN is a tool specially designed for approximate steady-state analysis of large probabilistic Boolean networks (PBNs). The approximate steady-state analysis is crucial for large PBNs, which naturally arise in the domain of Systems Biology. ASSA-PBN provides different solutions for different size PBNs. In particular, ASSA-PBN provides the two-state Markov chain approach and the Skart approach for large PBNs. The latest version of the package was released in Nov. 2014 and is available from http://satoss.uni.lu/software/ASSA-PBN/.

Changes: With respect to the first release ASSA-PBN 1.0 in Nov. 2014., the following new features and functionalities have been added in ASSA-PBN 2.0.1:

- the computation of steady-state probabilities with parallel computing,
- parameter estimation with the Particle Swarm algorithm,
- long-run in uence and sensitivity analysis of PBNs,

- a graphical user interface (GUI), which provides visualisation of a PBN and its simulation trajectory.

BUT4Reuse

License: N/A

Description: Bottom-up technologies for Reuse. Feature identification on Product variants. Reengineering Feature Models. Extraction of Reusable assets.

Baumüller ProMaster

License: UL

Members: Surena Neshvad (Developer), Marco Ney (Developer), David Peter Benjamin Norta (Developer)

Description: Baumüller ProMaster is the software to operate the inverter and electrical machines in the lab.

CSC Information System

http://demos.uni.lux/csc

License: Internal use only

Members: Bertrand Dessart (Analyst, Architect), Christian Glodt (Analyst, Architect, Designer, Developer, Tester)

Description: The CSC Information System is a web-based interface for the management of information related to the CSC, such as research projects, research areas, research groups, and many other elements related to the CSC and its member's activities. The CSC Information System is built using the Django Framework.

Changes: The CSC Information System has been improved in many ways in 2015. Notable improvements are:

- refinement of exported website,
- improved filtering in the log view,
- improved support for read-only viewing of entities,
- added revision management,
- improved the template for annual reports,
- added aliases for positions in order to better handle data imported from LDAP,
- added a view that shows the completion state of data used in annual reports,
- added seminars,
- improved support for tables in rich text fields.

Canephora

http://satoss.uni.lu/software/canephora/

License: free use

Description: Trust opinions can be represented as probability distributions over an (unknown) integrity parameter. Simple trust opinions (that are based only on personal observations) can be represented as a class of distributions known as Beta distributions. Trust opinions that are based on recommendations do not (necessarily) have such a simple representation. Canephora numerically approximates the trust opinion that can be inferred from a recommendation. Precision and coarseness of the result can be selected. The result may depend on the strategy of the recommender, Canephora allows implementations of such possible strategies to be added on the fly.

The tool was created by Tim Muller and can be accessed at http://satoss.uni.lu/software/canephora/.

Chameleon

License: GNU

Description: Chameleon is a tool to assist Hive administrators in analyzing and tuning job configuration. The system implements a K-means clustering algorithm to group similar queries and provide an aggregate analysis to those similar queries. The administrator can then analyze the performance of these queries and decide how to tune them up.

repository: git@gitlab.c3sl.ufpr.br:chameleon/chameleon.git

CollaTrEx

License: N/A

Members: Jean Botev (Architect)

Description: CollaTrEx is framework for collaborative context-aware mobile exploration and training. It is particularly designed for the in-situ collaboration within groups of learners performing together diverse educational activities to explore their environment in a fun and intuitive way.

Aside from employing both absolute and relative spatio-temporal context for determining the available activities, different buffering levels are an important conceptual feature supporting seamless collaboration in spite of temporary connection losses or when in remote areas.

CollaTrEx comprises a prototypical front-end implementation for tablet devices,

as well as a web-based back-end solution for the creation and management of activities which can be easily extended to accommodate both future technologies and novel activity types.

Data acquisition platform

License: MIT

Members: Andrei Popleteev (Developer)

Description: The INDOORS project has created an open-source data acquisition platform (DAQ), which is designed to facilitate data collection for indoor localization experiments. The DAQ platform allows recording of raw radio signal samples from multiple bands simultaneously with ground-truth location and environment state (weather and crowd dynamics) metadata. The platform employs an Ettus Research USRP B210 software-defined radio to collect short raw samples of FM, GSM downlink, Wi-Fi and several active DVB-T channels. Ground truth location is specified manually by the operator by selecting one of the predefined reference points on an interactive map; the detailed weather information, in turn, is automatically fetched from an online service. By collecting raw radio-frequency (RF) signal samples from a software-defined radio receiver, this tool separates data acquisition from the extraction of location-dependent signal features, thus offering unprecedented flexibility for the evaluation of classic and novel localization methods (potentially including those yet to be devised).

Democles

http://democles.lassy.uni.lu/

License: Freely redistributable, see details at: http://democles.lassy.uni.lu/license.html

Members: Christian Glodt (Architect, Designer, Developer, Tester)

Description: Democles is a modeling tool that supports the EP language developed by LASSYs MDE group. It is mainly developed by Christian Glodt.

Dexpler

http://www.abartel.net/dexpler/

License: GNU

Description: Converts Dalvik bytecode to Jimple

Digraph3

http://leopold-loewenhein.uni.lu/docDigraph3

License: GNU General Public License v.2+

Members: Raymond Bisdorff (Developer)

Description: Digraph3 is a collection of Python3 modules and resources for implementing decision aiding algorithms for selecting, ranking, sorting or rating, and clustering with multiple incommensurable criteria. These computing resources are useful in the field of Algorithmic Decision Theory and more specifically in outranking based multiple criteria decision aiding.

Discrete Particle Method (DPM)

http://luxdem.uni.lu/

License: Internal use only

Description: The Discrete Particle Method (DPM) itself is an advanced numerical simulation tool which deals with both motion and chemical conversion of particulate material such as coal or biomass in furnaces. However, predictions of solely motion or conversion in a de-coupled mode are also applicable. The Discrete Particle Method uses object oriented techniques that support objects representing three-dimensional particles of various shapes such as cylinders, discs or tetrahedrons for example, size and material properties. This makes it a highly versatile tool dealing with a large variety of different industrial applications of granular matter. A user interface allows easily extending the software further by adding user-defined models or material properties to an already available selection of materials, properties and reaction systems describing conversion. Thus, the user is relieved of underlying mathematics or software design, and therefore, is able to direct his focus entirely on the application. The Discrete Particle Method is organised in a hierarchical structure of C++ classes and works both in Linux and XP environments also on multi-processor machines. This software is developed by the XDEM research team from the Research Unit in Engineering Science (RUES) in collaboration with the Computer Science and Communications (CSC) research unit.

ELRA Language Corpus

License: LC/ELDA/DISTR-S/2014-11/001-UNILU

Members: Sviatlana Danilava (Architect), Christoph Schommer (Designer)

Description: The *deL1L2IM* corpus, created between May and August 2012 and

last updated in August 2014, has been collected within the framework of a PhD project (Mrs. Sviatlana Höhn, geb. Danilava) on the development of a learning method implying conversations with an artificial companion. This PhD work is presented as a qualitative investigation of instant messaging dialogues on a long-term basis (four months) between advanced learners of German and German native speakers, chatting about whatever topic they wish.

The dataset is composed of 72 dialogues, each of them having a duration of 20 to 45 minutes. The whole corpus contains ca. 52,000 words and 4,800 messages and has a file size of 0,5 Mb. Nine pairs of participants – i.e. nine learners and four native speakers – were required, with 8 dialogues per pair.

The interactions have undergone linguistic analysis whereby the annotation will be performed only on repair/correction sequences (incomplete learner error annotation). The goal of the project was to create an application for language modelling and to improve learner language applications, tutoring softwares and dialogue systems.

The corpus is delivered in one written text file (in XML format, customized under TEI P5).

Excalibur

License: Eclipse Public License 1.0

Members: Alfredo Capozucca (Developer), Nicolas Guelfi (Developer), Benoît Ries (Developer)

Description: Excalibur is a tool supporting the Messir methodology, a Scientific Method for the Software Engineering Master, used in Software Engineering Lectures at bachelor and master levels.

Excalibur tool covers the phase of Requirements Analysis and its main features are requirements analysis specification (its own DSL), requirements report generation (latex/pdf) and requirements simulation (prolog). It relies on Eclipse technologies as XText for textual specification and Sirius for graphical views of the textual specifications.

It is available here: http://messir.uni.lu:8090/confluence/display/EXCALIBUR/Excalibur

Changes: Excalibur v1.3 for BINFO semester 4 students. http://messir.uni.lu:8085/jira/projects/EX/versions/11700

Excalibur v1.4 for BINFO semester 3 students. http://messir.uni.lu:8085/jira/projects/EX/versions/10200

Face_recognition

http://www.ros.org/wiki/face_recognition

License: Attribution-NonCommercial 3.0

Description: A face recognition package for ROS robotic framework

GreenCloud Simulator

https://greencloud.gforge.uni.lu/

License: Open source

Members: Claudio Fiandrino (Developer), Mateusz Guzek (Architect), Dzmitry Kliazovich (Architect)

Description: Greencloud is a sophisticated packet-level simulator for energy-aware cloud computing data centers with a focus on cloud communications. It offers a detailed fine-grained modeling of the energy consumed by the data center IT equipment, such as computing servers, network switches, and communication links.

IDP

http://icr.uni.lu/mcramer/index.php?id=3

License: Public

Members: Diego Agustin Ambrossio (Tester), Marcos Cramer (Tester)

Description: implementation of revocation schemes according to the classification proposed by Hagström et al. (2001)

IccTA

https://sites.google.com/site/icctawebpage/home

License: N/A

Description: Inter-component and inter-application taint-analysis for Android Applications (based on FlowDroid)

JShadObf

http://jshadobf.uni.lu/

License: unknown

Description: A JavaScript Obfuscation Framework based on evolutionary algorithms.

Kevoree

http://kevoree.org/

License: LGPL 3

Description: Models@Run.time driven dynamic architecture

Lightning

http://lightning.gforge.uni.lu/

License: binary only, freely redistributable without modification

Members: Loïc Gammaitoni (Analyst, Architect, Designer, Developer, Tester), Christian Glodt (Architect, Designer, Developer, Tester)

Description: Lightning is a lightweight language workbench based on Alloy and Eclipse.

Lightning allows the definition of Languages via the specification of Alloy models, thus allowing the lightweight analysis of its components.

The focus of Lightning is to provide support to language engineers to efficiently design their DSLs.

Changes: In 2015, Lightning was improved in the following ways:

- the provided example projects were adapted and improved,
- support for F-Alloy transformations was improved,
- quick assist functionality was added for certain use cases,
- logging was improved,
- background task management was improved,
- the orientation of the metamodel view was made adjustable,
- many bugs were fixed.

LuxTraffic

http://www.luxtraffic.lu/

License: unknown

Description: LuxTraffic is a project aiming to provide real time traffic information by using smartphones as mobile traffic sensors. Luxembourg is an ideal location to validate the suggested system because of several factors. The country has a well developed road infrastructure with 282 km of highways in total on its territory which permits to have a country- scoped instead of city-scoped approach. Also, the recent high penetration rate of smartphones in combination with the data flat rates create a favorable environment for community based traffic sensing using mobile phones. Taking these factors into account we designed LuxTraffic, a traffic information system which, is in essence an online repository aiming at centralizing all information related to individual mobility in Luxembourg. The system has two main goals. The first is to create and maintain a community of users that will actively participate in collecting relevant traffic information using smartphone devices in an anonymous and autonomous manner. To accomplish this, applications (APPs) for the two dominant mobile platforms, iOS and Android, have been developed. In return, the users benefit from a variety of traffic information services available online. In the first phase, the system provides detailed information about traffic fluidity on Luxembourg highways. In the second phase, the system will be extended to cover the entire road network. The second purpose of the LuxTraffic platform is to gather, archive and analyze the collected traffic data centrally in order to identify traffic bottlenecks and propose solutions. To provide additional information, we interface with the local highway traffic control system called CITA, which among others provides a 24 hours access to highway cameras.

Luxembourg SUMO Traffic (LuST) Scenario

https://github.com/lcodeca/LuSTScenario

License: MIT

Members: Lara Codeca (Developer)

Description: The community needs a scenario with the following requirements:

- It has to be able to support different kinds of traffic demand such as congested or free-flow patterns.
- It should support different scenario dimensions.
- It has to include different road categories (e.g. residential, arterial and highway).
- It should allow multi-modal evaluations.
- Is should describe a realistic traffic scenario over one day (i.e. avoid gridlocks

and teleportations).

LuST is used for:

- Evaluation of different multi-modal strategies for commuters
- Testing protocols and applications on different scales
- On-board routing system to provide scenarios with different levels of congestion to test different re-routing algorithms.
- Test optimisation algorithms for
  - main arterial road (e.g. green waves)
  - emergency protocols (e.g. allow emergency vehicles to be prioritised)

MDPRevision

https://github.com/marcvanzee/mdp-plan-revision

License: Creative Commons

Members: Marc Van Zee (Developer)

Description: Read a more detailed description of the conceptual underpinnings and experimental results in the following paper:

> Intention Reconsideration as Metareasoning (Marc van Zee, Thomas Icard), In Bounded Optimality and Rational Metareasoning NIPS 2015 Workshop, 2015.

Summary

This project implements an agent that is situated on a Markov Decision Process (MDP).

The agent is able to compute the optimal policy through Value Iteration.

The MDP is changing over time, and the agent can respond to this change by either acting (i.e. executing the optimal action according to its current policy) or thinking (i.e. computing a new policy). The task is to learn the best meta-reasoning strategy, i.e. deciding when to think or act, based on the characteristics of the envrionment.

This general setup is quite complex, so we have simplified the environment (i.e. the MDP) to the TIleworld environment. This consists of an agent that is situated on a grid. It can move up, down, left, or right and has to fill holes, which means it has to reach specific states in the grid. It cannot move through obstacles.

We then develop several metareasoning strategies that the agent can use.

Changes: Developed framework in Java including visualization and presented it at the BORM workshop.

MSC Macro Package for LaTeX

http://satoss.uni.lu/mscpackage/

License: free use

Description: The message sequence chart (MSC) language is a visual language for the description of the interaction between different components of a system. This language is standardized by the ITU (International Telecommunication Union) in Recommendation Z.120 MSCs have a wide application domain, ranging from requirements specification to testing and documentation. In order to support easy drawing of MSCs in LaTeX documents, Sjouke Mauw and coworkers have developed the MSC macro package. Currently, Piotr Kordy is responsible for maintenance of the package. Version 1.17 is currently available from http://satoss.uni.lu/mscpackage/. In 2012 work started on recoding the package as to make it compatible with *pdflatex*.

MaM: Multidimensional Aggregation Monitoring

https://github.com/jfrancois/mam

License: Open Source

Description: MaM performs multidimensional aggregation over various types of data. The targeted use is the storage, visualisation and analysis of big data. For example, network operators may capture large quantities of flow based data which includes source and destination IP addresses and ports, number of packets, etc. Aggregation allows to leverage global view and so is particularly helpful for anomaly tracking as the most powerful, like spam campaigns, botnets, distributed denial of service, are distributed phenomena and can only be observed assuming a global point of view. However, defining the aggregation granularity is quite difficult and should not fixed over all the space. For example, some IP networks may require a small granularity while others need only a high level overview. Hence, MaM automatically selects the granularity by creating irregular dimension splits which are so better fitted to the underlying distribution. In addition, if a user does not know exactly what is looking for when he is monitoring his network, it does not know which dimension is the most important. For example, there is no reason to aggregate first on source IP addresses and then destination ports or vice-versa. Thus, MaM will automatically optimizes that by selecting the proper order of dimensions and even on multiple levels involving twice or more the same dimension with different granularity levels.To achieve a good scalability, MaM uses an underneath tree structure. A MaM tree is updated online with a limited complexity using a Least Recently Used strategy to keep the tree size compact and so to save resources.MaM is a generic tool and can be extended to any hierarchical types of data by implementing very few functions which describe the hierarchy. To summarize, the advantages of MaM

are:

- support of heterogeneous types of data simultaneously
- high scalability
- easy to extend
- user friendly outputs and graphical user interface
- open-source (available at https://github.com/jfrancois/mam)

The practicability of MaM have been highlighted in [lisa12] and a presentation is available at (demonstration at 14:15): https://www.usenix.org/conference/lisa12/efficient-multidimensional-aggregation-large-scale-monitoring

MaRCo Model Editor

http://marco.gforge.uni.lu/tools.html

License: binary only, freely redistributable without modification

Members: Christian Glodt (Architect, Designer, Developer, Tester)

Description: The MaRCo Model Editor is an Eclipse plugin that provides functionality for creating and editing XBPNM and Policy models, as well as transformation capabilities allowing to generate an Alloy representation of an XBPNM model.

MiCS Management System

http://demos.uni.lux/mics

License: non-redistributable, for internal use only

Members: Christian Glodt (Designer, Developer, Tester)

Description: An internal web-based tool developed for the management of modules, courses and profiles of the Master in Information and Computer Sciences. Developed by Christian Glodt.

Changes: In 2015, only minor maintenance was done on the MiCS Managements System.

MinUS

http://satoss.uni.lu/software/MinUS

License: free use

Members: Jun Pang (Analyst)

Description: This tool, MinUS, integrates the technologies of trajectory pattern mining with the state-of-the art research on discovering user similarity with trajectory patterns. Specifically, with MinUS, we provide a platform to manage movement datasets, and construct and compare users trajectory patterns. Tool users can compare results given by a series of user similarity metrics, which allows them to learn the importance and limitations of different similarity metrics and promotes studies in related areas, e.g., location privacy. Additionally, MinUS can also be used by researchers as a tool for preliminary process of movement data and parameter tuning in trajectory pattern mining. The tool is available at http://satoss.uni.lu/software/MinUS.

Model Decomposer

http://democles.lassy.uni.lu/documentation/TR_LASSY_10_06.pdf

License: free to use, binary redistribution permitted

Members: Christian Glodt (Architect, Developer), Qin Ma (Analyst)

Description: An Eclipse plugin that implements a generic model decomposition technique which is applicable to Ecore instances and EP models, and is described in a paper published in the proceedings of the FASE 2011 conference.

OVNIS

http://ovnis.gforge.uni.lu/

License: unknown

Description: For online vehicular wireless and traffic simulation. An integration of traffic simulator SUMO with network simulator ns-3.

Peerunit

http://peerunit.gforge.inria.fr/

License: GNU

Description: Peerunit is a testing framework for large-scale distributed systems. It is useful to developers who want to test their Java applications in a distributed way

ROS face_recognition package

http://www.ros.org/wiki/face_recognition

License: Attribution-NonCommercial 3.0

Members: Pouyan Ziafati (Developer)

Description: Provides a ROS simple actionlib server interface for performing different face recognition functionalities in video stream.

RationalGRL

https://github.com/RationalArchitecture/RationalGRL

License: Creative Common

Members: Marc Van Zee (Developer)

Description: Goal modeling languages, such as i* and the Goal-oriented Requirements Language (GRL), capture and analyze high-level goals and their relationships with lower level goals and tasks. However, in such models, the rationalization behind these goals and tasks and the selection of alternatives are usually left implicit.Rationalization consists of arguments for and against certain goals and solutions, which allow checking whether a particular goal model is a correct rendering of the relevant stakeholders' opinions and discussions. To better integrate goal models and their rationalization, we develop the RationalGRL framework, in which argument diagrams can be mapped to goal models. Moreover, we integrate the result of the evaluation of arguments and their counterarguments with GRL initial satisfaction values. We develop an interface between the argument web tools OVA and TOAST and the Eclipse-based tool for GRL called jUCMNav.

Changes: Initial framework using OVA and TOAST, allowing imports into jUCMNav.

SHARC

http://github.com/gjherbiet/sharc

License: GPL v3

Description: Source code and benchmarking framework for the SHARC (Sharper Heuristic for Assignment of Robust Communities) protocol

Seq-ACL+

http://www.di.unito.it/~genovese/tools.html

License: Free

Description: Developers: Daniele Rispoli, Valerio Genovese and Deepak Garg

Seq-ACL+ is a decidable theorem prover (written in PROLOG) for the modal access control logic ACL+ presented in V. Genovese and D. Garg "New Modalities for Access Control Logics: Permission, Control and Ratification" 7th International Workshop on Security and Trust Management - STM 2011

ULHPC-credits

https://gitlab.uni.lu/vplugaru/ulhpc-tools

License: GPLv3

Members: Valentin Plugaru (Designer)

Description: None

VehILux

http://vehilux.gforge.uni.lu/

License: unknown

Description: Large set of realistic vehicular traces over the area of Luxembourg country (110.000 trips) than can be used by traffic simulators like SUMO and in other simulations of traffic information systems

Visual Contract Builder

http://vcl.gforge.uni.lu/

License: free to use, binary redistribution permitted

Members: Christian Glodt (Architect, Designer, Developer)

Description: A suite of Eclipse plugins that provide support for graphically editing and typechecking VCL (Visual Contract Language) diagrams.

WFP toolbox

License: TBA

Members: Fabian Lanze (Developer), Andriy Panchenko (Developer)

Description: The website fingerprinting toolbox consists of multiple scripts and binaries that allow a user to carry out research related to the website fingerprinting attack. The toolbox enables a user to automate the visit of websites, record the traffic traces, clean the traffic traces from wrong instances, extract features from the traffic traces and finally train a machine learning classifier.

Changes: During the research in scope of the Privacy Flag project, the website fingerprinting toolbox got extended by more functionality. The toolbox can now be used to perform the extraction of relevant data points that are used as features for the machine learning algorithm on different layers of the networking stack, e.g., on the TLS or Tor cell level.

Web-based itinerary planner for Luxembourg

http://sfaye.com/vehicularlab/OTP.zip

License: MIT

Members: Sébastien Faye (Developer)

Description: The first prototype allows users to plan trips using several intermediate location points. In particular, users can choose between different modes of transport or a combination of several modes, including those with time-dependent availability (i.e. bike-sharing). The system automatically computes interesting trips and suggested the best ones to the user. Current modes of transportation include car, bicycle, Veloh, public transport and walking.

Yactul

License: N/A

Members: Steffen Rothkugel (Architect)

Description: Yactul is a game-based student response framework for interactive education.

bagit

http://demos.uni.lux/bagit

License: non-redistributable, for internal use only

Members: Christian Glodt (Designer, Developer, Tester)

Description: An internal web-based tool that provides assistance to research groups by storing, pooling, tagging and indexing papers and other publications.

delegation2spass

http://www.di.unito.it/~genovese/tools.html

License: Free

Description: Developers: Daniele Rispoli and Valerio Genovese

delegstion2spass is a parser (written in SCHEME) which implements a set of complete reduction axioms and translates dynamic formulas for a delegation/revocation logic into propositional logic expressed in DFG syntax.

mCarve and cCarve

http://satoss.uni.lu/software/ccarve/

License: free use

Description: mCarve and cCarve are software tools for carving attributed dump sets. These dump sets can, for instance, be obtained by dumping the memory of a number of smart cards or by regularly dumping the memory of a single smart card during its lifetime. The tools help in determining at which location in the dumps certain attributes are stored. mCarve is written in Python and is available from http://satoss.uni.lu/software/mcarve/. More information about mCarve can be obtained from our paper [DMR11]. cCarve is written in C++. It implements a linear algorithm for carving attributed dump sets, which improves its run time with respect to mCarve.

php-bibHTML package

http://satoss.uni.lu/software/php-bibHTML/

License: free use

Description: The php-bibHTML package provides a convenient PHP interface to the data stored in BibTEX files. Its main purpose is to automatically generate an HTML publication list based on a BibTEX input file, whose appearance is controlled via style sheets. Furthermore, it provides a function to convert LATEX accented characters and symbols (e.g., \"e, \OE, \={o}, \forall, \heartsuit, ...) to the corresponding HTML entities, and a function to determine which required fields are missing in a .bib file.

The latest version of the package was released in 2013, contains assorted minor improvements compared to the initial release, and is available from http://satoss.uni.lu/software/php-bibHTML/.

Chapter 8

Publications in 2015

The publications listed in this chapter have been generated from ORBi[lu], the official publication record repository of the university:

http://orbilu.uni.lu

An overview of the publication quantity (per category) is provided in the table below.

Publication Category	Quantity	Section
Book	8	8.1 (p.226)
Book Chapter	12	8.2 (p.227)
Journal	91	8.3 (p.228)
Thesis	1	8.4 (p.235)
Conference	181	8.5 (p.235)
Technical Report	9	8.6 (p.252)
Miscellaneous	7	8.7 (p.253)
Total	*329*	

Table 8.1: Overview of CSC publications in 2015

The figure below illustrates the distribution of the types of publications.

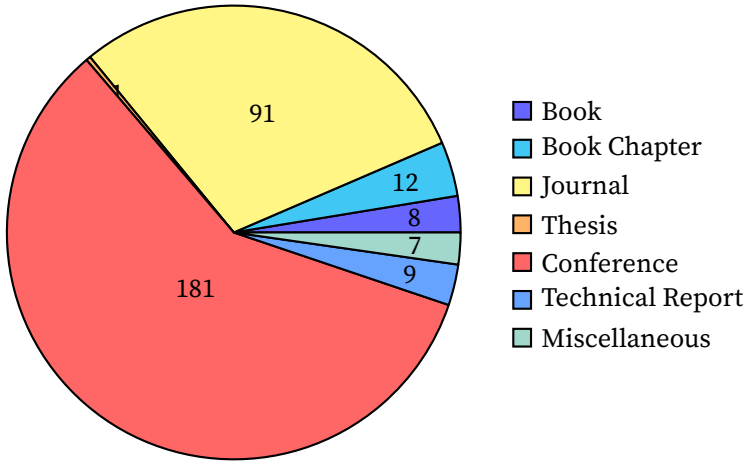

Figure 8.1: Distribution of CSC publications in 2015

8.1 Book

[1] D. Bianculli, R. Calinescu, and B. Rumpe, eds. *Software Engineering and Formal Methods - SEFM 2015 Collocated Workshops: ATSE, HOFM, MoKMaSD, and VERY*SCART, York, UK, September 7-8, 2015, Revised Selected Papers*. Springer, 2015. URL: http://hdl.handle.net/10993/24841.

[2] A. Biryukov and G. Vipul, eds. *Progress in Cryptology - INDOCRYPT 2015 - 16th International Conference on Cryptology in India*. Springer, 2015. ISBN: 978-3-319-26616-9. URL: http://hdl.handle.net/10993/25566.

[3] R. Bisdorff. *The EURO 2004 best poster award: Choosing the best poster in a scientific conference*. Springer, 2015. DOI: 10.1007/978-3-662-46816-6_5. URL: http://hdl.handle.net/10993/23714.

[4] R. Bisdorff et al. *Evaluation and decision models with multiple criteria: Case studies*. Springer, 2015. DOI: 10.1007/978-3-662-46816-6. URL: http://hdl.handle.net/10993/23698.

[5] R. Bisdorff et al. *Introduction*. Springer, 2015. DOI: 10.1007/978-3-662-46816-6_1. URL: http://hdl.handle.net/10993/23702.

[6] S. Chatzinotas, B. Ottersten, and R. DeGaudenzi, eds. *Cooperative and Cognitive Satellite Systems*. Elsevier, 2015. ISBN: 978-0-12-799948-7. URL: http://hdl.handle.net/10993/21056.

[7] J.-G. Dumas et al. *Foundations of Coding: Compression, Encryption, Error-Correction*. Wiley Sons, 2015. ISBN: 978-1-118-88144-6. URL: http://hdl.handle.net/10993/21594.

[8] J. Pang, Y. Liu, and S. Mauw, eds. *Proceedings 4th International Workshop on Engineering Safety and Security Systems*. EPTCS, 2015. URL: http://hdl.handle.net/10993/21540.

8.2 Book Chapter

[9] A. Baouya et al. “On the Probabilistic Verification of Time Constrained SysML State Machines”. In: *Intelligent Software Methodologies, Tools and Techniques*. Springer International Publishing, 2015, pp. 425–441. URL: http://hdl.handle.net/10993/24850.

[10] P. Bouvry et al. “Energy Efficiency and High-Performance Computing”. In: *Large-scale Distributed Systems and Energy Efficiency: A Holistic View*. John Wiley Sons, 2015, pp. 197–224. ISBN: 978-1-118-86463-0. URL: http://hdl.handle.net/10993/21596.

[11] D. Christopoulos, S. Chatzinotas, and B. Ottersten. “User Scheduling in Cooperative Satellite Systems”. In: *Cooperative and Cognitive Satellite Systems*. Elsevier, 2015. ISBN: 978-0-12-799948-7. URL: http://hdl.handle.net/10993/21524.

[12] W. Jamroga and M. Tabatabaei. “Strategic Noninterference”. In: *ICT Systems Security and Privacy Protection*. Springer, 2015, pp. 67–81. URL: http://hdl.handle.net/10993/21808.

[13] D. Kliazovich et al. “Energy Consumption Optimization in Cloud Data Centers”. In: *Cloud Services, Networking and Management*. Wiley, 2015. ISBN: 978-1-118-84594-3. URL: http://hdl.handle.net/10993/18275.

[14] T. Mouelhi, D. E. Kateb, and Y. L. Traon. “Inroads in Testing Access Control”. In: *Advances in Computers*. ELSEVIER, 2015. URL: http://hdl.handle.net/10993/21567.

[15] R. T. Rasua and J. Domingo-Ferrer. “Privacy in Spatio-Temporal Databases: A Microaggregation-Based Approach”. In: *Advanced Research in Data Privacy*. Springer, 2015, pp. 197–214. URL: http://hdl.handle.net/10993/24125.

[16] E. Ruttkamp-Bloem, G. Casini, and T. Meyer. “A non-classical logical foundation for naturalised realism”. In: *The Logica Yearbook*. College Publications, 2015, pp. 249–266. ISBN: 978-1-84890-177-3. URL: http://hdl.handle.net/10993/23779.

[17] S. K. Sharma, S. Chatzinotas, and B. Ottersten. “Cognitive Beamforming for Spectral Coexistence of Hybrid Satellite Systems”. In: *Cooperative and Cognitive Satellite Systems*. Elsevier, 2015. URL: http://hdl.handle.net/10993/18434.

[18] S. K. Sharma, S. Chatzinotas, and B. Ottersten. “Cognitive interference alignment for spectral coexistence”. In: *Cognitive Radio and Networking for Heterogeneous Wireless Networks*. Springer International Publishing, 2015, pp. 37–65. URL: http://hdl.handle.net/10993/26430.

[19] S. K. Sharma, S. Chatzinotas, and B. Ottersten. “Exploiting Polarization for Spectrum Awareness in Cognitive Satellite Communications”. In: *Software-Defined and Cognitive Radio Technologies for Dynamic Spectrum Access and Management*. IGI Global, 2015. ISBN: 9781466665712. URL: http://hdl.handle.net/10993/18435.

[20] S. Varrette et al. “Energy efficiency in HPC Data Centers: Latest Advances to Build the Path to Exascale”. In: *Handbook on Data Centers*. Springer, 2015. ISBN: 978-1-4939-2091-4. URL: http://hdl.handle.net/10993/21595.

8.3 Journal

[21] S. D. ALESIO et al. “Combining Genetic Algorithms and Constraint Programming to Support Stress Testing of Task Deadlines”. In: *ACM Transactions on Software Engineering & Methodology* 5.1 (2015). URL: http://hdl.handle.net/10993/20995.

[22] M. Alodeh, S. Chatzinotas, and B. Ottersten. “Constructive Multiuser Interference in Symbol Level Precoding for the MISO Downlink Channel”. In: *IEEE Transactions on Signal Processing* (2015). URL: http://hdl.handle.net/10993/19949.

[23] M. Alodeh, S. Chatzinotas, and B. Ottersten. “Spatial DCT-Based Channel Estimation in Multi-Antenna Multi-Cell Interference Channels”. In: *IEEE Transactions on Signal Processing* (2015). URL: http://hdl.handle.net/10993/19461.

[24] M. Amrani et al. “Formal verification techniques for model transformations: A tridimensional classification”. In: *Journal of Object Technology* 4.3 (2015). DOI: 10.5381/jot.2015.14.3.a1. URL: http://hdl.handle.net/10993/25157.

[25] A. Aravanis et al. “Power Allocation in Multibeam Satellite Systems: A Two-Stage Multi-Objective Optimization”. In: *IEEE Transactions on Wireless Communications* (2015). URL: http://hdl.handle.net/10993/20797.

[26] C. Arora et al. “Automated Checking of Conformance to Requirements Templates using Natural Language Processing”. In: *IEEE Transactions on Software Engineering* 1.10 (2015), pp. 944–968. DOI: 10.1109/TSE.2015.2428709. URL: http://hdl.handle.net/10993/20940.

[27] G. Avoine, S. Mauw, and R. T. Rasua. “Comparing distance bounding protocols: A critical mission supported by decision theory”. In: *Computer Communications* 7 (2015), pp. 92–102. URL: http://hdl.handle.net/10993/25857.

[28] A. C. Bahnsen, D. Aouada, and B. Ottersten. “A novel cost-sensitive framework for customer churn predictive modeling”. In: *Decision Analytics* 2.5 (2015). DOI: 10.1186/s40165-015-0014-6. URL: http://hdl.handle.net/10993/20971.

[29] A. C. Bahnsen, D. Aouada, and B. Ottersten. “Ensemble of Example-Dependent Cost-Sensitive Decision Trees”. In: *arXiv preprint arXiv:1505.04637* (2015). URL: http://hdl.handle.net/10993/25032.

[30] A. C. Bahnsen, D. Aouada, and B. Ottersten. “Example-Dependent Cost-Sensitive Decision Trees”. In: *Expert Systems with Applications* 2.19 (2015), pp. 6609–6619. DOI: 10.1016/j.eswa.2015.04.042. URL: http://hdl.handle.net/10993/20970.

[31] A. Baouya et al. “A Quantitative Verification Framework of SysML Activity Diagrams under Time Constraints”. In: *Expert Systems with Applications* (2015). URL: http://hdl.handle.net/10993/24849.

[32] F. G. Becerro et al. “Unified Multi-Lateral Filter for Real-Time Depth Map Enhancement”. In: *Image & Vision Computing* 1 (2015), pp. 26–42. DOI: 10.1016/j.imavis.2015.06.008. URL: http://hdl.handle.net/10993/21724.

[33] G. Bella, P. Curzon, and G. Lenzini. “Service security and privacy as a socio-technical problem”. In: *JOURNAL OF COMPUTER SECURITY* 3.5 (2015), pp. 563–585. DOI: 10.3233/JCS-150536. URL: http://hdl.handle.net/10993/25412.

[34] Z. Benenson et al. “4.2 Social Dynamics Metrics-Working Group Report”. In: *Socio-Technical Security Metrics* (2015), pp. 17–19. URL: http://hdl.handle.net/10993/25411.

[35] Z. Benenson et al. “Maybe Poor Johnny Really Cannot Encrypt - The Case for a Complexity Theory for Usable Security”. In: *Proc. of the New Security Paradigm Workshop* (2015). URL: http://hdl.handle.net/10993/21718.

[36] A. Bertolino et al. “Similarity testing for access control”. In: *Information and Software Technology* 8 (2015), pp. 355–372. DOI: 10.1016/j.infsof.2014.07.003. URL: http://hdl.handle.net/10993/26426.

[37] D. Bianculli et al. “Syntactic-Semantic Incrementality for Agile Verification”. In: *Science of Computer Programming* 7 (2015), pp. 47–54. DOI: 10.1016/j.scico.2013.11.026. URL: http://hdl.handle.net/10993/10656.

[38] D. Boru et al. “Energy-efficient Data Replication in Cloud Computing Datacenters”. In: *Cluster Computing* 8.1 (2015), pp. 385–402. DOI: 10.1007/s10586-014-0404-x. URL: http://hdl.handle.net/10993/19465.

[39] P. Bouvry et al. “Resilience within Ultrascale Computing System: Challenges and Opportunities from Nesus Project”. In: *Supercomputing Frontiers and Innovations* 2.2 (2015), pp. 46–63. DOI: 10.14529/jsfi1502. URL: http://hdl.handle.net/10993/22779.

[40] W. Bronzi et al. “Bluetooth Low Energy performance and robustness analysis for Inter-Vehicular Communications”. In: *Elsevier - Ad Hoc Networks* (2015). URL: http://hdl.handle.net/10993/24735.

[41] M. M. Butt, E. A. Jorswieck, and B. Ottersten. “Maximizing energy efficiency in multiple access channels by exploiting packet dropping and transmitter buffering”. In: *IEEE Transactions on Wireless Communications* 4.8 (2015), pp. 4129–4141. DOI: 10.1109/TWC.2015.2417151. URL: http://hdl.handle.net/10993/24873.

[42] G. Castignani et al. “Driver Behavior Profiling Using Smartphones: A Low-Cost Platform for Driver Monitoring”. In: *Intelligent Transportation Systems Magazine, IEEE* 7.1 (2015), pp. 91–102. DOI: 10.1109/MITS.2014.2328673. URL: http://hdl.handle.net/10993/19792.

[43] S. Chatzinotas, D. Christopoulos, and B. Ottersten. “Cellular-broadcast service convergence through caching for CoMP cloud RANs”. In: *arXiv preprint arXiv:1504.08274* (2015). URL: http://hdl.handle.net/10993/26380.

[44] D. Christopoulos, S. Chatzinotas, and B. Ottersten. “Multicast Multigroup Precoding and User Scheduling for Frame-Based Satellite Communications”. In: *IEEE Transactions on Wireless Communications* 4.9 (2015), pp. 4695–4707. URL: http://hdl.handle.net/10993/23515.

[45] V. V. Cogo et al. “A High-Throughput Method to Detect Privacy-Sensitive Human Genomic Data”. In: *Proceedings of the 14th ACM Workshop on Privacy in the Electronic Society* (2015), pp. 101–110. DOI: 10.1145/2808138.2808139. URL: http://hdl.handle.net/10993/22618.

[46] J.-S. Coron. “Zeroizing Without Low-Level Zeroes: New MMAP Attacks and Their Limitations”. In: *Proceedings of Crypto 2015* (2015). URL: http://hdl.handle.net/10993/24863.

[47] J.-S. Coron, T. Lepoint, and M. Tibouchi. “New Multilinear Maps over the Integers”. In: *Proceedings of Crypto 2015* (2015). URL: http://hdl.handle.net/10993/24864.

[48] J. M. Cortés-Mendoza et al. “VoIP Service Model for Multi-objective Scheduling in Cloud Infrastructure”. In: *International Journal of Metaheuristics* 4.2 (2015), pp. 185–203. DOI: 10.1504/IJMHEUR.2015.074251. URL: http://hdl.handle.net/10993/27838.

[49] J. Dreier et al. “Formal Security Analysis of Traditional and Electronic Exams”. In: *Communications in Computer and Information Science* 4 (2015), pp. 294–318. URL: http://hdl.handle.net/10993/24020.

[50] A. B. Fadhel, D. Bianculli, and L. Briand. “A Comprehensive Modeling Framework for Role-based Access Control Policies”. In: *The Journal of Systems & Software* 7 (2015), pp. 110–126. DOI: 10.1016/j.jss.2015.05.015. URL: http://hdl.handle.net/10993/21025.

[51] C. Fiandrino et al. “Performance and Energy Efficiency Metrics for Communication Systems of Cloud Computing Data Centers”. In: *IEEE Transactions on Cloud Computing* (2015). DOI: 10.1109/TCC.2015.2424892. URL: http://hdl.handle.net/10993/20888.

[52] A. Gharanjik et al. “Multiple Gateway Transmit Diversity in Q/V Band Feeder Links”. In: *IEEE Transactions on Communications* (2015). DOI: 10.1109/TCOMM.2014.2385703. URL: http://hdl.handle.net/10993/19261.

[53] A. Grzybek et al. “Mitigating flash crowd effect using connected vehicle technology”. In: *Vehicular Communications* 2.4 (2015). DOI: 10.1016/j.vehcom.2015.10.002. URL: http://hdl.handle.net/10993/24169.

[54] M. Guzek, P. Bouvry, and E.-G. Talbi. “A Survey of Evolutionary Computation for Resource Management of Processing in Cloud Computing”. In: *IEEE Computational Intelligence Magazine* 2 (2015), pp. 53–67. DOI: 10.1109/MCI.2015.2405351. URL: http://hdl.handle.net/10993/20857.

[55] M. Guzek et al. “Cloud Brokering: Current Practices and Upcoming Challenges”. In: *IEEE Cloud Computing* 2.2 (2015). URL: http://hdl.handle.net/10993/21135.

[56] S. He et al. “Energy Efficient Coordinated Beamforming for Multicell System: Duality-Based Algorithm Design and Massive MIMO Transition”. In: *IEEE TRANSACTIONS ON COMMUNICATIONS* 3.12 (2015), pp. 4920–4935. DOI: 10.1109/TCOMM.2015.2496948. URL: http://hdl.handle.net/10993/26316.

[57] W. Jamroga and M. Tabatabaei. “Accumulative knowledge under bounded resources”. In: *Journal of Logic & Computation* (2015), exv003. DOI: 10.1093/logcom/exv003. URL: http://hdl.handle.net/10993/21809.

[58] A. Kalantari and B. Ottersten. “Secrecy Analysis on Network Coding in Bidirectional Multibeam Satellite Communications”. In: *IEEE Transactions on Information Forensics and Security* (2015). URL: http://hdl.handle.net/10993/21069.

[59] A. Kalantari et al. “Joint Power Control in Wiretap Interference Channels”. In: *IEEE Transactions on Wireless Communications* (2015). URL: http://hdl.handle.net/10993/21003.

[60] D. E. Kateb et al. “Conviviality-driven access control policy”. In: *Requirements Engineering* 4 (2015), pp. 363–382. DOI: 10.1007/s00766-014-0204-0. URL: http://hdl.handle.net/10993/26427.

[61] A. Kaushik et al. “Performance Analysis of Underlay Cognitive Radio Systems: Estimation-Throughput Tradeoff”. In: *arXiv preprint arXiv:1510.03353* (2015). URL: http://hdl.handle.net/10993/26320.

[62] A. Kaushik et al. “Sensing-Throughput Tradeoff for Interweave Cognitive Radio System: A Deployment-Centric Viewpoint”. In: *Wireless Communications, IEEE Transactions on* 99 (2015), p. 14. URL: http://hdl.handle.net/10993/26312.

[63] S. D. Kinderen and Q. Ma. “Requirements Engineering for the Design of Conceptual Modeling Languages - a goal- and value-oriented approach”. In: *Applied Ontology* (2015). URL: http://hdl.handle.net/10993/20849.

[64] M. Kintis, M. Papadakis, and N. Malevris. “Employing second-order mutation for isolating first-order equivalent mutants”. In: *Software Testing, Verification & Reliability* 5.5 (2015), pp. 508–535. URL: http://hdl.handle.net/10993/16832.

[65] D. Kreutz et al. “Software-Defined Networking: A Comprehensive Survey”. In: *Proceedings of the IEEE* 3.1 (2015), pp. 14–76. DOI: 10.1109/JPROC.2014.2371999. URL: http://hdl.handle.net/10993/20596.

[66] C. Laczny et al. “VizBin - an application for reference-independent visualization and human-augmented binning of metagenomic data”. In: *Microbiome* (2015). DOI: 10.1186/s40168-014-0066-1.. URL: http://hdl.handle.net/10993/20140.

[67] E. Lagunas et al. “Resource Allocation for Cognitive Satellite Communications with Incumbent Terrestrial Networks”. In: *IEEE Transactions on Cognitive Communications and Networking* (2015). URL: http://hdl.handle.net/10993/23955.

[68] G. Lenzini, S. Mauw, and S. Ouchani. “Security analysis of socio-technical physical systems”. In: *Computers electrical engineering* (2015). DOI: 10.1016/j.compeleceng.2015.02.019. URL: http://hdl.handle.net/10993/21730.

[69] L. Li et al. “An Investigation into the Use of Common Libraries in Android Apps”. In: *arXiv preprint arXiv:1511.06554* (2015). URL: http://hdl.handle.net/10993/25163.

[70] Y. Li and J. Pang. “Formalizing provable anonymity in Isabelle/HOL”. In: *Formal Aspects of Computing* 7.2 (2015), pp. 255–282. URL: http://hdl.handle.net/10993/21325.

[71] Q. Ma, P. Kelsen, and C. Glodt. “A generic model decomposition technique and its application to the Eclipse modeling framework”. In: *Software & Systems Modeling* 4.2 (2015), pp. 921–952. URL: http://hdl.handle.net/10993/18135.

[72] S. Maleki et al. “Cognitive Zone for Broadband Satellite Communication in 17.3-17.7 GHz Band”. In: *IEEE Wireless Communications Letters* (2015). URL: http://hdl.handle.net/10993/20284.

[73] S. Maleki et al. “To AND or To OR: On Energy-Efficient Distributed Spectrum Sensing with Combined Censoring and Sleeping”. In: *IEEE Transactions on Wireless Communications* (2015). URL: http://hdl.handle.net/10993/20779.

[74] H. Margossian, G. Deconinck, and J. Sachau. “Distribution Network Protection Considering Grid Code Requirements for Distributed Generation”. In: *IET Generation, Transmission & Distribution* 9.12 (2015), pp. 1377–1381. URL: http://hdl.handle.net/10993/22102.

[75] R. Matinnejad et al. “Search-Based Automated Testing of Continuous Controllers: Framework, Tool Support, and Case Studies”. In: *Information and Software Technology* 7 (2015), pp. 705–722. DOI: 10.1016/j.infsof.2014.05.007. URL: http://hdl.handle.net/10993/16501.

[76] M. A. O. Mendez et al. “Towards an Autonomous Vision-Based Unmanned Aerial System against Wildlife Poachers”. In: *Sensors* 5.12 (2015), p. 29861. DOI: 10.3390/s151229861. URL: http://hdl.handle.net/10993/24563.

[77] S. Nair et al. “Evidence management for compliance of critical systems with safety standards: A survey on the state of practice”. In: *Information & Software Technology* (2015), pp. 1–15. DOI: 10.1016/j.infsof.2014.12.002. URL: http://hdl.handle.net/10993/21265.

[78] D. D. Nardo et al. “Coverage-based regression test case selection, minimization and prioritization: a case study on an industrial system”. In: *Software Testing, Verification & Reliability* 5.4 (2015), pp. 371–396. DOI: 10.1002/stvr.1572. URL: http://hdl.handle.net/10993/19426.

[79] S. Neshvad, S. Chatzinotas, and J. Sachau. “Wideband Identification of Power Network Parameters Using Pseudo-Random Binary Sequences on Power Inverters”. In: *IEEE Transactions on Smart Grid* (2015). URL: http://hdl.handle.net/10993/23880.

[80] P. Nguyen et al. “An Extensive Systematic Review on the Model-Driven Development of Secure Systems”. In: *Information & Software Technology* 8 (2015), pp. 62–81. DOI: 10.1016/j.infsof.2015.08.006. URL: http://hdl.handle.net/10993/23026.

[81] D. P. B. Norta et al. “11,8-100% Rural Renewable Energy and Power Supply and its Influence on the Luxembourgish Power System”. In: *Energy Procedia* 3 (2015), pp. 163–172. DOI: 10.1016/j.egypro.2015.07.666. URL: http://hdl.handle.net/10993/21988.

[82] D. P. B. Norta et al. “A Concept to Increase the Bulk Warm Water Production of Ordinary Direct and Indirect Solar-Thermal Systems in Rural India”. In: *Renewable Energy and Power Quality Journal* 3 (2015). URL: http://hdl.handle.net/10993/20795.

[83] D. P. B. Norta et al. “Hydrokinetic Micro-Power Generation in Small Rivers - a New Approach”. In: *Renewable Energy and Power Quality Journal* (2015). URL: http://hdl.handle.net/10993/20792.

[84] S. Ouchani and M. Debbabi. “Specification, verification, and quantification of security in model-based systems”. In: *Computing* 7 (2015), pp. 691–711. DOI: 10.1007/s00607-015-0445-x. URL: http://hdl.handle.net/10993/21774.

[85] S. Ouchani and G. Lenzini. “Generating attacks in SysML activity diagrams by detecting attack surfaces”. In: *Journal of Ambient Intelligence and Humanized Computing* 6.3 (2015), pp. 361–373. DOI: 10.1007/s12652-015-0269-8. URL: http://hdl.handle.net/10993/21520.

[86] M. R. Palattella et al. “On-the-Fly Bandwidth Reservation for 6TiSCH Wireless Industrial Networks”. In: *IEEE Sensors Journal* (2015). URL: http://hdl.handle.net/10993/23781.

[87] J. Pang and Y. Zhang. “A new access control scheme for Facebook-style social networks”. In: *Computers & Security* 4 (2015), pp. 44–59. URL: http://hdl.handle.net/10993/22854.

[88] M. Papadakis and Y. L. Traon. “Metallaxis-FL: mutation-based fault localization”. In: *Software Testing : Verification & Reliability* 5 (2015), pp. 605–628. DOI: 10.1002/stvr.1509. URL: http://hdl.handle.net/10993/15363.

[89] X. Parent. “Completeness of Aqvist’s systems E and F”. In: *Review of Symbolic Logic* 8.1 (2015), pp. 164–177. URL: http://hdl.handle.net/10993/23936.

[90] H. Pennanen et al. “Distributed Coordinated Beamforming for Multi-cell Multigroup Multicast Systems”. In: *arXiv preprint arXiv:1511.03561* (2015). URL: http://hdl.handle.net/10993/26309.

[91] R. Piazza, B. Shankar, and B. Ottersten. “Multi-gateway Data Predistortion for Non-linear Satellite Channels”. In: *IEEE Transactions on Communications* 3.10 (2015), pp. 3789–3802. URL: http://hdl.handle.net/10993/24104.

[92] F. M. V. Ramos, D. Kreutz, and P. Verissimo. “On the Road to the Softwarization of Networking”. In: *Cutter IT Journal* 8 (2015), pp. 6–13. URL: http://hdl.handle.net/10993/23825.

[93] R. T. Rasua and I. G. Yero. “k-Metric Antidimension: a Privacy Measure for Social Graphs”. In: *Information Sciences* 8 (2015), :403–417. URL: http://hdl.handle.net/10993/22529.

[94] P. Ryan, S. Schneider, and V. Teague. “End-to-End Verifiability in Voting Systems, from Theory to Practice”. In: *IEEE SECURITY & PRIVACY* 3.3 (2015), pp. 59–62. URL: http://hdl.handle.net/10993/25430.

[95] P. Ryan et al. “End-to-end verifiability”. In: *arXiv preprint arXiv:1504.03778* (2015). URL: http://hdl.handle.net/10993/25429.

[96] J. Seyler, N. Navet, and L. Fejoz. “Insights on the Configuration and Performances of SOME/IP Service Discovery”. In: *SAE International Journal of Passenger Cars- Electronic and Electrical Systems* 8.1 (2015), pp. 124–129. DOI: 10.4271/2015-01-0197. URL: http://hdl.handle.net/10993/21073.

[97] L. K. Shar, L. Briand, and H. B. K. Tan. “Web Application Vulnerability Prediction using Hybrid Program Analysis and Machine Learning”. In: *IEEE Transactions on Dependable and Secure Computing* 2.6 (2015), pp. 688–707. URL: http://hdl.handle.net/10993/18549.

[98] S. K. Sharma et al. “Cognitive Radio Techniques under Practical Imperfections: A Survey”. In: *IEEE Communications Surveys and Tutorials* (2015). DOI: 10.1109/COMST.2015.2452414. URL: http://hdl.handle.net/10993/21725.

[99] U. Sorger and Z. Suchanecki. “Nonlocalization Properties of Time Operators Transformations”. In: *International Journal of Theoretical Physics* 4.4 (2015), pp. 787–800. URL: http://hdl.handle.net/10993/24255.

[100] A. Stathakis et al. “Optimizing communication satellites payload configuration with exact approaches”. In: *Engineering Optimization* (2015), pp. 1–26. DOI: 10.1080/0305215X.2014.995176. URL: http://hdl.handle.net/10993/20057.

[101] S. C. Tosatto, P. Kelsen, and G. Governatori. “Business Process Regulatory Compliance is Hard”. In: *IEEE Transactions on Services Computing* 8.6 (2015), pp. 958–970. DOI: 10.1109/TSC.2014.2341236. URL: http://hdl.handle.net/10993/19564.

[102] S. C. Tosatto et al. “Algorithms for tractable compliance problems”. In: *Frontiers of Computer Science* 9.1 (2015), pp. 55–74. URL: http://hdl.handle.net/10993/19556.

[103] M. Usman et al. “Energy efficiency of TCP: An analytical model and its application to reduce energy consumption of the most diffused transport protocol”. In: *International Journal of Communication Systems* (2015). URL: http://hdl.handle.net/10993/22224.

[104] M. Á. Vázquez et al. “Precoding in multibeam satellite communications: present and future challenges”. In: *jourlib Journal* (2015). URL: http://hdl.handle.net/10993/26310.

[105] D. Xu et al. “Automated Model-Based Testing of Role-Based Access Control Using Predicate/Transition Nets”. In: *IEEE TRANSACTIONS ON COMPUTERS* 4.9 (2015), pp. 2490–2505. DOI: 10.1109/TC.2014.2375189. URL: http://hdl.handle.net/10993/25156.

[106] T. Yue, L. Briand, and Y. Labiche. “aToucan: An Automated Framework to Derive UML Analysis Models from Use Case Models”. In: *ACM Transactions on Software Engineering & Methodology* 4.3 (2015). URL: http://hdl.handle.net/10993/18949.

[107] E. Zenteno et al. “A MIMO Symbol Rate Signal Digital Predistorter for Nonlinear Multicarrier Satellite Channels”. In: *IET Communications* 9.15 (2015), pp. 2053–2059. URL: http://hdl.handle.net/10993/24105.

[108] E. Zenteno et al. “Low Complexity Predistortion and Equalization in Nonlinear Multicarrier Satellite Communications”. In: *EURASIP Journal on Advances in Signal Processing* (2015). URL: http://hdl.handle.net/10993/24106.

[109] E. Zenteno et al. “Multiple-input multiple-output symbol rate signal digital predistorter for non-linear multi-carrier satellite channels”. In: *Communications, IET* 9.16 (2015), pp. 2053–2059. URL: http://hdl.handle.net/10993/24874.

[110] X. Zhang et al. “Roundtable: Research Opportunities and Challenges for Emerging Software Systems”. In: *Journal of Computer Science and Technology* 5 (2015), pp. 935–941. DOI: 10.1007/s11390-015-1572-8. URL: http://hdl.handle.net/10993/25158.

[111] P. Ziafati et al. “Retalis Language for Information Engineering in Autonomous Robot Software”. In: *IfCoLog Journal of Logics and their Applications* 2.2 (2015), p. 85. URL: http://hdl.handle.net/10993/25150.

8.4 Thesis

[112] G. Neyens. “Principles and design of global proactive scenarios over a network of proactive engines”. PhD thesis. University of Luxembourg, Faculty of Science, Technology, Communication (FSTC), Computer Science, and Communications Research Unit (CSC), 2015. URL: http://hdl.handle.net/10993/22200.

8.5 Conference

[113] H. Afzal et al. “View-Independent Enhanced 3D Reconstruction of Non-Rigidly Deforming Objects”. In: *16th International Conference on Computer Analysis of Images and Patterns*. 2015. URL: http://hdl.handle.net/10993/21450.

[114] K. Allix et al. “Are Your Training Datasets Yet Relevant? - An Investigation into the Importance of Timeline in Machine Learning-Based Malware Detection”. In: *Engineering Secure Software and Systems - 7th International Symposium ESSoS 2015, Milan, Italy, March 4-6, 2015. Proceedings*. Springer International Publishing, 2015, pp. 51–67. ISBN: 978-3-319-15617-0. DOI: 10.1007/978-3-319-15618-7_5. URL: http://hdl.handle.net/10993/20299.

[115] M. Alodeh, S. Chatzinotas, and B. Ottersten. “Constructive Interference through Symbol Level Precoding for Multi-level Modulation”. In: *IEEE Global communications conference*. 2015. URL: http://hdl.handle.net/10993/23578.

[116] M. Alodeh, S. Chatzinotas, and B. Ottersten. “Energy Efficient Symbol-Level Precoding in Multiuser MISO Channels”. In: *16th IEEE International Workshop on Signal Processing Advances in Wireless Communications*. 2015. URL: http://hdl.handle.net/10993/20974.

[117] M. Alodeh, S. Chatzinotas, and B. Ottersten. “Symbol Based Precoding in the Downlink of Cognitive MISO Channel”. In: *Proceedings of CROWNCOM 2015*. 2015. URL: http://hdl.handle.net/10993/20823.

[118] S. Altmeyer, N. Navet, and L. Fejoz. “Using CPAL to model and validate the timing behaviour of embedded systems”. In: *6th International Workshop on Analysis Tools and Methodologies for Embedded and Real-time Systems (WATERS)*. 2015. URL: http://hdl.handle.net/10993/21250.

[119] D. Aouada, K. A. Ismaeil, and B. Ottersten. “Patch-based Statistical Performance Analysis of Upsampling for Precise Super–Resolution”. In: *11th International Joint Conference on Computer Vision, Imaging and Computer Graphics Theory and Applications (VISAPP'15)*. 2015. URL: http://hdl.handle.net/10993/20838.

[120] D. Appelt, D. C. Nguyen, and L. Briand. “Behind an Application Firewall, Are We Safe from SQL Injection Attacks?” In: *2015 IEEE 8th International Conference on Software Testing, Verification, and Validation (ICST)*. 2015. ISBN: 978-1-4799-7124-4. DOI: 10.1109/ICST.2015.7102581. URL: http://hdl.handle.net/10993/19703.

[121] C. Arora et al. “Change Impact Analysis for Natural Language Requirements: An NLP Approach”. In: *23rd IEEE International Requirements Engineering Conference, Ottawa 24-28 August 2015*. 2015. URL: http://hdl.handle.net/10993/21229.

[122] C. Arora et al. “NARCIA: An Automated Tool for Change Impact Analysis in Natural Language Requirements”. In: *10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering, Bergamo 30 August - 4 September 2015*. 2015. URL: http://hdl.handle.net/10993/21517.

[123] A. Atashpendar, B. Roscoe, and P. Ryan. “Information Leakage due to Revealing Randomly Selected Bits”. In: *Security Protocols XXIII: Lecture Notes in Computer Science, Volume 9379, 2015*. Springer, 2015, pp. 325–341. DOI: 10.1007/978-3-319-26096-9_33. URL: http://hdl.handle.net/10993/21251.

[124] T. Avanesov et al. “Network troubleshooting with SDN-RADAR (demo paper)”. In: *Proc. of IFIP/IEEE International Symposium on Integrated Network Management (IM)*. 2015. URL: http://hdl.handle.net/10993/24847.

[125] A. C. Bahnsen et al. “Detecting Credit Card Fraud using Periodic Features”. In: *IEEE International Conference on Machine Learning and Applications*. 2015. URL: http://hdl.handle.net/10993/24022.

[126] A. Baouya et al. “A probabilistic and timed verification approach of SysML state machine diagram”. In: *A probabilistic and timed verification approach of SysML state machine diagram*. 2015. URL: http://hdl.handle.net/10993/24851.

[127] S. Bardin et al. “Sound and Quasi-Complete Detection of Infeasible Test Requirements”. In: *8th IEEE International Conference on Software Testing, Verification and Validation (ICST'15)*. 2015. URL: http://hdl.handle.net/10993/20291.

[128] C. Bartolini et al. “Cloud Providers Viability: How to Address it from an IT and Legal Perspective?” In: *Economics of Grids, Clouds, Systems, and Services*. Springer, 2015. URL: http://hdl.handle.net/10993/21987.

[129] G. Bella et al. “A Secure Exam Protocol Without Trusted Parties”. In: *ICT Systems Security and Privacy Protection. 30th IFIP TC 11 International Conference, SEC 2015, Hamburg, Germany, May 26-28, 2015*. 2015. URL: http://hdl.handle.net/10993/21019.

[130] Z. Beneson et al. “Maybe Poor Johnny Really Cannot Encrypt - The Case for a Complexity Theory for Usable Security”. In: *Maybe Poor Johnny Really Cannot Encrypt - The Case for a Complexity Theory for Usable Security*. ACM, 2015, pp. 85–99. ISBN: 978-1-4503-3754-0. DOI: 10.1145/2841113.2841120. URL: http://hdl.handle.net/10993/23567.

[131] X. Besseron et al. “Performance Evaluation of the XDEM framework on the OpenStack Cloud Computing Middleware”. In: *Proceedings of the Fourth International Conference on Parallel, Distributed, Grid and Cloud Computing for Engineering*. Civil-Comp Press, 2015. URL: http://hdl.handle.net/10993/20671.

[132] D. Bianculli et al. “Syntax-driven program verification of matching logic properties.” In: *Proceedings of the 3rd FME Workshop on Formal Methods in Software Engineering (FormaliSE 2015)*. IEEE, 2015. URL: http://hdl.handle.net/10993/20069.

[133] A. Biryukov, P. Derbez, and L. P. Perrin. “Differential Analysis and Meet-in-the-Middle Attack against Round-Reduced TWINE”. In: *Fast Software Encryption - 22nd International Workshop, FSE 2015, Istanbul, March 8-11, 2015*. Springer-Verlag, 2015, pp. 3–27. ISBN: 978-3-662-48116-5. URL: http://hdl.handle.net/10993/20038.

[134] A. Biryukov and D. Khovratovich. “Tradeoff Cryptanalysis of Memory-Hard Functions”. In: *21st International Conference on the Theory and Application of Cryptology and Information Security*. Springer, 2015. ISBN: 978-3-662-48799-0. URL: http://hdl.handle.net/10993/20043.

[135] A. Biryukov and L. P. Perrin. “On Reverse-Engineering S-Boxes with Hidden Design Criteria or Structure”. In: *Advances in Cryptology – CRYPTO 2015,* Springer-Verlag, 2015, pp. 116–140. ISBN: 978-3-662-47989-6. DOI: 10.1007/978-3-662-47989-6. URL: http://hdl.handle.net/10993/21989.

[136] A. Biryukov and I. Pustogarov. “Proof-of-Work as Anonymous Micropayment: Rewarding a Tor Relay”. In: *Financial Cryptography and Data Security - 19th International Conference*. Springer International Publishing, 2015, p. 10. URL: http://hdl.handle.net/10993/19655.

[137] T. F. D. A. Bissyande et al. “Vulnerabilities of Government Websites in a Developing Country – The Case of Burkina Faso”. In: *7th International Conference on eInfrastructure and eServices for Developing Countries*. 2015. URL: http://hdl.handle.net/10993/19991.

[138] R. Booth et al. “On the Entailment Problem for a Logic of Typicality”. In: *Proceedings of the TwentyFourth International Joint Conference on Artificial Intelligence. Buenos Aires, Argentina, 25–31 July 2015*. AAAI Press, 2015, pp. 2805–2811. ISBN: 978-1-57735-738-4. URL: http://hdl.handle.net/10993/23776.

[139] D. Boru et al. “Models for Efficient Data Replication in Cloud Computing Datacenters”. In: *IEEE International Conference on Communications (ICC), London, UK, 2015*. 2015. URL: http://hdl.handle.net/10993/19443.

[140] J. Botev. “Structural Balance and Optimized Connectivity in Peer-to-Peer Massively Multiuser Virtual Environments”. In: *Proceedings of the 6th ACM Multimedia Systems Conference (MMSys)*. 2015. DOI: 10.1145/2723695.2723698. URL: http://hdl.handle.net/10993/20703.

[141] J. Botev, S. Rothkugel, and J. Klein. “Socio-Inspired Design Approaches for Self-Adaptive and Self-Organizing Collaborative Systems”. In: *Proceedings of the 9th IEEE International Conference on Self-Adaptive and Self-Organizing Systems (SASO)*. 2015. DOI: 10.1109/SASOW.2015.8. URL: http://hdl.handle.net/10993/23415.

[142] P. Bouvry et al. “NIDISC Introduction and Committees”. In: *Parallel and Distributed Processing Symposium Workshop (IPDPSW), 2015 IEEE International 2015-10-27 14:21:42 +0000 2015-10-27 14:21:42 +0000*. 2015. DOI: 10.1109/IPDPSW.2015.159. URL: http://hdl.handle.net/10993/22280.

[143] G. Brau, J. Hugues, and N. Navet. “A Contract-Based approach to support Goal-Driven Analysis”. In: *Proceedings of the IEEE 18th International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing (ISORC)*. IEEE, 2015. URL: http://hdl.handle.net/10993/20282.

[144] W. Bronzi. “Bluetooth Low Energy Robustness Analysis for V2V Communications”. In: *Ulmer Informatik-Berichte* (2015). URL: http://hdl.handle.net/10993/24736.

[145] A. Buda et al. “Data supply chain in Industrial Internet”. In: *11th IEEE World Conference on Factory Communication Systems*. IEEE, 2015, pp. 1–7. ISBN: 9781479982448. DOI: 10.1109/WFCS.2015.7160559. URL: http://hdl.handle.net/10993/22072.

[146] G. Casini et al. “Introducing Defeasibility into OWL Ontologies”. In: *14th International Semantic Web Conference. Bethlehem, PA, USA, October 11–15, 2015 Proceedings, Part II*. Springer, 2015, pp. 409–426. ISBN: 978-3-319-25009-0. URL: http://hdl.handle.net/10993/23783.

[147] X. Chen, A. Mizera, and J. Pang. “Activity tracking: A new attack on location privacy”. In: *Proceedings of the 3rd IEEE Conference on Communications and Network Security (CNS’15)*. IEEE CS, 2015, pp. 22–30. URL: http://hdl.handle.net/10993/22093.

[148] M. Chenal and Q. Tang. “Key Recovery Attacks Against NTRU-Based Somewhat Homomorphic Encryption Schemes”. In: *Information Security - 18th International Conference, ISC 2015*. 2015. URL: http://hdl.handle.net/10993/24362.

[149] R. Cheng, J. Pang, and Y. Zhang. “Inferring friendship from check-in data of location-based social networks”. In: *Proceedings of the 7th International Conference on Advances in Social Networks Analysis and Mining (ASONAM’15)*. IEEE CS, 2015, pp. 1284–1291. URL: http://hdl.handle.net/10993/21835.

[150] D. Christopoulos, S. Chatzinotas, and B. Ottersten. “Cellular-Broadcast Service Convergence through Caching for CoMP Cloud RANs”. In: *22nd IEEE Symposium on Communications and Vehicular Technology in the Benelux*. 2015. URL: http://hdl.handle.net/10993/23807.

[151] D. Christopoulos, S. Chatzinotas, and B. Ottersten. “Multicast multigroup beamforming for per-antenna power constrained large-scale arrays”. In: *IEEE Workshop on Signal Processing Advances in Wireless Communications, SPAWC* 5 (2015), pp. 271–275. DOI: 10.1109/SPAWC.2015.7227042. URL: http://hdl.handle.net/10993/26319.

[152] L. Codeca, R. Frank, and T. Engel. “Luxembourg SUMO Traffic (LuST) Scenario: 24 Hours of Mobility for Vehicular Networking Research”. In: *Proceedings of the 7th IEEE Vehicular Networking Conference*. 2015, pp. 1–8. URL: http://hdl.handle.net/10993/23011.

[153] J.-S. Coron et al. “Conversion from Arithmetic to Boolean Masking with Logarithmic Complexity”. In: *Fast Software Encryption, 22nd International Workshop, FSE 2015, Istanbul, Turkey, March 8-11, 2015, Revised Selected Papers*. Springer Verlag, 2015, pp. 130–149. ISBN: 978-3-662-48115-8. DOI: 10.1007/978-3-662-48116-5_7. URL: http://hdl.handle.net/10993/25599.

[154] M. Cramer, D. A. Ambrossio, and P. van Hertum. “A Logic of Trust for Reasoning about Delegation and Revocation”. In: *Proceedings of the 20th ACM Symposium on Access Control Models and Technologies*. 2015. URL: http://hdl.handle.net/10993/23933.

[155] M. Cramer, J. Pang, and Y. Zhang. “A logical approach to restricting access in online social networks”. In: *Proceedings of the 20th ACM Symposium on Access Control Models and Technologies*. ACM, 2015. URL: http://hdl.handle.net/10993/21327.

[156] G. Danoy, M. R. Brust, and P. Bouvry. “Connectivity Stability in Autonomous Multi-level UAV Swarms for Wide Area Monitoring”. In: *Proceedings of the Fifth ACM International Symposium on Development and Analysis of Intelligent Vehicular Networks and Applications*. ACM, 2015. URL: http://hdl.handle.net/10993/23024.

[157] G. Demisse, D. Aouada, and B. Ottersten. “Template-Based Statistical Shape Modelling on Deformation Space”. In: *22nd IEEE International Conference on Image Processing*. 2015. URL: http://hdl.handle.net/10993/21012.

[158] P. Derbez and L. P. Perrin. “Meet-in-the-Middle Attacks and Structural Analysis of Round-Reduced PRINCE”. In: *Fast Software Encryption - 22nd International Workshop, FSE 2015, Istanbul, March 8-11, 2015*. Springer-Verlag, 2015, pp. 190–216. ISBN: 978-3-662-48115-8. URL: http://hdl.handle.net/10993/20039.

[159] S. DING, T. A. N. H. B. KUAN, and L. K. Shar. “Mining Patterns of Unsatisfiable Constraints to Detect Infeasible Paths”. In: *Automation of Software Test (AST 2015)* (2015). URL: http://hdl.handle.net/10993/22865.

[160] R.-A. Dobrican, G. Neyens, and D. Zampunieris. “SilentMeet - A Prototype Mobile Application for Real-Time Automated Group-Based Collaboration”. In: *Proceedings of the 5th International Conference on Advanced Collaborative Networks, Systems and Applications (COLLA 2015)*. IARIA, 2015, pp. 52–56. ISBN: 978-1-61208-436-7. URL: http://hdl.handle.net/10993/22198.

[161] J. Dreier et al. “A Framework for Analyzing Verifiability in Traditional and Electronic Exams.” In: *Information Security Practice and Experience 11th International Conference, ISPEC 2015, Beijing, China, May 5-8, 2015*. 2015. URL: http://hdl.handle.net/10993/21018.

[162] J. Emeras et al. “Evalix: Classification and Prediction of Job Resource Consumption on HPC Platforms”. In: *Proc. of the 19th Intl. Workshop on Job Scheduling Strategies for Parallel Processing (JSSPP’15), part of the 29th IEEE/ACM Intl. Parallel and Distributed Processing Symposium (IPDPS 2015)*. IEEE Computer Society, 2015. URL: http://hdl.handle.net/10993/21136.

[163] S. Faye, R. Frank, and T. Engel. “Adaptive Activity and Context Recognition using Multimodal Sensors in Smart Devices”. In: *Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering - Mobile Computing, Applications, and Services* (2015). DOI: 10.1007/978-3-319-29003-4_3. URL: http://hdl.handle.net/10993/22108.

[164] A. Ferreira and G. Lenzini. “An Analysis of Social Engineering Principles in Effective Phishing”. In: *Proc. of the 5th International Workshop on Socio-Technical Security and Trust*. CSP, 2015. URL: http://hdl.handle.net/10993/21781.

[165] A. Ferreira, G. Lenzini, and L. Conventry. “Principles of Persuasion in Social Engineering and Their Use in Phishing”. In: *Human Aspects of Information Security, Privacy, and Trust Third International Conference, HAS 2015*. Springer, 2015, pp. 36–47. ISBN: 978-3-319-20375-1. DOI: 10.1007/978-3-319-20376-8_4. URL: http://hdl.handle.net/10993/20301.

[166] A. Ferreira et al. “Do graphical cues effectively inform users? A socio-technical security study in accessing wifi networks.” In: *Lecture Notes in Computer Science* (2015), pp. 323–334. URL: http://hdl.handle.net/10993/20782.

[167] A. Ferreira et al. “In Cyber-Space No One Can Hear You S·CREAM, A Root Cause Analysis for Socio-Technical Security”. In: *Security and Trust Management*. Springer, 2015, pp. 255–264. ISBN: 978-3-319-24857-8. DOI: 10.1007/978-3-319-24858-5_16. URL: http://hdl.handle.net/10993/22479.

[168] C. Fiandrino et al. “Network-Assisted Offloading for Mobile Cloud Applications”. In: *IEEE International Conference on Communications (ICC), London, UK, 2015*. 2015. URL: http://hdl.handle.net/10993/20059.

[169] C. Fiandrino et al. “Performance Metrics for Data Center Communication Systems”. In: *8th IEEE International Conference on Cloud Computing, New York, USA, 2015*. 2015. URL: http://hdl.handle.net/10993/20889.

[170] L. Gammaitoni and P. Kelsen. “F-Alloy: An Alloy Based Model Transformation Language”. In: *Theory and Practice of Model Transformations*. Springer, 2015. URL: http://hdl.handle.net/10993/23476.

[171] L. Gammaitoni, P. Kelsen, and C. Glodt. “Designing Languages using Lightning”. In: *Proceedings of the 2015 ACM SIGPLAN International Conference on Software Language Engineering*. ACM, 2015. ISBN: 978-1-4503-3686-4. URL: http://hdl.handle.net/10993/23477.

[172] F. Garcia and B. Ottersten. “Real-time Curve-skeleton Extraction of Human-scanned Point Clouds”. In: *International Conference on Computer Vision Theory and Applications (VISAPP 2015)*. 2015, pp. 54–60. URL: http://hdl.handle.net/10993/20667.

[173] A. Gharanjik et al. “Precoding Design and User Selection for Multibeam Satellite Channels”. In: *16th IEEE International Workshop on Signal Processing Advances in Wireless Communications, SPAWC 2015*. 2015. URL: http://hdl.handle.net/10993/21060.

[174] G. Gheorghe and T. Engel. “Towards Reinventing Online Privacy”. In: *LNCS - Annual Privacy Forum 2015 - Bridging the gap between research and policy*. Springer, 2015. URL: http://hdl.handle.net/10993/24118.

[175] G. Gheorghe et al. “SDN-RADAR: Network troubleshooting combining user experience and SDN capabilities”. In: *Proc. of IEEE Conf. on Network Softwarization (NetSoft)*. 2015. URL: http://hdl.handle.net/10993/23892.

[176] C. Grevisse and S. Rothkugel. “Tumaco: Collaboration of Mobile Devices in Hypermedia-based In-Vehicle Infotainment Systems”. In: *Libro de Actas del XXI Congreso Argentino de Ciencias de la Computación (CACIC 2015)*. 2015, p. 10. ISBN: 9789873724374. URL: http://hdl.handle.net/10993/23827.

[177] M. Guzek, D. Kliazovich, and P. Bouvry. “HEROS: Energy-Efficient Load Balancing for Heterogeneous Data Centers”. In: *8th IEEE International Conference on Cloud Computing IEEE CLOUD 2015*. 2015. URL: http://hdl.handle.net/10993/21417.

[178] I. Hajri et al. “Applying Product Line Use Case Modeling in an Industrial Automotive Embedded System: Lessons Learned and a Refined Approach”. In: *2015 ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MODELS), September 30 - October 2, 2015, Ottawa, ON, Canada*. 2015. URL: http://hdl.handle.net/10993/21598.

[179] T. Hartmann et al. “Stream my Models: Reactive Peer-to-Peer Distributed Models@run.time”. In: *2015 ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MODELS)*. Conference Publishing Consulting, 2015, pp. 80–89. ISBN: 978-1-4673-6907-7. URL: http://hdl.handle.net/10993/22329.

[180] T. Hartmann et al. “Suspicious Electric Consumption Detection Based on Multi-Profiling Using Live Machine Learning”. In: *2015 IEEE International Conference on Smart Grid Communications (SmartGridComm)*. 2015. ISBN: 978-1-4673-8288-5. URL: http://hdl.handle.net/10993/22781.

[181] C. Henard, M. Papadakis, and Y. L. Traon. “Flattening or not of the combinatorial interaction testing models”. In: *Eighth IEEE International Conference on Software Testing, Verification and Validation, ICST 2015 Workshops*. IEEE, 2015, pp. 1–4. URL: http://hdl.handle.net/10993/24172.

[182] C. Henard et al. “Combining Multi-Objective Search and Constraint Solving for Configuring Large Software Product Lines”. In: *37th International Conference on Software Engineering (ICSE 2015)*. 2015. URL: http://hdl.handle.net/10993/20292.

[183] L. Humphreys et al. “Classifying and Extracting Elements of Norms for Ontology Population using Semantic Role Labelling”. In: *The 15th International Conference on Artificial Intelligence & Law — San Diego, June 8-12, 2015*. 2015. URL: http://hdl.handle.net/10993/24015.

[184] L. Humphreys et al. “Mapping Recitals to Normative Provisions in EU Legislation to Assist Legal Interpretation”. In: *Proceedings of the 28th International Conference on Legal Knowledge and Information Systems*. 2015. URL: http://hdl.handle.net/10993/26579.

[185] K. A. Ismaeil et al. “Real-Time Non-Rigid Multi-Frame Depth Video Super-Resolution”. In: *IEEE Conference on Computer Vision and Pattern Recognition Workshop (CVPRW'15), (Best paper award)*. 2015. URL: http://hdl.handle.net/10993/21434.

[186] S. Jan, D. C. Nguyen, and L. Briand. “Known XML Vulnerabilities Are Still a Threat to Popular Parsers and Open Source Systems”. In: *The 2015 IEEE International Conference on Software Quality, Reliability & Security, Vancouver 3-5 August 2015*. 2015. URL: http://hdl.handle.net/10993/21242.

[187] R. Jhawar et al. “Attack Trees with Sequential Conjunction”. In: *ICT Systems Security and Privacy Protection - 30th IFIP TC 11 International Conference, SEC 2015*. Springer, 2015, pp. 339–353. ISBN: 978-3-319-18466-1. URL: http://hdl.handle.net/10993/25860.

[188] H. Jonker, S. Mauw, and S. Radomirovic. “Location-private interstellar communication”. In: *23rd Security Protocols Workshop*. Springer-Verlag, 2015. URL: http://hdl.handle.net/10993/25938.

[189] A. Kalantari et al. “Secrecy Energy Efficiency Optimization for MISO and SISO Communication Networks”. In: *The 16th IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*. 2015. URL: http://hdl.handle.net/10993/21568.

[190] D. E. Kateb et al. “Towards a full support of obligations in XACML”. In: *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)* 4 (2015), pp. 213–221. DOI: 10.1007/978-3-319-17127-2_14. URL: http://hdl.handle.net/10993/26429.

[191] A. Kaushik et al. “Estimation-Throughput Tradeoff for Underlay Cognitive Radio Systems”. In: *Proceedings of International Conference on Communications (ICC)*. 2015. URL: http://hdl.handle.net/10993/21332.

[192] A. Kaushik et al. “Sensing-Throughput Tradeoff for Cognitive Radio Systems with Unknown Received Power”. In: *Proceedings of CROWNCOM 2015*. 2015. URL: http://hdl.handle.net/10993/21333.

[193] D. Khovratovich et al. “Rotational Cryptanalysis of ARX Revisited”. In: *Fast Software Encryption - 22nd International Workshop, FSE 2015 Istanbul, Turkey, March 8-11, 2015, Revised Selected Papers*. Springer, 2015. DOI: 10.1007/978-3-662-48116-5_25. URL: http://hdl.handle.net/10993/24972.

[194] J. Klein, J. Botev, and S. Rothkugel. “Layered Consistency Management for Advanced Collaborative Compound Document Authoring”. In: *Proceedings of the 11th International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom)*. 2015. URL: http://hdl.handle.net/10993/24185.

[195] S. Kubler et al. “Opportunity to Leverage Information-as-an-Asset in the IoT – The road ahead”. In: *3rd International Conference on Future Internet of Things and Cloud*. IEEE Computer Society, 2015, pp. 64–71. ISBN: 9781467381031. DOI: 10.1109/FiCloud.2015.63. URL: http://hdl.handle.net/10993/21825.

[196] S. Kubler et al. “Technological Theory of Cloud Manufacturing”. In: *Service Orientation in Holonic and Multi Agent Manufacturing and Robotics*. Springer, 2015. URL: http://hdl.handle.net/10993/22381.

[197] E. Lagunas et al. “Impact of Terrain Aware Interference Modeling on the Throughput of Cognitive Ka-Band Satellite Systems”. In: *Ka and Broadband Communications Conference (KaConf), Bologna, Italy, Oct 2015.* 2015. URL: http://hdl.handle.net/10993/22204.

[198] E. Lagunas et al. “Power Control for Satellite Uplink and Terrestrial Fixed-Service Co-existence in Ka-band”. In: *IEEE Vehicular Technology Conference, Boston 6-9 Sept 2015*. 2015. URL: http://hdl.handle.net/10993/21483.

[199] E. Lagunas et al. “Resource Allocation for Cognitive Satellite Uplink and Fixed-Service Terrestrial Coexistence in Ka-band”. In: *Proceedings of CROWNCOM 2015*. 2015. URL: http://hdl.handle.net/10993/20386.

[200] E. Lagunas et al. “Resource allocation for cognitive satellite uplink and fixed-service terrestrial coexistence in ka-band”. In: *Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST* 6 (2015), pp. 487–498. DOI: 10.1007/978-3-319-24540-9_40. URL: http://hdl.handle.net/10993/26432.

[201] F. Lanze, A. Panchenko, and T. Engel. “A Formalization of Fingerprinting Techniques”. In: *Proceedings of the IEEE International Symposium on Recent Advances of Trust, Security and Privacy in Computing and Communications (IEEE RATSP 2015), held in conjunction with IEEE TrustCom 2015*. 2015, pp. 818–825. ISBN: 978-1-4673-7952-6. URL: http://hdl.handle.net/10993/21946.

[202] F. Lanze et al. “Hacker’s Toolbox: Detecting Software-Based 802.11 Evil Twin Access Points”. In: *Proceedings of the 12th Annual IEEE Consumer Communications & Networking Conference (CCNC 2015)*. 2015. URL: http://hdl.handle.net/10993/20445.

[203] G. Lenzini and A. Ferreira. “Can Transparency Enhancing Tools support patient’s accessing Electronic Health Records?” In: *Advances in Intelligent Systems and Computing*. Springer, 2015. URL: http://hdl.handle.net/10993/20300.

[204] L. Li et al. “ApkCombiner: Combining Multiple Android Apps to Support Inter-App Analysis”. In: *International Conference on ICT Systems Security and Privacy Protection (SEC 2015)*. 2015. URL: http://hdl.handle.net/10993/21476.

[205] L. Li et al. “IccTA: Detecting Inter-Component Privacy Leaks in Android Apps”. In: *2015 IEEE/ACM 37th IEEE International Conference on Software Engineering (ICSE 2015)*. 2015. URL: http://hdl.handle.net/10993/20058.

[206] L. Li et al. “Potential Component Leaks in Android Apps: An Investigation into a new Feature Set for Malware Detection”. In: *The 2015 IEEE International Conference on Software Quality, Reliability and Security (QRS 2015)*. 2015. URL: http://hdl.handle.net/10993/21473.

[207] Y. Li et al. “paraVerifier: An automatic framework for proving parameterized cache coherence protocols”. In: *Proceedings of the 13th International Symposium on Automated Technology for Verification and Analysis (ATVA'15)*. 2015, pp. 207–213. URL: http://hdl.handle.net/10993/22127.

[208] D. van der Linden and M. V. Zee. “nsights from a Study on Decision Making in Enterprise Architecture”. In: *In Short Paper Proceedings of the 8th IFIP WG 8.1 Working Conference on the Practice of Enterprise Modeling (PoEM)*. 2015. URL: http://hdl.handle.net/10993/23868.

[209] Z. Liu et al. “Efficient Implementation of ECDH Key Exchange for MSP430-Based Wireless Sensor Networks”. In: *ASIACCS'15: Proceedings of the 10th ACM Symposium on Information, Computer and Communications Security, April 14-17, 2015, Singapore*. ACM Press, 2015, pp. 145–153. ISBN: 978-1-4503-3245-3. DOI: 10.1145/2714576.2714608. URL: http://hdl.handle.net/10993/25601.

[210] Z. Liu et al. “Efficient Ring-LWE Encryption on 8-bit AVR Processors”. In: *Cryptographic Hardware and Embedded Systems - CHES 2015, 17th International Workshop, Saint-Malo, France, September 13-16, 2015, Proceedings*. Springer Verlag, 2015, pp. 663–682. ISBN: 978-3-662-48323-7. DOI: 10.1007/978-3-662-48324-4_33. URL: http://hdl.handle.net/10993/25971.

[211] M. Madhikermi et al. “Data Quality Assessment of Company's Maintenance Reporting: A Case Study”. In: *Proceedings of 4th International Conference on Data Management Technologies and Applications*. SciTePress, 2015, pp. 162–172. ISBN: 9789897581038. DOI: 10.5220/0005518401620172. URL: http://hdl.handle.net/10993/22071.

[212] S. Maleki et al. “Cooperative Power and DoT Estimation for a Directive Source”. In: *Asilomar Conference on Signals, Systems, and Computers 2015*. 2015. URL: http://hdl.handle.net/10993/23158.

[213] J. Martinez et al. “Automating the Extraction of Model-based Software Product Lines from Model Variants”. In: *30th IEEE/ACM International Conference on Automated Software Engineering (ASE 2015)*. 2015. URL: http://hdl.handle.net/10993/22868.

[214] J. Martinez et al. “Bottom-up adoption of software product lines: a generic and extensible approach”. In: *Proceedings of the 19th International Conference on Software Product Line, SPLC 2015, Nashville, TN, USA, July 20-24, 2015*. 2015, pp. 101–110. DOI: 10.1145/2791060.2791086. URL: http://hdl.handle.net/10993/22044.

[215] J. Martinez et al. “Estimating and Predicting Average Likability on Computer-Generated Artwork Variants”. In: *Genetic and Evolutionary Computation Conference, GECCO 2015, Madrid Spain, July 11-15, 2015, Companion Material Proceedings*. ACM, 2015, pp. 1431–1432. DOI: 10.1145/2739482.2764681. URL: http://hdl.handle.net/10993/22045.

[216] R. Matinnejad et al. “Effective Test Suites for Mixed Discrete-Continuous Stateflow Controllers”. In: *Proceedings of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering*. 2015. URL: http://hdl.handle.net/10993/21475.

[217] S. Mauw. “Location-private interstellar communication (Transcript of Discussion)”. In: *Proc.\ 23rd Security Protocols Workshop*. Springer-Verlag, 2015. URL: http://hdl.handle.net/10993/25934.

[218] S. Mauw and S. Piramuthu. “PUF-based authentication protocol to address ticket-switching of RFID-tagged items”. In: *Proc. 8th Workshop on Security and Trust Management, Pisa, Italy, September 13-14 2012*. Springer-Verlag, 2015. URL: http://hdl.handle.net/10993/25933.

[219] S. Mauw and S. Radomirovic. “Generalizing multi-party contract signing”. In: *Proc. 4th Conference on Principles of Security and Trust (POST'15)*. Springer Verlag, 2015. URL: http://hdl.handle.net/10993/25932.

[220] N. Mazzali, B. Shankar, and B. Ottersten. “On-board Signal Predistortion for Digital Transparent Satellites”. In: *Proceedings on IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC)*. 2015. URL: http://hdl.handle.net/10993/20818.

[221] N. Mazzali et al. “Performance Analysis of Noncoherent Frame Synchronization in Satellite Communications with Frequency Uncertainty”. In: *Proceedings on IEEE Symposium on Communications and Vehicular Technology in the Benelux*. 2015. URL: http://hdl.handle.net/10993/22780.

[222] R. Mccall et al. “Text entry on smart glasses A comparison of two input techniques”. In: *8th International Conference on Human System Interaction (HSI'2015)*. 2015. URL: http://hdl.handle.net/10993/21514.

[223] A. Mileva, V. Dimitrova, and V. Velichkov. “Analysis of the Authenticated Cipher MORUS (v1)”. In: *Cryptography and Information Security in the Balkans: First International Conference, BalkanCryptSec 2015*. Springer, 2015. URL: http://hdl.handle.net/10993/22703.

[224] A. Mizera, J. Pang, and Q. Yuan. “ASSA-PBN: An approximate steady-state analyser for probabilistic Boolean networks”. In: *Proceedings of the 13th International Symposium on Automated Technology for Verification and Analysis (ATVA'15)*. Springer, 2015, pp. 214–220. URL: http://hdl.handle.net/10993/22132.

[225] A. Moawad et al. “Adaptive Blurring of Sensor Data to balance Privacy and Utility for Ubiquitous Services”. In: *The 30th Annual ACM Symposium on Applied Computing*. ACM, 2015, pp. 2271–2278. ISBN: 9781450331968. DOI: 10.1145/2695664.2695855. URL: http://hdl.handle.net/10993/21077.

[226] A. Moawad et al. “Beyond Discrete Modeling: A Continuous and Efficient Model for IoT”. In: *2015 ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems (MODELS)*. Conference Publishing Consulting, 2015, pp. 90–99. ISBN: 978-1-4673-6907-7. URL: http://hdl.handle.net/10993/22330.

[227] A. Moawad et al. “Polymer: A Model-Driven Approach for Simpler, Safer, and Evolutive Multi-Objective Optimization Development”. In: *MODELSWARD 2015 - Proceedings of the 3rd International Conference on Model-Driven Engineering and Software Development*. SCITEPRESS, 2015, pp. 286–293. ISBN: 978-989-758-083-3. URL: http://hdl.handle.net/10993/20392.

[228] N. Montavont et al. “Handover triggering in IEEE 802.11 Networks”. In: *16th IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks*. 2015, p. 9. URL: http://hdl.handle.net/10993/21243.

[229] J. Muszynski et al. “Distributed Cellular Evolutionary Algorithms in a Byzantine Environment”. In: *Proc. of the 18th Intl. Workshop on Nature Inspired Distributed Computing (NIDISC 2015), part of the 29th IEEE/ACM Intl. Parallel and Distributed Processing Symposium (IPDPS 2015)*. IEEE Computer Society, 2015. URL: http://hdl.handle.net/10993/21593.

[230] D. D. Nardo, F. Pastore, and L. Briand. “Generating Complex and Faulty Test Data Through Model-Based Mutation Analysis”. In: *Software Testing, Verification and Validation (ICST), 2015 IEEE Eighth International Conference on*. 2015. URL: http://hdl.handle.net/10993/19427.

[231] D. D. Nardo et al. “Evolutionary Robustness Testing of Data Processing Systems using Models and Data Mutation”. In: *Proceedings of the 30th IEEE/ACM International Conference on Automated Software Engineering*. 2015, pp. 126–137. URL: http://hdl.handle.net/10993/21581.

[232] S. B. Nasr et al. “MatrixMiner: A Red Pill to Architect Informal Product Descriptions in the Matrix”. In: *10th Joint Meeting on Foundations of Software Engineering (ESEC/FSE 2015), Bergamo, Italy, August 30 - September 4, 2015*. 2015, pp. 982–985. URL: http://hdl.handle.net/10993/22577.

[233] G. Neyens, R.-A. Dobrican, and D. Zampunieris. “Enhancing Mobile Devices with Cooperative Proactive Computing”. In: *Proceedings of the 5th International Conference on Advanced Collaborative Networks, Systems and Applications (COLLA 2015)*. IARIA, 2015, pp. 1–9. ISBN: 978-1-61208-436-7. URL: http://hdl.handle.net/10993/22199.

[234] P. Nguyen et al. “SoSPa: A System of Security Design Patterns for Systematically Engineering Secure Systems”. In: *Proceedings ACM/IEEE 18th International Conference on Model Driven Engineering Languages and Systems*. 2015. URL: http://hdl.handle.net/10993/23027.

[235] S. S. Nielsen et al. “A Novel Multi-objectivisation Approach for Optimising the Protein Inverse Folding Problem”. In: *Applications of Evolutionary Computation: 18th European Conference, EvoApplications 2015, Copenhagen, Denmark, April 8-10, 2015, Proceedings*. 2015. URL: http://hdl.handle.net/10993/25029.

[236] S. S. Nielsen et al. “An NK Landscape Based Model Mimicking the Protein Inverse Folding Problem”. In: *27th European Conference on Operational Research (EURO)*. 2015. URL: http://hdl.handle.net/10993/22771.

[237] S. S. Nielsen et al. “NK Landscape Instances Mimicking the Protein Inverse Folding Problem Towards Future Benchmarks”. In: *GECCO Companion ’15 Proceedings of the Companion Publication of the 2015 Annual Conference on Genetic and Evolutionary Computation*. ACM, 2015. ISBN: 978-1-4503-3488-4. URL: http://hdl.handle.net/10993/25028.

[238] D. P. B. Norta et al. “Using Polyurethane to Reduce the Production Cost of Hydrokinetic Turbine Foils”. In: *Proceedings International Conference on Hydropower for Sustainable Development*. IIT Roorkee, AHEC, 2015, pp. 135–145. URL: http://hdl.handle.net/10993/20793.

[239] S. Östlund, A. Panchenko, and T. Engel. “A study on ethical aspects and legal issues in e-learning”. In: *Proceedings of the 8th International Conference on E-Learning (e-Learning’15)*. 2015, pp. 286–292. URL: http://hdl.handle.net/10993/22040.

[240] A. Panchenko. “On the Impact of Cross-Layer Information Leakage on Anonymity in Crowds”. In: *Proceedings of the 11th ACM International Symposium on QoS and Security for Wireless and Mobile Networks (ACM Q2SWinet 2015)*. ACM, 2015. URL: http://hdl.handle.net/10993/22043.

[241] J. Pang and Y. Zhang. “Cryptographic protocols for enforcing relationship-based access control policies”. In: *Proceedings of the 39th Annual IEEE Computers, Software & Applications Conference (COMPSAC’15)*. 2015, pp. 484–493. URL: http://hdl.handle.net/10993/21834.

[242] J. Pang and Y. Zhang. “Event prediction with community leaders”. In: *Proceedings of the 10th International Conference on Availability, Reliability and Security (ARES’15)*. IEEE CS, 2015, pp. 238–243. URL: http://hdl.handle.net/10993/21833.

[243] J. Pang and Y. Zhang. “Exploring communities for effective location prediction”. In: *Proceedings of the 24th World Wide Web Conference*. ACM, 2015. URL: http://hdl.handle.net/10993/21328.

[244] J. Pang and Y. Zhang. “Location prediction: Communities speak louder than friends”. In: *Proceedings of the 3rd ACM Conference on Online Social Networks (COSN’15)*. ACM, 2015, pp. 161–171. URL: http://hdl.handle.net/10993/22410.

[245] M. Papadakis et al. “Trivial Compiler Equivalence: A Large Scale Empirical Study of a Simple, Fast and Effective Equivalent Mutant Detection Technique”. In: *37th International Conference on Software Engineering (ICSE 2015)*. 2015. URL: http://hdl.handle.net/10993/20289.

[246] R. Piazza, M. R. B. Shankar, and B. Ottersten. “Generalized direct predistortion with adaptive crest factor reduction control”. In: *ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing - Proceedings* 5 (2015), pp. 3242–3246. DOI: 10.1109/ICASSP.2015.7178570. URL: http://hdl.handle.net/10993/26313.

[247] G. Plataniotis et al. “A Conceptual Model for Compliance Checking Support of Enterprise Architecture Decisions”. In: *Proceedings of the 17th IEEE Conference on Business Informatics, Lisbon Portugal, July 13-16, 2015, Volume 1*. 2015, pp. 191–198. URL: http://hdl.handle.net/10993/25173.

[248] G. Plataniotis et al. “Traceability and Modeling of Requirements in Enterprise Architecture from a Design Rationale Perspective”. In: *Ninth IEEE conference on Research Challenges in Information Systems (RCIS 2015), Athens, May 13-15, 2015*. 2015. URL: http://hdl.handle.net/10993/20904.

[249] A. Popleteev, N. Louveton, and R. Mccall. “Colorizer: Smart Glasses Aid for the Colorblind”. In: *WearSys'15*. ACM, 2015. URL: http://hdl.handle.net/10993/20739.

[250] H. Qu et al. “Improving BDD-based attractor detection for synchronous Boolean networks”. In: *Proceedings of the 7th Asia-Pacific Symposium on Internetware*. ACM, 2015. URL: http://hdl.handle.net/10993/25937.

[251] C. Ragona et al. “Energy-Efficient Computation Offloading for Wearable Devices and Smartphones in Mobile Cloud Computing”. In: *IEEE Global Communications Conference (GLOBECOM), San Diego, CA, USA, 2015*. 2015. URL: http://hdl.handle.net/10993/21864.

[252] J. Seyler et al. “Formal Analysis of the Startup Delay of SOME/IP Service Discovery”. In: *Proceedings of the 2015 Design, Automation & Test in Europe Conference & Exhibition*. EDA Consortium, 2015, pp. 49–54. ISBN: 978-3-9815370-4-8. URL: http://hdl.handle.net/10993/21070.

[253] B. Shankar et al. “Feasibility Study of Full-duplex Relaying in Satellite Networks”. In: *The 16th IEEE International Workshop on Signal Processing Advances in Wireless Communications, SPAWC 2015*. 2015. URL: http://hdl.handle.net/10993/21418.

[254] M. R. B. Shankar et al. “Feasibility study of full-duplex relaying in satellite networks”. In: *IEEE Workshop on Signal Processing Advances in Wireless Communications, SPAWC* 5 (2015), pp. 560–564. DOI: 10.1109/SPAWC.2015.7227100. URL: http://hdl.handle.net/10993/24887.

[255] S. K. Sharma, S. Chatzinotas, and B. Ottersten. “Cooperative Spectrum Sensing for Heterogeneous Sensor Networks Using Multiple Decision Statistics”. In: *Proceedings of CROWNCOM 2015*. 2015. URL: http://hdl.handle.net/10993/20803.

[256] S. K. Sharma et al. “3D Beamforming for Spectral Coexistence of Satellite and Terrestrial Networks”. In: *IEEE Vehicular Technology Conference 2015*. 2015. URL: http://hdl.handle.net/10993/21553.

[257] S. K. Sharma et al. “Improving Robustness of Cyclostationary Detectors to Cyclic Frequency Mismatch Using Slepian Basis”. In: *Proceedings of IEEE PIMRC 2015*. 2015. URL: http://hdl.handle.net/10993/22208.

[258] S. K. Sharma et al. “Joint Carrier Allocation and Beamforming for Cognitive SatComs in Ka-band (17.3-18.1 GHz)”. In: *Proceedings of International Conference on Communications*. 2015. URL: http://hdl.handle.net/10993/20575.

[259] S. K. Sharma et al. “Repeater for 5G Wireless: A Complementary Contender for Spectrum Sensing Intelligence”. In: *Proceedings of International Conference on Communications 2015*. 2015. URL: http://hdl.handle.net/10993/20499.

[260] S. K. Sharma et al. “Resource Allocation for Cognitive Satellite Communications in Ka-band (17.7-19.7 GHz)”. In: *Proceedings of International Conference on Communications (ICC)*. 2015. URL: http://hdl.handle.net/10993/21014.

[261] S. Signorello, R. State, and O. Festor. “Exploring IoT Protocols Through the Information-Centric Networking’s Lens”. In: *Intelligent Mechanisms for Network Configuration and Security*. Springer, 2015. ISBN: 9783319200347. URL: http://hdl.handle.net/10993/26774.

[262] M. Skrobot and J. Lancrenon. “On the Provable Security of the Dragonfly Protocol”. In: *Information Security - 18th International Conference, ISC 2015, Trondheim, Norway, September 9-11, 2015*. Springer, 2015, pp. 244–261. ISBN: 978-3-319-23317-8. URL: http://hdl.handle.net/10993/24767.

[263] G. Soltana. “A Model-Based Framework for Legal Policy Simulation and Legal Compliance Checking”. In: *Doctoral Symposium co-located with 18th ACM/IEEE International Conference on Model-Driven Engineering Languages and Systems (DS@MODELS 2015)*. CEUR Workshop Proceedings, 2015. URL: http://hdl.handle.net/10993/21799.

[264] G. Soltana et al. “A Model-Based Framework for Probabilistic Simulation of Legal Policies”. In: *18th ACM/IEEE International Conference on Model Driven Engineering Languages and Systems (MODELS’15)*. IEEE, 2015, pp. 70–79. ISBN: 978-1-4673-6908-4. DOI: 10.1109/MODELS.2015.7338237. URL: http://hdl.handle.net/10993/21583.

[265] D. Spano et al. “Total degradation analysis of precoded signals onto nonlinear satellite channels”. In: *21st Ka Conference*. 2015. URL: http://hdl.handle.net/10993/21955.

[266] X. Sun and D. A. Ambrossio. “Computational Complexity of Input/Output Logic”. In: *Lecture Notes in Computer Science* 6 (2015). URL: http://hdl.handle.net/10993/23943.

[267] X. Sun and D. A. Ambrossio. “On the complexity of input/output logic”. In: *Proceedings of the Fifth International Conference on Logic, Rationality and Interaction*. 2015. URL: http://hdl.handle.net/10993/23949.

[268] Q. Tang and J. Wang. “Privacy-Preserving Context-Aware Recommender Systems: Analysis and New Solutions”. In: *Computer Security - ESORICS 2015 - 20th European Symposium on Research in Computer Security*. 2015. URL: http://hdl.handle.net/10993/24361.

[269] U. Tewari, S. Neshvad, and J. Sachau. “Verification and Implementation of Pseudo-Random-Binary-Sequences for Online Determination of Grid Impedance Spectrum”. In: *The Renewable Energy & Power Quality Journal* (2015). URL: http://hdl.handle.net/10993/23881.

[270] U. Tewari, D. P. B. Norta, and K. Kolmsee. “Hydrokinetic Energy for Enlightening the Future of Rural Communities in Uttarakhand”. In: *Proceedings International Conference on Hydropower for Sustainable Development*. IIT Roorkee, AHEC, 2015, pp. 146–157. URL: http://hdl.handle.net/10993/20395.

[271] L. E. Ha-Thanh et al. “Automated Inference of Access Control Policies for Web Applications”. In: *20th ACM Symposium on Access Control Models and Technologies (SACMAT), 1-3 June 2015*. 2015. DOI: 10.1145/2752952.2752969. URL: http://hdl.handle.net/10993/20786.

[272] J. Thome. “A Scalable and Accurate Hybrid Vulnerability Analysis Framework”. In: *Doctoral Symposium co-located with 26th IEEE International Symposium on Software Reliability Engineering (2015)*. 2015. URL: http://hdl.handle.net/10993/21897.

[273] J. Thome, L. K. Shar, and L. Briand. “Security Slicing for Auditing XML, XPath, and SQL Injection Vulnerabilities”. In: *26th IEEE International Symposium on Software Reliability Engineering*. 2015. URL: http://hdl.handle.net/10993/21795.

[274] P. Thubert, M. R. Palattella, and T. Engel. “6TiSCH Centralized Scheduling: when SDN Meet IoT”. In: *Proc. of IEEE Conf. on Standards for Communications & Networking (CSCN’15)*. 2015. URL: http://hdl.handle.net/10993/23784.

[275] C. F. Torres, H. Jonker, and S. Mauw. “FP-Block: Usable Web Privacy by Controlling Browser Fingerprinting”. In: *Computer Security – ESORICS 2015*. Springer International Publishing, 2015, pp. 3–19. ISBN: 978-3-319-24176-0. DOI: 10.1007/978-3-319-24177-7_1. URL: http://hdl.handle.net/10993/25999.

[276] C. F. Torres et al. “Preference-Based Genetic Algorithm for Solving the Bio-Inspired NK Landscape Benchmark”. In: *7th European Symposium on Computational Intelligence and Mathematics (ESCIM)*. 2015. URL: http://hdl.handle.net/10993/23324.

[277] A. Tsakmalis, S. Chatzinotas, and B. Ottersten. “Power Control in Cognitive Radio Networks Using Cooperative Modulation and Coding Classification”. In: *Proceedings of 10th International Conference on Cognitive Radio Oriented Wireless Networks (CROWNCOM) 2015*. 2015. URL: http://hdl.handle.net/10993/24891.

[278] A. Tsakmalis, S. Chatzinotas, and B. Ottersten. “Power control in cognitive radio networks using cooperative modulation and coding classification”. In: *Lecture Notes of the Institute for Computer Sciences, Social-Informatics and Telecommunications Engineering, LNICST* 6 (2015), pp. 358–369. DOI: 10.1007/978-3-319-24540-9_29. URL: http://hdl.handle.net/10993/26315.

[279] P. K. Vadnala and J. Groszschädl. “Faster Mask Conversion with Lookup Tables”. In: *Constructive Side-Channel Analysis and Secure Design, 6th International Workshop, COSADE 2015, Berlin, Germany, April 13-14, 2015. Revised Selected Papers*. Springer Verlag, 2015, pp. 207–221. ISBN: 978-3-319-21475-7. DOI: 10.1007/978-3-319-21476-4_14. URL: http://hdl.handle.net/10993/25939.

[280] S. Varrette, B. Dorronsorro, and P. Bouvry. “An LLVM-based Approach to Generate Energy Aware Code by means of MOEAs”. In: *Proc. of the 7th European Symposium on Computational Intelligence and Mathematics.(ESCIM 2015)*. 2015. URL: http://hdl.handle.net/10993/21597.

[281] S. S. Wagle, M. Guzek, and P. Bouvry. “Cloud Service Providers Ranking Based on Service Delivery and Consumer Experience”. In: *2015 IEEE 4th International Conference on Cloud Networking (CloudNet)*. 2015, pp. 209–212. DOI: 10.1109/CloudNet.2015.7335308. URL: http://hdl.handle.net/10993/24794.

[282] S. S. Wagle et al. “An Evaluation Model for Selecting Cloud Services from Commercially Available Cloud Providers”. In: *2015 IEEE 7th International Conference on Cloud Computing Technology and Science (CloudCom)*. 2015, pp. 1–8. URL: http://hdl.handle.net/10993/24793.

[283] C. Wang et al. “Automatic Generation of System Test Cases from Use Case Specifications”. In: *Proceedings of the International Symposium on Software Testing and Analysis (ISSTA’ 15), July 2015, USA*. 2015. URL: http://hdl.handle.net/10993/21147.

[284] C. Wang et al. “UMTG: A Toolset to Automatically Generate System Test Cases from Use Case Specifications”. In: *10th Joint Meeting of the European Software Engineering Conference and the ACM SIGSOFT Symposium on the Foundations of Software Engineering, Bergamo 30 August - 4 September 2015*. 2015. URL: http://hdl.handle.net/10993/21772.

[285] J. Wang et al. “Higher-Order Masking in Practice: A Vector Implementation of Masked AES for ARM NEON”. In: *Topics in Cryptology - CT-RSA 2015, The Cryptographer’s Track at the RSA Conference 2015, San Francisco, CA, USA, April 20-24, 2015. Proceedings*. Springer Verlag, 2015, pp. 181–198. ISBN: 978-3-319-16714-5. DOI: 10.1007/978-3-319-16715-2_10. URL: http://hdl.handle.net/10993/25942.

[286] E. Weydert. “A Multiverse Axiom Induction Framework”. In: *Symposium on the Theoretical Foundations of Mathematics III*. 2015. URL: http://hdl.handle.net/10993/25593.

[287] M. V. Zee. “Rational Architecture = Architecture from a Recommender Perspective”. In: *Proceedings of the International Joint Conference on Artificial Intelligence*. 2015. URL: http://hdl.handle.net/10993/21042.

[288] M. V. Zee, F. Bex, and S. Ghanavati. “Rationalization of Goal Models in GRL using Formal Argumentation”. In: *In Proceedings of RE: Next! track at the Requirements Engineering Conference 2015 (RE’15)*. 2015. URL: http://hdl.handle.net/10993/24919.

[289] M. V. Zee and D. van der Linden. “ARMED: ARgumentation Mining and reasoning about Enterprise architecture Decisions”. In: *Proceedings of the 27th Benelux Conference on Artificial Intelligence (BNAIC2015)*. 2015. URL: http://hdl.handle.net/10993/23867.

[290] M. V. Zee et al. “AGM Revision of Beliefs about Action and Time”. In: *Proceedings of the International Joint Conference on Artificial Intelligence*. 2015. URL: http://hdl.handle.net/10993/21354.

[291] Y. Zhang and J. Pang. "Community-Driven Social Influence Analysis and Applications". In: *Proceedings of the 15th International Conference on Web Engineering*. Springer, 2015. URL: http://hdl.handle.net/10993/21326.

[292] Y. Zhauniarovich et al. "StaDynA: Addressing the Problem of Dynamic Code Updates in the Security Analysis of Android Applications". In: *Proceedings of CODASPY '15*. ACM, 2015. DOI: 10.1145/2699026.2699105. URL: http://hdl.handle.net/10993/23812.

[293] Y. Zhauniarovich et al. "Towards Black Box Testing of Android Apps". In: *Proc. of Software Assurance Workshop at the 10th International Conference on Availability, Reliability and Security (ARES)*. IEEE, 2015. DOI: 10.1109/ARES.2015.70. URL: http://hdl.handle.net/10993/23816.

8.6 Technical Report

[294] A. Biryukov, D.-D. Dinu, and D. Khovratovich. *Argon and Argon2*. University of Luxembourg, Faculty of Science, Technology et al., 2015. URL: http://hdl.handle.net/10993/19901.

[295] A. Biryukov et al. *The memory-hard Argon2 password hash function*. SJD AB; University of Luxembourg, Faculty of Science, Technology et al., 2015. URL: http://hdl.handle.net/10993/26817.

[296] D. Dinu et al. *Triathlon of Lightweight Block Ciphers for the Internet of Things*. University of Luxembourg, Faculty of Science, Technology, Communication (FSTC), Computer Science, and Communications Research Unit (CSC), 2015. URL: http://hdl.handle.net/10993/25565.

[297] L. Li et al. *A Study of Potential Component Leaks in Android Apps*. University of Luxembourg, Faculty of Science, Technology et al., 2015. URL: http://hdl.handle.net/10993/25337.

[298] B. Liu et al. *Simulink Fault Localization: an Iterative Statistical Debugging Approach*. University of Luxembourg, Interdisciplinary Centre for Security, Reliability et al., 2015. URL: http://hdl.handle.net/10993/22196.

[299] R. Matinnejad, S. Nejati, and L. Briand. *Automated Test Suite Generation for Time-Continuous Simulink Models*. University of Luxembourg, Interdisciplinary Centre for Security, Reliability et al., 2015. URL: http://hdl.handle.net/10993/21975.

[300] N. Navet et al. *Lean Model-Driven Development through Model-Interpretation: the CPAL design flow*. RealTime-at-Work (RTaW); University of Luxembourg, Faculty of Science, Technology, Communication (FSTC), Computer Science, and Communications Research Unit (CSC), 2015. URL: http://hdl.handle.net/10993/22279.

[301] P. Ryan et al. *Privacy and Security in an Age of Surveillance*. University of Luxembourg, Faculty of Science, Technology, Communication (FSTC), Computer Science, and Communications Research Unit (CSC), 2015. URL: http://hdl.handle.net/10993/25431.

[302] D. P. B. Spagnuelo and G. Lenzini. *Security on medical data sharing (a literature review)*. University of Luxembourg, Interdisciplinary Centre for Security, Reliability and Trust (SNT), 2015. URL: http://hdl.handle.net/10993/23241.

8.7 Miscellaneous

[303] C. Bartolini et al. *Assessing IT Security Standards Against the Upcoming GDPR for Cloud Systems*. 2015. URL: http://hdl.handle.net/10993/20791.

[304] L. Codeca, R. Frank, and T. Engel. *LuST: a 24-hour Scenario of Luxembourg City for SUMO Traffic simulations*. 2015. URL: http://hdl.handle.net/10993/21015.

[305] C. Franck and J. van de Graaf. *Dining Cryptographers are Practical*. 2015. URL: http://hdl.handle.net/10993/23848.

[306] T. Laurent et al. *Assessing and Improving the Mutation Testing Practice of PIT*. 2015. URL: http://hdl.handle.net/10993/24473.

[307] D. P. B. Norta et al. *11,8-100% Rural Renewable Energy and Power Supply and its Influence on the Luxembourgish Power System*. 2015. URL: http://hdl.handle.net/10993/20794.

[308] D. P. B. Norta et al. *Hydrokinetic Micro-Power Generation in Small Rivers - a New Approach*. 2015. URL: http://hdl.handle.net/10993/21030.

[309] A. Popleteev. *Activity tracking and indoor positioning with a wearable magnet*. 2015. DOI: 10.1145/2800835.2800938. URL: http://hdl.handle.net/10993/23846.

Appendix A

Statistics for 2015

A.1 Number of CSC Staff by Category

Category	Number
Director of the Interdisciplinary Centre "Security, Reliability and Trust"	1
Professor	16
Associate Professor	6
Doctoral Candidate	85
Administrative Aid	2
Program Coordinator	1
Project Coordinator	2
Research Assistant	2
Research Associate	40
Research Associate (Post-doc)	24
Research Scientist	14
Technical Support Staff Member	5
Research Facilitator	1
Secretary	3
Senior Research Scientist	4
Senior Researcher (Post-doc)	6
Technician on Project	1
Total	*214*

Table A.1: Number of CSC Staff by Category

A.2 List of CSC Members by Category

Position	Last Name	First Name
Director of the Interdisciplinary Centre ”Security, Reliability and Trust”	Ottersten	Björn
Professor	Biryukov	Alex
	Bisdorff	Raymond
	Bouvry	Pascal
	Briand	Lionel
	Engel	Thomas
	Esteves-Veríssimo	Paulo
	Guelfi	Nicolas
	Kelsen	Pierre
	Le Traon	Yves
	Leprévost	Franck
	Mauw	Sjouke
	Ryan	Peter
	Sachau	Jürgen
	Sorger	Ulrich
	Zampunieris	Denis
	van der Torre	Leon
Associate Professor	Coron	Jean-Sébastien
	Müller	Volker
	Navet	Nicolas
	Rothkugel	Steffen
	Schommer	Christoph
	Steenis	Bernard
Doctoral Candidate	Ambrossio	Diego Agustin
	Atashpendar	Arash
	Ben Fadhel	Ameni
	Bilibin	Ilya
	Boechat	Andre
	Brau	Guillaume
	Bronzi	Walter
	Brühl	Manuel
	Chenal	Massimo
	Codeca	Lara
	Colombo Tosatto	Silvano
	Danilava	Sviatlana
	Delerue Arriaga	Afonso
	Derrmann	Thierry
	Dinu	Dumitru-Daniel
	Dobrican	Remus-Alexandru
	Du	Manxing
	Falk	Eric
	Fiandrino	Claudio

Position	Last Name	First Name
	Forster	Markus
	Gammaitoni	Loïc
	Giustolisi	Rosario
	Glauner	Patrick
	Gottmann	Susann
	Hajri	Ines
	Hammerschmidt	Christian
	Helali	Raja
	Humphreys	Llio
	Hurier	Médéric
	Höhn	Winfried
	Ibrahim	Abdallah Ali Zainelabden Abdallah
	Jafarnejad	Sasan
	Jan	Sadeeq
	Jimenez	Matthieu
	Kampas	Dimitrios
	Khan	Yasir Imtiaz
	Klein	Johannes
	Le	Ha Thanh
	Li	Daoyuan
	Li	Li
	Li	Yu
	Liu	Bing
	Liu	Zhe
	Lopez Becerra	José Miguel
	Lounis	Karim
	Maddouri	Sami
	Marchal	Samuel
	Margossian	Harag
	Martinez	Jabier
	Mouline	Ludovic
	Mouton	Maximilien
	Muller	Christian
	Muszynski	Jakub
	Nachtigall	Nico
	Neshvad	Surena
	Neyens	Gilles
	Nguyen	Anh Quan
	Nielsen	Sune Steinbjorn
	Norta	David Peter Benjamin
	Pejo	Balazs
	Perez Urquidi	Jose Miguel
	Perrin	Léo Paul
	Pierina Brustolin Spagnuelo	Dayana

Position	Last Name	First Name
	Podlaszewski	Mikolaj Jan
	Pustogarov	Ivan
	Rubab	Iram
	Sanchez Guinea	Alejandro
	Signorello	Salvatore
	Simionovici	Ana-Maria
	Skrobot	Marjan
	Soltana	Ghanem
	Steichen	Mathis
	Sun	Xin
	Sundharam	Sakthivel Manikandan
	Thome	Julian
	Toro Pozo	Jorge Luis
	Udovenko	Aleksei
	Vadnala	Praveen Kumar
	Van Zee	Marc
	Venkatesh	Srinivas Vivek
	Wang	Chunhui
	Wang	Jun
	Wu	Yining
	Yuan	Qixia
	Zhang	Yang
Administrative Aid	Edwardsdottir	Helga
	Thür	Claudia
Program Coordinator	Ladid	Latif
Project Coordinator	Ochsenbein	Anne
	Östlund	Stefanie
Research Assistant	Glodt	Christian
	Plugaru	Valentin
Research Associate	Allix	Kevin
	Appelt	Dennis
	Arora	Chetan
	Avanesov	Tigran
	Bissyande	Tegawendé François D Assise
	Cramer	Marcos
	De Kinderen	Sybren
	Derbez	Patrick
	Di Nardo	Daniel
	Dou	Wei
	Ferreira	Ana
	Fouquet	François
	Gadyatskaya	Olga
	Groszschädl	Johann
	Guzek	Mateusz

Position	Last Name	First Name
	Göknil	Arda
	Hartmann	Thomas
	Huynen	Jean-Louis
	Jhawar	Ravi
	Kliazovich	Dzmitry
	Lancrenon	Jean
	Lee	Moon Sung
	Lucas Filho	Edson Ramiro
	Lucia	Lucia
	Machalek	Aurel
	Matinnejad	Reza
	Moawad	Assaad
	Nguyen	Duy Cu
	Ouchani	Samir
	Pastore	Fabrizio
	Rienstra	Tjitze
	Robert	Jérémy
	Sannier	Nicolas
	Shar	Lwin Khin
	Sirres	Raphaël
	Tabatabaei	Masoud
	Tantar	Alexandru-Adrian
	Trujillo Rasua	Rolando
	Velichkov	Vesselin
	Ziafati	Pouyan
Research Associate (Post-doc)	Altmeyer	Sebastian
	Castignani	German
	Dolberg	Lautaro
	Faye	Sébastien
	Gheorghe	Gabriela
	Henard	Christopher
	Hermann	Frank
	Jostock	Markus
	Kantor	Miroslaw
	Khovratovich	Dmitry
	Kim	Dongsun
	Lanze	Fabian
	Louveton	Nicolas
	Ma	Qin
	McCall	Roderick
	Melakessou	Foued
	Mizera	Andrzej
	Naveh	David
	Palattella	Maria Rita
	Parent	Xavier
	Popleteev	Andrei
	Sasnauskas	Raimondas

Position	Last Name	First Name
	Tang	Qiang
	Tantar	Emilia
Research Scientist	Bernard	Nicolas
	Bianculli	Domenico
	Capozucca	Alfredo
	Danoy	Grégoire
	Franck	Christian
	Frank	Raphaël
	Nejati	Shiva
	Panchenko	Andriy
	Pang	Jun
	Papadakis	Mike
	Ries	Benoît
	Suchanecki	Zdzislaw
	Varrette	Sébastien
	Weydert	Emil
Technical Support Staff Member	Cartiaux	Hyacinthe
	Dunlop	Dominic
	Le Corre	Yann
	Reis	Sandro
	Stemper	André
Research Facilitator	Dessart	Bertrand
Secretary	Flammang	Danièle
	Glemot-Schroeder	Isabelle
	Schmitz	Fabienne
Senior Research Scientist	Klein	Jacques
	Lenzini	Gabriele
	Sabetzadeh	Mehrdad
	State	Radu
Senior Researcher (Post-doc)	Botev	Jean
	Casini	Giovanni
	Doder	Dragan
	Emeras	Joseph
	Kubler	Sylvain
	Robaldo	Livio
Technician on Project	Kordy	Piotr

Appendix B

Acronyms used

ComSys Communicative Systems Laboratory
CSC Computer Science & Communications
HPC High Performance Computing
ILIAS Interdisciplinary Laboratory for Intelligent and Adaptive Systems
LACS Laboratory of Algorithmics, Cryptology and Security
LASSY Laboratory for Advanced Software Systems
SnT Interdisciplinary Centre for Security Reliability and Trust
UL University of Luxembourg
FNR Fonds National de la Recherche Luxembourg

http://csc.uni.lu

Computer Science & Communication (CSC) Research Unit
University of Luxembourg
Faculty of Science, Technology and Communication
6, rue Richard Coudenhove-Kalergi
L-1359 Luxembourg
Luxembourg

Administrative Contact:
Isabelle Glemot-Schroeder and Fabienne Schmitz
Email: csc@uni.lu