Celebrating 10 Years of Web Science

Celebrating the 10th anniversary of Web Science as an interdisciplinary field of study, the 8th ACM Web Science Conference in Hannover provided a unique forum for researchers from different backgrounds to discuss all aspects of the Web, from the study of information networks, social communities, organizations, applications and policies that shape and are shaped by the Web.
libraries, FID Pharmazie (DFG) provides new information services for pharmacy, while SoBigData (EU) will help us understand the complexity of the global society. Arithmetics for Cryptography (DFG) will help us develop more efficient cryptographic protocols, Virtual Doubles (DFG) will help us improve advanced editing and compositing for 3D human poses for example in augmented reality applications, in Next Generation Video Coding we will lay out foundations for UHDTV in 5G networks, in the Russian Flu project (DFG/NEH) we investigate together with colleagues from history how media and medical reporting covered the Russian flu epidemic 125 years ago, and in eLabour we will provide methods and research infrastructure for German sociologists focusing on work and production processes.

The legal, societal and ethical implications of digital change will provide a lot of additional opportunities for interdisciplinary research in the years to come. We will focus in particular on big data (in projects such as ABIDA) and will actively participate in the ongoing debate on reform of Europe’s regulatory framework. We will collaborate with internal partners (such as the newly established Leibniz Center for Science and Society) as well as with external institutions and will further increase L3S’ visibility in Europe and beyond. We will provide advice on Europe’s top priorities and challenges with a truly interdisciplinary and multidisciplinary approach that merges academic research with practical expertise. There is plenty to think about and work on – let us mention the new General Data Protection Regulation 2016/679/EU as an example. The European Union tries to reshape its approach to data protection, data security and privacy by this law – in a way that will have impact on the matter for the next ten to twenty years.

There are many more projects we have been working on during the last year. Please take the opportunity to learn more about them through this technical report, and contact us for more information, collaboration possibilities or an interesting research career!

Prof. Dr. techn. Wolfgang Nejdl, L3S Executive Director and Prof. Dr. iur. Nikolaus Forgó, L3S Director
CONTENTS

Preface: Celebrating 10 Years of Web Science ......................................................... 2

VISION STATEMENT

2015: A Year of Growths and Interdisciplinarity Research in Web Science ......................... 8
L3S Members ................................................................................................................ 10
L3S Advisory Board ..................................................................................................... 11
L3S Staff ........................................................................................................................ 12

NEW PROJECTS

AFEL .......................................................................................................................... 16
Arithmetics for Cryptography ..................................................................................... 17
CARISMAND ................................................................................................................ 18
CITYCoP ....................................................................................................................... 19
eLabour ........................................................................................................................ 20
FID Pharmazie ............................................................................................................. 21
fidmath .......................................................................................................................... 22
LA4S ............................................................................................................................. 23
Next Generation Video Coding .................................................................................... 24
Next Level Video Editing .............................................................................................. 25
SoBigData ...................................................................................................................... 26
Tracking the Russian Flu ............................................................................................. 27

INTERNET

Big Data Security ......................................................................................................... 30
CONFINE ...................................................................................................................... 32
rebirth ............................................................................................................................. 34
SmokeBot ....................................................................................................................... 36
T-NOVA ........................................................................................................................ 38
UniQue ............................................................................................................................. 40
USBV-Inspektor ............................................................................................................ 42
CONTENTS

INFORMATION

#science .................................................................................................................. 46
3D-Reconstruction ..................................................................................................... 48
ALEXANDRIA ............................................................................................................... 50
BRENDA .................................................................................................................... 52
DURAARK .................................................................................................................... 54
EUMSSI ....................................................................................................................... 56
ForgetIT ....................................................................................................................... 58
GlycoRec ..................................................................................................................... 60
Gute Arbeit .................................................................................................................. 62
NUMEXAS .................................................................................................................... 64
QualiMaster ............................................................................................................... 66

COMMUNITY

e-IRGSP4 .................................................................................................................... 70
K3 ................................................................................................................................ 72
LearnWeb ..................................................................................................................... 74

SOCIETY

AETIONOMY ................................................................................................................. 78
CHIC ............................................................................................................................ 80
EVIDENCE ................................................................................................................... 82
MAPPING ..................................................................................................................... 84
MyHealthAvatar ........................................................................................................ 86

L3S RESEARCH CENTER

Cooperation Partners ................................................................................................. 90
News .............................................................................................................................. 96
Awards ......................................................................................................................... 103
Publications .............................................................................................................. 104
Committees ............................................................................................................... 124
Imprint ......................................................................................................................... 128
**VISION STATEMENT**

The Web has grown from a small set of just a few hundred servers in 1993 to a world-wide information and communication infrastructure with a huge impact on business, science and society. Yet, due to its unprecedented growth and wealth of applications which build on it, the Web poses more challenges now than 16 years ago. These challenges can only be solved through a combination of methods and technologies from various areas of information systems and computer science, with additional input from social science, business and law.

The L3S Research Center is at the forefront of this new field of Web Science, developing innovative methods and technologies which provide intelligent and seamless access to information through the Web, support and connect individuals and communities in all sectors of the knowledge society, including science and education, and connect the Web to the real world and its entities.
The L3S Research Center focuses on fundamental and application-oriented research in all areas of Web Science and has established itself as a nationally and internationally renowned research center in these areas. The L3S team is addressing themes such as information retrieval, data mining, social web, security and privacy, bias and diversity, visual analytics, performance modelling, service computing, and mobile networks. Encouraged by the positive recommendation of the German Science Council (Wissenschaftsrat) in the year 2014, L3S has continuously and successfully expanded its range of interdisciplinary projects in four research clusters connected to:

1. Internet
2. Information
3. Society
4. Communities.

All third party funded projects are targeted to develop innovative methods and technologies that enable intelligent, seamless access to information via the Web, support and link together individuals and communities across all areas of the knowledge society – including academia and education – and to connect the Internet to the real world and its institutions.

2015: Twelve new projects

The experience gained by L3S over the last few years participating in a variety of projects by the European Commission and other funding agencies has led to fruitful cooperations with more than 300 research institutions and companies throughout Europe and worldwide.

In 2015, the L3S has been involved in 17 European Union financed projects as part of the Horizon 2020 and EU’s 7th Framework Program – like Mapping, Evidence etc. In addition, two projects – Alexandria and Unique – are funded by the European Research Council. L3S is responsible for the coordination of the EU projects Qualimaster, DuraArk and ForgetIT located in the L3S cluster Information, and in the e-irgp 4 project – a support program of the e-Infrastructure Reflection Group (e-IRG) – in the Community cluster. Five interdisciplinary projects have been newly financed by the EU program Horizon 2020: AFEL (How do we learn on and through the Web?), Carismand (Incorporating Culture Aspects in Disaster Management), CityCop (Communities Policing in the Digital Age), SoBigData (Understanding the Complexity of the Global Society) and LA4S (Understanding and Optimizing Learning). Five new projects within the clusters Internet and Society have been accepted and financed by the German Research Foundation (DFG) and will start in 2016. All of these projects expand the interdisciplinary research of L3S in the years 2015 and 2016.

During the reporting period, we have welcomed two new members, who enrich the interdisciplinary work of the field of Web Science at L3S. Thus, at the end of 2015 we have a total of 21 members; all L3S members are presented on page 10 of this report.

L3S Finances 2015

In 2015, the total L3S budget of more than 6.4 million euros again reflects an increase in third party funding during the year. 4.5 million euros are funded by the European Union, German Research Foundation (DFG), German Federal and State Governments or governmental institutions as well as from industry. Third party funding thus accounts for more than two-thirds of the overall budget of L3S, while base funding through the Ministry of Culture and Science of Lower Saxony is 1.85 million euro.
L3S Staff

The L3S Research Center has more than 110 researchers. These are senior researchers, doctoral students, research students and interns as well as a small administration team. Over 72% of the full time scholars are working on third party funded projects, while the administration is financed from base funding (see fig. 2).

L3S attracts outstanding students and researchers from all over the world with its open and invigorating research culture. For young researchers, L3S is encouraging, innovative, international, independent, and supportive.

L3S researchers come from a variety of places in Europe as well as overseas (i.e. US, Asia, Africa); over 25 nationalities are present at L3S. The highly international research staff of L3S shows the attractiveness of the research center as a well-known lab for excellent research and interesting projects.

This clearly strengthens the capabilities of L3S in current and future projects. Given all these achievements, this report again presents a very visible contribution to the interdisciplinary field of Web Science, connecting to law, social science, life science and economics and provides an insight into important aspects of digital transformation in Lower Saxony, in Germany, and worldwide.

The researchers at L3S published more than 240 articles, again increasing both quantity and quality of L3S publication results.

They were asked to take up position in more than 72 program committees in international conferences. The results produced by L3S have been presented at top conferences worldwide, including the 24th International World Wide Web Conference (WWW) in Florence (Italy) and the 38th International ACM Conference on Research and Development in Information Retrieval (SIGIR) in Santiago, Chile.

Finally, we congratulate our eight doctoral students on their successful PhD defenses in 2015 and we wish all of them good luck in their new positions in academia and industry outside the L3S.

Under the slogan “Build your digital business at L3S”, we are extending our L3S entrepreneurship program, started in 2014. L3S offers consulting and workspace for starting a business as well as a series of talks and workshops to support entrepreneurial thinking. Students and scholars use the program to gain knowledge and skills to develop business ideas and to build their own business model. The support of entrepreneurship plays an important part in the endeavor of L3S to transfer know-how and technology to the economy and to provide benefit to society.

Combining our knowledge with our national and international partners, we are looking forward to an even more successful and exciting 2016.

Hannover, June 2016

Gabriele Herrmann-Krotz
L3S Managing Director
L3S DIRECTORS
Prof. Dr. techn. Wolfgang Nejdl • Executive Director
Prof. Dr. rer. nat. Wolf-Tilo Balke • Deputy Director
Prof. Dr. iur. Nikolaus Forgó • Deputy Director
Dipl.-Vw. Gabriele Herrmann-Krotz • Managing Director

L3S MEMBERS & ASSOCIATED MEMBERS
Prof. Dr. techn. Wolfgang Nejdl • Leibniz Universität Hannover
Prof. Dr. rer. nat. Wolf-Tilo Balke • Technische Universität Braunschweig
Prof. Dr. iur. Nikolaus Forgó • Leibniz Universität Hannover (since 2016)
Prof. Dr.-Ing. Holger Blume • Leibniz Universität Hannover
Prof. Dr.-Ing. Markus Fidler • Leibniz Universität Hannover
Jun.-Prof. Dr. rer. nat. Robert Jäschke (associated) • Leibniz Universität Hannover
Jun.-Prof. Dr. iur. Tina Krügel, LL.M (associated) • Leibniz Universität Hannover (since 2016)
Prof. Dr.-Ing. Marcus A. Magnor • Technische Universität BS
Prof. Dr.-Ing. Jörn Ostermann • Leibniz Universität Hannover
Jun.-Prof. Dr. Panagiotis Papadimitriou • Leibniz Universität Hannover
Direktor Uwe Rosemann • Technische Informationsbibliothek (TIB)
Prof. Dr.-Ing. Bodo Rosenhahn • Leibniz Universität Hannover
Prof. Dr. rer. nat. Kurt Schneider • Leibniz Universität Hannover
Prof. Dr. rer. nat. Dietmar Schomburg • Technische Universität Braunschweig
Prof. Dr. rer. nat. Matthew Smith • Rheinische Friedrich-Wilhelms-Universität Bonn
Prof. Dr. rer. nat. Gerd Stumme • Universität Kassel
Prof. Dr.-Ing. Gabriele von Voigt • Leibniz Universität Hannover
Prof. Dr. rer. nat. Heribert Vollmer • Leibniz Universität Hannover
Prof. Dr.-Ing. Bernardo Wagner • Leibniz Universität Hannover
Prof. Dr. rer. soc. Gabriele Wagner • Leibniz Universität Hannover

RESEARCH GROUP LEADERS
Dr. rer. nat. Stefan Dietze
Leibniz Universität Hannover
⇒ Intelligent Access to Information
Jun.-Prof. Dr. rer. nat. Robert Jäschke
Leibniz Universität Hannover
⇒ Intelligent Access to Information
Jun.-Prof. Dr. iur. Tina Krügel, LL.M
Leibniz Universität Hannover
⇒ Web Governance
Dr. rer. nat. Peter Löwe
Technische Informationsbibliothek (TIB)
⇒ E-Science
Dr. rer. nat. Claudia Niederée
Leibniz Universität Hannover
⇒ Intelligent Access to Information
Jun.-Prof. Dr. Panagiotis Papadimitriou
Leibniz Universität Hannover
⇒ Next Generation Internet
Dr.-Ing. Thomas Risse
Leibniz Universität Hannover
⇒ Intelligent Access to Information

L3S MEMBERS & ASSOCIATED MEMBERS
Prof. Dr. techn. Wolfgang Nejdl • Leibniz Universität Hannover
Prof. Dr. rer. nat. Wolf-Tilo Balke • Technische Universität Braunschweig
Prof. Dr. iur. Nikolaus Forgó • Leibniz Universität Hannover
Prof. Dr.-Ing. Holger Blume • Leibniz Universität Hannover
Prof. Dr.-Ing. Markus Fidler • Leibniz Universität Hannover
Jun.-Prof. Dr. rer. nat. Robert Jäschke (associated) • Leibniz Universität Hannover
Jun.-Prof. Dr. iur. Tina Krügel, LL.M (associated) • Leibniz Universität Hannover
Prof. Dr.-Ing. Marcus A. Magnor • Technische Universität BS
Prof. Dr.-Ing. Jörn Ostermann • Leibniz Universität Hannover
Jun.-Prof. Dr. Panagiotis Papadimitriou • Leibniz Universität Hannover
Direktor Uwe Rosemann • Technische Informationsbibliothek (TIB)
Prof. Dr.-Ing. Bodo Rosenhahn • Leibniz Universität Hannover
Prof. Dr. rer. nat. Kurt Schneider • Leibniz Universität Hannover
Prof. Dr. rer. nat. Dietmar Schomburg • Technische Universität Braunschweig
Prof. Dr. rer. nat. Matthew Smith • Rheinische Friedrich-Wilhelms-Universität Bonn
Prof. Dr. rer. nat. Gerd Stumme • Universität Kassel
Prof. Dr.-Ing. Gabriele von Voigt • Leibniz Universität Hannover
Prof. Dr. rer. nat. Heribert Vollmer • Leibniz Universität Hannover
Prof. Dr.-Ing. Bernardo Wagner • Leibniz Universität Hannover
Prof. Dr. rer. soc. Gabriele Wagner • Leibniz Universität Hannover
S C I E N T I F I C  A D V I S O R Y  B O A R D

Prof. Dr. Karl Aberer
Distributed Information Systems Laboratory (LSIR), EPFL Lausanne, Switzerland

Prof. Dr. Jos Dumortier
Research Unit Law and Information Technology, Katholieke Universiteit Leuven, Belgium

Prof. Dr. Dieter Kranzlmüller
Institut für Informatik, Ludwig-Maximilians-Universität München, Germany

Prof. Dr. Christoph Meinel
Hasso-Plattner-Institut, Universität Potsdam, Germany

Prof. Dr. Clara Nahrstedt
Department of Computer Science, University of Illinois at Urbana-Champaign, USA

Prof. Dr. Steffen Staab
Institute for Computer Science and Technologies (WeST), Universität Koblenz, Germany

Prof. Dr. Ralf Steinmetz
Multimedia Communications Lab, Technische Universität Darmstadt, Germany

Prof. Marianne Winslett
Department of Computer Science, University of Illinois at Urbana-Champaign, USA
M.Sc. Abujoda, Ahmed Mohamed
Dr. Ackermann, Hanno
Dr.-Ing. Akin, Sami
Dr. rer. nat. Al-Rifai, Mohammad
Dr.-Ing. Anand, Avishek
M.Sc. Barthel, Simon
Ass.jur. Basten, Dominik Tobias
Dipl.-Math. Becker, Nico
Dr.-Ing. Bozakov, Zdravko
M.A. Buber, Olivia
M.Sc. Busse, Karoline
Dr.-Ing. Cao, Zhen
M.-Ing. Ceroni, Andrea
Dr. rer. nat. Chelaru, Sergiu
LL.M. Dahi, Alan Bertrand
Dr. rer. nat. Demidova, Elena
Dr.-Ing. Dietrich, David
Dr. rer. nat. Dietze, Stefan
Dipl.-Math. Djafari Naini, Kaweh
Dr. rer. nat. Fahl, Sascha
M.Sc. Fenzi, Michele
M.Sc. Fetahu, Besnik
Dr. rer. nat. Fischella, Marco
M.Sc. Gadiraju, Ujwal Kumar
Dr.-Ing. Gärtner, Stefan
Dr. rer. nat. Georgescu, Mihai
Mgr Goralczyk, Magdalena
Dipl.-Inform. Gosser, Gerhard
M.Sc. Gottschalk, Simon
LL.M. Graupe, Simon
M.Sc. Haak, Anselm
Dipl.-Ing. Hackmann, Tom Hendrik
M.Sc. Hadgu, AsmelashTeka
M.Sc. Hahn, Matthias
Ass.jur. Hänel, Stefanie
Dr. rer. nat. Harbach, Marian
Dipl.-J ur. Hawellek, Christian
RA Heermann, Thorsten
Dipl.-J ur. Heinemeyer, Dennis
Dr.-Ing. Herder, Eelco
M.Sc. Holzmann, Helge
Ass.jur. Hosseini Tehrani, Dania
M.Sc. Hube, Christoph
Dipl.-J ur. Jensen, Sarah
M.Sc. Jeske, Lisa
Dr. Kanhabua, Nattiya
Dr. rer. nat. Kawase, Ricardo
B.Sc. Kemkes, Philipp
M.Sc. Khangura, Sukhpreet Kaur
M.Sc. Kiesling, Stephan Jürgen
Kleiner, Michaela
Ass.jur. Knoke, Friederike
Dipl.-Wirtsch.-Ing. Koenig, Christoph
M.Sc. Langenbruch, Felix
Dr. phil. Langhof, Antonia
M.Sc. Liao, Wentong
LL.M. Lischchuk, Iryna
Dr.-Ing. Lübben, Ralf
Luk sche, Carolin
Dr. phil. Marenzi, Ivana
Dipl.-Ing. (FH) Mitev, Dimitar
Dipl.-Bi ol. Munaretto, Cornelia
Dr. rer. nat. Niederée, Claudia
LL.M. Nwankwo, Iheanyi Samuel
Dipl.-Geogr. Oetzm ann, Susanne
M.Sc. Panitz, Michael
M.A. Paysen, Gabriele
Dr.-Ing. Pérez Guirao, María Dolores
Ass.jur. Pfeiffenbring, Julia
Dr.-Ing. Risse, Thomas
M.Sc. Rokicki, Markus Gregor
Dipl.-J ur. Rottwinkel, Wolfgang
Dr. rer. nat. Shaltev, Miroslav
Dr. rer. nat. Siahatgar, Mohammad
M.Sc. Siehndel, Patrick
Dr.-Ing. Siersdorfer, Stefan
M.Sc. Singh, Jaspreet
M.Sc. Soltow, Erik
M.A. Stalz, Sara
Dr. jur. Stauch, Marc
Dipl.-J ur. Stoklas, Jonathan
Dr. rer. nat. Szongott, Christian
M.Sc. Tiefenau, Christian
M.Sc. Tillack, Jana
Dipl.-Inform. Tobaben, Hinrich Wilhelm
M.Sc. Tran, Anh Tuan
M.Sc. Tran, Binh Giang
M.Sc. Tran, Nam Khanh
M.Sc. Varis etty, Tilak
Wicht, Marion
Dipl.-Ing. Wiebelitz, Jan
M.Sc. Yu, Ran
M.Sc. Zab, Jan-Hendrik
M.Sc. Zell, Petris sa
Dr. rer. nat. Zerr, Sergej
Dr. Zhu, Xiaofei
Zieseniss, Iris
NEW PROJECTS

The Web has become a societal factor that has changed every individual’s environment and potential. Therefore, it is the overarching responsibility of the nation as a whole to ensure that all residents and users are given the help they need to gain access to the knowledge and information society. The way in which this transition is brought about will have a crucial impact on people’s future working and living conditions, and on the competitiveness of our economy.
AFEL – Analytics for Everyday Learning

How Do We Learn on and through the Web?

The rise of the Web had a tremendous impact on how learning is happening, involving formal education, for instance, through Massively Open Online Courses (MOOCs) as well as informal learning, which increasingly takes place as part of our daily online interactions, specifically in social environments. Here, exchange of knowledge is among the key motivations for online interactions. This includes social resource sharing platforms, such as Slideshare, Youtube or Bibsonomy, but also general social networks such as LinkedIn, where finding, forming, and presenting expertise is one of the key user aims.

MOTIVATION | In this context, understanding the needs of all involved stakeholders, such as users, learners, job seekers, training or resource providers, remains a challenging problem. This is due not least to the scale, diversity and heterogeneity of data on the Web, where the extraction and analysis of relevant information poses significant scientific challenges.

CHALLENGES & HIGHLIGHTS | The goal of AFEL (Analytics for Everyday Learning) is to develop methods for understanding and analyzing informal/collective learning as it surfaces implicitly in online social environments. This includes solutions for retrieving, extracting and enriching data from Web environments, as well as learning analytics techniques applied in relation to cognitive models of learning and collaboration.

To achieve this, AFEL gathers a range of skills in a consortium funded by the EU Horizon 2020 program, including experts in data analytics, cognitive models of learning and collaboration, as well as social media analytics, together with industrial partners and social Web service providers.

POTENTIAL APPLICATIONS & FUTURE ISSUES | AFEL results will be applicable for a wide variety of stakeholders. Providers of social online environments will be able to better understand needs of their users and to bring involved stakeholders together. Users on the other hand will benefit from improved and highly personalized services that will be informed by the analytical tools and methods provided by the project.
Arithmetics for Cryptography

Arithmetic versus Boolean Complexity: The Case of Small-Depth Circuits

IT Security is a topic of highest relevance in today’s web applications. However, users will only accept the use of protecting tools if they do not slow down efficiency of their system. Most actual cryptographic protocols make use of mathematical developments and algorithms from number theory. Efficient implementation of these is therefore of utmost importance.

**Motivation** | Cryptographic protocols like Diffie-Hellman key exchange, RSA, El-Gamal (either on Galois fields or elliptic curves) all require large numbers of arithmetic operations. Efficient use of these protocols thus hinges on efficient implementation of basic arithmetic operations, starting with addition, multiplication, exponentiation, etc., but also the efficient use of these operations as basic building blocks. The goal of this project is the study of the computational complexity of so called arithmetic circuits, i.e., circuits that have multiplication and addition gates or any other ring operation instead of the usual Boolean gates.

**Challenges & Highlights** | The area of computational complexity is determined by the search for efficient algorithms (upper bounds) as well as for proofs that algorithms of certain complexity do not exist (lower bounds). Arithmetic circuits have turned into a very popular computation model in the recent past, because algorithms (in particular from areas such as numerical analysis) can be very naturally formulated in this model, but also because of its very restricted “structured”) nature a number of impressive lower bounds are known. In the eighties and nineties of the previous century, Boolean circuits were widely studied because of the invention of deep techniques for obtaining lower bounds. It will be the aim of this project to exploit connections between arithmetic and Boolean circuits in a more systematic way than up to date, to attack some of the most important open questions in both areas. The desired results will hopefully broaden our understanding of the structure of small complexity classes within the class P of all efficiently solvable problems.

**Potential Applications & Future Issues** | Results of this project will lead to efficient implementations of arithmetic algorithms involved in cryptographic protocols, but also point out efficient hardware solutions (cryptography on a chip).

**Information:**
Research Field: WG – Web Governance
L3S Member: Prof. Dr. Heribert Vollmer · vollmer@L3S.de
Project Manager: Prof. Dr. Heribert Vollmer · vollmer@L3S.de
https://www.l3s.de/projects/afc
NEW L3S PROJECTS

CARISMAND – Culture And RISKmanagement in Man-made And Natural Disasters

Incorporating Cultural Aspects in Disaster Management

People’s perception of risks and disaster coping strategies differ. Often, social and cultural factors play significant role in such scenarios. CARISMAND aims to develop a disaster management toolkit that incorporates cultural factors, and will, by identifying the gaps that currently exist regarding cultural sensitivities and disasters, develop a feedback-loop between disaster managers and citizens, establish, test and refine solutions that incorporate culturally informed best practices in disaster situations.

MOTIVATION | Disasters – natural or man-made, directly impact the way affected population enjoy their human rights. Destroyed shelter due to flooding for instance, affects the right to shelter, and other ripple effects could follow: lack of food, sickness, etc., which invariably affect other human rights. But often cultural aspects that may shape and influence citizens’ risk perceptions and response in disasters situations are overlooked, leading to a lack of theoretical understanding on how cultural factors could be integrated into disaster policies and procedures, and how they could be utilized to improve disaster management. The goal of this project is to assist in disaster resilience and to propose new approaches that incorporate cultural aspects in disaster management.

CHALLENGES & HIGHLIGHTS | The main challenge for L3S is to review the legal situation of citizens during disasters, particularly regarding human rights, privacy rights, and any form of cultural rights and explore how these rights, especially cultural rights, are being implemented and to recommend to the European Commission and other policy makers how to reform the current framework.

POTENTIAL APPLICATIONS & FUTURE ISSUES | A key outcome of the CARISMAND project is the envisaged toolkit that will be developed through a multi-disciplinary effort that will map out cultural factors in the context of disaster management. The tool will include: a formal set of recommendations for stakeholders at all levels aimed at improving policies and guidelines, and a comprehensive “cultural map” for formal and “informal” disaster managers as well as citizens, which will be available online, downloadable, and adaptable to their individual or institutional needs.

INFORMATION:
Research Field: WG – Web Governance
L3S Member: Prof. Dr. Nikolaus Forgó · forgo@L3S.de
Project Manager: Iheanyi Nwankwo · nwankwo@L3S.de
http://www.carismand.eu

L3S_AR_2015-5.qxp_Layout 1  13.07.16  12:07  Seite 18
Theories underlying community policing received new impetus with the recent advent of smartphones and social media and especially, user-generated content (UGC) where citizens engage in closer interaction with their local community and law enforcement agency (LEA). The years 2010 – 2014 have shown a rapid upsurge of smartphone apps aimed at improving crime reporting and other forms of UGC and interaction associated with community policing. In order to take good advantage of these ICT innovations, CITYCoP is set out to determine how the needs of citizens and LEAs could be met in a smart way using these interactive technologies, and at the same time enhance crime reporting, law enforcement and respect for privacy.

**Motivation** | In recent years, the contact between LEAs and citizen has decreased continuously. To achieve a high level of public safety, it is important for community policing to be as wide reaching as possible, and one way this goal could be achieved is by using widely available interactive technologies. The widespread use of smartphones, social media and mobile applications could leverage this. The project’s approach is to bring the interaction between citizen and LEAs on a digital level. On the first level, we will determine the needs of citizens and LEAs in order to define the content and scope of the needed application, and to map out possible functions such as a crime reporting function, a messaging service or a public forum. In the end, a test run of the tool in different cities will be conducted and feedback will be analyzed to improve the application. The application will potentially process a lot of personal data, and therefore it is important to ensure high data security and transparency as well. To raise citizen’s confidence, compliance with privacy and data protection laws should be an integral part of the application. In this respect, L3S is responsible for developing and implementing a data protection audit and will also act as a “watchdog” for a strong data protection when developing and using the tool.

**Challenges & Highlights** | The main challenges for the project are how to leverage already existing interactive technologies and make citizens use them in a way that enhances public safety and interaction with LEA. How to gain citizens’ trust for this purpose is paramount, as well as how to implement the technical and administrative requirements for the needs of LEAs.

**Potential Applications & Future Issues** | The focus of the project will be to develop a mobile application for law enforcement agencies and citizens that could be used in every EU member state.
eLabour: Interdisciplinary Center for IT-based qualitative Research in Work Sociology

Leveraging the Assets of Qualitative Studies in Sociology

How did contours of work and production develop after the end of “Fordisms”? Such questions require the reuse of material collected in qualitative studies in work sociology in the past decades for performing a secondary analysis, which looks into evolutionary aspects on top of the snap shots of the original studies. New exciting insights are expected from such analysis. Novel e-humanities methods and IT support for adequately dealing with the diverse and context rich material collected over the decades will be developed in interdisciplinary work in the eLabour project.

**Motivation** | Qualitative research in the area of work sociology has created a large asset of insights in the perception of and attitude to work at various points of the past decades. So far there has, however, been little progress in the demanding task of reusing those assets for secondary analysis, thus leveraging the effort from the original studies and opening opportunities for new types of research questions, e.g. for longitudinal studies. The eLabour project has brought together leading institutes in work sociology and experts from IT for developing innovative IT-based methods for secondary analysis and to make them available as part of a digital humanities center.

**Challenges & Highlights** | The support of research work in the qualitative social sciences and especially in the novel area of exploiting qualitative studies for secondary analysis imposes a number of challenges that can only be solved in interdisciplinary collaboration between sociologists and IT experts. It is not only necessary to develop IT methods and tools for supporting researchers from the Humanities. The methods for effective and valid secondary analysis on qualitative material, which has been collected in very specific context, themselves still require development in qualitative social science.

**Potential Applications & Future Issues** | The main application for the methods and infrastructure developed in the eLabour project are the support of secondary analysis in qualitative sociology. It is, however, expected that the solutions can also be used by other researchers in the humanities. Work in the next year of the project will focus on the collection of requirements for the IT methods and on the development of methods for search and for socio-historic contextualization of older studies.

**Information:**
Research Field: IAI – Intelligent Access to Information
L3S Member: Prof. Dr. Wolfgang Nejdl · neidl@L3S.de
Project Manager: Dr. Claudia Niederée · niederee@L3S.de
www.elabour.de
Introducing the New Specialized Information Service for Pharmacy

This Is Where Pharmacists Meet!

In recent years the process of generating, disseminating, and archiving new knowledge has changed fundamentally. Beside the increasing amount of new knowledge that needs to be processed, new paradigms for search, access, and exchange have evolved: Digital information is discovered, interlinked with curated databases, commented upon, adapted, and shared in Web-based collaborative research infrastructures. This need has also been recognized by prominent funding agencies like the German Research Foundation (DFG), which recently phased out one of its oldest grant programs for libraries, the system of Special Subject Collections, and introduced a new funding line called Specialized Information Services.

MOTIVATION | In 1949, the German Research Foundation decided to distribute responsibilities for establishing potentially complete literature collections for each scientific discipline. This basically means that the funds needed for acquisitions over the German universities’ library system must be balanced to avoid duplicate acquisitions of necessary, yet rarely used items in all respective fields. While the basic idea proved quite successful, evergrowing publication rates made the system more and more costly each year. The novel idea of the new funding line for Specialized Information Services is to additionally provide (pro-)active support for knowledge acquisition in each discipline.

CHALLENGES & HIGHLIGHTS | In close cooperation with the University Library of Brunswick Technical University, the digital library group of L3S has accepted the challenges of the new program:

• SIS licenses will grant nationwide online access to journals in the field of pharmacy as well as access to ebooks acquired by patron-driven acquisition. Following a general e-only policy, there will also be cooperation with the L3S partner TIB to provide extensive access to literature for the entire range of this interdisciplinary subject.

• By developing an extensible and personalizable information infrastructure, customizable value-added services will be established, including a discovery system as nucleus for a virtual research environment. In addition to bibliographic sources, specialists need curated data about active substances, enzymes and proteins.

• Furthermore, an individualizable profile service will be created to automatically and regularly disseminate information about new acquisitions and especially new periodical articles, and searchers may establish personal profiles for their use of the services of the Pharmacy SIS.

POTENTIAL APPLICATIONS & FUTURE ISSUES | The Pharmacy SIS will focus on the actual requirements and research interests of the scientific community and extend its services continually according to direct feedback from scientists.

INFORMATION:
Research Field: ESC – E-Science
L3S Member: Prof. Dr. Wolf-Tilo Balke · balke@L3S.de
Project Manager: Prof. Dr. Wolf-Tilo Balke · balke@L3S.de
http://www.pubpharm.de
Fachinformationsdienst Mathematik – Mathematics Information Service

Maths Beyond Text

Scientific libraries play a twofold role:
1. As service providers they offer access to resources. Access to digital resources must now be independent of time and location.
2. As research facilities they support scientists with information research: Finding information and archiving research data in all forms. They also develop new tools to satisfy subject-specific information-seeking behavior. Both aspects are considered in this project. As a particular use case, we focus on software as a (so far) neglected form of research data.

MOTIVATION | The Mathematics Information Service’s subproject Maths Beyond Text follows the explicit desideratum of mathematicians to provide repositories, access, and publication standards to aggregate digital research data in the scientific working process.

CHALLENGES & HIGHLIGHTS | In order to develop a comprehensive framework for software research data embedded in the research process, our first step is to collect best practices that may become standards along the way. At present, referencing and citation of software is scrutinized: Software developers often are not scientifically credited for their work. On the other hand, there is no standard to give credit to software developers by citation. Practical and widely used tools (e.g., GitHub) shall be embedded in the scientific working and publishing process.

POTENTIAL APPLICATIONS & FUTURE ISSUES | The next step concerning “Maths Beyond Text” is a prototypical set-up for software in the research process: An institutional GitHub-like repository, including referencing functionalities accepted by publishers and scientists (DOI). To cover proprietary software we also aim at archiving software documentation via web archives. In the big picture we provide tools and services that accompany the whole research process in the mathematical sciences comprising the stages’ literature review, research funding, project management, research data, writing, publication, presentation and general communication. At present, we focus on research data and software in particular (because it was an explicit and urgent requirement along with citation metrics of traditional publications). Audiovisual data, raw field data and their processed derivatives are considered in adjoining repository projects. Another focus lies on the final three steps of the research process: Using the internet for Open Access publishing while providing tools satisfying current information-seeking behavior in the digital world. Optimally, presenting and communicating will produce results not only within the science community, but also outreach to stakeholders in particular and the public in general. Along with traditional methods, such as conference contributions, social media is an important carrier for scientific knowledge. The development and application of crowd sourcing methods in parallel shall provide trend scouting, market analysis, and outreach. All these approaches form a comprehensive framework of best practices of mathematical research with its modular structure allowing continuous enhancements in collaboration with the community of the mathematical sciences.
NEW L3S PROJECTS

LA4S

Learning Analytics and Learning Process Management for Small Size Organizations in Higher Education

Understanding and Optimizing Learning

Learning Analytics (LA) as a key aspect of Learning Process Management (LPM) supports the measurement, analysis and reporting of data about learners and their contexts for purposes of understanding and optimizing learning and the environments in which it occurs. The main objective of this project is to integrate already carried out experiences in the research field of LA and LPM, in combination with aspects of Learning Semantics (LS) and transfer innovations of these fields into the area of small size Higher Education organizations like the University of Liechtenstein.

MOTIVATION | Small size universities such as the University of Liechtenstein, with about 550 students, have less resources available to invest in the modernization of their teaching and training system. Strategic partnership and cooperation with larger European Higher Education Institutions (HEI) that are leaders in research areas such as LA and LPM can help small size universities to get involved and participate in current developments for implementing advanced learning techniques and technologies.

CHALLENGES & HIGHLIGHTS | Even though Learning Analytics has gained much attention in the research field and has been adopted by many HEIs in Europe and around the world, the maturity levels of institutions to be data informed are only in the early stages. Thus, there is a high demand for good practices and legal frameworks on how to apply LA in practice.

The LA4S project aims to design and prepare a prototype toolset especially developed for small size universities which includes a framework for identifying and supporting learning paths, and provides a structured collection of existing LA Datasets and “ready to use” LA Tools, as well as recommendations covering Ethical Issues, Privacy and Data Protection considerations. The project results will be available to various stakeholders such as universities, companies and schools allowing them to integrate learning analytics in the most convenient way.

POTENTIAL APPLICATIONS & FUTURE ISSUES | For learners, educators and researchers LA already provides crucial insights into student progress and interaction with online texts, courseware and learning environments used to deliver instruction. Data-driven learning and assessment will build on those early efforts to build better pedagogies, empower students to take an active part in their learning, target at-risk student populations, and assess factors affecting completion and student success.

INFORMATION:

Research Field: IAI – Intelligent Access to Information
L3S Member: Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
Project Manager: Dr. Ivana Marenzi · marenzi@L3S.de
https://www.l3s.de/projects/LA4S
NEW L3S PROJECTS

Next Generation Video Coding

UHDTV for 5G Networks

Video is playing an important role in our life nowadays. Applications can be seen everywhere, ranging from live-streaming on mobile devices, the offline Blu-ray for the entertainment at home, to the latest 3D films in the cinema. Due to the constraint data transfer or storing capacity of the media and limited capacity of 4G and 5G mobile networks, we study video coding.

MOTIVATION | The techniques to compress the videos have been an interesting topic since the emergence of digital video in the 1980s. The coding standard HEVC has avoided the transfer of the repeated information by some prediction methods, spared the color information by utilizing the inferior sensitivity of human eyes for color. Considering the requirements of the upcoming 5th generation wireless systems, the project is aiming at improving on the current standard and achieve both better compression ratio and subjective visual quality.

CHALLENGES & HIGHLIGHTS | It is observed that texture information requires the majority of the bit rate. Vector quantization (VQ) has been proven to exploit non-linear statistical dependencies in the video signal. Therefore applying VQ in video coding can lead to an enhancement in compression efficiency. To further improve the compression rates we model parts of the human visual system (HVS) which automatically separates relevant and irrelevant information. We develop an algorithm where a large region of similar texture (e.g. a homogeneously textured wall) is represented by a small patch extracted from that region.

POTENTIAL APPLICATIONS & FUTURE ISSUES | The presented methods will be contributed to the next video coding standardization process within ISO/MPEG. This standardization process is expected to start in 2017 resulting in a new video coding standard by 2021. It will target a further bitrate reduction by 50% for conventional rectangular HDTV and UHDTV resolution video compared to the current standard HEVC. Furthermore, virtual reality and augmented applications will be supported natively. The new video coding standard will be ready in time for the deployment of the 5th generation mobile network.

INFORMATION:
Research Fields: Next Generation Internet
L3S Member: Prof. Dr. Jörn Ostermann · ostermann@L3S.de; Prof. Dr. Bodo Rosenhahn · rosenhahn@L3S.de
Project Manager: Prof. Dr. Jörn Ostermann · ostermann@L3S.de, Prof. Dr. Bodo Rosenhahn · rosenhahn@L3S.de
https://www.l3s.de/projects/ngvc
Comprehensive Human Performance Capture from Monocular Video Footage

**Next Level Video Editing: Virtual Doubles**

Photo-realistic modeling and digital editing of image sequences with human actors are common tasks in the movie and games industry. The processes, however, are still laborious since tools only allow basic manipulations. This project aims to solve this dilemma by providing algorithms and tools for automatic and semi-automatic digital editing of actors in monocular footage. To enable visual convincing renderings, a digital model of the human actor, detailed spatial scene information as well as scene illumination need to be reconstructed. Consequently, the plausible look and motion of the digital model are crucial.

**Motivation** | Providing tools for 3D post processing of standard monocular video footage enables a wide range of editing and compositing possibilities. Possible use cases are not limited to professional movie production. Improving personal hardware, such as in PCs or mobile devices, give users access to technology based on latest research in scene reconstruction. Virtual or augmented reality applications for entertainment or e-commerce, for example, benefit from latest scientific findings.

**Challenges & Highlights** | The project aims to contribute to solving the highly under-constrained problem of reconstructing complex 3D human poses in such quality, that renderings based on the reconstructed shape are visually convincing. While other projects estimate 3D body information with multi-view recordings or 3D laser scans, this project faces the challenge of using solely monocular footage as input data. Resulting challenges are the lack of depth information, ambiguity in pose reconstruction, self-occlusion as well as missing information about the back view of the actor. It has been shown that we are particularly sensitive to inconsistencies in human look and motion. A rendered 3D model based on reconstructed scene data, therefore has to meet special requirements in terms of realism.

**Potential Applications & Future Issues** | Potential applications can be found in the movie industry or in augmented reality applications. Former projects have already investigated how the clothing of an actor can be virtually edited. Use cases can be found in the fashion industry, in e-commerce or youth protection. The long-term goal is to lay the foundation for a digital archive of digital actor doubles. The acting performance of current and past artists can so be preserved for the future and may be re-used at any time.

**Information:**
Research Field: NGI – Next Generation Internet
L3S Member: Prof. Dr. Marcus Magnor · magnor@L3S.de, Prof. Dr. Bodo Rosenhahn · rosenhahn@L3S.de
Project Manager: Prof. Dr. Marcus Magnor · magnor@L3S.de, Prof. Dr. Bodo Rosenhahn · rosenhahn@L3S.de
https://www.l3s.de/projects/virtualdoubles
NEW L3S PROJECTS

SoBigData: Social Mining & Big Data Ecosystem

Understanding the Complexity of the Global Society

One of the most pressing and fascinating challenges scientists face today is understanding the complexity of our globally interconnected society. The big data arising from the digital breadcrumbs of human activities promise to let us scrutinize the ground truth of individual and collective behavior at an unprecedented detail and scale. There is an urgent need to harness these opportunities for scientific advancement and for the social good. The main obstacle to this accomplishment, besides the scarcity of data scientists, is the lack of a large-scale open infrastructure, where big data and social mining research can be carried out.

Motivation | Multiple dimensions of our social life have “big data” proxies: Our desires, opinions and sentiments leave their traces in our web pages, social media, query logs; our social links leave their traces in the network of our phone or email contacts and in social networks; our movements leave their traces in the records of our phone calls and GPS tracks. This increasing wealth of data is a chance to disentangle social complexity and face the challenges of our world, provided we can rely on social data mining, i.e., adequate means for accessing big data and extracting useful knowledge from them.

Challenges & Highlights | SoBigData aims at creating the Social Mining & Big Data Ecosystem: A research infrastructure providing an integrated ecosystem for ethically sensitive scientific discoveries and advanced applications of social data mining on the various dimensions of social life. Building on several established national infrastructures, SoBigData will open up new research avenues in multiple research fields, including mathematics, ICT, and human, social and economic sciences, by enabling easy comparison, re-use and integration of state-of-the-art big social data, methods, and services, into new research. It will create a pan-European, inter-disciplinary community of social data scientists, fostered by extensive training, networking, and innovation activities.

In addition, as an open research infrastructure, SoBigData will promote repeatable and open science.

Potential Applications & Future Issues | Although SoBigData is primarily aimed at serving the needs of researchers, and the openly available datasets and open source methods and services provided by the new research infrastructure will also impact industrial and other stakeholders (e.g., government bodies, non-profit organizations, funders, policy makers).

Information:

Research Field: IAI – Intelligent Access to Information
L3S Member: Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de,
Prof. Dr. Nikolaus Forgó · forgo@L3S.de
Project Manager: Dr. Thomas Risse · risse@L3S.de
http://www.sobigdata.eu
Tracking the Russian Flu in U.S. and German Medical and Popular Reports, 1889-1893

Historic Epidemiology

Automatic studies of epidemics have concentrated on the analysis and prediction of current outbreaks. In contrast, the Russian Flu project brings together researchers from Computer Science at the L3S and researchers in History at Virginia Tech to examine a historic influenza epidemic. The project is of relevance to humanities scholars seeking new ways to understand popular and scientific perceptions of disease, and data analysts seeking to track the spread of information about disease outbreaks.

**MOTIVATION** | This project examines US and German medical discussion and popular reporting during the Russian influenza epidemic, from its outbreak in late 1889 through the successive waves that lasted through 1893. The Russian influenza is an especially appropriate case study for an approach that integrates the digital humanities and computational analysis. With the establishment of the global telegraph network, for the first time in world history, news about a disease could spread across long distances faster than the disease itself. Medical discoveries were transforming both scholarly and public opinion about disease origins, transmission, and prevention. Finally, the Russian influenza is an excellent case study because although it had a relatively low mortality rate, it spread quickly and infected high proportions of the population in each region it reached.

**CHALLENGES & HIGHLIGHTS** | In Russian Flu, the following main research questions have been identified:
1. How does the tone of reporting during a disease outbreak change in relation to variables such as proximity to reporting location, number of cases, categories of victims, and accumulating deaths? We will use up-do-date NLP methods in fact extraction and sentiment analysis and adapt them to historic medical and newspaper texts to compare factual reporting to sentiment.
2. How did newspapers and medical journals contribute to the narrative of the Russian flu, including the recognition of an outbreak, involvement of medical experts, attention to celebrity victims, the effort to shape public opinion, scope of opinions, and the response of authorities? We are going to build social networks for the scientific communities working on the Russian flu and explore the influence of these communities on popular reporting.
3. How accurate were predictions about the scope, impact, and significance of the Russian flu at distinct stages, by comparison to epidemiological data?

**POTENTIAL APPLICATIONS & FUTURE ISSUES** | This project is unique among digital humanities projects by bringing together two distinctive approaches: first, the integration of popular newspaper reporting and expert medical analysis, and second, developing analytical tools for source materials in two languages (English and German) to illustrate the nature of the transnational medical dialogue that also engaged with popular reporting. This allows applications in epidemiology as well as data analytics.
In the research area Future Internet, our scientists study the communication infrastructure that made the Web, and all the applications based on it possible in the first place. The Internet today is the fundamental communication platform for all kinds of distributed applications, from traditional telephony and streaming of YouTube videos and beyond to social networks like Facebook and Twitter. A flexible, efficient architecture is needed in order to support the rapidly changing requirements of a heterogeneous mixture of future applications, some of them as yet unknown, both within the network core and in wireless access networks – since this is a technical prerequisite for mobile applications of all kinds.
Motivation | Studies show that companies cannot react to attacks towards their infrastructure in proper time and are not aware of the potential of Big-Data technologies. The awareness that countries like the USA attack and spy on European infrastructures and organizations shows that research and development is needed for IT security to obtain access to Big Data technologies. Only with these technologies is it possible to get relevant information in real-time out of this vast amount of different and unstructured security-relevant data.

Challenges & Highlights | This project is divided into four sub-projects:

SSL Security (L3S) – The compromising of Certificate Authorities and “Man in the Middle” attacks show that the SSL ecosystem is vulnerable. This vulnerability is caused due to the fact that the security is provided through the local verification of a certificate issued by a trusted CA. Goal of this project is to create a Certificate Transparency monitor that examines all certificates held in Certificate Transparency logs. These logs contain a list of certificates that are issued and published by them and verify the validity of each certificate. The monitor has to collect all certificates and provide a usable interface for people that want to gather information about the certificates. Also it should detect malicious behavior.

Targeted attacks against web infrastructures (SAP) – More and more software in companies is realized as a web application. The challenge with these applications is to detect attacks that are happening on the client side like cross site scripting. It is necessary to create sensors to get information about possible malicious occurrences and to analyze this big rise of data. The challenge here is to create a suitable sensor system that reliably detects attacks with respect to sensible user data and the restricted client-environment.

DDoS (RUB+DE-CIX) – Distributed denial of service attacks are a well known type of attack that are getting more and more powerful because of the rise of attackers and botnets. Cooperating with DE-CIX in Frankfurt, we are able to get information about the network traffic that occur during a DDoS attack. Because this data can be very large, it is necessary to find suitable algorithms that identify those attacks.

Client threats (Fraunhofer) – As mentioned above more software is run on client machines through web applications. There are attack scenarios that attack these clients by forcing...
them to download malicious code that is executed on the machines locally to perform further attacks. Like in the web infrastructures section, there needs to be a method that gathers usage information on the client side and an algorithm that processes and analyses this data to recognize large-scale attacks on clients in real time.

**Potential Applications & Future Issues**

Based on the CT monitor there could be a subsequent project that tries to increase SSL Security of the client by checking certificates on the current site the user is browsing (project already started by Google).

The resulting algorithms of all projects could be extended to gain more value and get more precise results. For example could the DDoS algorithm be used to recognize more types of attacks.

**Information:**

- **Project Type:** BMBF
- **Project Duration:** Apr 2015 – Mar 2018
- **Project Research Area:** Web Information Management, Web Research Infrastructures
- **Keywords:** Big Data Security
- **Research Field:** IAI – Intelligent Access to Information
- **L3S Member:** Prof. Dr. Matthew Smith · smith@L3S.de
- **Project Manager:** Karoline Busse · busse@L3S.de, Christian Tiefenau · tiefenau@L3S.de
- **http://www.bdsec.de**

*The Certificate Transparency Observatory aims to collect and generates valuable complementary information.*
CONFINE – Crowd-Shared Wireless Mesh Networks for Wider Internet Access

Internet Access for Everyone

Home broadband connection sharing can enable wider access to Internet, especially for digitally deprived communities. In CONFINE, we aim at mitigating the fundamental problem of any crowd-shared network, i.e., the presence of a single point of access for each guest user. To this end, we extend the coverage of a crowd-shared network using a wireless mesh, managed by a third-party operator leveraging on software-defined networking. Our main goal is to exploit the path redundancy towards the Internet backhaul and efficiently utilize the spare bandwidth across home broadband connections.

**MOTIVATION** | The Internet today is facing the challenge of growing digital divide, i.e., an increasing disparity between populations with and without Internet access. Affordability is currently considered as the main barrier to Internet access in residential areas. In this respect, several initiatives, such as Public Access WiFi Service (PAWS), utilize the spare capacity in home broadband connections, allowing digitally deprived communities to access the Internet for free. Other initiatives, such as FON, incentivize their members to share their Internet connection by granting them free access to other members’ Internet connections. Controlled allocation of such resources (e.g., during off-peak periods) will not incur additional charges for Internet Service Providers, since they are charged for peak demands by transit providers.

**CHALLENGES & HIGHLIGHTS** | The underlying problem with any crowd-shared network (e.g., PAWS, FON) is that it serves as single point of access to users within the coverage of the wireless router and, hence, has no provision to extend the coverage or to provide any redundancy during unavailability of the routers (e.g., when sharers need all the bandwidth of their broadband connection or all the ports of their home router). A potential solution to this problem is a crowd-shared wireless mesh network (WMN) where home broadband users share their own broadband connection with the public, while home routers are also connected to each other as a wireless mesh, providing extended coverage via redundant paths to the Internet backhaul. In the CONFINE project, we investigate experimentally the feasibility and any potential benefits of such a crowd-shared WMN. Our main goal is to exploit the path redundancy towards the Internet backhaul and achieve better utilization of the shared bandwidth, while maintaining existing guest user connections irrespective of user sharing patterns. To this end, we developed and implemented a software-defined network (SDN) control plane for the redirection of guest user traffic to any of the available access points through the WMN. SDN brings significant benefits to crowd-shared networks, since all sharing policy and WMN utilization information can be conveyed to a centralized controller, facilitating the assignment of guest flows to access points.
points and the traffic redirection configurations in the WMN. Our experimental results from the SDN control plane deployment in one of the CONFINE community networks show that a crowd-shared WMN can achieve very high utilization of the shared bandwidth and accommodate a significantly larger volume of guest user traffic compared to a crowd-shared network with a single point of access, such as PAWS. Furthermore, the advance knowledge of user sharing policies reduces the number of guest flow redirections, avoiding packet reordering and control communication overhead.

**POTENTIAL APPLICATIONS & FUTURE ISSUES**

In response to the growing digital divide, we promote a community-wide participation, where home broadband subscribers are incentivized to donate controlled but free use of their broadband Internet connection to fellow citizens. Crowd-shared WMNs can be further used for the coordination of human reactions during emergency situations and natural disasters. Our architecture can also open up a market for applications that provide value-added services to end-users and virtual network operators, such as reward point management and social media based access.
Bioresorbable Magnesium Implants

Regenerative processes are complex and multicellular dynamic events, resulting from an orchestrated interaction at different levels, ranging from a subcellular range to physiology, up to organ scale. Being able to trace, document and visualize parts of the regeneration process is therefore essential for the study, development and control of these events. Based on novel state-of-the-art image acquisition devices, such as optical coherence tomography (OCT), and scanning laser optical projection tomography (OPT/SLOT), novel computer vision methods will be developed to segment and reconstruct relevant structures (e.g. cell locations, orientations, variations, ligament densities, vessel branches, etc.) from such 3D input data.
biomaterials and smart implants which are resorbed by the body upon remodelling of the tissue: What is possible for polymer materials should also be realized for biodegradable metallic materials. To avoid possible but unwanted systemic side effects, MetBioMat develops new aluminium free magnesium implant materials with tailored properties specific for a bone related application especially in children. The focus is laid on in vivo trials. Carefully selected materials and processing routes will be combined with comprehensive research to elucidate the correlation between microstructure and corrosion processes in vitro and in vivo. The ultimate goal will be a prototype implant design.

**INFORMATION:**

Project Type: DFG  
Project Duration: January 2015 – December 2017  
Project Research Area: Collective Intelligence  
Keywords: Medical Image processing, Computer Vision, Machine Learning  
Research Fields: NGI – Next Generation Internet  
L3S Member: Prof. Dr. Bodo Rosenhahn · rosenhahn@L3S.de  
Project Manager: Prof. Dr. Bodo Rosenhahn · rosenhahn@L3S.de  
http://www.rebirth-hannover.de  
http://metbiomat.hzg.de

**PUBLICATIONS:**

Bartsch, Ivonne; Willbold, Elmar; Rosenhahn, Bodo & Witte, Frank; Non-invasive pH determination adjacent to degradable biomaterials In Vivo Acta Biomaterialia; Elsevier; November 2013

Soltow, Erik & Rosenhahn, Bodo; Automatic Pose Estimation Using Contour Information from X-Ray Images; Image and Video Technology – PSIVT 2015 Workshops, Springer International Publishing; March 2016; edited by Fay Huang and Akihiro Sugimoto
SmokeBot – Mobile Robots with Novel Environmental Sensors for Inspection of Disaster Sites with Low Visibility

**Seeing through Smoke: Robots Supporting Fire Brigades in Search and Rescue Missions**

SmokeBot is driven by the application needs for robots that operate in domains with restricted visibility. The focus is on civil robots supporting fire brigades in search and rescue missions, e.g., in post-disaster management operations in response to tunnel fires. Existing sensor technology and the related cognitive approaches cannot cope with such demanding conditions. SmokeBot addresses this shortcoming and can thus bring about a step change for robotics. It will deliver software and hardware components that facilitate robot systems, to perform under harsh conditions of smoke, dust, or fog.

**Motivation** | Harsh conditions such as rain, snow and fog and situational occurrences, e.g., fire-related smoke and dust, significantly decrease quality and usability of traditional, light-based sensor modalities. Robots for emergency response and disaster management will satisfy an upcoming field with a high demand of risk reduction for first responder personnel as well as reduced mission costs. These applications require new perceptual and cognitive robotic capabilities. Limits of traditional sensors for tasks of dealing with only partial or erroneous information as well as mechanical, electronic, and thermal robustness restrict the use of current robotic platforms.

**Challenges & Highlights** | State-of-the-art robot perception is mostly unsuited in low visibility conditions that frequently occur during aforementioned scenarios. SmokeBot addresses this shortcoming and can bring a step change for robotics. A key element of the project is the development of a novel sensor unit and the corresponding cognitive approaches for low visibility conditions.

The project results will be demonstrated through integration with an industrial prototype Low Visibility Explorer Robot and will be evaluated in real-world experiments in the target environment.

SmokeBot has three main objectives: Hardware and software development of a novel sensor suite for low visibility conditions, a set of perception modules to enhance the cognitive abilities of mobile robots, especially for use in disaster response, and integration of the project results in a prototype for a commercial Low Visibility Explorer Robot.

**Potential Applications & Future Issues** | Especially in mountainous regions within Europe, tunnel accidents have happened and still occur frequently. Thus, there is a high demand for tunnel safety and substantial measures have been taken to increase safety standards after major accidents (see accidents in Tauern tunnel, Gotthard tunnel, and on Kaprun railroad). Conditions for first responders in tunnel systems during or after an emergency are very dangerous.
They are often condemned to wait as they are uncertain of the situation within the tunnel. Dense smoke and enormous heat hinders them from getting first-hand information and preparing for the right measures. SmokeBot tackles these challenges, but also has the potential to open up new opportunities by expanding the range of possible applications for robot systems, for example to dusty environments often found in agriculture applications.

A key element of the project is the development of a novel sensor unit and the corresponding cognitive approaches for low visibility conditions.
T-NOVA – Network Functions as-a-Service Over Virtualized Infrastructures

Network Function Virtualization at Your Fingertips

Network function virtualization (NFV) can significantly reduce the deployment cost of new network services. In this respect, T-NOVA addresses the challenges entailed by NFV orchestration, with the design and implementation of a platform for the elastic provisioning, management, and configuration of network functions (NF) over virtualized infrastructures. T-NOVA promotes Network Functions-as-a-Service (NFaaS), enabling enterprises to introduce new functionality in their network without the need to deploy expensive specialized hardware at their premises.

MOTIVATION | Network function virtualization (NFV) is an emerging concept that promotes the migration of NFs, traditionally implemented via specialized hardware appliances known as middleboxes, to virtualized infrastructures. The T-NOVA project leverages on commodity servers and cloud computing platforms to enable the rapid deployment, reconfiguration and elastic scaling of network services. With the aim of promoting the NFV concept, T-NOVA introduces a NFV orchestration platform that provides the ability to roll out new functionality in the network at lower cost, while it creates opportunities for infrastructure providers to generate more revenue via attractive NFaaS offerings.

CHALLENGES & HIGHLIGHTS | NFV orchestration entails significant challenges, such as the elastic provisioning of compute, storage and network resources in a coordinated manner, service chaining, the development of APIs for virtualized network function configuration, and the specification of network service abstractions exposed to clients. To this end, T-NOVA has developed and implemented an orchestration platform for the automated provisioning, configuration, monitoring, and optimization of Network Functions-as-a-Service (NFaaS) over virtualized network infrastructures. A prominent component of the T-NOVA orchestrator is a service chain embedder that first partitions service chains (i.e., sequence of NFs) across multiple datacenters (DCs) and subsequently maps each chain segment onto the assigned DC network. T-NOVA employs linear programming and heuristic algorithms to optimize network service embedding based on the utility functions of the various stakeholders.

For service chaining within DCs, T-NOVA couples software-defined networking (SDN) with source routing. Encoding the path into the packet header leads to a significant reduction in the forwarding state, enabling service chaining at massive scale.

In order to facilitate the involvement of diverse actors in the NFV scene, T-NOVA introduces a "Network Function Store", containing NFs by third-party developers, published as independent entities and accompanied with the necessary metadata. The Store allows clients to select the virtual appliances...
that best match their needs, plug them into their existing connectivity services and configure/adapt them according to their needs.

In order to foster competition and support different value chain configurations, a Brokerage Platform allows clients to transact with the T-NOVA Service Provider and multiple third-party function developers for selecting the best service bundle that suits their needs. Upon receiving the user’s requests, the brokerage platform jointly examines the available resources and NFs at the Function Store and comes up with specific economic/technical offerings and associated billing models.

POTENTIAL APPLICATIONS & FUTURE ISSUES

With NFaaS, virtual network appliances can be offered on-demand as a service, obviating the need to acquire, install and maintain specialized hardware at clients’ premises. This can lead to a significant reduction of the operational (OPEX) and technology investment costs (CAPEX) in enterprise networks. The advent of NFaaS can also open up a commodity market for high-performance network function software. In this respect, clients will be able to compose services out of virtual appliances selected from a NFV Marketplace, while negotiating SLAs and billing models with NFV service providers.

INFORMATION:

Project Type: EU FP7
Project Duration: Jan 2014 – Dec 2016
Project Research Area: Future Internet
Keywords: Network Function Virtualization, Software-Defined Networking
Research Field: NGI – Next Generation Internet
L3S Member: Prof. Dr. Panagiotis Papadimitriou · papadimitriou@L3S.de
Project Manager: David Dietrich · dietrich@L3S.de
http://www.t-nova.eu

PUBLICATIONS:


To Sleep or Not to Sleep?

An annoying characteristic of mobile phones, tablets etc. is that batteries are chronically empty, requiring frequent recharging. To save energy, mobiles can enter sleep states, where power-intensive parts such as the radio interface are deactivated. The decision when to sleep or not to sleep is, however, difficult to make, as waking up the radio requires energy and time for signaling to re-activate the connection with the network. This is a challenge particularly for future safety-critical applications, such as in cyber-physical systems and vehicular communications, that may not afford signaling delays.

**MOTIVATION** | Mobiles, such as smart phones and tablets, use a hierarchy of sleep states for energy saving. In cellular radio the feature is referred to as discontinuous reception as it disables the transceiver of the mobile station. The mobile wakes up periodically according to a defined sleep schedule to receive information in the downlink or in case an uplink transmission is requested by the user or an application. In any case the re-activation of the wireless connection requires the exchange of signalling messages, where a connection attempt implies up to thirty or more signalling messages. During this time, data will queue in buffers where it awaits transmission. These transient phases can cause noticeable delays that impact the quality of experience of users and are problematic for safety-critical applications.

**CHALLENGES & HIGHLIGHTS** | While there exist different well-established theories for the analysis of the queuing performance of buffered transmission systems in steady state, few works deal with the transient behavior, e.g., during connection establishment or reactivation. The reason is due to the complexity, e.g., in classical queuing theory the steady state solution is found from a set of linear equilibrium equations, whereas the transient behavior is characterized by a set of differential equations.

In our work, we extend the theory of the stochastic network calculus by a notion of time-variant systems that enables us to deal with transient phases. This way we are able to model non-stationary service characteristics, such as for systems with sleep scheduling, to reveal the impact of, e.g., the transient overshoot in buffers on performance relevant metrics, such as backlog and delay. Our models also lay the basis for the conceptual design of a new service measurement technique, which enables us to measure time-variant service in, e.g., cellular networks. Using this method we compared the transient overshoot plus the following relaxation time up to a stationary backlog and delay distribution in 2.5G, 3G and 4G networks. The evaluation of a massive measurement campaign signifies that the transmission capacity, that is used as a single measure for the definition of broadband, e.g., 25 Mb/s down, 3 Mb/s up – FCC 2015, is not sufficient to characterize the system as transient delays may matter more than capacity.
POTENTIAL APPLICATIONS & FUTURE ISSUES | The rapid growth of the number of networked devices and their increased data demands, induced by, e.g., machine-type communications, requires a better understanding of the fundamental data transport mechanisms. In particular, strong dependability requirements necessitate the evaluation of the existing architecture and the conceptual design of seminal models. Our work creates basic insights, e.g., to close the semantic gap between application and communication networks by an accurate and time-dependent system identification. Further, by answering the question when a user equipment has to sleep or not to sleep, the signaling process can be improved to avoid signaling storms and the following risk of collapsed networks. Especially in vehicular networks, where a reliable communication among cars is crucial to guarantee safe driving, our work is significant as it shows limits of current technologies and hints at possible improvements. Generally, our work helps to build better, adapted networks, e.g., in machine-to-machine-communications and cyber-physical systems, by adjusting signaling needs and ensuring quality of service requirements.

INFORMATION:
Project Type: ERC
Project Duration: Dec 2012 – Nov 2017
Project Research Area: Future Internet
Keywords: Network Information Theory
Research Fields: NGI – Next Generation Internet
L3S Member: Prof. Dr. Markus Fidler · fidler@L3S.de
Project Manager: Prof. Dr. Markus Fidler · fidler@L3S.de
https://www.l3s.de/projects/unique

PUBLICATIONS:
Becker, N. & Fidler, M.; A Non-stationary Service Curve Model for Performance Analysis of Transient Phases; arXiv:1506.04657; Proceedings of ITC-27; September 2015
USBV-Inspektor: Multimodal Sensor Suite for Backed Disarming of Improvised Explosive Devices and Additional Conservation of Evidence

**Where It’s too Dangerous for Humans**

At airports, train stations and in other public places, unattended items of baggage are part of everyday life. Even if most of them are harmless, they need to be treated as potential menace until the situation has been clarified. Therefore, unattended luggage can spark off a large-scale police operation. As part of the USBV-Inspektor project, we developed a new device for environmental perception. In order to prevent emergency forces getting close to a potentially explosive device to inspect it, the device can be mounted on a remote-controlled robot platform. This multimodal sensor suite can be used to support the local action forces and preserve evidence for criminal proceedings.

**MOTIVATION** | Suitcases, bags or backpacks left lying around unsupervised are part of daily life. Even though most abandoned luggage items turn out to be harmless, they can be the cause of a large-scale police operation. The objective of the USBV-Inspektor project is to develop a sensor suite that can be mounted on the end effector of a remotely operated robot to enable local forces to inspect suspicious objects without placing themselves in danger. The operator remotely controls the robot from a safe distance to get a 3D visualization of the environment. Furthermore, the data of the sensor suite can be used to preserve evidence for criminal proceedings and to facilitate threat assessment of suspicious items by providing additional 3D information of the crime scene and the content of the object.

**CHALLENGES & HIGHLIGHTS** | The sensor suite consists of a millimeter wave scanner, a 3D range scanner and a high-resolution camera system. All these devices are included in the case of the sensor suite and mounted on a remote controlled robot platform. Current techniques are limited to two-dimensional information of cameras and X-ray apparatuses. The new sensor suite captures the three-dimensional content of the improvised explosive devices and makes it possible to visualize the spatial relationship of identified parts. The three-dimensional environment is perceived with reference to the sensor suite to help the operator to navigate remotely. A time-of-flight based depth camera and a LiDAR, rotated by a servo motor, perceive the three dimensional environment. The described approach provides robustness as well as high resolution depth information. During runtime, features of the environment are extracted from the sensor data to localize the position of the sensor suite regarding the world model. Afterwards, based on the position of the sensor suite, new points are added to the feature map of the world. The final model is then used to create a three-dimensional mesh. This extended surface model gives a better overview of the situation, thus enhancing the local force’s operability. All data will be transmitted to a control station and visualized for disarming and legal evaluation. Besides processing each...
Even though most abandoned luggage items turn out to be harmless, they can be the cause of a large-scale police operation. Photo: Landeskriminalamt Nordrhein-Westfalen

sensor individually, all sensors have to be externally calibrated and synchronized to get a merged interpretation of the data.

**Potential Applications & Future Issues**
The presented approach can be used to support the local action force and preserve evidence for criminal proceedings. Based on the data generated by the sensor suite, rescue forces are enabled to assess the risk level faster compared to the data generated by conventional solutions. The solution results in a compact approach, enabling the examination of less accessible items. In contrast to existing approaches, the resulting 3D model includes the inside of the model and is not limited to the outside of the suspicious object.

**Information:**
- **Project Type:** BMBF
- **Project Duration:** Nov 2014 – Oct 2017
- **Project Research Area:** robotic, 3D perception, forensic
- **Keywords:** robotics, 3D perception, forensic
- **Research Field:** NGI – Next Generation Internet
- **L3S Member:** Prof. Dr. Bernardo Wagner · wagner@L3S.de
- **Project Manager:** Prof. Dr. Bernardo Wagner · wagner@L3S.de
- **http://www.L3S.de/project/USVB**
The Web search and Web information management research areas play a crucial role when it comes to access to the vast information available on the Web. Relevant areas in this regard include unstructured text and multimedia content alongside semi-structured content, linked data, and conventional structured data, aggregation and contextualization of information, as well as recognition analysis of temporal processes on the Web and in longterm archives.

Extraction of valuable semantic information is important in terms of access to audio and video content on the Web, and in terms of recognizing diversity of opinion and bias in the content provided via the Web. Personalization of content is, on the one hand, a necessary prerequisite for helpful information filtering, on the other hand, it also represents a possible restriction on the large amounts of information potentially available. And finally, the Web is not only interesting as a giant, if ephemeral, space filled with information, but must also be provided as an archive and a medium for information, communication, and social developments that can be accessed and analyzed by future users and researchers.
#science – Analyzing and Supporting Researchers with Twitter

## How Can Research and Researchers Benefit from Twitter?

Twitter is a communication platform, a social network, and a system for resource sharing. For researchers, it offers an opportunity to connect with other scholars, announce calls for papers and the like, communicate and discuss—basically: Stay up-to-date. However, the exponential growth of information in society does not exclude social media like Twitter: An abundant number of users court one’s attention. This leads to the question of how (young) researchers can focus on the essential users and tweets?

### MOTIVATION

The conventional scientific approach for filtering information is the peer review: Only information considered to be novel, sound, and significant by experts in the respective field is published. On Twitter, such a process is currently implemented at most manually: Researchers can subscribe individually to other researcher’s feeds by following them. However, there is no “directory” of researchers on Twitter and finding feeds of experts in a specific discipline or area of interest is cumbersome. Twitter’s “lists” are manually created and therefore neither universally accepted nor easily maintainable. Furthermore, the trend to consider visibility of scholarly articles on the social web as a possible (and immediate) alternative or complement to citation counts (with services like Altmetric that provide counts for the number of times a publication has been mentioned on Twitter and other social networks) necessitates the need for peerreview-like mechanisms for the social web.

### CHALLENGES & HIGHLIGHTS

The #science project will fill this gap by providing automatically curated discipline-specific directories of scholars using Twitter. This will be complemented by a recommendation service for content that is relevant for researchers. The envisioned system will simplify expert finding and the provision of topic-relevant feeds authored by peers. A unique characteristic of tweets is their 140-character limitation. This brevity and also the compilation of appropriate ground-truth data are two crucial challenges that will be tackled within the #science project. In particular, approaches to identify researchers and content that is relevant for them will be developed. The goal is to develop an academic information platform that extracts and presents relevant tweets and related content.

### POTENTIAL APPLICATIONS & FUTURE ISSUES

Within the #science project, methods for classifying users, identifying and extracting scholarly content, and ranking researchers and academic tweets on Twitter will be developed. In particular, a framework for discipline-specific researcher
classification on Twitter will be developed, which comprises the identification of Twitter users that are likely researchers and the classification of their areas of interest. This will enable comprehensive analyses of academic Twitter usage, for instance, to identify communities of interest, discover trending topics among researchers, or to compare offline and online collaboration in research. For the general public, the project will provide a web application that aims to help users gain insights about academic users and content on Twitter. An important goal of the project is to provide and publish reusable datasets.

Finally, within L3S the project plays a crucial role by working in synergy with other projects towards the realization of the L3S Web Observatory. The project is one of the contributions of L3S Research Center to the Leibniz Research Alliance “Science 2.0” and is a foundation for collaboration with partners from information science, scientometrics, and sociology of scientific knowledge.

**INFORMATION:**

Project Type: Internal
Project Duration: Jan 2014 – Jun 2015
Project Research Area: Science 2.0, Virtual Communities and Collaboration
Keywords: Twitter, science, recommendation
Research Field: IAI – Intelligent Access to Information
L3S Member: Prof. Dr. Robert Jäschke · jaeschke@L3S.de
Project Manager: Prof. Dr. Robert Jäschke · jaeschke@L3S.de
https://www.L3S.de/projects/science

**PUBLICATIONS:**

3D-reconstruction of rigid and dynamic objects is a necessary step in many “intelligent applications” such as autonomous vehicles, scene understanding, and applications of machine learning. E.g. the reconstruction of human motion from video data is a typical example for non-rigid 3D reconstruction, thus it has severe applications in medical applications, in surveillance, driver assistance or security. Factorization approaches have been used in this context yet but are limited by their susceptibility to incomplete data, and a tendency to converge to physically implausible solutions. This German Research Council (DFG) financed project aims at developing factorization approaches which better cope with both aforementioned problems.

Motivation | 3D-reconstruction is a necessary step in many “intelligent applications” such as autonomous vehicles or scene understanding. In the context of supervised or unsupervised learning, it can provide crucial information to discriminate the data. Factorization approaches have been used in this context. Their advantage is that they may be applied to rigid or non-rigid scenes. Up to this day, however, their application has been limited by their susceptibility to incomplete data, and a tendency to converge to physically implausible solutions. This project, financed by the German Research Council (DFG), aims at developing solution to both problems. The key idea is to extract and integrate prior information offered by many natural data sets.

Challenges & Highlights | Prior information need be reliably identified and extracted. To handle corrupted data, algorithms from robust fitting have to be adapted. Since matrix factorization is nonlinear and non-convex these constraints must be integrated such that the numerical procedures converge to better local optima. Rigid structure-from-motion (SfM) usually consists of two steps: First, a projective reconstruction is computed which is then upgraded to Euclidean structure and motion in a subsequent step. Reliable algorithms exist for both problems. In the case of non-rigid SfM, on the other hand, especially the Euclidean upgrading has turned out to be difficult. A few algorithms have been proposed for upgrading an affine reconstruction, and are able to obtain successful 3D-reconstructions. For upgrading a non-rigid projective reconstruction, however, either simple sequences are used, or no 3D-reconstructions are shown at all. We recently proposed an algorithm for estimating the self-calibration of a projectively reconstructed non-rigid scene. In contrast to other algorithms, neither prior knowledge of the non-rigid deformations is required, nor a subsequent step to align different motion bases. An evaluation with synthetic data reveals that the proposed algorithm is robust to noise and it is able to accurately estimate the 3D-reconstructions and the intrinsic calibration.
Although the proposed algorithms are developed for the particular application of 3D-reconstruction, some are general in the sense that the integrated prior information is provided by almost any "natural" data. In other words, the underlying mathematical models do not only describe image data but also data obtained from sources such as social media networks or internet search engines. For this we recently started to work on the extension of conventional clustering to hypergraph clustering, which involves higher order similarities instead of pairwise similarities. We focus on this aspect, since many grouping problems require affinity measures that must involve a subset of data of size more than two, i.e., hyperedges. Almost all previous works, however, have considered the smallest possible hyperedge size, due to a lack of study into the potential benefits of large hyperedges and effective algorithms to generate them. We will show that large hyperedges are better from both theoretical and empirical standpoints. As consequence, a novel guided sampling strategy for large hyperedges, based on the concept of random cluster models can be formulated.
Providing Insights into the History of the Web

The ALEXANDRIA project (ERC No. 339233) aims to develop models, tools and techniques necessary to explore and analyze Web archives in a meaningful way. ALEXANDRIA will significantly advance semantic and time-based indexing for Web archives using human-compiled knowledge available on the Web, to efficiently index, retrieve and explore information about entities and events from the past. The ALEXANDRIA Testbed will provide relevant collections and algorithms that enable further research on and practical application of research results to existing archives.

**Motivation** | Easy access to historical Web information becomes more and more important, as significant parts of our cultural heritage are produced and consumed online. Traditional institutions keeping our cultural heritage need to be complemented with facilities for preservation and public access of online cultural assets. The ALEXANDRIA project aims to develop models, tools and techniques necessary to archive and index relevant parts of the Web, and to retrieve and explore this information in a meaningful way. While the easy accessibility to the current Web is a good baseline, optimal access to Web archives requires new models and algorithms for retrieval, exploration, and analytics that go far beyond what is needed to access the current state of the Web. This includes taking into account the unique temporal dimension of Web archives, structured semantic information already available on the Web, as well as social media and network information.

**Challenges & Highlights** | Within ALEXANDRIA, we will significantly advance semantic and time-based indexing for Web archives using human-compiled knowledge available on the Web, to efficiently index, retrieve and explore information about entities and events from the past. Two examples of research results are briefly described next: Supporting search, which goes beyond navigational search via URLs, is a very challenging task in Web Archives with huge, redundant and noisy temporal content. Within ALEXANDRIA, we address the search needs of expert users such as journalists, economists or historians for discovering a topic in time. For a given query, the top returned results should give the best representative documents that cover most interesting time-periods for the topic. For this purpose, we developed a novel random walk-based model that integrates relevance, temporal authority, diversity and time in a unified framework. Our experimental results on the large-scale real-world web archival collection shows that our method significantly improves the state-of-the-art algorithms (i.e., Page-Rank) in ranking temporal web pages. Research results of ALEXANDRIA helps in improving Wikipedia. Entity pages on Wikipedia are a valuable source of information for direct consumption and for knowledge-base construction, update and maintenance. Facts in these entity pages are typically supported by (online) references. Many entity pages are incomplete even if relevant information is already
available in existing news articles. Even for the already present references, there is often a delay between the news article publication time and the reference time. We developed a novel news-article suggestion task to improve news coverage in Wikipedia, and reduce the lag of newsworthy references. Our work finds direct application, as a precursor, to Wikipedia page generation and knowledge-base acceleration tasks that rely on relevant and high quality input sources.

POTENTIAL APPLICATIONS & FUTURE ISSUES |
The ALEXANDRIA Testbed will provide an important context for research, exploration and evaluation of the concepts, methods and algorithms developed in this project, and will provide both relevant collections and algorithms that enable further research on and practical application of our research results to existing archives like the Internet Archive, the Internet Memory Foundation and Web archives maintained by European national libraries.

INFORMATION:
Project Type: EU FP7 ERC
Project Duration: Mar 2014 – Feb 2019
Project Research Area: Web Search
Keywords: Web Archives, Temporal Information Retrieval, Big Data
Research Fields: IAI – Intelligent Access to Information
L3S Member: Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
Project Manager: Dr. Thomas Risse · risse@L3S.de
http://alexandria-project.eu

PUBLICATIONS:
Fetahu, Besnik; Anand, Abhilaje & Anand, Avishek; How much is Wikipedia lagging behind News?. In: Proc. of 7th Web Science; 2015

Tempas, a tag-based temporal search engine for Web archives.
BRENDA, BRaunschweig ENzyme DAtabase: a Database for Metabolic Research, Enzyme Technology and Systems Biology

The Main Collection of Enzyme Functional Data and Information in the World Wide Web

The BRENDA enzyme database represents the largest information system of functional biochemical and molecular enzyme data with more than 3 million manually annotated data (from ~135,000 references) on enzyme function, occurrence, kinetics, and molecular properties. BRENDA provides access to seven interconnected databases, and each entry is linked to a reference, the source organism, and, if available, the protein sequence. More than 3,000 users visit the BRENDA website each day, mainly from North America, Asia, and Europe. BRENDA is freely available to the scientific community.

**Motivation** | The BRENDA database is the major information system for enzyme-related research. The aim of the project is the continuous integration of new enzymes with current information on their occurrence and function. The data for all enzymes are updated periodically. The sophisticated and flexible query system offers a variety of applications in life science. New tools for an intuitive data access and for combinatorical queries are continuously developed and adapted. New features improving the functionality and analysis tools were implemented.

**Challenges & Highlights** | BRENDA covers a wide range of aspects of all classified enzymes. The information includes functional data of the catalyzed reactions, enzyme names, ligands, kinetics, inhibition, stability and mutants. They are complemented by information on occurrence, enzyme/disease relationships from text mining, sequences and 3D structures from other databases, and predicted enzyme location and genome annotation. The manually derived core contains 3 million data from 77,000 enzymes of more than 30,000 organisms annotated from 135,000 literature references. Functional and structural data of more than 190,000 enzyme ligands are stored in BRENDA. Each value is connected to the enzyme source, the tissue (10,633 terms), the localization (369 terms), a literature reference and a protein sequence.

- **BRENDA Tutorials and YouTube videos.** The tutorials and training materials are updated and improved. Videos about enzyme, ligand and sequence searches, protein structure search, the Genome Explorer, the EC Explorer, the BRENDA Tissue Ontology and the TaxTree were created and published in the BRENDA YouTube channel.

- **Word Maps and BRENDA Pathways.** New functions, optimized and more user-friendly applications visualizing the relevance of enzymes. The word maps have been equipped with a mouse over containing links to BRENDA enzymes, ligands, diseases, and organism information.
• **New ontologies.** Integration of MeSH, SCOPe, and CATH ontologies, linked to BRENDA enzyme data.

• **Substructure Search and 3D protein structure.** In order to increase the performance and security all query methods based on Java applications will be successively removed. In a first instance this has been accomplished for the interactive 3D view of proteins showing the active sites, the bound cofactors and/or metal ions. In addition, this has been achieved with molecules for performing a Substructure Search if BRENDA ligands.

**POTENTIAL APPLICATIONS & FUTURE ISSUES |**

BRENDA is the major source for enzyme-related biochemical research in life sciences. The database is an essential repository for biochemistry, molecular biology, systems biology, medical research, and biotechnology. Intensive interactions and discussions with network users secure that BRENDA at all times is responsive to their demands. Due to its continuous development BRENDA is remaining one of the world’s most important biochemical information systems.

**INFORMATION:**

Project Type: BMBF

Project Duration: Jan 2013 – Dec 2015

Project Research Area: Web Research Infrastructures

Keywords: Enzyme, Database, Metabolomics

Research Field: ESC – E-Science

L3S Member: Prof. Dr. Dietmar Schomburg · schomburg@L3S.de

Project Manager: Prof. Dr. Dietmar Schomburg · schomburg@L3S.de

http://www.brenda-enzymes.org

**PUBLICATIONS:**

DURAARK – Durable Architectural Knowledge

Beyond Mere Architecture: Preservation of Building Data and Knowledge

Preservation of semantically rich architectural and building data is crucial to provide the ability to retrofit legacy buildings, to preserve cultural heritage, or to enable knowledge-reuse of design and engineering solutions. In this context, the Web of data has emerged as an important knowledge resource, providing data about the infrastructural, social or historical context of buildings and geographic areas.

MOTIVATION | Digital processes in the building industry, architecture and urban planning create data that are dynamic and range from low-level architectural models to building-related vocabularies and taxonomies, legal and environmental policies or statistical and historical data about a buildings context and infrastructure. The Web and in particular the Web of data holds a wealth of relevant information about the context, environment, history, usage or surrounding infrastructure of structures and buildings. In order to take into account the needs of a wide variety of stakeholders, such as libraries and archives, urban planners, architects and the building industry, novel methods are required for linking, enrichment and preservation of all sorts of related data, specifically Web data.

CHALLENGES & HIGHLIGHTS | DURAARK aims at the developing methods for semantic enrichment and preservation of architectural data, in particular, by exploiting data available on the Web, for instance, through publicly available open data or the social Web. Thus, stakeholders include archival institutions and libraries as well as researchers and practitioners in the architecture or urban planning areas. Key challenges include (a) geometric enrichment of low-level models, (b) semantic enrichment into rich contextual datasets and (b) long-term preservation of the complete spectrum of architectural data. By exploiting the wealth of data and knowledge on the Web, in particular Linked Data, DURAARK provides consistent and reliable contextual information about architectural structures to ensure future-proof reusability of archived data. As a so far unprecedented effort, DURAARK covers and exploits the complete spectrum of representations used for architectural knowledge, ranging from low-level 3D point clouds up to semantically rich data extracted from the Web, describing the historic, social, legal and environmental context of existing structures. Among the major outcomes are, for instance, a wide range of datasets (http://data.duraark.eu) spanning the whole range of building-related information, specifically including a semantic knowledge base providing contextual knowledge about buildings and their environment. Methods
for crawling and retrieval of contextual Web data, specifically RDF data, are developed and integrated into a general application framework (the DURAARK workbench, http://workbench.duraark.eu), which supports the full life-cycle for curating and preserving semantically rich architectural data.

**POTENTIAL APPLICATIONS & FUTURE ISSUES**

DURAARK has the potential to enable a paradigm shift in the preservation and maintenance of architectural data and information, not only in the architectural field but also in urban planning or cultural heritage-related scenarios. That could, for instance, enable the temporal analysis of the evolution of buildings, infrastructure and their legal, environmental and social context over time. On the other hand, several of the enrichment, crawling and preservation techniques developed in DURAARK provide general-purpose methods for retrieving and preserving data, specifically data from the Web, and will be of use to other scenarios and settings in archival contexts.

**INFORMATION:**

- **Project Type:** EU FP7
- **Project Duration:** Feb 2012 – Jan 2015
- **Project Research Area:** Web Information Management
- **Keywords:** Preservation, 3D Model, Architecture, Semantic Web, Multimodal fusion, Model Integration
- **Research Field:** IAI – Intelligent Access to Information
  - L3S Member: Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
  - Project Manager: Dr. Stefan Dietze · dietze@L3S.de
  - http://duraark.eu

**PUBLICATIONS:**

- Fetahu, Besnik; Gadiraju, Ujwal & Dietze, Stefan; Improving Entity Retrieval on Structured Data. In: Proceedings of the 12th International Semantic Web Conference; ISWC’15; Bethlehem, Pennsylvania, USA; 2015
- Gadiraju, Ujwal; Dietze, Stefan & Diaz Aviles, Ernesto; Ranking Buildings and Mining the Web for Popular Architectural Patterns. In: Proceedings of the 7th Web Science Conference (Web Science 2015); Oxford, United Kingdom; 2015
- Yu, Ran; Gadiraju, Ujwal Kumar; Fetahu, Besnik; Dietze, Stefan; Adaptive Focused Crawling of Linked Data. In: Proceedings of the 2015 Conference on Web Information Systems Engineering (WISE); 2015
EUMSSI – Event Understanding through Multimodal Social Stream Interpretation

Is What Is Written also What Is Said or What Is Shown?

In the EUMSSI project, cross-modal analysis techniques are developed for analysing news articles, videos and audio reports. This will allow journalists and media consumers to relate all media activity with one another and to understand the underlying events. Journalists will benefit from the results with a contextualizing tool that increases their productivity. News consumers will be able to further explore background information on news broadcasts and to engage in interactive, informative games.

MOTIVATION | One task of a multimedia journalist is to monitor, gather, curate and contextualise the relevant information for the target audience. He needs to go through an enormous amount of records with information of very diverse degrees of granularity. In order to put information into context and tell his story from all significant angles, and, at the same time, he needs to reduce the noise of irrelevant content. This is extremely time-consuming, especially when a topic or event is interconnected with multiple entities from different domains.

The main objective of EUMSSI is to develop technologies for identifying and aggregating data presented as unstructured information in sources of very different nature (video, image, audio, speech, text and social context), including both online (e.g., YouTube) and traditional media (e.g. audiovisual repositories), and for dealing with information of very different degrees of granularity.

A core idea is that the process of integrating content from different media sources is carried out in an interactive manner, so that the data resulting from one media helps reinforce the aggregation of information from other media, in a cross-modal interoperable semantic representation framework. This will be accomplished thanks to the integration in a multimodal platform of state-of-the-art information extraction and analysis techniques from the different fields involved.

CHALLENGES & HIGHLIGHTS | Making use of the entities and other information provided by the components for text analysis, audio transcription, speaker recognition, video analysis and semantic enrichment, an elaborate contextualizing tool has been developed for journalists and news consumers. The tool allows for exploring events and the persons and places that are related to these events, making use of interactive maps, timelines and word graphs.

Both journalists and news consumers may benefit from these visualizations, although for different reasons: For journalists, the visualizations serve as a basis for finding background information, for collaboration and for generating illustrations for the general public.

For news consumers, the visualisations aim to further engage them and to allow them to investigate background information and related aspects. Our second screen application dis-
plays the extracted information in a constant flow of information related to the broadcast that users are currently watching. As a basis, we take the entities (persons, places, organizations) that appear or are mentioned in a video at a specific moment or in a specific scene. The EUMSSI video, audio and text processing provides this information and the entity enrichment process provides links to structured resources such as DBpedia.

**Potential Applications & Future Issues**

Given a specific entity – such as a person, for example Angela Merkel – the second screen application provides either a description of this person (an abstract), useful background information or trivia (“Angela Merkel was born in Hamburg, West-Germany”) or a quiz question that the user can choose to answer (e.g. “What university did Angela Merkel attend?”). A counter keeps track of how many questions have been asked and how many questions have been answered correctly.

**Information:**

- **Project Type:** EU FP7
- **Project Duration:** Dec 2013 – Nov 2016
- **Project Research Area:** Web Information Management
- **Keywords:** Cross-media streams, multimodal search, media industry
- **Research Field:** IAI – Intelligent Access to Information
- **L3S Member:** Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
- **Project Manager:** Dr. Eelco Herder · herder@L3S.de
- **http://www.eumssi.eu**

**Publications:**

- Tran, Giang; Alrifai, Mohammad & Herder, Eelco; Timeline Summarization from Relevant Headlines. In: Proc. ECIR 2015
**Motivation** | The growing amount of content that is created today increasingly raises the issue of adequate survival control for the long run: What remains relevant and, thus, suggests preservation investment? How to ensure that what has been identified as important remains usable over decades – and also understandable? Some of these issues are addressed by preservation technology. However, the gap between mere backup and intelligent preservation remains large, requiring e.g. manual selection of what to preserve. Therefore, the European project ForgetIT, which is coordinated by L3S, develops concepts and technologies, which help in selecting what to keep and in keeping, what is preserved, understandable. In addition, immediate benefits are sought for fostering the adoption of preservation technology.

**Challenges & Highlights** | In ForgetIT three main concepts have been identified for realizing the targeted intelligent, early-benefit preservation solutions:

- The core ingredient, Managed Forgetting, aims to map the benefits of human forgetting, i.e. staying focused on important things, into the digital world. It is be based on dynamic multidimensional information value assessment in combination with flexible forgetting options such as aggregation, elimination of redundancies and, finally, also deletion. Challenges here include adequate information assessment, forgetting strategies, redundancy detection and methods for information aggregation.

- For Contextualized Remembering methods have to be developed, which are able to bring content back even after decades, in a way that it is still understandable. This raises challenges such as the adequate contextualization of content at archival time and the reflection of context evolution.

- Synergetic Preservation aims at a seamless, bi-directional transition between the active system and the preservation system. Here, especially an extended information management model has to be defined, which embraces preservation. In this third year, the focus was on developing advanced methods for the managed forgetting, synergetic preservation and the contextualized remembering processes and in disseminating and preparing the exploitation of project results. Especially, L3S team focussed on the following activities:
  - development of methods for automated selection of impor-
tant content for preservation focusing on personal photo collection; an effective expectation-oriented method has been successfully presented at CeBIT 2016;

- development of managed forgetting methods for textual content including entity centric summarization and preservation value computation.
- development of methods for time-aware re-contextualization, which help users to understand content from the past, and for intelligent search, including forgetful search, which helps to cope with topical evolution, and situation search, which gives structure to archive access.

Furthermore, the final version of the Preserve-Or-Forget (PoF) Framework, which is a major outcome of the project, has been implemented.

**Potential Applications & Future Issues**

In the project, two application domains are considered for the ForgetIT technology: personal preservation, i.e. preservation of personal content and organizational preservation, especially in the context of a content management system.

In the next phase, the ForgetIT project will analyse how to exploit the results that have been developed in the ForgetIT project and further investigate the idea of managed forgetting in other context.

**Publications:**

- Tran, N. K.; Ceroni, A.; Kanhabua, N. & Niederée, C.; Back to the Past: Supporting Interpretations of Forgotten Stories by Time-aware Re-Contextualization. In: Proc. of 8th International Conference on Web Search and Data Mining (WSDM); 2015
GlycoRec – Interactive Life-logging for Improving Life with Diabetes

What’s on My Plate?

Diabetes is a widely spread, major epidemic. Proper treatment minimizes the risk of secondary diseases, but particularly elderly patients and those who have just been diagnosed experience difficulties in doing so. The GlycoRec system aims to support patients in making decisions that are related to the treatment by modeling their behavior and their physiology. This empowers patients to better communicate their needs with their doctors and advisors, and to better implement advices and stated goals in their everyday lives.

MOTIVATION | Diabetes mellitus is a widely spread chronic disease that affects about 8.3% of the world adult population. Even though there is no known cure for diabetes, it can be managed through a combination of diet, exercise and medication. This implies that patients have to take several important decisions on a daily basis, such as: Can I eat this, what is my blood sugar level, how much insulin should I take right now? To avoid secondary conditions, such as cardiovascular diseases, it is of high importance that patients are able to manage their diabetes treatment on their own, aiming at near normal glucose levels. GlycoRec will provide patients with information and advice regarding their nutrition, physical activities, and the use of medicine. This empowers patients to better communicate their needs with their doctors and advisors, and to better implement advices and stated goals in their everyday lives.

CHALLENGES & HIGHLIGHTS | One of the challenges in managing diabetes is the necessity for patients to learn how their body reacts to food intake, activity and insulin application. Mobile apps currently available for calculating insulin dose without reference to individual needs show systemic issues, such as missing validity checks of input data affecting the safety of patients. Physical reactions to insulin, food intake and activity in diabetes are idiosyncratic. While the general patterns are known, individual patients seem to respond differently in similar situations, depending on factors such as age, weight, general health, medication, comorbidities, to name but a few. Individual response patterns need to be observed and learned. Despite the availability of online nutritional information, these databases only provide information on single ingredients and/or standardized products such as ready-made meals. Our goal is to provide diabetes patients with recommendations and feedback in everyday situations, including:
• How many carbohydrates can I expect the Thai curry on the menu to contain?
• Which recipe variation best matches both my dietary restrictions and my taste?
First analysis results confirm that anticipated differences between user groups are reflected in the data. Significant involvement of patients in the development process and the application of further user centered design methods is planned for the next phase. A user evaluation, including validation against physiological parameters of treatment quality, will demonstrate the effects of the system.

**How many carbohydrates can I expect the Thai curry on the menu to contain?**
Gute Arbeit — Exploring and Contextualizing Qualitative Data for Secondary Analysis

Let’s Explore It Together!

Scientists in qualitative social sciences are accumulating valuable information about behavior, attitudes, and beliefs — “realities” that cannot be captured later. However, sharing and re-use of such documents, e.g., for longitudinal analysis, is not a common practice so far. “Gute Arbeit” enables intelligent access to such qualitative data gathered in the context of the topics work and employment. For this purpose, we are developing, adapting, and advancing computational approaches from Information Retrieval and Data Mining, thus promoting the area of digital humanities.

**MOTIVATION** | Intelligent access to the assets of qualitative data collected in the social sciences in different kinds of studies over long time periods requires structuring and enrichment of those materials to help researchers to understand the situational context back then. In “Gute Arbeit”, we address important challenges in dealing with qualitative data and develop research solutions leveraging state-of-the-art IT methods from the fields of Information Retrieval and Data Mining — adapting and integrating them for usage as research tools in digital humanities.

**CHALLENGES & HIGHLIGHTS** | Within “Gute Arbeit” we have focused on several challenges for enabling secondary analysis for qualitative studies. The first challenge is to support the researcher in finding the right studies for his work. For this purpose we have developed methods for faceted search, topic modelling, and semantic annotation.

The second challenge in our project is to ensure adequate interpretation of interviewees’ statements within (older) qualitative interviews, which is crucial for understanding the socio-cultural macro-context. In order to tackle this problem, we propose a time-aware contextualization approach that retrieves context from sources such as Wikipedia or newspapers articles. More specifically, we propose different query formulation methods and ranking methods taking into account topical and temporal relevance as well as complementarity with respect to the original text for collecting contextualization candidates. Experiments with different datasets (newspaper articles and microblog posts) showed the effectiveness of our proposed approach with promising results.

The third challenge is to ensure the agreed upon anonymity of the interviewees. We are developing and adopting modern entity extraction and sentiment analysis techniques that could help to judge the sensitivity of particular textual content and help the social scientists as data provider to protect sensitive information from unauthorized eyes, thus reducing manual processing needs. In addition, mining opinions enables enhanced data access, e.g. by indicating text passages with negative attitudes about a topic.

Finally, we address the problem of semi-automatic annotation for the qualitative digital archives. Human input is very valuable and accurate but expensive. In addition, at archiving
time we do not know what people will exactly search for or what kind of metadata will be needed. Automatic annotation, on the other hand, is cheap although noisy. For this, we proposed a hybrid approach combining both manual and automatic metadata. Those annotations might be later used as facets in the advanced exploration system. The solutions developed in the project were integrated into a prototype system, the Workive, which supports the researcher in secondary analysis.

**POTENTIAL APPLICATIONS & FUTURE ISSUES**

Re-using qualitative data for secondary analysis within archives requires intelligent solutions for material accessibility, findability, and interpretability. In the scope of “Gute Arbeit”, we are closely collaborating with scientists from digital humanities disciplines focused on concrete secondary analysis tasks, evaluating our technological development and inspiring us for new research ideas. These insights help to understand the way social scientists are exploring data archives and shed light on possible applications in Web Observatories — a research area which still remains largely undiscovered.

**INFORMATION:**

Project Type: BMBF
Project Duration: Oct 2012 – Sep 2015
Project Research Area: Web Information Management
Keywords: Archive Exploration, Analysis
Research Field: IAI – Intelligence Access to Information
L3S Member: Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
Project Manager: Dr. Claudia Niederée · niederee@L3S.de
http://www.L3S.de/projects/gute-arbeit

**PUBLICATIONS:**


**Exascale Computing:**
Wind Flow Simulation from City Scale to World Scale

Exascale computing will make a considerable impact on several areas of engineering and applied sciences. In the 2020 horizon, it is likely that exascale machines will be available. The overall aim of the NUMEXAS project is to develop, implement and validate the next generation of numerical methods to be run by exascale supercomputers. This cannot be done by just scaling currently available codes, but by implementing new algorithms for advanced numerical methods to really exploit the intrinsic capabilities of the future exascale computing infrastructures.

MOTIVATION | It has become inconceivable to carry out experiments or develop a new theory in applied sciences and engineering without the heavy support of numerical simulations during all stages of research and development. Any industrial product, from cars, trucks, trains, ships, airplanes, large buildings, bridges, skyscrapers, medical devices, to consumer products of value, will go through considerable computer simulation-based design and optimization during its development. It is also true that computational engineering is an everyday practice not only in the design, optimization and verification of finished products, but also for the optimization of manufacturing processes in practically all industrial sectors. Furthermore, high-end computing of this kind is increasingly being used to provide data bases for fast simulations of engineering models. The challenges in this new area, also known as real-time computing, for example in large eddy simulation for turbulence modeling in aeronautics, the study of the effect of natural hazards on constructions fusion research, or stochastic optimal design, are beyond current computing capabilities. Large-scale (exasflop) computing is the answer to this overall increasing demand for computing power. Exascale’s grand scientific challenges cover a wide extend of topics, ranging from computer architecture to mathematical models and algorithms, including system software, programming models and environments. The answer to this question is new numerical methods and computer codes for validated models ready to fill the technological gap required to solve grand-challenge applied science and engineering problems in the future exascale machines. Contributing to fill this gap is the main objective of NUMEXAS.

CHALLENGES & HIGHLIGHTS | In NUMEXAS we are developing next generation of numerical simulation techniques that are scalable to millions of cores so that exascale class problems can be solved routinely. The goal is the development and implementation of new numerical simulation techniques amenable to scalability to millions of cores along the complete simulation pipeline for a variety of large-scale multidisciplinary problems in applied sciences and engineering: Parallel pre-processing and grid generation, parallel structured/unstructured field solvers of high order, parallel optimum design solvers considering uncertainties and parallel...
in-solver visualization and feature extraction. All of the numerical techniques are being implemented for hybrid OpenMP and GPU-based local processing and scalable, distributed, MPI-based off-node computing architectures. The outcome of NUMEXAS will be a new set of algorithms and codes that will allow industry, government and academia to solve exascale-class problems with the efficiency and ease of use as today’s state-of-the-art codes. In order to achieve the above mentioned goals, improvements are required along the whole simulation pipeline, including parallel pre-processing of analysis data and mesh generation, parallel, scalable, parallel field solvers in fluid, solid mechanics and coupled problems, optimum design parallel solvers considering uncertainties and parallel post-processing of numerical results.

**Potential Applications & Future Issues**
The NUMEXAS methods and codes will be the main project outcomes that will be disseminated and exploited by the project partners. Emphasis will be put in the dissemination and exploitation of the NUMEXAS outputs among SMEs in Europe.
Motivation | The failure to detect recent global financial crisis early enough has shown that existing analytic models and technologies are not yet capable to accurately detect such crisis or estimate its impact on the global market. The emerging field of systemic risk analysis aims at filling this gap by detecting and managing the exposure to risk of financial market players such as banks, companies or traders and analyzing their complex co-dependency network. However, conducting such a complex analysis in real-time remains a challenge due to the lack of enabling technologies that support the real-time and simultaneous processing of large number of data streams at high level of velocity (i.e. high arrival rate of new data).

Challenges & Highlights | The QualiMaster project aims at developing an infrastructure for enabling real-time analysis of high volume and high velocity data streams in support of financial systemic risk analysis. This is realized by building on top of the state-of-the-art Big Data technologies such as Apache Hadoop and Apache Storm. One of the challenges that QualiMaster has to deal with is the dynamicity and volatility in the financial markets, which can lead to significant variance in the data load and quality. QualiMaster handles this by its quality-aware configuration and adaptation model, which enables autonomous quality-driven adaptation of its data processing elements at run-time. One of the distinguishing features of QualiMaster is the integration of re-configurable hardware, such as FPGAs, in its computing model. By translating some of the heavy computations to FPGAs, QualiMaster can accelerate the real-time processing and analysis of data streams and reach high levels of scalability.

In addition to the financial data streams, QualiMaster provides scalable and quality-aware algorithms for processing and analyzing web and social media streams. The goal is to use these media as societal sensors for providing additional signals that can complement the financial systemic risk analysis. The highlights of the second year of the project was the setup of the configurable and adaptive QualiMaster infrastructure and the creation of an extended set of effective processing pipelines for financial risk analysis. The L3S team has focused on methods for sentiment analysis and social network analysis as well as for event detection and event prediction, which are
tailored to the needs of financial risk analysis and can for example help in dynamically focusing the financial data analysis to critical market players and in providing further context information for the correlation information for market players computed in other parts of the project. Furthermore, the L3S team is also involved in work for supporting the adaptivity of the QualiMaster infrastructure.

**POTENTIAL APPLICATIONS & FUTURE ISSUES |**
The main application of the QualiMaster project is the risk analysis in financial markets. The models, algorithms, tools and the QualiMaster infrastructure developed in the project will be validated and tested using data from the financial domain as well as relevant web and social web content. However, it is also expected that a significant part of the results will be applicable for real-time analysis of data streams in other domains.

---

**INFORMATION:**
- Project Type: EU FP7
- Project Duration: Jan 2014 – Dec 2016
- Project Research Area: Web Information Management
- Keywords: Big Data, Social Networks, Stream Processing
- Research Field: IAI – Intelligent Access to Information
- L3S Member: Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
- Project Manager: Dr. Claudia Niederée · niederee@L3S.de
- http://www.qualimaster.eu

**PUBLICATIONS:**
The center’s research in the field of collective intelligence focuses on the Web’s many users. In the context of social computing and collaborative production processes, large numbers of contributors and contributions make it possible to develop impressive applications such as Wikipedia and OpenStreetMap, which can supplant products and services offered by businesses and traditional publishers. Feedback from Web users regarding what is offered and Web user interactions (living analytics) enable new algorithms for identifying trends and analyzing users and opinions, as well as furnishing the basis for personalization of offers and content. Human interaction is also the main subject of inquiry in the field of Virtual communities and collaboration, which serves as the platform for our work, grouped together according to psychological and linguistic aspects, on cooperation and communication within groups. Researchers in this field also work within interdisciplinary projects to study potential uses of the Web for innovative forms of teaching and learning.
**MOTIVATION |** The e-Infrastructure Reflection Group (e-IRG) is recognized by the EC as a leading advisory body in the field of eScience and e-Infrastructures. In its e-IRG Roadmap 2012 the idea of an e-Infrastructure Commons is introduced. The e-Infrastructure Commons is the technological and administrative framework for an easy and cost-effective shared use of distributed electronic resources across Europe. The main feature is the provisioning of a well-defined, interoperable and sustained set of services, provisioned by several European e-Infrastructure providers to fulfill specific needs of European research communities, projects and research infrastructures.

The e-Infrastructure Reflection Group Support Programme 4 (e-IRGSP4) is an FP7 funded project, which provides a comprehensive support framework for the work of the e-Infrastructure Reflection Group. The key activities of e-IRGSP4 are to provide operational and policy support to e-IRG as well as dissemination. e-IRGSP4 is aiming to strengthen the relations between e-IRG and ESRI. L3S research center is the coordinator of the project and is leading the work package related to the liaison activities.

**CHALLENGES & HIGHLIGHTS |** e-IRG is currently producing high-level policy documents to encourage a practical implementation of the e-Infrastructure Commons. These recommendations target the different research infrastructures but also the European Commission to give advice for the upcoming developments and funding programs.

The main focus of e-IRG was on the implementation of e-Infrastructure as commons and thus the strengthening of its collaboration with ESFRI. E-IRG’s vision of an e-Infrastructure Commons is the foundation for the large-scale research infrastructures as the projects of the ESFRI Roadmap of 2014. Data Management is recognized as a very crucial problem due to the enormous growth of data and the lack of common infrastructures for long term data archiving and the curation of data is the most important challenge that has to be solved in the near-term leading to the corresponding publication of e-IRG.

Besides the policy documents, e-IRG produces task force reports on contemporary issues and takes a position on current high-level expert group reports like the GÉANT expert...
group or communications of the European commission. Furthermore e-IRG was involved in shaping the Horizon 2020 program. The project received its first and very positive review in Dec. 2015.

**POTENTIAL APPLICATIONS & FUTURE ISSUES |**
The paradigm shift in science towards data driven research sees e-Infrastructures as horizontal layer in all research infrastructures. e-IRG’s recommendations focus on the coordination and collaboration among e-Infrastructures and their integration in these future research infrastructures to enable a sustainable and efficient use of resources.

**INFORMATION:**
- **Project Type:** EU FP7
- **Project Duration:** Jun 2014 – Nov 2016
- **Project Research Area:** Web Research Infrastructures
- **Keyword:** Policy Recommendation, Support Action
- **Research Field:** ESC – E-Science
- **L3S Member:** Prof. Dr. Gabriele von Voigt · vonvoigt@L3S.de
- **Project Manager:** Jan Wiebelitz · Wiebelitz@L3S.de
- **http://e-irgsp4.e-irg.eu**

**PUBLICATIONS:**

The e-IRG mission is to pave the way towards a general-purpose European e-Infrastructure.
**MOTIVATION |** In unexpected events and crisis situations, social networks such as Twitter are increasingly used for informal communication when official information is perceived as not being sufficient or timely enough, or to exchange useful hints, observations, and experiences. Due to the popularity, visibility, and speed in information dissemination, appropriate handling of social media plays an important role in dealing with crisis situations. This situation calls for new overarching communication concepts that take requirements of aid organizations into account, and benefit from the potential of new social media, while avoiding information overload.

**CHALLENGES & HIGHLIGHTS |** The growing use of social media often produces an information overload for humanitarian aid organizations and other actors in crisis situations. Thus, new mechanisms and routines have to be developed to deal adequately with the huge amount of information. Organizations have to learn how to collect and select information in Social Media and how to decide what kind of information is useful in decision making processes. Based on sociological and information technological research, K3 aims at developing innovative concepts for information and communication management for crisis situations. Therefore, chosen experts of organizations will be videotaped while developing company-based solutions or approaches. Based on these videos, these solutions will be evaluated and prototypically implemented. During summer 2015, K3-researchers undertook sociological participatory observations at a multitude of large-scale events like music, and city festivals, and sport events. They aim at understanding how information and communication management, as well as decision making during voluntary medical services of large German humanitarian aid organizations, actually work. In addition to this, the social media data related to the above events has been collected and analysed with the goal of identifying crisis relevant information. In a crisis situation the information has to be processed very fast. Here the K3-researchers have been working on a data processing pipeline which grab relevant information for the aid organization during a large event. The challenges here include the collecting, filtering, analysing and visualizing of the crisis relevant data from the social web.

**Is More Information Always Better?**

Dealing with emergencies such as accidents, natural disasters or terrorist attacks requires communication between different participating actors. Emergency communication today has to also consider the use of Social Media; it has a high impact on citizens’ behavior, as well as on the interaction and perception of aid organizations. K3 aims at developing communication concepts that consider social media in emergency situations by smoothly combining organizational and technological aspects that meet the requirements of all participating stakeholders.
**COMMUNITY**

**POSSIBLE APPLICATIONS & FUTURE ISSUES |**
K3 will develop concepts for communication in crisis situations targeting the needs of aid organizations and other stakeholders in crisis situations such as BOS actors.

Close observation of practices in the field is core for a successful communication concept.

**INFORMATION:**

- **Project Type:** BMBF
- **Project Duration:** Jan 2014 – Jan 2017
- **Project Research Area:** Sociology of Organizations, Sociology of Knowledge, Sociology of Science and Technology
- **Keywords:** Crisis situation, aid, social media, data analysis
- **Research Fields:** IAI – Intelligent Access to Information
- **L3S Members:**
  - Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de,
  - Prof. Dr. Kurt Schneider · schneider@L3S.de,
  - Prof. Dr. Gabriele Wagner · g.wagner@L3S.de
- **Project Manager:** Dr. Claudia Niederée · niederee@L3S.de

http://www.k3-projekt.de

**PUBLICATIONS:**

In modern learning scenarios where interactive and dialogic skills are increasingly important, teachers need to enact and experience online communication themselves, starting from teacher education and continuing throughout their professional life. Teaching and learning a foreign language add an additional level of complexity due to, on the one hand, the developing quality of language competence in learners and, on the other hand, the language and teaching competence of teachers and teacher trainers. To address these issues and promote collaborative learning and teaching practices the Young English Language Learners/Teen English Language Learners (YELL/TELL) online environment was designed, based on the collaborative platform LearnWeb-OER (http://learnweb.l3s.uni-hannover.de), to offer a virtual space for different groups of teachers from a variety of schools and with different backgrounds.

The goal of the project is to improve the experience of teachers’ development by optimizing an existing digital environment on the basis of actual user requirements and feedback. Teachers become part of a professional e-community and contribute in optimizing the online environment for their own professional development.

At school, as well as in everyday life, communication is increasingly based on digital means (e.g. social media, digital learning resources). If teachers want to promote interactive and dialogic skills in their students, they need to enact and experience this kind of communication themselves, starting from teacher education and continuing throughout their professional life. LearnWeb-OER invites teachers to be the protagonists of their lifelong professional education: to become part of a professional e-community and to actively contribute to optimizing an online environment for teacher professional development.

The goal of the project is to improve the experience of teachers’ development by optimizing an existing digital environment on the basis of actual user requirements and feedback. Teachers become part of a professional e-community and contribute in optimizing the online environment for their own professional development.

COMMUNITY

“I like the opportunity LearnWeb gives to teachers to become a community of professionals that can act as a ‘filter’, to take from the web, for instance, what is useful and authoritative.” (Roberta Gozzi)

LearnWeb-OER: from Open Educational Resources to Open Educational Practices

At school, as well as in everyday life, communication is increasingly based on digital means (e.g. social media, digital learning resources). If teachers want to promote interactive and dialogic skills in their students, they need to enact and experience this kind of communication themselves, starting from teacher education and continuing throughout their professional life. LearnWeb-OER invites teachers to be the protagonists of their lifelong professional education: to become part of a professional e-community and to actively contribute to optimizing an online environment for teacher professional development.

The goal of the project is to improve the experience of teachers’ development by optimizing an existing digital environment on the basis of actual user requirements and feedback. Teachers become part of a professional e-community and contribute in optimizing the online environment for their own professional development.

The social community YELL/TELL, supported by the LearnWeb social platform, has the aim to encourage professional collaboration among trainees, teachers of different schools and teacher educators in pre-service and in-service training. Lifelong learning is promoted on the basis of sharing resources, commenting and reflecting on them in the spirit of co-construction of knowledge through open educational practices and resources, offering support, ideas, and competences for teaching English as L2/FL. The flexibility of the YELL/TELL platform allows the community to re-contextualize resources for professional use and exploit the peer-teaching environment to share and exchange both resources and the competence of adapting them for one’s own teaching context. In collaboration with Maria Bortoluzzi at the University of Udine, we involve various groups of teachers in the co-design of the platform. Using an iterative evaluation-driven design-based research approach we investigate how experienced teachers use online platforms for their teaching profession, and how trainee teachers use it for their learning how to teach while becoming part of a professional e-community. The ultimate goal of our work is to improve the experience of teachers’ development by optimizing an existing digital environment on the basis of actual user requirements and feedback.

The goal of the project is to improve the experience of teachers’ development by optimizing an existing digital environment on the basis of actual user requirements and feedback. Teachers become part of a professional e-community and contribute in optimizing the online environment for their own professional development.

Das Ziel des Projektes ist es, die Arbeit von Lehrern durch die kontinuierliche Optimierung einer digitalen Lernumgebung auf der Grundlage von Anforderungen und Feedback aller Nutzer zu unterstützen. Die Lehrer werden Teil einer professionellen Gemeinschaft und tragen dazu bei, die Lernumgebung für ihre eigene berufliche Entwicklung zu optimieren.
As next step we plan to support the YELL/TELL community of teachers to move from teaching objects towards a more reflexive, critical and aware use of digital resources and teaching practices. This will be achieved by customizing the LearnWeb-OER environment to support the activities carried out by the online professional community for example by:

- Analysing search modalities and use of resources by experienced teachers in order to improve the relevance of search results for specific learning scenarios. We shall work on the findings to outline guidelines for teachers when searching resources and identify critical issues related to sharing practices and resources.
- Selecting Apps for learning/teaching languages: a group of resources will be created on YELL/TELL to explore the world of teaching and learning quality apps – we shall focus on open access apps or apps affordable for the individual teacher/learner. A possible integration of apps onto the platform will be discussed.
- Continuing the collaboration on student dissertations on different aspects of applied research for teaching and learning languages

Another ongoing aim is to extend the online professional community embracing an increasingly large network of schools.

**INFORMATION:**

- **Project Type:** Internal
- **Project Duration:** Apr 2014 – Mar 2016
- **Project Research Area:** Virtual Communities and Collaboration
- **Keywords:** Technology Enhanced Learning, professional development, Open Educational Practices
- **Research Field:** IAI – Intelligent Access to Information
- **L3S Member:** Prof. Dr. Wolfgang Nejdl · nejdl@L3S.de
- **Project Manager:** Dr. Ivana Marenzi · marenzi@L3S.de
- **https://www.L3S.de/projects/internal/LearnWeb-OER**

**PUBLICATIONS:**

- Bortoluzzi, M. & Marenzi, I.; YELL/TELL. Comunità Online per insegnanti di inglese, Universitas, Studi e documentazione di vita universitaria 35 (143), 28-29, 2014
Data security and privacy are central aspects of society, both from the computer science and IT standpoint as well as from the legal perspective; scholars in the Web Governance research area study all of these factors. The tremendous speed at which the Web develops, and the innovative force that is behind these developments, inherently defy simple legal categorization.

For example, more pronounced personalization of content is necessarily associated with closer identification of the user, which, by design, throws up various questions related to data protection. Improving the usability of Web services (such as payment systems) is often possible only with limitations on the security of data, which in turn gives rise to both technical problems, and issues of liability. Outsourcing computing and storage capacity using a cloud computing model for example, raises questions of ownership of, and responsibility for, data and calls for new security and privacy technologies that can adapt to changing legal conditions.

These activities make the L3S an interdisciplinary research institution that is able to cover all aspects of Web science “from a single source” (from Internet infrastructure to the Web’s effects on society), and thus one that is able to play a leading role, both within Germany and internationally, in the overall evolution of the Web and the process of forward-looking technology assessment that will accompany these developments.
AETIONOMY – Organizing Knowledge about Neurodegenerative Disease Mechanisms for the Improvement of Drug Development and Therapy

Investigating the Causes of Alzheimer’s and Parkinson’s Diseases in order to Develop Better Pharmaceutical Treatments in Response

AETIONOMY is aiming to develop a new way to classify Alzheimer’s and Parkinson’s disease. The five-year-project is funded by the Innovative Medicines Initiative (IMI), a joint undertaking between the European Union and the pharmaceutical industry association EFPIA.

MOTIVATION | Currently, Alzheimer’s and Parkinson’s disease are classified by their symptoms and severity, but it is clear that this does not represent the many different causes of these diseases. It has been widely recognized that within these broad disease groups there are sub-groups where the different causes result in the symptoms of memory loss or movement disorder. The “mechanism-based taxonomy”, AETIONOMY is aiming at, will be generated using data derived from a wide range of new biological approaches and will be based on the underlying causes of the disease.

CHALLENGES & HIGHLIGHTS | A specific challenge the project is facing lies in the fact that for most neurodegenerative diseases the dysfunctional biological pathways underlying the disease are not known. AETIONOMY will therefore have to first define new routes towards the identification of the underlying disease mechanisms before organizing these and proposing rational disease taxonomy for Alzheimer’s and Parkinson’s disease. The AETIONOMY project will therefore involve the collection of all available data including clinical data, imaging and genetic data. Besides this, it will validate the mechanism-based taxonomy at least partially in the course of a prospective clinical study. After 5 years of work, AETIONOMY will have generated a publicly accessible knowledge base with mechanism-based taxonomies for AD and PD. The knowledge base will be made sustainable and maintained for another 5 years after the end of public funding. An initial validation of the mechanism-based taxonomies will take place in order to prove that it can be used for patient subgrouping target/biomarker identification. The taxonomy will be shared with regulatory authorities to ensure its consideration in the future development of regulatory requirements and promoted in the researcher community. Public awareness of the problem-solving approach taken in AETIONOMY will be generated and dissemination will reach out to global stakeholders, including patient organizations, the European citizens funding the project and the political and administrative bodies involved in this IMI project. Within the project L3S will ensure legal and ethical compliance of the above-described research, taking into account the European legal framework as well as international guidelines. The challenge will be to safeguard patients’ rights.
on the one side while enabling the envisaged research to be undertaken in AETIONOMY on the other side.

In its first two Deliverables D4.1.1, and D4.1.2, L3S developed an initial Data Protection Framework focusing on the legal, organizational and technical measures required in order for AETIONOMY partners, currently holding sensitive patient data may transfer the relevant data to the project, as well as the requirements, post-transfer, for the data to be safeguarded in compliance with relevant legal and ethical requirements. Subsequently in Deliverables D4.4.1 and D4.4.2, it is working together with the patient organization, Alzheimer Europe, to establish the legal and ethical safeguards needed to include participants into a prospective study, which will collect and analyze their biomarkers to validate hypotheses as to discrete causal mechanisms in different Alzheimer and Parkinson patients subgroups.

POTENTIAL APPLICATIONS & FUTURE ISSUES

A current focus, being addressed together with the Alzheimer pressure group “Alzheimer Europe” [http://www.alzheimer-europe.org] is on ensuring participant recruitment for the AETIONOMY prospective clinical study (and processing of collected data and bio-samples to validate project stratification hypotheses) is managed so as to safeguard fully the participants’ dignity, autonomy, and privacy interests.
CHIC – Computational Horizons in Cancer

Developing Meta and Hyper-Multiscale Models and Repositories for In-Silico Oncology

CHIC proposes the development of a suite of tools and services in a secure infrastructure that will support accessibility and reusability of VPH mathematical and computational hypermodels, and will initially be tested in the cancer domain. The aim is that by executing such hypermodels, clinicians will be assisted in selecting the most suitable therapy for each individual patient.

MOTIVATION | The impressive rate of the generation of human biological data during the last decades has dictated the development of numerous statistical, computational and mathematical methods in order to extract, analyze and exploit the hidden wealth of information therein. Unquestionably, systems biology has been established as a key player in this arena. Nevertheless, in order for models generally developed by different modelers or modeling groups to be reusable, there are a number of prerequisites that have to be satisfied. Models should be robust, reproducible and interoperable. This implies that standardization of model description and operation is a sine qua non if rational, coherent and comprehensive exploitation of the invaluable information hidden within human multiscale biological data is envisaged. Responding to this imperative in the context of both the broad (VPH) initiative and the paradigmal cancer domain is what CHIC stands for.

In order to ensure clinical relevance and foster clinical acceptance of hypermodeling in the future, the whole endeavor will be driven by the clinical partners of the consortium in practice. Cancer hypermodels to be collaboratively developed by the consortium cancer modelers will provide the framework and test-bed for the development of the CHIC infrastructure. Clinical adaptation and partial clinical validation of hypermodels and hypermodel oncosimulators will also be undertaken.

CHALLENGES & HIGHLIGHTS | The main challenge for the L3S Research Center is to set up an ethical and legal framework to guarantee compliance with existing rules governing the field of patients’ medical data. This framework will help partners to process data on valid legal grounds within the project. In addition, the L3S Research Center will clearly define who is entitled to do what with existing models and data sets from inside and outside the consortium. Specific attention will be given to the fact that CHIC involves an amalgamation of models, which adds additional complexity to defining roles and responsibilities in the project. In the same vein, a deep analysis will be done on the protectability and the pros and cons of copyright protection in the field.
A key aspect of the CHIC architecture is the planned modularity of the system. All developed software, tools and services should be as granular and modular as possible and provide standardized, open interfaces and functionality descriptions (e.g. via something similar to WSDL [Web Services Description Language]) so that a user can build new models as a composition of existing granular tools. As an example, a tool only needs to be developed once that will link gene expression data of a tumor with the KEGG database. If this tool is as generic as possible and if the interface is standardized, this tool can be used in different settings and models, independent of the underlying tumor or disease.

The facilitation of data exchange with other health care systems in accordance with the legal framework is of great importance to the architecture of the CHIC platform. Otherwise it will become an “information island” that contains different patients’ data sets, isolated from other information about the patients with limited access and value. As a result, the CHIC platform will be designed to interoperate with other systems throughout the entire health and clinical studies information environment. At a minimum, CHIC should export anonymized data to and import data from other systems in a standardized (and interoperable) way. To provide interoperability, the CHIC platform is developing messaging from the outset and content encoding standards to support communication with other health information systems (HIS) like EHR.

**INFORMATION:**

- **Project Type:** EU FP7
- **Project Duration:** Apr 2013 – Mar 2017
- **Project Research Area:** WG – Web Governance
- **Keywords:** eHealth, Hypermodels, In Silico Medicine
- **Research Field:** WG – Web Governance
- **L3S Member:** Prof. Dr. Nikolaus Forgó · forgo@L3S.de
- **Project Manager:** Iheanyi Nwankwo · nwankwo@L3S.de
- **http://www.chic-vph.eu**

**PUBLICATIONS:**

**MOTIVATION** | All legal proceedings rely on the production of evidence in order to take place. Thanks to technological advances in information gathering, law enforcement agencies now are able to obtain evidence when carrying out criminal investigations, in very effective ways that were impossible a few years ago. However, legislations on criminal procedures in many European countries were enacted before these new technologies appeared, thus taking no account of them and creating a scenario where criteria are different and uncertain. Regulations are not harmonized and aligned, and therefore the exchange among member state jurisdictions (and at a transnational level) is very hard to realize. EVIDENCE, on the one hand should enable policy makers to realize an efficient regulation, treatment and exchange of digital evidence, while on the other hand, support judges, prosecutors and lawyers practicing in the criminal field by guiding them with a standardized and harmonized European framework for dealing with treatment and exchange of digital evidence.

**CHALLENGES & HIGHLIGHTS** | One of the challenges in this project is the fact that there is no legal framework that governs the exchange of evidence between courts in Europe. Thus, the project faces different national regulations and views that have to be taken into account when searching for a solution for the European Union as a whole. In a multidisciplinary approach the whole set of actions that should be carried out in a coherent framework is identified, defined, assessed and articulated in the EVIDENCE project. L3S, being responsible for the Work Package "Data Protection Issues", prepared a report on "Data Protection Issues in Gathering and Using Electronic Evidence" where the legal situation at EU and international level and the national legal situation in selected European countries was analyzed, focusing on relevant problem areas. Finally, the report made recommendations for a future European legal framework from a data protection perspective.

In addition, a workshop was held dedicated to "Data Protection in Sharing and Exchanging Electronic Evidence". During this event, additional practical expertise and profound knowledge from external experts working in this field was received that was provided to two group discussion sessions, firstly identifying data protection issues of sharing and
exchanging electronic evidence, and secondly developing remedies to enable all participants to address these issues. In late 2015, a “Status Quo Workshop” was held in which the results of the Data Protection Issues, Legal Issues, Law Enforcement Issues and Standard Issues work packages were presented, discussed and acknowledged, benefitting among other things from knowledgeable and experienced external experts as participants of the event.

**POTENTIAL APPLICATIONS & FUTURE ISSUES |**

In the following months of the EVIDENCE project, a Road Map will be developed.

The impact of the project will be by:

- Positively influencing key actors – judges and police experts
- Positively effecting perceptions held by different agents by adjusting and creating national and supranational legislation
- Enhancing confidence in experts related to collecting, analyzing, and conserving of electronic evidence,
- Supporting training, knowledge and experience for experts
- Improving communication related to electronic evidence between actors at the national, European and international level
- Foreseeing future actions and plans to be undertaken by future policies, programs and plans, also considering the possible application, re-use and adaptation of the EVIDENCE Road Map to legal domains other than criminal law (civil justice, administrative justice, etc.)
MAPPING – Managing Alternatives for Privacy, Property and Internet Governance

Quo Vadis, Internet?

MAPPING is based on the predecessor projects SMART, RESPECT and CONSENT in which the IRI was involved as well. MAPPING’s goal is to create an all-round and “joined-up” understanding of the many and varied economic, social, legal and ethical aspects of recent developments on the Internet, and their consequences for the individual and society at large. The project can be seen as the final part of the European Union’s Digital Agenda which should lead to a modern, innovative EU.

MOTIVATION | After investigating on-line consent and privacy in social networks (CONSENT) and smart on-line surveillance (SMART, RESPECT), MAPPING specifically investigates and debates existing innovation policies, business models and legal frameworks related to the implementation of the Digital Agenda for Europe and the changes needed to set up an improved governance structure for the EU innovation ecosystem. In order to accomplish this, MAPPING mobilizes a wide spectrum of ICT-related stakeholders and social actors from the EU and associated countries. This also includes academics, law and policy makers, Internet service provider, international Internet governance bodies, NGOs and civil society organizations. Using the project as a platform for informed discussions, these actors contribute ideas for finding solutions in problem areas like personal data and the protection of Intellectual Property Rights online. These solutions will be put in an action plan to put forward workable policy guidelines to shape the European Union’s technological future.

CHALLENGES & HIGHLIGHTS | The Internet and all corresponding aspects offer a huge variety of problems. It is more or less impossible to find solutions that are in everyone’s interest. In order to make proper decisions, many aspects have to be taken into account and carefully considered. Since some debates got stuck over the past years (e.g., about the Intellectual Property Rights protection online), MAPPING will try to start a new process of dialogue with and between various ICT-related stakeholders in order to find workable solutions.
which took place on the September 22 and 23 in Hanover. The Assembly brought together around 120 experts, academics, decision-makers and practitioners that had an initial discussion about the focus areas of the project and the respective direction for future research.

**POTENTIAL APPLICATIONS & FUTURE ISSUES**

The next tasks of L3s will be to investigate future scenarios of personal data use in commercial and non-commercial settings, identifying potential issues. Therefore, according MAPPING’s overall approach, meetings and conferences will be organized to foster the exchange of knowledge and experience. In order to foster innovation regarding privacy and IT security, a competition to develop an application called "Privacy via IT Security: Innovating Mobile Apps" will be organized. The first prize of the competition is 20,000 euros, the top three competitors will be awarded a one-week stand at CeBIT 2016. The award ceremony will include a panel discussion and take place at Scale 11 Main Stage at the CeBIT. Having identified a number of future scenarios of use of personal data, the task will be to compile recommendations on how to address privacy issues in the future scenarios. This process may be linked back to the previous analysis of best practices for current scenarios, checking whether those best practices might be feasible for future scenarios as well.

**INFORMATION:**

Project Type: EU FP7
Project Duration: Mar 2014 – Feb 2018
Project Research Area: Future Internet
Keywords: Privacy, Internet Governance, IPR
Research Field: WG – Web Governance
L3S Member: Prof. Dr. Nikolaus Forgó · forgo@L3S.de
Project Manager: Jonathan Stoklas · stoklas@L3S.de
www.mappingtheinternet.eu
M O T I V A T I O N  | The MyHealthAvatar (MHA) project is a research and demonstration-oriented iterative venture. It studies the feasibility of creating personal health records configured as digital patients ("avatars"). Currently, gaining access to health records of citizens in cross-border activities is unnecessarily difficult because each nation has its own unique record-keeping system. The 4D avatars envisioned by MHA represent a citizen’s health status data and allow the citizen to store, access and share this data. As such, the avatars are designed as a lifetime companion for individual citizens. By representing the health status in this way, MHA hopes to make a valuable contribution to individualized disease prediction and prevention, while at the same time promoting greater awareness of healthy living.

C H A L L E N G E S  &  H I G H L I G H T S  | In the beginning, the L3S Research Center served as a legal helpdesk and provided a number of legal guidelines to assist the consortium in dealing with legal questions as they arose. Furthermore, the L3S Research Center analyzed a number of legal issues that would arise later in the project during exploitation of the MHA platform. Now that the project is nearing its end and entering its exploitation phase, the L3S Research Center is providing concrete advice on security, e-consent, and other data protection issues, as well as drafting General Terms & Conditions and a robust Privacy Policy.

Last year saw a review and analysis of relevant European and national legislation on data protection, data security and ownership of (personal) data with reference to the data generated and processed within the project. As part of this process, the L3S Research Center surveyed the strengths and weaknesses of the proposed General Data Protection Regulation with regards to avatars, i.e., enabling patients to keep control of their personal medical information in the MHA scenario. Moreover, the L3S Research Center gave a general overview and analysis of the main legal issues that can arise in the context of digital avatars, including data ownership, electronically given consent, data collection and sharing and liability for the correctness of data. L3S Research Center also assisted MHA in handling IPR issues, both at a stage of project implementation and for the exploitation phase. Contractual framework for collaboration of research projects, API license
agreement, IPR rules in General Terms & Conditions were elaborated, license compatibility checks were done and open source license solutions for release of MHA software components identified.

**POTENTIAL APPLICATIONS & FUTURE ISSUES |**
The avatars can be viewed as a suitcase full of one’s personal health data that an individual will keep with them throughout their lifetime and wherever their journey takes them. They will empower and encourage individuals to look after their own health records. MHA can also help resolve some legal and ethical issues in data sharing. Doing so between different institutions across Europe is a major challenge due to in part unanswered legal and ethical questions. In comparison, it is much easier to let individual citizens manage their own data and to determine how and where it is revealed and shared for clinical and other purposes. MHA aims to strike a good balance between facilitating sharing and retaining control over one’s data. MHA provides an infrastructure to maximize the yield of biomedical research expenditure through integrated models and data. In particular, MHA integrates patient information into a coherent entity, giving medical professionals through it access to a large set of structured patient information. Medical professionals can thereby blend information with extreme heterogeneity into different models, organ systems, space-time scales and modalities. MHA will also make use of recent ICT advances in the integration of simulation models, semantic and data reasoning and visual analytics technology within a cloud-based architecture to target effective information collection, access, analysis and new knowledge discovery.

**INFORMATION:**
Project Type: EU FP7
Project Duration: Mar 2013 – Feb 2016
Project Research Area: WG – Web Governance
Keywords: eHealth, Patient-driven Health Data Information Space, Clinical Care
Research Field: WG – Web Governance
L3S Member: Prof. Dr. Nikolaus Forgó · forgo@L3S.de
Project Manager: Sarah Jensen · jensen@L3S.de
http://www.myhealthavatar.eu

**PUBLICATIONS:**
### University Cooperation Partners, National

- Bergische Universität Wuppertal · Wuppertal · Germany
- Hochschule für Technik und Wirtschaft Dresden (FH) · Dresden · Germany
- HU Berlin – Institute for Library and Information Science · Berlin · Germany
- HTW Berlin · Berlin · Germany
- Julius-Maximilians-Universität Würzburg · Würzburg · Germany
- Ludwig-Maximilians-Universität München · München · Germany
- Ostbayerische Technische Hochschule Amberg Weiden · Amberg · Germany
- Otto-Friedrich-Universität Bamberg · Bamberg · Germany
- Private Hochschule Göttingen · Göttingen · Germany
- Rheinische Friedrich-Wilhelms-Universität · Bonn · Germany
- Ruhr-Universität Bochum · Bochum · Germany
- Soziologisches Forschungsinstitut Göttingen (SOFT) e.V an der Georg-August-Universität Göttingen · Göttingen · Germany
- Technische Universität Braunschweig · Braunschweig · Germany
- Technische Universität Braunschweig, Institut für Computergraphik · Braunschweig · Germany
- Technische Universität Ilmenau · Ilmenau · Germany
- TU Berlin, Fachbereich Komplexe und Verteilte IT-Systeme · Berlin · Germany
- TU Clausthal-Zellerfeld · Clausthal · Germany
- TU Darmstadt · Darmstadt · Germany
- TU Dortmund, IT und Medien Centrum · Dortmund · Germany
- TU Kaiserslautern · Kaiserslautern · Germany
- Technische Universität Dresden · Dresden · Germany
- Universität Freiburg · Freiburg · Germany
- Universität Kassel · Kassel · Germany
- Universität des Saarlandes · Homburg · Germany
- Universität Hildesheim, Information Systems and Machine Learning Lab (ISMML) · Hildesheim · Germany
- Universität Hildesheim, Software Systems Engineering (SSE) · Hildesheim · Germany
- Universität Stuttgart, Höchstleistungsrechenzentrum · Stuttgart · Germany
- Universität Trier, Neuere und Neueste Geschichte · Trier · Germany
- Universität zu Köln · Köln · Germany
- Universitätsklinikum Bonn · Bonn · Germany

### University Cooperation Partners, International

- Aalborg University · Aalborg East · Denmark
- Aalto University · Helsinki · Finland
- Alma Mater Studiorum – Università di Bologna · Bologna · Italy
- Aristotelio Panepistimio Thessalonikis · Thessaloniki · Greece
- Athens University of Economics and Business · Athens · Greece
- Brno University of Technology · Brno · Czech Republic
- Brunel University · Uxbridge · United Kingdom
- Centre Hospitalier Universitaire Vaudois (CHUV), Department of Psychiatry, Centre d'Epidemiologie Psychiatrique et de Psychopathologie · Lausanne · Switzerland
- Communications Group, Dep. of Electrical and Computer Engineering, University of Toronto · Toronto · Canada
- Coventry University · Coventry · United Kingdom
- Democritus University of Thrace · Komotini · Greece
- Ecole Polytechnique Fédérale de Lausanne · Lausanne · Switzerland
- Erasmus Medical Center · Rotterdam · Netherlands
- ETH Zürich · Zürich · Switzerland
- Helsingin Yliopisto · Helsinki · Finland
- Institut de Recherche et de Documentation Pédagogique · Neuchatel · Switzerland
- Institut Télécom ParisTech · Paris · France
- Instytut Chemii Bloorganicznej PAN (PSNC) · Poznan · Poland
- Jyväskylän Yliopisto (JYU) · Jyväskylän · Finland
- Karolinska Institutet · Stockholm · Sweden
- Katholieke Universiteit Leuven · Leuven · Belgium
- Køgskolen · Gjovik · Norway
- KUNSTAKADEMIETS ARKITEKTSKOOLE · Copenhagen · Denmark
- King's College London · London · United Kingdom
- Kyoto University · Kyoto · Japan
- Lancaster University · Lancaster · United Kingdom
- Leopold-Franzens-Universität · Innsbruck · Austria
- Libera Università di Bolzano · Bolzano · Italy
- Luleå Tekniska Universitet · Luleå · Sweden
- Lund University · Lund · Sweden
- Medical University Plovdiv · Plovdiv · Bulgaria
- Moholy-Nagy Muveszeti Egyetem · Budapest · Hungary
- National University of Ireland, DERI · Galway · Ireland
L3S COOPERATION PARTNERS

- National Technical University of Athens · Athens · Greece
- National Technical University of Athens, Institute of Communications and Computer Systems (ICCS) · Zografou · Greece
- Open Universiteit Nederland (OUNL) · Heerlen · The Netherlands
- Örebro University · Örebro · Sweden
- Oulu University · Oulu · Finland
- Politecnico di Milano · Milan · Italy
- Queen Mary University of London · London · United Kingdom
- Queen Mary and Westfield College, University of London · London · United Kingdom
- Radboud University · Nijmegen · The Netherlands
- Rijksuniversiteit Groningen (RUG) · Groningen · Netherlands
- Saint George’s Hospital Medical School · London · United Kingdom
- Scuola IMT (Istituzioni, Mercati, Tecnologie) · Lucca · Italy
- Scuola Normale Superiore · Pisa · Italy
- Technische Universiteit Delft · Delft · The Netherlands
- Technische Universiteit Eindhoven · Eindhoven · The Netherlands
- The Chancellor, Master and Scholars of the University of Cambridge · Cambridge · United Kingdom
- The Open University · Milton Keynes · United Kingdom
- The Provost, Fellows and Scholars of the holy and undivided Trinity of Queen Elizabeth near Dublin · Dublin · Ireland
- The University of Edinburgh · Edinburgh · United Kingdom
- The University of Nottingham · Nottingham · United Kingdom
- TU Graz – Know Center · Graz · Austria
- Trinity College Dublin · Dublin · Ireland
- Ulusal Akademik A ve Bilgi Merkezi (ULAKBIM) · Ankara · Turkey
- Umeå University · Umeå · Sweden
- Universidad de Salamanca · Salamanca · Spain
- Universidad de Zaragoza · Zaragoza · Spain
- Universidad Nacional de Educacion a Distancia (UNED) · Madrid · Spain
- Università degli Studi dell’Aquila · L’Aquila · Italy
- Università degli Studi di Catania · Catania · Italy
- Università degli Studi di Firenze · Firenze · Italy
- Università degli Studi di Padova · Padova · Italy
- Università degli Studi di Pavia (UniPV) · Pavia · Italy
- Università degli Studi di Roma “la Sapienza” · Roma · Italy
- Università degli Studi di Torino · Torino · Italy
- Università degli Studi di Trento (UniTN) · Trento · Italy
- Università degli Studi di Verona · Verona · Italy
- Università della Svizzera italiana (University of Lugano) · Lugano · Switzerland
- Università di Pisa · Pisa · Italy
- Università ta Malta (UoM) · Msida · Malta
- Universität Bern, Institute of Surgical Technology and Biomechanics · Bern · Switzerland
- Universität Graz · Graz · Austria
- Universitatea Tehnica Cluj-Napoca · Cluj-Napoca · Romania
- Université Catholique de Louvain · Louvain-la-Neuve · Belgium
- Université de Nice-Sophia Antipolis · Nice · France
- Université Joseph Fourier · Grenoble · France
- Université Paris-Diderot · Paris · France
- University College London · London · United Kingdom
- University of Bedfordshire · Bedford · United Kingdom
- University of Bristol · Bristol · United Kingdom
- University of Cyprus · Nicosia · Cyprus
- University of Lincoln · Lincoln · United Kingdom
- University of Luxembourg, Centre for Systems Biomedicine · Luxembourg · Luxembourg
- University of Macedonia · Thessaloniki · Greece
- University of Malaga · Malaga · Spain
- University of Manchester · Manchester · United Kingdom
- University of Oxford · Oxford · United Kingdom
- University of Pennsylvania · Philadelphia · United States of America
- University of Sheffield · Sheffield · United Kingdom
- University of Southampton · Southampton · United Kingdom
- University of Sussex · Brighton · United Kingdom
- University of Tartu · Tartu · Estonia
- University of Warwick · Warwick · United Kingdom
- University of Novom Sadu · Novi Sad · Serbia
- Vrije Universiteit Brussel · Brussel · Belgium
- Virginia Tech · Blacksburg · United States of America
- Vytauto Didziojo Universitetas (VMU) · Kaunas · Rep. Of Lithuania
## L3S Cooperation Partners

### Non-University Partners, National

- ESCP Europe Wirtschaftshochschule Berlin E.V. (ESCP-Europe) · Berlin · Germany
- Deutsches Forschungszentrum für Künstliche Intelligenz GmbH (DFKI) · Kaiserslautern · Germany
- DGSM – Deutsche Gesellschaft für Schlafforschung und Schlafmedizin / Charité-Universitätsmedizin Berlin · Berlin · Germany
- Deutsche Zentralbibliothek für Wirtschaftswissenschaften (ZBW) · Kiel · Germany
- Fraunhofer Focus · Berlin · Germany
- Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V. · München · Germany
- Fraunhofer IAIS · Sankt Augustin · Germany
- Fraunhofer IGD · Darmstadt · Germany
- Fraunhofer-Institut für Hochfrequenzphysik und Radartechnik FHR · Wachtberg · Germany
- Forschungszentrum Jülich GmbH · Jülich · Germany
- Göttingen Centre for Digital Humanities (GCDH) · Göttingen · Germany
- GWDG – Gesellschaft für wissenschaftliche Datenverarbeitung mbH · Göttingen · Germany
- GWT-TUD GmbH · Dresden · Germany
- Humboldt-Institut für Internet und Gesellschaft (HIIG) · Berlin · Germany
- Institute for Science Networking Oldenburg GmbH (ISN) · Oldenburg · Germany
- IWM – Institut für Wissensmedien · Tübingen · Germany
- Karlsruher Institut für Technologie · Karlsruhe · Germany
- Leibniz Supercomputing Centre LRZ · Garching · Germany
- Max-Planck-Institut für Informatik · Saarbrücken · Germany
- Max-Planck-Institut für Physik / Werner-Heisenberg-Institut · München · Germany
- Materna GmbH · Dortmund · Germany
- OFFIS · Oldenburg · Germany
- Robert Koch Institut · Berlin · Germany
- Stiftung Wissenschaft und Politik (SWP) · Berlin · Germany

### Non-University Cooperation Partners, International

- Alzheimer Europe · Luxembourg · Luxembourg
- Asociatia Pentru Technologie si Internet (ApTI) · Bucharest · Romania
- ATHENA Institute for the Management of Information · Athens · Greece
- Barcelona Supercomputing Center – Centro Nacional de Supercomputación · Barcelona · Spain
- Centre D’Excellence en Technologies de l’Information et de la Communication (CETIC) · Charleroi · Belgium
- Centre for Research and Technology Hellas · Thermi, Thessaloniki · Greece
- Centre Virtuel de la Connaissance sur l’Europe · Sanem, Luxembourg
- CINECA · Casalecchio di Reno · Italy
- Commissariat à l’Energie Atomique · Paris Cédex · France
- Computer and Automation Research Institute, Hungarian Academy of Sciences · Budapest · Hungary
- Consiglio Nazionale delle Ricerche · Pisa · Italy
- Consorci de Serveis Universitaris de Catalunya (CSUC) · Barcelona · Spain
- Consorzio Nazionale Interuniversitario per le Telecomunicazioni · Parma · Italy
- CREATE-NET · Trento · Italy
- EGI.eu · Amsterdam · Netherlands
- Fraunhofer Austria Research GmbH · Vienna · Austria
- Greek Research and Technology Network (GRNET) · Athens · Greece
- EFMD · Brussels · Belgium
- EMBL-EBI European Bioinformatics Institute · Hinxton, Cambridge · United Kingdom
- Euro-Mediterranean Seismological Centre (EMSC) · Brüxelles-le-Chatel · France
- European Cervical Cancer Association · Lyon · France
- European Institute for Participatory Media e.V. · Berlin · Germany
- Fondazione Bruno Kessler · Trento · Italy
- Fondazione Istituto per L’Interscambio Scientifico (I.S.I.) · Torino · Italy
- Foundation for Research and Technology Hellas (Forth), Institute of computer science · Heraklion · Greece
- Fundació Barcelona Media Universitat Pompeu Fabra / Yahoo Research · Barcelona · Spain
- Greek Research and Technology Network S.A. · GRNET · Greece
- Indian Statistical Institute · Bangalore · India
L3S COOPERATION PARTNERS

Industrial Partners, National

- Attensity Europe GmbH · Kaiserslautern · Germany
- Boehringer Ingelheim International GmbH · Ingelheim · Germany
- d.k.d. Internet Service GmbH · Frankfurt · Germany
- e*Message Wireless Information Services Deutschland GmbH · Berlin · Germany
- Emperra E-Health Technologies · Potsdam · Germany
- European Logistics Partners GmbH · Wuppertal · Germany
- Hentschel System GmbH · Hannover · Germany
- HothoData GmbH · Leipzig · Germany
- IMC Information Multimedia Communication AG · Saarbrücken · Germany
- Institut für Berufliche Bildung AG · Buxtehude · Germany
- intelligent views GmbH · Darmstadt · Germany
- Nokia Siemens Networks · Munich · Germany
- Orfix International GmbH & Co. KG · Radbruch · Germany
- Pro Design Electronic GmbH · Bruckmühl · Germany
- SAP AG · Walldorf · Germany
- Siemens AG, Siemens Professional Education, München · München · Germany
- Spring Techno GmbH & Co. KG · Bremen · Germany
- Stonesoft GmbH · München · Germany
- Sun Microsystems GmbH · Kirchheim · Germany
- TES Electronic Solutions GmbH · Stuttgart · Germany
- Tixel · Hannover · Germany
- VS-Verlag für Sozialwissenschaften · Wiesbaden · Germany

Industrial Partners, International

- Advanced Communication Research & Development S.A. · Santander · Spain
- Agence France Presse · Paris · France
- Agentura pro Evroskope Projekty & Management Sdruzení (EPMA) · Prague · Czech Republic
- Agenzia Nazionale Stampa Associata · Rome · Italy
- Alinari 24Ore SpA · Firenze · Italy
- Ammin D.O.O. Centr Za Znanstveno Vizualizacijo · Ljubljana · Rep. Of Slovenia
- AnSmart Ltd · Wembley · United Kingdom
- Astrid Research Kft. · Debrecen · Hungary
- Athens Technology Center S.A. · Athens · Greece
- ATOS Origin Sociedad Anonima Española · Madrid · Spain
• British Business Federation Authority (BBFA) · London · United Kingdom
• Catenda AS · Oslo · Norway
• Conseil des Barreaux Européens ASBL (CCBE) · Brussels · Belgium
• Custodix NV · Sint-Martin-Latem · Belgium
• Diplofoundation · Msida · Malta
• Elsevier B.V. · Amsterdam · The Netherlands
• EMC · Cork · Ireland
• Engineering – Ingegneria Informatica Spa · Rome · Italy
• European Research and Project Office GmbH · Saarbrücken · Germany
• EURIX Group · Torino · Italy
• EUSTIX – Alliance zur Unterstützung von föderierten Identitätsmanagementsystemen und Modellen · Vienna · Austria
• Exalead · Paris · France
• Expert System spa · Modena · Italy
• Fédération Autonome de Fonction Publique Territoriale et des Établissements Publics · Paris · France
• Giunti Labs S.R.L. (Gilabs) now Exact Learning Solutions SPA · Florence · Italy
• Genias Benelux BV · Genias · Netherlands
• Google Ireland Limited · London · United Kingdom
• Hanzo Archives Limited · London · United Kingdom
• Hewlett-Packard IIC · Milan · Italy
• Homeria open Solutions s.l. · Cáceres · Spain
• Hoplite Software SL · Salamanca · Spain
• Hypatia AS (HYP) · Krakøy · Norway
• IBM Israel – Science & Technology Ltd. · Haifa · Israel
• INMARK · Madrid · Spain
• Innovation Engineering S.R.L. · Rome · Italy
• Intel Performance Learning Sols. Ltd · Dublin · Ireland
• INTRASOFT International S.A. · Brussels · Belgium
• I-Sieve Technologies Ltd · Aghia Paraskevi · Greece
• Italtel SpA · Palermo · Italy
• Maxeler Technologies Ltd · London · UK
• Medical Exchange MEDTING Limited (formerly Situsi Limited) · Dublin · Ireland
• Microtask Oy · Helsinki · Finland
• Minerva Consulting & Communication · Etterbeek · Belgium
• Neurorad · Timisoara · Romania
• Nexture Consulting S.R.L. · Ivrea · Italy
• Novartis Pharma AG · Basel · Switzerland
• Nutcracker Research Limited · London · United Kingdom
• Pharmaoidea Ltd. · Szeged · Hungary
• Philips Consumer Electronics B.V. · LW Eindhoven · The Netherlands
• Portugal Telecom Inovação e Sistemas SA · Aveiro · Portugal
• PrimeTel PLC · Limassol · Cyprus
• Quantech ATZ, S.A. · Barcelona · Spain
• Routledge, Taylor & Francis Publishing, UK · Abingdon · United Kingdom
• Royal Philips Electronic B.V. · Eindhoven · The Netherlands
• SAIL LABS Technology AG · Vienna · Austria
• Siveco Romania SA · Bucharest · Romania
• SÖRA Institute Ogris & Hofinger GmbH · Wien · Austria
• Sanofi-Aventis Research and Development · Paris · France
• STMicroelectronics N.V. · Plan-les-Ouates · Switzerland
• Strategische Projectorganisatie Kempen – VZW (SPK) · Turnhout · Belgium
• Succubus Interactive S.A.R.L. · Nantes · France
• Symposium Publishing · Oxford · United Kingdom
• Taurob GmbH · Wien · Austria
• Telefónica Investigación y Desarrollo S.A. Unipersonal · Madrid · Spain
• TES Electronic Solutions Ltd. c/o Dundas & Wilson LLP · London · United Kingdom
• Thales Communications S.A. · Colombes · France
• Türk Telekom · Ankara · Turkey
• UBC Biopharma · Brussels · Belgium
• UBITECH Ltd (GIOMPITEK MELETI SCHEDIASMOS YLOPOISSI KAI POLISI ERGON PILOFORIKIS E.P.E.) · Athens · Greece
• Valtion Teknillinen Tutkimuskeskus · Espoo · Finland
• Wiley-Blackwell Publishing · Chichester · United Kingdom
• Xerox SAS · Meylan · France
• Yahoo! Iberia SL · Madrid · Spain

Cooperation with Public Institutions, National

• Arbeiter-Samariter-Bund Deutschland · Köln · Germany
• Bundeskriminalamt Wiesbaden · Wiesbaden · Germany
• Bundespolizei Entschärfungsdienst Düsseldorf · Düsseldorf · Germany
• Deutsche Welle · Bonn · Germany
• Deutsches Diabetes Zentrum · Düsseldorf · Germany
Cooperation with Public Institutions, International

- Academia Nationala de Informatii Mihai Viteazul (National Intelligence Academy) · Bucharest · Romania
- Austrian Parliamentary Administration · Vienna · Austria
- Ayuntamiento de Valencia · Valenzia · Spain
- Commune de Lyon · Lyon · France
- Commune di Firenze · Firenze · Italy
- Consiglio Nazionale delle Richerche (CNR) · Rome · Italy
- Fundatia Pentru Smurd · Targu Mures · Romania
- Hellenic Parliament · Athens · Greece
- Institut Européen d’Administration des Affaires (INSEAD) · Fontainebleau · France
- Institutul Pentru Tehnologii Avansate · Bucharest · Romania
- Joint Research Center · Trento · Italy
- Ministério da Justica · Lisboa · Portugal
- Moravian Library · Brno · Czech Republic
- National Library of the Czech Republic · Prague · Czech Republic
- NCSR Demokritos · Athens · Greece
- Netherlands Computing Facilities Foundation (NCF) · Gravenhage · The Netherlands
- Russian News & Information Agency “RIA Novosti” · Moskow · Russian Federation
- Serviciului de Telecomunicatii Speciale · Bucharest · Romania
- Swiss Society for Research in Education (SSRE/SGBF) · Aarau · Switzerland
- The International Criminal Police Organization (INTERPOL) · Lyon · France
- The Police and Crime Commissioner for South Yorkshire · Sheffield · United Kingdom
- Vlaamse Instelling voor Technologisch Onderzoek N.V. · Mol · Belgium
CeBIT 2015: Head of Government at L3S Booth

L3S presented its research results in the field of Web Science at CeBIT Hannover, the world’s biggest IT fair, from 16 – 20 March 2015.

At the research booth of the Federal State of Lower Saxony, L3S provided an insight into the area of contact-free human-computer interaction. The team of L3S members, led by Prof. Dr.-Ing. Bodo Rosenhahn demonstrated the project “Real time Object Tracking in Video Streams – Game Control with Face Tracking” to the public and also to prominent guests. Together with L3S researchers, the President of the Leibniz Universität Hannover, Prof. Dr. Volker Epping, and the Vice President Prof. Dr. Joachim Escher welcomed Lower Saxony’s Prime Minister Stephan Weil and the Minister for Culture and Science Dr. Gabriele Heinen-Kljajic as well as Hauke Jagau, the President of the Hannover Region, at the L3S booth.

The L3S researchers presented a camera-based face tracker. The tracker uses a virtual network structure to allow stable and fast tracking while being robust against severe occlusions and illumination changes. The tracker output is used to move a mouse cursor on a display in order to control a simple maze game. In the future, contact-free human-computer interaction will gain more and more importance in order to increase the efficiency of communication with computers. It can be applied in the area of gesture-driven computer-interaction in sterile environments, elderly home healthcare sports analysis, and also in the game and movie industry. Since devices such as the Kinect are already well established, plain video-based interaction will attract increasing attention in outdoor scenarios. For more information please have a look at: http://www.l3s.uni-hannover.de/project/RelTracking
The L3S workshop took place in the beautiful Harz region.

9th L3S Research Workshop in Goslar

More than 50 Researchers from various universities of Germany participated at the L3S Research Workshop 2015.

The L3S successfully held its 9th Research Workshop from October 28-29, 2015 at the historical building of the hotel “Der Achtermann” in Goslar. Just like previous events in Goslar, Wernigerode, or Quedlinburg, the latest workshop took place in the beautiful Harz region of Lower Saxony as well. This time the workshop was under the general topic of “Computer Science and Digital Society” in the context of current funding opportunities. L3S’s computer scientists were joined by scholars from diverse areas like sociology, linguistics, computer design and law. Consisting of a creative mixture of more than 50 participants – ranging from PhD students and postdocs to professors and externals – the L3S research workshop participants explored specific challenges and synergies in several areas of focus, determining the impact on society as well as on the web science community.

The annual L3S research workshops provide a platform for the informal exchange of new ideas and a forum for planning joint projects with fellow researchers in the interdisciplinary fields of web science. They specifically aim at reinforcing the fabric of the underlying research and strengthening the network between L3S researchers. Traditionally the well-known social event – organized by a small group of L3S team members – support the effort of networking.

New Members in 2015/2016

H E R I B E R T V O L L M E R is professor for Computer Science and head of the theory group at Leibniz Universität Hannover since 2002. He received his habilitation and his PhD from the University of Würzburg. His main research interests are computational complexity theory and logics in computer science. Currently, he is dean of study affairs for computer science.

B E R N A R D O W A G N E R has been full professor at the University of Hanover since 1997. He is a member of the Faculty for Electrical Engineering and Computer Science and is in charge of the Real Time Systems Group (RTS). Moreover, he is director of the Centre for Technical Didactics (ZDT) and has been a founding member of the L3S Research Center. His main research interests are in autonomous service robots, especially robot perception, as well event discrete control and distributed real-time systems. He served in several deanship positions and from 2009 to 2010 he was elected dean of his faculty.

S I N C E 2 0 1 4 T I N A K R Ü G E L is a W1 professor for IT-Law in particular data protection law at the Institute for Legal Informatics (www.iri.uni-hannover.de) at the Leibniz University of Hanover and since 2016 associated member of the interdisciplinary L3S Research Centre. Prof. Dr. Tina Krügel, LL.M., has studied law in Hanover and completed her legal clerkship in Hanover/Johannesburg (South Africa). In 2002 she attended the LL.M.-Programme EULISP in Hanover/Oslo. In 2005 she got her Dr. iur. (e-commerce law). Since 2004 she is an attorney at law with a special focus on IT-Law. She worked for the Institute for Legal Informatics (www.iri.uni-hannover.de) as senior research associate with the main focus on data protection law between 2004 and 2014. In 2014 she was appointed to a professorship in IT law in particular data protection law at the University of Hanover. Since February 2016 she has been associated member of the interdisciplinary L3S Research Center.
Once a month, L3S invited innovative entrepreneurs, entrepreneurship researchers, and start-up consultants to share their experience and to give new insights into entrepreneurship. The topics of the talks ranged from setting up a business in Germany as a foreign graduate or scientist – due to the international background of the L3S staff – to intellectual property rights particularly with regard to university spin-off companies.

L3S graduates and scientists took the chance to broaden their skills and competences towards entrepreneurial thinking in three two-day Entrepreneurship Workshops. Participants applied new forms of promoting creative ideas like Design Thinking and developing business models with the Business Model Canvas. The five-day Summer School in September provided participants with an overview about entrepreneurship. They got an insight in different areas, questions, and issues related to starting and planning a business. The participants applied creative techniques and developed their own business model.

Furthermore, L3S established the L3S Startup-Corner which offers workspace and infrastructure for teams with innovative and sustainable digital business ideas. The L3S Startup Adviser has discussed several ideas for business start-ups and gave advice, e.g. on business model generation and funding.

From Research to Innovation – Students and Scientists Learn to Develop Business Models

In 2015, L3S fostered a culture of innovation and entrepreneurship to meet the challenge of turning research results into innovative and marketable products, processes, and services. Therefore, L3S offered a series of talks and workshops to support entrepreneurial thinking as well as consulting and workspace for starting a business.
The second Alexandria Workshop took place in L3S Research Center on 2nd – 3rd November 2015. The workshop was aimed at bringing together communities involved in web archiving, digital preservation, digital humanities and information retrieval to encourage a closer dialogue between researchers from computer science, digital humanities and cultural heritage institutions. It was widely attended from participants from national libraries, humanities to computer scientists from varying disciplines like Information retrieval, natural language processing, database systems and distributed systems.

The first keynote address, given by Prof. Wolfgang Nejdl from the L3S Research Center, focussed on the challenges and solutions surrounding searching and exploring Web archives. Putting in context some of the findings in the BUDDAH project, which underlined the need for combining qualitative and quantitative analysis of archives, he surmised the need for novel and better access methods for Web archives. He argued that better access methods are not only useful for searching archived collections, but are potentially useful for corpus creation, which is a fundamental task for historians and researchers in humanities. Keyword search, widely studied in the area of information retrieval, is a natural and easier access method but is fraught with uncertainty of keyword generation especially for advanced search tasks. Also, the intent of the user searching archives is markedly different from the traditional search behavior of end users.

Complementing the need for improved access methods, other talks were targeted towards application for specific usability of Web archives. Ivana Marenzi discussed the possibility of improving usability to improve the user experience when working with web archive collections. Prof. Maarten De Rijke, acknowledged the potential of Web archives for monitoring vocabulary shifts over time. Elisabeth Niggemann, from German National Library, discussed how Websites and their content become relevant objects when cited by researchers. Thus citations need permanency to ensure validity and reproducibility of research results. She however expressed concerns about “link rot” which makes links unreliable and transient.

Prof. Niels Brügger from the Digital Media Lab (Aarhus University) gave the second keynote about Web History, Web archives, and Web Research Infrastructure. He highlighted the challenges faced in setting up such infrastructure and shared experiences about RESAW – A Research Infrastructure for the Study of Archived Web Materials, and NETLAB – An internet research infrastructure within the Danish research infrastructure for the humanities Digital Humanities Lab. Similarly, Thomas Risse also talked about the SoBigData project which creates a research infrastructure providing an integrated ecosystem for ethic-sensitive social data mining.

In addition to these wide ranging set of talks, there was a demo session showcasing the proof-of-concept systems developed in L3S relating to the topics of interest to the workshop. Finally, the workshop concluded by a panel discussion on the issues that affects archives in general. A key challenge that was identified was legality of openness and data sharing. In the second year of the workshop we saw tangible research results and prototype systems emerging validating the real potential of Web archives and temporal collections, although some concerns regarding data sharing, web infrastructures and data persistence still remain.
Internet Technologies and Information Systems – A cooperation with L3S

Since 2011, the M.Sc. program “Internet Technologies and Information Systems (ITIS)” is offered by the four universities TU Braunschweig, TU Clausthal, Georg-August-Universität Göttingen and Leibniz Universität Hannover.

All courses from this international program are offered in English through various course modes, such as video recording, live streaming and transmission to other universities.

In 2015, the following ITIS students contributed their work to L3S projects:

- Rajib Das (Bangladesh): Personal Photo Selection (Supervisors: Prof. Dr. Robert Jäschke, M.Sc. Andrea Ceroni)
- Sudhir Kumar Sah (Nepal): Policy-based Preservation Framework (Supervisors: Prof. Dr. Wolfgang Nejdl, Dr. Nattiya Kanhabua, M.Sc. Anh Tuan Tran)
- Mainul Quraishi (India): Temporal Performance of Product Review Analysis Algorithms (Supervisors: Prof. Dr. Wolfgang Nejdl, Dr. Katja Markert)
- Mohammad Wazed Ali (Bangladesh): Entity Retrieval on Web Data Commons (Supervisors: Dr. Stefan Dietze, M.Sc. Ran Yu)
- Supriya Gurupadaswamy (India) / Hao Cheng (China): Pattern recognition on kochbar dataset (Supervisors: Prof. Dr. Wolfgang Nejdl, Dr. Eelco Herder)
- Qazi Asim Ijaz Ahmad (Pakistan): Extending MWS with Dynamic Relational Timelines (Supervisor: Dr. Ivana Marenzi)
- Abhijit Anand (India): Event Lag In Wikipedia (Supervisors: Prof. Dr. Robert Jäschke, Prof. Dr. Wolfgang Nejdl)
- Zeon Trevor Fernando (India): Ranking and Diversification of Search Results for Temporal Queries (Supervisors: Dr. Avishek Anand, M.Sc. Jaspreet Singh)

During the winter semester 2015/16, another four ITIS students successfully graduated, receiving the academic grade “Master of Science” (M.Sc.):
- Chuong Thach Nguyen (Vietnam)
- Haile Migna (Ethiopia)
- Morsheda Shimu Akter (Bangladesh)
- Rashmi Kothali (India)

Additionally, five ITIS students received the “Lower Saxony scholarship” for their outstanding performances in academic studies, their commitment to social causes and their help for new students during their spare time:
- Mainul Quraishi (India)
- Rajib Das (Bangladesh)
- Fatema Tuj Johora (Bangladesh)
- Andrea Hernandez Garcia (Mexico)
- Thishanth Thevarajah (Sri Lanka)

All courses are offered through various course modes. Photos: L3S
Conferral of a Doctorate
2015

Big Data Cluster Extended

Projects with a focus on big data analytics require an adequate infrastructure for handling such data, for instance, BDSec, ALEXANDRIA, and QualiMaster. Consequently, the dedicated big data cluster system of L3S Research Center was extended in 2015 by four new nodes, i.e., 48 CPU cores, 512 GiB main memory, and 192 TB hard disk space. Overall, the system now features 25 compute nodes with an overall disk space of one pebibyte and 268 CPU cores. The cluster features a comprehensive set of services which address different requirements, e.g., ElasticSearch for information retrieval in very large document collections, Apache Storm for real-time analysis of streams, and Apache Spark for large-scale data processing. Within 2015, almost 10000 jobs were started and several new data collections were added.
Are You Ready to Take the Next Step in Your Scientific Career?

The L3S Research Center participated in the European Career Fair (ECF) in February 2015 at the Massachusetts Institute of Technology (MIT) in Cambridge to visualize its research on the interdisciplinary field of Web Science in US. The German Academic Exchange Service (DAAD) and the German Federal Ministry of Education and Research (BMBF) support the participation of German universities.

It was the 20th anniversary and ECF continues to serve the Boston area universities and colleges by providing opportunities for students at all levels to connect with European Universities, Research Centers and employers. This fair hosts some of the brightest candidates who are interested in a career in Europe, and increases awareness in the US about the exciting career opportunities that Europe, as well as Germany and Hannover, have to offer. It is the largest event of its kind in the United States and has a proven track record providing domestic, foreign, and multinational companies access to some of the highest caliber applicants worldwide. The candidates are students, working professionals and recent alums of Ivy League, and renowned European and American universities.

"It is the ideal place to discover new opportunities for a research career in Germany“ mentioned L3S Managing Director Gabriele Herrmann-Krotz, who was also the representative of the Leibniz Universität among the TU9-Initiative, the German Institutes of Technologies (http://www.tu9.de). “The ECF is an excellent opportunity for us to get in contact with graduates and scientists from top universities. We inspire them to continue their academic career in Hanover at the L3S.”

The following two e days of ECF were specially reserved for one-on-one interviews. “We use those days to inform interested scientists about our current research and course offerings at L3S and LUH to show them their individual opportunities in Hanover”, said Herrmann-Krotz.

The German Academic Exchange Service (DAAD) and the German Federal Ministry of Education and Research (BMBF) support the participation of German universities. The L3S and numerous other German universities and research institutions were jointly presented under the label “Research in Germany – Land of Ideas” to increase visibility and to show the great variety of science and research in Germany.

More than eighty exhibitors from Europe (Italy, Switzerland, Germany, France, Denmark) as well as overseas like Canada participated in the recruitment and career fair, of which roughly 20 percent were corporate entities and 80 percent non-profit or academic institutions. Approximately 3,800 international visitors attended the event, on a very frozen and snowy February day in 2015.

Venio Quniqe (TU9), Gabriele Herrmann-Krotz (L3S).
Best Paper Award

HypTrails: A Bayesian Approach for Comparing Hypotheses about Human Trails

L3S Member Prof. Dr. Andreas Hotho and his colleagues Philipp Singer and Markus Strohmaier (GESIS, Leibniz-Institut für Sozialwissenschaften) and Denis Helic (Technischen Uni Graz) received a Best Paper Award at WWW 2015:

For more information please have a look at:
http://www.informatik.uni-wuerzburg.de/aktuelles/meldungen/single2/artikel/wie-nutzer-sich-im-web-bewegen-1
PUBLICATIONS


Ackermann, Hanno; Scheuermann, Bjorn; Chin Tat-Jun & Abu-Salma, Ruba; Sasse, M. Angela; Bonneau, Joseph & Akin, Sami; Fidler, Markus; Akin, Sami & Gursoy, Mustafa Cenk; Performance Analysis of Cognitive Radio Systems with Imperfect Channel Sensing and Estimation. In: IEEE Transactions on Communications Vol. 63(5); 2015

In cognitive radio systems, employing sensing-based spectrum access strategies, secondary users are required to perform channel sensing to detect the activities of licensed primary users in a channel, and in realistic scenarios, channel sensing occurs with possible errors due to miss-detections and false alarms. As another challenge, time-varying fading conditions in the channel between the secondary transmitter and the secondary receiver have to be learned via channel estimation. In this paper, performance of causal channel estimation methods in correlated cognitive radio channels under imperfect channel sensing results is analyzed, and achievable rates for reliable communication under both channel and sensing uncertainty are investigated by considering the input-output mutual information. Initially, cognitive radio channel model with channel sensing error and channel estimation is described. Then, using pilot symbols, minimum mean square error (MMSE) and linear-MMSE (L-MMSE) estimation methods are employed at the secondary receiver to learn the channel fading coefficients. Expressions for the channel estimates and mean squared errors (MSE) are determined, and their dependencies on channel sensing results, and pilot symbol period and energy are investigated. Since sensing uncertainty leads to uncertainty in the variance of the additive disturbance, channel estimation strategies and performance are interestingly shown to depend on the sensing reliability. It is further shown that the L-MMSE estimation method, which is in general suboptimal, performs very close to MMSE estimation. Furthermore, assuming the channel estimation errors and the interference introduced by the primary users as zero-mean and Gaussian distributed, achievable rate expressions of linear modulation schemes and Gaussian signaling are determined. Subsequently, the training period, and data and pilot symbol energy allocations are jointly optimized to maximize the achievable rates for both signaling schemes.


Al-Shaikhli, Saif; Yang, Michael & Rosenhahn, Bodo; Brain Tumor Classification and Segmentation Using Sparse Coding and Dictionary Learning. In: Biomedical Engineering / Biomedizinische Technik (BMT) Journal; 2015

This paper presents a novel fully automatic framework for multi-class brain tumor classification and segmentation using a sparse coding and dictionary learning method. The proposed framework consists of two steps: classification and segmentation. The classification of the brain tumors is based on brain topology and texture. The segmentation is based on voxel values of the image data. Using K-SVD, two types of dictionaries are learned from the training data and their associated ground truth segmentation: feature dictionary and voxel-wise coupled dictionaries. The feature dictionary consists of global image features (topological and texture

Akin, Sami; Akin, Sami & Fidler, Markus; Backlog and delay reasoning in HARQ systems. In: CoRR Vol. abs/1506.01530; 2015

Akin, Sami & Fidler, Markus; Backlog and delay reasoning in HARQ systems. In: CoRR Vol. abs/1506.01530; 2015

Al-Shaikhli, Saif; Yang, Michael & Rosenhahn, Bodo; Brain Tumor Classification and Segmentation Using Sparse Coding and Dictionary Learning. In: Biomedical Engineering / Biomedizinische Technik (BMT) Journal; 2015

This paper presents a novel fully automatic framework for multi-class brain tumor classification and segmentation using a sparse coding and dictionary learning method. The proposed framework consists of two steps: classification and segmentation. The classification of the brain tumors is based on brain topology and texture. The segmentation is based on voxel values of the image data. Using K-SVD, two types of dictionaries are learned from the training data and their associated ground truth segmentation: feature dictionary and voxel-wise coupled dictionaries. The feature dictionary consists of global image features (topological and texture

Akin, Sami & Fidler, Markus; Backlog and delay reasoning in HARQ systems. In: CoRR Vol. abs/1506.01530; 2015

Akin, Sami & Fidler, Markus; Backlog and delay reasoning in HARQ systems. In: CoRR Vol. abs/1506.01530; 2015


105

features). The coupled dictionaries consist of coupled information: gray scale voxel values of the training image data and their associated label voxel values of the ground truth segmentation of the training data. For quantitative evaluation, the proposed framework is evaluated using different metrics. The segmentation results of the brain tumor segmentation (MICCAI-BraTS-2013) database are evaluated using five different metric scores, which are computed using the online evaluation tool provided by the BraTS-2013 challenge organizers. Experimental results demonstrate that the proposed approach achieves an accurate brain tumor classification and segmentation and outperforms the state-of-the-art methods.

Atzmueller, Martin; Kibanov, Mark; Hayat, Naveed; Trojahn, Matthias & Kroll, Dennis; Adaptive Class Association Rule Mining for Human Activity Recognition. In: Proc. of International Workshop on Mining Ubiquitous and Social Environments (MUSE@PKDD/ECML 2015); 2015

Atzmueller, Martin; Kibanov, Mark; Scholz, Christoph; Mueller, Juergen & Stumme, Gerd; Conferator – A Ubiquitous System for Enhancing Social Networking at Conferences. In: Proc. of UIS 2015 Umwelt.Daten.Vielfalt; 2015


Baethge-Kinsky, Volker & Zerr, Sergej; Die Erschließung von Primärmaterial qualitativer Studien für die Sekundäranalyse als Herausforderung für Sozialwissenschaften und Informatik. In: Datenbank-Spektrum Vol. 15(1); Springer Berlin Heidelberg; 2015

Baumann, Florian; Liao, Jie; Ehlers, Arne & Rosenhahn, Bodo; Recognizing Human Actions using novel Space-time Volume Binary Patterns. In: Neurocomputing Journal; 2015

Barthel, Simon; Tönnies, Sascha; Köhncke, Benjamin; Siehnadel, Patrick & Balke, Wolf-Tilo; What does Twitter Measure?: Influence of Diverse User Groups in Altmetrics.. In: Proc. of 15th ACM/IEEE Joint Conference on Digital Libraries (JCDL); ACM; 2015

The most important goal for digital libraries is to ensure high quality search experience for all kinds of users. To attain this goal, it is necessary to have as much relevant metadata as possible at hand to assess the quality of publications. Recently, a new group of metrics appeared, that has the potential to raise the quality of publication metadata to the next level – the altmetrics. These metrics try to reflect the impact of publications within the social web. However, currently it is still unclear if and how altmetrics should be used to assess the quality of a publication and how altmetrics are related to classical bibliographical metrics (like e.g. citations). To gain more insights about what kind of concepts are reflected by altmetrics, we conducted an in-depth analysis on a real world dataset crawled from the Public Library of Science (PLOS). Especially, we analyzed if the common approach to regard the users in the social web as one homogeneous group is sensible or if users need to be divided into diverse groups in order to receive meaningful results.


Baumann, Florian; Liao, Jie; Ehlers, Arne & Rosenhahn, Bodo; Recognizing Human Actions using novel Space-time Volume Binary Patterns. In: Neurocomputing Journal; 2015

In this paper, we propose a novel feature type, namely Motion Binary Pattern (MBP) and different computation strategies for the well-known Volume Local Binary Pattern (VLBP). MBPs are a combination of VLBPs and Optical Flow. By combining the benefit of both methods, a simple and efficient descriptor is constructed. Motion Binary Patterns are computed in the spatio-temporal domain while the motion in consecutive frames is described. Finally, a feature descriptor is constructed by a histogram computation. Volume Local Binary Patterns are a feature type to describe object characteristics in the spatio-temporal domain. But apart from the computation of such a pattern further steps are required to create a discriminative feature. These steps are evaluated in detail and the best strategy is shown. For MBPs and VLBPs, a Random Forest classifier is learned and applied to the task of human action recognition. The proposed novel feature type and VLBPs are evaluated on the well-known, publicly available KTH dataset, Weizman dataset and on the IXMAS dataset for multi-view action recognition. The results demonstrate challenging accuracies in comparison to state-of-the-art methods.
Baumann, Florian; Vogt, Karsten; Ehlers, Arne & Rosenhahn, Bodo; Probabilistic Nodes for Modelling Classification Uncertainty for Random Forest. In: Proc. of 14th IAPR International Conference on Machine Vision Applications (MVA); 2015

Baumann, Florian; Wei, Liu; Ehlers, Arne & Rosenhahn, Bodo; Sequential Boosting for Learning a Random Forest Classifier. In: Proc. of IEEE Winter Conference on Applications of Computer Vision (WACV); 2015

Bauszat, Pablo; Eisemann, Martin; John, Stefan & Magnor, Marcus; Sample-Based Manifold Filtering for Interactive Global Illumination and Depth of Field. In: Computer Graphics Forum Vol. 34(1); 2015

We present a fast reconstruction filtering method for images generated with Monte Carlo–based rendering techniques. Our approach specializes in reducing global illumination noise in the presence of depth-of-field effects at very low sampling rates and interactive frame rates. We employ edge-aware filtering in the sample space to locally improve outgoing radiance of each sample. The improved samples are then distributed in the image plane using a fast, linear manifold-based approach supporting very large circles of confusion. We evaluate our filter by applying it to several images containing noise caused by Monte Carlo-simulated global illumination, area light sources and depth of field. We show that our filter can efficiently denoise such images at interactive frame rates on current GPUs and with as few as 4–16 samples per pixel. Our method operates only on the colour and geometric sample information output of the initial rendering process. It does not make any assumptions on the underlying rendering technique and sampling strategy and can therefore be implemented completely as a post-process filter.


Cao, Zhen & Papadimitriou, Panagiotis; Collaborative Content Caching in Wireless Edge with SDN; ACM; 2015

Cao, Zhen; Fitschen, Jürgen & Papadimitriou, Panagiotis; FreeSurf: Application-Centric Wireless Access with SDN; In: ACM SIGCOMM Computer Communication Review Vol. 45(1); 2015

Cao, Zhen; Fitschen, Jürgen & Papadimitriou, Panagiotis; Social Wi-Fi: Hotspot Sharing with Online Friends; IEEE; 2015


Cerconi, Andrea; Solachidis, Vassilios; Niederée, Claudia; Papadopoulou, Olga; Kanhabua, Nattiya & Mezaris, Vasileios; To Keep or not to Keep: An Expectation-oriented Photo Selection Method for Personal Photo Collections. In: Proc. of 5th International Conference on Multimedia Retrieval (ICMR); 2015

Cerconi, Andrea; Solachidis, Vassilios; Fu, Mingxin; Kanhabua, Nattiya; Papadopoulou, Olga; Niederée, Claudia & Mezaris, Vasileios; Investigating Human Behaviors in Selecting Personal Photos to Preserve Memories. In: Proc. of IEEE International Conference on Multimedia and Expo Workshops (ICMEW 2015); 2015

Cordes, Kai & Ostermann, Jörn; Increasing the Precision of Junction Shaped Features. In: Proc. of 14th IAPR International Conference on Machine Vision Applications (MVA); 2015

Cordes, Kai; Grundmann, Lukas & Ostermann, Jörn; Feature Evaluation with High-Resolution Images. In: Proc. of 16th International Conference on Computer Analysis of Images and Patterns (CAIP); LNCS; Vol. 9256; 2015

Cordes, Kai; Hockner, Mark; Ackermann, Hanno; Rosenhahn, Bodo & Ostermann, Jörn; WM-SBA: Weighted Multibody Sparse Bundle Adjustment. In: Proc. of 14th IAPR International Conference on Machine Vision Applications (MVA); 2015


We consider the weighted satisfiability problem for Boolean circuits and propositional formulae, where the weight of an assignment is the number of variables set to true. We study
the parameterized complexity of these problems and initiate a systematic study of the complexity of its fragments. Only the monotone fragment has been considered so far and proven to be of same complexity as the unrestricted problems. Here, we consider all fragments obtained by semantically restricting circuits or formulae to contain only gates (connectives) from a fixed set $B$ of Boolean functions. We obtain a dichotomy result by showing that for each such $B$, the weighted satisfiability problems are either \text{W[p]}-complete (for circuits) or \text{W[sat]}-complete (for formulae) or efficiently solvable. We also consider the related enumeration and counting problems.

Creignou, Nadia; Ktari, Raida; Meier Arne; Müller Julian-Steffen; Olive, Frederic & Vollmer, Heribert; Parameterized Enumeration for Modification Problems. In: Proc. of 9th International Conference, LATA 2015, Nice, France, March 2-6, 2015; 2015

Dahi, Alan; Can the US-Government Conscript Private Firms?. In: ZD-Aktuell; 2015


Dahi, Alan & Revolidis, Ioannis; Further Processing of Personal Data – Is there a Future for the Purpose Limitation Principle in the Upcoming General Data Protection Regulation?. In: ZD-Aktuell; 2015

Demidova, Elena; Risse, Thomas & Tran, Giang Binh; Entity-Centric Preservation for Linked Open Data: Use Cases, Requirements and Models. In: Proc. of 5th International Workshop on Semantic Digital Archives (SDA 2015); ceur-ws.org; 2015


The ever-increasing need to diversify the Internet has recently revived the interest in network virtualization. Wide-area virtual network (VN) deployment raises the need for VN embedding (VNE) across multiple Infrastructure Providers (InPs), due to the InP's limited geographic footprint. Multi-provider VNE, in turn, requires a layer of indirection, interposed between the Service Providers and the InPs. Such brokers, usually known as VN Providers, are expected to have very limited knowledge of the physical infrastructure, since InPs will not be willing to disclose detailed information about their network topology and resource availability to third parties. Such information disclosure policies entail significant implications on resource discovery and allocation. In this paper, we study the challenging problem of multiprovider VNE with limited information disclosure (LID). In this context, we initially investigate the feasibility of VN Providers on substrate network resources and question the suitability of topology-based requests for VNE. Subsequently, we present linear programming formulations for: (i) the partitioning of traffic matrix based VN requests into segments mappable to InPs, and (ii) the mapping of VN segments into substrate network topologies. VN request partitioning is carried out under LID, i.e., VN Providers access only information which is not deemed confidential by InPs. We further investigate the suboptimality of LID on VNE against a "best-case" scenario where the complete network topology and resource availability information is available to VN Providers.


Dietze, S.; d’Aquin, M.; Gasevic, D. & Herder, E.; 5th International Workshop on Learning and Education with the Web of Data, as part of Companion Publication of the ACM World Wide Web 2015 Conference; ACM; 2015


Reusable educational resources became increasingly important for enhancing learning and teaching experiences, particularly in the medical domain where resources are particularly expensive to produce. While interoperability across educational resources metadata repositories is yet limited to the heterogeneity of metadata standards and interface mechanisms with a lack of shared or aligned controlled vocabularies, Linked Data (LD) principles, based on W3C standards and supported through a wide range of tools, open up opportunities to alleviate such problems. We introduce the “mEducator Linked Educational Resources” dataset, which offers a range of open educational resources for the medical domain, exposed through LD principles. Data have been generated through a combination of manual curation and semi-automated harvesting techniques, and state-of-the-art enrichment and clustering techniques were deployed in order to classify and categorize data, toward improved reusability and access. Data are currently used by a range of educational applications and is accessible for third parties and developers, for instance through the LinkedUp Catalog and other registries, to facilitate further take-up and applications.

Drachsler, Hendrik; Dietze, Stefan; Herder, Elco; d’Aquin, Mathieu; Taibi, Davide & Scheffel, Maren; The 3rd LAK data competition.. In: Proc. of LAK; ACM; 2015

Durand, Arnaud; Ebbing, Johannes; Kontinen, Juha & Vollmer, Heribert; Dependence Logic with a Majority Quantifier. In: Journal of Logic, Language and Information Vol. 24(3); 2015


Fenzi, Michele; Leal-Taixé, Laura; Schindler, Konrad & Ostermann, Jürgen; Pose Estimation of Object Categories in Videos Using Linear Programming. In: Proc. of IEEE Winter Conference on Applications of Computer Vision (WACV); 2015


Fidler, Markus & Rizk, Amr; A guide to the stochastic network calculus. In: IEEE Communications Surveys and Tutorials Vol. 17(1); 2015

The aim of the stochastic network calculus is to comprehend statistical multiplexing and scheduling of non-trivial traffic sources in a framework for end-to-end analysis of multimode networks. To date, several models, some of them with subtle yet important differences, have been explored to achieve these objectives. Capitalizing on previous works, this paper contributes an intuitive approach to the stochastic network calculus, where we seek to obtain its fundamental results in the possibly easiest way. In detail, the method that is assembled in this work uses moment generating functions, known from the theory of effective bandwidths, to characterize traffic arrivals and network service. Thereof, affine envelope functions with an exponentially decaying overflow profile are derived to compute statistical end-to-end backlog and delay bounds for networks.

Fidler, Markus; Lübben, Ralf & Becker, Nico; Capacity-delay-error boundaries: a composable model of sources and systems. In: IEEE Transactions on Wireless Communications Vol. 14(3); 2015

This paper develops a notion of capacity-delay-error (CDE) boundaries as a performance model of networked sources and systems. The goal is to provision effective capacities that sustain certain statistical delay guarantees with a small probability of error. We use a stochastic non-equilibrium approach that models the variability of traffic and service to formalize the influence of delay constraints on the effective capacity. Permitting unbounded delays, known ergodic capacity results from information theory are recovered in the limit. We prove that the model has the property of additivity, which enables composing CDE boundaries obtained for sources and systems as if in isolation. A method for construction of CDE boundaries is devised based on moment generating functions, which includes the large body of results from the theory of effective bandwidths. Solutions for essential sources, channels, and respective coders are derived, including Huffman coding, MPEG video, Rayleigh fading, and hybrid automatic repeat request. Results for tandem channels and for the composition of sources and channels are shown.

Fetahu, Besnik; Gadiraju, Ujwal & Dietze, Stefan; Improving Entity Retrieval on Structured Data. In: Proc. of 14th International Semantic Web Conference (ISWC); Springer; 2015

108
Fiosins, Maksims; Zeise, Björn; Gernert, Björn; Schildt, Sebastian; Fritsche, Paul; Manesh, Ramin; Müller, Jörg; Wagner, Bernardo & Wolf, Lars; dCIM: An Agent-Based Distributed Common Information Model for Teams of Mobile Robots. In: Proc. of Autonomous Agents and Multi-Agent Systems at Scale Workshop at the International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2015); 2015

Forgó, Nikolaus; Datenschutz in der EU: Nach dem Spiel ist vor dem Spiel. In: heise.de; 2015

Forgó, Nikolaus; Europäischer Datenschutz. In: Forschung und Lehre Vol. 22. Jahrgang(10); 2015

Forgó, Nikolaus; Kommentierung der §§ 30a und 33 BDSG. In: Beck’scher Online-Kommentar Datenschutzrecht; C.H. Beck; 2015

Forgó, Nikolaus; Kommentierung des § 17 NHG (Verarbeitung personenbezogener Daten). In: Kommentar zum Niedersächsischen Hochschulgesetz (NHG); Nomos; 2015

Forgó, Nikolaus; Kommentierung des § 45 NHG (Ständige Kommissionen für Lehre und Studium; Studiendekaninnen und Studiendekane). In: Kommentar zum Niedersächsischen Hochschulgesetz (NHG); Nomos; 2015


Fritsche, Paul & Wagner, Bernardo; Comparison of two radar-based scanning-techniques for the use in robotic mapping. In: Proc. of 12th International Conference on Informatics in Control, Automation and Robotics (ICINCO); 2015

Fricker, Samuel A.; Schneider, Kurt; Fotrousi, Farnaz & Thuemmler, Christoph; Workshop videos for requirements communication. In: Requirements Engineering; Springer; 2015

Shared understanding of requirements between stakeholders and the development team is a critical success factor for requirements engineering. Workshops are an effective means for achieving such shared understanding. Stakeholders and team representatives can meet and discuss what a planned software system should be and how it should support achieving stakeholder goals. However, some important intended recipients of the requirements are often not present in such workshops: the developers. Thus, they cannot benefit from the in-depth understanding of the requirements and of the rationales for these requirements that develops during the workshops. The simple handover of a requirements specification hardly compensates the rich requirements understanding that is needed for the development of an acceptable system. To compensate the lack of presence in a requirements workshop, we propose to record that requirements workshop on video. If workshop participants agree to be recorded, a video is relatively simple to create and can capture much more aspects about requirements and rationales than a specification document. This paper presents the workshop video technique and a phenomenological evaluation of its use for requirements communication from the perspective of software developers. The results show how the technique was appreciated by observers of the video, present positive and negative feedbacks from the observers, and lead to recommendations for implementing the technique in practice.

Fu, Mingxin; Ceroni, Andrea; Solachidis, Vassilis; Niederée, Claudia; Papadopoulou, Olga; Kanhabua, Nattiya & Mezaris, Vasileios; Learning Personalized Expectation-oriented Photo Selection Models for Personal Photo Collections. In:
In the 21st century, where automated systems and artificial intelligence are replacing arduous manual labor by supporting data-intensive tasks, many problems still require human intelligence. Over the last decade, by tapping into human intelligence through microtasks, crowdsourcing has found remarkable applications in a wide range of domains. In this article, the authors discuss the growth of crowdsourcing systems since the term was coined by columnist Jeff Howe in 2006. They shed light on the evolution of crowdsourced microtasks in recent times. Next, they discuss a main challenge that hinders the quality of crowdsourced results: the prevalence of malicious behavior. They reflect on crowdsourcing’s advantages and disadvantages. Finally, they leave the reader with interesting avenues for future research.

Crowdsourcing is increasingly being used as a means to tackle problems requiring human intelligence. With the ever-growing worker base that aims to complete microtasks on crowdsourcing platforms in exchange for financial gains, there is a need for stringent mechanisms to prevent exploitation of deployed tasks. Quality control mechanisms need to accommodate a diverse pool of workers, exhibiting a wide range of behavior. A pivotal step towards fraud-proof task design is understanding the behavioral patterns of microtask workers. In this paper, we analyze the prevalent malicious activity on crowdsourcing platforms and study the behavior exhibited by trustworthy and untrustworthy workers, particularly on crowdsourced surveys. Based on our analysis of the typical malicious activity, we define and identify different types of workers in the crowd, propose a method to measure malicious activity, and finally present guidelines for the efficient design of crowdsourced surveys.

Efforts to make highly specialized knowledge accessible through scientific digital libraries need to go beyond mere bibliographic metadata, since here information search is mostly entity-centric. Previous work has realized this trend and developed different methods to recognize and (to some degree even automatically) annotate several important types of entities: genes and proteins, chemical structures and molecules, or drug names to name but a few. Moreover, such entities are often crossreferenced with entries in curated databases. However, several questions still remain to be answered: Given a scientific discipline what are the important entities? How can they be automatically identified? Are really all of them relevant, i.e. do all of them carry deeper semantics for assessing a publication? How can they be represented, described, and subsequently annotated? How can they be used for search tasks? In this work we focus on answering some of these questions. We claim that to bring the use of scientific digital libraries to the next level we must find treat topic-specific entities as first class citizens and deeply integrate
their semantics into the search process. To support this we propose a novel probabilistic approach that not only successfully provides a solution to the integration problem, but also demonstrates how to leverage the knowledge encoded in entities and provide insights to explore the use of our approach in different scenarios. Finally, we show how our results can benefit information providers.


Researchers in the Digital Humanities and journalists need to monitor, collect and analyze fresh online content regarding current events such as the Ebola outbreak or the Ukraine crisis on demand. However, existing focused crawling approaches only consider topical aspects while ignoring temporal aspects and therefore cannot achieve thematically coherent and fresh Web collections. Especially Social Media provide a rich source of fresh content, which is not used by state-of-the-art focused crawlers. In this paper we address the issues of enabling the collection of fresh and relevant Web and Social Web content for a topic of interest through seamless integration of Web and Social Media in a novel integrated focused crawler. The crawler collects Web and Social Media content in a single system and exploits the stream of fresh Social Media content for guiding the crawler.


In lungs the number of conducting airway generations as well as bifurcation patterns varies across species and shows specific characteristics relating to illnesses or gene variations. A method to characterize the topology of the mouse airway tree using scanning laser optical tomography (SLOT) tomograms is presented in this paper. It is used to test discrimination between two types of mice based on detected differences in their conducting airway pattern. Based on segmentations of the airways in these tomograms, the main spanning tree of the volume skeleton is computed. The resulting graph structure is used to distinguish between wild type and surfactant protein (SP-D) deficient knock-out mice.

Badgu, Asmelash Teka; Nigam, Aastha & Diaz-Aviles, Ernesto; Large-Scale Learning with AdaGrad on Spark. In: Proc. of IEEE International Conference on Big Data (Big Data); 2015


Hänold, Stefanie; Neue Perspektiven für die Einbeziehung von Ethikkommissionen in die Forschung mit humanen Bio- materialien und Daten. In: Zeitschrift für Datenschutz; 2015


Heermann, Thorsten; AG Nienburg: Erstmals Dash-Cam Aufzeichnung als Beweismittel im Strafverfahren zugelassen. In: Zeitschrift für Datenschutz; 2015


Heermann, Thorsten; Niedersachsen drängt auf schärfere Regelungen für den Einsatz privater Drohnen. In: Zeitschrift für Datenschutz; 2015


Heinrich, Robert; Gärtner, Stefan; Hesse, Tom-Michael; Ruhroth, Thomas; Reussner, Ralf; Schneider, Kurt; Paech, Barbara & Jürjens, Jan; A Platform for Empirical Research on Information SystemEvolution. In: Proc. of 27th International Conference on Software Engineering and Knowledge Engineering (SEKE’15); 2015


Hell, Benjamin; Kassubeck, Marc; Bauszat, Pablo; Eisemann, Martin & Magnor, Marcus; An Approach Towards Fast Gradient-based Color Image Segmentation. In: IEEE Transactions on Image Processing (TIP) Vol. 24(9); 2015

In this paper, we present and investigate an approach to fast multilabel color image segmentation using convex optimization techniques. The presented model is in some ways related to the well-known Mumford-Shah model, but deviates in certain important aspects. The optimization problem has been designed with two goals in mind. The objective function should represent fundamental concepts of image segmentation, such as incorporation of weighted curve length and variation of intensity in the segmented regions, while allowing transformation into a convex concave saddle point problem that is computationally inexpensive to solve. This paper introduces such a model, the nontrivial transformation of this model into a convex-concave saddle point problem, and the numerical treatment of the problem. We evaluate our approach by applying our algorithm to various images and show that our results are competitive in terms of quality at unprecedentedly low computation times. Our algorithm allows high-quality segmentation of megapixel images in a few seconds and achieves interactive performance for low resolution images.

Henschel, Roberto; Leal-Taixé, Laura & Bodo, Rosenhahn; Solving Multiple People Tracking In A Minimum Cost Arborescence. In: Proc. of IEEE Winter Conference on Applications of Computer Vision Workshops (WACVW); 2015

Henseler, Helga; Bonkat, Sarah Kim; Vogt, Peter & Rosenhahn, Bodo; The kinect recording System for objective three- and fourdimensional breast assessment with image overlays. In: Journal of Plastic, Reconstructive and Aesthetic Surgery; 2015

**Introduction**: We investigated the application of the validated portable Kinect camera for three- and four-dimensional breast assessment in female life models.

**Method**: Breast images from six life models were captured using the Kinect camera. Capture was conducted with taking three different arm positions while standing upright: with the arms straight down, straight up to the side at 90° and straight all the way up. Images of the volunteers were superimposed on each other. Digital linear distances between sternal notch and nipple-areola complexes were obtained and compared. The views of plastic and breast surgeons to arm positions were questioned. An example for clinical application was provided.

**Results**: Successful capture of images of the female life breast models was achieved. Digital breast measurements at the three different arm positions revealed considerable variation in linear distances measured on the images obtained with the Kinect camera. The dynamic of breast movements could be demonstrated by image overlay and the first ever four-dimensional breast assessment was demonstrated. Fourteen plastic and breast surgeons were found to have nine different opinions regarding their favoured arm positions for breast capture. Even though precision of image sharpness still needs improvement, the images were satisfactory for clinical patient use. The Kinect data were shown to be applicable to surgery planning by designing a planar flap from the 3D mesh.

**Conclusion**: The portable and low-cost Kinect camera proved to be easy to use for the first application in life models for three- and four-dimensional breast assessment.


Iryna, Lischchuk; Localization of personal data of Russian citizens in Russia. In: ZD-Aktuell; 2015


Jensen, Sarah; Opposition kritisiert Entwurf zum IT-Sicherheitsgesetz in erster Lesung. In: ZD-Aktuell; 2015

Kanhabua, Nattiya; Blanco, Roi & Nørvåg, Kjetil; Temporal Information Retrieval. In: Foundations and Trends in Information Retrieval Vol. 9(2); 2015


Kibanov, Mark; Mining Groups Stability in Ubiquitous and Social Environments: Communities, Classes and Clusters. In: Proc. of 8th International Conference on Web Search and Data Mining (WSDM 2015); WSDM ‘15; ACM; 2015

Ubiquitous Computing is an emerging research area of computer science. Similarly, social network analysis and mining became very important in the last years. We aim to combine these two research areas to explore the nature of processes happening around users. The presented research focuses on exploring and analyzing different groups of persons or entities (communities, clusters and classes), their stability and semantics. An example of ubiquitous social data are social networks captured during scientific conferences using face-to-face RFID proximity tags. Another example of ubiquitous data is crowd-generated environmental sensor data. In this paper we generalize various problems connected to these and further datasets and consider them as a task for measuring group stability. Group stability can be used to improve state-
of-the-art methods to analyze data. We also aim to improve the performance of different data mining algorithms, eg. by better handling of data with a skewed density distribution. We describe significant results some experiments that show how the presented approach can be applied and discuss the planned experiments.

Knoke, Friederike; EuGH: Videoüberwachung auf Privatgrundstück, die auch den öffentlichen Raum erfasst, fällt unter die DS-RL. In: Zeitschrift für Datenschutz Vol. 5(3); 2015

Krombholz, Katharina; Dabrowski, Adrian; Smith, Matthew & Weippl, Edgar; Ok Glass, Leave Me Alone: Towards a Systematization of Privacy Enhancing Technologies for Wearable Computing. In: Financial Cryptography and Data Security; LNCS Vol. 8976; Springer Berlin Heidelberg; 2015

Kuznetsova, Alina; Hwang, Sung Ju; Rosenhahn, Bodo & Sigal, Leonid; A Metric Learning Approach for Multi-View Object Recognition and Zero-shot Pose Estimation. In: Proc. of 1st Workshop on Object Understanding for Interaction in conjuncton with IEEE International Conference on Computer Vision Workshops (ICCVW); 2015


Krombholz, Katharina; Dabrowski, Adrian; Smith, Matthew & Weippl, Edgar; Ok Glass, Leave Me Alone: Towards a Systematization of Privacy Enhancing Technologies for Wearable Computing. In: Financial Cryptography and Data Security; LNCS Vol. 8976; Springer Berlin Heidelberg; 2015

Laude, Thorsten & Ostermann, Jörn; Copy Mode for Static Screen Content Coding with HEVC. In: Proc. of IEEE International Conference on Image Processing (ICIP); 2015


Lishchuk, Iryna & Stauch, Marc; Copyright in Hyper-Models. In: Proc. of Tagungsband Herbstakademie 2015; Oldenburg Verlag für Wirtschaft, Informatik und Recht; 2015

Kontinen, Juha; Müller, Julian-Steffen; Schnoor, Henning & Vollmer, Heribert; A Van Benthem Theorem for Modal Team Semantics. In: Proc. of 24th EACSL Annual Conference on Computer Science Logic (CSL 2015), September 7-10, 2015, Berlin, Germany; 2015

Lischchuk, Iryna & Stauch, Marc; Copyright in Multiscale Cancer Modelling. In: IARIA XPS Press; 2015


Liu, Yiqun & Ostermann, Jörn; Fast Motion Blur Compensation in HEVC Using Fixed-length Filter. In: Proc. of IEEE International Conference on Image Processing (ICIP); 2015

Liu, Yiqun; Wu, Wei & Ostermann, Jörn; Motion Blur Compensation in HEVC Using Fixed-length Adaptive Filter. In: Proc. of 31th Picture Coding Symposium (PCS); 2015


Löwe, Thomas; Stengel Michael; Förster, Emmy-Charlotte; Gregorick, Steve & Magnor, Marcus; Visualization and Analysis of Head Movement and Gaze Data for Immersive Video in Head-mounted Displays. In: Proc. of Workshop on Eye Tracking and Visualization (ETVIS 2015); 2015

Maarry, Kinda El; Lofi, Christoph & Balke, Wolf-Tilo; Crowd-sourcing for Query Processing on Web Data: A Case Study on the Skyline Operator. In: Computing and Information Technology Vol. 23(1); 2015


Maarry, Kinda El; Günztzer, Ulrich & Balke, Wolf-Tilo; Realizing Impact Sourcing by Adaptive Gold Questions: A Socially Responsible Measure for Workers’ Trustworthiness. In: Proc. of International Conference on Web-Age Information Management (WAIM); LNCS Vol. 9098; Springer International Publishing; 2015

Meier, Arne; Schindler, Irina; Schmidt, Johannes; Thomas, Michael & Vollmer, Heribert; On the parameterized complexity of non-monotonic logics. In: Archive for Mathematical Logic Vol. 54(42526); 2015

Meuel, Holger; Kluger, Florian & Ostermann, Jörn; Region of Interest Coding for Aerial Surveillance Video Using AVC & HEVC. In: Technical Report; 2015

Meuel, Holger; Munderloh, Marco & Ostermann, Jörn; Stereo Mosaicking and 3D-Video for Singleview HDTV Aerial Sequences using a Low Bit Rate ROI Coding Framework. In: Proc. of 12th IEEE International Conference on Advanced Video and Signal based Surveillance (AVSS); 2015

Meuel, Holger; Munderloh, Marco; Reso, Matthias & Ostermann, Jörn; Mesh-based Piecewise Planar Motion Compensation and Optical Flow Clustering for ROI Coding. In: APSIPA Transactions on Signal and Information Processing Vol. 4; 2015

Morais, Alana; Marenzi, Ivana & Kantz, Deirdre; The LearnWeb formative assessment extension: Supporting awareness and reflection in blended courses.. In: Proc. of ARTEL@EC-TEL; CEUR Workshop Proceedings Vol. 1465; CEUR-WS.org; 2015

Naini, Kaweh Djafari; Altingovde, Ismail Sengor; Kawase, Ricardo; Herder, Eelco & Niederée, Claudia; Analyzing and Predicting Privacy Settings in the Social Web.. In: Proc. of UMAP; LNCS Vol. 9146; Springer; 2015

Nejdl, Wolfgang & Niederée, Claudia; Photos to Remember, Photos to Forget. In: IEEE MultiMedia Vol. 22(1); 2015

Each year makes it easier to accumulate large numbers of photos and videos in the social and personal digital space. Their long-term existence is mostly driven by chance rather than by clear guidelines or rules for archiving them. Thus, unfortunately, cases of unintended both the exposure and disappearance of personal photos happen much too often. This article mainly focuses on this question: What should we remember and thus archive, and what can we forget? The authors describe the European project ForgetIT (www.forgetIT-project.eu), which is investigating the introduction of a form of digital or managed forgetting into information management environments. The project focuses on the idea of making more conscious decisions about which content is really important, and thus should be preserved safely, and which content we can (and should) forget.


Nunes, Bernardo Pereira; Fetahu, Besnik; Kawase, Ricardo; Dietze, Stefan; Casanova, Marco Antonio & Maynard, Diana: Interlinking Documents Based on Semantic Graphs with an Application. In: Knowledge-Based Information Systems in Practice; Smart Innovation, Systems and Technologies Vol. 30; Springer International Publishing; 2015


Oltrogge, Marten; Acar, Yasemin; Dechand, Sergej; Smith, Matthew & Fah1, Sascha: To Pin or Not to Pin – Helping App Developers Bullet Proof Their TLS Connections. In: Proc. of 24th USENIX Security Symposium (USENIX Security 15); USENIX Association; 2015

For increased security during TLS certificate validation, a common recommendation is to use a variation of pinning. Especially non-browser software developers are encouraged to limit the number of trusted certificates to a minimum, since the default CA-based approach is known to be vulnerable to serious security threats. The decision for or against pinning is always a tradeoff between increasing security and keeping maintenance efforts at an acceptable level. In this paper, we present an extensive study on the applicability of pinning for non-browser software by analyzing 639,283 Android apps. Conservatively, we propose pinning as an appropriate strategy for 11,547 (1.8%) apps or for 45,247 TLS connections (4.25%) in our sample set. With a more optimistic classification of borderline cases, we propose pinning for consideration for 58,817 (9.1%) apps or for 140,020 (3.8%) TLS connections. This weakens the assumption that pinning is a widely usable strategy for TLS security in non-browser software. However, in a nominal actual comparison, we find that only 45 apps actually implement pinning. We collected developer feedback from 45 respondents and learned that only a quarter of them grasp the concept of pinning, but still find pinning too complex to use. Based on their feedback, we built an easy-to-use web-application that supports developers in the decision process and guides them through the correct deployment of a pinning-protected TLS implementation.


More than 45% of the pages that we visit on the Web are pages that we have visited before. Browsers support revisits with various tools, including bookmarks, history views and URL auto-completion. However, these tools only support revisits to a small number of frequently and recently visited pages. Several browser plugins and extensions have been proposed to better support the long tail of less frequently visited pages, using recommendation and prediction techniques. In this article, we present a systematic overview of revisitation prediction techniques, distinguishing them into two main types and several subtypes. We also explain how the individual prediction techniques can be combined into comprehensive revisitation workflows that achieve higher accuracy. We investigate the performance of the most important workflows and provide a statistical analysis of the factors that affect their predictive accuracy. Further, we provide an upper bound for the accuracy of revisitation prediction using an ‘oracle’ that discards non-revisited pages.
Many data processing tasks such as semantic annotation of images, translation of texts in foreign languages, and labeling of training data for machine learning models require human input, and, on a large scale, can only be accurately solved using crowd based online work. Recent work shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by workers shows that frameworks where crowd workers compete against each other can drastically reduce crowdsourcing costs, and outperform conventional reward schemes where the payment of online workers is proportional to the number of accomplished tasks (“pay-per-task”). In this paper, we investigate how team mechanisms can be leveraged to further improve the cost efficiency of crowdsourcing competitions. To this end, we introduce strategies for team based crowdsourcing, ranging from team formation processes where workers are randomly assigned to competing teams, over strategies involving self-organization where workers actively participate in team building, to combinations of team and individual competitions. Our large-scale experimental evaluation with more than 1,100 participants and overall 5,400 hours of work spent by
crowd workers demonstrates that our team based crowdsourcing mechanisms are well accepted by online workers and lead to substantial performance boosts.

Rottwinkel, Wolfgang; BVerfG: Identitätsfeststellung bei Ver- sammlung erfordert konkrete Gefahr für ein polizeiliches Schutzgut. In: ZD-Aktuell; 2015

Rottwinkel, Wolfgang; Thorsten auf Abwegen. In: Juristische Arbeitsblätter; 2015

Ruf, Miriam; Ziehn, Jens; Willersinn, Dieter; Rosenhahn, Bodo; Beyrer, Jürgen & Gotzig, Heinrich; Global Trajectory Optimization on Multilane Roads. In: Proc. of IEEE International Conference on Intelligent Transportation Systems; 2015

Ruhl, Kai; Eisemann, Martin; Hilsmann, Anna; Eisert, Peter & Magnor, Marcus; Interactive Scene Flow Editing for Improved Image-based Rendering and Virtual Spacetime Navigation. In: Proc. of ACM Multimedia; ACM; 2015

High-quality stereo and optical flow maps are essential for a multitude of tasks in visual media production, e.g. virtual camera navigation, disparity adaptation or scene editing. Rather than estimating stereo and optical flow separately, scene flow is a valid alternative since it combines both spatial and temporal information and recently surpassed the former two in terms of accuracy. However, since automated scene flow estimation is non-accurate in a number of situations, resulting rendering artifacts have to be corrected manually in each output frame, an elaborate and time-consuming task. We propose a novel workflow to edit the scene flow itself, catching the problem at its source and yielding a more flexible instrument for further processing. By integrating user edits in early stages of the optimization, we allow the use of approximate scribbles instead of accurate editing, thereby reducing interaction times. Our results show that editing the scene flow improves the quality of visual results considerably while requiring vastly less editing effort.

Siersdorfer, Stefan; Kemkes, Philipp; Ackermann, Hanno & Zerr, Sergej; Who With Whom And How?: Extracting Large Social Networks Using Search Engines. In: Proc. of 24th ACM International Conference on Information and Knowledge Management (CIKM 2015); CIKM ‘15; ACM; 2015


When users interact with the Web today, they leave sequential digital trails on a massive scale. Examples of such human trails include Web navigation, sequences of online restaurant reviews, or online music play lists. Understanding the factors that drive the production of these trails can be useful for e.g., improving underlying network structures, predicting user
clicks or enhancing recommendations. In this work, we present a general approach called HypTrails for comparing a set of hypotheses about human trails on the Web, where hypotheses represent beliefs about transitions between states. Our approach utilizes Markov chain models with Bayesian inference. The main idea is to incorporate hypotheses as informative Dirichlet priors and to leverage the sensitivity of Bayes factors on the prior for comparing hypotheses with each other. For eliciting Dirichlet priors from hypotheses, we present an adaption of the so-called (trial) roulette method. We demonstrate the general mechanics and applicability of HypTrails by performing experiments with (i) synthetic trails by performing experiments with (i) synthetic trails for which we control the mechanisms that have produced them and (ii) empirical trails stemming from different domains including website navigation, business reviews and online music played. Our work expands the repertoire of methods available for studying human trails on the Web.


Sommer, Minh Phuong Nguyen Aron; Comparison of Omega-K and backprojection regarding spatial resolution for squinted spotlight SAR with motion errors. In: Proc. of 5th IEEE Asia-Pacific Conference on Synthetic Aperture Radar (APSAR 2015); 2015

Stauch, Marc; The 2013 German Patient Rights Act – Codifying Medical Malpractice Compensation. In: Journal of European Tort Law Vol. 6(1); 2015

Stauch, Marc; UK: HL (A Young Person) v Facebook Inc. In: ZD-Aktuell; 2015


Stauch, Marc; UK: Max Mosley v Google Inc. In: ZD-Aktuell; 2015


Stauch, Marc & Wheat, Kay; Text, Cases & Materials on Medical Law and Ethics; Routledge; 2015

Stengel, Michael; Bauszat, Pablo; Eisemann, Martin; Eisemann, Elmar & Magnor, Marcus; Temporal Video Filtering and Exposure Control for Perceptual Motion Blur. In: IEEE Transactions on Visualization and Computer Graphics (TVCG) Vol. 21(5); 2015
We propose the computation of a perceptual motion blur in videos. Our technique takes the predicted eye motion into account when watching the video. Compared to traditional motion blur recorded by a video camera our approach results in a perceptual blur that is closer to reality. This postprocess can also be used to simulate different shutter effects or for other artistic purposes. It handles real and artificial video input, is easy to compute and has a low additional cost for rendered content. We illustrate its advantages in a user study using eye tracking.

Stengel, Michael; Grogorick, Steve; Eisemann, Martin; Eisemann, Elmar & Magnor, Marcus; An Affordable Solution for Binocular Eye Tracking and Calibration in Head-mounted Displays. In: Proc. of ACM Multimedia; ACM; 2015

Immersion is the ultimate goal of head-mounted displays (HMD) for Virtual Reality (VR) in order to produce a convincing user experience. Two important aspects in this context are motion sickness, often due to imprecise calibration, and the integration of a reliable eye tracking. We propose an affordable hard- and software solution for drift-free eye-tracking and user-friendly lens calibration within an HMD. The use of dichroic mirrors leads to a lean design that provides the full field-of-view (FOV) while using commodity cameras for eye tracking. Our prototype supports personalizable lens positioning to accommodate for different interocular distances. On the software side, a model-based calibration procedure adjusts the eye tracking system and gaze estimation to varying lens positions. Challenges such as partial occlusions due to the lens holders and eye lids are handled by a novel robust monocular pupil-tracking approach. We present four applications of our work: Gaze map estimation, foveated rendering for depth of field, gaze-contingent level-of-detail, and gaze control of virtual avatars.

Steß, Marek; Schlüchte, Michael & Wagner, Bernardo; Camera-Based Field of View Parameter Optimization. In: International Journal of Mechanical Engineering and Robotics Research; EJournal Publishing; 2015


Taibi, Davide; Chawla, Saniya; Dietze, Stefan; Marenzi, Ivana & Fetahu, Besnik; Exploring TED talks as linked data for education. In: British Journal of Educational Technology (BJET); 2015

In this paper, we present the TED Talks dataset which exposes all metadata and the actual transcripts of available TED talks as structured Linked Data. The TED talks collection is composed of more than 1800 talks, along with 35 000 transcripts in over 30 languages, related to a wide range of topics. In this regard, TED talks metadata available in structured, multilingual and HTTP-accessible form constitute a valuable resource, for instance, for schoolteachers, to explore controversial contemporary topics with their students in order to stimulate awareness and critical thinking or as a means for language learning. Moreover, being compliant with state-of-the-art Linked Data principles, our dataset facilitates the computation of links with related data and resources. The TED dataset is used by a number of educational applications, and it is included in the LinkedUp Data Catalog.

Taibi, Davide; Marenzi, Ivana; Kantz, Deirdre & Fulantelli, Giovanni; MWS-Web: un sistema a supporto di un approccio pedagogico basato sul concetto di Multiliteracies. In: TD Tecnologie Didattiche Vol. 23(66); 2015


Automatic timeline summarization (TLS) generates precise, dated overviews over (often prolonged) events, such as wars or economic crises. One subtask of TLS selects the most impor-
tant dates for an event within a certain time frame. Date selection has up to now been handled via supervised machine learning approaches that estimate the importance of each date separately, using features such as the frequency of date mentions in news corpora. This approach neglects interactions between different dates that occur due to connections between subevents. We therefore suggest a joint graphical model for date selection. Even unsupervised versions of this model perform as well as supervised state-of-the-art approaches. With parameter tuning on training data, it outperforms prior supervised models by a considerable margin.


Large-scale web search engines need to crawl the web continuously to discover and download newly created web content. The speed at which the new content is discovered and the quality of the discovered content can have a big impact on the coverage and quality of the results provided by the search engine. In this paper, we propose a search-centric solution to the problem of prioritizing the pages in the frontier of a crawler for download. Our approach essentially orders the web pages in the frontier through a random walk model that takes into account the pages’ potential impact on user-perceived search quality. In addition, we propose a link graph enrichment technique that extends this solution. Finally, we explore a machine learning approach that combines different frontier prioritization approaches. We conduct experiments using two very large, real-life web datasets to observe various search quality metrics. Comparisons with several baseline techniques indicate that the proposed approaches have the potential to improve the user-perceived quality of web search results considerably.


Tran, Tuan; Niederée, Claudia; Kanhabua, Nattiya; Gadiraju, Ujwal & Anand, Avishek; Balancing Novelty and Salience: Adaptive Learning to Rank Entities for Timeline Summarization of High-Impact Events. In: Proc. of 24th ACM International Conference on Information and Knowledge Management (CIKM 2015); 2015

Ueberheide, Matthias; Klose, Felix; Varisetty, Tilak; Fidler, Markus & Magnor, Marcus; Web-based interactive free-viewpoint streaming: a framework for high quality interactive free viewpoint navigation. In: Proc. of ACM Multimedia; ACM; 2015

Unger, Nik; Dechand, Sergej; Bonneau, Joseph; Fahl, Sascha; Perl, Henning; Goldberg, Ian & Smith, Matthew; SoK: Secure Messaging. In: Proc. of IEEE Symposium on Security and Privacy; IEEE Computer Society; 2015

Motivated by recent revelations of widespread state surveillance of personal communication, many solutions now claim to offer secure and private messaging. This includes both a large number of new projects and many widely adopted tools that have added security features. The intense pressure in the
past two years to deliver solutions quickly has resulted in varying threat models, incomplete objectives, dubious security claims, and a lack of broad perspective on the existing cryptographic literature on secure communication. In this paper, we evaluate and systematize current secure messaging solutions and propose an evaluation framework for their security, usability, and ease-of-adoption properties. We consider solutions from academia, but also identify innovative and promising approaches used “in-the-wild” that are not considered by the academic literature. We identify three key challenges and map the design landscape for each: trust establishment, conversation security, and transport privacy. Trust establishment approaches offering strong security and privacy features perform poorly from a usability and adoption perspective, whereas some hybrid approaches that have not been well studied in the academic literature might provide better trade-offs in practice. In contrast, once trust is established, conversation security can be achieved without any user involvement in most two-party conversations, though conversations between larger groups still lack a good solution. Finally, transport privacy appears to be the most difficult problem to solve without paying significant performance penalties.


Wandt, Bastian; Ackermann, Hanno & Rosenhahn, Bodo; 3D Human Motion Capture from Monocular Image Sequences. In: Proc. of IEEE Conference on Computer Vision and Pattern Recognition (CVPR Workshops); 2015

Wang, Qi; Wieghardt, C.S.; Jiang, Yan; Gong, Jianwei & Wagner, B.; Generalized Path Corridor-based Local Path Planning for Nonholonomic Mobile Robot. In: Proc. of 18th IEEE International Conference on Intelligent Transportation Systems (ITSC); 2015

Weibelzahl, Stephan; Heckmann, Dominikus; Herder, Eelco; Müssig, Karsten & Schildt, Janko; Adaptive Recommendations for Patients with Diabetes.. In: Proc. of UMAP Workshops; CEUR Workshop Proceedings Vol. 1388; CEUR-WS.org; 2015

Weibelzahl, Stephan; Herder, Eelco; Rokicki, Markus; Heckmann, Dominikus; Müssig, Karsten & Schildt, Janko; Personalized Advice and Feedback for Diabetes Patients.. In: Proc. of Mensch und Computer 2015 – Workshopband; De Gruyter Oldenbourg; 2015

Wille, Philipp; Lofi, Christoph & Balke, Wolf-Tilo; Towards Narrative Information Systems. In: Proc. of International Conference on Web-Age Information Management (WAIM); LNCS Vol. 9098; Springer International Publishing; 2015

Wuhrer, Stefanie; German, Leonid & Rosenhahn, Bodo; Statistical Human Body Modeling. In: CRC Press; 2015

Yang, Michael Ying; Qiang, Yu & Rosenhahn, Bodo; A global-to-local framework for infrared and visible image sequence registration. In: Proc. of IEEE Winter Conference on Applications of Computer Vision (WACV); 2015


Yu, Ran; Gadiraju, Ujwal; Fetahu, Besnik & Dietze, Stefan; Adaptive Focused Crawling of Linked Data.. In: Proc. of Web Information Systems Engineering – WISE 2015; LNCS Vol. 9418; Springer; 2015

Zeise, Björn; Kleinschmidt, Sebastian & Wagner, Bernardo; Improving the Interpretation of Thermal Images with the aid of Emissivity’s Angular Dependency. In: Proc. of IEEE International Symposium on Safety, Security and Rescue Robotics (SSRR); 2015

Zell, Pettrissa & Rosenhahn, Bodo; A physics-based statistical model for human gait analysis. In: Proc. of German Conference on Pattern Recognition (GCPR); 2015

Ziehn, Jens; Ruf, Miriam; Rosenhahn, Bodo; Willersinn, Dieter & Heinrich, Gotzig; Correspondence between Variational Methods and Hidden Markov Models. In: Proc. of IEEE Intelligent Vehicles Symposium; 2015

Zoller, Daniel; Doerfel, Stephan; Jäschke, Robert; Stumme, Gerd & Hotho, Andreas; On Publication Usage in a Social Bookmarking System. In: Proc. of 2015 ACM Conference on Web Science; ACM; 2015
Committees

Board Membership 2015

- ACM Transactions on the Web (Nejdl, Editorial Board)
- Journal on Web Semantics (Nejdl, Editorial Board)
- Journal of Universal Computer Science (Nejdl, Editorial Board)
- AIEDAM – Artificial Intelligence for Engineering Design, Analysis and Manufacturing (Nejdl, Editorial Board)
- ABIS – German SIG on Adaptivity and User Modeling (Herder, Chair)
- Future Internet Journal (Risse, Editorial Board)
- IEEE TCDE Executive Committee (Risse, Treasurer, Secretary)
- IJSWIS – International Journal for Semantic Web and Information Systems (Dietze, Editorial Board)
- IMAVIS – Imaging and Vision (Rosenhahn, Editor)
- User Modeling Inc. (Herder, Information Officer)
- Journal of Web Science (Nejdl, Editor in Chief)
- KEYSTONE COST ACTION (Demidova, MC Member)
- NFV workshop (Papadimitriou)
- Open Journal on Semantic Web, Editorial Board (Dietze, Editorial Board)
- TVC – The Visual Computer (Rosenhahn, Editor)

Organisation Board 2015

- 3rd LAK data competition, at LAK 2015 (Herder, Organizer)
- ABIS 2015 – 21st International Workshop on Intelligent and Personalized Human-Computer Interaction 2015 (Herder, Organizer)
- ACL-IJCNLP 2015 – 53rd Annual Meeting of the Association for Computational Linguistics and the 7th International Joint Conference on Natural Language Processing of the Asian Federation of Natural Language Beijing Processing 2015, July 2015, Beijing, China (Markert)
- Dagstuhl Seminar on Network Calculus (Fidler)
- ESWC 2015 – 12th Extended Semantic Web Conference 2015 (Dietze, Linked Data Track Chair)
- IUI 2015 – 20th ACM Conference on Intelligent User Interfaces (Herder, Publicity Chair)
- Linked Learning 2015 – Learning and Education with the Web of Data, collocated with the WWW2015, May 2015, Florence, Italy (Dietze; Herder, Organizer)
COMMITTEES

- SDA 2015 – 5th International Workshop on Semantic Digital Archives 2015 in conjunction with 19th International Conference on Theory and Practice of Digital Libraries (TPDL), September 18, 2015; Co-Organizer (Risse)

Program Committee 2015

- 3DV 2015 – International Conference on 3D Vision 2015 (Magnor)
- APWiMob 2015 – IEEE Asia Pacific Conference on Wireless and Mobile 2015 (Papadimitriou)
- CIKM 2015 – Conference on Information and Knowledge Management 2015 (Nejdl)
- CoCoNet 2015 – International Conference on Computing and Network Communications 2015 (Papadimitriou)
- CVPR 2015 – IEEE Conference on Computer Vision and Pattern Recognition 2015 (Rosenhahn)
- DCPerf 2015 – IEEE International Workshop on Data Center Performance 2015 (Papadimitriou)
- DVC 2015 – IEEE Workshop on Dependable Vehicular Communications 2015 (Fidler)
- ECCV 2015 – European Conference on Computer Vision 2015 (Magnor)
- EG 2015 – The 36th Eurographics Conference 2015, May 4, 2015 – May 8, 2015, Zürich, Switzerland; Symposium on Rendering (Magnor)
- EUCNC 2015 – European Conference on Networks and Communications 2015 (Papadimitriou)
- GCPR 2015 – The 37th German Conference on Pattern Recognition 2015 (Rosenhahn)
- GlobasSIP 2015 – IEEE Global Conference on Signal and Information Processing 2015 (Papadimitriou)
- Globecom 2015 – IEEE Global Communication Conference Exhibition & Industry Forum 2015 (Fidler)
- Hypertext 2015 – 26th ACM Conference on Hypertext and Social Media 2015 (Herder)
- ICC 2015 – IEEE International Conference on Communications 2015 (Fidler, Papadimitriou)
- ICCVE 2015 – International Conference on Computer Vision 2015 (Magnor, Rosenhahn)
- ICCVE 2015 – IEEE The 4th International Conference on Connected Vehicles & Expo 2015 (Fidler)
- ICFA 2015 – 13th International Conference on Formal Concept Analysis 2015, June 23 – 26, 2015, Málaga, Spain (Jäschke)
- ICSLE 2015 – 2nd International Conference on Smart Learning Environments 2015, September 23-25, 2015, Sinaia, Romania (Herder, Marenzi)
- ICWL 2015 – The 14th International Conference on Web-based Learning 2015, 5-8 November 2015 Guangzhou, China (Herder, Marenzi)
- IESD 2015 – 4th Intl. Workshop on INTELLIGENT EXPLORATION OF SEMANTIC DATA 2015 (Herder)
- IFIP 2015 – 13th International Conference on Wired/Wireless Internet Communications 2015 (WWIC) (Papadimitriou)
- IFIP Networking Conference 2015, Toulouse, France, 20 – 22 May 2015 (Fidler)
- I-KNOW 2015 – 15th International Conference on Knowledge Technologies and Data-driven Business 2015 (Herder)
- INFOCOM 2015 – IEEE Conference on Computer Communications 2015 (Fidler)
- ISWC 2015 – International Conference on Semantic Web Conference 2015 (Dietze)
- JCDL 2015 – Joint Conference on Digital Libraries 2015 (Risse; Nejdl, Senior PC)
• JIST2015 – 5th Joint International Semantic Technology 2015 (Dietze)
• K-CAP 2015 – 8th International Conference on Knowledge Capture 2015, October 7 – 10, 2015, Palisades, NY, USA (Jäschke)
• KDIR 2015 – Conference on Knowledge Discovery and Information Retrieval 2015 (Nejdl)
• KEOD 2015 – 7th International Conference on Knowledge Engineering and Ontology Development, 12 – 14 November 2015, Lisbon, Portugal (Risse)
• KESW 2015 – International Conference on Knowledge Engineering and Semantic Web 2015, September 30 – October 2, 2015 (Demidova)
• LAK 2015 – 5th International Conference on Learning Analytics & Knowledge 2015 (Dietze, Herder)
• LC 2015 – International Workshop on Learning in the Cloud 2015 (Herder)
• LDOW 2015 – 8th Workshop on Linked Data on the Web 2015 (Dietze)
• Mis4TEL 2015 – Methodologies and Intelligent Systems for Technology Enhanced Learning, 3-5June 2015, Salamanca, Spain (Herder, Marenzi)
• ML 2015 – 11th International Conference Mobile Learning 2015, 14 – 16 March 2015, Madeira, Portugal (Marenzi)
• MSM2015 – 6th International Workshop on Modeling Social Media 2015 (Herder)
• PALX 2015 – Player And Learner Experience Design Workshop co-located at CHIItaly 2015, September 28th, Roma (Marenzi)
• PCS 2015 – Picture Coding Symposium 2015 (Magnor)
• PIMRC 2015 – IEEE International Symposium on Personal, Indoor and Mobile Radio Communications 2015 (Papadimitriou)
• PREM 2015 – 6th International Conference on Pattern Recognition and Machine Intelligence 2015 (Demidova)
• RecSys 2015 – 9th ACM Conference on Recommender Systems 2015, September 16 – 20, 2015, Vienna, Austria (Jäschke; Nejdl Senior PC)
• SAC 2015 – ACM Symposium on Applied Computing – Track on Intelligent, Interactive and Innovative Learning Environments 2015, Salamanca, Spain, April 13 to 17, 2015 (Marenzi)
• SAVE-SD 2015 – International Workshop on Semantics, Analytics, Visualisation: Enhancing Scholarly Data 2015 (Dietze)
• SDA 2015 – 5th Workshop on Symbolic Data Analysis 2015 (Demidova)
• SEMANTICS 2015 – 11th International Conference on Semantic Systems 2015 (Dietze, Herder)
• SIGGRAPH 2015 – The 42nd International Conference and Exhibition on Computer Graphics and Interactive Techniques 2015 (Magnor)
• SIGGRAPH Asia 2015 – 8th ACM SIGGRAPH Conference and Exhibition on Computer Graphics and Interactive Techniques in Asia 2015 (Magnor)
• SPS2015 – International Workshop on Social Personalisation & Search 2015 (Herder)
• TempWeb 2015 – 5th Temporal Web Analytics Workshop in conjunction with WWW 2015, May 18/19, 2015, Florence, Italy (Risse)
• TPD 2015 – 19th International Conference on Theory and Practice of Digital Libraries, 14–18 September 2015, Pozna√, Poland (Risse, Senior PC)
• UIST 2015 – ACM Symposium on User Interface Software and Technology 2015 (Magnor)
• USEWOD2015 – 5th International Workshop on Usage Analysis and the Web of Data (Demidova, Dietze)
• VISLA15 – Visual approaches to learning analytics 2015 (Herder)
• VMV 2015 – International Workshop on Vision, Modeling and Visualization 2015 (Magnor)
• WCNC 2015 – IEEE Wireless Communications and Networking Conference 2015 (Fidler)
• WEBIST 2015 – 11th International Conference on Web Information Systems and Technologies, 20 – 22 May 2015, Lisbon, Portugal (Risse)
• WS-REST2015 – Sixth International Workshop on Web APIs and RESTful Design 2015 (Dietze)
• Wswed2015 – Workshop on Semantic Web and Education 2015, 26-30 October 2015, Maceio, Alagoas, Brazil (Marenzi)
• WWIC 2015 – International Conference on Wired/Wireless Internet Communications 2015 (Papadimitriou)
• WWW 2015 – 24th International World Wide Web Conference 2015, May 18 – 22, 2015, Florence, Italy (Jäschke; Nejdl; Dietze, Web Science Track)
Journal Reviewing

- ACM Computing Surveys (ACM CSUR) (Risse)
- ACM Transactions on Graphics (Magnor)
- ACM Transactions on Interactive Intelligent Systems (Herder)
- ACM Transactions on Internet Technology (Jäschke)
- ACM Transactions on the Web (TWEB) (Risse)
- AGU Journal of Geochemical Exploration (Löwe)
- Artificial Intelligence (Markert, associate editor)
- Computer Communications (Fidler)
- Computer Graphics Forum (Magnor)
- Elsevier Acta Astronautica (Löwe)
- Elsevier Computers & Graphics (Magnor)
- Elsevier Image and Vision Computing (IMAVIS) (Rosenhahn)
- Elsevier Journal of Computer and System Sciences (JCSS) (Demidova, Review in a special Issue)
- Elsevier Journal on Information Science (Dietze)
- Elsevier Journal on Web Semantics (JWS) (Dietze)
- Elsevier Leaind – Learning and Individual Differences – A Multidisciplinary Journal in Education (Marenzi, Invited Reviewer)
- IEEE Computer Graphics and Applications (Magnor)
- IEEE Intelligent Systems (Dietze)
- IEEE Transactions on Image Processing (TIP) (Magnor, Rosenhahn)
- IEEE Transactions on Learning Technologies (TLT) (Dietze)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (Tpmi) (Rosenhahn)
- IEEE Transactions on Services Computing (TSC) (Risse)
- IEEE Transactions on Visualization and Computer Graphics (Magnor)
- International Journal of Computer Vision (IJCV) (Rosenhahn)
- International Journal of Continuing Engineering Education and Life-Long Learning (IJCEEL) (Marenzi, Invited Reviewer)
- International Journal on Semantic Web and Information Systems (IJJSWIS) (Dietze)
- Jx&D Special Issue on “Technology-enhanced assessment: Agency change in the educational ecosystem” (Marenzi)
- Journal of Neural Engineering (Magnor)
- Journal of Web Semantics (Herder)
- Knowledge and Information Systems (Jäschke)
- Multimedia Tools and Applications (Herder)
- Pervasive and Mobile Computing (Risse)
- Semantic Web Journal (Dietze)
- Special Issue on Dataset Profiling and Federated Search for Linked Data (IJSWIS) (Demidova, Guest Editor)

Conference Committees 2016

- ACM WebSci 2016 – ACM Conference on Web Science 2016 (Nejdl, General Chair; Dietze, Finances Chair; Jäschke, Local Chair; Gadiraju, Publicity Chair)
- ACM WSDM 2016 – ACM Conference on Web Search and Data Mining 2016 (Nejdl)
- ECIR 2016 – European Conference on Information Retrieval 2016 (Nejdl)
- ESWC 2016 – 13th Extended Semantic Web Conference 2016 (Fetahu, PC Member)
- GCPR 2016 – 38th German Conference on Pattern Recognition 2016, Hannover, Germany, September 12-15 2016 (Rosenhahn, Organizer)
- Hypertext 2016 – 27th ACM Conference on Hypertext and Social Media 2016 (Herder, General Chair)
- IJCAI 2016 – International Joint Conference on Artificial Intelligence 2016 (Nejdl; Senior PC; AI and the Web)
- IST 2016 – Conference on Intelligent Tutoring Systems 2016 (Nejdl, Senior PC)
- KEOD 2016 – 8th International Conference on Knowledge Engineering and Ontology Development 2016 (Risse)
- PROFILES 2016 – 3rd International Workshop on Dataset PROFiling & Federated Search for Linked Data 2016, collocated with the 13th Extended Semantic Web Conference (ESWC2016) (Demidova)
- TempWeb 2016 – 6th Temporal Web Analytics Workshop in conjunction with WWW 2016, April 11/12/13, 2016, Montreal, Canada (Risse)
- TPDL 2016 – 20th International Conference on Theory and Practice of Digital Libraries 2016, September 5-9, 2016; Hannover, Germany,(Nejdl, General Chair; Risse General Co-Chair; Löwe)
- WEBIST 2016 – 12th International Conference on Web Information Systems and Technologies, 23 – 25 April 2016, Rome, Italy (Risse)
Legal Notice

Publisher:
Forschungszentrum L3S
Leibniz Universität Hannover
Appelstraße 9a
30167 Hannover / Germany

Responsible in respect of content:
Dipl.-Vw. Gabriele Herrmann-Krotz
Phone: + 49.(0)511.762-17713
Fax: + 49.(0)511.762-17779
E-Mail: herrmann@L3S.de
www.L3S.de

Representatives:
Prof. Dr. techn. Wolfgang Nejdl • Executive Director
Dipl.-Vw. Gabriele Herrmann-Krotz • Managing Director

Design & Layout:
Dipl.-Des. Priska Tosch
www.tosch-kommunikation.de

Print:
Ströher Druckerei und Verlag GmbH & Co. KG
www.stroeher-druck.de

Photos:
Portrait photos: private
Unless otherwise stated, the pictures are from fotolia.de.

All rights reserved. In particular transfer of data into machine readable form as well as storage into information systems (even abstracts) is only permitted with prior written consent by L3S.
WEB SCIENCE
Investigating
the Future of
Information and
Communication

Forschungszentrum L3S
Leibniz Universität Hannover
Appelstraße 9a
30167 Hannover · Germany
www.L3S.de