“Future Requires Interdisciplinarity”

12th International Conference on

\textit{i}^2\textit{CS} 2012

Innovative Internet Community Systems

June 13 - 15, 2012

Norwegian University of Science and Technology (NTNU)
Trondheim, Norway

Conference Information Pack

http://www.i2cs-conference.org/
mailto:info@i2cs-conference.org
Conference Program

All presentations are in R3 in the Natural Science Building at Gløshaugen (Høgskoleringen 5).

Tuesday, June 12, 2012

19:00 22:00 Informal welcome and pre-registration (optional event)

Wednesday, June 13, 2012

08:30 10:00 Registration and coffee

10:00 10:30 Conference Opening

10:30 11:30 Key note: Making money out of innovative communities on the internet

11:30 13:00 Lunch

13:00 14:30 Session 1 -- Social networks and mobility

14:30 15:00 Coffee break

15:00 16:30 Session 2 -- Transport systems and architecture

19:00 20:00 Welcome Reception, including snack and drink

20:00 Informal dinner 1)

Thursday, June 14, 2012

08:30 09:30 Invited talk 1: Urban traffic systems, computer networks and power grids: different systems - same solution? Herwig Unger

09:30 10:00 Coffee break

10:00 11:30 Session 3 -- Health, wellnes and emergency support

11:30 13:00 Lunch

13:00 14:00 Excursion to the computer museum

14:00 15:00 Panel Session

15:00 15:30 Coffee break

15:30 17:00 Session 4 -- Infrastructure and security

19:00 23:00 Conference dinner

Friday, June 15, 2012

08:30 09:30 Invited talk 2: Semantic Search – Adaptation of Knowledge Models Stein L. Thomasen

09:30 10:00 Coffee break

10:00 11:30 Session 5 -- Technology for cloud computing and future internet

11:30 12:00 Coffee break

12:00 13:30 Session 6 -- Information retrieval and modelling

13:30 14:00 Best paper and presentation award

Closing and presentation of I2CS 2013

1) Note: this dinner is not included in the conference fee, though we do get a special price for both food (set menu) and drinks. During the full duration of I2CS, you get a 10% discount on drinks when you show your conference badge.
Conference Topics

Foundations - Theories, models, algorithms for communities
- Distributed algorithms and simulation models
- Game theory, graph theory and cost models
- Innovative communication protocols
- Self organization and self stabilization
- Security and privacy protection
- Swarm intelligence and collaborative behaviour
- Small world models and clouds

Technology - Distributed architectures and frameworks
- Service-oriented architectures for communities
- Peer-to-peer and grid architectures
- Distributed community middleware for Web x.0
- Software agents and adaptive systems
- eHealth challenges and ambient assisted living
- Community management in ad-hoc environments
- Information retrieval and distributed ontologies

Applications and socialization - Communities on the move
- Mobile Internet applications and user experience
- Context and location awareness
- Personalization and unique identifiers
- Personal networks and social search
- Social and business aspects of user generated content
- Recommender solutions and expert profiles
- Domain specific languages for semantic design

Motto of 12th I²CS 2012
"Future Requires Interdisciplinarity"

Conference host: Norwegian University of Science and Technology (NTNU) Trondheim, Norway

Image source: Mentz Indergaard/NTNU Info
Keynote

Tom Arnøy & Per Gunnar Auran
Zedge
CEO & Senior Data Scientist

Making Money out of Innovative Communities on the Internet

Online advertising has been around for more than a decade, and today most Internet users are familiar with the contextual ad targeting in online search, of which Google AdWords is a dominant example. The pay per click model (PPC) introduced by Goto.com (later Overture) in 1998 has been the main revenue model since Google adopted it in 2002, but the advertising industry is under increasing pressure to find a better alternative model as the conversion rate for ad clicks to actual purchase is very low.

There is a huge potential for improving the experience as seen from both advertiser, publisher and end user point of view. Enter the cost per install model where advertising cost is directly tied to the response of potential customers. While this reduces risk for advertiser spending, it demands precise customer targeting to create added value for the end user and secure revenue for the publisher.

The authors present a system for content-based targeting where the user behaviour within Zedge’s massive mobile community is the core signal for segmenting users into preference groups that are used for targeted advertisements. Large scale clustering using Hadoop and machine learning is combined to optimize the performance.

Invited Talk 1

Herwig Unger
Chair of Communication Networks, FernUniversität in Hagen

Urban Traffic System, Computer Networks and PowerGrids: different systems - same solutions?

In the last decade, technical and logistic systems became more and more specialised, complex and in most cases globally distributed. Already today, it is not possible to oversee or control them from any centralised instance.

Nevertheless, from the modelling point of view and their mathematical background those networks seems to have a lot in common. The author give a comparision of urban traffic systems, peer-to-peer computer networks and power grids. In a set of examples will be shown, how an interdisciplin ary application of methods and principles from one system may contribute to the progress of other ones.

Last but not least, it is intended to show that self-organisation will be the key issue to guarantee the efficient work of those systems in the future. We argue that self-organisation not only come along with structure building but also demonstrate that a suitable structure building may support the emergence of work division and cooperation.
Invited Talk 2

Stein L. Tomassen

Program Manager II at Microsoft

Semantic Search – Adaptation of Knowledge Models

Search applications have for many become part of their daily tools, empowering the users with easy access to vast amount of information. Despite the commonality with these tools finding quality information can still be both tedious and frustrating often involving multiples queries and analysis of extensive amounts of information. Semantic search is believed to solve many of the shortcomings found with current search applications, but still not commonly used. Semantic search has been a research area for a while, yet there are many issues to solve and improvements to make.

In this talk, the author will present a variety of semantic search systems that focus on adaptation of knowledge models. The author will present different approaches for how knowledge models can be enriched or created for a domain and how they can be used in search to increase the user experience.
**Session 1: Social Networks and Mobility**

**Chairman:** Gerald Eichler

**Jörg Roth**

**Sharing Personal Symbolic Locations between Friends – A Location Service for Small Communities**

In this paper we introduce a novel community service based on personal symbolic locations. Users can share their location with other people using simple textual distribution mechanisms without the need of a geographic map display service. Small communities can set up a light-weight infrastructure and do not need to send private locations to big central service centers.

Eirik Fikkan, Emil Grunt, Simen Kind Gulbrandsen, Kjetil Mehl, Safoura Shamsolketabi, Jaspreet Singh, Miso Vrucinic, Bjørn Magnus Mathisen and Anders Kofod-Petersen

**Social Network for Elderly**

Elderly's health is closely related to their level of social activity. Maintaining an active social life contributes to peoples' ability to live at home longer and enjoy an active and healthy life. Yet, as age progresses maintaining and expanding a social network can be challenging. The work presented here demonstrates a design and implementation of a social network system for elderly, including a recommender system, which will recommend relevant cultural and social events, and friends and acquaintances to enjoy these events with.

Bjørn Magnus Mathisen, Idoia Olalde and Anders Kofod-Petersen

**Co-Living social community for elderly**

This paper describes some of the challenges faced when activating elderly people in an organised fashion. We propose a Virtual Collaborative Social Living Community for Elderly; utilizing friends, family and care-professionals connected to the elderly in achieving this goal. Challenges and related to this work in progress is presented.

**Session 2: Transport Systems and Architecture**

**Chairman:** Jörg Roth

**Christoffer Jun Marcussen, Lars Moland Eliassen, Rune Sætre and Björn Gambäck.**

**Context-Awareness and Real-Time Information in an Intelligent Smartphone Application**

With the constant increase in smartphone sales, integrated sensors and map navigation have now become available to the average user. This allows for mobile applications to use the user's context to provide more relevant information. An interesting use-case for such applications is a route information systems for buses.

The paper describes an application which interfaces over a mobile phone to BusTUC, a reasoning-system for bus routes in Trondheim. By combining user context with BusTUC reasoning and real-time data from the bus route company, the user-interaction is simplified, compared to a standard information system. We discuss issues on supporting context-awareness and real-time information in the system, comparing the system to previously available route information systems. Feedback from beta-testers indicate that the application suits the needs of typical bus travellers.

**Tor K Moseng and Marit Natvig**

**Integrating the individual vehicle in the transport system using open services in a distributed architecture**

Road traffic management has traditionally been targeted through control and monitoring of the flow of vehicles, using the same measures towards all vehicles. As vehicles can have very different capabilities and profiles, it is however desired to use different control strategies towards the individual vehicles to
meet the environmental, safety and efficiency targets for the future. SMARTFREIGHT has developed a holistic control and monitoring tool for managing the traffic, and individual vehicles in particular. The individual vehicle is integrated with the traffic management and freight distribution management centers by using open service interfaces for an interoperable information exchange between distributed systems across a heterogeneous wireless infrastructure. SMARTFREIGHT realized and successfully demonstrated this integration in its final event in Trondheim.

Runar Andersstuen, Trond Bøe Engell, Rune Sætre and Björn Gambäck

A Multiple Platform Approach to Building a Bus Route Information System for Mobile Devices

The paper describes a multiple platform-based approach to creating a bus route information system for mobile devices. The system is context aware: users only need to tell the system (in natural language) where they wish to go, and the system takes care of the rest. The users are presented with a list of possible routes they can take to reach their desired destination. The results are also shown on a map that makes finding the bus-stops very easy.

In order to make the system available to as many users as possible, the architecture is client-server-based and relies on technology standards that are widely accepted and implemented, making it easily adaptable to new platforms. The application aims at minimizing the amount of data transfer and calculation needed on the client side. The client focuses instead on the interaction with the user and facilitates multiple platform possibilities, using technology such as HTML5, PhoneGap and Sencha Touch. The client's functionality includes a search function and a map view, as well as the ability to use bookmarks. The server handles most of the business logic and communicates with external services such as the natural language processing back-end and real-time bus departure information.

Session 3: Health, Wellness and Emergency Support

Chairman: Anders Kofod-Petersen

Marius Mikalsen, Ståle Walderhaug, Dario Salvi and Geir Kjetil Hanssen

Key Technological Success Features for a Domain Specific Open Software Ecosystem for Ambient Assisted Living

Ambient Assisted Living (AAL) is a domain with great potential for economic and societal impact. But market uptake of such solutions is so far limited because of market, standards and technology uncertainty. The businesses that will prevail are those that are cost effective. To support cost effective development of AAL solutions, domain specific open software ecosystems are being established. We developed a survey to investigate key technology success factors for such ecosystems. The survey was sent to 60 developers from a representative selection AAL development projects. 18 responded. Following a qualitative data analysis we found several key factors and features that must be in place to facilitate the success of such ecosystems. We found that given the nature of the AAL domain, characterised by divergent users, software and hardware, developers are seeking for support in three main areas. First, they want the artefacts available in the ecosystem to support relevant standards in the domain. Second, support for tracing artefacts available in the ecosystem to requirements (domain-fit) is needed. Third, they want support for developing, testing and emulating for complex user-software-hardware workflows in this distributed environment. The main obstacles that will scare away developers from the ecosystems is lack of documentation of the artefacts in the ecosystem. Second, not enough decoupled components, and finally, lack of proper search features. Finally, in order to be able to learn to use the artefacts, examples, scenarios and API documentation is necessary.

Davy Preuveneers, Andreas D. Landmark and Leendert W. M. Wienhofen

Probabilistic Event Processing for Situational Awareness

Over the last century the continuous innovation of technology, coupled with a steady increase in the size of the healthcare organizations, has created a need for information systems supporting healthcare professionals with their daily tasks and decisions. Modern hospitals are full of technology producing electronic records of events and activities, with the opportunity of these events culminating in a wealth of information that these semi-autonomous experts can tap into to improve situational awareness, facilitate
coordination and take better informed decisions. However, processing these footprints, contextualizing and inferring over them presents several interesting challenges to the current state of Complex Event Processing methods. This article looks at challenges presented by an information system for perioperative process support and how contextualization and adequate tool support can provide the essential backdrop for meaningful inference.

Volkmar Schau, Kathrin Kirchner, Steffen Späthe, Sebastian Scharf, Stefan Hellfritzsch, Gerald Eichler, Christian Erfurth, Wilhelm Rossak and Jens Reichel

Simulation of Rescue Forces Communities in Mass Causal Incident Situations

Mass causal incident (MCI) situations require a high flexibility of the rescue forces community, including their need for efficient communication in sparse mobile ad-hoc networks. Simulations help to understand the performance of information flooding, to identify critical lacks in the infrastructure and to build-up professional models. Based on resources, described as profiles, roles of community members will be assigned more flexible to handle complex situations effectively. The presented approach and the thereupon aligned simulation tool provide a technological basis for developing an intelligent decision support system. This system can – in advance or during a MCI situation – give support in estimating risks and emergency situations and in comparing different alternatives.

Session 4: Infrastructure and Security

Chairman: Herwig Unger

Hauke Coltzau

Structured Peer-to-Peer Networks through Distributed Nonmetric Multidimensional Scaling

Multidimensional Scaling (MDS) is a technique for dimensionality reduction widely used in the field of data-mining. For P2P data networks, it holds the potential to provide an intuitive way to browse and explore heterogeneous data distributed over the system. Current MDS approaches are dependent on a centralized instance (controller) and can therefore not be used in decentralized environments. In this article, a distributed algorithm for multidimensional scaling is discussed that does not need any such centralized control.

Cédric Ramassamy, Hacène Fouchal and Philippe Hunel

Impact of Application layer over Wireless Sensor Networks

Applications over Wireless Sensor Networks (WSNs) are various and different. Many routing protocols have been proposed for WSNs since a decade. Medium Access Control (MAC) protocols can differ from a network to another. The transmission range can also be variable from a sensor to another depending on their battery capacities. All these various protocols have an influence on the WSNs. It is worthy to choose the appropriate protocol for each specific situation in order to ensure high security of the network.

In this paper, we show that the type of applications has a real impact on WSN. Indeed, each kind of application with a specific routing protocol, MAC layer and transmission range value impact on security of network in terms of packet lost rate and energy consumption.

We have undertaken a set of experimentations in order to show the importance of good parameters configuration to deploy a WSN with a high security confidence degree.

For the application layer, we have handled three types of applications. We have also considered a various kind of network sizes. For the routing layer, we have handled only with AOMDV protocol. For MAC layer we use 802.15.4 protocols. We have conducted many simulations through the NS-2 simulator in order to analyze two relevant security indicators on WSNs: energy consumption and lost packet rate.
Asmund Ahlmann Nyre and Martin Gilje Jaatun

On the adoption of usage control technology in collaborative environments

As the Internet facilitates collaboration across system boundaries the potential for misusing shared information is increasing. While firewalls, intrusion detection systems and anti-virus software is commonplace in order to protect assets from active attackers, there is only limited commercially available software to protect information from misuse. Businesses are requesting non-disclosure agreements, but have no means to prevent or detect violations of these. Usage control has been proposed as the means to protect information even after its distribution. However, despite the efforts to develop new usage control technology and the apparent need for it, the industry is less enthusiastic. In this paper we investigate existing theories of technology adoption in order to better understand the industry-perspective and to improve technology development. We base our study well-known general theories on protection motivation, innovation diffusion and technology acceptance. We then utilize these theories and preliminary results of a case study to build a new model for understanding usage control technology acceptance.

Session 5: Technology for Cloud Computing and Future Internet

Chairman: Bjørn Magnus Mathisen

David Bouck-Standen, Jörg Cassens and Michael Herczeg

Lazy Disclosure - Mixing Cloud and Local Storage

The use of multiple computer systems by a single user makes data transfer a necessity. Cloud storage solutions provide synchronisation features and file accessibility across systems but the exact location and type of storage varies between services. Many systems rely on a client-server architecture where the data is held at the data centers of the service provider. This leads to several difficulties for the end user, for example with regard to privacy or data security. This is countered by the convenience of highly available servers. If the user wants to minimise exposure to the challenges of Cloud-based services, then he is required to either host a server infrastructure himself or to rely on inconvenient on-demand synchronisation by means of file transport protocols or even physical storage devices. The approach presented here tries to harvest the positive aspects of using Cloud-based services while keeping the user in control of his data. To this end, we focus on a hybrid system of a client-server and a peer-to-peer architecture which expands the Cloud to the user’s system giving him full control over which data he selects to be stored on a server in the Cloud and which data he prefers to keep private on personal computing devices while ensuring unified access to both types of storage over the network.

Martin Gilje Jaatun, Christian Askeland and Anders Salvesen

Drizzle: The RAIN Prototype

Internet communities are moving to the Cloud, but in addition to the advantages regarding cost and convenience, this also means that cloud service providers are increasingly in a position to aggregate large amounts of personal data, which means that it is becoming prudent to develop mechanisms that can contribute to limiting the information available to providers. In this paper we present a prototype cloud security solution for protection against an “honest but curious” cloud provider. The solution is based on splitting up data and distributing it to multiple cloud providers, without encrypting the individual pieces. Our initial tests indicate that our solution is sufficiently efficient for normal use.

John Krogstie

The role of modeling in innovative business and community information systems based on the future internet

Future internet systems have a number of properties that enable supporting new innovative systems. Event-driven architectures (EDA) providing varied information to support collaborative decision-making enable more decisions to be made closer to the problem owner. The “Internet of Things” (IoT) enables the Internet to reach out into the real world of physical objects. Mobile and collaborative applications and services utilizing information processing and process support enabled by sensor data from a vast numbers of connected and cheap devices and directly and indirectly from humans in control of these devices will change a number of markets. Future innovative business and community information systems
will need to take this situation into account, addressing technological, methodological and conceptual challenges. This paper will focus on the latter, discussing in particular the potential role of model-based techniques and how to assess and improve the quality of models and modeling approaches in this setting.

Session 6: Information Retrieval and Modelling
Chairman: Leendert W. M. Wienhofen

Christian Hentschel, Johannes Hercher, Magnus Knuth, Johannes Osterhoff, Bernhard Quehl, Harald Sack, Nadine Steinmetz, Jörg Waitelonis and Haojin Yang
Open Up Cultural Heritage in Video Archives with Mediaglobe
Film, video, and TV have become a predominant medium, but most audiovisual (AV) material being part of our cultural heritage is kept in archives without the possibility of appropriate access for the public. Although digitalization of AV-objects in conjunction with AV analysis is making progress, content-based retrieval remains difficult because of the so called semantic gap. The mediaglobe project is focussed on digitalization, indexation, preservation and exploitation of historical AV archives. In this context, we show how traditional AV analysis is complemented with semantic technologies and user-generated content to enable content-based retrieval exposing contentual dependencies to promote new means of visualization and explorative navigation within AV archives.

Mario Kubek and Herwig Unger
Detecting Source Topics by Analysing Directed Co-occurrence Graphs
This paper describes a new method to determine the sources of topics, that influence the main topics in texts, by analysing directed co-occurrence graphs using an extended version of the HITS algorithm. Additionally, this method can be used to identify characteristic terms in texts. In order to obtain the needed directed term relations the notion of term association is introduced to cover asymmetric real-life relationships between concepts and it is described how they can be calculated by statistical means. In the experiments, it is shown that the detected source topics and the characteristic terms can be used to find similar documents and documents that mainly deal with them in large corpora like the World Wide Web. In doing so iteratively, it is possible to easily follow topics by analysing documents from these corpora using this method. This way, users can be offered this new search function in interactive search systems that goes beyond a simple presentation of similar documents. This application will be elaborated on as well.

Gerald Eichler and Roland Schwaiger
Creation and Management of Community-specific Knowledge Domain Taxonomies
The semantic understanding of domain-specific terminology typical for communities, like a scientific conference, requires both, the analysis of daily spoken and in documents written language. A living taxonomy can help to cluster knowledge and classify questions against it, as well as to build up profiles of expertise. Text analysis modules support the parsing of training materials to extract a significant set of key phrases. However, the creation of a balanced categorisation tree requires the experience of community members. The Spree project introduces an OntoEditor™ to optimize automatic and manual processes to setup an expert finding and communication application, following well-known Web 2.0 paradigms.
List of Conference Participants

<table>
<thead>
<tr>
<th>Name</th>
<th>First name</th>
<th>Affiliation</th>
<th>Country</th>
<th>E-mail address</th>
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Please note: this page is limited to the printed copy and will not be published on the conference website.
Social Events – Your Networking Opportunity

Informal Come Together "Brukbar"

Tuesday, 12.06.2012, 19.00

Café Brukbar
Kongensgt 19, Trondheim

We have reserved a table at Brukbar. It is possible to do your conference pre-registration here so you can sleep a bit more Wednesday. Look for an i2CS sign. You can join us at any time after your arrival. URL: www.brukbar.no

Welcome Reception
"City Hall"

Wednesday, 13.06.2012, 19.00

City Hall
Munkegata 1, 2nd floor in "Storsalen"

A warm welcome to Trondheim by one of Trondheim municipalities representatives. At the reception we will have a drink and a small snack.

After the reception, we continue to Old Dublin Steakhouse at Kongensgt 15 for a main course and desert. Main course and desert are not included in the conference fee, tough on this menu option we get a special price of 299 NOK (regular price 348 NOK):
Main course: Old Dublin Sirloin, whiskey-flamed steak served with pepper sauce and salt baked potatoes
Desert: Home made brownies with ice cream.
During the full conference duration, showing your i2CS badge gives a 10% discount on drinks at this location.

Conference Dinner "Munkholmen"

Thursday, 14.06.2012, 19.30

Boat ride, guided tour at Munkholmen and dinner

Ravnkloa

The boat to the island Munkholmen leaves at 19:30 sharp. Be on time!
At Munkholmen we will first have a guided tour on the island and in some of its buildings, followed by a BBQ dinner (included in the conference fee).

From wikipedia: "Munkholmen (Norwegian: the monk's islet) is an islet north of Trondheim, Norway. It sits in the Trondheimsfjord about 1.3 kilometres (0.81 mi) northwest of the island of Brattøra and the mouth of the river Nidelva. The islet has served as a place of execution, a monastery, a fortress, prison, and a World War II anti-aircraft gun station. Today, Munkholmen is a popular tourist attraction and recreation site."
Practicalities

WLAN (WiFi) Access
WLAN access is available at the full campus. If you have Eduroam, connection should be automatic. If you do not have Eduroam, connect to the NTNU Guest network, open a web browser and follow the instructions.

Wardrobe
You will find appropriate wardrobe facilities inside the auditorium.

Phone Hotline Chairs
In case you get lost, are not able to find a meeting point, or need immediate help, do not hesitate to contact one of the members of the OrgTeam on their mobile phones:

- Leendert W. M. Wienhofen, Conference Chair +47 98245177
- Gerald Eichler, Conference Co-Chair +49 160 7458291
- Anders Kofod-Petersen, Program Chair +47 73592955 (forwarded)
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- Gilbert Babin, HEC Montreal, Canada
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Publication Chair
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I²CS Chronology

- **1st I²CS June 2001**  Germany  Ilmenau  Thomas Böhme, Herwig Unger
- **2nd I²CS June 2002**  Germany  Kühlungsborn  Herwig Unger, Thomas Böhme
- **3rd I²CS June 2003**  Germany  Leipzig  Gerhard Heyer, Herwig Unger
- **4th I²CS June 2004**  Mexico  Guadalajara  Herwig Unger, V.M. Larios Rosillo
- **5th I²CS June 2005**  France  Paris  Alain Bui, Marc Bui
- **6th I²CS June 2006**  Switzerland  Neuchâtel  Peter Kropf, Pascal Felber

  URL: [http://www.unine.ch/i2cs/](http://www.unine.ch/i2cs/)

- **7th I²CS June 2007**  Germany  Munich  Ulrike Lechner, Achim Dannecker

  URL: [http://i2cs.informatik.uni-bw-muenchen.de/](http://i2cs.informatik.uni-bw-muenchen.de/)

- **8th I²CS June 2008**  Martinique  Schœlcher  Hacène Fouchal, Philippe Hunel

  URL: [http://www.nasdy.fr/cms/](http://www.nasdy.fr/cms/)

- **9th I²CS June 2009**  Germany  Jena  Christian Erfurth, Gerald Eichler

  URL: [http://www.i2cs2009.uni-jena.de/](http://www.i2cs2009.uni-jena.de/)

- **10th I²CS June 2010**  Thailand  Bangkok  Phayung Meesad, Herwig Unger


- **11th I²CS June 2011**  Germany  Berlin  Gerald Eichler, Axel Küpper

  URL: [http://www.i2cs.uni-jena.de/](http://www.i2cs.uni-jena.de/)

- **12th I²CS June 2011**  Norway  Trondheim  Leendert Wienhofen, Gerald Eichler

  URL: [http://www.ntnu.edu/i2cs](http://www.ntnu.edu/i2cs)

Proceedings of 12th I²CS 2012

All accepted I²CS 2012 papers are published in the conference proceedings under ISBN 978-3-88579-298-7, as volume P-204 in the series Lecture Notes in Informatics (LNI), ISSN 1617-5468 by the Gesellschaft für Informatik (GI).


Announcement of the 13th I²CS 2013