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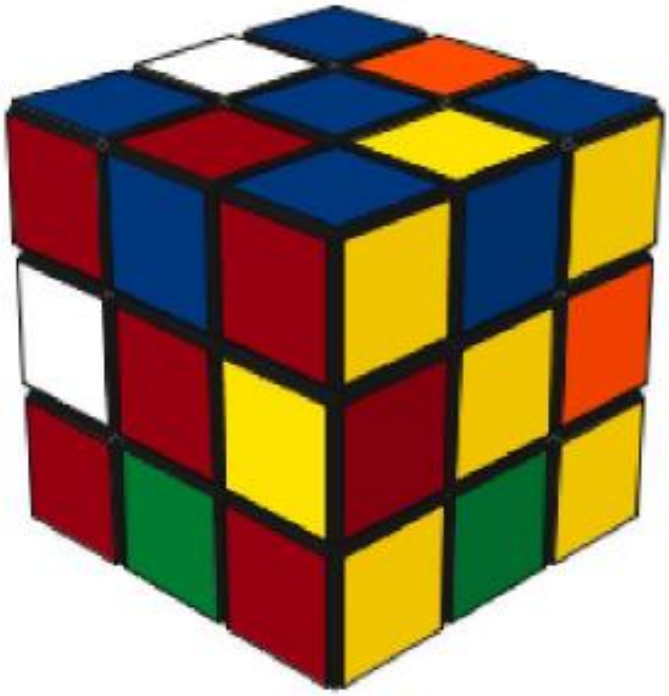


Self-Organising Knowledge Systems

The Evolution of Deception

Serious Gaming and Social Simulation

News from the Benelux Association for Artificial Intelligence

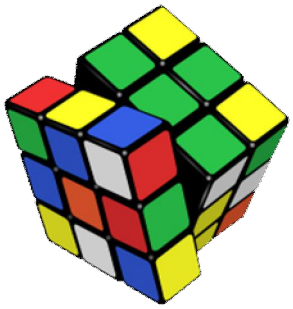
God's Number

Editor-in-chief

One of my favourite puzzles years ago was Rubik's Cube. Originally called the "Magic Cube", it was invented in 1974, by the Hungarian sculptor and professor of architecture Ernö Rubik. Since it came on the market in 1980, more than 350 million cubes have been sold, making it the best-sold toy ever. Although nowadays many different versions have appeared, the original 3 × 3× 3 cube in the colours blue, red, yellow, green, orange, and white was the first I received, and it always kept my interest.

First it fascinated me how the cube was constructed. How could any face be rotated and still the cube be kept together? A little wriggling with a screwdriver and decomposing it into parts quickly revealed its inner secrets. How simple it was after all, but how ingenious to come to this idea! As any really good puzzle (and game) it combined both the simplicity of its rules and the immense complexity of its possibilities.

Despite its easy rules (after all, for every move you can only opt between six faces, and rotate it 90º, 180º or 270º), it turned out to be rather difficult to solve it, in the sense of transforming a scrambled cube into its goal,



i.e., the cube with six uniformly coloured faces (and this time *without* screwdriver). Although achieving this goal mostly succeeded, I was sure that my strategy surely wasn't optimal, in fact only little more than random. And I was amazed to see some speed kids solving the puzzle in no time, almost without thinking, as it seemed. Now I encountered on the web a message with the intriguing title "God's Number is 20". It appeared that the puzzle was finally solved. Solving in this sense means finding the shortest sequence of moves for any start configuration. And since God obviously knows the algorithm achieving this, such an algorithm was called *God's Algorithm.* Then the number of moves this algorithm would take in the worst case was consequently denoted as *God's Number*.

It now is proven that God's number for Rubik's Qube is 20. Since its appearance, it took many mathematicians and computer scientists 30 years to prove this. In fact it was easy to show that a lower bound on this number is 18, since the number of effectively distinct move sequences of 17 or fewer moves turned out to be lower than the number of distinct Cube positions (43,252,003,274,489,856,000). Morwen Thistlethwaite proved in 1981 that 52 moves is an upper bound. In the following years, the upper bound was gradually lowered to 29 in 1995. Then Michael Reid proved that the so-called "superflip" position required at least 20 moves. This superflip position (see front cover) is a famous position, where all corners are solved (i.e., with the same colours as the central squares), but all edges are flipped. So the range of God's number then was 10 (somewhere from 20 to 29). It took another 10 years to lower the upper bound further to 28 (in 2005) and then gradually lower to 22 (in 2008). Now, finally a team consisting of Tomas Rokicki, Herbert Kociemba, Morley Davidson, and John Dethridge has lowered the upper bound to 20, thus proving that God's Number exactly is 20. They did this using some 35 CPU-years of idle computer time, donated by Google, by partitioning all 43,252,003,274,489,856,000 positions into 2,217,093,120 sets of 19,508,428,800 positions each. Next, using symmetry and set covering, they lowered the number of sets to be solved to 55,882,296. With a program that solved a single set in about 20 seconds of CPU-time they then were able to solve all 55,882,296 sets.

Case closed. Of course, this only concerns Rubik's Cube. However, the notion of God's Algorithm and God's Number is applicable to many other puzzles and combinatorial games. For some, like the Towers of Hanoi, they are trivial. The number of moves required to solve a Tower of Hanoi puzzle is 2^n–1, where n is the number of disks. For others, they are virtually unknown (especially if the puzzle is shown to be NP-complete, like the family of n-puzzles). For anyone having results for other puzzles or games, please feel free to inform me!

Rubik's Cube:	**http://en.wikipedia.org/wiki/Rubik's_Cube**
God's Algorithm:	**http://en.wikipedia.org/wiki/God's_algorithm**
God's Number is 20:	**http://cube20.org/**

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The photographs on p. 57 are by courtesy of Christophe Guéret.

Front cover: Superflip, the first position of Rubik's Cube proven to require 20 moves (see editorial).

The deadline for the next issue is: **August 1, 2010**.

BNVKI-Board News

Antal van den Bosch

An important part of being an association is having a memory. This does not come automatically. It is all too easy for a loose collective of professionally linked people, like BNVKI-AIABN, to have a weak memory, as board members do not serve life-long terms. The association is fortunate to have people in the membership ranks of the likes of Cees Witteveen and Jaap van den Herik, who will be able to refresh any board's memory on how things were done in the past. Which reminds me of the wonderful role of Donald Michie at BNAIC-2006 in Namur, when we celebrated 50 years of AI and 25 years of our association. Professor Michie sadly and tragically died the next summer, in 2007; the memory of him sharing memories of Bletchley Park to a room of Low Countries AI researchers of all generations is still warming me.

Talking of Bletchley Park, the mansion and grounds on which at least part of the Second World War was won due to the cryptographic and computational work of people like Alan Turing an Donald Michie: the place has been barely kept from demolition in the 1990s, is still not in a great shape, and is now the focus of a "Save Bletchley Park" movement that attempts to get people involved through gifts and having them visit the place for a fee. Keeping memories alive is an important ingredient of associations like ours, but it should be an active occupation of any organization, also (and especially) of governments and government-subsidized organizations, and it is sad to see that the political environment of these days stresses the fact that preservation and conservation should be economically viable. I can't draw up a tight reasoning that would argue that Bletchley Park could be expected to make money – but how dearly important it is to hold on to these classic grounds. I encourage you to visit the URL below and spread the word.

The board hopes to see you at one of the next AI events of the summer or, of course, at BNAIC-2010 in Luxembourg!

http://www.bletchleypark.org.uk/

Symposium on Self-Organising Knowledge Systems (SOKS)

Christophe Guéret

Semantic Web technologies have been designed to create a Web linking things rather than documents and using meaningful relationships rather than standardized links. The corresponding standards (RDF, SPARQL, ...) have been applied to the creation of a Web of Data (WoD). A huge, rapidly growing, and Web-based network of facts compromising governmental data, general knowledge, musical information and bibliographical facts among many other topics. As for the Web of Documents (WWW), everyone is free to contribute to this Web of Data by creating new facts and/or declaring new things. Also like the WWW, it is impossible to get a complete picture of the WoD though a significant portion of it can be observed through the eye of the Linked Open Data project. An observation that can be made when having a look at this subset is that the WoD is messy. It contains billions of facts hosted by many different parties, represented using a variety of vocabularies with varying degrees of preciseness, and supplied in an inconsistent fashion. These are not deficiencies in the WoD, instead they are the core to the open world that allows providers to easily expose and connect their data. However, the messiness of the WoD is currently not taken advantage of. The WoD is often treated as a database where precise queries can be formulated and answers are definitive. There is a need for the Semantic Web research community to focus on returning "good enough" answers.

The SOKS project is a joint initiative from the Knowledge Representation and Reasoning (KRR) and the Computational Intelligence (CI) research groups of the Vrije Universiteit Amsterdam. It aims at combining two different (and until now separated) main streams in Artificial Intelligence research: computational intelligence and knowledge representation, applying bottom-up computational intelligence techniques to solve Semantic Web problems through emergence and self-organisation. This domain of study is young and differs a lot from common practices on the WoD. The goal of the SOKS symposium organised on the 28th and 29th of April, 2010 was to bring together researchers working on CI, the Semantic Web and Complex Systems to highlight some of the currently happening cross-research and foster new opportunities of collaboration. The attendance of roughly 30 participants as well as the keynote speakers reflected such diversity.

This event, generously sponsored by The Benelux Association for Artificial Intelligence (BNVKI-AIABN), the Network Institute and the Netherlands research school for Information and Knowledge Systems (SIKS) was structured around tutorials introducing the relevant topics and 4 keynotes.

TUTORIALS

INTRODUCTION TO EVOLUTIONARY COMPUTING, SITUATED EVOLUTION AND THE SEMANTIC WEB

Evolutionary Computing is an important part of CI techniques aimed at producing an artificial evolutionary process to solve optimisation problems. Guszti Eiben and Martijn Schut gave an introduction to that topic explaining the basics of the design of an artificial evolutionary process and how these concepts have been recently given a new spin in situated evolution. In "traditional" evolutionary computing, the entire evolutionary process takes place within a single machine, often out of the application context of the problem to solve. For instance, an artificial brain for a robot would be trained in some machine and then transferred into the physical controller. Situated evolution changes this by embedding the evolutionary process both in space and time: the controllers evolve in their usage context and during their usage.

Frank van Harmelen gave an introduction to the Semantic Web, explaining the role of semantic technologies and emphasizing successful applications of them from around the world. A highlight of the talk was the recent announcement of Facebook as a new contributor to the WoD. With its OpenGraph protocol and the possibility to "Like" any web page using it, the social network website shows a great interest in using structured data. The semantic data incorporated into a web page allows Facebook to get precisely defined information about this page.

Frank van Harmelen, giving a tutorial on the Semantic Web on the first day.

KEYNOTES

OBSERVATION AND DESIGN OF SELF-ORGANISING PROCESSES ON AND FOR THE WOD

Self-organisation can be seen through activities on the WoD or in algorithms designed to deal with it. The first two keynotes were dealing with the former aspect. David Chavalarias explained how data trails left by researchers can be used to study community-level interaction. Siegfried Handschuh spoke about social activities and the creation of semantic information through the Desktop using the social semantic desktop platform Nepomuk.

Siegfried Handschuh.

The following two keynotes were aimed at the second aspect, the usage of self-organising processes to deal with data from the WoD, and addressed the specific problems of data interoperability and access. Philippe Cudré-Mauroux introduced the notion of emergent semantics as a design principle for decentralized semantic structures. He explained how this notion has been successfully applied to establish semantic interoperability across data sources using different schema and also how the same principles can be applied to identify URIs referring to the same thing. Then, Kia Teymourian introduced the SwarmLINDA project: a self-organising triple store making use of a swarm of artificial ants. The system offers a triple-space access to the set of triples managed by the ants: without having to worry about where the data is finally stored, any user can query for adding or retrieving a triple. The benefit of the self-organising process is that the system itself figures out how to organise the storage of data in order to increase query performances.

Philippe Cudré-Mauroux explaining the notion of Emergent Semantics.

WRAPPING UP

The event wrapped up with a discussion on the relevance of self-organisation principles for the WoD and the future of using it as a design principle for algorithms. The audience agreed both on the interest of pursuing such research initiative and the difficulty of defending it. The specifics of self-organising approaches, such as the far-from-equilibrium state, make them tricky to compare with traditional approaches in terms of performances. They address a different goal, namely reaching a "good-enough" state, that can not be directly compared with the common goal of finding the definitive answer to a given problem. Finally, the audience agreed on turning this symposium into the first meeting of a series of gatherings around that particular topic. A community log of notes around the event can be found on twitter under the hashtag #soks.

MORE INFORMATION

More information, including the abstracts and the slides from the talks, can be found on the web page of the symposium: http://www.few.vu.nl/soks/symposium.

Symposium: The Evolution of Deception

June 2, 2010

Benno Kruit
USCKI Incognito

One of the most debated questions of all time concerns the root of evil. Evil itself is very interesting, of course, but its implementation is of considerable interest as well. One of the nastiest ways it rears its head is most definitely through deception. It is often hard to fathom how someone who looks honest and trustworthy could knowingly lie and cheat and it's very painful to find out your confidante was not, in fact, to be trusted. It is also most important for a functional society to know that people mean what they say, and act on their words. Countless back-stabbings, forgeries and conspiracies have undermined the faith of the trusting and broken both hearts and empires. There is no shortage of reasons to try to answer the age-old question: "How could you?"

For this reason USCKI Incognito, working together with Studium Generale Utrecht, devoted its annual symposium to the subject of the Evolution of Deception. Five thinkers in the fields of Game Theory, Philosophy, Agent Logic and Bioinformatics shared their research findings and theories about the origin, execution and implications of lies. On the 2nd of June, 2010, after the room had filled with interested spectators, the symposium was opened by John-Jules Meyer, who gave numerous examples of everyday dishonesty. On average, he told us, we tend to lie in a quarter of conversations lasting over 10 minutes. Half of all college students regularly lie to their mothers, and most people lie to two out of three strangers. However, soon we found out that not all deception is created equal. Bragging and modesty are forms of lying, but fundamental to social interaction. And is an unconscious untruth still deceit?

Fundamental to deception is communication. Thijs Ruijgrok, our expert on game theory from the University of Utrecht, presented a model of communication in a game based on nestlings competing for food and screeching for attention. In the evolutionary simulation, the screeching came to mean different things depending on their parents' feeding reaction. Depending on the level of the baby birds' genetic ties, the screeching either came to mean 'Feed me, I'm hungry!' or 'Feed my siblings, I've had enough!'. In this way, deception was breaking the evolved communication rules for personal gain, but it couldn't happen too often: deceive too much and communication loses meaning. If everyone deceives, there's no trust, which means that no-one actually speaks lies because there is no real speaking at all.

This system of evolved communication rules is not exactly what we'd call deception because the birds have no choice but to follow their evolutionary rules. Our second speaker, Mark Coeckelbergh of the University of Twente, spoke about the morals of deception in social relationships. He explained the difference between 'immoral' and 'amoral'. The deceptive nestlings were amoral, because they didn't know what they were doing. It's not until something can sympathize with you that it can knowingly deceive you and become immoral. This way, deception hijacks empathy.

You can't convincingly tell a lie your audience knows to be untrue. We knew Martin Caminada of the University of Luxembourg was speaking the truth when he told us about deceit with different distribution of knowledge. Untruths are spoken when the speaker is unknowingly wrong, speaking lies is convincing someone of fiction on purpose. If you don't know whether you're right or wrong but try to make them believe what you say, you're misleading. And finally, if you don't care whether they believe you or not, but just want to impress them with something you know nothing about, you're simply talking bullshit, to use the eminent speakers' terminology. The problems arise when uninformed people try to find those who know what they're talking about!

Knowing how much your hearer knows is very important for a lie. Even saying you don't know can change a situation drastically! Games involving conclusions from shared and private knowledge were made clear to us by Hans van Ditmarsch, of the University of Utrecht. Long strings of 'I know he knows I know he knows' can solve interesting logic puzzles, and even unmask a liar.

The day was concluded by Paulien van Hogeweg, of the University of Utrecht, who showed us amazing results of decades of research into multi-level evolution. When different species form an ecological balance, a cheating parasite can disrupt this. In many cases, however, the system adapts and even exterminates the parasite. This is often due to spatial distances and activating networks of genes in subsequent generations. Evolution can change species back and forth very rapidly and respond to deception and imbalance many times faster than is often thought.

In all, our knowledge about the fundamentals of deception and its rise in evolutionary systems was vastly expanded by the insights provided in this symposium. Different models and knowledge about its prerequisites can help us realize in which situations deception can arise and even prevent it. This solves the 'how' in "How could you?", but in the end, another question worth asking might be: "Why did you?"

Serious Gaming and Social Simulation

Aske Plaat
TiCC, UvT, Tilburg

On June 11, 2010, in collaboration with NWO and SIKS, the TiCC institute at Tilburg University organized a successful symposium on Serious Gaming and Social Simulation in honor of the inaugural address of dr. Aske Plaat. Approximately 25 participants listened to four interesting talks and participated in the lively discussions afterwards. An outline of the four talks is presented below.

Prof.dr. Jaap van den Herik welcomed all the participants to the symposium, and outlined the occasion and the background of the speakers.

JONATHAN SCHAEFFER (UNIVERSITY OF ALBERTA, EDMONTON, ALBERTA, CANADA)

Jonathan Schaeffer is a professor at the University of Alberta and the Canada Research Chair in Artificial Intelligence. Professor Schaeffer was the guest of honor at this symposium. He led the team that wrote CHINOOK, a computer program that is the world's strongest American checkers player. Chinook is recognized as the first program to achieve supremacy over the human champion in a non-trivial game. After achieving that milestone, for which he is listed in the Guinness Book of Records, professor Schaeffer continued to solve the game of checkers. Again, his result, after a multi-year multi-computer effort, is the first achievement solving a problem of this complexity. He has written the book *One Jump Ahead* on his experience with CHINOOK and Checkers. Professor Schaeffer's talk described the long road that led to his achievements.

CHATHOLIJN JONKER (TU DELFT)

Prof.dr. Catholijn Jonker is the head of the Man-Machine-Interaction group at the Delft University of Technology. She is well known for her work on multi-agent simulations. She presented joint work with Geert and Gert-Jan Hofstede on modeling cultural aspects of organizations and countries in a multi-agent simulation. For example: Americans are goal oriented, Dutchmen are relationship oriented, Russians are hierarchy-oriented. In developing systems to aid trade-negotiations this knowledge can be useful. The work presented by Jonker has recently been presented at the AAMAS 2010 conference in Toronto.

PAUL VAN HOOFF (SIGNIFICANT AND MINISTRY OF JUSTICE)

Paul van Hooff gave a very interesting talk about the practice of policy simulation. He gave an overview of the kinds of questions that large corporations and ministries are faced with, such as building a system for road pricing, or decreasing juvenile delinquency. Achieving these goals can be difficult, and history has taught us many examples of failed ideas, failed projects, and time and cost overruns. By simulating ideas in an early phase, policy makers get feedback on how their ideas might play out in real life, and what intended or unintended consequences their policy ideas might have.

PIETER SPRONCK (TILBURG UNIVERSITY)

Dr. Spronck gave a lively talk on player modeling. In the field of entertainment games it is important to create a game play that induces the player to continue playing. The game should not be so hard as to frustrate the player, nor should it be too easy to bore the player. Dr. Spronck presented recent results in modeling and recognizing the behavior of different artificial game participants. Recognizing different playing styles is an intricate problem central to the question of how to create appealing game play.

The symposium was closed with a lively discussion. After that participants were invited to attend the

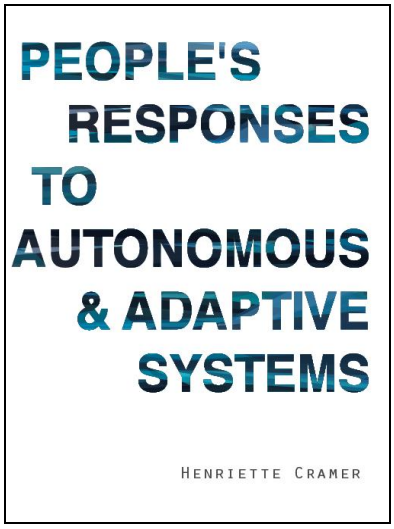
inaugural address of dr. Plaat entitled “De vlinder en de mier” (The butterfly and the ant), on modeling human behavior in large organizations. After the address part of the discussions continued during the reception and dinner.

PH.D. THESIS ABSTRACTS

People’s Responses to Autonomous and Adaptive Systems

Ph.D. thesis abstract
Henriette Cramer

Promotor: Prof.dr. B.J. Wielinga
Copromotor: Dr. V. Evers
Date of defense: April 23, 2010



A growing number of computer systems no longer are passive tools; instead they learn, adapt and to a certain extent make decisions that previously required human intervention. This thesis investigates people’s interaction with such autonomous and adaptive systems. These systems range from spam filters that learn from users’ feedback which messages are unwanted, to social robots that interact with people in ways similar to human-to-human interaction.

When systems act in more autonomous ways, reactions will be invoked (cognitive, affective, social) that are less likely in the context of ‘more traditional’ systems and interfaces. Systems become less predictable, the reasons for their actions are harder to understand and users have to hand over a certain level of control. Beyond a cognition-based assessment that a system will competently perform its tasks, social-affective aspects of the interactions will play a role in user perceptions, acceptance, behaviour and trust.

This thesis discusses six user studies which between them focus on two themes: the fundamental conflict of adaptive, autonomous behaviour versus user control and understanding, and the potential of social behaviours in interaction with highly complex, ‘intelligent’ systems. The studies explore the effect of awareness and understanding, the effect of user control and system autonomy, the effect of systems’ social-expressive behaviours and effects of individual user traits and various context characteristics. Presented are studies in users’ own environment, controlled experiments and on-line video-based studies.

The first two studies focus on awareness and understanding in interaction with systems that are adaptive and take semi-autonomous decisions as part of an on-screen application (adaptive spam filtering, recommender systems). The subsequent four studies focus on interaction with systems with a more ‘agent’-like nature and more social presence: a (simulated) in-vehicle agent that interacts using voice, physically embodied social robots and a distant,‘invisible’ mobile hazard monitoring system that interacts via text messages in a mobile application.

Studies
The first study presents an effort to gain more understanding in the ways that users trust systems that make (semi-)autonomous decisions on their behalf by evaluating how people interact with spam filters. Adaptive (trainable) spam filters are a common example of systems that make (semi-) autonomous decisions on behalf of the user; they decide whether or not a message is relevant and whether it can or cannot be deleted. Many spam filters also contain feedback mechanisms and ways for the user to train the filter and correct its mistakes. In that capacity spam filters offer a fine opportunity for studying user interaction with and trust in (semi-)autonomous and adaptive systems in real-life contexts, but trust in these filters and how people interact with them has been surprisingly underexplored. This study investigates usage of spam filters in the daily workplace and user behaviour in training these filters (N=43). User observation, interview and survey techniques were used to investigate attitudes towards two types of filters: a user-adaptive (trainable) and a rule-based filter. Participants generally were very positive toward using spam filters. Many of our participants also invested extensive effort in training their filters.

However, participants mostly did not want to delegate tasks to their filters. Adaptivity, whether users could train their filter, and users' investment in doing so, did not necessarily lead to increased trust in a filter. In addition, trust did not appear decisive in delegation to the filter. Instead, the findings indicate that users' filter awareness and understanding, coupled with contextual perceptions of risk, seriously impact user attitudes and behaviour. Misconceptions about the filter or a lack of awareness of its functionality for example led to suboptimal training behaviour, illustrating unsolved interaction challenges for adaptive systems in general.

The second study investigates the effects of transparency on trust in adaptive recommender systems that rely on user feedback. The study centres around participants' interaction with a recommender system in the cultural heritage domain. User-adaptive art recommender systems aim to present their users with art content tailored to their interests. Users then need to be able to depend on the system to competently adapt to the feedback they provide and to find the artworks that are most interesting to them. A between-subject experiment (N=60) evaluated interaction with three versions of a content-based art recommender that used explicit feedback. The recommender system provided users with artworks of interest to them, based on their individual ratings of other artworks. Version 1 was not transparent, version 2 explained to the user why a recommendation had been made and version 3 showed a rating of how certain the system was that a recommendation would be of interest to the user. Results show that explaining to the user why a recommendation was made increased acceptance of the recommendations and increased chances that users' perception of competence matched actual profile quality. Trust in the system itself was not improved by transparency. Showing how certain the system was of a recommendation did not influence trust and acceptance. The study showed that it is important that the level of transparency and the type of feedback users can provide need to be congruent; users need to be able to correct system mistakes made apparent by transparency features. This, while safeguards also have to be in place against suboptimal training behaviours that might result from this direct feedback.

The third study explores the interplay of autonomy of a system, individual user traits and usage context in interaction with autonomous and adaptive systems. Focus is on agents that to a certain extent employ more human-like ways of communicating with the user (in this case speech) and to which perhaps a higher degree of agency might be attributed than to for example trainable on-screen filters and recommenders. The study specifically investigates user attitudes toward assistive agents and their decisions in an in-vehicle context. Balancing user control and system autonomy has been established as an important aspect of interaction with semi-autonomous and adaptive systems. In-vehicle agents can potentially avert dangerous driving situations by adapting to the driver, context and traffic conditions. Different levels of user control and system autonomy are possible; agents can for example fully take over control, they could instruct users what to do or could provide information. The way agents offer assistance and associated perceptions of system autonomy, the driving context and users' personality traits are all expected to affect acceptance and trust. This survey-based experiment (N=100) further investigates how these factors affect attitudes. The 2x2, between-subject, video-based design varied driving context (high, low density traffic) and type of agent (providing information, providing instructions). The study's results show that type of agent and traffic context interact in their effects on attitudes towards the agent, with attitudes being most positive towards the instructive agent in a light traffic context. Participants who scored high on locus of control tended to report that the driver should comply to the agent's instructions more than those scoring low on locus of control. Dislike of driving and aggression increased perceived urgency of the situation presented in the video scenario. The study shows that a higher level of system autonomy is not necessarily better or worse, but has to be adapted to the context.

The fourth study explores the effect of social behaviours of embodied autonomous systems. Embodied social agents mimic human social behaviours to increase intuitiveness of interacting with these agents. It is however not yet fully clear how social behaviours displayed by embodied agents affect user perceptions and attitudes towards them. For example, despite robots' embodiment and their increasing autonomy, the effect of communicative touch in combination with robots' autonomous behaviour is an aspect of human-robot interaction that has not been extensively researched yet. This video-based, 2x2 between-subject survey experiment (N=119) found that touch and proactiveness interacted in their effects on perceived machinelikeness and dependability. Attitude towards robots in general also interacted with the effects of touch and influenced perceived social proximity. Results show that touch is considered more appropriate behaviour for proactive agents than for reactive agents. Also, people that are generally more positive towards robots find robots that interact using touch less machine-like. This study's results illustrate the importance of

considering that social behaviours have to fit with the interaction context and need to be adapted to individual characteristics and preferences.

The fifth study further investigates the effect of social behaviours on interaction with autonomous systems, focusing on empathy. Robots (and other autonomous agents) are increasingly designed to display social behaviours, including empathy. Expressing empathy requires an appraisal of the user's affect. However, making a correct inference on the user's emotional experience is challenging and mistakes are likely, due to the problem of having to appraise a deeply personal, individual experience. Systems thus are bound to make errors in affect recognition, making it very important to understand how people respond to empathic capabilities if a robot displays empathic behaviours incongruent with the users' emotional experience. In this study, we sought to clarify the effects of accurate and inaccurate emphatic robot behaviours on human responses by investigating participants' attitudes toward a robot team mate in a game playing scenario. A 3x2 between-subject video-based survey experiment was conducted with empathic robot behaviour (empathically accurate vs. neutral vs. empathically inaccurate) and valence of the situation (positive vs. negative) as dimensions. Participants (N=133) reported decreased trust of the robot when the robot's empathic responses were incongruent to the affective state of the user in the video. However, in the negative valence condition (losing the game) participants found the robot that responded positive (and incongruent to the emotional state of the user) to have the highest empathic abilities. These findings indicate that inaccurate empathic behaviour indeed negatively influences participants' attitudes toward the robot. The results also suggest that in negative circumstances, accurate empathic robot behaviour should to be positive rather than honest when striving for a perception of social ability. The incongruent results on perceived empathic ability and trust show the influence of the conceptualisation of social ability and illustrate the importance of not only assessing whether attempts at social behaviour are recognised, but also which effects behaviours have on user trust. These results also indicate the importance of showing restraint when implementing explicit social behaviours. A system's mistakes in assessing the affective state of the user and inaccurate empathic behaviour may have a detrimental effect on trust. In certain contexts, system designers may need to reconsider the introduction of empathic behaviours when the likelihood of inappropriate inferences on user affect is high.

The sixth study also investigates the effects of empathy, but this study focuses on interaction with non-embodied autonomous mobile systems that both provide information to, and request information from users. Mobile applications and services can provide context-aware services to users wherever they go, but may also interrupt users during their regular activities. Socially expressive and empathic system behaviour have been suggested as a way to build reciprocal relationships with users and increase trust. This between-subject, Wizard-of-Oz experiment (N=50) further investigates the effects of socially expressive, empathic behaviour on mobile interaction. The participants interacted with either a socially expressive, empathic system, or a non-expressive system while performing a physical search task in a semi-crisis context in a controlled lab setting. The experiment also explored the effect of the user personality traits empathy and extraversion. Participants were observed, interviewed and filled out a questionnaire. Dependent variables include trust, compliance to system requests and follow-up on information provided, emotional experience and perceptions of the collaboration with the system and its intentions. Results show that socially expressive, empathic behaviour will not always lead to increased trust and that user personality traits will affect reactions. Even though the socially expressive, empathic condition was recognised as more empathic, it did not increase trust or compliance. Instead, the study found indications that social, empathic expressivity can change perceived systems' intentions. The system's social behaviour in this study negatively affected trust in the system's actions, trust in the information provided and led to less follow up on the system's warnings. Messages that appeared motivating to some participants, were considered socially awkward and inappropriate by others. The socially expressive messages were in some cases considered inappropriate in such an urgent situation and as incongruent with the actual affective experience of participants. When actively reflecting on the messages, participants' comments on the socially expressive condition during the interviews ranged from 'encouraging' to 'inappropriate for the situation' or even 'sarcastic'. User personality traits will affect reactions to social system behaviour as well; participants low on empathy reported a less positive affective experience when interacting with the expressive, empathic system. The study also identified interaction issues that have to be taken into account in development of mobile systems that need user feedback to provide context-aware services.

General conclusions

Together these studies provide insight in how people interact with adaptive and autonomous systems. The studies show that while attitudes towards adaptive, autonomous systems may be positive, users do not

necessarily feel they can depend on a system in their specific situation. Adaptivity and user investment do not always lead to more trust. Even when users have a general trust that a system will perform its task well, they are not necessarily more willing to assign a high level of autonomy to a system. Trust is a multi-faceted concept and we need to distinguish between users' trust in a system's 'general character' and dependability of the system in the user's specific situation and trust in system decisions and the information and results it provides.

When users interact with adaptive, autonomous systems they are much less sure about functionalities and capabilities than when interacting with more 'traditional' systems. This uncertainty results in suboptimal use and user behaviour that can be unexpected or even erratic at times. As the adaptive systems adapt themselves to the user, users in turn also adapt their behaviour to their perceptions of the system's inner workings. When confronted with results users think are unsuitable or which they do not understand, they will start experimenting with the system to both understand it and to gain better results. While experimenting is not necessarily a negative thing, we do need to consider that users will for example tailor their feedback in a manner that they think will yield them the best results, but in actuality only decreases performance. Simple attempts to increase trust by social interaction styles using explicit social statements or by adding transparency features will only in very specific settings yield their expected results. The consequence of this general observation is that future research and design of interaction features of autonomous systems cannot be performed in a vacuum; we have to consider what the effects of these features are in different circumstances and for different people.

Congruency of system behaviour with the user's expectations and context of use is very influential in user acceptance. Incongruence negatively affects trust in most contexts. Negative effects for example occur when social behaviour is incongruent with the situation. Incongruence of the users' expectations of the effect that their feedback will have on a system and the actual results a system produces leads to less trust and unexpected user behaviour. Social behaviour can be incongruent with the level of autonomy of a system and finally, incongruence between personality traits of the user and the 'personality' traits and behaviour of a system can also have a negative effect.

Adaptive and autonomous systems offer great promises for the future role of technology but their nature provides us with complex challenges. The difficulties in awareness and understanding highlight the risk that users will over- or underuse adaptive and autonomous systems. It becomes harder to predict how users will use these systems and harder to predict users' and system behaviour. This points to great questions about (social) and ethical implications when these systems are used in more critical domains or when they are used in social situations. Directions suggested in the literature to ease interaction and increase trust cannot be directly applied in every situation. Features such as transparency will not always lead to increased trust, acceptance and optimal use. The social behaviours suggested to ease interaction with autonomous systems cannot be blindly implemented in every system as their effects will depend on the context and user. Social behaviours and features related to user feedback and system explanations cannot be 'tacked on' to a system as an afterthought. They need to be an integral part of its interaction design and need to be designed and evaluated in a situated manner. This work has attempted to identify these challenges in building and usage of adaptive and autonomous systems and has laid a basis for addressing these issues in an informed way.

Weakly Supervised Methods for Information Extraction

Ph.D. thesis abstract
Koen Deschacht

Promotores: Prof.dr. M.-F. Moens, Prof.dr. D. De Schreye
Date of defense: May 3, 2010

This thesis studies weakly supervised learning for information-extraction methods in two settings: (1) unimodal weakly supervised learning, where annotated texts are augmented with a large corpus of unlabeled texts and (2) multimodal weakly supervised learning, where images or videos are augmented with texts that describe the content of these images or videos.

In the unimodal setting we find that traditional semi-supervised methods based on generative Bayesian models are not suitable for the textual domain because of the violation of the assumptions made by these models. We develop an unsupervised model, the latent words language model (LWLM), that learns accurate word similarities from a large corpus of unlabeled texts. We show that this model is a good model of natural language, offering better predictive quality of unseen texts than previously proposed state-of-the-art language models. In addition, the learned word similarities can be used

successfully to automatically expand words in the annotated training with synonyms, where the correct synonyms are chosen depending on the context. We show that this approach improves classifiers for word sense disambiguation and semantic role labeling.

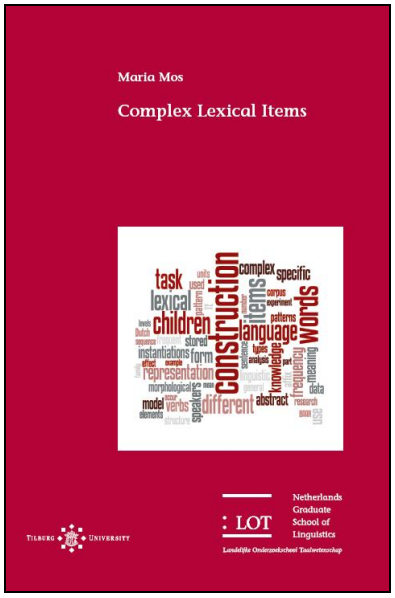
The second part of this thesis discusses weakly supervised learning in a multimodal setting. We develop information-extraction methods to information from texts that describe an image or video, and use this extracted information as a weak annotation of the image/video. A first model for the prediction of entities in an image uses two novel measures: The salience measure captures the importance of an entity, depending on the position of that entity in the discourse and in the sentence. The visualness measure captures the probability that an entity can be perceived visually, extracted from the WordNet database.

We show that combining these measures results in an accurate prediction of the entities present in the image. We then discuss how this model can be used to learn a mapping from names in the text to faces in the image, and to retrieve images of a certain entity. We then turn to the automatic annotation of video. We develop a model that annotates a video with the visual verbs and their visual arguments, i.e., actions and arguments that can be observed in the video. The annotations of this system are successfully used to train a classifier that detects and classifies actions in the video. A second system annotates every scene in the video with the location of that scene. This system comprises a multimodal scene cut classifier that combines information from the text and the video, an IE algorithm that extracts possible locations from the text and a novel way to propagate location labels from one scene to another, depending on the similarity of the scenes in the textual and visual domain.

Complex Lexical Items

Ph.D. thesis abstract
Maria Mos

Promotor: Prof.dr. A.P.J. van den Bosch
Copromotores: Dr. A. Vermeer, Dr. A. Backus
Date of defense: May 12, 2010



Complex Lexical Items or CLIs are sequences such as *comparable* and *proud of*. They are complex, because they consist of more than one part, but they are also lexical items: they are likely to be stored as units in speakers' linguistic repertoires. What people know about CLIs and how they use this knowledge, is the topic of this book.

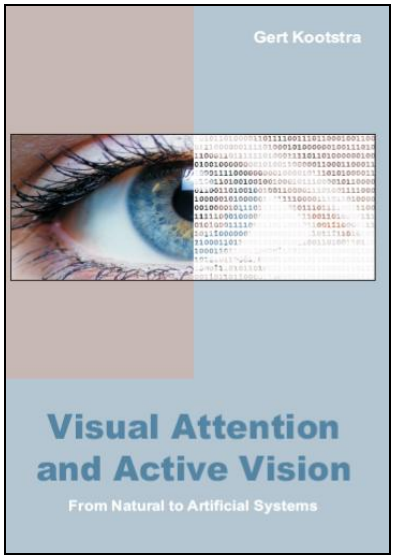
Taking a usage-based view of language acquisition, Maria Mos investigates children's knowledge of Dutch CLIs in a number of online and offline experiments. Performance on these tasks is contrasted with frequency data from corpora and with adult performance. These studies investigate specific CLIs, but also seek to find out if evidence can be found for knowledge of underlying patterns. The experimental data are interpreted in the light of a model of Multiple Representations, which draws on insights from the Construction Grammar framework.

Because this book combines corpus and experimental data on a topic at the crossroads between lexicon, morphology and syntax, it is of interest to linguists coming from diverse scientific angles. The analyses convincingly show that it is necessary to assume that both concrete CLIs and (partially) abstract representations are part of speakers' linguistic repertoires. They should not be thought of as either pertaining to the lexicon or being part of syntax: they are *Complex Lexical Items*.

Visual Attention and Active Vision
From Natural to Artificial Systems

Ph.D. thesis abstract
Gert Kootstra

Promotor: Prof.dr. L.R.B. Schomaker
Copromotor: Dr. B. de Boer
Date of defense: May 17, 2010



The multi-disciplinary approach taken in this dissertation has led to new insights in visual attention and active vision in natural and artificial systems. Vision, instead of being passive, involves active processes to focus attention. This is not only true for natural systems, but it is also important for artificial vision systems. This dissertation deals with visual attention in natural and artificial systems and proposes symmetry, one of the Gestalt principles for figure-ground segregation, as an important feature.

In the first part of the dissertation, the perception of symmetry by the human visual system is studied in the context of overt visual attention. We propose a visual-attention model based on symmetry. The results show that human eye fixations are predicted better by our model than by a model using center-surround contrasts of basic features such as brightness, color, and orientation. The results furthermore indicate that symmetry is detected efficiently by humans, despite being a higher-level visual feature.

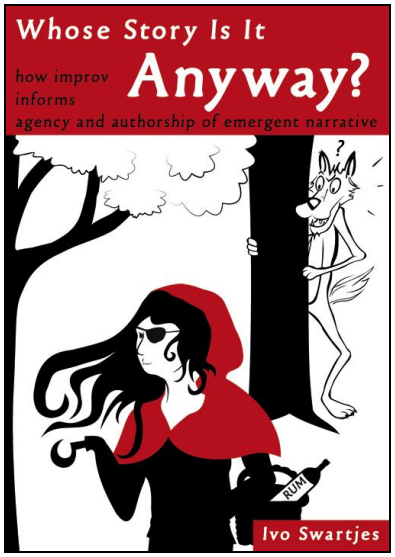
In the second part, the proposed visual-attention model is applied to focus the attention of a robot on interesting parts in its environment. The use of symmetry is shown to be beneficial for the selection of stable and robust visual landmarks. Based on these landmarks, the robot builds a map of the environment and uses this map to localize itself. In this context, the use of symmetry outperforms the landmark-selection method based on center-surround contrasts. It is furthermore illustrated that perception is simplified using active vision.

The main conclusion of this dissertation is that symmetry is a valuable feature both for the prediction of human gaze and for focusing the attention of an autonomous robot.

Whose Story Is It Anyway?
How improv informs agency and authorship of emergent narrative

Ph.D. thesis abstract
Ivo Swartjes

Promotor: Prof.dr.ir. A. Nijholt
Assistant-promotor: Dr. M. Theune
Date of defense: May 19, 2010



One of the more recent developments in interactive entertainment, art and media is the notion of *interactive digital storytelling*. One of the goals pursued here is to be able to build highly immersive, highly interactive fictional worlds in which a user can have the first-person experience of being a character in a story that unfolds in part based on the actions of the user. For this, we must go beyond the branching narrative models used in the games industry; it requires organizing story content using novel procedural and generative (AI-based) representations.

One particular approach to creating this kind of experience is that of *emergent narrative*. In the

emergent-narrative approach, the storyworld is inhabited by a collection of intelligent, autonomous agents, each playing out the role of a character in the storyworld. The story is not scripted, but collaboratively emerges based on the interactions of these characters with each other and with the storyworld they inhabit. The unscripted nature of emergent narrative solves the *narrative paradox*, the apparent clash between the user's freedom to interact within a virtual environment, and the goal of the system to tell a story within this environment.

The use of AI-based story-generation techniques for creating interactive storytelling applications has significant ramifications for the authoring process in comparison to traditional story writing. It creates tensions between what an author envisages for the final experience, what an author is afforded to express with the system, and what actually occurs at run time, which is partially unpredictable and uncontrollable by the author due to the generativity of the AI formalisms used. This is especially true for emergent narrative, where the author faces the paradox of 'authoring for emergence'.

At the same time, for creating interactive storytelling environments, it is also important to have an understanding of what would motivate users to take action within such environments. However, due to the lack of playable prototypes, and the great effort of creating these, our understanding of user agency is still limited.

This thesis presents a conceptual and technical contribution situated within the emergent narrative approach, aiming to better understand agency and authorship of unscripted narrative in virtual environments. It does this by drawing comparisons with the theory and practice of dramatic improvisation. The thesis is organized in four parts. Part one, *Narrative in Virtual Environments*, illustrates some of the challenges of using virtual environments for interactive storytelling: the narrative paradox, the high amount of authoring required, the necessity of using story generation techniques and the resulting trade-off between story generation and authorial control. The approach of emergent narrative is discussed in detail, and a model for authoring is proposed that goes beyond the current, rather technical discourse on emergent narrative authoring by instead investigating its processes of constructing meaning. By using C.S. Peirce's three 'modes of being', the model clarifies how the paradox of authoring for emergence can be resolved and illustrates how authorial ideas interact with system implementation. This frames authoring as a *co-creation* between author and storyworld-under-development, decreasing the tension between authorial control and system generativity. In this conception, authoring must be iterative; in each authoring cycle, authorial decisions are made in the context of what actually happens in the simulations that have occurred so far.

Part two, *Dramatic Improvisation*, draws the comparison between emergent narrative and the practice of dramatic improvisation, as both are based on a collaborative emergence of drama. The process of story construction within improvisational theater is described based on the work of Keith Johnstone, resulting in guidelines for the design of agents for emergent narrative. The improvisational theater model is also used to clarify agency within emergent narrative, by means of an experiment in which human improv actors were given the task to immerse a participant in an engaging improvised dramatic experience. Interestingly, the poetics of dramatic improvisation, in which each actor has the perspective of both a character *within* the world of the story and a collaborative actor *of* this storyworld, appears to extend naturally to subjects that have little to no experience with dramatic improvisation.

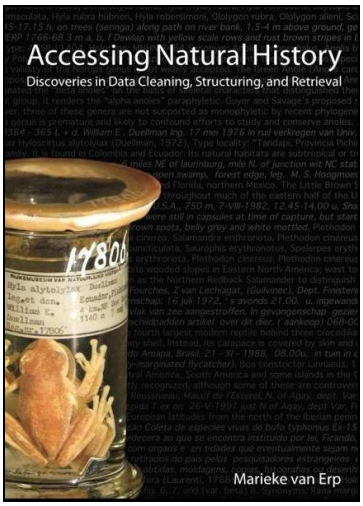
Part three, *The Virtual Storyteller*, describes the design of a system that generates simple stories based on the emergent-narrative approach. This system, called The Virtual Storyteller, generates stories in two phases: (1) the simulation phase, which uses an emergent narrative setup to simulate a particular course of events (a fabula, for which a formal model is given), and (2) the presentation phase, in which the fabula produced is used to construct a narrative text. Some of the techniques used in dramatic improvisation were translated into architectural components of the agents in order to open up an actor-level perspective on the story-construction process. Most notably, the concept of *late commitment* is introduced to refer to the ability of agents to retroactively define aspects of the initial state of the storyworld, as is also done in dramatic improvisation. A formalization and implementation of late commitment was made for The Virtual Storyteller, where it is used to justify the adoption of character goals and to enable plans of action for these goals.

The thesis concludes with part four, *Reflection*, which discusses the authoring process, the simulation and resulting event sequences of two sample story domains. The claims of this thesis are illustrated here: it is shown that in addition to informing agency, a model of dramatic improvisation also holds promise for the design of believable agents involved in the collaborative emergence of narrative, as well as for understanding the iterative process of authoring for emergence.

Accessing Natural History
Discoveries in data cleaning, structuring, and retrieval

Ph.D. thesis abstract
Marieke van Erp

Promotor: Prof.dr. A.P.J. van den Bosch
Copromotor: Dr. P. Lendvai
Date of defense: June 30, 2010



Cultural-heritage institutions harbour a vast treasure of information. However, this treasure of information is often confined to the walls of the archive, museum, or library. This thesis is about improving access to cultural-heritage collections through digitisation and enrichment.

In this thesis, three themes that improve information access in a digital information collection from the Dutch National Museum for Natural History *Naturalis* were investigated: data cleaning, information structuring, and object retrieval. The problem statement that guides the research of this thesis is as follows.

> **Problem Statement**: To what extent can manual and automatic soft- and hard-reasoning approaches improve the data quality, structure, and access to information in an analogue cultural-heritage collection of natural history?

The novelty in the work done for this thesis is that techniques from the Natural-Language-Processing field are applied to data from the natural-history domain, which had not been done so far. Also, the interaction between soft-reasoning, or data-driven, and hard-reasoning, or knowledge-driven, approaches is investigated.

In Chapter 2, the field of natural history is introduced and some necessary background is given. Moreover, the resources involved in this work are described.

In Chapter 3, experiments and results on the automatic population of a database from semi-structured text are presented, as well as a manually constructed ontology for the natural-history domain.

In Chapter 4, the issue of data quality is addressed. The chapter starts with an overview of issues regarding data that contain errors and an analysis of errors in data from the natural-history domain. Then, two methods for automatic cleanup of databases are presented: TIMPUTE and VALIDATO. TIMPUTE is a data-driven method that checks the database for inconsistent values by predicting database values on the basis of all other values in the database. VALIDATO is a hard-reasoning method that utilises domain knowledge from the ontology presented in Chapter 3, as well as from external resources to check database values. Both TIMPUTE and VALIDATO detect a large number of inconsistencies in the data. The two approaches yield complementary results, as they detect different types of errors.

In Chapter 5, an automatic ontology-construction method is presented. The chapter starts with a discussion of automatic ontology construction approaches. Then the approach that is developed in MITCH called TWIBIO is described. TWIBIO makes the implicit domain information present in the R&A database explicit by linking it to the online encyclopaedia Wikipedia. From Wikipedia, TWIBIO extracts relations between different database cells, which are then aggregated to find relations between the different database columns. The ontology constructed by TWIBIO provides a different structure for the R&A domain than the manually constructed ontology, which is a reflection of the point of view from the underlying resources used in building the ontology. The manually constructed ontology is created from an organisational point of view and is thus more hierarchical; the TWIBIO ontology shows off the aim of an encyclopaedia, namely expressing all relevant information, leading to a more unorganised structure. This insight is valuable in itself, as it illustrates that it is possible to have two different ontological views of one domain.

In Chapter 6, improvements for data retrieval are presented. Here, the MITCH Information Retrieval Appliance, or MIRA, is presented. The chapter starts with a short introduction of the field of information retrieval, then the resources used for the MIRA experiments are discussed after which the MIRA system is presented. MIRA is novel in that it utilises

three different types of domain knowledge in three different stages of the retrieval process. It utilises knowledge from external resources and rules to interpret the queries to formulate more precise queries. It utilises the same types of knowledge to expand queries with synonyms to increase recall. To rank results by relevance, MIRA utilises knowledge from the domain ontologies and query analysis. MIRA provides a significant improvement in data access as it decreases the number of unanswered queries. However, not all MIRA modules that utilise domain knowledge provide the same increase in performance of the retrieval results. The experiments show that query interpretation and query expansion provide the greatest increases in performance.

Chapter 7 summarises to what extent the problem statement and each of the research questions are answered and provides conclusions and recommendations for future work.

Science in Action

H. Jaap van den Herik
TiCC, UvT, Tilburg

Classification of research is as difficult as explaining the deep results of any arbitrary research project. The results may vary from new theoretical frameworks to successful applications in practice. The set-out of a scientific result is multi-faceted. This being so, every Ph.D. student has the liberty to make his/her choice and to spend four years of his/her life to a preferred topic. Even in Artificial Intelligence and AI-related disciplines the choices are divergent. Three arbitrary choices (abbreviated) out of the list of Ph.D. defence announcements underline the diversity of our topics: (1) Managing dependance relations, (2) Does ERP add company value?, and (3) Accessing natural history.

An intriguing question is: how do people react on the text as included in the thesis? Without any doubt, a fresh Ph.D. researcher will read a thesis (assuming that it belongs to the own preferred research area) with another appreciation than a seasoned researcher or a member of the assessment committee. Yet, we suppose that the thesis should be readable for all three types of readers. A challenging thinking experiment would be: who will understand best (in the own class) what has been written in this thesis? After reading a good thesis (as a member of the assessment committee) and providing my approval in a fair assessment, I may many times think: "Yes, here we see science in action". So my following question is: take ten theses from our list and assume four assessments per thesis (assume further that all 40 assessors are different). How many of them will state after reading: "Indeed, here we see science in action"? I believe that 32 is a good score.

In summary, all supervisors should have as a criterion for a thesis: is this science in action? In its extreme form, science in action means changing the world. The Editorial Board congratulates all Ph.D. students with completing their theses and all supervisors with the research performed.

Marten Voulon (UL) (June 3, 2010). *Automatisch Contracteren*. Leiden University. Promotores: Prof.dr. H. Franken (UL), Prof.dr. H.J. van den Herik (UvT/UL).

Harold van Heerde (UT) (June 4, 2010). *Privacy-aware Data Management by Means of Data Degradation.* Twente University. Promotores: Prof.dr. P.G.M. Apers (UT), Prof.dr. P. Pucheral (University of Versailles Saint-Quentin), Copromotor: Dr. M. Fokkinga (UT).

John Borking (UL) (June 9, 2010). *Privacyrecht is Code, Over het Gebruik van Privacy Enhancing Technologies.* Leiden University. Promotor: Prof.mr. H. Franken (UL).

Lianne Bodenstaff (UT) (June 17, 2010). *Managing Dependency Relations in Inter-Organizational Models.* Twente University. Promotor: Prof.dr. R.J. Wieringa (UT), Copromotor: Prof.dr. M.U. Reichert (University of Ulm).

Lineke Sneller (Nyenrode Business Universiteit) (June 18, 2010). *Does ERP Add Company Value?* Nyenrode Business Universiteit. Promotor: Prof.dr.ir. J.M. Bots (Nyenrode Business Universiteit), Copromotor: Dr. N.L. van der Sar (EUR).

Stratos Idreos (UvA) (June 18, 2010). *Database Cracking: Towards Auto-tuning Database Kernels.* University of Amsterdam. Promotor: Prof.dr. M.L. Kersten (CWI), Copromotor: Dr. S. Manegold (CWI).

Marieke van Erp (UvT) (June 30, 2010). *Accessing Natural History: Discoveries in Data Cleaning, Structuring, and Retrieval.* Tilburg University. Promotor: Prof.dr. A.P.J. van den Bosch (UvT), Copromotor: Dr. P. Lendvai (UvT/Hungarian Academy of Sciences).

Edwin Commandeur (UvT) (June 30, 2010). *Implicit Causality and Implicit Consequentiality in Language Comprehension.* Tilburg University.

Promotores: Prof.dr. L. Noordman (UvT), Prof.dr. W. Vonk (RUN), Copromotor: Dr. R. Cozijn (UvT).

Eline Westerhout (UU) (July 2, 2010). *Definition Extraction for Glossary Creation – A Study on Extracting Definition for Semi-automatic Glossary Creation in Dutch.* Utrecht University. Promotor: Prof.dr. J.E.J.M. Odijk (UU), Copromotor: Dr. P. Monachesie (UU).

Ying Zhang (CWI) (July 8, 2010). *XRPC: Efficient Distributed Query Processing on Heterogeneous XQuery Engines.* University of Amsterdam. Promotor: Prof.dr. M. L. Kersten (CWI/UvA), Copromotor: Dr. P. Boncz (CWI).

Dolf Trieschnigg (UT) (September 10, 2010). *Proof of Concept: Concept-based Biomedical Information Retrieval*. University of Twente. Promotores: Prof.dr. F.M.G. de Jong, (UT), Prof.dr.ir. W. Kraaij (RUN).

Peter van Kranenburg (UU) (October 4, 2010). *A Computational Approach to Content-based Retrieval of Folk Song Melodies.* Utrecht University. Promotores: Prof.dr. R.C. Veltkamp (UU), Prof.dr. L.P. Grijp (UU), Copromotor: Dr. F. Wiering (UU).

INAUGURAL ADDRESSES

With much pleasure we announce the following four inaugural addresses.

Dr. A. Bijlsma (June 7, 2010). *Klasse-interferentie*. Open University.

Dr. A. Plaat (June 11, 2010). *De Vlinder en de Mier*. Tilburg University.

Dr. M. Diocaretz (June 18, 2010). *The Human and the Digital*. Tilburg University.

Drs.dr. L.J.M. Rothkrantz (October 20, 2010). *Digital Guardian Angels.* NLDA Den Helder.

Section Editor
Richard Starmans

5th SIKS/Twente Seminar on Searching and Ranking

September 1, 2010
University of Twente
The Netherlands
http://www.cs.utwente.nl/~hiemstra/ssr5/

The goal of the one-day workshop is to bring together researchers from companies and academia working on biomedical text mining. Invited speakers are:

- Martijn Schuemie (Erasmus MC/LUMC, Rotterdam, Netherlands)
- Dietrich Rebholz-Schuhmann (European Bioinformatics Institute, UK)

The workshop will take place at the campus of the University of Twente at the small lecture hall of the Vrijhof (building 47).

PROGRAM

11:15 Coffee and Welcome
11:30 Martijn Schuemie (Erasmus MC/LUMC, Rotterdam, Netherlands)
12:15 Lunch
13:15 Dietrich Rebholz-Schuhmann (European Bioinformatics Institute, UK)
14:00 Closing
14:45 Ph.D. defence of Dolf Trieschnigg (University of Twente)

SPONSORS

- SIKS: Netherlands research School for Information and Knowledge Systems
- CTIT: Centre for Telematics and Information Technology, SRO Natural Interaction in Computer-mediated Environments

REGISTRATION

Participation is free. Please send your name and affiliation to ssr@lists.utwente.nl if you plan to participate in the seminar, and help us estimate the required catering.

Advanced SIKS Course on "Smart Auditing"

INTRODUCTION

On October 5 and 6, 2010, the School for Information and Knowledge Systems (SIKS) will organize an advanced course on "Smart Auditing". The course takes two days, will be given in English and is part of the so-called Advanced Components Stage of the Educational Program for SIKS-Ph.D. students. Although these courses are primarily intended for SIKS-Ph.D. students, other participants

are not excluded. However, their number of passes will be restricted and depends on the number of students taking the course. The course is given by experienced lecturers actively involved in the research areas related to the topics of the course.

Location: Landgoed Huize Bergen, Vught
Date: October 5-6, 2010
Scientific Director: Dr. H. Weigand (UvT)

COURSE DESCRIPTION

In order to ensure that business processes behave according to regulations and performance constraints, it is necessary to monitor them. How this monitoring is done effectively and efficiently changes over time as it depends heavily on the technology on which the business processes are executed and the tools available to the auditor. Important examples of technological developments that have an impact on the auditing are service-orientation, web computing and ubiquitous computing.

In this course, the student will learn both about innovation challenges in auditing and about new computational solution directions that can be pursued to meet these challenges, such as Process Mining, Complex Event Processing and Data Stream Querying.

PROVISIONARY PROGRAM

Tuesday, October 5
Morning (10.30-12.00) – Introduction

- Hans Weigand (UvT) – *Smart Auditing, an IT/SOA perspective*
- Philip Elsas (Computationauditing.com) – *Smart Auditing, an auditor (historical) perspective*

Lunch
Afternoon (13.30-17.00) – Innovations in Auditing

- Philip Elsas (Computationauditing.com) – *New risk control mechanisms*
- Yao-Hua Tan (TUD) – *New control mechanisms in e-government*
- Marc Verdonk (Deloitte) – *Online auditing (industrial experience)*

Wednesday, October 6
Morning (9.00-12.30) – Complex Event Processing

- Adrian Paschke (FU Berlin) – *Complex event processing and rule engine technology*
- Wil van der Aalst (TU/e) – *Auditing 2.0: using process mining to support tomorrow's auditor*

Lunch
Afternoon (14.00-17.00) – Intelligent Data Processing

- Hennie Daniels (UvT) – *Observing exceptional values*
- Andreas Wombacher (UT) – *Data stream querying*
- Willem Jan van den Heuvel (UvT) – *Monitoring web service event trails for business compliance (experiences from the COMPAS project)*

REGISTRATION

In the conference center there is a limited number of places and there is interest from other groups in the topic as well. Therefore, an early registration is required.

Deadline for registration for SIKS-Ph.D. students: **September 21, 2010.** After that date, applications to participate will be honoured in a first-come first-serve manner. Of course, applications to participate from other interested groups are welcome already. They will receive a notification whether they can participate as soon as possible.

For registration you are kindly requested to fill in the registration form at the SIKS website.

Arrangement 1 includes single room, all meals, and course material. Arrangement 2 includes two lunches, one dinner and course material (so no stay in the hotel and no breakfast).

SIKS Masterclass on "Design Science Methodology: Principles and Practice"

INTRODUCTION

On October 15, 2010, the School for Information and Knowledge Systems (SIKS) organizes a masterclass on "Design Science Methodology: Principles and Practice". The location will be Conference Center Hoog Brabant in Utrecht. The class is scheduled from 10.00-17.00 hours. The event is primarily intended for SIKS-Ph.D. students, but also SIKS research fellows and SIKS alumni are cordially invited to participate. Although this masterclass is primarily intended for SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS members taking the class. This masterclass is part of the Advanced Components stage of SIKS' educational program.

The engineering of information and knowledge systems is a design science, in which artefact design alternates with validation and evaluation research. This is methodologically complex because it involves a mutual nesting of design problems and research questions, as well as a balancing between abstract generalization and concrete applicability for

stakeholders. This masterclass provides guidelines for the practicing IKS researcher to deal with this complexity.

We will use the engineering cycle as the top-level methodological framework for design science. Within this framework, we first treat typical engineering research questions such as the validation question what effects will be produced by the interaction between a designed artifact and a problem domain, what the valuation of these effects with respect to stakeholder goals is, what trade-offs are involved and how sensitive this is to changes in the problem domain. Next, we discuss the large range of research methods available to the IKS researcher when validating artifact designs, from lab experiments to simulations and field research. Thirdly, we will discuss the role of theories of practice in balancing abstraction with applicability, and fourthly we will provide a structure for practical design theories and show how this can be linked to the practical problems that IKS research aims to solve. Many examples from IKS research are given to illustrate the points made in the tutorial. The masterclass is summarized in the form of a set of guidelines for practicing IKS researchers.

SCIENTIFIC DIRECTOR

Prof.dr. R.J. Wieringa (UT)

PROGRAM

The final program is not known yet, but the outline is as follows:

Block 1
- Introduction
- Design Science
- Knowledge questions and practical problems

Block 2
- The engineering cycle

Block 3
- The research cycle

Block 4
- Mutually nested engineering and research cycles

Block 5
- Structure and content of design theories
- Discussion

REGISTRATION

Participation, lunch included is free for all SIKS members and SIKS alumni. However, an early registration is required. For participation, please fill in the registration form at the SIKS website.

SIKS-Day 2010 in Veldhoven

INTRODUCTION

On November 2, 2010, the School for Information and Knowledge Systems (SIKS) organizes its annual SIKS-day. The location will be NH Conference Hotel Koningshof in Veldhoven. This year the SIKS-day will be part of a three-day national event, entirely dedicated to the Computing and Information Sciences. This event involves a cooperation with IPA, ASCI, NWO and STW. More details will be made available shortly.

The main aim of the SIKS-day is to give SIKS members, participating in research groups all over the country, the opportunity to meet each other in an informal setting and to inform them about current developments and some new activities and plans for the coming year. A small scientific symposium will be organized at the SIKS-day as well. Four invited speakers have agreed to perform:

- John-Jules Meyer (UU)
- Djoerd Hiemstra (UT)
- Hans Akkermans (VU)
- Antal van den Bosch (UvT)

By inviting these researchers we hope to have selected the right ingredients for a memorable day. All members of our research school (research fellows, associated members and Ph.D. students) as well as the members of SIKS' Advisory Board and our alumni are invited to participate.

REGISTRATION

For registration, please visit the website of the event: http://www.ictonderzoek.net/?c=759.

5th SIKS/Benais Conference on "Enterprise Information Systems"

For the fifth time, the Dutch Research School SIKS organizes a Dutch/Belgian Conference on Enterprise Information Systems (EIS). The purpose of EIS is to bring together Dutch/Belgian researchers interested in the advances in and the business applications of information systems. This broad field includes topics such as: Management Information Systems, E-Business, IS Analysis and Design, Requirements Engineering, Business Innovation, Knowledge Management, Business Process Management, Product Software Development, Coordination and Communication, Collaborative Information Systems, Business/IT Alignment, Enterprise Engineering, Architectures for IKS, Business Process Intelligence, Business Process Compliance,

Process Mining, Service Government, Agile Service Networks, and many others.

EIS 2010 is organized by SIKS (School for Information and Knowledge Systems) in cooperation with LOIS (strategic initiative for Logistics, Operations and Information Systems), BENAIS (Benelux Chapter of the Association for Information Systems) and NIRICT (Netherlands Institute for Research on ICT). The conference offers a unique opportunity for research groups from both the Computer Science side and the Management side to report on research, meet and interact. We also welcome practitioners with an interest in research and innovation, as well as doctoral students in the early stages of their careers. The event will take place in Eindhoven, at the campus of Eindhoven University of Technology. Participation in this event is free of charge, but registration is compulsory.

IMPORTANT DATES

September 6:	Submission deadline for Alpha papers
September 13:	Submission deadline for Beta papers
October 5:	Notification of acceptance
November 16:	EIS 2010, Eindhoven, the Netherlands

CONFERENCE ORGANIZATION

Organization Chair:	Wil van der Aalst
PC Co-chairs:	Hajo Reijers, Boudewijn van Dongen
Publicity chair:	Jan Martijn van der Werf
Demo chair:	Pieter van Gorp
Secretariat:	Ine van der Ligt

SIKS Basic Course "Research Methods and Methodology for IKS"

INTRODUCTION

On 24, 25, and 26 November, 2010, the School for Information and Knowledge Systems (SIKS) organizes the annual three-day course "Research Methods and Methodology for IKS". The location will be Conference center Woudschoten in Zeist. The course will be given in English and is part of the educational Program for SIKS-Ph.D. students. Although the course is primarily intended for SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS-Ph.D. students taking the course.

"Research Methods and Methodology for IKS" is relevant for all SIKS-Ph.D. students (whether working in computer science or in information science). The primary goal of this hands-on course is to enable these Ph.D. students to make a good research design for their own research project. To this end, it provides an interactive training in various elements of research design, such as the conceptual design and the research planning. But the course also contains a general introduction to the philosophy of science (and particularly to the philosophy of mathematics, computer science and AI). And, it addresses such divergent topics as "the case-study method", "elementary research methodology for the empirical sciences" and "empirical methods for computer science".

"Research Methods and Methodology for IKS" is an intense and interactive course. First, all students enrolling for this course are asked to read some pre-course reading material, comprising some papers that address key problems in IKS methodology. These papers will be sent to the participants immediately after registration. Secondly, all participants are expected to give a brief characterization of their own research project/ proposal, by answering a set of questions, formulated by the course directors, and based on the aforementioned literature. We believe that this approach results in a more efficient and effective course; it will help you to prepare yourself for the course and this will increase the value that you will get from it.

COURSE COORDINATORS

Hans Weigand (UvT), Roel Wieringa (UT), John-Jules Meyer (UU), Hans Akkermans (VU), and Richard Starmans (UU)

PROGRAM

More details on the program will be made available in due course.

REGISTRATION

In the conference center there is a limited number of places and there is interest from other groups in the topic as well. Therefore, an early registration is required. For registration you are kindly requested to fill in the registration form at the SIKS website.

Arrangement 1 includes single room, all meals, and course material. Arrangement 2 includes only lunch, dinner and course material (so no stay in the hotel and no breakfast).

Deadline for registration for SIKS-Ph.D. students: November 1, 2010. After that date, applications to participate will be honoured in a first-come first-serve manner. Of course, applications to participate from other interested groups are welcome already. They will receive a notification whether they can participate as soon as possible.

Information for non-SIKS-Ph.D. students: SIKS needs a confirmation from your supervisor/office that they agree with the arrangement and paying conditions.

SIKS Basic Courses "Mathematical Methods for IKS" and "Knowledge Modeling"

INTRODUCTION

From December 7-10, 2010, the School for Information and Knowledge Systems (SIKS) organizes two basic courses "Mathematical Methods for IKS" and "Knowledge Modeling". Both courses will be given in English and are part of the obligatory Basic Course Program for SIKS-Ph.D. students. Although these courses are primarily intended for SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS-Ph.D. students taking the course.

Location: Landgoed Huize Bergen, Vught
Date: December 7-10, 2010

SCIENTIFIC DIRECTORS

- Prof.dr. Eric Postma (UvT), Mathematical Methods for IKS
- Prof.dr. Tom Heskes (RUN), Mathematical Methods for IKS
- Dr. Bert Bredeweg (UvA), Knowledge Modeling

PROGRAM

The program is not available yet, but may include the following topics:

Mathematical Methods for IKS

- Basic formalisms relevant to modern intelligent knowledge systems
- Automatically acquired knowledge representations
- Inductive learning
- Bayesian statistics
- Entropy and Information theory
- Computer-intensive techniques
- Minimum-Description-Length Methods

Knowledge Modeling

- Ontologies, epistemology and models
- Modeling with Description Logics
- Methodology for Ontology Engineering
- KADS
- OWL: Ontology Language for the Web
- Ontology patterns, re-use of information

REGISTRATION

In the conference center there is a limited number of places and there is interest from other groups in the topic as well. Therefore, an early registration is required.

Deadline for registration for SIKS-Ph.D. students: **November 30, 2010.** After that date, applications to participate will be honoured in a first-come first-serve manner. Of course, applications to participate from other interested groups are welcome already. They will receive a notification whether they can participate as soon as possible.

For registration you are kindly requested to fill in the registration form at the SIKS website.

Arrangement 1 includes single room, all meals, and course material. Arrangement 2 includes two lunches, one dinner and course material (so no stay in the hotel and no breakfast).

ANNOUNCEMENTS

Call for Participation

WCC2010

September 20-23, 2010, Brisbane, Australia

You are invited to attend WCC2010 – the 21st IFIP World Computer Congress hosted by the Australian Computer Society, on September 20-23, 2010, Brisbane, Australia. See www.wcc2010.com.

WCC2010 is an international event encompassing all things on ICT – innovation, leading practice, new capabilities and trends. Attendees can look forward to four days of exposure to innovative thinking, problem solving and business opportunities.

Although WCC2010 is a *Computer* Congress, it is not just about *Technology*. It is also about *People*, *Business & Processes*. The Congress is expected to attract more than 1,000 attendees from the community, business, industry, research sector, education, government and professional associations to examine the present state, the future and stewardship of information technology across the globe.

To register go to: www.wcc2010.com/content/registration.

CONGRESS HIGHLIGHTS

Congress highlights include:

- 300 IFIP presenters in 17 separate conferences;
- Eight streams encompassing all aspects of ICT practice: DeliverIT, LearnIT, GovernIT, PlayIT, SustainIT, TreatIT, TrustIT and ValueIT;
- A specific conference entitled YoungIT which will challenge established corporate culture; and
- The 26th South East Asia Regional Computer Confederation (SEARCC) Conference.

Each stream will include a number of leading IFIP scientific conferences. These will involve many international researchers and well-known experts. More program details are available at www.wcc2010.com/content/program.

PLENARY KEYNOTE SPEAKERS

Plenary keynote speakers include:

- Nicholas Carr, Author of the Big Switch … Rewiring the World
- Sir John Daniel, CEO & President, Commonwealth of Learning
- Professor S.V. Raghavan, Scientific Secretary, Government of India
- Professor Penelope Sanderson, the University of Queensland and NICTA
- Richard Stallman, President, Free Software Foundation
- John Suffolk, UK Government CIO

SPONSORS AND EXHIBITORS

A comprehensive exhibition will run concurrently with WCC2010. Current sponsors include the Queensland Government, APC by Schneider Electric, IBM Global Services, Dialog, CSIRO, NICTA, Brisbane Marketing, Edith Cowan University, EzeScan, Google, Greythorn, Griffith University, Queensland University of Technology, Riverbed, Sophos, SECAU, Springfield Land Corporation, Tata Consultancy Services and the University of Queensland. To participate, go to www.wcc2010.com/sponsors/become-a-sponsor.

WHO SHOULD ATTEND?

WCC2010 is designed to have a broad appeal, provide outstanding networking and offer a distinctive showcase of ICT product and services.

Young people will value the YoungIT stream, the proposed gaming and Expo events, discounted courses, the PlayIT stream and the potential to meet future employers.

ICT practitioners will appreciate the in-depth coverage of various ICT technological and managerial trends, especially in the areas of services delivery, cyber security, e-learning, green technology and eHealth.

CIOs will enjoy the keynote presentations about large and challenging project implementations, plenary debates between world experts, public speaking opportunities and tutorials with subject matter experts.

CEOs will appreciate the opportunity to mix with fellow CEOs, potential business partners and suppliers from Australia and overseas, international experts, key media representatives and leaders from major universities and research organisations.

Many *overseas delegates* will see WCC2010 as a once-in-a-lifetime experience to visit Australia and establish new business contacts.

CONFERENCE FEES – ALL INCLUSIVE OF GST

- Fulltime member **Earlybird** (*up to 31 July, 2010*) A$990
- Fulltime member **Normal** (*from 1 August, 2010*) A$1,100
- Fulltime non-member **Earlybird** (*up to 31 July, 2010*) A$1,300
- Fulltime non-member **Normal** (*from 1 August, 2010*) A$1,400

There are also special rates for students; for the SEARCC conference; and for the ACS YIT (YoungIT) conference. Go to www.wcc2010.org/content/registration and scroll down the page.

WHAT IS IFIP?

The International Federation for Information Processing (IFIP) is an umbrella organisation for national societies working in the field of ICT. Established in 1959 by the United Nations, IFIP has 58 member associations in 56 countries throughout the world. With over half a million members, IFIP holds the World Computer Congress every two years.

WHERE WILL WCC2010 BE HELD?

Brisbane is the capital of Queensland and is Australia's largest subtropical city. A modern city dotted with parks, Brisbane makes a refreshing change from most major capitals, offering the very best in food, wine, arts and entertainment. In September, Brisbane's beautiful spring weather makes it an ideal destination for visitors to WCC2010, with average temperatures ranging from 15 - 25°C.

ACCOMMODATION

A wide range of comfortable hotels to suit any budget is located close to the WCC2010 venue, the Brisbane Conference and Exhibition Centre. Special accommodation room rates have been negotiated for

the event and, subject to availability, may apply to extended stays. See www.wcc2010.com/content/accommodation.

JOIN US IN SEPTEMBER IN BRISBANE, AUSTRALIA
A discounted earlybird fee applies for all delegates registering prior to July 31. Take this opportunity to share your views with over 400 speakers from around the world, dozens of keynote speakers, workshops and seminars by registering via the WCC2010 website www.wcc2010.com NOW!

Call for Abstracts

D-CIS Human Factors Event 2010
November 1-3, 2010, Delft

This year marks the third D-CIS Human Factors Event. The goal of the D-CIS Human Factors Event 2010 is to bring together researchers, technology developers and end-users with an interest in the human-factors field to foster informal meetings and the exchange of ideas and knowledge. It is an excellent opportunity to gain insight in the state-of-the-art technology and research on human factors, to establish cooperation between technology providers and researchers and to discuss specific research needs in the field of human factors.

We cordially invite you to submit an extended abstract for the D-CIS Human Factors Event 2010. If your abstract is accepted you are either invited to give a presentation or to present a poster.

Below is a list of possible topics of interest for the conference. You are welcome to submit an abstract on any of these topics. Please contact the organizers for suitability of other topics.

- Multi-modality and human performance
- Modeling of human-machine relationships
- Cognition and decision making
- Human monitoring: e.g., human performance, emotions, biofeedback
- Human factors in training
- Human factors in team collaboration
- Human factors and social computing

For the abstracts the following guidelines should be followed:

- If you are an academic, either provide a clear problem statement concerning human-factors research or discuss your recent work on human factors. In the latter case, specify what the aim of your research was, what equipment you used, what the results are and discuss the relevance of these results for application of human-factors research.
- If you are an end-user or industrial partner, please briefly describe your system and its application, and point out what it is used for and how it involves human-system-integration considerations. Note that the D-CIS Human Factors Event focuses on innovative system developments based on user-centred approaches. Presenting only a description of a system and its general use will thus not be sufficient.

A template for submitting your abstract can be found on the website.

The abstract should not exceed a maximum of *800 words* and should not be more than *3 pages* maximum, including figures, tables and references.

The deadline for submitting abstracts is **July 15, 2010**. The notification deadline is the 10th of September. Final abstracts are due on October 10th.

More information about the D-CIS Human Factors Event 2010 can be found on the website: www.humanfactors.d-cis.nl.

HOW TO SUBSCRIBE

The BNVKI-AIABN Newsletter is a direct benefit of membership of the BNVKI-AIABN: Benelux Association for Artificial Intelligence. Membership dues are € 40 for regular members; € 25 for doctoral students (AIO's); and € 20 for students. In addition, members will receive access to the electronic version of the European journal *AI Communications*. The Newsletter appears bimonthly and contains information about conferences, research projects, job opportunities, funding opportunities, etc., provided enough information is supplied. Therefore, all members are encouraged to send news and items they consider worthwhile to the editorial office of the BNVKI/AIABN Newsletter. Subscription is done by payment of the membership due to Postbank no. 3102697 in The Netherlands (IBAN: NL 74 PSTB 0003 1026 97; BIC: PSTBNL21). Specify *BNVKI/AIABN* as the recipient, and please do not forget to mention your name and address. Sending of the BNVKI/AIABN Newsletter will only commence after your payment has been received. If you wish to conclude your membership, please send a written notification to the editorial office before December 1, 2010.

COPY

The editorial board welcomes product announcements, book reviews, product reviews, overviews of AI education, AI research in business, and interviews. Contributions stating controversial opinions or otherwise stimulating discussions are highly encouraged. Please send your submission by E-mail (MS Word or text) to newsletter@maastrichtuniversity.nl.

ADVERTISING

It is possible to have your advertisement included in the BNVKI/AIABN Newsletter. For further information about pricing etc., see elsewhere in the Newsletter or contact the editorial office.

CHANGE OF ADDRESS

The BNVKI/AIABN Newsletter is sent from Maastricht. The BNVKI/AIABN board has decided that the BNVKI/AIABN membership administration takes place at the editorial office of the Newsletter. Therefore, please send address changes to:

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