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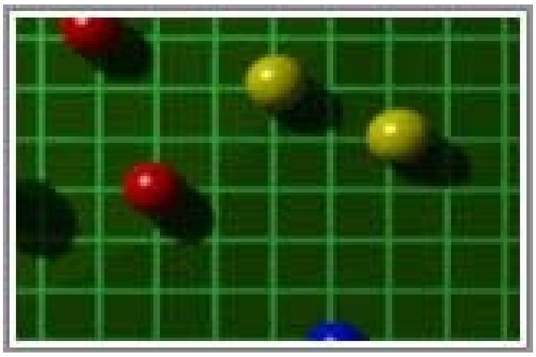
NEWSLETTER



AAAI Video Competition

CHIP Demo

In Memoriam: Donald Michie

News from the Belgium-Netherlands Association for Artificial Intelligence

Win and Loss

Editor-in-chief

Let me start with a lot of good news. First, a few weeks ago I was informed that the CHIP demo, developed in the framework of the CATCH programme, has been nominated as one of the top five contestants in the Semantic Web Challenge 2007. Out of 34 international submissions CHIP made it in the top 5 and will be presented in November at the International Semantic Web Conference (ISWC'07) in Buzan, South Korea, to compete for one of the three prizes. Congratulations to the authors. This nomination is an important recognition for the CHIP project and of course for CATCH in general. We are glad to present to you in this issue an article describing the CHIP demo program.

Second, during AAAI-07 there was a new competition, the AI video competition, for short (maximum 1 minute) or long (maximum 5 minutes) videos featuring exciting AI projects. This competition received much attention and interest from the AAAI community, and will be continued in future years. Trophies, named *Shakeys* after SRI's pioneering robot, were announced and presented by co-chairs Sebastian Thrun and David W. Aha for six category winners at the AAAI-07 AI Video Competition's Awards Ceremony, which took place on July 23, 2007 at AAAI-07 in Vancouver (BC), Canada. The winners also received a monetary award. There were 24 nominees for these categories (see the link below). And the winners were…

- **Best Video:** *Morphogenesis: Shaping swarms of intelligent robots*; Anders Lyhne Christensen, Rehan O'Grady, and Marco Dorigo; Université Libre de Bruxelles, Belgium;
- **Best Short:** *Artificial intelligence: An instance of Aibo ingenuity*; Michael Littman; Rutgers University, USA;
- **Best Student:** *Dance evolution*; Jeff Balogh, Gregg Dubbin, and Michael Do; University of Central Florida, USA;
- **Best Demonstration:** *Autonomous UAV search and rescue*; Patrick Doherty and Piotr Rudol; Linkopings Universitet, Sweden;
- **Best Explanation:** *k-nearest neighbor classification*; Antal van den Bosch; Tilburg University; The Netherlands; and
- **Most Innovative:** *Color-based object recognition*; Jan-Mark Greusebroek and Frank Seinstra; University of Amsterdam, The Netherlands.

As you can see, among the six winners are three from Belgium and The Netherlands! We congratulate them wholeheartedly.

A third noteworthy fact is that in honour of prof.dr. Jaap van den Herik's 60th birthday MICC in cooperation with SIKS will organize a symposium, free for all members of SIKS. For more information, please visit the website http://www.cs.unimaas.nl/jaap60/. In the next issue we will report on this symposium and other related events.

Unfortunately, when there is good news, there often is bad news also. On July 8 I received an email informing me on the tragic death one day before of one of the pioneers of Artificial Intelligence, prof.dr. Donald Michie. Many of you might have seen him in good health at the BNAIC 2006 in Namur, where he was one of the keynote speakers. He there demonstrated his latest brainchild, SOPHIE. In this issue we publish an In Memoriam by David Levy, Chess master and friend of Michie.

Professors Michie (l) and Van den Herik at the BNAIC 2006.

CHIP demonstrator: **http://www.chip-project.org/demo/**
Semantic Web Challenge: **http://challenge.semanticweb.org/**
AAAI video competition: **http://www.aivideo.org/**
Nominees video competition: **http://www.aivideo.org/videos.html**
Fast access to the videos: **http://videolectures.net/aaai07/**
Donald Michie in Wikipedia: **http://en.wikipedia.org/wiki/Donald_Michie**
MICC-SIKS symposium: **http://www.cs.unimaas.nl/jaap60/**

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The photograph on page 74 in this issue is by courtesy of Joke Hellemons.

Front cover: screenshots of three winners in the AI Video Competition at AAAI-07: **Best Video:** *Morphogenesis: Shaping swarms of intelligent robots*; Anders Lyhne Christensen, Rehan O’Grady, and Marco Dorigo; Université Libre de Bruxelles, Belgium (upper left); **Best Explanation:** *k-nearest neighbor classification*; Antal van den Bosch; Tilburg University; The Netherlands (upper right); and **Most Innovative:** *Color-based object recognition*; Jan-Mark Greusebroek and Frank Seinstra; University of Amsterdam, The Netherlands (down). See editorial on page 74 for more details.

The deadline for the next issue is: **October 1, 2007**.

BNVKI-Board News

Antal van den Bosch

The summer is over; if the calendar hasn't made it clear yet, then the weather certainly has. It also means that the course season starts. New groups of students across the low countries are introduced into AI topics again. The cycle starts once more.

Unfortunately, the academic system in the Netherlands has developed the unhealthy habit to start courses as early as September. You may recognize the September dilemma – how to combine your first fall lectures with the last summer conferences. It makes you wonder how academic life would be if education would be really constrained to the six months that all the education efforts of a year realistically take, I venture to think. Start on October 1; enjoy a Christmas break; end on March 31 the next year. On April 1, the full-time researcher awakens to a new dawn, marking a period of work, rest and play straight on until September 30 the same year.

Enough daydreaming; the board of the BNVKI welcomes you back at work. BNAIC-2007 is on its way; we kindly remind you to check registration dates and plan your trip to Utrecht. And: update your Powerpoint slides, brush up your AI anecdotes; good luck in the class room.

You Rate – We Recommend: Personalized User Experience in the Rijksmuseum Amsterdam

Lora Aroyo[1,2], Yiwen Wang[2], Natalia Stash[2], Lloyd Rutledge[3], and Peter Gorgels[4]

Currently most museums face two main problems related to their collections and their visitors: (1) the size of their digital collections often goes beyond 50,000 artworks, which makes it very difficult for the Website visitors to find their way in the collection; and (2) the size of the museum and the number of artworks to be seen in the museum often are much larger than what a regular user can see in a visit; users do not know where are the masterpieces, do not know where to start from, and often get lost.

With this goal in mind, since 2005 Rijksmuseum Amsterdam collaborates with researchers from Eindhoven University of Technology and Telematica Institute in the context of the CHIP[5] (Cultural Heritage Information Personalization) project, part of the Dutch Science Foundation funded program CATCH promoting Continuous Access to Cultural Heritage in the Netherlands. The focus of the project is to explore various aspects of personalized access and presentation of virtual museum collections. The goal was to support personalized disclosure of semantics-enriched museum collections and to aid the user in navigation and interaction with the cultural content; see in Figure 1 the set of personalization components (in purple), which can be integrated within the existing Rijksmuseum website architecture (in blue) in order to support personalized services on the museum website (e.g., personalized museum tours, personalized search and browsing of the collection).

In other words we aimed at developing tools, which allow users to have their visits to both museum website and the physical museum tailored to their own interests and preferences. Rijksmuseum Amsterdam maintains two main databases: ARIA and ADLIB (see Figure 1). ARIA is an educational database, containing 700 most popular artworks, and ADLIB is a database for professionals, containing 300,000 artworks. Due to constraints from the Rijksmuseum, for the CHIP demonstrator, we currently use ARIA only. However, our final goal is to incorporate all information from ARIA, ADLIB and other databases, e.g., data from museum shop and online news feeds (see Figure 1).

The main motivation for this work, given by the Rijksmuseum Amsterdam, is to engage their visitors and give them reasons to return, both on the museum Website and in the physical museum. Important assumptions in this context are that (1) the museum visitors would spend more time *preparing for their visit online*; (2) they will use *during their museum visit* an interactive and not disturbing way to *enhance* their museum *experience* and *record their activity history*; and (3) they will spend time *after each visit* to reflect on the seen and to update their user profile and interaction data. Thus, we focus on the one hand helping users *find their way in the museum collection*, and providing them with the *right information at the right time;* and on the other hand, increasing their *awareness of art-historical themes*, and *stimulating* and *tempting* them to visit the museum more often. Different users have different needs, goals and interests. While the one-time visitors prefer to view all the

[1] Free University Amsterdam
[2] Eindhoven University of Technology
[3] Telematica Institute
[4] Rijksmuseum Amsterdam

[5] http://www.chip-project.org

museum highlights, the regular art lovers would like to expand their knowledge about the collection according to their specific interests and the objects they have already seen. *Thus, in overall this will result in a more intensive, long-lasting and engaging experience with the Rijksmuseum collection for a wider audience*. At the same time, this will also allow the Rijksmuseum to maintain a close relationship with her audience – seamlessly fusing the museum experience with the everyday reality of the visitors.

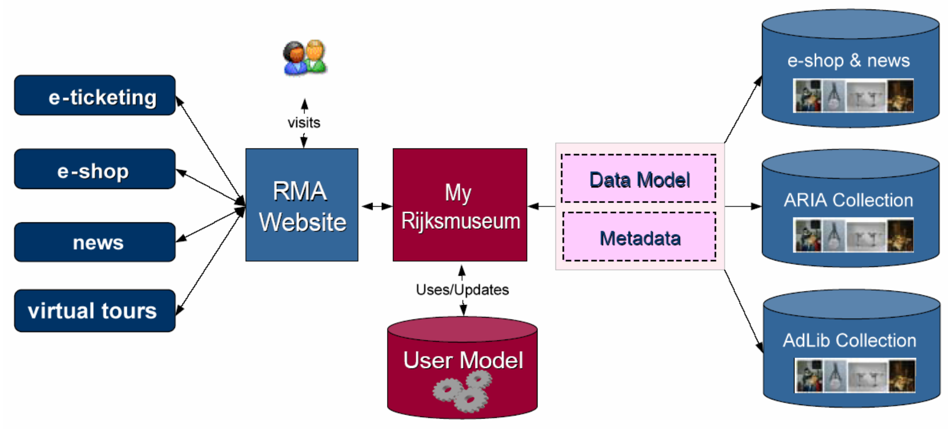


Figure 1: Personalization components for the Rijksmuseum Web site.

We intend to (1) embrace the complexity of the digital space, mobile devices and diversity of users in a museum context; (2) realize immersed interaction with museum visitors both in the physical and in the virtual (Web) space; and (3) provide the essential glue to bring them all together to the level of true personal experience in the times of a digital revolution. In other words, *personalization* is our goal: *methods and techniques* that support *personalization across the boundaries of the Web and the physical museum space.*

A central role to realize such a personalized interaction has the *building and maintenance of a user profile* for each museum visitor. To ensure a high usability for users of a vast range of cultures, interests, and art-history proficiency we designed an *interactive rating-based dialog* between the system and the user, where they *collaboratively build her user profile*. This allows both users who have extensive knowledge in art-history and lay users to quickly get to the right place in the large museum collection according to their interests. In this rating-recommendation dialog the users can indicate both *short-term and long-term interests*. The user data is further used to *recommend* not only single artworks but also entire *museum tours tailored according to the individual user's preferences*. Users can view at any time selection of the museum's master pieces or other museum exhibitions adapted to their current short-term interests stored in their user profile. Finally, the museum visitor can download on a mobile device (e.g., PDA) any selected tour from the museum website and use the device to navigate through the museum. This navigation is adapted to the user's latest artwork choice and current user profile.

The CHIP research team has performed an extensive *exploration phase*, including:

- *interviewing curators* and *collection managers* to identify target user types, web applications and interactions desired inside the museum. Several low-fidelity prototypes were developed using the ARIA Rijksmuseum digital collection (see Figure 1) to elicit ideas from domain experts about novel personalization functions that potential users would like to have on a museum web site.
- overview of *state-of-the-art in multimedia tours* in various museums in the Netherlands, as well as *online museum tours* and *personalized services* in different international museums.
- overview of the existing *cultural web infrastructure* and the *state-of-the-art in semantic enrichment* of cultural heritage collections (e.g., using thesauri, converted from their original XML format into an RDF/OWL representation, such as the three Getty vocabularies, i.e., the Art & Architecture Thesaurus (AAT), Union List of Artists Names (ULAN) and the Thesaurus of Geographical Names (TGN), as well as the lexical resource WordNet and the subject-specific classification system IconClass). After exemplifying the first results within the ARIA collection our goal is to include also ADLIB curators database, as well as the e-shop and news items (see Figure 1).

With all this in mind, we have designed an approach that stimulates the users to gradually grow into active contributors and continuous participants in cultural heritage. Following a user-centered design cycle, we have so far accomplished the following steps: (i) enriched the museum digital collection with semantics from common vocabularies; (ii) implemented semantics-based reasoning strategies for recommendations; (iii) developed an interactive ontology-driven elicitation of a user model; (iv) designed a personalized museum tour on the Web, and on a PDA to be used in the physical museum; and (v) performed a sequence of multi-dimensional user studies with a wide range of users to test the effectiveness and usability of our current demonstration and derive requirements for further design. The CHIP online (e.g., artwork recommender and user profiler; (semi-)automatic personalized tour generator and a PDA-based personalized museum tour) can be found at http://www.chip-project.org/demo. We suggest that you first take a look at the demonstrator before reading on. You can create an account and login into the system. For help please consult the *online tutorial* section available on the demo page. It provides a sample walk-through of the system's functionalities.

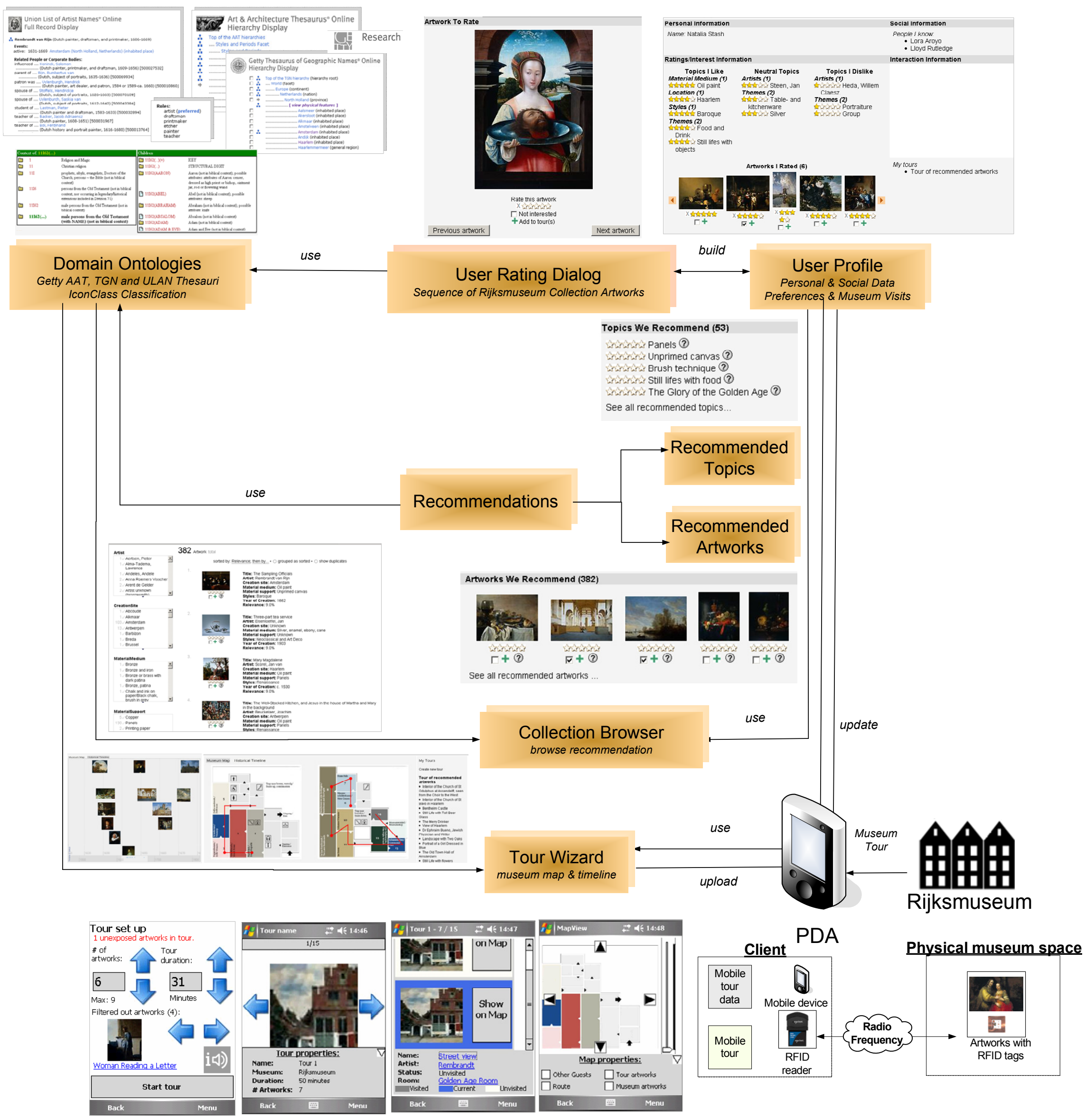


Figure 2: CHIP Demonstrator Personalization Pipeline.

INSIDE LOOK IN THE CHIP DEMONSTRATORS

Users can use the *Artwork Recommender* to express in a simple, unobtrusive and engaging way their preferences and interests in art and history. These preferences are stored in a user profile, which we further use in the *Tour Wizard* to (semi-) automatically generate personalized tours through the museum. By default all users get an automatically generated, and tailored to their concrete interests, tour of 20 Rijksmuseum masterpieces (e.g., each user will see a different set of the Rijksmuseum master pieces, which are only interesting to her). Further, the users can also upload their *personal tours on a PDA* and use it to navigate through the physical museum. The PDA tour keeps track of what the user saw during the visit (including artworks which were not initially in the tour) and at the end synchronizes this information with the user profile maintained at the website. In this way, the user has a common place to keep record of her museum visits and of the artworks that she has seen. In Figure 2 we give the personalization pipeline which links all the CHIP components for building, maintaining and updating the user profile, and the ones for creating and maintaining museum tours.

An important feature of the CHIP demonstrator is realized in the form of an *interactive rating-recommendation-feedback dialogue* between the user and the Rijksmuseum collection (see Figure 3 for a snapshot of the interface). It starts by presenting the user artworks from the Rijksmuseum collection for him or her to rate.

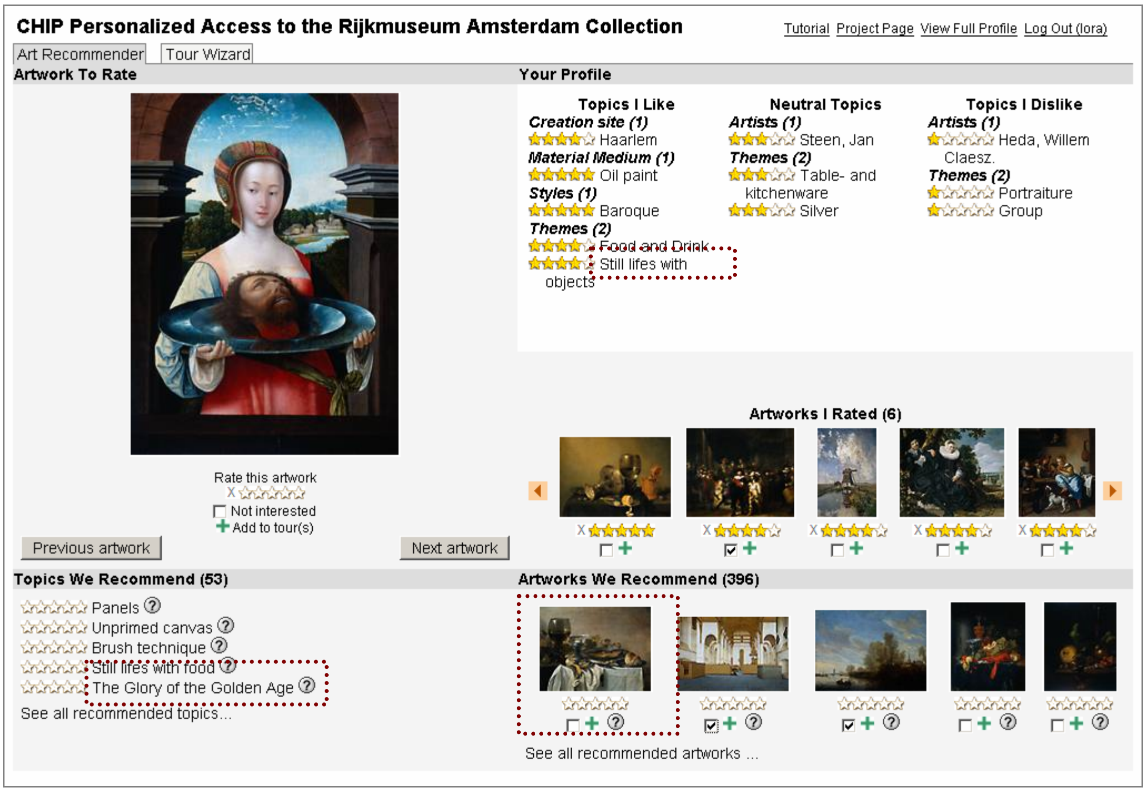


Figure 3: User Profiling and Recommendation Interface.

Based on these ratings, the system looks for other artworks, and related topics, from the collection that the user is likely to find interesting. For example, if the user rates (see rating stars in top-left of Figure 3) several portrait paintings highly and other landscape paintings poorly, then the system will deduce that the user is interested more in the topic of “Portraiture” and less in the topic of “Landscapes”.

The CHIP demonstrator then recommends the topic “Portraiture” along with other portrait paintings from the Rijksmuseum collection. In her turn, the user can give her explicit rating to the recommended topics, and in this way refines the assumptions of the system about probable interests levels. All explicit ratings (for topics and artworks) are stored in the user profile (top-right in Figure 3). Each rating given for an artwork or a topic generates an update in the user profile in terms of artists and topics that she likes, or dislikes and continuum of artworks with their explicit ratings. If the user is not interested to see recommendations along the lines of her last rating than she can check the ‘not interested in’ option and this is stored in the short-term preferences user profile. In this way, by presenting the user with a set of artworks to rate and letting her express her opinion about recommended topics and artworks, the system gradually builds the user profile. In the top-right of Figure 3 the current state of the user profile is shown. In this way, the user can inspect at any time the evolution of her user profile. The user can always correct the ratings in this system-generated profile. The whole rating-recommendation-feedback dialog is entirely content-based (van Setten 2005; Balabanovic *et al.* 1997) and is driven by the explicit semantics with which the Rijksmuseum collection is enriched (see Figure 2 the start of the personalization pipeline). The bottom-right and left sections depict a number of such recommended topics and artworks as a product of reasoning with the OWL/RDF shared vocabularies (e.g., Getty's ULAN, AAT and TGN, and IconClass) mapped to the Rijksmuseum collection terminology.

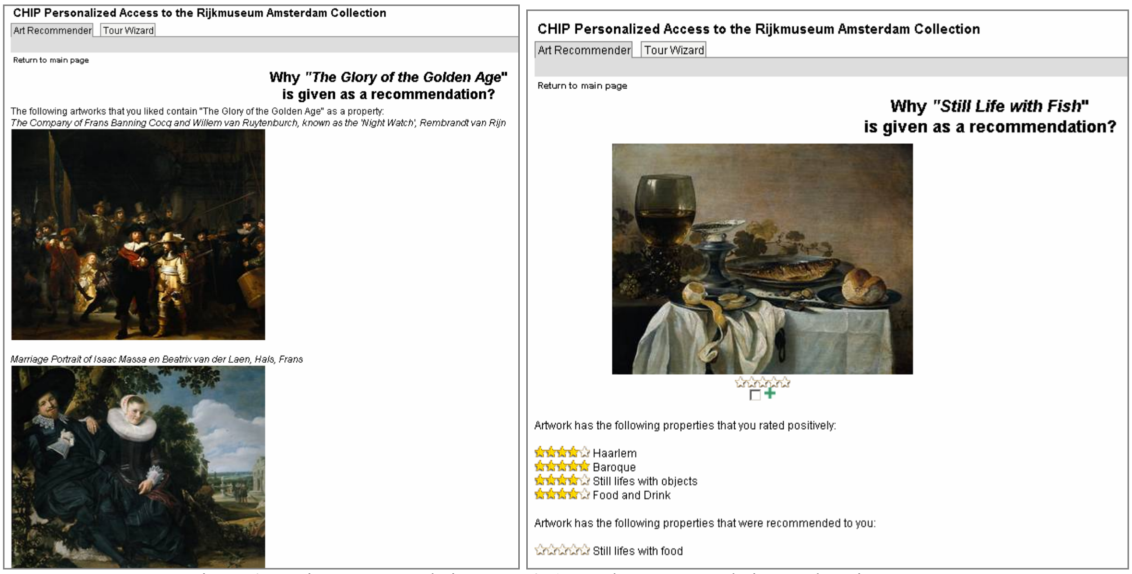


Figure 4: Topic Recommendation page & Artwork Recommendation explanation pages.

Clicking the icon (see Figure 3) for a topic or an artwork the system presents an explanation, why this topic or artwork is considered interesting for the user (see the result of the explanations in Figure 4). The explanation is given in terms of features of the art works, such as painter, style, and topic depicted. It also contains clarification on the confidence level of the recommendation.

Figure 5: Artwork description page (detailed rating).

Further, each artwork and topic presented in the demonstrator has a detailed explanation page (see screenshot in Figure 5 of artwork explanation page and Figure 7 of topic explanation page), which is available upon user's click on either a topic or an artwork.

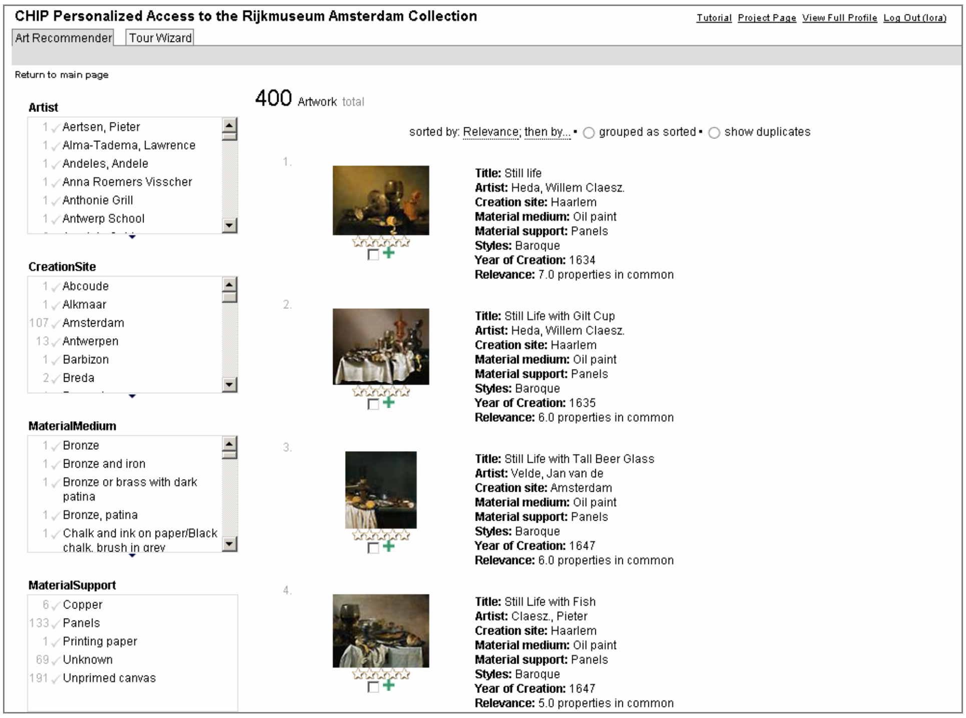


Figure 6: Related artworks in the collection to the artwork in Figure 3.

The detailed explanation of an artwork (see Figure 5) contains a larger view of the artwork, a short descriptive note and all artwork properties (e.g., creator, style, year and period of creation, themes depicted). Additionally, for each artwork we provide all related artworks in the Rijksmuseum collection (see screenshot of the related artworks in Figure 6). This is a typical example where we use the strength of the semantic mappings between Rijksmuseum collection terms and common vocabularies, e.g., the Getty thesauri and IconClass. The detailed explanation page for a topic (see Figure 7) contains a set of artworks related to this topic organized by their additional properties (e.g., `creator`, `year`, `style`).

An important feature in those explanation pages is that the user can directly give her rating to a property or an artwork related to the one in focus. In this way, we allow the user at any point of time to express her opinion about artworks in the collection (i.e., there is not an isolated rating space of the system). Moreover, the user can actually express interest in terms of "*I like this painting because its creator is* `Rembrandt`", or "*I don't like very much this painting, but I do like the topic of* `portraits`". This allows us to collect much more concrete and semantically rich feedback from the user with respect to her interests and preferences. In other words, the metadata that we use to describe features of each artwork in the collection (e.g., `creator`, `style`, `year`, `theme`) is not simple text strings but are instead links to entries in common vocabularies, e.g., the *Art & Architecture Thesaurus* (AAT), the *Union List of Artist Names* (ULAN), the *Thesaurus of Geographic Names* (TGN) and the *IconClass* thesaurus. The fact that the metadata come from these thesauri provides us with a rich semantic structure, which we can exploit in making recommendations. For example, if the user selects paintings from `Pisarro`, `Cezanne` and `Monet`, the system can hypothesize that the user might be interested in "`Impressionist painters`" in general. We use an RDF representation of these thesauri provided by the MultimediaN E-Culture project (Van Assem *et al.* 2004) (in the case of the Getty vocabularies) and the CATCH-STITCH project (Van Gendt *et al.* 2006) (in the case of IconClass). The Getty thesauri were converted by the e-culture project from their original XML format into an RDF/OWL representation using the conversion-method principles as formulated by van Assem *et al.* (2004). The RDF/OWL version of the data models is available on-line (see http://e-culture.multimedian.nl/ resources/). The Getty thesauri are licensed. The project has acquired licenses for the thesauri. RDF is the W3C recommendation for web-based metadata representation and ensures interoperability.

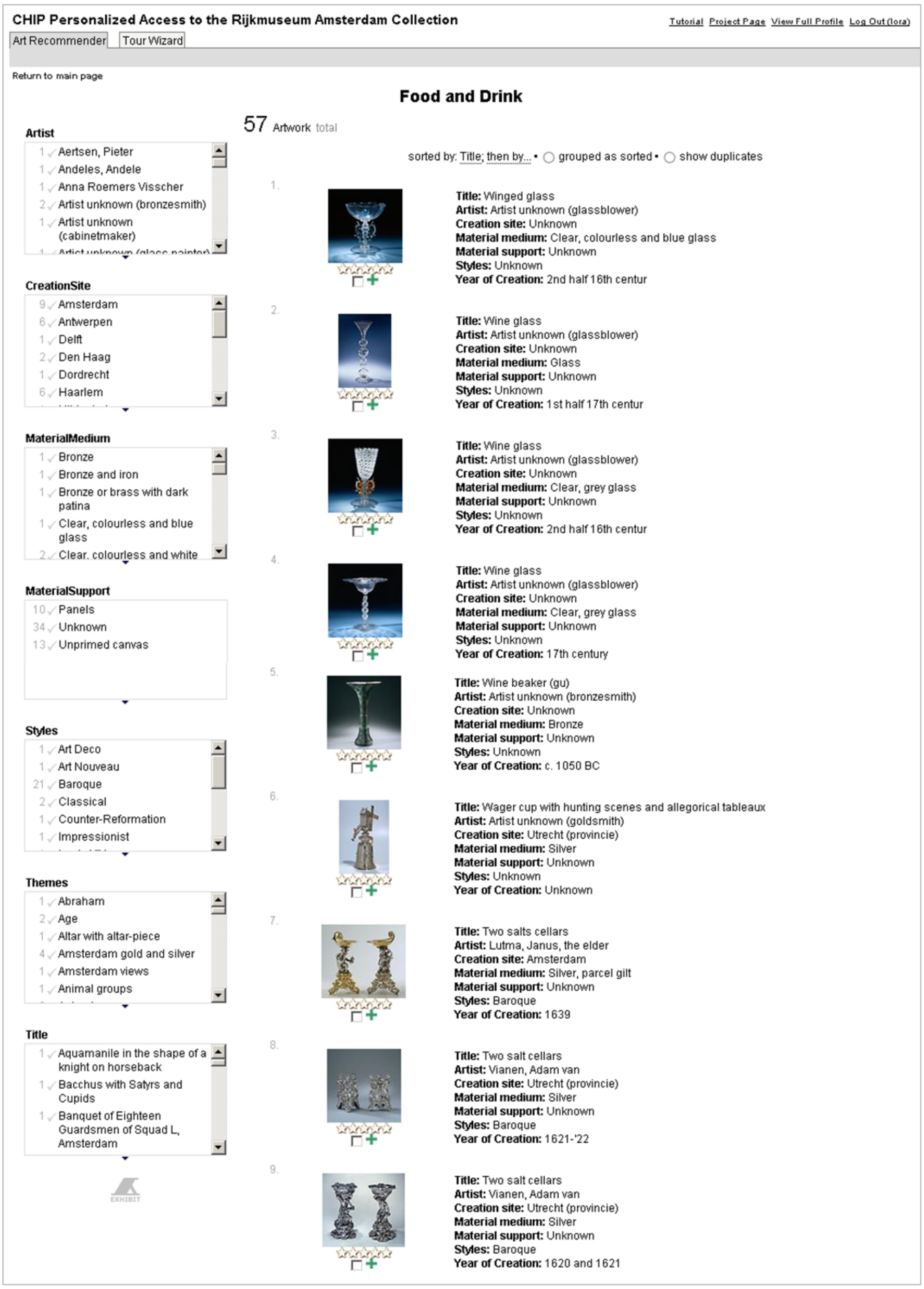


Figure 7: Topic description page (showing all artworks in the collection related to it).

Figure 8 shows an example of how RDF encodes our data model. It depicts sample RDF code for an artwork. We assign each Rijksmuseum artwork values for particular properties, such as its creator (artist), its subject (what it depicts or conveys), the material it is made of, the place it comes from and other terms for concepts that apply to it. In addition, we assign artists to the styles they use. The set of artwork properties we use comes from the VRA 3.0 Core Categories (Visual Research Association, 2000), which constitutes a specialization of Dublin Core for visual resources. The RDF representation of VRA was provided by courtesy of the MultimediaN E-Culture project (http://e-culture.multimedian.nl/resources/)

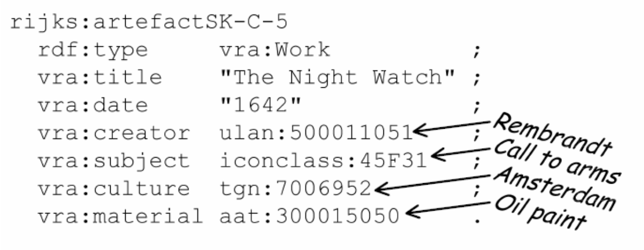


Figure 8. RDF example for an artwork.

Figures 9 and 10 give an illustration of the types of reasoning and semantic relations we can use, by exploiting the RDF/OWL graph of the Rijksmuseum enriched data, in order to discover artworks and topics of interest to recommend to the user.

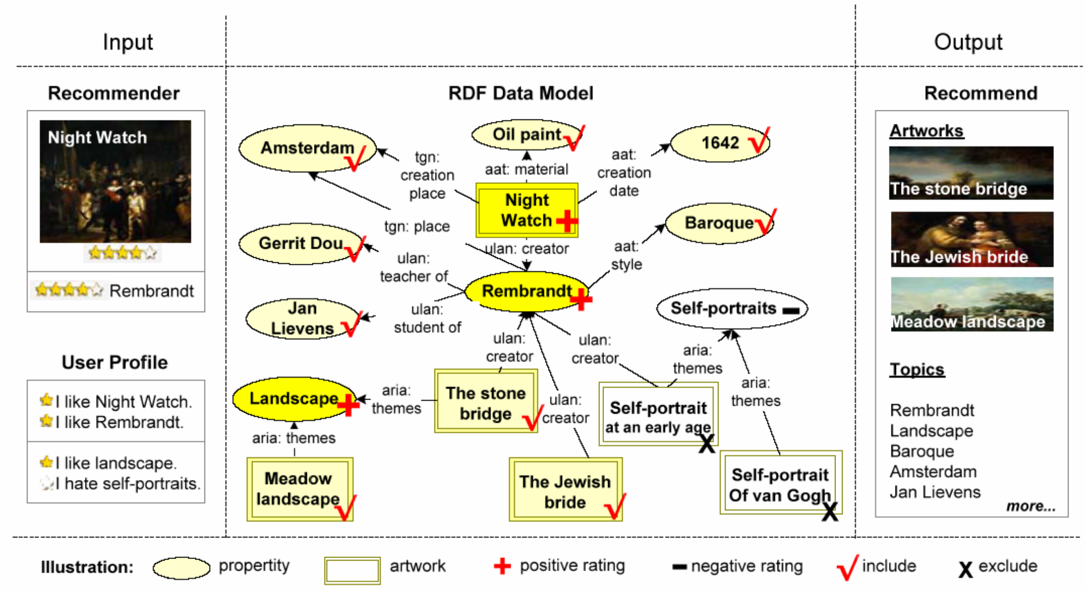


Figure 9. Finding interesting related objects through semantics.

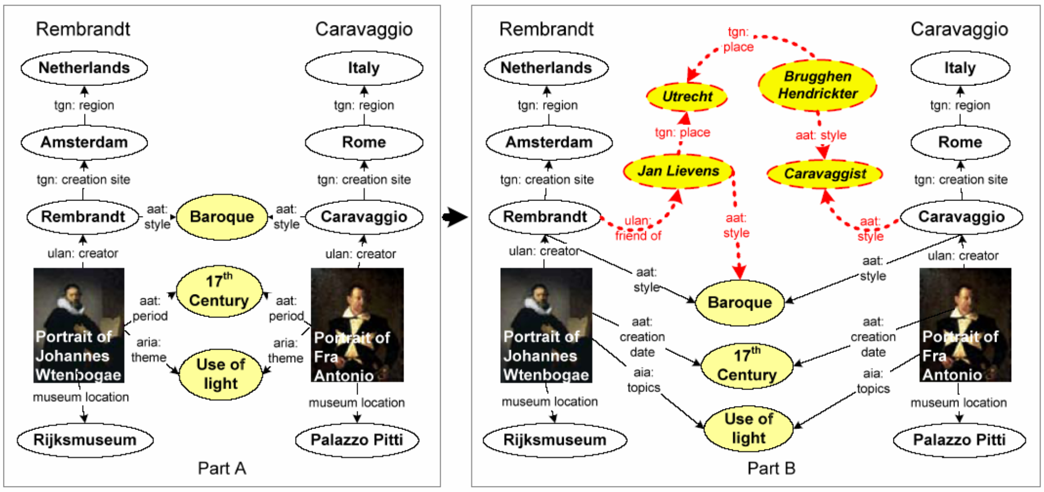


Figure 10. Discover new knowledge through semantics.

So far, we have explained in detail the main part of the demonstrator – dealing with building of the user profiles and generating semantics-driven recommendations to optimize the user-modeling process. Another part of the demonstrator is the Tour Wizard, which exemplifies the use of the user profile for generating (semi-)automatically personalized museum tours for each user. In Figures 11 and 12 you can see an example of a personalized Master pieces tour presented from two different perspectives: (1) in terms of rooms covered in the museum and (2) in terms of historical period in which the artworks included in the tour represent. In this way, the users can navigate both spatially through the museum rooms and temporally through the historical timeline.

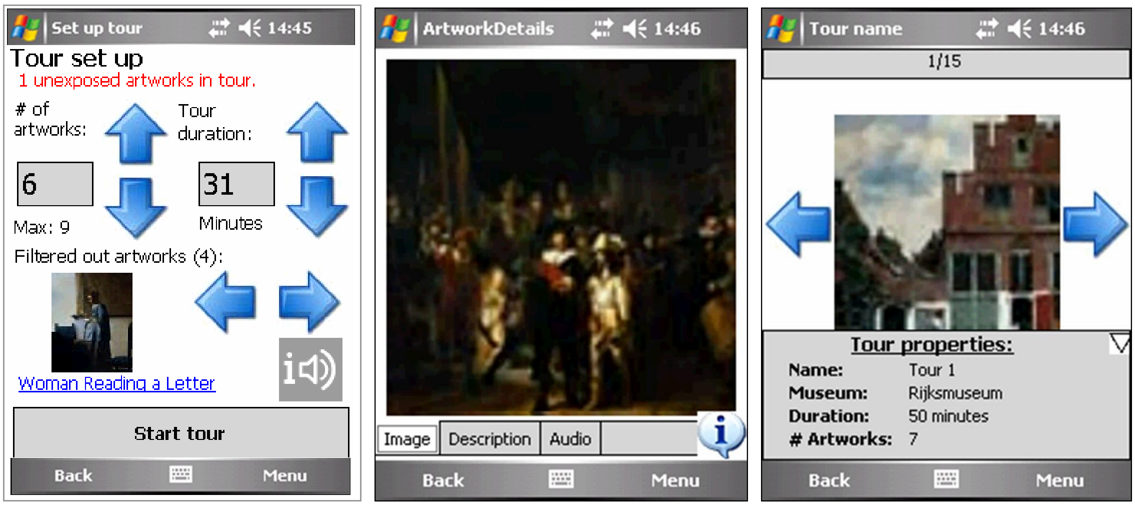
Figure 11: Personalized Tour of Recommended Artworks Presented on a Timeline.

Figure 12: Personalized Tour of Recommended Artworks Presented on a Museum Map.

Once created a personalized tour online with the CHIP Tour Wizard, the users are able to upload this tour on a PDA (see Figures 13 and 14) and use it as a guide while navigating through the physical museum (requesting information about artworks tagged with passive RFID). The tour on the PDA is an adapted version of the one created in the Tour Wizard according to the following rules:

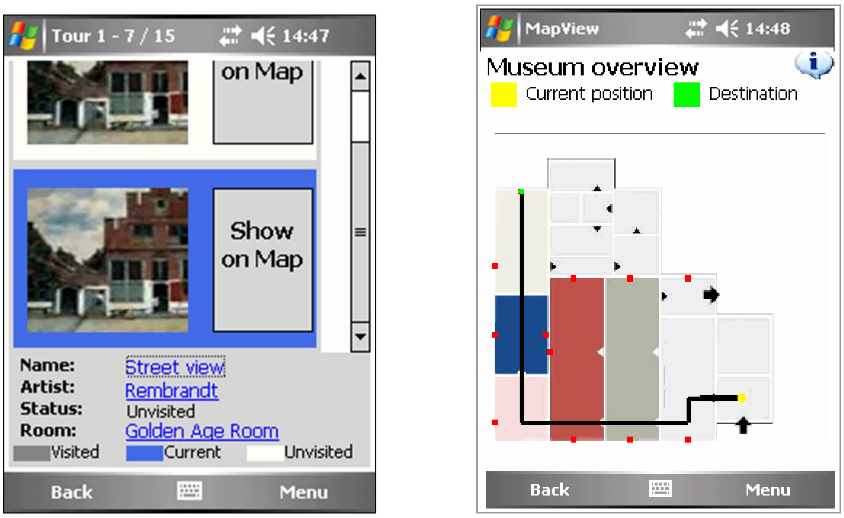
- artworks which are currently *not on display* are not considered in the calculation of the tour, and are used only as a *background information* for the artworks the user views in the museum, in order to keep the coherency of the tour;
- a user can indicate the *max number of artworks* she wants to see during the museum visit; the system recalculates which artworks to be included and how long time this will take (see Figure 13a);
- a user can indicate the *max time she wants to spend in the museum*; the system then re-calculates the tour by excluding some paintings in order to reach the desired time limit (see Figure 13a);

- while walking through the museum the user can see interesting artworks (*not originally included in the tour*) and request via the RFID to view its information. Based on this user's choice the system recalculates the rest of the tour, in terms of route, number of paintings and duration.



(a) (b) (c)

Figure 13: (a) PDA Tour adaptation for duration and size of the tour; (b) Artwork details screen; (c) Tour properties and sequential navigation.



(a) (b)

Figure 14: (a) PDA artwork status, short details and location; (b) museum map navigation.

Figure 15 shows the client-server architecture with Java Servlets running on the CHIP server. The server stores the domain model and user models represented in RDF. Sesame and SeRQL are used for RDF data processing. Java servlets generate an interactive dialog quiz, maintain the various steps of this dialog with the user and give recommendations.

To this end, we have developed several functional prototypes. Next to the various domain analysis of the Rijksmuseum, the collection and the Web site, we have also performed number of user studies with real visitors to the Rijksmuseum. These helped us confirming our hypotheses with respect to the learning gains of novices and expert users. Equally important were the findings we obtained from the usability questionnaire, which give clear indications about what factors influence the acceptance of the recommender system and what aspects may confuse the user.

Future work involves exploring aspects of way-finding and navigation in the museum for the PDA tour. A longer-term goal is to use the semantic infrastructure we have developed as well as the experiences gained during the studies and prototype development within the CHIP project in order to realize a sustainable and maintainable "Virtual Rijksmuseum". This platform should provide personalized museum tours in virtual reality and in real in the museum, personalized services for news, groups and postcards, social tools, such as chat room and sharing of pictures, and authoring tools to allow active engagement of users with artworks in the collection These services will target not only the museum website as a platform, but also mobile phones, PDAs in the museum and virtual reality applications.

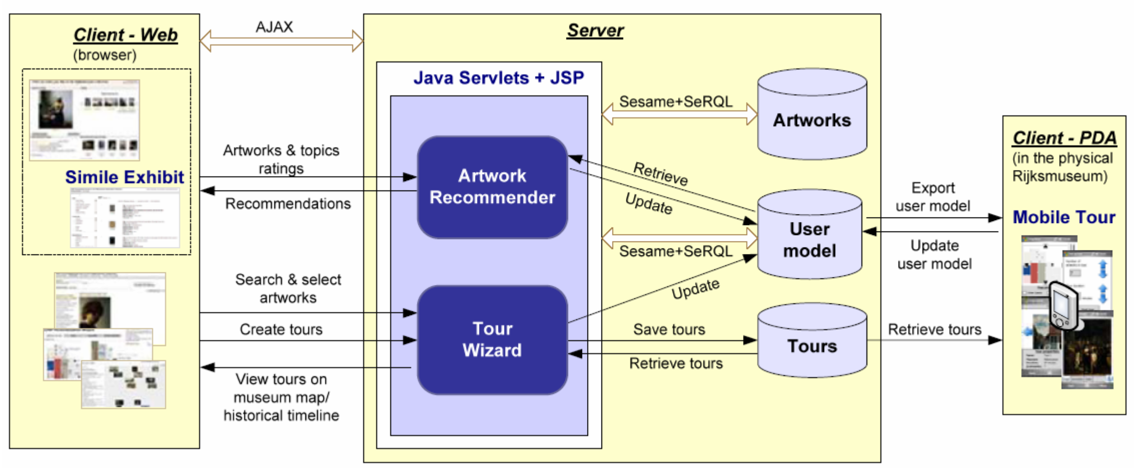


Figure 15: Overall CHIP architecture.

ACKNOWLEDGEMENTS

The CHIP project is one of ten projects launched within the NWO research program CATCH: Continuous Access to Cultural Heritage. This work is a collaboration between the Technical University Eindhoven, the Telematica Institute and the Rijksmuseum Amsterdam as part of the CHIP project, funded by the CATCH program of the Dutch Science Foundation NWO. We thank the STITCH and E-Culture projects for providing vocabulary data. The Rijksmuseum Amsterdam gave permission for use of its images.

The CHIP demonstrator has been also nominated as one of the five runner-ups for the ISWC'07 Semantic Web Challenge[6] prize

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[6] http://challenge.semanticweb.org/

In Memoriam: Donald Michie

November 11th 1923 - July 7th 2007

David Levy
London

With the death of Professor Donald Michie in a car accident, at the age of 83, the world has lost a brilliant scientist of great breadth and one of the pioneers of Artificial Intelligence. Donald died alongside his ex-wife, Anne McLaren, herself a world renowned scientist, with whom he was travelling from Cambridge to London when their car came off the motorway and crashed.

Donald Michie was born in Rangoon, Burma, and educated at one of Britain's leading schools, Rugby. In 1942 he won an open scholarship to study classics at Balliol College Oxford, but wishing to help in the war effort he deferred his place at university and attempted to enrol on a Japanese language course for intelligence officers at the School of Codes and Ciphers at Bedford. His hope was that he would then be able to be dropped by parachute behind enemy lines in the Far East. That course was already full when he arrived at the school so Donald decided instead to opt for cryptography, a field to which he took like a duck to water. He was quickly recruited to Bletchley Park, the centre of the British code-breaking effort during World War II, where his colleagues included half of the English national chess team at that time (Stuart Milner-Barry, Harry Golombek and Hugh Alexander) as well as the already renowned Alan Turing and several other noted British scientists and mathematicians.

Much of the work at Bletchley has been declassified only in recent years, so for almost 60 years after the war Michie's profound contribution to the code-breaking effort was not properly recognised. He worked on breaking the coded messages that came from the Wehrmacht's "Tunny" machine, now known to be more sensitive in their military content than those derived from the more famous Enigma machine and those from the Lorenz machine.

Michie's greatest contribution to the code-breaking effort was the invention of a technique for improving the efficiency and usability of the Colossus computer, which had been developed at Bletchley to work out the permutations of positioning for the wheels in German cipher machines. Colossus was capable of performing 10^{11} Boolean calculations without making a significant error, but it required a team of expert mathematicians to operate it. Michie developed his idea together with Jack Good, who in later years shared some of Michie's absorbtion with computer chess, and between them they simplified the workings of Colossus sufficiently for it to be operable by "wrens" (female recruits from the Womens' Royal Naval Service), and in a fraction of the time previously needed. A message that had taken a mathematician several days to decode could now be completed by less qualified staff in a matter of hours, permitting the British to intercept enemy attacks frequently and to great military benefit.

While at Bletchley, Michie and Turing became good friends. They played a lot of chess together and discussed the possibility of programming a computer to play chess and to solve other tasks that normally require human intelligence.

With the war over, Michie left Bletchley in 1946 and took up his place at Oxford, though not to study classics as he had originally intended. Instead he started at pre-clinical medical school, taking an M.A. in 1949 in Human Anatomy and Physiology. That same year he embarked on what was to be a brief first marriage to Zena Davies.

While studying for his first degree he spent the summer of 1948 in Cambridge, where he devoted most of his evenings to working on MACHIAVELLI, a paper simulation of a chess playing machine that he and his wartime colleague Shaun Wylie were creating, with the hope of challenging a similar paper simulation developed by Alan Turing and his former undergraduate colleague, David Champernowne. These simulations were in fact chess position analyzers, later to be called "evaluation functions", that would enable the operators of one of these "machines" to calculate by hand the score for every position that could be reached in one move by the machine, and thereby to choose the highest scoring move. Turing wanted to program both of the simulations for a computer in Manchester, and play them against each other, but the computing resource was never made available to him.

Before long Michie's principal scientific interest had turned to genetics, the field of his D.Phil., which was also from Oxford. During the course of his doctoral research he put to good use his boyhood hobby of breeding pet mice, as the basis for a series of genetic experiments, publishing the results in a series of articles in *Nature*. In 1952 he married a fellow genetics student at Oxford, Anne McLaren, and they moved to London where they both started work in the zoology department at University College. There they made significant advances in the study of embryology, developing techniques that would later prove important to *in vitro* fertilisation.

Michie had never lost his interest in whether computers could be programmed to think, and in particular to learn from experience and to play chess, questions that had been stimulated by his extensive discussions on the subject with Turing. Tragically, after Turing's homosexuality had led to a conviction for "acts of gross indecency", Turing believed that he would be shunned as a result by the academic community, and although Michie had tried to convince Turing that his reputation among his peers would not be affected, Turing committed suicide in June 1954.

In 1958 Michie took up the post of Senior Lecturer in Surgical Science at Edinburgh University, where he continued to work on genetics and co-authored the 1964 book *An Introduction to Molecular Biology*, one of the first introductory textbooks on that nascent science. He and Anne were divorced in 1959, but they remained lifelong friends.

While at Edinburgh, Michie's thoughts veered once more towards the discussions he had had with Turing during the war and in the years that followed. In 1960 his principal interest in machine intelligence turned to automated learning. With no computer available to him at the time, he tested some of his ideas by building a noughts-and-crosses (tic-tac-toe) playing "machine" called MENACE out of 288 matchboxes, each of which represented one of the 288 unique positions with which MENACE could be faced during the course of a game. In each matchbox were a number of coloured glass beads, each colour representing one of the moves that could be made if the corresponding position in the game was reached. MENACE's moves were chosen by randomly selecting one of the beads from the matchbox corresponding to the current position. If the game resulted in a win for the machine then each of the matchboxes used during that game would have one bead added, of the colour corresponding to the move actually made in the game. If the machine lost a game then one bead was removed from each matchbox, of the colour corresponding to the move chosen when that matchbox was accessed. In this way, good moves were reinforced and bad ones were penalized, so that, as more and more games were played, the performance of MENACE improved as it learned from experience. Michie called this algorithm "boxes", and later demonstrated its usability in a wide range of learning tasks, including controlling a steel mill.

Michie's success with MENACE led to his being recruited by the U.S. Office of Naval Research to implement the boxes method on an IBM computer at Stanford University, by which time he was completely hooked on machine intelligence and his career thereby started to take him in that completely new direction. By 1963 he had brought together a small group of researchers to investigate this nascent field, basing the group in offices in Hope Park Square in Edinburgh. One of the early supporters of his work in this field was Sir Edward Appleton, Vice-Chancellor of Edinburgh University, who helped Michie to secure research funding from the UK government's newly established Science Research Council. Thus was born, in 1965, the Experimental Programming Unit at Edinburgh University, of which Michie was the first director. In 1967 the unit changed its name to the Department of Machine Intelligence and Perception, in which Donald Michie was appointed to a personal chair. It was late that year that I first met Donald, who told me what a wonderful research environment it was, with "three professors and no undergraduates". (The other two professors at that time were Richard Gregory and Christopher Longuet-Higgins.)

The decade from 1963 to 1973 was one of the most fertile periods in the early development of artificial intelligence. Michie started a series of annual "machine intelligence workshops", the first several of which were held in Edinburgh during the summer vacations. The proceedings of those workshops were published, under Michie's editorship from 1967 to 2000, as the *Machine Intelligence* series. One of Michie's major research achievements during that era was the development of FREDDY, the first robot capable of learning to perform a task by being shown how. FREDDY could assemble an object from a heap of its component parts, being able to recognize each object through the use of computer-vision technology. When FREDDY was confronted with a jumbled heap of parts, some of which belonged to a toy car, others to a toy ship, and others being extraneous objects having no relevance to either the car or the ship, the robot was able to fish the bits and pieces out of the heap, identify them, discard the irrelevant ones and then construct one car and one ship.

Another of Michie's pioneering achievements from that same era was the invention of the concept of "memo functions" (also called "function caching"). In 1967 he encapsulated rote-learning as a generic library facility, drawing together the seemingly disconnected principles and techniques of machine learning, and embedding them in a defined procedure in a programming language. With these "memo functions", which were predecessors of the partial evaluation mechanisms used in logic programming and other areas of computer science, Michie made novel use of the fact that every computable function has both a tabular and an algorithmic representation, speeding up programming by storing the results of functions for later reuse, rather than recomputing them. Memo functions were added to the library of the POP-2 programming system and later worked into the POP-2 language itself and into the programming language LISP**.** Thus self-optimising capabilities were made available to programmers for any function procedure with integer values. Memo functions were also employed to great effect in Michie's robot project FREDDY.

Early in the 1970s disaster struck the A.I. community in the U.K., when the Science Research Council commissioned Sir James Lighthill, an expert in the completely different field of fluid dynamics, to comment on the prospects for A.I. research in the UK. Lighthill had no comprehension of the potential of artificial intelligence, and his report reflected its author's scepticism of a science that he didn't understand, and caused the termination of SRC funding for most A.I. research in the U.K. Michie's robot project was terminated and his research group was sorely depleted.

Michie's attentions then focused more closely on chess and learning, two areas that required less funding than many other areas of A.I., and in which he had been interested since his earliest discussions with Turing. One of his most outstanding achievements in computer learning was to develop and progressively systematize techniques for inductively extracting machine-executable concepts from example data. By this Michie showed how to circumvent the "Feigenbaum bottleneck" in expert systems development – the problem caused by the difficulties experienced by knowledge engineers when they attempt to elicit, through dialogue, the (often intuitive) rules of human expertise, rules which human experts normally find arduous or near-impossible to articulate.

Michie's ultimate goal in his computer-learning research was to prove that the computer can match or exceed human intelligence in generalising from past observations and experience. A generalisation could be expressed by the formulation of new theories and laws, which would hopefully be as simple as the rules-of-thumb discovered and used by humans. Combining his interests in chess and learning, Michie experimented with chess endgames with very few pieces, in which it was possible, even in the 1970s, to exhaustively analyze the entire search space. Michie's research was the first to lead to the discovery, by a computer using inductive learning, of valid rules of thumb for playing certain endgames. One of Michie's research students in this field was M. Ross Quinlan, who later showed the promise of his own ID3 algorithm for processing complex data, though it yielded massively unwieldy and incomprehensible decision rules. Michie and another of his students, Alen Shapiro, overcame this problem with a more advanced technique which he called "structured induction", an interactive regime for generating machine-executable decision rules and configuring them into transparent concept hierarchies. Structured induction places a hierarchical framework on a complex problem, splitting the problem into manageable chunks. Michie developed a method to measure the information content of this framework and turned the process of problem solving by induction into a software manufacturing process. His idea was that, if the solution could be understood it could be extended. Since inductive learning allows a solution to grow by the application of tutorial examples, the result was a mechanism of software development that could produce efficient, understandable solutions to complex problems, solutions that could automatically be turned into computer code. Shapiro later set up a company that developed more than twenty banking application products, used around the world, processing in excess of a thousand billion dollars worth of foreign exchange deals each day for large international banks. These complex applications were automatically generated from examples using structured-induction tools and techniques.

Michie and his students repeatedly reduced previously intractable problem domains (e.g., constructing large bodies of chess endgame knowledge previously unknown to grandmasters), including several industrial problems, creating machine-generated solution programs that both explained the rationale of their decisions and provided more comprehensive, more precise and deeper answers than those from human experts. One notable example of Michie's successes in this field was a 1984 rule-based program for controlling a uranium plant for Westinghouse Research, improving yield-efficiency from less than 85% to about 95% and achieving annual savings in excess of $10 million. This was the first major commercial success for machine learning, and opened the way for the subject to move out of the research laboratory and into everyday commercial use.

In addition to using chess endgames as a vehicle for his research into learning technologies, Michie worked on other aspects of computer chess, his contributions to which include a proof of completeness and correctness for various strategies for the king-and-rook against king ending; the introduction of "advice programming", which allowed knowledge-based programming of chess; and the use of machine learning to develop complete and correct chess descriptions.

Michie was also instrumental in promoting computer-chess competitions, initially by accident when he became one of the original protagonists in the man vs machine chess challenge – a bet that I (at that time the reigning Scottish Chess Champion), would be defeated by a computer program in a match within ten years. Although Michie lost that bet it did much to inspire chess programmers to improve the strength of their programs, and by the time that Michie organized the 1989 match in which I did finally lose, it was to a forerunner of IBM's DEEP BLUE chess machine that subsequently defeated Kasparov.

In 1971 Donald Michie married Jean Hayes, with whom he subsequently set up a company, Intelligent Terminals Ltd., to exploit some of the inductive-learning techniques he had developed. Years later Michie and Hayes were able to enjoy the success of their business when they sold the company and its principal asset – a software tool for the development of expert systems. In 1984 he retired from Edinburgh, becoming Professor Emeritus, and two years later he established the Turing Institute in Glasgow, at the University of Strathclyde, for which he was able to obtain sufficient funding to take advantage of a resurgence of interest in the UK in robotics, computer vision and expert systems. Michie was the institute's first Director of Research.

Amongst Michie's many other achievements in artificial intelligence, mention should be made of the following. (1) His work and publications about a "Knowledge Refinery" described the processing of a huge database of facts and rules, from which an expert system, through a number of iterations, would act as a systematizing repository that could extract critical patterns and try to formulate new rules and solutions. This was the forerunner to the field that has since become known as *Data Mining*. (2) Experimental and theoretical contributions to the foundations of heuristic search methods. Michie and Doran's "Graph Traverser" was the first best-first search algorithm and a predecessor of (and inspiration for) the celebrated A* algorithm. (3) Basic contributions to mechanical theorem-proving techniques with the introduction of G-deduction.

Following his retirement in the early 1990s, Michie remained an active researcher in the field of machine learning, and also found a new interest – human-computer conversation. He followed research in this area and attended some of the annual Loebner Prize competitions. He also started work on his own conversational program, a chatbot called SOPHIE, on which he was still working at the time of his death. His 83 years did not in any way diminish his enthusiasm for his research, nor did it prevent him from writing software whenever he had a new idea for improving SOPHIE.

Jean Hayes died of cancer in 2002, after which Michie shared a home in London with Anne McLaren.

Michie was the scientific leader of Britain's Artificial Intelligence community, a major builder of academic institutions, and a scientific mentor to a large number of younger scientists. Those who worked with him and under his guidance were drawn to Michie not only because of his outstanding reputation, but also by his dedication to the field of Artificial Intelligence and his tireless efforts to publish and obtain funding. The lessons his students learned from him went far beyond any classroom: proper protocols for research, scholarship, publication, obtaining research grants, and the entire world of academia in the classical sense. His students and colleagues also learned from Michie that the quest for scientific truth for the betterment of mankind is a more than worthy life-long goal.

During his time at Edinburgh, Michie provided a consummate lesson in how a small nonprofit scientific research organization with limited resources should be managed and developed, while exploiting to the fullest the skills and virtues of each of its individual researchers. Many research scientists who visited his laboratory in Edinburgh were forever affected and enlightened by his creativity, his insights, his perception and his persistence. And there were many times when the public and even the scientific establishment would have been stunned to learn how much was accomplished there with so few people and so few other resources.

In addition to his numerous and often outstanding accomplishments in the field of Artificial Intelligence, Donald Michie was also a chairman of the Turing Trust and the holder of awards and fellowships too numerous to list. Amongst the most prestigious of these were: Founding Fellow of the AAAI, the Feigenbaum Medal of the World Congress on Expert Systems, and the International Joint Conference on Artificial Intelligence Award for Research Excellence. He was also, *inter alia*, a Scientific Fellow of the Zoological Society of London, Fellow of the Royal Society of Edinburgh, and the recipient of honorary degrees at the National Council for Academic Awards (UK), the University of Aberdeen, the University of Salford, the University of Stirling, and the University of York.

Donald Michie and Anne McLaren shared a lifelong commitment to socialism. Both joined the Communist party during the cold war, and were often seen at world peace congresses and anti-war demonstrations. They integrated scientific enquiry with the struggle for social justice – one without the other would have made no sense to them. As they sought to enlarge scientific knowledge, so they also worked to change society to allow that science to flower for the universal good.

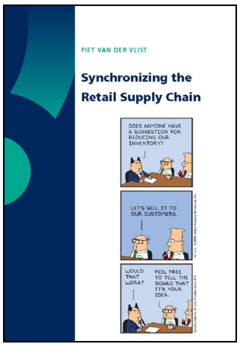
Donald Michie leaves a son, Christopher, from his first marriage, and daughters Susan and Caroline and son Jonathan from his marriage to Anne McLaren.

PH.D. THESIS ABSTRACTS

Synchronizing the Retail Supply Chain

Ph.D. thesis abstract
Piet van der Vlist

Promotores: Prof.dr.ir. J.A.E.E. van Nunen (EUR) and Prof.dr. A.G. de Kok (TU/e)
Date of defense: June 29, 2007



This thesis actually is a design, a design of a retail supply chain, better and cheaper than the usual one. The usual retail supply chain is shown in Figure 1.

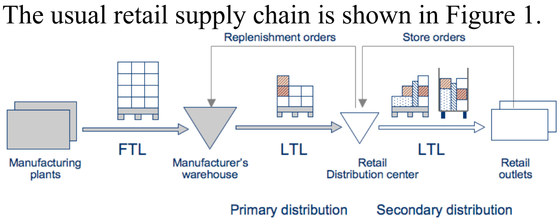


Figure 1: Current retail supply chain.

Straight from production goods move in full homogeneous pallets in full truckload (FTL) to the manufacturer's warehouses. To produce efficiently, suppliers run large batches, resulting in relatively high levels of cycle stock in their warehouses. To keep their inventory levels low, retailers order frequently in small quantities. As a consequence retail distribution centers (RDC's) are replenished with (manually assembled) mixed pallets in less than full truckloads (LTL). Also the stores re-order frequently. They receive the goods they order on pallets or rolling cages, containing articles from various manufacturers grouped per family so as to make filling the shelves easier.

But the retailers seem to have gone too far in inventories savings. A logistics costs breakdown at both supplier and retailer shows that at the supplier the costs of inventory and of picking the retail orders are ten times as high as the costs of inventory at the retail distribution centers. The focus on inventory reduction at the retailer is at the least questionable. Most of the supply chain inventory sits at the manufacturer, where it cannot fulfill urgent consumer needs; whereas at the retail distribution centers only limited amounts of inventory are available for immediate replenishment of the stores. So the goods are available, but at the wrong location.

This thesis is based on the hypothesis that to get a good retail supply chain, downstream processes should be synchronized to upstream processes, instead of the other way around. To validate this hypothesis, this thesis in the Chapters 2 through 6 explores and extends the theory on such supply chain management aspects as: *Inventory, Handling, Network structure, Order fulfillment* and *Sharing the benefits*.

Chapter 2 on *Inventory* extends the well-known single echelon single period news vendor equation[1] to a formula suitable for a multi-echelon and multi-period divergent distribution network. We derive the formula for the optimally tuned distribution network via marginal analysis[2]. From this formula it can be read that downstream nodes must be tuned to higher service levels than upstream ones. This means that the client at the most downstream node, the retail store, experiences the customer-service level that is being set by the most upstream node.

From the formula one can also derive the optimal inventory positioning. If both lead-times and added value are equal between the nodes of the retail supply chain, most of the inventory should be positioned downstream. If a node is replenished with a relatively high lead-time, extra safety stock is needed at that node. If a node adds more value than the other nodes, part of the inventory remains upstream of that node. If the most upstream node adds most of the value, all inventory should be

[1] How many newspapers should the news vendor buy, when he pays *h* and earns *p* when sold.

[2] In the equilibrium, one extra newspaper most probably costs as much as its expected yield.

positioned at the most downstream nodes. In the retail supply chain normally the most upstream node, the manufacturer, adds most of the value. *If we consider the retail supply chain to include the supplier, all inventory should be at the shop*. Simulations support these findings.

The costs of *Handling* are mainly determined by the order sizes. Chapter 3 extends the single-echelon EOQ-model (Economic Order Quantity) to a multi-echelon divergent supply chain model. The chapter concludes that compared to a non integrated supply chain, where every supply chain partner minimizes his own costs, in a synchronized supply chain, the number of transactions goes down, overall system inventory goes down and overall system costs go down even more.

Chapter 4 is on *Network structure*. It explores the use of stock-less consolidation points and direct shipments that skip a network echelon. Application of the theory in a case example shows that quite frequently (in the case example almost in one-third of the situations) it is worthwhile passing by the manufacturer's warehouse and driving straight from production to one or more retail distribution centers. The chapter also explores the use of retail consolidation centers, where manufacturers can deliver all of their goods for a retailer, where-after the retailer moves these goods on to the other distribution centers. Using the logistics cost model in Appendix B indicative costs per pallet are calculated. An interesting retail network structure is one where the consolidation points and any central slow mover distribution center are distributed and collocated with the RDC's and a carrousel of trucks move the goods on between these locations. In the current situation the overall costs per pallet will be around 30 Euro; this figure drops to around 13 Euro with the carrousel in operation. Chapter 4 finally compares the network structure where goods are cross docked at the manufacturer and stored at the retailer with the distribution structure at Wal-Mart where goods are stored at the manufacturers and cross docked at the retailer.

Chapter 5 on *Order fulfillment* speculates on ways to improve the Shop Order fulfillment process. To give some examples: An integral logistics calculation soon might show that more goods should be positioned at the store. It might be worthwhile to pack small items into assortment boxes with a mixed content. For slow movers with ample shelf space, one might concentrate ordering on given days of the week, thus enhancing the warehouse order pick operation.

The paradox of a synchronized supply chain is that downstream supply chain partners need to invest in order to save costs at upstream partners. It is obvious that Supply Chain Synchronization will only be implemented between supply chain partners if there exist adequate contractual arrangements to *Share the benefits*. This is the subject of Chapter 6. It is concluded that the regular commercial negotiations between retailer and supplier should be kept separate from the logistics negotiations, as these are completely cost justifiable. Furthermore the logistic negotiations on Inventory, Handling and Network-structure should each be treated and compensated differently.

Throughout the thesis observations and design choices are being made. Using these, Chapter 7 *Puts the pieces together* and gives a final comprehensive description of all aspects of Supply Chain Synchronization.

A synchronized retail supply chain is a supply chain, where distribution is synchronized to production and where store replenishment is synchronized to warehouse operation. That supply chain indeed has the overall lowest cost.

From a supply chain perspective inventory should be at the retailer, close to the client. It should move to the retailer at the lowest costs, that is on full pallets in full truckloads. This then should happen prior to urgent replenishment needs, as soon as goods become available from production. "Ship as soon as you can and don't wait till you have to!" In other words distribution should be synchronized to the production schedule. The manufacturer's warehouse then becomes a stock-less cross docking point, where goods from the various plants can be consolidated into the same truck to a retail distribution center. That supply chain structure is shown in Figure 2.

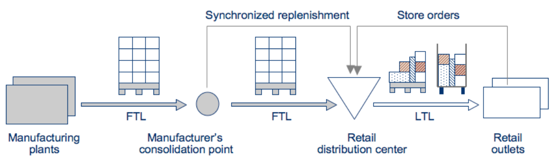


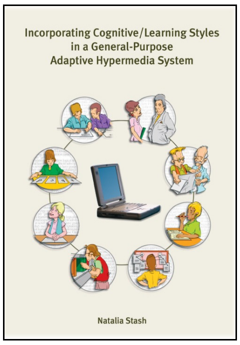
Figure 2: Synchronized retail supply chain.

Incorporating Cognitive/Learning Styles in a General-Purpose Adaptive Hypermedia System

Ph.D. thesis abstract

Natalia Stash

Promotores: Prof.dr. P.M.E. De Bra (TU/e) and Prof.dr. L. Hardman (CWI / TU/e)
Co-promotor: dr. A.I. Cristea (Univ. of Warwick)
Date of defense: July 2, 2007



This dissertation brings together two disciplines – **Adaptive Hypermedia**, a *computer science* topic and **Cognitive/Learning Styles**, a research topic in *cognitive psychology*.

Adaptive hypermedia (AH) addresses the usability problems users often encounter in traditional hypermedia applications, such as navigation and comprehension problems. These problems are caused by the rich link structure of the applications. Adaptive hypermedia systems (AHS) can support the user in navigation by limiting the browsing space; they can guide the user through the information towards relevant pages so that (s)he can reach them more easily and quickly. Furthermore AHS allow to improve comprehension of the content by presenting the most relevant information on a page to the user and hiding information that is not relevant. In the field of adaptive hypermedia these forms of adaptation are referred to as *adaptive navigation support* (or *link adaptation*) and *adaptive presentation* (or *content adaptation*). For each user, an AHS constructs and maintains a user model that represents various characteristics of the user and his/her environment and applies this information for providing adaptation. Information about the user is gathered by the system by observing his/her behavior which is most often browsing.

Typically AHS are developed for a specific application area and cannot be reused in another context. The most popular area for adaptive hypermedia research is adaptive educational hypermedia systems (AEHS). The goal of the user (learner) is to learn all the learning material or a reasonably large part of it. The key feature in this area is the user's knowledge of the subject area being studied. Other learner features the AEHS may take into account are background, hyperspace experience, preferences and interests. These properties tend to relate to the application domain. Less attention has been paid in the adaptive hypermedia field to the fact that people have different approaches to learning, namely that individuals perceive and process information in very different ways. These differences are referred to as cognitive/learning styles and are studied by Cognitive Psychology.

The aim of this dissertation is twofold. First, it aims at developing a general-purpose system that targets various application domains and is capable of performing adaptation to many different aspects of users. Second, it pays special attention to the application of learning styles (LS) in adaptive hypermedia. It thus bridges the gap between the disciplines of adaptive hypermedia and cognitive psychology.

Chapter 1 introduces the research questions and approaches and the outline of this dissertation.

Chapter 2 gives an overview of adaptive hypermedia systems and existing models for adaptive hypermedia. From these models, we select the Adaptive Hypermedia Application Model (AHAM) as a basis for creating a general-purpose tool, and formulate a number of design requirements.

Chapter 3 describes the design and implementation of a general-purpose tool. Rather than start from scratch (or from the AHAM model) we have developed the general-purpose AHA! system (version 3.0) based on an existing educational adaptive hypermedia engine. This was used in the course "Hypermedia Structures and Systems", known as 2L670 and later 2L690, at the Eindhoven University of Technology (TU/e). The Chapter presents the overall AHA! 3.0 architecture and different AHA! sub-models with respect to AHAM. It discusses whether and how AHA! implements the design requirements formulated in Chapter 2 and pays attention to the issue of authoring adaptive applications in AHA!. We show that building a general-purpose tool is a time consuming and difficult process. Though we can already consider AHA! as a general-purpose system, since it can be used for creating applications targeting various domains and can provide adaptation to various aspects of users, not all of the design requirements are currently satisfied by AHA!.

Chapter 4 presents general information about the field of learning styles and puts stress on those that, according to psychology researchers, have potential implications for pedagogy.

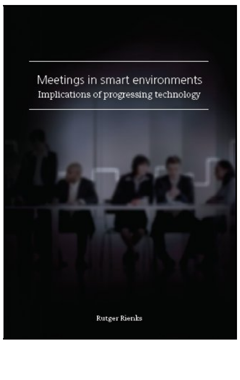
Chapter 5 discusses the suggestions from psychological and computer science research for possible adaptation of instructional design to a number of learning styles. It presents an overview of existing AHS that provide learning styles adaptation. By analyzing existing implementations we identify a number of issues we wish to improve in our approach. The overview shows that only a few systems can provide certain types of adaptation independently of the learning style model. In most systems, the choice of learning style and the corresponding instructional strategy are predefined by the designers of the systems. Furthermore in most systems, the LS are assessed through psychological questionnaires and psychometric tests. The disadvantage of using questionnaires is that they are time consuming, the results are not always reliable and valid and moreover not all characteristics they measure are stable and invariable across different subject domains.

We present our approach to incorporating learning styles in AHA! in Chapter 6. We consider that the task of choosing the learning style model and defining the learning styles strategies should be left to the authors of adaptive applications rather than the developers of the system. We define an adaptation language for learning styles, called LAG-XLS. Authors can create their strategies in this language and decide which strategies to apply to which application. LAG-XLS not only allows the definition of instructional strategies as identified in Chapter 5, but also the monitoring strategies for inferring preferences corresponding to particular learning styles. These inference strategies can serve as an alternative solution in cases when the time consuming process of filling in long psychological questionnaires is undesirable. The Chapter compares our approach with the approaches adopted in other systems providing LS adaptation. It also shows the results of evaluation of this approach with students from the TU/e and the results of approach validation performed by a number of LS experts.

Meetings in Smart Environments: Implications of Progressing Technology

Ph.D. thesis abstract
Rutger Rienks

Promotor: Prof.dr.ir. A. Nijholt (UT)
Co-promotor: dr. D.K.J. Heylen (UT)
Date of defense: July 11, 2007



Meetings are often inefficient. They are numerous and unavoidable. If we look at the technological developments in this area we quickly see that along with the introduction of the microphone and the data projector, the execution of a meeting for the participants has become much easier. Yet there are still many aspects of a meeting that can be improved, where technology in its current stage has not contributed much. There is for instance hardly any technology that is able to autonomously interpret, or analyze, aspects of the meeting process.

An automatic analysis of a meeting could provide valuable insights for both the attendants, as well as for those interested parties who could not attend. These insights hypothetically could in turn lead again to more successful meeting processes. It is, for example, often the case that one or two dominant participants can monopolize a complete meeting in a way that they make it impossible for others to contribute. Another example is that the argumentation that has been put forward and that led to a certain decision is often forgotten and lost, not to mention that during a discussion just one line of argumentation can be in the center of attention.

It is investigated to what extent the latest technological developments can provide automatic insights into both so-called higher-level meeting phenomena. To enable the automatic recognition, a descriptive and computationally accessible model has been created for the phenomenon of dominance hierarchy as well as for argument structure. Whereas the model for a dominance hierarchy did not require more than a ranking of the participants, the model that describes the argumentation structure requires interpretation of the individual contributions, as well as the knowledge of how to label contributions in the context of the discussion.

From a social psychological background, correlated and more easily detectable aspects and signals that either have proven to be, or were expected to be useful for the recognition of the phenomena have been collected. The resulting corpus of meeting recordings in combination with the collected relevant aspects was, combined with human interpretations of the phenomena presented, used as input for machine learning algorithms. These algorithms were trained on this data with the aim to have them learn how to replicate the human interpretations of these higher-level phenomena on unseen data.

For a dominance hierarchy this appears to be possible in approximately 70% of the meetings that were tested. For the recognition of an argumentation structure, the individual contributions can be correctly interpreted in terms of the predefined model in around 75% of the cases. The contextual labels that describe the relations between these contributions can be correctly replicated in around 60% of the cases. All in all this shows that full reproduction of human interpretation is not (yet) completely possible, but although the results are not perfect, the recognition is already sufficient for the creation of at least some meeting-supporting applications. The future will show if and how these technological possibilities can eventually lead to the enhancement of meeting processes and if the meeting experience for all participants can, as intended, be improved.

Dynamics and Adaptivity

Jaap van den Herik
MICC-KAT, Maastricht

The world of research should be dynamic, since dynamics seem to express progress and that appropriately fits scientific development. Here the following question is relevant: is a shift from static to dynamic sufficient to start such a scientific development? Or otherwise stated: is a shift of one hundred million of euros from the first-money stream (the universities) to the second-money stream (NWO) a sufficient means to achieve the national goal of (1) better ranked research and (2) more publications in refereed journals? It is an open question, but if Minister Plasterk is able to execute his policy then we know the answer in – say – 10 years from now. Thus around 2017. It takes one year to implement it politically, then one year to rearrange things within NWO. Subsequently we have the many competitions (one more year) and thereafter the appointments. So, after four years we have the first students, who take another four years. Here five years are necessary for a good evaluation that will be held in 2016/2017. The evaluation criteria are clear; see (1) and (2) above.

The envisaged shift of money does not increase the number of Ph.D. students. The Vice-Chancellors (Rectores Magnifici) of the Dutch universities all have put emphasis on enlarging the input of the Ph.D. students, by a factor of 1.5 or more. So 40 Ph.D. students (per research / graduate school) should become 60. It is a fine example of quality versus quantity.

We all know that they are interrelated; more students will usually increase also the level. Conversely, a better quality will attract more students. The intriguing question is: how can we handle both? The concept of a (large) graduate school with a department (and special education) for Ph.D. students seems to be an attractive solution. Many universities are developing plans and in September 2007 it will be a topic discussed within the VSNU. I look forward to the outcome of the various discussions and expect that by 2017 both groups (qualitative and quantitative) will reach their goals set. So, over ten years (that is 60 issues of the BNVKI Newsletter) our list of Ph.D. defence announcements will grow. Moreover, full professors will be stimulated to double their production from two Ph.D. students per year to four per year. Here a logical question is: what is the limit? For SIKS we have the results and the expectations (see the December 2006 issue and all previous December issues). I am curious whether we will make an accelerated step forward in the coming three years. We will see what happens. At this moment the Editorial Board would like to congratulate all listed Ph.D. students with their performance achieved. We wish you much success with the official defence of your thesis and hope that the milestone will bring you what you expected the last four years.

Marcel van Gerven (September 5, 2007). *Bayesian Networks for Clinical Decision Support: A Rational Approach to Dynamic Decision-Making under Uncertainty*. Radboud University Nijmegen. Promotor: Prof.dr.ir. Th.P. van der Weide (RUN). Co-promotor: Dr. P.J.F. Lucas (RUN).

Bart Orriëns (September 12, 2007). *On the Development and Management of Adaptive Business Collaborations*. Tilburg University. Promotor: Prof.dr.ir. M.P. Papazoglou (UvT). Co-promotor: Dr. J. Yang (UvT).

Theodoros Charitos (September 17, 2007). *Reasoning with Dynamic Networks in Practice*. Utrecht University. Promotor: Prof.dr.ir. L.C. van der Gaag (UU).

Nora Kasirye Mulira (September 17, 2007). Implementing Inter-Organisational Service Systems; An approach for emerging networks in volatile contexts. Technical University Delft. Promotor: Prof.dr. H.G. Sol (TUD).

Davide Grossi (September 17, 2007). *Designing Invisible Handcuffs. Formal Investigations in Institutions and Organizations for Multi-agent Systems*. Utrecht University. Promotor: Prof.dr. J.-J.Ch. Meyer (UU). Co-promotor: Dr. F. Dignum (UU).

Joyca Lacroix (September 20, 2007). *NIM: A Situated Computational Memory Model.* Universiteit Maastricht. Promotores: Prof.dr. J.M.J. Murre (UM/UvA), Prof.dr. E.O. Postma (UM), Prof.dr. H.J. van den Herik (UM).

Zlatko Zlatev (October 4, 2007). *Goal-oriented Design of Value and Process Models from Patterns*. University of Twente. Promotor: Prof.dr. R.J. Wieringa (UT).

Slinger Jansen (October 8, 2007). *Customer Configuration Updating in a Software Supply Network*. Utrecht University. Promotores: Prof.dr. S. Brinkkemper (UU), Prof.dr. P. Klint (CWI).

Niek Bergboer (October 10, 2007). *Context-based Image Analysis*. Universiteit Maastricht. Promotores: Prof.dr. H.J. van den Herik (UM), Prof.dr. E.O. Postma (UM).

David Levy (October 11, 2007). *Intimate Relationships with Artificial Partners*. Universiteit Maastricht. Promotores: Prof.dr. M.J.H. Meijer (UM), Prof.dr. H.J. van den Herik (UM).

Karianne Vermaas (November 26, 2007). *Fast Diffusion and Broadening Use: A Research on Residential Adoption and Usage of Broadband Internet in the Netherlands between 2001 and 2005*. Utrecht University. Promotor: Prof.dr. S. Brinkkemper (UU). Co-promotor: Dr. L. van de Wijngaert (UU).

Section Editor
Richard Starmans

Workshop on Cooperative Information Agents for SIKS-Ph.D. Students

From September 19-21, 2007, the Eleventh International Workshop on Cooperative Information Agents (CIA 2007) takes place in Delft. Details on program and location can be found at http://www-ags.dfki.uni-sb.de/~klusch/cia2007/.

An intelligent information agent is a computational software entity that is capable of accessing one or multiple, potentially heterogeneous and distributed information sources, proactively acquiring, mediating, and maintaining relevant information or services on behalf of its human users, or other agents, preferably just in time and anywhere. One key challenge of developing intelligent and cooperative information systems is to balance the autonomy of networked data, information, and knowledge sources with the potential payoff of leveraging them by the appropriate use of such agents. Research on intelligent information agents and systems is inherently crossdisciplinary covering themes from domains such as artificial intelligence, HCI, Internet and Web technologies, information systems, KDD, IR, P2P and grid computing, and multiagent-system technologies as well.

The objective of the international workshop series on cooperative information agents (CIA), since its establishment in 1997, is to provide a distinguished, interdisciplinary forum for researchers, programmers, and managers to get informed about, present, and discuss latest high-quality results in research and development of agent-based intelligent and cooperative information systems, and appli–cations for the Internet, Web and semantic Web.

As a result of the cooperation between SIKS and the CIA 2007 organisation, SIKS-Ph.D. students can participate without paying entrance fee. The workshop is part of the advanced components stage of the school's educational program and therefore Ph.D. students working in the field of (multi-)agent systems are strongly encouraged to participate. However, there is a fixed number of places available for SIKS-Ph.D. students at the workshop, and therefore an early registration is required.

This special SIKS arrangement applies to all SIKS-Ph.D. students, whether they have submitted a paper or not. A free participation as a SIKS-Ph.D. student is only possible by sending an e-mail to office@siks.nl and inform Mrs. Corine Jolles that you want to participate. Ph.D. students will receive a notification whether they can participate as soon as possible. So, please do not contact the CIA 2007 organisation for questions about this SIKS-arrangement. For all questions regarding SIKS and its educational program, contact office@siks.nl.

For more information on the CIA workshop series, see http://www-ags.dfki.uni-sb.de/~klusch/IWS-CIA-home.html.

Symposium "Situated Models of Perception and Memory"

Location: Salon, Faculty of Law, Bouillonstraat 1-3, Maastricht
Date: September 19, 2007, 13:30h to 16:30h

On September 19, 2007, the Maastricht ICT Competence Center (MICC) together with the School for Information and Knowledge Systems (SIKS) organizes a symposium under the title "Situated Models of Perception and Memory". You are kindly invited to participate in the symposium; participation is free of charge. It is not necessary to register for the symposium. More information on the symposium can be found below or on http://www.cs.unimaas.nl/~postma/NIMworkshop.

Recent advances in Artificial Intelligence and Cognitive Science gave rise to a new class of models of perception and memory that can deal with real-world input. This workshop brings together researchers that study computational models of perception and memory in the context of real-world constraints. It offers a unique view on the exciting field of situated cognition and situated AI by means of presentations from promising and established researchers working in various domains centering on the theme of computational modeling.

The symposium includes talks by prof.dr. Gary Cottrell (University of California San Diego), prof.dr. Justus Piater (University of Liége), dr. Valerie Goffaux (Univerity of Louvain / Maastricht University), and Joyca Lacroix (Leiden University / Maastricht University). More details on the program can be found on http://www.cs.unimaas.nl/~postma/NIMworkshop. The symposium will be held in the Salon at the Maastricht University Faculty of Law, Bouillonstraat 1-3, Maastricht, The Netherlands. The program starts at 13:30h and will finish at 16:30h. We hope to see you all at September 19th!

Advanced SIKS Course "Service-Oriented Computing"

INTRODUCTION

On October 4 and 5, 2007 the School for Information and Knowledge Systems (SIKS) will organize an advanced course on Service-Oriented Computing. 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.

Service-oriented computing is the new emerging cross-disciplinary paradigm for distributed computing that is changing the way software applications are designed, architected, delivered and consumed. Services are autonomous, platform-independent computational elements that can be described, published, discovered, orchestrated and programmed using standard protocols for the purpose of building networks of collaborating applications distributed within and across organizational boundaries (Papazoglou, 2006).

The advanced course offers an overview of the rapidly expanding field of SOC and an insight into the latest developments in service discovery, dynamic service composition and adaptive services, among others. Lecturers include prof.dr. Mike Papazoglou (UvT), dr. Manfred Reichert (UT) and prof.dr. Frank van Harmelen (VU). Students will receive some reading material before the course to prepare themselves.

LOCATION

Landgoed Huize Bergen, Vught.

SCIENTIFIC DIRECTORS

Dr. Hans Weigand (UvT), dr. Willem-Jan van den Heuvel (UvT).

PROGRAM (PROVISIONARY)

Thursday, October 4, 2007

9.45	Welcome (dr. Hans Weigand)
10.00 - 12.30	prof.dr. Mike Papazoglou (Tilburg University): Service-Oriented Computing: state of the art and future challenges
12.30 - 13.30	lunch
13.30 - 15.00/30	prof.dr. Kees van Hee (TU Eindhoven): Service Governance
15.30 - 17.00	(Perry Krol, TIBCO): Tibco solutions for realizing SOC

Friday, October 5, 2007

9.00 - 11.00	prof.dr. Frank van Harmelen (VU Amsterdam): Ontology-based Service Discovery
11.15 - 12.30	dr. Willem-Jan van den Heuvel (Tilburg University): Service-Oriented Design
12.30 - 13.30	lunch
13.30 - 15.30	dr. Manfred Reichert (Univ Twente): (Adaptive) Service Composition
15.30 - 17.00	Hans Diepstraten (chief SOA architect, Atos Origin): Practical experience with SOC projects

REGISTRATION

For registration you are kindly requested to fill in the registration form at the SIKS-website. 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 8, 2007.

SIKS Basic Course "Research Methods and Methodology for IKS"

INTRODUCTION

On November 14, 15, and 16, 2007, the School for Information and Knowledge Systems (SIKS) organizes the annual three-day course "Research methods and methodology for IKS". The location will be Landgoed Huize Bergen in Vught. 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 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.

COURSE COORDINATORS

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

PROGRAM

A provisionary program is not available yet. More details will be made available on the SIKS-site in due course.

REGISTRATION

For registration you are kindly requested to fill in the registration form at the SIKS-website. 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: October 23, 2007.

SIKS Basic Course "Agent Systems"

INTRODUCTION

On December 10-11, 2007, the School for Information and Knowledge Systems (SIKS) and the Netherlands Research School on Transport, Infrastructure and Logistics (TRAIL) organize the course "Agent Systems". The location will be Landgoed Huize Bergen in Vught. The course will be given in English.

Although the course is primarily intended for TRAIL- and SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS and TRAIL students taking the course.

SCIENTIFIC DIRECTORS

Prof. dr. C.M. Jonker (TUD), Prof. dr. J.-J.Ch. Meyer (UU), Prof. dr. B. De Schutter (TUD), Prof. dr. C. Witteveen (TUD).

PRELIMINARY PROGRAM

Monday, December 10, 2007

10.00 - 12.00	General Introduction MAS and Architectures; prof.dr. J-J. Ch. Meyer (UU)
12.00 - 13.00	Agent Logics; dr. J. Broerse (UU)
13.00 - 14.00	*lunch*
14.00 - 17.00	Agent Programming Languages + practical assignment; dr. M. Dastani (UU)

Tuesday, December 11, 2007

9.00 - 10.00	Multi-agent Planning Systems and Technology; dr. M.M. de Weerdt (TUD)
10.00 - 11.00	Cognitive Agent Models; prof.dr. J. Treur (VU) and/or ir. K. van de Bosch (TNO)
11.00 - 13.00	Negotiation (+ assignments); prof. C.M. Jonker en dr. K. Hindriks (TUD)
13.00 - 14.00	*lunch*
14.00 - 17.00	Design of Multi-agent Systems (+ practical assignments); prof.dr. F. Brazier (VU)

REGISTRATION

For registration you are kindly requested to fill in the registration form at the SIKS-website. 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 23, 2007.

Advanced SIKS Course "Multi Agent Systems: Theory, Technology and Applications"

INTRODUCTION

On December 12-13, 2007, the School for Information and Knowledge Systems (SIKS) and the Netherlands Research School on Transport, Infrastructure and Logistics (TRAIL) organize the advanced course "Multi Agent Systems: Theory, Technology and Applications". The location will be Landgoed Huize Bergen in Vught. The course will be given in English. Although the course is primarily intended for TRAIL- and SIKS-Ph.D. students, other participants are not excluded. However, their number of passes will be restricted and depends on the number of SIKS and TRAIL students taking the course.

SCIENTIFIC DIRECTORS

Prof.dr. C.M. Jonker (TUD), prof.dr. J.-J.Ch. Meyer (UU), prof.dr. B. De Schutter (TUD), prof.dr. C. Witteveen (TUD).

PROGRAM

Wednesday, December 12, 2007

9.00 - 9.30	Introduction TRAIL themes; prof.dr. H. van Zuylen
9.30 - 12.30	Game Theory: an introduction; prof.dr. ir. G.J. Olsder
12.30 - 13.30	*lunch*
13.30 - 15.00	MAS in traffic networks; dr. B. Immers (TNO)
15.30 - 17.00	Demo traffic control; drs. R. van Katwijk (TNO)

Thursday, December 13, 2007

9.00 - 10.30	Swarm intelligence + applications; prof.dr.ir. R. Babuska (TUD)
11.00 -12.30	AGV lab demo; ir. M. Duinkerken (TUD)
13.30 - 15.00	Route choice behaviour; dr.ir. H. van Lint and/or drs. E. Bogers (TUD)
15.30 - 17.00	Agent-based models and simulation of pedestrian flows; prof.dr.ir. S. Hoogendoorn (TUD)
17.00 - 17.15	Closing

REGISTRATION

For registration you are kindly requested to fill in the registration form at the SIKS-website. 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 23, 2007.

ANNOUNCEMENTS

Call for Participation

The 19th Belgian-Dutch Conference on Artificial Intelligence

BNAIC 2007
Utrecht, November 5-6, 2007
http://www.cs.uu.nl/bnaic2007

Registration is Open
Early Registration until September 15, 2007

The BNAIC 2007 aims at presenting an overview of state-of-the art research in artificial intelligence in Belgium and The Netherlands. The program of this edition of BNAIC, which will be available soon, consists of 63 oral presentations, 35 poster presentations, and 13 system demonstrations. Moreover, the program includes invited talks by Michael Thielscher and Pedro Domingos, and an industry track organised by the Decis Lab (Delft Cooperation on Intelligent Systems).

The conference will be held at the historical Academiegebouw of Utrecht University, the Netherlands, and is organized under the auspices of the Belgian-Dutch Association for Artificial Intelligence (BNVKI) and the Dutch Research School for Information and Knowledge Systems (SIKS). Visit http://www.cs.uu.nl/bnaic2007 to register now.

CONFERENCES, SYMPOSIA WORKSHOPS

Below, the reader finds a list of conferences, symposia and workshops, and websites or addresses for further information.

SEPTEMBER 12-14, 2007
ACII 2007: Affective Computing and Intelligent Interaction, Lisbon, Portugal.
http://gaips.inesc-id.pt/acii2007/index.html

OCTOBER 22-24, 2007
Workshop on Multi-Agent Systems and Simulation 2007 (during ESM'07), St. Julian's, Malta.
http://lisdip.deis.unical.it/workshops/mass07/

NOVEMBER 5-6, 2007
BNAIC 2007: The 19th Belgian-Dutch Conference on Artificial Intelligence Utrecht, The Netherlands.
http://www.cs.uu.nl/bnaic2007

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COPY

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