



Birbeck, University of London

June 23rd - 24th, 2011

EWG-DSS London-2011

EURO Working Group on Decision Support Systems - Workshop on Decision Systems

June 23rd – 24th, 2011

London, UK





EURO Working Group on Decision Support Systems

Digital Proceedings

of the

EWG-DSS London-2011 Workshop

on

Decision Systems

London, June 23rd-24th, 2011

Editors:

**F. Dargam, B. Delibasic, J. E. Hernández,
S. Liu, R. Ribeiro, P. Zaráté**

The logo for IRIT (Institut de Recherche en Informatique de Toulouse) features the acronym "IRIT" in a stylized, bold font with a red "I" and a grey "RIT". Below it, smaller text reads "CNRS - INPT - UPS - UT1 - UTM".	<p>IRIT Institut de Research en Informatique de Toulouse Report : IRIT / RR--2011-14—FR, June 2011 (Digital Version)</p>
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Workshop Proceedings

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*Abstracts appear in the same order that they are presented in the program.



Institutional Support

	<p>EURO, The Association of European Operational Research Societies</p> <p>EWG-DSS, EURO Working Group on Decision Support Systems</p> <p>(http://www.euro-online.org/web/ewg/10/ewg-decision-support-systems)</p>
	<p>School of Business, Economics and Informatics at Birkbeck, University of London</p> <p>(http://www.bbk.ac.uk/)</p>
	<p>School of Management, University of Plymouth, UK</p> <p>(http://www.plymouth.ac.uk/)</p>
	<p>Management School, University of Liverpool, UK</p> <p>(http://www.liv.ac.uk/management/)</p>
	<p>SimTech Simulation Technology, Austria</p> <p>(http://www.SimTechnology.com)</p>
	<p>IRIT Institut de Research en Informatique de Toulouse, France</p> <p>(http://www.irit.fr/)</p>
	<p>University of Toulouse, France</p> <p>(http://www.univ-tlse1.fr/)</p>
	<p>University of Belgrade, Serbia</p> <p>(http://www.bg.ac.rs/eng/uni/university.php)</p>
	<p>UNINOVA - CA3 - Computational Intelligence Research Group (www.uninova.pt/ca3/)</p>
	<p>ILTC - Instituto de Lógica Filosofia e Teoria da Ciência, RJ, Brazil (http://www.iltc.br)</p>



About the EWG-DSS

The EWG-DSS is a Working Group on Decision Support Systems within EURO, the Association of the European Operational Research Societies.

The main purpose of the EWG-DSS is to establish a platform for encouraging state-of-the-art high quality research and collaboration work within the DSS community. Other aims of the EWG-DSS are to:

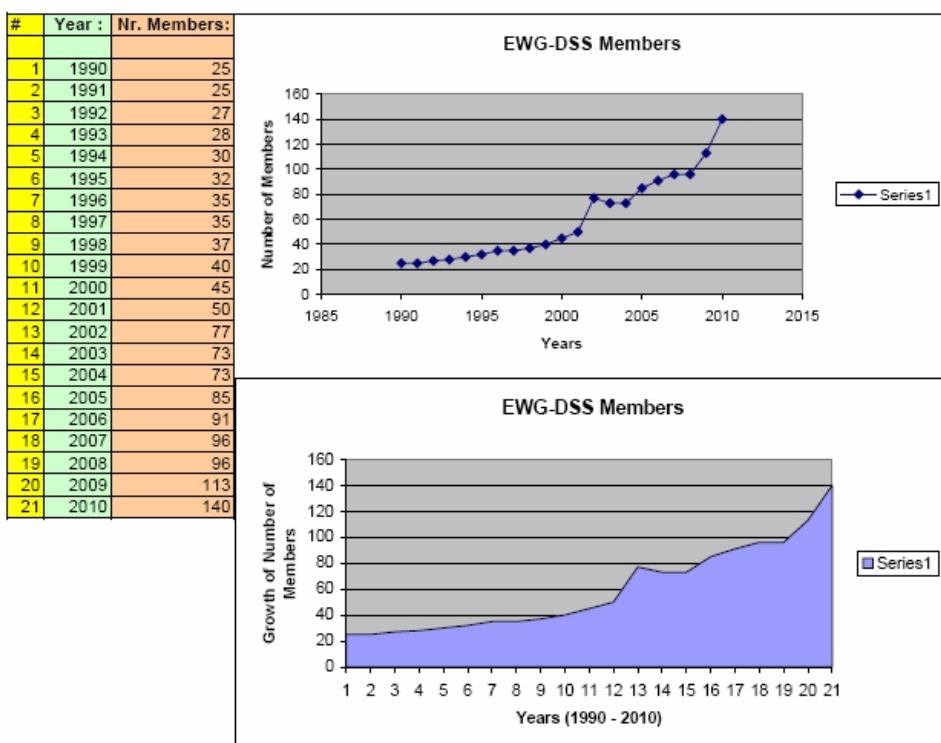
- Encourage the exchange of information among practitioners, end-users, and researchers in the area of Decision Systems.
- Enforce the networking among the DSS communities available and facilitate activities that are essential for the start-up of international cooperation research and projects.
- Facilitate professional academic and industrial opportunities for its members.
- Favour the development of innovative models, methods and tools in the field Decision Support and related areas.
- Actively promote the interest on Decision Systems in the scientific community by organizing dedicated workshops, seminars, mini-conferences and conference streams in major conferences, as well as editing special and contributed issues in relevant scientific journals.

The EWG-DSS was founded during a memorable EURO Summer Institute on DSS that took place at Madeira, Portugal, in May 1989. This Summer Institute was organized by two well-known academics of the OR Community: Jean-Pierre Brans and José Paixão. It counted with the participation of 24 (at that time) young researchers of 16 different nationalities. Most of them still continue nowadays to pursue their goals, working actively in their research areas.

The number of EWG-DSS members has substantially grown along the years. Now we are over 140 members coming from various nationalities. There has also been established quite a few well-qualified research co-operations within the group members, which have generated valuable contributions to the DSS field in journal publications. Since its creation, the EWG-DSS has held annual Meetings in various European countries, and has taken active part in the EURO Conferences on decision-making related subjects.

Since 2007 the EWG-DSS has been managed by a Coordination Board. One of the aims of this coordination board is to better promote joint-work among the group members and to encourage more participation of the whole group in DSS related projects and events. In the period of June 2007 to January 2011 the EWG-DSS Coordination Board was composed by: Pascale Zaraté, Fatima Dargam and Rita Ribeiro. Since the beginning of 2011, the EWG-DSS Managing Board has doubled in number of members. Besides the old coordinators, now we count with the assistance of three new Board Members, namely: Jorge Hernández; Boris Delibasic; and Shaofeng Liu, to better administrate the activities of the group, as well as to bring new ideas to it.

EWG-DSS EURO Working Group on Decision Support Systems
Number of Members from 1990 up to 2010



EWG-DSS Members from 1990 to 2010

Joining the EWG-DSS

The EWG-DSS membership does not cost you anything.
If you wish to join the EURO-Working Group on Decision Support Systems,
all you have to do is to send an e-mail to our group at:
<ewg-dss@fccdp.com>, with the following information:

Name; Affiliation; Mailing Address; Phone; e-mail; and Homepage link..

Alternatively, you can also join the EWG-DSS via our LinkedIn Group at:
http://www.linkedin.com/groups?about=&gid=1961459&trk=anet_ug_grpro

Thanks for your interest!
The EWG-DSS Coordination Board



Notes from the Workshop Organizers

The EURO Working Group on Decision Support Systems (**EWG-DSS**), in cooperation with **Birkbeck-University of London**, had the pleasure to organize the **EWG-DSS London-2011 Workshop on Decision Systems** on the period of June 23rd to June 24th, 2011, at the School of Business, Economics and Informatics at Birkbeck, in London.

This Workshop's main purpose was to provide a setting in which the professionals of the research and application areas related to Decision Making and Decision Support, could have the opportunity to meet and discuss about technical, methodological and social aspects for developing Decision Systems in an informal way.

Based on this main aim, we have tried to find the ideal place for the Workshop to happen. We were lucky! We had the honor to count with the great support of one of the EWG-DSS founding members: **Philip Powell**, who is currently Executive Dean and Professor of Management at the School of Business, Economics and Informatics at Birkbeck. Philip enabled the EWG-DSS to organize this Workshop in the heart of central London, at Birkbeck, which is a centre of academic excellence of the University of London. As members of the EWG-DSS Coordination Board and Workshop Organizers, we are extremely grateful to all the local arrangements and support received from him. **Many Thanks Philip!**

When we started planning this Workshop, we did not really know how much interest it would arise among the members of the EWG-DSS and the professionals of the DSS Community. We were all positively surprised as, by the end of the submissions' deadline, we had received 45 research work contributions of considerable relevance to the research community. We would like to acknowledge the interest and cooperation of all the authors who submitted their finished and on-going research work for presentation in our workshop. We also take this opportunity to thank each participant, who directly contributed for the high academic quality standard of this event. Without you, this workshop would not exist! **Thanks Participants!**

This workshop presents a total of 42 research contributions and 3 special talks. The topics of the papers are various. To select some of them, we cite: decision support and e-mediation in electronic negotiations; social network analysis supporting decision systems; multi-criteria decisions in cooperation models; data mining; qualitative decision-making; geographic/spatial decision systems; real-time decision approaches; methods using agent-based models; etc. The range of applications include resource allocation; finances; production waste elimination; expert winemaking support; rural-urban migration; energy management environmental policy planning; defense systems; and collaborative supply chains, among others. This rich diversity of approaches to the design, implementation and usage of Decision Systems within this Workshop, is itself an invaluable source of inspiration, for our further investigations in the area.

A highlight of this workshop's organization was the reviewing support received mainly by the Workshop Program Committee, who themselves are mid or long-term members of the EWG-DSS. The workshop reviewing process was planned to be performed in a concise and fast way, so that authors could count with the referees' evaluation not only to help them to finalize their full papers to be submitted to the Journal Special Issues promoted by this workshop, but also to improve their presentations. We have managed to achieve our reviewing goals with a minimal of delay, thanks to our engaged team of reviewers. We are very grateful to all of them, for their constructive feedback and prompt cooperation. **Thanks Reviewers!**

Last, but not least, we - the long-term Coordinators of the EWG-DSS - want to express here our deep and very true gratitude to the new group Board Members, for their invaluable and non-exhausting support, in all its organizational stages and up to the last minute, in making this workshop come true. **Dear EWG-DSS Board Assistants: Thank you so much for all your engaged participation in the EWG-DSS Coordination Board and for your great help on the EWG-DSS London-2011 Workshop organization!**

We hope you all enjoy the Workshop!

We for sure will!

The EWG-DSS Coordinators

	<p>EWG-DSS Coordination Board: ewg-dss@fccdp.com</p> <p>Pascale Zaraté (Coordinator) IRIT / Toulouse University , France Fátima Dargam (Coordinator) SimTech Simulation Technology / ILTC, Austria Rita Ribeiro (Board Chair) UNINOVA - CA3, Portugal Jorge Hernández (Board Assistant) University of Liverpool, UK Boris Delibasic (Board Assistant) University of Belgrade, Serbia Shaofeng Liu (Board Assistant) University of Plymouth, UK</p> <p>EWG-DSS EURO Homepage: http://www.euro-online.org/web/ewg/10/ewg-decision-support-systems EWG-DSS Blog: http://ewgdss.wordpress.com/ EWG-DSS LinkedIn : http://www.linkedin.com/groups?about=&gid=1961459&trk=anet_ug_grppro EWG-DSS IRIT Server: https://wwwsecu.irit.fr/listes/info/ewg-dss EWG-DSS Mailing List : ewg-dss@irit.fr (only for Members)</p>
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Workshop Organizing & Program Committees

Local Organizing Committee:

Shaofeng Liu, University of Plymouth, UK
Jorge Hernández University of Liverpool, UK
Boris Delibašić University of Belgrade, Serbia
Fátima Dargam, SimTech Simulation Technology, Austria
Pascale Zaráté, IRIT / Toulouse University , France
Rita Ribeiro UNINOVA – CA3, Portugal

Special Local Organization Support:

Philip Powell, Executive Dean and Professor of Management
School of Business, Economics and Informatics at Birkbeck,
University of London, UK

Workshop Program Committee:

Ana Respício, University of Lisbon, Portugal
Antonio Rodrigues, University of Lisbon, Portugal
Boris Delibašić, University of Belgrade, Serbia
Csaba Csaki, University College Cork, Ireland
Dragana Becejski-Vujaklija, Fac.Org. Sciences, Univ. Belgrade, Serbia
Fátima Dargam, ILTC, Brazil & SimTech Simulation Technology, Austria
Frédéric Adam, University College Cork, Ireland
Jason Papathanasiou, University of Macedonia, Greece
Joao Lourenço, IST, Technical University of Lisbon, Portugal
Jorge Freire de Souza, Engineering University of Porto, Portugal
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Peter Keenan, University College Dublin, Ireland
Philip Powel, Birkbeck, University of London, UK
Rita Ribeiro, UNINOVA – CA3, Portugal
Rudolf Vetschera, University of Vienna, Austria
Shaofeng Liu, University of Plymouth, UK



Special Talks

Invited Speaker:

Alex Duffy

Associate Dean of Research, Faculty of Engineering
Professor of the Department of Design, Manufacture and Engineering Management of the
University of Strathclyde, Glasgow, Scotland

Talk:

“Supporting distributed decision-making in a global economy”

A cooperative research work with: *Robert I. Whitfield and Iain Boyle*

Special Talk:

Philip Powell

Executive Dean, Professor of Management at the School of Business
Economics and Informatics at Birkbeck, University of London, UK

Talk:

“On-line game participation: Competition and Hedonism”

A cooperative research work with: *Thomas Weiss & Claudia Loebbecke*

Special Talk:

Rita Ribeiro

Founding member and Coordinator of the CA3
Computational Intelligence Research Group at UNINOVA, Portugal

Talk:

“Decision Making Challenges in Space Applications”



Workshop Program

Day 1, Thursday – June 23rd, 2011
Birkbeck Main Building, Room: 414 (4th. Floor)

9:00: Registration /Distribution of Workshop Material

Welcome to the EWG-DSS London-2011 Workshop at Birkbeck, Univ. London
Opening Session by the Workshop Organisers

9:30 – 10:10: Session D1-1: Special Talk by Philip Powell

(Executive Dean, Professor of Management at the School of Business Economics and Informatics at Birkbeck, University of London, UK)

S.D1-1.1. 9:30 – 10:10: “On-line game participation: Competition and Hedonism”

Authors: Philip Powell, Thomas Weiss & Claudia Loebbecke

Chair: Pascale Zaraté

10:10 – 10:25: Coffee Break

10:25 – 11:25: Session D1-2: Concepts and Systems in Negotiation Support

Chair: Rudolf Vetschera

S. D1-2.1. 10:25 – 10: 45: Supporting Communication, Decisions, and Document Management in Electronic Negotiations – the System Negoisst.

Authors: Mareike Schoop, Andreas Reiser, Alexander Dannenmann.

S. D1-2.2. 10: 45 – 11: 05: e-mediation in e-negotiation: Support philosophies and tools.

Authors: Dan Druckman, Michael Filzmoser, Sabine Köszegi, Ronny Mitterhofer.

S. D1-2.3. 11: 05 – 11: 25: Impact of and interaction between behavioral and economic decision support in electronic negotiations.

Authors: Alexander Dannenmann, Daniel Druckman, Michael Filzmoser, Johannes Gettinger, Sabine Köszegi, Ronny Mitterhofer, Andreas Reiser, Mareike Schoop, Per van der Wijst, Rudolf Vetschera.

11:25 – 12:25: Session D1-3: Social Networks & Decision Making

Chair: Boris Delibašić

S. D1-3.1. 11:25 – 11:45: Networking the EWG-DSS: How do we proceed now?

Authors: Fatima Dargam, Rita Ribeiro, Pascale Zaraté.

S. D1-3.2. 11:45 – 12:05: Rural-urban Migration Decision Making Process: A whole and Personal Support Network Analysis. Authors: Wei Sun, Gang Zong, John Scott, Shaofeng Liu.

S. D1-3.3. 12:05 – 12:25: Social Cognocracy Network. Some Notes about the design and the actors' reputation.

Authors: J. M. Moreno-Jiménez, J. Aguarón, A. Raluy, J.M. Subero, A. Turón.

12:25 – 13:30: Working Lunch (served at Birkbeck Main Building)

13:30 – 14:30: Session D1-4: Special Talk**S. D1-4.1.** 13:30 – 14:30: “*Supporting distributed decision-making in a global economy*”**Invited Speaker: Alex Duffy**

(Associate Dean of Research, Faculty of Engineering Professor of the Department of Design, Manufacture and Engineering Management of the University of Strathclyde, Glasgow, Scotland)

Chair: Shaofeng Liu**14:30 – 15:30: Session D1-5: DSS Case Studies 1****Chair: Jorge Hernández****S. D1-5.1.** 14:30 – 14:50: *DSS for Winemaker: A dynamic modelling approach*

Authors: Hassan A.Haddou, Guy Camilleri, Pascale Zaraté.

S. D1-5.2. 14:50 – 15:10: *A DSS design for environmental policy planning and land use within EU.* Author: Jason Papathanasiou**S. D1-5.3.** 15:10 – 15:30: *A real-time DSS for demand-responsive energy management*

Author: Carlos H. Antunes

15:30 – 15:45: Coffee Break**15:45 – 17:05: Session D1-6: Experimental Results in Negotiation Support****Chair: Fatima Dargam****S. D1-6.1.** 15:45 – 16:05: *Communication in electronic negotiations.*

Authors: Marije van Amelsvoort, Johannes Gettinger, Sabine Köszegei, Mareike Schoop, Per van der Wijst.

S. D1-6.2. 16:05 – 16:25: *Support tools for offer generation in negotiations: Requirements and methods.* Authors: Michael Filzmoser, Rudolf Vetschera**S. D1-6.3.** 16:25 – 16:45: *Impact of Decision Support in Electronic Negotiations.*

Authors: Andreas Reiser, Mareike Schoop.

S. D1-6.4. 16:45 – 17:05: *TOPSIS Based Negotiation Offers’ Scoring Approach for Negotiation Support Systems.* Author: Tomasz Wachowicz**17:05 – 18:25: Session D1-7: DSS Case Studies 2****Chair: Jason Papathanasiou****S. D1-7.1.** 17:05 – 17:25: *A Case Study on the Representation of Cognitive Decision-Making within Business Process.* Authors: Andreia C.T.D. Pereira, Flávia M. Santoro.**S. D1-7.2.** 17:25 – 17:45: *Training Clinical Decision-Making through Simulation*
Authors: Ana Respício, João Fonseca, Marta Bez, Cecília Flores.**S. D1-7.3.** 17:45 – 18:05: *A Knowledge System for Integrated Production Waste Elimination in Support of Organisational Decision Making.*
Authors: Shaofeng Liu, Fenio Annansingh, Jonathan Moizer, Pushpa Subramaniam, Wei Sun.**S. D1-7.4.** 18:05 – 18:25: *Understanding Decision Support in a Financial Services organization.* Authors: Mary Daly, Frederic Adam**19:00: EWG-DSS London-2011 Workshop Dinner at Malabar Junction Restaurant
107 Great Russel Street, London WC 1B 3NA**



Workshop Program
Day 2, Friday – June 24th, 2011
Birkbeck Main Building, Room: 414 (4th. Floor)

9:00 – 9:45: Session D2-8: Special Talk

S. D2-8.1. 9:00 – 9:45: *“Decision Making Challenges in Space Applications”*

by Rita Ribeiro (Founding member and Coordinator of the CA3, Computational Intelligence Research Group at UNINOVA, Portugal)

Chair: Philip Powell

9:45 – 10:00: Coffee Break

10:00 – 11:20: Session D2-9: DSS for Collaborative Supply Chain Management

Chair: Ana Respício

S. D2-9.1. 10:00 – 10:20: *Conceptualising the Mass Customisation Decision Making Process in Collaborative Supply Chains*

Authors: Jorge E. Hernández, Andrew C. Lyons, Dong Li, Lucy Everington.

S. D2-9.2. 10:20 – 10:40: *Framework for the modelling of the decisional view of the supply chains collaborative planning process*

Authors: D. Pérez, Fco-Cruz Lario, M.M.E. Alemany, Jorge E. Hernández.

S. D2-9.3. 10:40 – 11:00: *Combining FDSS and simulation to improve Supply Chain Resilience* Authors: Isabel L. Nunes, Sara Figueira, and V. Cruz Machado.

S. D2-9.4. 11:00 – 11:20: *A Framework for Supply Chain Coordination decision using System Dynamics simulation-A Case on Hypermarkets in Egypt*
Authors: G. Elkady, Shaofeng Liu, J. Moizer.

11:20 – 12:40: Session D2-10: Business Intelligence and DSS - Chair: João Climaco

S. D2-10.1. 11:20 – 11:40: *Analysis of ERP – based BI tools*

Author: Dragana Becejski-Vujaklija.

S. D2-10.2. 11:40 – 12:00: *A Decision Support System architecture for data mining based on reusable components (patterns)*

Authors: Boris Delibašić, Miloš Jovanović, Milan Vukićević, Milija Suknović, Kathrin Kirchner, Johannes Ruhland, Zoran Obradović.

S. D2-10.3. 12:00 – 12:20: *Limitations in Implementing Data Mining in Montenegro*

Author: Ljiljana Kaščelan.

S. D2-10.4. 12:20 – 12:40: *Post Production Assistant: creative film making meets Semantic Web*

Authors: Anna Dabrowska, Michael Hausenblas.

12:40 – 13:40: Working Lunch (served at Birkbeck Main Building)

13:40 – 15:00: Session D2-11: Multi-Criteria Analysis within DSS
Chair: Dragana Becejski-Vujaklija

- S. D2-11.1.** 13:40 – 14:00: *Analysing and modelling multi criteria decisions in cooperation with the decision maker*. Author: Kathrin Kirchner.
- S. D2-11.2.** 14:00 – 14:20: *PROBE: a Dss for multicriteria resource allocation*
Authors: João C. Lourenço, Carlos A. Bana e Costa , Alec Morton.
- S. D2-11.3.** 14:20 – 14:40: *An Interactive Bicriteria Location DSS – Recent Developments*
Authors: João Clímaco, Maria Eugénia Captivo, Sérgio Fernandes.
- S. D2-11.4.** 14:40 – 15:00: *Multi-Event Decision Making over Multivariate Time Series*
Authors: Chun-Kit Ngan, Alexander Brodsky, Jessica Lin.
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15:00 – 16:00: Session D2-12: Decision Making in Organizations - Chair: Peter Keenan

- S. D2-12.1.** 15:00 – 15:20: *From Knowledge Sharing to Collaborative Decision Making*
Authors: Pierre-Emmanuel Arduin, Michel Grundstein, Camille Rosenthal-Sabroux.
- S. D2-12.2.** 15:20 – 15:40: *Multi-criteria methodology based on majority principle for collective identification of company's valuable knowledge*. Authors: Inès Saad, Salem Chakhar.
- S. D2-12.3.** 15:40 – 16:00: *Generalizing DEX to capture influences across networks*
Authors: Rok Orel, Daniel Vladuši, Marko Bohanec.

16:00 - 16:15: Coffee Break

16:15 – 17:35: Session D2-13: Tools for DSS - Chair: Pascale Zaraté

- S. D2-13.1.** 16:15 – 16:35: *Hierarchical, Searchable, Secure, Persistent Publish / Sbscribe Software*. Author: Pınar Osanmaz Çelik.
- S. D2-13.2.** 16:35 – 16:55: *Cloud computing and DSS: The Case of spatial DSS*
Author: Peter Keenan.
- S. D2-13.3.** 16:55 – 17:15: *Diversion of Efficient Sub-Banches of the Decision Tree*
Authors: Toms Reizins, M. Gulbe.
- S. D2-13.4.** 17:15 – 17:35: *Ranking of non linear qualitative decision preferences using copulas*
Authors: Biljana Mileva-Boshkoska, Marko Bohanec.
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17:35 – 18:35: Session D2-14: Multi-Agent Technologies for DSS - Chair: Shaofeng Liu

- S. D2-14.1.** 17:35 – 17:55: *Generic multi-agent framework for human notification*
Authors: Julien Cotret, Christophe Fagot.
- S. D2-14.2.** 17:55 – 18:15: *Automatic agent-based model specification using an integrated cognitive architecture*. Authors: Robert Stratton, Peter McBurney, Michael Luck.
- S. D2-14.3.** 18:15 – 18:35: *Modelling Cooperation DSS with Hybrid Agents*
Author: Abdelkader Adla, Bakhta Nachet.
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18:35 – 18:45: Closing Session

18:45 – 19:00: EWG-DSS Business Meeting

Note: All EWG-DSS Members are welcome to take part in the Business Meeting.



Workshop on Decision Systems List of Participants

Name:	Reg. code:	Affiliation:	E-mail:
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Jason Papathanasiou	LW-R17	University of Macedonia, Greece.	jasonp@uom.gr

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Workshop Papers & Abstracts

Special Talks

Invited Speaker:

Alex Duffy

Associate Dean of Research, Faculty of Engineering
Professor of the Department of Design, Manufacture and Engineering Management of the
University of Strathclyde, Glasgow, Scotland

Talk:

“Supporting distributed decision-making in a global economy”

A cooperative research work with: *Robert I. Whitfield and Iain Boyle*

Special Talk:

Philip Powell

Executive Dean, Professor of Management at the School of Business
Economics and Informatics at Birkbeck, University of London, UK

Talk:

“On-line game participation: Competition and Hedonism”

A cooperative research work with: *Thomas Weiss & Claudia Loebbecke*

Special Talk:

Rita Ribeiro

Founding member and Coordinator of the CA3
Computational Intelligence Research Group at UNINOVA, Portugal

Talk:

“Decision Making Challenges in Space Applications”

Supporting distributed decision-making in a global economy

* **Alex H.B. Duffy¹, Robert I. Whitfield¹, and Iain Boyle²**

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ABSTRACT

Decision-making and its subsequent effects play a significant role in the lives of individuals as well as organizations. Not only can individuals and organizations be affected by their own decisions, but they are also open to impacts arising from the decisions of others. More precisely, it is the implementation of decisions that creates these effects. In today's global economy the effects of local decisions can have a widespread impact throughout the world, as exhibited by the recent financial recession. Furthermore, the complexity of decision-making today is magnified due to the distributed and collaborative natures that typify the manner in which modern industry functions. Thus the need to provide effective support for decision-making activities becomes ever more critical given the increased impacts that decisions may have, together with the added complexity imbued in decision-making due to the distributed, collaborative trait that characterises modern industry.

This talk will describe and discuss our research focussed on providing support for distributed and collaborative decision-making, which has been successfully applied within the European maritime industry. This research has been directed towards the development of a virtual integration capability that allows designers to use their own techniques, tools and knowledge in a co-ordinated manner to generate effective decisions. Specifically, our focus is on supporting effective decision-making through facilitating the co-ordination of distributed agents' behaviour during decision-making, providing consistent and neutral data representation for information sharing, enabling virtual interaction, maintaining data consistency within distributed and dynamic environments, co-ordinating resources and processes, and empowering multi-objective and multi-disciplinary optimisation.

Keywords: Distributed decision-making, integration, consistency management, co-ordination

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On-line game participation: Competition and Hedonism

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ABSTRACT

This research seeks to understand participation in competitive on-line games by analyzing competitive and hedonistic decision elements. On-line gaming clearly has competitive and hedonistic components, yet there are no decision models in the literature that include both elements. Current research largely investigates co-operation and dependency among on-line game players and also assesses the role of experience.

This paper asks '*which competitive and hedonistic decision elements drive play time in competitive on-line games?*' Time spent playing the game, in hours per day, is considered the dependent element and the research is driven by a uses and gratification model. This model surfaces five competitive (competition, achievement, challenge, reputation and rewards) and five hedonic (social relationships, escapism, self-fulfillment, fun, and virtual identity) potential decision elements. In order to address the research question, first, exploratory research involving 10 qualitative interviews was carried out with current games players. This refined the decision elements to five – competition (playing to compete), challenge (to oneself), social relationships (gaining social recognition), escapism (from real life) and fun. The latter three elements are hedonic and the first two competitive. Questionnaires were then developed measuring these items on 7 point Likert scales and these were tested on 60 players in order to assess content validity. A pre-test of the questionnaire was then run. Questionnaires were made available to participants at the World Cyber Games. 360 usable responses were received which were analysed by PLS regression. The outcome demonstrates that competition and challenge are the main decision elements driving participation – i.e. competitive elements outweigh the hedonistic ones. This aligns with previous research that identifies the importance of competition in hedonic game participation and also the importance of striving for power. It also suggests that future work might usefully address issues of competition in social networks that are considered hedonic.

Keywords: On-line gaming, competition, hedonism

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Decision Making Challenges in Space Applications

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ABSTRACT

In many decision-making Space applications, dynamic changing inputs are essential factors to achieve good results. Obtaining partial or incorrect data, or even missing the occurrence of events that might imperil space crafts, are important aspects to be handled in Space missions.

Moreover, when tackling problems such as monitoring and/or classification or selection, to be able to deal with dynamically changing input data as well as imprecision in data, is of paramount importance.

In this talk, I will discuss topics related with decision support systems in dynamic and imprecise environments and then provide real illustrative cases developed for the Space domain (projects financed by the European Space Agency- ESA).

Keywords: Space Applications DSS; ESA



Workshop Abstracts

The EWG-DSS London-2011 Workshop Organizing and Program Committees acknowledge the interest and cooperation of all the authors who submitted their finished and on-going research work for presentation in the workshop. In the sequel, we list the names and affiliations of the researchers who participated in the refereeing process of the workshop papers and abstracts. We thank them all for their constructive reviewing and prompt cooperation.

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Impact of and interaction between behavioural and economic decision support in electronic negotiations¹

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ABSTRACT

Mediation is an important extension of the traditional negotiation procedure for conflict resolution. It focuses on the support of the negotiation process in very conflicting negotiations without determining the outcome of the negotiations. Mediation has been shown to have positive effects on the rate of agreement as well as the satisfaction with the outcome in face-to-face negotiations. While mediation is a behavioral approach to support negotiators, the linkage of exchanged offers to distinct utility values represents an economic approach to support negotiations. The specification of user preferences allows among others the use utility values, the evaluation of feasible alternatives, the interpretation of the agreement space and the assessment of potential agreements.

While utility values have already been successfully used in electronic negotiation support systems, electronic mediation has not been implemented by now in such electronically supported negotiations.

We therefore aim at investigating (i) the acceptance of behavioral support in electronic negotiations and (ii) the effect of and interaction between economic and behavioral support on e-negotiation process and outcome dimensions. We conducted two empirical studies in which we combined the use of an electronic negotiation support system – *Negoisst* – with an e-mediation system - *vienNA*.

In a pilot study 130 subjects engaged in anonymous and asynchronous bilateral online negotiations. To test the acceptance of such an electronic expert system, users were free to use *vienNA* whenever they needed additional support. The pilot revealed a tendency that users of e-mediation indeed reach better agreements. Moreover, the expert system seems to be most effective when used in an early stage of the negotiation process. However, negotiators were actually reluctant to refer to the online expert system.

¹ This research was partly funded by the Austrian Research Fund (FWF).

Therefore, we conducted a follow-up study with 224 subjects in the winter term 2010. In this study we combined these two systems in four treatments differing in their availability of economic and behavioral support. Furthermore, this time subjects in a treatment with *vienNA* were forced to use the mediation system at least once. While first results show only small difference in terms of agreement rates between these four groups, we can detect several differences due to the provided support. Subjects without economic support showed different communication behavior. Moreover, both approaches had an impact on objective negotiation outcome measures. While for example the use of the behavioral support showed a positive effect on the efficiency of the negotiation outcome, the economic support increased fairness in the final outcome. This difference in the support was also reflected in the post-negotiation questionnaires.

These first results already show that different philosophies in the support approaches have a major impact on objective as well as subjective dimensions of the negotiation process and outcome.

Supporting Communication, Decisions, and Document Management in Electronic Negotiations – the System Negoisst

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ABSTRACT

Electronic negotiations are conducted between agents that exchange messages in order to come to an agreement fixed in a contract. To support such complex processes, different forms of support have been proposed.

In this paper, we will introduce the negotiation support system Negoisst that offers one of the most holistic support approaches (Schoop et al., 2003; Schoop, 2010).

The first type of support is the communication support. Negoisst is firmly based on communication theories (Searle, 1969; Habermas, 1981). On the syntactic level, the system offers negotiation protocols to structure the process of interaction and communication. A trusted server stores the messages and prevents modifications of sent messages. On the semantic level, the message content is linked to a structured negotiation agenda to prevent misunderstandings in messages. On the pragmatic level, a message type is specified for each message to ensure that the recipient's interpretation is similar to the sender's intended meaning.

The second type of support is the decision support. It offers different methods of preference elicitation to provide the user with a wide range of possibilities to express his or her goals. If that is not possible, e.g. due to missing information, Negoisst offers support to deal with incomplete preferences and to change the preferences dynamically during the process. Based on the preferences, the utility function is calculated. The negotiation process is visualised graphically and as tables based on the utilities of one's own offers and the offers of the negotiation partner.

The third type of support is the support of document management. Each negotiation has the goal of reaching an agreement represented in a contract. Thus, documents play a crucial role in negotiations. Each message in Negoisst leads to a new contract version. The whole process is not only stored in terms of messages but also in terms of documents representing contract version, thereby enabling complete traceability. Simulation of contractual obligations is offered.

Negoisst has been used in around 1000 negotiations between participants worldwide and we will draw on these extensive experiences (e.g. Dannenmann et al., 2011) when introducing Negoisst focusing on the sophisticated decision support.

PROCEEDINGS OF THE EWG-DSS LONDON-2011 WORKSHOP ON DECISION SYSTEMS

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London, UK, June 23-24, 2011

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e-mediation in e-negotiation: Support philosophies and tools¹

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ABSTRACT

The intentions and philosophies of the developers are embodied in the functionality of the support systems they design. The roots of negotiation support systems (NSS), that support the social decision making process of negotiation, are above all decisions support and negotiation analysis. NSS therefore provide a variety of decision support functionalities to facilitate decision making and allow a more informed and rational choice among possible alternatives. Passive NSS provide functionalities like the elicitation of the user's preferences, the automatical calculation and presentation of utility values for received and proposed offers or the graphical representation of the development of the exchanged offers' utility. More active NSS intervene in the negotiation process for example by suggesting a post settlement phase to improve the efficiency of tentative agreements reached or they make use of software agent technologies for offer generation and to monitor the user's strategy.

Following the developers' philosophies, the objective of these functionalities of NSS is to help their users in making better decisions in negotiations so that negotiated outcomes become more efficient. However, efficiency of outcomes is just one dimension for evaluating negotiations. Other dimensions are agreement rate, outcome fairness or the relationship among the negotiators to mention only a few. Moreover, often these evaluation dimensions are conflicting as for example found in the fundamental negotiation dilemma: Aspects that improve the quality of agreements simultaneously reduce the propensity to reach agreements. Too much claiming of value may lead to impasse and therefore no value creation at all. The aim of the e-Nego-motion research project is to systematically study the influence of different NSS functionalities (from different background philosophies like decision, communication or document support and mediation) on different evaluation dimensions of negotiations. In a first step we analyze the effect of behavioral support in negotiations in the form of mediation.

Based on the system Negotiator Assistant, which was developed as an e-mediation expert tool for face-to-face negotiations, we developed VienNA as e-mediation systems for e-negotiation. The system provides functions usually performed by a mediator i.e. (i) the diagnosis of the progress of the negotiation towards or away from an agreement by posing the negotiators a set of questions to retrieve the necessary information as well as graphical representation of the thereby derived flexibility of parties, (ii) analysis of the

1. This research is partly funded by the Austrian Research Fund (FWF).

causes of potential impasse situations and (iii) advice in form of recommendations to overcome impasses based on diagnosis and analysis. This advice makes an extensive knowledge base derived by a negotiation meta-analysis of existent literature, experiments and case studies available and easily applicable in e-negotiations. This behavioral support in form of e-mediation should increase flexibility and thereby the prospects of reaching an agreement and positive relationships between the negotiators.

Keywords: e-mediation

Networking the EWG-DSS^{*}: How do we proceed now?

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ABSTRACT

Since 2008 the EWG-DSS Coordination Board has been conducting a study about research interests of the group members, with the intention to draw a knowledge map on Decision Systems within the group. This project targets mainly to disseminate the research work of the EWG-DSS members. As a primary step, a social structure for the group was developed, using the group members as its defined population. The output of this step devised an academic-social network analysis, which identified the collaboration relationship that exists among the group members, as well as how the group's dynamics has evolved since its foundation in 1989. It also revisited the current areas of research of the professionals involved, as a by-product.

Preliminary results of this project were presented in the DSS Streams of the 2009 and 2010 EURO K Conferences in Bonn and Lisbon, respectively. Since the publication of those results, the EWG-DSS academic-social network analysis has already shown to encourage new research and promote further collaboration among the group members in common projects and joint-publications.

As a further step towards the main objectives of this study, we plan to enhance the existing represented network, so that we can support a EWG-DSS member in getting the shortest path (connection) to some other members (or collaborators) of the group, who may be working in subject areas which the first member is currently interested in investigating or collaborating. This paper intends to present the status of our study on one hand, and also to request the EWG-DSS members' feedback for further collaboration on the other, with the confidence that this project will continue encouraging new research and academic cooperation within the DSS community.

Keywords: Social Network, Network Analysis, EURO Working Group, Decision Support Systems, EWG-DSS.

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Rural-urban Migration Decision Making Process: A whole and Personal Support Network Analysis

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ABSTRACT

Social network analysis is one of the most important instruments to assess or justify personal support network in whole community. Villagers' decision making on rural-urban migration is directly or indirectly affected by the ties ego (villager) connected to alter (other villager), the whole network structure and the attribute characteristic of ego and alter, although cost-benefit analysis is a fundamental method to analyze human migration decision making. The aim of the research based on case study is to draw attention on decision making support network of ego and alter and the whole network during migration from rural to urban instead of conventional cost-benefit analysis method. An empirical study considering the rural-urban migration in China has been undertaken to discuss and yield the implementation of social network analysis associated with migration decision making under government's soft migration policy, where cost-benefit model has a non-significant effect on villagers' decision making.

Firstly, this paper discusses the ethnographic characteristic of the ego that initiates a tie to other villagers to consult migration issues and exchange information, as well as the ethnographic characteristic of alter who is popular and influential. Secondly, we map and measure the whole network by combining the information exchange relationship (ego connected to alter based on exchanging migration information) and the decision making relationship (ego's migration decision making strongly influenced by the alter) based on relational data, where ties are either absent or present indicating the kinds of villager interaction during migration decision making process. We analyse the density, degree centrality, betweenness centrality, closeness centrality and cohesive subgroup of the whole network. Finally, this paper considers the arguments for adopting a multiple regression model to highlight the factors associated with migration decision making under government's soft policy.

The implications of the paper include that: (1) it explores the structure of villager's network both from the ethnographic prosperity and relationship prosperity, the personal support network and the whole network. (2) It unpacks the different ways in which the attribute of ego, alter and whole network affect villagers' decision making. (3) It enables government to make strategic policy to guide 'prestige' villager, who play a positive role in rural-urban integration, to secure a smooth transition in rural-urban migration proposes.

Keywords: Social Network Analysis, Decision Making, Rural-urban Migration, Centrality, Soft Policy

Social Cognocracy Network. Some Notes about the Design and the Actors' Reputation

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ABSTRACT

This paper presents some of the activities that the Multi-Criteria Decision Making Group (GDMZ) is carrying out with the aim of creating a Social-Political Network. In this case we analyze the initial steps followed in the design of a network that, based on the principles that support the model of cognitive democracy known as e-cognocracy [1-3], aims to settle one of the great drawbacks that arise when citizens are incorporated to the public decision making and, in general, in the joint building of a better society: the lack of citizen participation. The network, that considers three levels of interaction -information, content creation and decision making, uses Internet as the communications support, the multi-criteria decision making techniques, in particular AHP, as the methodological support, the democracy as catalyst for the creation and spreading of the knowledge that characterises the e-cognocracy and the PRIOR-WK&E tool as the framework (DSS) that allows to carry on with the last and most innovative level -co-decision between representatives and represented. Likewise, the work -corresponding to an ongoing research, analyses the concept of reputation and its measurement according to a triple perspective: direct, derived and induced reputation.

Keywords: Policy Making, Social Network, Multi-Actor Decision Making, AHP, DSS, Reputation

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DSS for winemaker: A dynamic modeling approach

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ABSTRACT

In this paper, we present a decision support system for the fermentation step in winemaking based on a mathematical model of kinetics of alcoholic fermentation. We used an optimization technique in order to predict the fermentation step. This optimization technique was carried out using the method of factorial analysis. The first interesting application of this system, rather than existing ones, comes from the fact that it can predict the evolution of pH during alcoholic fermentation. Recall that pH is used in oenology as an indicator of censorial properties, efficiency of sulfating and contamination risks. The second interesting application of this software is that it allows users “online” monitoring of the evolution of the constituents of grape musts. The used methodology for this application is a modeling approach based on chemical engineering equations for which we found optimal coefficients thanks to experimental studies.

Keywords: dynamic modeling, simulation, optimization, decision support systems, oenology.

A Decision Support System design for environmental policy planning and land use within the EU

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ABSTRACT

This paper was developed in the context of the research project entitled TESS (Transactional Environmental Support System [1]) which is an international project supported by the 7th Framework Programme of the European Commission. The project's major aim is to assess the need for information about environmental decision making and land use planning at the very local governance level, encouraging at the same time the local people to participate actively in data collection and exchange of information in order to monitor and restore ecosystems services. To achieve this, a decision support tool will be designed linking all governance levels (local – regional – central) and ensuring adequate information flows throughout Europe, aiming to (i) predict impacts of small-scale actions on incomes and biodiversity, (ii) monitor results of the decisions that follow such prediction and (iii) inform central assessors to enable appropriate tuning of regulatory and fiscal incentives [2].

A number of case studies in local communities across EU member and candidate states tested how best to meet local decision support needs in exchange for local monitoring that meets central policy requirements. Such information requires mapping of ecological information for combination with socio-economic information; for this reason a questionnaire survey was conducted for each of the case studies plus a mapping exercise by local volunteers. The project participants also organised a number of workshops in order to produce an initial technical design document using the ICONIX method [3]. A number of use cases were agreed upon as well as the domain model and requirements analysis plus robustness analysis were performed. This paper presents the main results from the case studies analysis and the DSS initial design requirements.

Keywords: Environmental Decision Support System, environmental policy planning, land use, Decision Support System design

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A real-time decision support system for demand-responsive energy management

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ABSTRACT

The ongoing transformation of electric grids into “smart grids” provides the technological basis to implement demand-sensitive pricing schemes aimed at using the electric power infrastructure more efficiently. This creates benefits for: - the end-users, by lowering their electricity bill while satisfying their energy service requirements namely regarding comfort levels; - the network operators, by contributing to manage the peak of the load diagram and flattening the aggregate demand curve that may enable to meet forecasted demand growth with the current portfolio of generation sources; - marketers, by offering new business opportunities related with exploiting electricity buying and selling prices as well as providing value-added services to clients; the environment, by promoting end-use energy efficiency and contributing to delay or even avoid building new generation units.

In this context of migration to smart grids demand-sensitive pricing of electricity will expectedly become the standard pricing mechanism. Therefore, the judicious use of short-term price signals, comfort requirements and user preferences can be engineered to induce changes in the usage of end-use loads and electricity consumer behaviour. A real-time decision support system is under development, which is aimed at further developing and implementing in practice the concept of Energy Box proposed in [1]. This real-time DSS will operate as a 24/7 background processor to manage in an intelligent manner electrical energy usage in homes or small businesses.

This DSS will be an automated energy management system able to mimic the individual consumer’s decision-making process under the same conditions (of the grid, in-door comfort and air quality, occupancy patterns, weather, etc.). The Energy Box will exploit the flexibility that consumers generally have in the timing of their electricity usage to induce changes in their electricity-consuming patterns through time-varying electricity pricing. This becomes feasible with the smart grid infrastructure, including two-way communication and short-interval meter reading, complemented with sensor networks.

This paper will provide a comprehensive overview of the Energy Box project, focusing in particular on user’s involvement and requirements for a real-time DSS.

Keywords: Energy efficiency, Energy Box, Demand-responsive energy management, Real-time DSS

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1. D. Livengood, R. C. Larson, “The Energy Box: Locally Automated Optimal Control of Residential Electricity Usage”, Service Science 1(1), 1-16, 2009.

A Decision Support System for Estiamtion of the Required Maintenance Resources of A Defence System

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ABSTRACT

As the growing demand for the functional performance of a defence system in the modern national defence, the high-tech defence systems are getting more complex and difficult to maintain supportability and availability. Therefore, the integrated logistics support has become the core in the modern weapons systems development. The current RAM (Reliability, Availability and Maintainability) analysis ignored the impact of dynamic functional relationships between the supply chains of WBS (work breakdown structure) and the potential risks on the maintenance efficiency over the defence system life. As a result, there is often a serious gap on the maintenance resources between the predicted demand and the actual needs, which usually leads to lack or waste of resources in the system maintenance. The proposed decision support system used System Dynamics modeling approach to construct these problems. Then, it used Monte Carlo simulation to estimate the probability distribution of system availability over time and the range values of the required maintenance resources if the availability targets need to be achieved. The developed decision support system can provide information with the 95% confidence level of the required maintenance resources which includes the probability for the worst case values, the best case values and the expected values. This is helpful for logistics managers to allocate proper maintenance budget and manpower of the integrated logistics support to achieve defence system availability target under uncertainty.

Keywords: Reliability, Availability, Maintainability, System dynamics, Monte Carlo simulation.

Communication in electronic negotiations¹

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ABSTRACT

Negotiations are often characterized as a mixed motive activity. Negotiators are at the same time competing and cooperating with each other. Although negotiations mostly happen face to face, electronic environments are used more and more in the negotiation processes, both for communication objectives and for decision support. The added value of the technology in this respect is somewhat ambiguous. In spite of the undisputed advantages of helping to bridge time and place, to reduce ambiguities, to structure communication processes, and to make the communication traceable, it is also clear that the use of IT to communicate in negotiations strongly affects on the social behavior of the negotiators (Postmes, Spears & Lea, 2000; Thompson & Nadler, 2004) and puts the cooperation at risk. In the absence of nonverbal cues, communication through e-mail or chat increases the risk of communication disturbance and of biases in the interaction, such as the temporal synchrony bias and burned bridges bias. Furthermore, it is more difficult to build rapport in an e-negotiation (e.g. Sproull & Kieser, 1986).

Information technology that supports the decision process in negotiations is becoming more and more powerful and especially in complex, multi-item negotiations, the benefits of these are beyond doubt (see Dannenman et al, 2011). For example, the platform Negoisst (Schoop, Jertila & List, 2003; Schoop 2010), not only provides the negotiator with this decision support (DS), but also offers a communication support tool that enables the negotiator to classify the pragmatic intention of his messages and helps to disambiguate the e-mail messages. The latest supportive tool that can be used in Negoisst is the e-mediation instrument VienNA. At moments of conflict, negotiators can decide to seek help of the digital Negotiator Assistant (see Druckman & Harris (2002) and Druckman et al. (2004) for a description).

The question addressed in this study is whether the availability of the supportive programs helps to improve the communication process in e-negotiations. Focusing on DS, it can be expected that the availability of DS will reduce the need to coordinate the agenda of the negotiation. Feedback about the implications an offer has for the negotiator's agenda is provided by the system. This leaves more energy to the negotiator to put effort in building rapport and to overcome the negative effects of e-communication. Building rapport will not only be reflected in the actual verbal behavior, but also in the perception of each other.

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The question will be answered within the framework of the e-nego-motion project, which provides a rich dataset of 110 e-negotiations. Half of these negotiations were carried out with DS and half without DS. Independent, trained coders first unitize the messages into functional categories, and then categorize these units. The categorical scheme is based on Srnka and Koeszegi (2007) and has been validated in Gettinger, Koeszegi and Schoop (2011). The categories range from verbal behavior addressing the agenda of the negotiation (offers, concessions, rejections) to social support (understanding, reference to relationship). We expect the presence of DS to have an effect on the respective proportions of these categories. Furthermore, post experimental questionnaires with perceptions of the participants allow us to see if changes in communication as a result of the presence of DS lead to changes in the mutual perspective of the negotiators.

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Support tools for offer generation in negotiations: Requirements and methods

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ABSTRACT

Offers are a central element in any negotiation process. However, as offers have to serve many different purposes simultaneously, formulating adequate offers is a quite demanding task for negotiators. On one hand, offers have to serve the negotiator's own interest, but on the other hand, they also have to transmit positive signals to the opponent that one is ready to make (some) concessions, and to reciprocate positive movements made by the other side. In integrative bargaining situations, where joint gains are possible, offers should also exploit possibilities for joint value creation. This complex set of requirements becomes even more demanding if negotiations concern multiple issues, and offers have to specify values for all of these issues. In that case, different bundles of issue values might exist which provide the same utility to the focal negotiator and therefore afford the same concession. While the focal negotiator is indifferent between these offers they are possibly quite different for the other party.

Based on a review of existing bargaining models, we formulate a set of requirements which offers should fulfill, and present these requirements formally in a multi-attribute utility framework. Using data from a recent set of negotiation experiments conducted with the negotiation support system (NSS) *Negoisst*, we analyze to what extent actual offers made during the experiments fulfill our requirements, and whether standard methods of decision support used in an NSS like *Negoisst* (for example automatic utility evaluation for offers sent and received, and graphs representing how the utility values of exchanged offers develop over time) improve the quality of offers with respect to our criteria. Results indicate that a considerable part of offers fails to meet plausible requirements. In particular, in the progress of negotiations, parties quite often make offers that destroy, rather than create value. Providing standard decision support modules has only a limited impact on the structure of offers made.

We therefore present models that allow negotiators to determine offers which fulfill the criteria value creation, concession making and reciprocity. Following the decision support approach, our models do not completely determine offers to be made, but leave considerable freedom for negotiators to employ different negotiation tactics by controlling the "toughness" of offers. In contrast to other analytical bargaining models, or approach is not only concerned with modeling the bargaining process in utility space (in which most of our requirements are formulated), but also allows to "translate" desired utility values into actual offers concerning multiple issues. Thereby our models also take into account desired structural properties of offers in issue space.

Impact of Decision Support in Electronic Negotiations

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ABSTRACT

Decision support is said to be one of the most important support components (besides communication) of electronic negotiations [Schoop 2010]. Many support tools have been adapted from decision theory to fit into the domain of negotiation [e.g. overview in Bichler et al. 2003 and Köhne 2008]. Most of these tools are based on MAUT and provide passive analytical support in forms of utility values, graphs and verbal suggestions. From a research point of view, many (descriptive) behavioural models are based on the utility evaluation of the users. However, on the other side, there exists only little knowledge about the perceived usefulness of decision support for the negotiator himself and the impact on the negotiations process and outcome. This might be due to the fact that most of the current negotiation support systems lack a component for comprehensive negotiation analysis, not only focusing on special issues driven by hypotheses. Therefore, we have developed an extensive toolset for analysing the negotiation process and outcome on different levels of detail, i.e. including the composition of offers as well as aggregation of whole negotiations. The aim was to provide a comprehensive instrument not only for verification of hypotheses, but also for a more explorative data analysis [Schoop et al. 2010, Köhne et al. 2008].

On a more general level, we will compare the results of various negotiation experiments with decision support and without decision support. We will show that using decision support will have a major impact on the negotiators' behaviour during the ongoing negotiation. People stick to quantitative measurements instead of a real evaluation of the underlying facts, which even holds if we intentionally provide wrong information to the participants. On the other hand, decision support only has a moderate to low impact on negotiation style (distributive vs. integrative) and the individual outcome.

Additionally, we also want to take a closer look at the impact of incomplete information on decision support. Several tools for preference elicitation have been used in negotiations, distinguishable by the subject of negotiation, that is, criteria-driven (e.g. direct preference elicitation or Hybrid Conjoint Analysis) and alternative-driven (e.g. AHP or trade-off instruments such as Even Swap Analysis). However, mostly all of these methods are based on the assumption that the preferences remain stable and unchanged during the time of investigation. While this is not a problem for applications in market research (because they only measure a certain snapshot in time and aggregate the results), this becomes a crucial problem in negotiation theory since preferences will change due to new or changed information during a negotiation. Additionally, preference data must be valid on an individual level, not only on an aggregated level [Reiser et al. 2010].

PROCEEDINGS OF THE EWG-DSS LONDON-2011 WORKSHOP ON DECISION SYSTEMS

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We will investigate these problems using the above-mentioned framework for explorative data analysis and also examine some possible solutions.

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TOPSIS Based Negotiation Offers' Scoring Approach For Negotiation Support Systems

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ABSTRACT

In this paper we analyze the straightforward TOPSIS method and the possibility of its application to electronic negotiation support. TOPSIS is a multiple criteria decision making method that basis on measuring the distances between alternatives under consideration and two bipolar reference alternatives, a positive ideal and negative ideal ones. Thus the criteria used for alternatives evaluation should be described using strong scales, such as the ratio or interval ones. However in the negotiation the issues are very often described qualitatively or verbally, which results in ordinal or even nominal variables that must be taken into consideration in offers' evaluation process. What is more, TOPSIS may be applied for solving the discrete decision problems while the negotiation space may be defined by means of the continuous variables too. In this paper we try to modify the TOPSIS method to make it applicable for negotiation support. We discuss the following methodological issues: using TOPSIS for negotiation problems with continuous negotiation space; selecting the distance measure for adequate representation of negotiator's preferences and measuring distances for qualitative issues. Finally we propose a simple web-based prenegotiation support tool for facilitating the process of preference analysis and negotiation offers' evaluation that apply the modified TOPSIS based negotiation protocol.

Keywords: negotiation support, negotiation support systems, preference analysis, negotiation offers' scoring system, continuous negotiation problem, TOPSIS, distance measures.

A Case Study on the Representation of Cognitive Decision-Making within Business Process

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ABSTRACT

The performance of an activity in a business process depends on the ability of the participants to learn how to perform their tasks and deal with changes that might occur. For the total understanding of actions and events within a business process, relevant contextual information involved in particular situations should be available. In this sense, cognitive decision-making process is an important contextual element, since it could help to characterize how an activity was performed. Nevertheless, it is still a challenge to make an individual mental process or the rationale of a decision explicit. We present an approach for capturing and representing cognitive decision making as contextual knowledge surrounding activities in the business process and discuss the results of case studies made.

Keywords: Cognitive process, decision-making process, context information, knowledge representation

Training Clinical Decision-Making through Simulation

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ABSTRACT

Clinical decision making faces relevant uncertainties, outcomes and trade-offs. It has to deal with the diagnosis uncertainties, the choice of diagnostic tests, the selection of prescriptions and procedures, and the treatment follow up, many times facing severe budget limitations and lack of sophisticated equipments.

This paper presents a multi-agent learning system for health care practitioners: SimDeCS (Simulation for Decision Making in the Health Care Service). This system relies on simulations of complex clinical cases integrated in a virtual learning environment. SimDeCS development is funded by the Brazilian Ministry of Health, within a programme proposing to offer continuous education, training and qualification to professionals of the Brazilian Health Care Service. Consequently, SimDeCS will be made available in the Internet, thus providing access to professionals working across the country.

The learning environment has been designed as a serious game. Three intelligent agents are included. The Domain Agent is responsible by the knowledge management which is based on Bayesian networks. Clinical cases of varying degrees of complexity have been modeled by expert clinicians, using a high level domain specific language, the VR-MED, and collected in a repository. The Student Agent represents the user and his actions in the game. The Mediator Agent is in charge of managing interaction between the two other agents, proposing problems, supervising and evaluating the student performance, and generating incentives. A case study is presented and discussed.

Keywords: clinical decision making, simulation, reasoning, multi-agent systems, Bayesian networks.

A Knowledge System for Integrated Production Waste Elimination in Support of Organisational Decision making

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ABSTRACT

Lean production has been at the centre of modern manufacturing operations management. As one of the three key elements of the lean philosophy, waste elimination has received substantial research interests. Because of the complex composition of production waste and disparate nature of where these wastes occur in an organisation, it is impossible for one decision maker to have all necessary knowledge needed for waste elimination decisions. It is believed that the level of knowledge- and expertise- sharing in the organisation determines the performance of collaborative decision making. Therefore, a knowledge-based decision support system that can provide explicit knowledge and expert advices for decision makers involved in the organisational decision making process will be greatly beneficial to achieving leaner production.

This paper discusses an intelligent decision support system named Production Waste Elimination Knowledge System (ProWEKS) for organisational decision making. A waste elimination knowledge model is proposed. The ProWEKS knowledge base is designed through a decision tree. Artificial Intelligence (AI) tools, specifically VisiRule and Flex, are explored as vehicles for the ProWEKS development. The system is demonstrated using a quality control case from electronics industry for its evaluation. The knowledge base has been populated with over four hundred pieces of waste elimination rules.

Three main contributions of the paper are that: (1) it proposes a new knowledge architecture which comprehensively captures seven waste elimination knowledge components and systematically structures the knowledge in four layers (“know-what”, “know-why”, “know-how” and “know-with”). The knowledge architecture is then transformed into a knowledge matrix for knowledge elicitation; (2) it visually captures the waste elimination knowledge, allowing the knowledge objects and relationships to be transparently designed, updated and maintained in the knowledge base; (3) it integrates the waste elimination knowledge model into an AI system shell, which allows “deep” expert knowledge in the form of “explanations” to be provided to the system users, so that company-wide decision makers will have access to not only the same waste elimination solutions but also their justifications, therefore they can collectively make better informed decisions.

Keywords: Integrated Waste Elimination, Knowledge Based Systems, Support Collaborative Decision Making, Lean Production management

Understanding Decision support in a Financial Services Organisation

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ABSTRACT

The provision of decision support tools for highly uncertain decision situations has occupied researchers in the Decision Support Systems (DSS) area since the term was initially coined by Gorry and Scott Morton in 1971. In this paper, we used Humphreys and Bekerley's 1985 representation levels framework and Adam and Pomerol's 2008 framework of decision support types to categorise the decision problems faced by top managers in a large financial services firm and to match them against the decision support tools made available to managers, in order to measure the DSS maturity of the firm. The case shows a wealth of decision problems and activities spanning all categories of the framework and a very large portfolio of over fifty thousand decision support applications. Our analysis shows the importance of *handovers*, where the representations of decision problems proposed by top managers become increasingly refined and are handed over to other managers for fine tuning and implementation. The conclusions deliver insights into why developing applications that support the highly unstructured decision situations is so difficult and why so many good ideas are never implemented in organisations.

Keywords: Decision Support Systems (DSS), Decision making/makers, Case study, Business Intelligence (BI)

Conceptualising the Mass Customisation Decision-Making Process in Collaborative Supply Chains^{*}

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ABSTRACT

Mass customisation processes inevitably lead to complex environments where raw materials, modules and assemblies, finished goods and services are planned to meet the needs of individual customers by co-ordinating resources within and across organisational boundaries. Furthermore, collaborative approaches are necessary components of the process of managing mass customisation regimes and dampening the inherent complexities of mass customisation environments. These collaborative approaches are information-sharing processes that facilitate decision-making at every supply chain node. These nodes include product design, production planning, transport and logistics and resource management. Moreover, within an SME environment, the information flows and requirements often change due to the variability of customer requirements. A generic integrated view which considers the critical aspects of mass customisation is needed to support the necessary decision-making processes. These generic solutions will lead to the reusability of the models in different kinds of environment.

This paper presents the conceptualisation of the mass customisation decision-making process for a particular collaborative supply chain which has been developed in the European REMPLANET project. The conceptual model describes the ideal network structure, strategic and operational considerations and information and decision flow. The purpose of this is to allow companies to be cognisant of the ideal practices for their network type and how such practices can be achieved through collaborative initiatives. The conceptual model provides a route map for companies to ‘move’ from one network type to another to support different customer requirements that are associated with differing degrees of customisation.

Keywords: Decision-making, Mass Customisation, Collaboration, Supply Chain Management.

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Framework for the modelling of the decisional view of the supply chains collaborative planning process

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ABSTRACT

In the context of supply chains operations planning, it has been mainly assumed that different members make decisions in a centralised manner. However, the supply chain members not always agree on the alignment of individual supply chain decisions objectives and are usually reluctant to share all the required information. For these reasons, the decentralised or distributed supply chain decision making, in which different decision centres have to be coordinated to achieve a certain level of the supply chain performance, is the most usual situation. To support these situations, this paper aims to propose a framework which supports the modelling of the decisional view of the collaborative planning under a decision-making process perspective. Further, the supply chain is composed by several decision centres oriented to support every supply chain planning operations. Thereafter, the main framework contributions are: the consideration of the decision jointly within the physical, organisation and information views, the spatial and temporal integration among the different supply chain decision centres, and the definition of the macro level for the “conceptual” modelling of the collaborative planning process and the micro level for the development of analytical models in each of the decisional activities identified in the supply chains operations planning process.

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Keywords: framework, collaborative planning, decision-making process, decisional view

Combining FDSS and simulation to improve Supply Chain resilience

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ABSTRACT

This work presents a Fuzzy Decision Support System (FDSS) designed to support a decision-making process aimed at improving the resilience of Supply Chains (SC). For this purpose, the FDSS analyses the effects of disturbances to a SC and the effects of implementing mitigation (proactive) and/or contingency (reactive) plans set to counter such disturbances, reducing their negative impacts [1]. The main characteristics of the FDSS are twofold: on one hand, the system uses the Fuzzy Set Theory/Fuzzy Logics to model the vagueness and uncertainty associated with disturbance occurrences and their effects on a SC; and, on the other hand, it uses computer simulation to study the behavior of a SC subject to disturbances, and the effect of implementing mitigation or contingency plans. Arena software is a discrete-event simulation tool that was used in association with the FDSS. The simulations adopted the SCOR methodology [2, 3]. In order to estimate the effects of a disturbance and of the implementation of mitigation and/or contingency plans some performance indicators (PI) were used. The FDSS normalizes [4] and analyzes these PI providing conclusions and recommendations about the situation considered. The outputs are presented to users in different formats that include sentences in natural language as well as color coded impact graphical representations. This paper illustrates a case study where four scenarios related with an automotive SC were considered. The analysis showed that the implementation of a mitigation plan was the one that ensured best resilience of the SC, since its members were less severely affected by disturbance occurrence or even not affected at all.

Keywords: Fuzzy Decision Support System; Supply Chain Disturbances Management; Mitigation plan; Contingency plan; Performance Indicators; Simulation

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A Framework for Supply Chain Coordination decision using System Dynamics simulation A case on Hypermarkets in Egypt

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ABSTRACT

Supply chain management is concerned with the coordination of material, information and financial flows within and across often legally separated organizational units. With the recent advances in information technology, real time data exchange has become feasible and affordable.

In today's world that is confronted with rapid technological changes and high competitiveness, companies are more successful that respond to the customers' needs effectively, regarding the existing opportunities and threats. Since a supply chain consists of various organizations, it can satisfy customers' needs, only when the whole of its parties become integrated and coordinated. The results showed that one of the important objectives in a supply chain is coordinating all of its parties, so such coordination mechanisms that provide coordination between various members of a supply chain, have more importance. Although recent development in information technology has affected the whole supply chain circuits. Moreover co-ordination of activities and management of supply chain relationships can be a source of competitive advantage and can bring additional value to the customer [1]. The design of co-ordination processes is vital for successful supply chain management and internet technologies enabled SCM processes are achieved in the best way [2].

Coordination is realised when a decision maker in the supply chain, acting rationally, makes decisions that are efficient for the supply chain as a whole [3] Companies forming a supply chain are dependent on the performance of other organisations. The need to manage these dependencies and different resource flows is important for a company's success [4,5]. However, Supply chain coordination is a vehicle for redesigning decision rights, workflow, and resources between supply chain members to leverage improved performance [6,7].

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This paper focuses on the dynamic aspect of supply chain coordination decisions. It develops an integrated system dynamics model for supply chain management that can be used as a decision support tool for evaluation and understanding of the problems that arise in a retailer Supply Chain. A case study has been undertaken in the Egyptian Hypermarket to validate the developed system dynamics model. Main advantage of the supply chain coordination model is that uncertainty and dynamics nature of supply chains can be appreciated in the decision making process, so that decision makers can be better equipped with the decision analysis technology.

Keywords: supply chain management; coordination decision; system dynamics modeling, Hypermarkets; Egypt

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Analysis of ERP- based BI tools

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ABSTRACT

The subject of this research is an overview of Business Intelligence (BI) tools which use databases of ERP (Enterprise Resource Planning) systems as their source of data. The goal of the paper is to analyse possibilities of currently available BI tools and compare them, so the ERP users could decide for a BI tool more easily, considering own specific needs.

ERP software is based on a centralised database. It provides information for appropriate operative decisions to management. The need to use ERP-based BI arose from abundance of data stored in many tables, out of which it was not possible to produce analytical reports for making tactical and strategic decisions.

First criterion for the analysis was the BI tool type [1] (Alarms and reports, Organisational reports, OLAP analysis, Ad-hoc queries, Statistical analysis and data mining), then scalability, ease of use and price.

Following commercial tools were analysed: IBM Cognos BI, Panorama NovaView, BI4Dynamics and open source tools Eclipse BIRT Project and RapidMiner.

In general, all commercial packages contain all 5 types of tools, are scalable (except for BI4Dynamics which is exclusively meant for MS Dynamics NAV users), and satisfy the need for ease of use. Their bad side is high price. Open Source BI is strong and very cost effective in the area of data warehouse, ETL and Reporting. In terms of ad hoc reporting and dashboard, it will need some work. They are mostly specialised for certain types of BI analyses.

Based on results of this research, users can assign weights to the criteria and determine which of the tools would be the most adequate to their specific needs.

Keywords: Enterprise Resource Planning, Business Intelligence tools, Analysis, scalability, ease of use, price

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A decision support system architecture for data mining based on reusable components (patterns)

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ABSTRACT

Choosing the right algorithm for data at hand was always a major problem in data mining. We propose a new architecture for decision-support systems for data mining, with the ability of generic algorithm design to help users choose the right algorithm. Opposite to the prevalent black-box approach of using algorithms in data mining were users have the ability to define inputs, setup parameters and read outputs, we propose using reusable component (RC) based algorithms. The RC-based algorithms are assembled from reusable components, which are standalone algorithm units which were originally found in black-box algorithms and their partial improvements. RC based algorithms have been proven to better adapt to data than black-box algorithms that, due to "hard" bindings of algorithm parts, are disabled to achieve best results on some datasets. On the other hand, the RC-based approach of algorithm design produces a galore of algorithms making it thus harder to search through the algorithm space. We show how this problem can be solved using meta-heuristics for searching through the algorithm space. We also propose further research directions that will enable to connect the proposed approach with meta-learning. We believe that users will be better supported in the future for choosing an adequate algorithm for the problem at hand, because the decision-support system will be enabled to perform an intelligent search through the algorithm space that is based on dataset properties, algorithm performance results, empirical rules gained from meta-learning and theoretical support.

Keywords: DSS architecture, reusable-components, generic design

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Limitations in Implementing Data Mining in Montenegro

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ABSTRACT

This paper talks about the main limitations for the application of data mining systems in small and poor economies such as Montenegro. Some of these limitations are related to the poor financial conditions, but some other factors are evident as well.

High costs of software, long period for its realization, the effort made by internal personnel and hiring of external consultants are some of the factors influencing that many data mining projects do not have an immediate, positive impact to the company's financial statements. Many companies in Montenegro have early database design, which includes limited availability, inflexibility, and poor documentation of database structure. In addition, they often include data containing errors - dirty data. Poor data quality is responsible for most time and cost overruns in data mining implementation projects. The main limitation here represents inexperience of personnel.

This paper also includes case study about a company, which successfully uses these systems. It is a telecommunication company Promonte. This company did not build by itself its Data Warehouse. With the assistance of vendors and a team made of IT and business experts, this company created an enormous data warehouse, which is not located in the company due to its size and complexity. Although an independent vendor has built DWH based on the business and technical instructions, there are persons in the company that oversee technical processes on daily basis that are connected with filling the data into DWH and the quality of data. The users i.e. business analysts are on the other side that use these data through CRISP DM methodology, i.e. Teradata Warehouse Miner tools. Data mining system has been successfully used in this company to identify market micro segments, churn prediction, company efficiency forecast, and the like. Large number of business problems at operational level is solved in this company thanks to DWH and DM tools. The company has successfully implemented and applied data mining through its good development strategy and hiring young people ready to accept new knowledge. However, it should be mentioned that no restrictions in the form of financing, old database design and poor data quality existed, since this is a foreign owned company.

Case study showed that it is possible to implement successfully and use data mining systems even in small economies, i.e. in weak business conditions.

Key words: data mining, costs, time, dirty data, Promonte, CRISP DM, Teradata Warehouse Miner

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POST PRODUCTION ASSISTANT: CREATIVE FILM MAKING MEETS SEMANTIC WEB

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ABSTRACT

In the era of digital post-processing, where computers can support almost every aspect of post-production, creativity is still desired. There are many tools on the market, such as sound mixers or colour correction programs, which support media professionals in the post-production process. However, production of films or commercials in addition to many creative processes also involves some non-creative activities and/or requirements, such as keeping timing, following client/supervisor requirements and dealing with large amount of, very often, unstructured data. These non-creative tasks often require a significant amount of effort that becomes a distraction to the creative tasks, which in the end bring the biggest value to film production companies. In this work we introduce a system called Post Production Assistant. The system is designed to support media professionals in their creative work. We focused on rather different approach to supporting creativity problem than commonly suggested in literature. Instead of building a tool able to promote and directly support creativity by imposing it, we propose a system, which is able to track non-creative part of the process and give suggestions for solving problems arising from such activity. Thus, we promote a process, where the creative part of the post-production is only marginally distracted. Such solution allows limiting the amount of effort required to make decisions and to improve the performance in creative tasks. This paper introduces a model of the system, technologies used and their application in specific post-production use cases and scenarios. In this context, we emphasize applicability and usefulness of semantic web technologies in such processes. We argue that this approach can be successfully used in other use cases, where creativity is an important part of the process.

Keywords: knowledge management system, post-production, semantic web, decision support system, creativity

Analyzing and modeling multi criteria decisions in cooperation with the decision maker

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ABSTRACT

In small and medium sized companies, decisions are not always formalized and mostly based on expert knowledge and expertise. They are often subjective because of a higher problem complexity and a huge number of domain constraints, attributes and objectives. The refinement of issues, alternatives and decision criteria is therefore an important element in the documentation of decisions and the design of decision support systems (DSS). Although decision makers have problems to explain their expertise based decision process to analysts, most decision analytic research does not focus on these initial steps of analyzing and modeling decision situations. Furthermore, most analysts are not familiar with the domain of the decision maker and have therefore difficulties to understand all decision motives. But a deep understanding of decision situations by the analyst would help the decision maker to build trust in the DSS that has to be developed.

To analyze decision situations, we use ideas from Participatory Design (PD) which builds on democratic participation of stakeholders in the software development process [1]. Especially card games as one approach in PD can provide a familiar atmosphere, where analyst and decision maker can collaboratively discuss decision situations more easily [2].

Using our card game, analyst and decision expert collaboratively model decisions in an expert-friendly and understandable manner. Therefore, two types of cards are used as material: criteria and alternative cards. During an interview with the decision maker, the analyst notes alternatives and decision criteria on these cards to collect all information according the decision. The decision maker can move the cards around, sort them and group them in self-defined categories. With the help of criteria cards, the decision maker can also explain conflicts between different decision criteria or rank them. Our evaluation in companies showed that the cards give the opportunity to explain decision details the decision maker would never tell without the cards. Later, criteria and alternative cards can be formalized so that they can be used as inputs in decision algorithms.

Keywords: decision analysis, decision modeling, card game, participatory design

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PROBE: a decision support system for multicriteria resource allocation

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ABSTRACT

All organisations have to select a portfolio of activities to undertake, but it is rarely possible to specify, without uncertainty or disagreement, how these projects relate to the organisation's objectives. Multicriteria Porfolio Decision Analysis (MCPDA) provides a useful modelling framework to guide organisational decision makers through such choices, helping them think hard and clearly about the most critical and decision-relevant sources of uncertainty. However, software support for MCPDA is currently in its relative infancy. In this paper, we propose a new decision support system, PROBE – Portfolio Robustness Evaluation, which is informed by a review of available commercial software [1], but which goes beyond them in important respects. We conceptualise analysis as a two stage process. In the first stage, PROBE uses an intuitive Pareto-front display to give decision makers an overview of the efficient solutions at different levels of spend, including both “convex” and “nonconvex” efficient portfolios. In the second stage, PROBE uses an innovative restricted efficiency concept to facilitate indepth interactive exploration and robustness checks around some attractive portfolios, given interval-valued information about projects costs and benefit scores, and linear relationships on the criteria weights (for example, weights rankings and/or weights ranges). PROBE is a decision support system with a user-friendly interface and as it is based on mathematical programming incorporates math programming solvers as subroutines. As such it provides a flexible modelling framework, allowing decision makers to specify, for example, interactions and interdependencies between projects. We demonstrate that the PROBE algorithms perform well for a reasonably sized problem, and PROBE could easily be deployed in a workshop or decision conferencing environment.

Keywords: Portfolio Robustness Evaluation, Restricted Efficiency, Multicriteria Resource Allocation, Multicriteria Porfolio Decision Analysis, Decision Support System.

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An Interactive Bicriteria Location DSS – Recent Developments

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ABSTRACT

On this presentation, the most recent developments on the Decision Support System SABILOC [1] are presented. This system is a modular interactive application aimed at supporting decision-making concerning bicriteria location models with environmental impacts. Several bicriteria location models are already included in the tool. As the system was developed in a modular way, the insertion of more models and/or procedures to solve them is very simple. Intrinsic to SABILOC is an interactive process, based on [2], that looks for a progressive and selective learning of the non-dominated solutions set. The process only stops when the decision-maker finds one or several satisfactory solution(s) or feels satisfied with the knowledge obtained about the problem.

Once a small set of compromise alternatives is chosen, a second phase procedure, consisting in a multi-attribute *a posteriori* analysis, should be carried out for a more detailed analysis of this subset of alternatives. As additional criteria are usually considered in this second phase, in many cases it is justified to extend the analysis to slightly dominated solutions (in terms of the two objective function values initially considered) very close to the solutions selected in the first phase. All this analysis can be done through SABILOC. Visualizing and manipulating *radar graphs* will allow an analysis of the different alternatives under several criteria, supporting a final choice of the decision-maker, or ranking the alternatives.

When the facilities have environmental effects, all the decisions depend on factors like the morphology of the potential locations, winds, temperature, rainfall, etc., most of which can be more easily evaluated with a Geographical Information System (GIS). So, a GIS platform was embedded in SABILOC, enabling the achievement of qualitative added values [3].

Keywords: Location, Multi-criteria, DSS

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Multi-Event Decision Making over Multivariate Time Series

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ABSTRACT

We propose a multidimensional time-point model and algorithm to solve Multi-Event Expert Query Parametric Estimation (ME-EQPE) problems over multivariate time series. Our proposed model and algorithm combine the strengths of both domain-knowledge-based and formal-learning-based approaches to learn optimal decision parameters for maximizing utility over multivariate time series. More specifically, our approach solves the decision optimization problems to maximize the utility from multiple decision time points, as well as maintaining an optimality of the learned multiple sets of decision parameters in their respective events during the computations. We show that our approach guarantees a remarkable forecasting result by using the learned multiple sets of decision parameters.

Keywords: Statistical Learning, Prediction, Multivariate Time-Series, Decision-Support

Generic multi-agent framework for human notification

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ABSTRACT

Notification strategies are an essential feature for every collaborative system. Internet, and lately the web 2.0, greatly increased the amount of generated data, events and users for such systems where semantic value of the produced data tend to get richer and sharable through semantic web standards. The main problem in these systems is to keep the user “in” the systems, establishing a “bond” with him, despite the great amount of information, cognitive overload risks and the heterogeneous ways of interaction. This could be partly achieved through the notification mechanism. The notification is an artifact sent to an agent, human or machine, to inform him of a relevant new event. In this context we will propose a generic multi-agent framework addressing the issue of contextual notification strategies targeted for each user. In this article, we will present the key issues for a generic approach to notification process and inference in collaborative systems such as large scale online debates. We will present our response, a multi-agent framework for human notification assistance (MAHN) in large scale collaborative, semantically rich, context.

Keywords: Group Support Systems, MAS, Notification, Web 2.0 Systems for Decision Support

Automatic agent-based model specification using an integrated cognitive architecture

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ABSTRACT

Models are used as a tool for decision making in many domains, but there is often no obvious specification for the form that a particular model should take. Researchers are therefore required to use some form of model selection to identify the ‘best’. With potentially numerous candidate models, and theoretical constraints to consider, selecting a suitable model can be a complex issue.

Because of this complexity, and the often iterative nature of the tasks involved, many aspects of the selection process can be proceduralised. Methods for automating the process of model selection have already proven successful in many areas of equation based modelling (EBM), but so far there has been little progress in developing automatic approaches to the selection of agent based models (ABM). The need for automation is especially relevant in ABM when individual micro-level models are needed to represent numerous heterogenous agents. In addition there may be trade offs between the different objectives and considerations. Unlike in EBM, where hypotheses are represented as variables, in an ABM these are built up from agent level behavioural rules, parameters and interactions.

In this paper we use household consumer panel data to create a behavioural simulation, with each agent represented by a household-specific multinomial logit model. The models are trained using the first half of the dataset and then simulated and tested against the actual purchase patterns in the second half of the dataset. The model building approach employs a Procedural Reasoning System (PRS) based cognitive agent architecture, with the model selection process split between three agents. The decision making and mechanical operations are performed by the specifying agent, with two additional agents monitoring the characteristics of the candidate models at macro and micro level. The specification process works through a set of candidates for the individual models of 1200 heterogenous agents.

The PRS architecture fits well with the tasks and concepts involved in model specification. The process achieves a good level of accuracy at agent level, but in this application, optimising agent-level fit creates some anomalies at aggregate level. In many cases there is a conflict between a specification that maximises a particular agent’s individual accuracy and a specification that improves overall aggregate fit, such that optimising aggregate level fit can result in a sub-optimal agent model. Further progress in this area would involve developing an approach that handles this and other trade-offs that would arise in more developed applications.

Keywords: Agent based models, cognitive architectures, automatic model specification

Modeling Cooperative Decision Support Systems with Hybrid Agents

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ABSTRACT

In this paper, we propose to use Multi-Agents Systems (MAS) to model Cooperative Decision Support Systems (DSS). These systems support the collaboration of two agents: the decision-maker (the user) and the machine to solve jointly a problem of decision making, which enable to take advantage of the capacities of both the decision-maker and the machine. The idea introduced in this work is the modelling of Cooperative DSS using agent technology by coupling two MAS, the first is reactive and the latter is cognitive or deliberative.

The resulting system is designed to support operators, as decision-makers during contingencies in which the operators using the system should be able to: gather information about the incident location; access databases related to the incident; activate predictive modelling programs; support analyses of the operator, and monitor the progress of the situation and action execution. A simple scenario is given, to illustrate the feasibility of our proposal.

Keywords: Multi-Agent System (MAS), Decision support system (DSS), Cooperative DSS, Intelligent Agents, Hybrid MAS



Hierarchical, Searchable, Secure, Persistent Publish / Subscribe Software Framework

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ABSTRACT

One of types of Decision Support Systems (DSS) is Communications-Driven DSS. It enhances decision-making by enabling communication and sharing of information between groups of people. The media for communication is generally a simple email or video conferencing. However, simple communication methods are not adequate for decision support systems. We believe Distributed Publish/Subscribe Messaging Systems may be used as an information sharing infrastructure even if such an asynchronous messaging system is quite complex to develop.

Distributed Publish / Subscribe systems such as Java Message Service (JMS) [1] and Web Service Eventing and Notification [2] provide basic services such as queuing, publishing and subscribing. However they provide no other services such as authentication, authorization, persistence, hierarchy and discovery. Development of such services or implementation of such services using software libraries developed by third parties is considered to be responsibility of developers.

For the services mentioned above, software development in a reasonable period and acceptable accuracy is very difficult to be achieved, because of the complex nature of distributed publish / subscribe systems and the necessity of many functions running in a seamlessly coordinated way. In this work, we describe how a software framework was designed and developed. This framework includes services authentication, authorization, persistence, hierarchy and discovery in addition to the services that JMS provides. The framework may be used by developers by just plug-in style. In order to demonstrate usability and ease of the framework, an application is developed on the services that the framework provides.

Keywords: Publishing, subscription, asynchronous, messaging, JMS, distributed, enterprise, framework

Cloud computing and DSS : The case of spatial DSS

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ABSTRACT

While academic researchers in the field of Decision Support Systems (DSS) tend to emphasise the technology independent nature of the decision support concept, they also need to assess the role of new technology; cloud computing is one such new technology. This paper suggests that the specific nature of DSS means that cloud computing is of limited relevance in most sectors of DSS application. However, spatial DSS is a distinct area of DSS application where large volumes of generic data are needed from outside the organisation making the decision. Consequently, a number of issues arise in the provision of data for SDSS which are not typical of the DSS field. Spatial data infrastructure projects provide collections of spatial data and can make use of technologies such as cloud computing. Consequently, cloud computing can contribute to spatial DSS applications. Spatial DSS remains a form of DSS which continues to push the limits of technology and developments in this sector can inform our understanding of the progression of DSS.

Keywords: Spatial Decision Support Systems, Cloud Computing

Diversion of Efficient Sub-Banches of The Decision Tree

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ABSTRACT

This research is the next step in widening the usage of decision tree for complex nowadays problem solving. The research was encouraged by results of Erzo G.J. Luttmer and Thomas Mariotti work about time-inconsistent preferences of consumers [1].

The goal of this research is to implement time value in decision tree not as logical duration of a decision or event, but as a factor that can divert particular decision node or event node branches in the third dimension. During the research a hypothesis has been stated that there can exist at least two fundamentally similar decision tree branches that come out from the same node and are characterized by three values – utility, standard deviation of utility and skew in time. For these fundamentally similar decision tree branches only utility and its standard deviation will be alike, but skew in time will differ.

The authors of this paper emphasizes the concept of Pareto (μ, σ)-efficient strategy, that was introduced by A.Jaunzems and T.Reizins in 2008 [2]. By using the provided methodology authors of this paper strengthen mathematical foundation of this concept and introduce another concept – Pareto (μ, σ, λ)-efficient strategy. The new concept anticipates that each decision tree sub-branch (strategy) can be characterized not only by mathematical expectation of utility and the standard deviation, but also by moment value in time dimension. Accordingly, efficient strategies can be found by drawing Pareto plane in a three dimensional space.

Keywords: Decision tree, sequential decision making, branches and sub-branches of the decision tree, Pareto efficiency

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Ranking of non-linear qualitative decision preferences using copulas

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ABSTRACT

In this paper we address the problem of option ranking in qualitative evaluation models. Current approaches make the assumptions that when qualitative data are suitably mapped into discrete quantitative data, they form monotone or closely linear tabular value functions. Although the power of using monotone and linear functions to model decision maker's preferences is impressive, there are many cases of non-linear decision preferences that need to be modeled using non-linear functions. In this paper, we present one possibility of how to capture the discrete non-linear decision maker preferences by employing copulas. Copulas are functions that manage to capture the non-linear dependences between random variables. Mainly, they are used for aggregation of two attributes. We extend the concept to multivariate case by introducing a hierarchical copula. That way we capture the non-linear dependences among all uniformly distributed variables. We use the obtained dependence structure for copula-based median regression which results into the required option ranking.

The results show that this method may outperform the current approaches for qualitative option ranking of non-monotone decision preferences for a class of non-linear preferences. Furthermore, the mathematics behind copula functions allows extending their usage on preferences expressed with continuous attributes.

Keywords: qualitative decision models, copula, option ranking

From Knowledge Sharing to Collaborative Decision Making

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ABSTRACT

This paper introduces an approach developed at AXA, a main French insurance company, in order to retain the knowledge acquired by outsourcing teams. This approach is based on the assumption that sharing and disseminating knowledge are two key factors for actually getting knowledge retention. It has been used, tested and improved within AXA France's industrial environment.

By presenting the problem raised by knowledge retention within organizations and the different ways envisaged to improve it, we propose a discussion about their efficiency, and describe our approach in order to retain knowledge in a specific case.

This approach, based on our approach of Knowledge Management, has implied Collaborative Decision Making, which will be highlighted in this paper.

Bridging Knowledge Management and Collaborative Decision Making has been a means to reinforce the ability of the stakeholders to actually retain knowledge and to easily elaborate a consensus, the starting point of an efficient Collaborative Decision Making.

Keywords: Knowledge Management, Knowledge Retention, Collaborative Decision Making, Ba, Semi-opened Infrastructure Model (SoPIM).

Multi-criteria methodology based on majority principle for collective identification of company's valuable knowledge

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ABSTRACT

The necessity to formalize knowledge produced and used in firms has increased rapidly these last years. Firms become aware of the importance of the immaterial capital owned by their employees which corresponds to their experience and accumulated knowledge about the firm activities. Maintaining this capital is a powerful mean to improve the level of performance of the firm. In this paper we present a methodology for inducing a set of collective decision rules representing a generalized description of the preferential information of a group of decision makers involved in a multi-criteria classification problem to identify company's crucial knowledge to be capitalized.

Keywords: Group decision making, Knowledge management, Multicriteria classification, DRSA, Aggregation procedure.

Generalizing DEX to capture influences across networks

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ABSTRACT

This paper presents the extension of the qualitative multi-attribute decision making method DEX. The DEX method is based on hierarchical aggregation of attributes, defined by decision rules. In some practical problems, we encountered situations when the influences between the attributes were not hierarchical. In this paper we tackle these situations and observe the difficulties this generalization brings.

Keywords: Networks, MADM, DEX, Qualitative decision making

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