

DEEBIS-Net: Doctoral Education in Environmental and Business Information Systems - Bi-national PhD-Programme with Cuba -

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Abstract

In this contribution a research network for Doctoral Education in Environmental and Business Information Systems (DEEBIS-Net) will be introduced. It is a bi-national PhD network founded by the DAAD between Germany and Cuba with the main topics in Environmental Information Management Systems (EMIS) and Very Large Business Applications (VLBA). This paper gives an overview of the background, the project itself and the main research areas related to the Environmental Information Systems topic.

1. Introduction

The German Academic Exchange Service (Deutscher Akademischer Austausch Dienst (DAAD)) and the German Federal Ministry of Education and Research is funding the cooperation of German and foreign universities to support the PhD education. One offered program is the bi-national PhD network (PhD-Net). Objective of PhD-Net is to support transboundary, bi-national graduation and to win highly qualified foreign young scientist for a scientific career in Germany and to increase the scientific cooperation. Within this program the Department of Business Information Systems started in August 2008 the research network DEEBIS-Net (Doctoral Education in Environmental and Business Information Systems - Network).

The chair of Business Information Systems is part of the Faculty of Computing Science, Business Administration, Economics and Law in the Department of Computing Science. It covers research areas which are connected to the development, modelling and integration of different types of Enterprise Systems within cross-enterprise software landscapes. The main research activities focus on Environmental Management Information Systems (EMIS) and Very Large Business Applications (VLBA), like ERP and Federated ERP (FERP) systems, Data Warehousing and BI. In EMIS, research topics deal with an overall holistic approach to corporate wide Environmental Management Information System. In VLBA, technologies like web services, P2P systems, component frameworks and semantic web are used to improve the effectiveness and the efficiency of business processes. Besides this expertise, the researcher group is involved in the field of Enterprise Systems in Higher Education and has a close cooperation with the chair of Vocational Studies and Economic Education concerning the pedagogic issues of this research. In teaching, next to classical business information systems classes, they give special lectures and trainings in different types of Enterprise Systems, i.e. trainings on the ERP system market leader SAP or the material and energy flow system UMBERTO.

The working group has several international cooperation's worldwide and a long-time experience in the coordination and realization of international projects, i.e. the Export of Master Studies in Business Infor-

mation Systems to Cuba from 2004 to 2006 (also founded by DAAD). This successful implemented Master Study in Cuba is one important resource of the PhD network: the graduates with an extraordinary academic accomplishment applied for a participation in this bi-national research network. Additionally the best graduates from Computer Science and Industrial Engineering from the two leading Cuban universities applied for DEEBIS. Finally four PhD students were evaluated and are now taking part in the research exchange. The selection of the doctoral candidates was split into two short criteria groups, due to the short amount of time and the thematic focal points that should be concerned in the project. In the first group potential candidates were filtered by essential formal criteria: study results of the last two years, the mark of the Master Degree, professional experience in the area and the personal motivation. Because of the intercultural aspects of the project, fluent English language (Cubans), capability of basic Spanish language (Germans) and the intercultural engagement were a topic too. The second group was more thematic oriented, beside a short summary of previous publications the candidates had to submit a 15-20p long description of their research. The evaluation committee was composed from Cuban and German Professors working in the research area of VLBA and EMIS. The student evaluation process in Germany was analogue: finally four applicants from the Otto-von-Guericke-University of Magdeburg and the University of Oldenburg were selected.

2. Research Background

The main research topics in the DEEBIS-Net Research Network are based upon a long term experience and well known reputation of the participating chairs in the fields of Environmental Management Information Systems and Very Large Business Applications. Beside the expert knowledge in these fields, an increasing demand for high level education and research abilities gives a reasonable motivation to build up and perpetuate a research network on these both topics.

2.1 Very Large Business Applications (VLBA)

Very Large Business Applications are defined as Enterprise-wide and inter-corporate information systems. The development of these systems can be done by implementing different types of Business Application Systems or by implementing through the System Landscapes. VLBA support the execution of business processes along the value chain and are not limited to the borderlines of a company. They integrate on fields like accounting, customer relationship management, human resources or logistics, or every other field that contain at least one process as a business process. Examples of VLBA are Enterprise-Resource-Planning Systems, Corporate Environmental Management Information Systems, and systems for computer integrated manufacturing and inter-organizational systems.

From a technical perspective this systems are distributed, federated and integrated. The implementations are based on architectural concepts and sophisticated technologies like for example Service Oriented Architectures (SOA), component frameworks, p2p-networks, grid-architectures and mediators. By raising the current software-engineering principles to the System Landscapes Layer, Design Theories like System Landscape Engineering can be developed and further researched. The open research questions concern topics like extended ontology design or the application of Compensatory Fuzzy Logic as well as the organizational questions for optimization and advancements for VLBA.

2.2 Environmental Management Information Systems (EMIS)

The area of Environmental Management Information Systems, especially the topic of corporate oriented systems, is build-up of software systems with the goal to assist, collect, transform (Hopfenbeck and Jasch 1993) and report in versatile ways the work with environmental information, often inside of enterprises and in exchange with other participators in industrial, governmental or socially institutions. This led to a strong growing attention and the research area became increasingly popular. As enterprises have to face new challenges, like the problem of extreme climate changes, a growing public interest in environmentalism and the environmental impacts of a company, EMIS can help them to identify these impacts and build up and support in measures to avoid or reduce the polluting behaviour, for example by simulation (Wohlgemuth et al. 2001) or as a method and management tool. In addition, the need for new and extensive environmental management information systems is still driven by legal compliance and pressure by mass media.

While many existing EMIS which are used by enterprises are still focused on single, specific tasks, which are driven by legal compliance or simple input-oriented efficiency systems (Page and Voigt 2003), new research can continue the existing work by going beyond the current practice and start developing an all-encompassing view on the Environmental Management Information Systems. This opens research topics like the development of EMIS, how to gain a holistic view on new systems, integration strategies for environmental information or improving Stakeholder relations.

3. DEEBIS-Net

Besides the traditional research funding based on research projects the promotion of the PhD degree is an important objective of many research promotion institutes and initiatives to build-up young academics. Funding is available from the German Research Association (Deutschen Forschungsgemeinschaft (DFG)) in form of scholarships, graduate schools or clusters of excellence and also by special programs from the European Union (EU), i.e. the Marie Curie Program. Additionally, German universities invest in qualification positions and foundations like e.g. the German Environmental Foundation (Deutsche Bundesstiftung Umwelt (DBU)) offers scholarships for high potentials in their research field.

Especially the international PhD promotion and a regularly research exchange is in the focus of the German Academic Exchange Service (Deutscher Akademischer Austausch Dienst (DAAD)). The financial support varies from initiatives for the export of studies, universities partnerships with developing countries, scholarships, summer schools and workshops to alumni networks. The program "PhD at German universities" (Promotion an Hochschulen in Deutschland (PHD)) exists since 2001. With a small financial budget (6 Mio. Euro for ca. 50 projects: 120.000 Euro per project) circa 3000 PhD candidates (40% women) could be supported in the first funding period (2001-2006). This success story (see Bode 2006) was extended with a new call for project proposals in 2008 focussing on bi-national research networks. DEEBIS-Net is one of the project in this period founded by the DAAD and the Federal Ministry of Education and research. In this section the main idea and the objectives of the PhD-Net will be pointed out and an overview about the DEEBIS project is given.

3.1 Bi-national PhD network (PhD-Net)

This programme exists since 2001 and is part of the founding programme "PhD at German universities". The objective is to realise the recommendations of the German Scientific Council to reform the Doctoral Education. The founding conducts to the development of structural PhD programmes with international

focus to strengthen the attractiveness and competitiveness of the PhD Education in Germany. They should be established at universities with excellent research structures to reach a huge amount of PhD students in different faculties.

Some important objectives of the programme are the following:

1. To give the PhD graduation more attractive at German universities by establishing clear structures
 - at excellent research institutions,
 - with a structured and good supervision and support,
 - with a terminated PhD duration for German and foreign students and
 - for high qualified PhD students, especially from outside.

2. To promote the internationalisation of the PhD in Germany
 - to offer the international degrees
 - to give foreign graduates the possibility of a clearly structures PhD programme
 - to engage PhD students to research exchanges and international cooperation
 - to write the PhD thesis in English
 - to offer organised supervision for foreign PhD students and
 - to promote the PhD offer of German universities worldwide to motivate qualified foreign graduates.

This summary shows the essential objectives from this DAAD PhD programme. For more information, please see: <http://www.daad.de/hochschulen/internationalisierung/phd-net/08472.de.html>

3.2 Objectives of DEEBIS-Net

Starting August 2008 the DEEBIS-Net project is established for first funding period of 3 years as a bi-national PhD network between the Carl von Ossietzky University Oldenburg and two Cuban partner universities: the Technical University of Havana (Instituto Superior Politécnico José Antonio Echeverría (CUJAE)) and the University of Santa Clara (Universidad Central de las Villas (UCLV)). It offers the participants access to the academic infrastructures at all participating institutions and provides workspace, including computer facilities as well as access to all university facilities, i.e. library, sports etc.. The research work of all participating PhD students is based on their individual research topics related to the overall research profile of the PhD network and the research activities of all partners. The individual research activities and their results are the major and key component of the PhD work and a successful graduation. Basically DEEBIS-Net is following the main objectives of the PhD-Net programme, accompanied with some special needs according to the special situation with a corporation partner as Cuba.

The supervision in DEEBIS-Net is based on a "sandwich" model: besides a primary dissertation advisor at the home institution, a secondary supervisor and/or a mentor is assigned to each candidate during his/her stay abroad. The designated mentor provides independent advice on the student's intellectual and personal development, and he/she counsels the student on issues of personal and career development as well as on possible further exploration of scientific work in the partner country. Additionally there are two part-time staff members who organize and coordinate the whole network, the research activities and exchanges. A technical infrastructure is provided to bridge the distance between the participants: A platform for an interactive exchange and communication beyond the research stays is implemented and provides additionally information for collaboration. Furthermore all participating universities got professional equipment

for videoconferencing to allow a participation in seminars and guest lectures. The following list provides a short overview about the research topics which are part of the DEEBIS-Net. All topics are work in progress and for detailed information please visit our website: <http://deebis.wi-ol.de>

VLBA:

- Daniel Castro Morell: Improving QoS and Costs of Maintenance and Support (M &S) in IT Organizations
- Nikolai Dahlem: Ontology Design by Domain Experts
- Inti Yulién González Herrera: Compensatory Fuzzy Logic and Artificial Intelligence
- Frederik Kramer: Strategical Decision- and Implementation-Model for Gaining Competitive Advantage Using Open Source Software

EMIS:

- Yaima Yiri Antelo Gonzalez: Procedures for measuring social impact of Corporate Social Responsibility
- Tabassom Hashemi Farzad: Environmental Information Management (EIM)
- Naoum Jamous: Organisations Environmental Performance Indicators
- Daniel Súpke: Improving Stakeholder relations by using Web 2.0 technologies for target oriented and dialogue based sustainability reporting

In the following section the research topics focussing on EMIS will be introduced in detail.

4. Main Research in the EMIS Area

The research area of Environmental Management Information Systems (EMIS), especially with the thematic and focal point on enterprise size and corporate information systems covers software systems for versatile methods of collecting, processing, exchanging and reporting environmental related information. These systems have the same field of application as corporate information systems (Rautenstrauch 1999), but the focal point of environmental management information systems is internal, for example by integrating existing ERP-Systems with EMIS-Systems (Funk et al. 2009), as well as external, in the exchange with stake holder in industry, governance or social institutions.

The research topic titled “Procedures for measuring social impact of Corporate Social Responsibility (CSR)” aims to design and implement a procedure to assess the social impact of CSR on society using the potential of IT. In particular, the impact and measurability of the development undertaken is to be detected using different methods, which can be included for optimization later on. There is a deep conviction that more and more organizations consider CSR as purely a matter of business, but rather a question of what kind of society we want to build and what is the role of each of the parties that comprise (PNUD 2005). The integration of CSR into the strategic objectives of the company will thereby enable the long-term protection against claims of society, (Sulbarán 2001). The demands on a company management are aiming more on social and environmental areas, which requires transparency in the decisions and the communications (see Arteche 2002). This requires structured approaches that build up a guideline for the development of such comprehensive strategies, the choice of methods, and an effective and efficient integration of the CSR.

The on-going research topic titled “Environmental Information Management” is part of the scientific discussion to develop a holistic environmental information management, which will serve as a base or connection element of the mostly isolated and different special solutions of existing (operational) environ-

mental information systems. At the core of the approach are not so much the technical possibilities for a comprehensive environmental management information system (Giesen et al. 2009) as methods and processes for the integration of environmental management at the strategic level of decision making.

The environmental impact of corporate activities is the connection element for each research topic inside of the DEEBIS-Net project. The goal of the research topic titled “Organisations Environmental Performance Indicators (OEPI)” is to fulfil the need to build a tool which could measure and show these indicators - in other words this tool should provide the organization with information regarding the current impact on the environment by its processes/operations: Data about different environmental standards should be incorporated into the repository, business process data from enterprises should be collected and converted into environmental indicators. These indicators should be compared and matched with the environmental standards to measure the accordance. The Development will include various services and tools to enable the distribution of environmental indicators (for example via mobile devices, internet access or integration of existing systems through web services).

Another work is devoted to the topic „Improving Stakeholder relations by using Web 2.0 technologies for target oriented and dialogue based sustainability reporting” and explores how, by using the social web, the consumers of sustainability reports can be integrated in the assessment, analysis and commentary of these reports. The resulting bi-directional communication will promote a direct dialogue between entrepreneurs and stakeholders. Especially the need for information is different for each stake holder in the sustainability reporting, what is not handled in previous reports so far (Süpke et al. 2008). Although there is an increase of sustainability reporting in larger businesses, especially in the context of CSR (Blanke et al. 2007), in the small and medium enterprises these activities are much less pronounced (Kuhndt et al. 2008).

5. Experience and Impact

The current progress in the research network shows how strong the demand for a qualified high education and research transfer in the topics of Environmental Management Information Systems and Very Large Business Applications actually is. Beside technical and organizational differences and obstacles, which had to be resolved, the exchange and collaboration between the PhD students establishes a very agile and comprehensive base for the research work. In addition to the internal progress of the participating PhD students, the research network led to several follow-up projects between the initial partners. One of these projects deals with the export of an “Environmental Business Information Systems” Master study to Latin America, covering not only Cuba but also adding countries like Chile, Argentina and Mexico. This project is following up to the previous work with the experience from the export of the mentioned Business Informatics Master study as well as from the DEEBIS-Net research network itself. Another follow-up project is the “Developing Sustainability” Network, which was set up in September 2009 to establish a base for dialogue, solidarity and excellence in teaching and research. In addition to the existing collaboration between Cuba and Germany, Mexican, South African, Indonesian and Tanzanian universities work together in this environmental oriented project.

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7. Literature

- Arteche, F. (2002) - "Empresa y desarrollo sostenible" SOLUZIONA Calidad y Medio Ambiente.
- Blanke, M., Godemann, J., Herzig, C. (2007): Internetgestützte Nachhaltigkeitsberichterstattung. Eine empirische Untersuchung der Unternehmen des DAX30. Lüneburg: Centre for Sustainability Management (CSM) & Institut für Umweltkommunikation (INFU).
- Bode, Ch. (2006): Statement: 5 Jahre PHD-Programm: Zahlen und Fakten einer Erfolgsgeschichte. Im Rahmen der 5. Jahrestagung im Programm „Promotion an Hochschulen in Deutschland (PHD)“. Bonn, http://www.daad.de/imperia/md/content/magazin/2006_05_phd.pdf, last access: 05.07.2010.
- DAAD, Deutscher Akademischer Austauschdienst, Internet: <http://www.daad.de>, last access: 05.07.2010.
- DBU, Deutsche Bundesstiftung Umwelt, Internet: <http://www.dbu.de>, last access: 05.07.2010.
- DFG, Deutsche Forschungsgemeinschaft, Internet: <http://www.dfg.de>, last access: 05.07.2010.
- Marie Curie Programm, EU, Internet: http://cordis.europa.eu/fp7/mariecurieactions/home_en.html, last access: 05.07.2010.
- Funk, B., Niemeyer, P., Möller, A.: A reference architecture for the integration of EMIS and ERP-systems, Lecture Notes in Informatics, vol. 154, pp. 3393-3401, 2009.
- Giesen, N., Hashemi Farzad, T., Marx Gómez J. (2009): A component based approach for overall Environmental Management Information Systems (EMIS) integration and implementation. In: Wohlgemuth, V.; Page, B.; Voigt, K. (Eds.): EnviroInfo 2009 - Environmental Informatics and Industrial Environmental Protection: Concepts, Methods and Tools; Shaker, Aachen., pp. 155-160.
- Hopfenbeck W., Jasch C. (1993) Öko-Controlling. Audits, Umweltberichte und Ökobilanzen als betriebliche Führungsinstrumente. Landsberg/Lech, Moderne Industrie.
- Kuhndt, M., Eckermann, A., Herrendorf, M. (2008): Kleine und mittlere Unternehmen als Akteure eines nachhaltigen Wirtschaftens. Aus: Ralf Isenmann (Eds.), Jorge Marx Gómez (Hrsg.): Internetbasierte Nachhaltigkeitsberichterstattung: Maßgeschneiderte Stakeholder-Kommunikation mit IT. Schmidt, p. 67.
- PNUD (2005) "Hagamos de la competitividad una oportunidad para todos" Sinopsis del Informe sobre Desarrollo Humano Revista de la facultad de ciencias económicas de la UNMSM, año x n° 27. septiembre Perú.
- Page, B., Voigt, K. (2003): Recent History and Development of Environmental Information Systems and Databases in Germany. In: Online Information Review, vol. 27, 1, pp. 37-50.
- Sulbarán, Juan Pedro (2001) "El concepto de Responsabilidad Social de la Empresa" Revista Economía No. 10, Facultad de Ciencias Económicas y Sociales Universidad de Los Andes, Chile, pp. 225-248.
- Süpke, D., Marx Gómez, J., Isenmann, R. (2008): Concept and implementation of a flexible and differentiated shopping cart functionality for creating personalised sustainability reports. Aus: 3rd IEEE International Conference on Information & Communication Technologies: From Theory to Applications (ICTTA' 08). Damascus, Syria.
- Rautenstrauch, C. (1999): Betriebliche Umweltinformationssysteme, Springer, Berlin.
- Wohlgemuth V., Bruns L., Page B. (2001) Simulation als Ansatz zur ökologischen und ökonomischen Planungsunterstützung im Kontext betrieblicher Umweltinformationssysteme (BUI). In: Hilty L.M., Gilgen P.W. (Eds.) Sustainability in the Information Society. 15th International Symposium Informatics for Environmental Protection, Zurich 2001. Part 2: Methods/Workshop Papers. Metropolis, Marburg, pp. 999-1008.