**End-User Development in Small and Medium Enterprises: Research and development Issues**

Position Paper for the CHI 2006 workshop on 'End-User Computing'

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Our research currently aims at the development of innovative strategies and techniques of end-user development for the business software market and focuses on small and medium enterprises (SMEs). The development of business software for this target group is a big challenge. Due to the fast changes in the market, flexibility and customisation are main requirements of such software. Most enterprises are not able to invest in individually programmed software but adjust the existing standard software to their own needs as long as possible. As only few options are adaptable, the level of modification is quite limited. Here, end user development can open up new perspectives. EUD strategies shall enable end-users (as non-professional developers) to manage their local IT-infrastructure within their organizational and process context.

# Research Question and Approach

Our research questions in this context are: How can the necessary flexibility for business standard software be reached and how can one arrange these technologies in a way suitable to the users. What interface concepts and architectures can help to reach this goal? Where do we have to modify existing software engineering concepts? To answer these questions we will explore and evaluate EUD concepts for this context. (e.g. Concepts like Programming by Example, Incremental Programming or Model-based EUD, and software architectures for customizing like Service Oriented Architectures) .

Our EUD approach is based on two different and complementary perspectives: the development perspective and the appropriation perspective. On one side the development perspective focuses on the development of technologies, interfaces and methods to provide highly-tailorable, domain-oriented ERP software for small and medium enterprises. On the other side the appropriation perspective targets the activities that are being actively performed by end users in order to make sense of technology, and that usually go far beyond 'just' configuring technology. For the development of technology several points are interesting:

- What are 'good' decompositions of technology that make them flexible and manageable?

- What roles and competencies necessary to manage different levels of technological complexity? How can less competent users manage more complex technology?
- How can interface concepts be developed so that they can be easily specialised to serve users from different domains?

For the appropriation perspective, users are being perceived as a 'Virtual Community of Technology Practice', with support options in several directions:

- Articulation support: for the exchange of (online-/offline-) comments about the software
- Negotiation support: for the exchange of (online-/offline-) negotiation between end-users regarding software configuration
- Decision support: for collaborative decisions on software configuration solutions
- Observation support: with respect to practice of use (e.g., frequency and correlation of use patterns, configuration solutions etc.)
- Demonstration support: regarding the intended visualization of individual and collaborative use of software
- Recommendation support: establishment of a recommendation network regarding use patterns and configuration solutions
- Simulation support: use patterns and configuration solutions shall be simulated in a comprehensive way for end-users
- Exploration support: enhancement of the simulation by freely configurable, hypothetic use scenarios
- Version management support: storage and visualization of histories of use patterns and configuration solutions
- Delegation support: tasks of adaptation and configuration shall be delegated to specific users and roles in user communities

## The research project

EUDISMES is a research project within the program of "Software Engineering 2006" promoted by the German "Federal Ministry of Education and Research" (BMBF). Research partners are SAP AG, Buhl Data GmbH and University of Siegen. SAP is an international key player in the area of ERP (Enterprise Resource Planning) software solutions. Buhl Data develops business software mainly for end-user. The chair of "Information Systems and New Media" at the University of Siegen has a long experience in the domain of End User Development (EUD). For more than five years we are organizing workshops regarding this issue. Soon the book "End User Development" will be released where Prof. Dr. Wulf functioned as co-editor. In 2005 the research group got the "IBM Eclipse Awards 2005" for a cooperative EUD concept with "Eclipse" (CHiC – Community Help in Context"). Furthermore we collaborate with two small (Natursteinwerk Schiffer GmbH and Dachdecker-Meisterbetrieb Vißer) and two medium (Alfred Sternjakob GmbH & Co. KG and Strähle+Hess GmbH & Co. KG) industry partners in order to gain practice experience. Via analysis of the existing business processes we want valuate which techniques are best to be used. Later prototypes will be implemented. The prototypes ("Proof of Concepts") will be revied and evaluated. From the gained experience we hope to create an integrated concept for EUD in SMEs. Additionally we plan to build up an EUD community to verify our concepts externally.