A Proposed Architecture Useful to Develop Financial Decision Support System

necula, sabina-cristiana

Alexandru Ioan Cuza University of Iasi

30 November 2010

A PROPOSED ARCHITECTURE USEFUL TO DEVELOP FINANCIAL DECISION SUPPORT SYSTEM

Abstract

The usability of financial software has always been a main problem for software producers and it was always been related to the users' degree of acceptability. In this article we started from the main premise that knowledge of making financial decisions is local, depends on context and we try to define architecture suitable in developing financial software.

Key words: decision-making, rules, knowledge, architecture

JEL classification M15

1. Introduction

The theme of the present paper falls within the thematic area of information and knowledge technologies. The technological support is formed by the convergence of three sectors: information technology, communications technology, digital content production. Although science and technology are suitable to any specific field of activity, with real benefits for the society we live in, the limits imposed on the integration requires recognized standards for software manufacturers, so we appreciate that the direction of research on the development of standards and use of semantic technologies presents importance in the context of implementing specific knowledge solutions. Moreover, one of the FP6 program was to develop interface technologies and knowledge (cognitive systems, semantics, multimodal interfaces), and from the FP7 program objectives related to the theme of our research we mention the intelligent content and semantic.

Among the research projects funded through FP7 we include: INSEMTIVES - Incentives for semantics, IKS - Interactive knowledge stack for small to medium CMS / KMS providers, NOTUBE - Networks and ontologies for the transformation and unification of broadcasting and the Internet, PLUGIT - Business and IT alignment using a model-based plug-in framework (all of them have the starting date 2009).

Yet the degree of acceptability to the user (seen as a group) of the technology is sufficiently small. Only if software producers will focus more towards the real needs of the knowledge society will be able to offer one day a common working platform to allow integration of the various models in different fields of science. On the international plain, the groups of researchers are organized into teams of study that include business parties that are interested in the application of techniques and tools developed in research.

Professional accountants are a category of technology users „pretentious". Often, they are not satisfied with the tools provided, but they not get to "comfortable" using software that is absolutely necessary to carry on their business. The awareness of the accountants should have the starting point during the university studies by improving specialized analytical programs of compulsory subjects covering the use of information technologies. Curricula of universities from abroad include courses on the Semantic Web or semantic technologies.

We must admit that we cannot propose solutions without us asking what might be the causes that led to the reluctance shown by professionals in the use of accounting solutions. Accountants often reject software as it not corresponds to the concepts and their meanings.

Reason for which, detecting the factors that lead to the failure of the accounting software is a goal that we propose to our research.

Informatics and management has found applicability in modeling the business structure and data processing to organize information and making decisions. The ideal information technology improves and reduces complexity to provide balance. In a report in 2007 the Gartner company noted that semantic technologies will be gradually adopted by organizations (somewhere in 2014) and will mean an advance in the information visualization.

A search conducted on Google Books after the keywords "semantic technologies in business" returned 2041 books published between 2005 and 2009, 30 magazines (most items are specified on the CIO online magazine dedicated to IT executives in the United States of America). In 2001, the Nobel prize for economics was awarded for research performed on information asymmetry (particularly important in the context of the theme of our research project). Also, the last Nobel prize for research carried out in the decision field was granted in 2002 (D. Kahneman).

2. The problem

We should note that there are three aspects that characterize the field of study:

- the accounting has found the solution to the problems of information management through planning, performance dashboards, performance management, often using numerical evaluation of qualitative factors through the use of indicators. In the business software, these indicators do not have the necessary semantic descriptions of their subsequent use;

- qualitative factors are important and numerous, but depend on context and they are not specified in the developed applications;

- the "intersection" between the modeling and accounting decisions are placed in the area of quantitative factors on the one hand because of the rational decisions appearance, and secondly because of the accounting evaluation and synthesis. Rational aspect leads to constant attempts to measure information and less to its semantic study.

Issues presented by us attract attention to the following problems:

- factors determining an essential aspect in making decisions are numerous (more than 2) so that simulations must use multidimensional models;

- factors mentioned above are not only numerical but also qualitative, and often present values as long, least, very much, probably so. Simulations are unlikely in this case, without specifying any control or knowledge of extracting factors in real-time from the decision-maker.

- source data input in determining the factors is different: often require data on active markets, from internal database or from surveys.

It appears that an accountant should know: to provide financial information from economic transactions data, to interpret and analyze financial information obtained, to certify and validate the information presented in financial reports.

All these activities consist in knowledge management from an accounting firm. Here the need for significant remarks: the scope of modeling is more accurate, "accounting information". Although it would appear that field of study is limited by the lack of the word "financial", according to our opinion the field of study is more "generous" than the previous in that it "forces" consideration of non-financial information and of qualitative information.

From the operational to the strategic the accountants rationalize trough the use of budgets and indicators and obtain information through the recognition, classification and evaluation. Balance between plans, estimates and summary values, recognition is not the

result of a rational behaviour, but one influenced by laws and uncertainty, relations with suppliers, customers, employees and regulatory bodies. Responsibility and professional ethics make the accountant ignore possible personal interests, but so many uncertainties and influences of so many external factors diminish the ideal rationality proposed by the classical economic models.

The problem of obtaining information to reduce uncertainty means for accountants:

- synthesizing data for the indicators needed to assess the current activities, financing, investment (after economic events being produced);

- use of indicators in analysis of the effects for possible alternative decisions on profitability.

We advocate the idea that the creativity of the model is the basic manifestation of intelligent behavior model, beyond the incorporation of knowledge, which is equally important. While the model does not interact with the decision-maker (in the sense of sharing common meanings), it will not have intelligent behaviour, as many techniques, methods and algorithms it has.

Sources of information are different problems in decision making. Data are from: Business Intelligence applications, customer relationship management (CRM), managing relationships with suppliers (SCM), resource planning (ERP) systems, collaborative systems, knowledge-based and diverse web sources of information. To provide information in real time, a decision-maker would need a single interface for searching it. It's what Google tries to do through the Google OneBox Enterprise namely integration of various information systems and delivering them in an interface known as the Google search engine by carrying out simple searches by members of the organization. The decision-maker will make queries based on the need for information in a logical sequence to solve its own problem.

Until the specifications that require semantic integration are not fulfilled, any system developed would appear to solve a small problem.

3. The solution

In the following we detail the solution we considered acceptable for developing intelligent decision accounting.

The architecture is shown in Fig. 1

Feature of intelligence can be assured of a system when the internal logic of an application could be used by internal logic of a second application and information handled by the system would be organized on the basis of general knowledge in ontologies and domain ontologies applications.
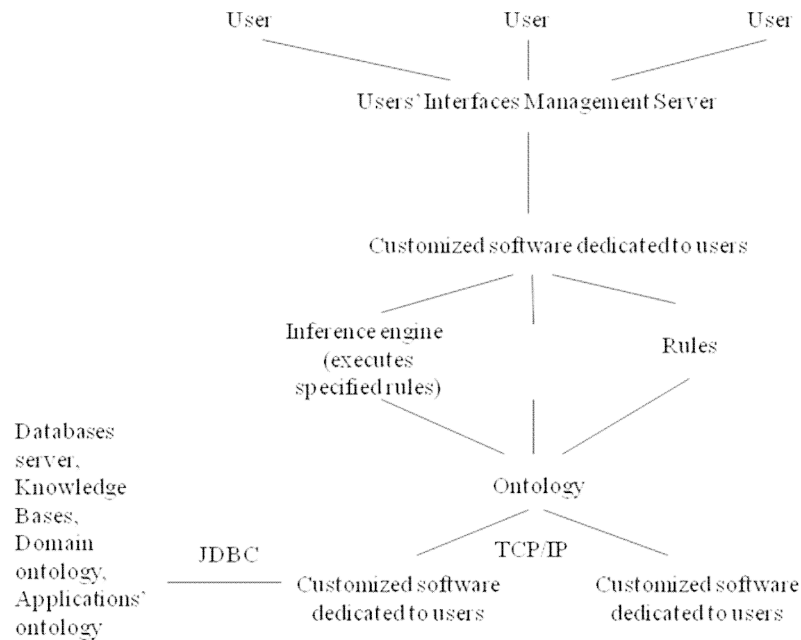
Fig. 1 The proposed architecture

4. Conclusions

As a main conclusion we will note that developing software on the proposed architecture would be of tremendous benefits for all the potential users, not only decision-makers. Information integration is a main problem and it depends on how people make decisions.

Noticing the implications for practice we mention:

- integrating the architecture in software development process that will offer intelligent decision support systems

- representing declarative knowledge by using ontologies might offer an intelligent meaning of information.

5. Acknowledgments

References

Buchanan, B. G., Bobrow, D., Davis, R. W., McDermott, J., Shortliffe, E. H., "Research Directions in Knowledge-based Systems", *Annual Review of Computer Science*, no.4, 1989
Buchanan, L. O', Connell, A., "A Brief History of Decision Making", *Harvard Business Review*, 2006

Chandrasekaran, B., "Design Problem Solving: A Task Analysis", *AAAI*, Vol. 11, No. 4, 1990

Chandrasekaran, B., "From Numbers to symbols to Knowledge Structures: AI Perspectives on the Classification Task", *IEEE*, vol.18, no.3, 1988

Chen, Z., *Computational Intelligence for Decision Support*, CRC Press, 2000

Choo, C.W., "Closing the Cognitive Gaps: How People Process Information", *Financial Times of London*, 1999

Choo, C.W.,"The Knowing Organization: How Organizations Use Information to Construct Meaning, Create Knowledge and Make Decisions", *International Journal of Information Management*, vol.16, no.5, 1996

Collier, P.M., *Accounting for Managers. Interpreting Accounting Information for Decision-Making*, Wiley & Sons, 2003

Davies, J., Studer, R., Warren, P., *Semantic Web Technologies*, John Wiley & Sons, 2006

Haag, S., Cummings, H., Phillips, M., *Management Information Systems for the Information Age*, McGraw-Hill Irwin, Inc., New York, 2007

Jiambalvo, J., *Managerial Accounting*, 3th Edition, John Wiley&Sons, 2007

Koehler, D.J., Harvey, N., *Blackwell Handbook of Judgment & Decision Making*, Blackewell Publishing, 2007

Laudon, J.P., Laudon, K.P., *Management Information Systems: Managing the Digital Firm*, 9th ed., Prentice Hall, 2006

Mora, M., Forgionne, G., Gupta, J., *Decision Making Support Systems: Achievements and Challenges for the New Decade*, Idea Group Inc, 2002

Tang, Z., MacLennan, J., *Data Mining with SQL Server 2005*, Wiley Publishing Inc, 2005

Wefers, M.G., "Advanced Budgeting with SAP SEM and Business Analytics", *Internal Report*, 2004

Weick, K. E., Roberts, K., "Collective Mind in Organizations: Heedful Interrelating on Flight Decks", *Administrative Science Quarterly (38)*, 1993

Zuboff, S., *In the Age of the Smart Machine*, Basic Books, New York, 1988