



# Re-engineering Banking with Object-Oriented Models: Towards Customer Information Systems

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The banking sector is demanding re-engineering due to changes in economic setting, consumer needs and market competition and requires a redesign of current accounts-oriented information technology systems to customer-oriented systems. The paper argues that object-orientation provides the needed transparency and consistency between the models of business systems and the models of IT systems and adopts the use of object-oriented methods as a basis for redesigning banking business processes and information systems. The paper reports the findings of a research project that dealt with the development of the Banking Re-engineering with Object-Oriented Modelling (BROOM) method for the coupled redesign of business and information systems and gives the results of an application of the method to a bank. © 1997 Elsevier Science Ltd

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## Introduction

The banking sector is undergoing significant changes in economic needs and market competition. Although it is hard to forecast the details of such an evolution, it is clear that it will demand an emphasis on increased flexibility in marketing of different product mixes, greater branch autonomy and shortening of 'time-to-market' new products; see e.g. Bollenbacher.<sup>1</sup> Information technology (IT), on the other hand, plays a crucial part in the provision of banking products and services; see e.g. Metzger and Rau<sup>2</sup> and Cressey.<sup>3</sup> IT investments are one of the well-recognized keys of competition in the banking sector, while IT cost reaches high scores in relation to operating expenses. In addition, quality, security and risk assessment are vital characteristics of the sector and of its information systems; see e.g. Ramani and Pavri<sup>4</sup> and Dutta and Doz.<sup>5</sup>

Existing banking systems, practically always home-grown, remain huge and cumbersome, requiring intensive maintenance and lacking in flexibility. On the other hand, the investments already made in existing systems cannot be discarded and constitute a typical 'legacy' drag. A significant issue is the need to manage 'customer-oriented' rather than 'accounts-oriented' systems. Contrary to the emerging business needs for client-orientation, the majority of current banking IT systems adopt an account-oriented approach, thus limiting the flexibility of banks either to create strong links with existing customers, or to attract new ones with increased marketing efforts. These considerations demonstrate the practical need for a re-engineering of both the banking business processes and the associated information systems; see Watkins<sup>6</sup> and Maull and Childe.<sup>7</sup>

<sup>1</sup>Bollenbacher, G. M., Reengineering financial processes. *The Bankers Magazine*, 1992, **154**, 42-46.

<sup>2</sup>Metzger, R. O., and Rau, S. E., Strategic planning for future bank growth. *Bankers Magazine*, 1982, **6**, 57-65.

<sup>3</sup>Cressey, P., The development of information technology in UK banking. In *Information Technology for Organisational Systems*, eds. H.-J. Bullinger, E. N. Protonotarios, D. Bouwhuis and F. Reim. Elsevier Science, Barking, 1073-1078, 1988.

<sup>4</sup>Ramani, K. V. and Pavri, F., IY supports business strategy growth at the Development Bank of Singapore. *Journal of Strategic Information Systems*, 1994, **3**, 327-337.

<sup>5</sup>Dutta, S. and Doz, Y., Linking information technology to business strategy at Banco Comercial Portugues. *Journal of Strategic Information Systems*, 1995, **4**, 89-110.

<sup>6</sup>Watkins, J., Business process redesign in the UK retail financial services sector. *Business Change and Re-engineering*, 1994, **1**, 38-48

<sup>7</sup>Maull, R. and Childe, S., Business process re-engineering: an example from the bank-  
*continued on page 180*

Considering the development of business models for banking information systems design, some general conceptual models of data and processes have been developed and constitute 'kernels' of applications ('designware'). These models are usually built using traditional methodologies and antedate modern approaches to the design of information systems and especially the object-oriented approach. Although, however, the IT profession is constantly improving its understanding of how object-oriented development can support the business process re-engineering ventures for business transformation, few financial institutions are, today, ready to tread this path. This is in contrast to other domains; see e.g. Murthy and Wiggins<sup>8</sup> and Wang.<sup>9</sup>

This is due to the specific business requirements of the banking business as well as the need to explicitly provide mechanisms for the encapsulation of legacy data. However, we argue that object-orientation provides the needed transparency and consistency between the models of business systems and the models of IT systems. Object-oriented approaches seem to have the potential to *encapsulate legacy data and processes* that are already described in existing information systems applications, and treat them as a primitive variety of objects that can be associated to new objects and progressively replaced. Such an approach can apparently offer an opportunity to break the 'legacy deadlock' with its associated maintenance burden.

The present paper adopts the use of object-oriented methods as a basis for redesigning banking business processes and information systems. Specifically, the paper reports the findings of a research project that dealt with the development of the Banking Re-engineering with Object-Oriented Modelling (BROOM) method for the coupled redesign of business and information systems and gives the results of an application of the method to the banking sector.

The paper is structured in the following manner. The next section outlines the major trends and the need to redesign the banking systems, as well as the need to re-engineer the information systems of banks with a customer-oriented emphasis. The BROOM method, that enhances the expressive power of the object-oriented approach and further extends its business modelling abilities by representing the inherent business logic is outlined followed by a case-study application of method and redesign of a specific banking process. The final section gives some concluding remarks and directions for further research.

## Re-engineering banking: trends and needs

In order to analyse the current trends in the banking environment one should take into account the following issues:

- business trends, i.e. the trends concerning banking products, clients, etc.;
- operations trends, i.e. the trends already developed from within the main operations of banking institutions;
- technology trends, i.e. mainly the information technology trends that may affect the banking business;
- infrastructural barriers that may constrain the evolution of the banking business.

*continued from page 179*

ing sector. *International Journal of Service Industry Management*, 1994, 5(3), 26–34.

<sup>8</sup>Murthy, U. and Wiggins, C. Jr. Object-oriented approaches for designing accounting information systems. *Journal of Information Systems*, 1993, 7, 97–109.

<sup>9</sup>Wang, S. Object-oriented modeling of business processes: object-oriented systems analysis. *Information Systems Management*, 1994, 11, 36–43.

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