# Internet Banking Integration within the Banking System

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*Internet Banking developed due to increasing demand of online banking transactions. The biggest advantages of Internet Banking consist of complex banking solutions, 24 hours availability, quick and secure access to the back-end application through Internet. These advantages are due to the use of SOA (service-oriented architecture). SOA appeared as a necessity of companies to integrate big and independent portions of applications, in order to obtain an homogeneous functionality of the system. For the Internet Banking applications, SOA proved to be the optimal architectural solution, for a smoth integration between banking services from the front-end to the back-end.*
*This paper intend to offer an insite analyse of the Internet Banking applications architecture integrated with other banking systems. A SOA oriented analyse will establish the scope of the integration architecture.*
***Keywords***: *Internet Banking, SOA, architecture, front-end, back-end, Banking Systems.*

Internet has changed very much the rules of the game in the past years (Gunasekaran and Love, 1999). The banking area of the economic sector was impacted by those changes as well. Customers requests for quick access and no matter the location at their bank accounts, or at financial/banking transactions, all of these have determined the banking institutions world wide to adopt the Internet as the optimal solution for the presented demands. Through the Internet network banks are able to connect front-end (front-office) applications with back-end (back-office) (Aladwani, 2001). Based on such advantages, Internet Banking applications were created.
The evolution of bank presence on Web from simple, static applications, to complex, dynamic applications with numerous transactions, is presented bellow:

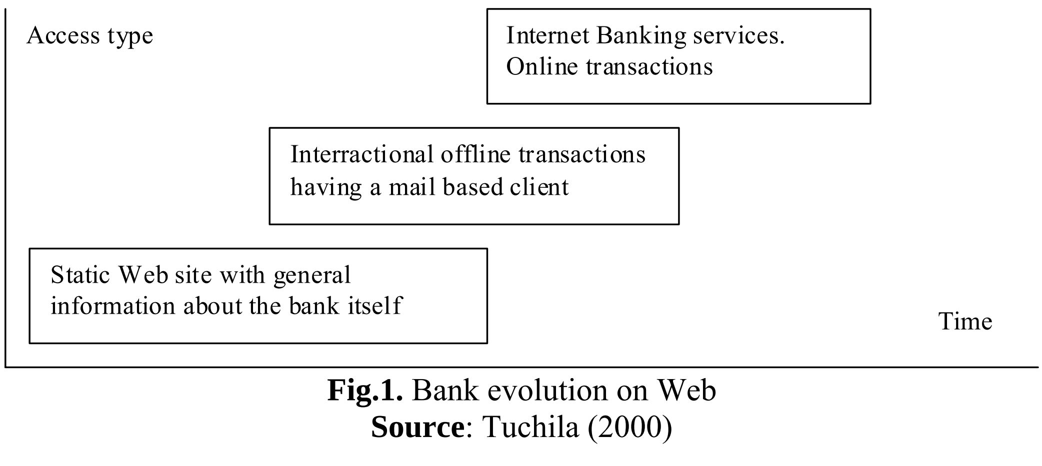


**Fig.1.** Bank evolution on Web
**Source**: Tuchila (2000)

Until 2000, Internet Banking applications could have been accessed mostly in the United States of America, or in European countries such as: United Kingdom, Spain, Italy and France (Tuchila, 2000). Since 2000, online banking applications are commercialized or created in Romania, for example: Emporiki Bank launched its Internet Banking service in December 2000 (Valentina Tudor, 2004, BRD-NET from BRD, raiffeisenonline from Raiffeisen Bank, Alpha Click from Alpha Bank, ING Home Bank from ING.

The advantages of Internet Banking applications consist of: quickness; secured access to sensitive data as accounts, personal data of customers, transactions; account management; operating sale-purchase transactions in real time and at long distance; suppressing the stress of staying in bank for a transaction; low costs for the maintenance of this kind of applications.
Internet determined also the appearance of firsts service-oriented architectures (SOA). This architecture can be used to interact on Internet or from an workstation to another (using point-to-point protocols for data transfer – EDI, electronic data interchange). SOA is basically built from software services. These services are independent one from each other and they run protected on the working platforms (application servers): .NET or Java. These have the ability to manage the memory, to create the synchronous or asynchronous links between different components and to create the data mapping. The architecture is presenting itself as a summary of services:

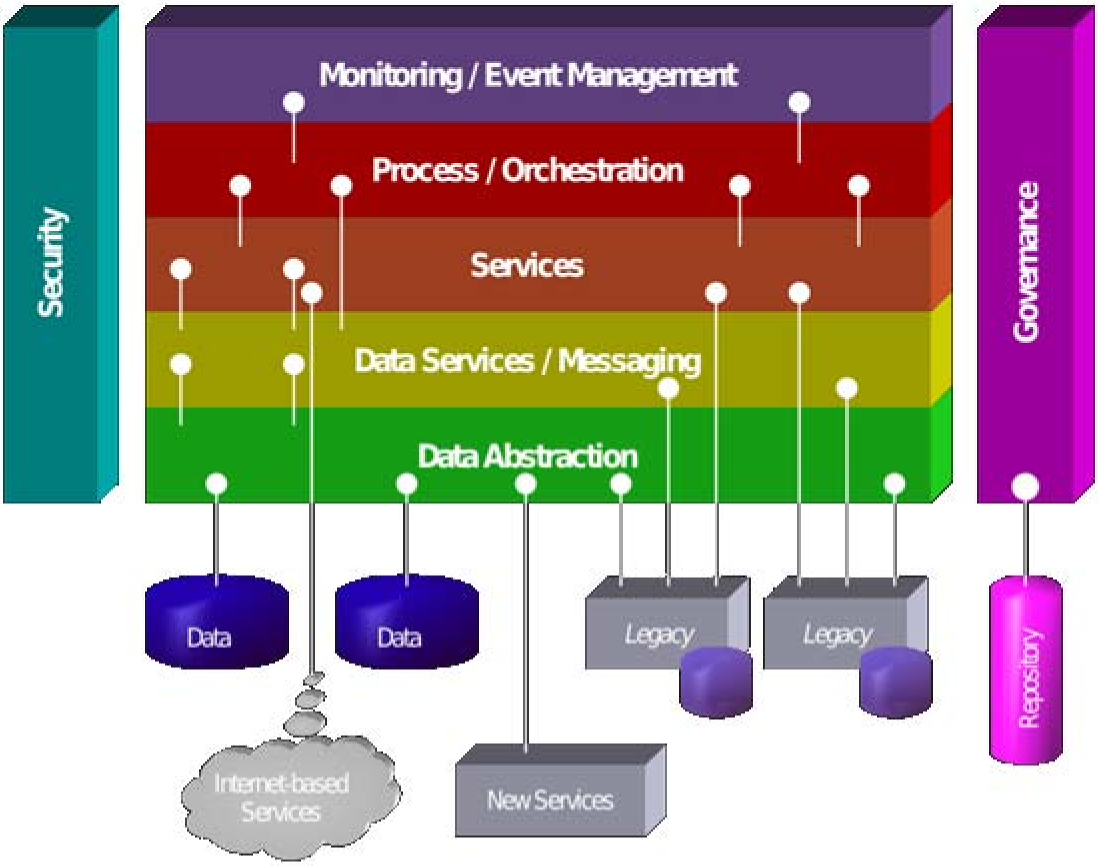


**Fig.2.** SOA model
**Source:** The Linthicum Group (2007)

SOA architectures helped banks by offering them the possibility to connect different applications or to integrate big portions of software code in ad hoc applications. This is one of the reasons why SOA became a key element in Internet Banking applications.
Although there is an increasing interest for Internet Banking usability, there are few case studies referring the solutions which banks are using to create Internet Banking applications.
Another point of view of the theme of this paper is based on the fact that Internet Banking represents an interface of banking operations directly with the customers, which is integrated with the back-end system of the

bank. Case studies about architectures able to sustain an integrated application system are few in the specialty reviews. Banks encountered many problems in their attempt to be compatible with SOA, with this architecture requests (Symantec.com, 2005). By the small number of interfaces between different components provided by this type of architecture, companies can optimize the flows between their systems. The optimization is done through a special link system-to-system which doesn't necessitate repetitive files download (in physical format), nor effective software development (requires specific parametric to be done by the architect himself). This is the context by which Internet Banking applications represent the front-end part which has to be integrated with a back-end part; the purpose of this being a integrated solution for the banking institution.

By the Internet and Intranet development, the banking market faced a healthy growth. Customer's demands influenced the ascension. In this way more distribution channels for banking services appeared:

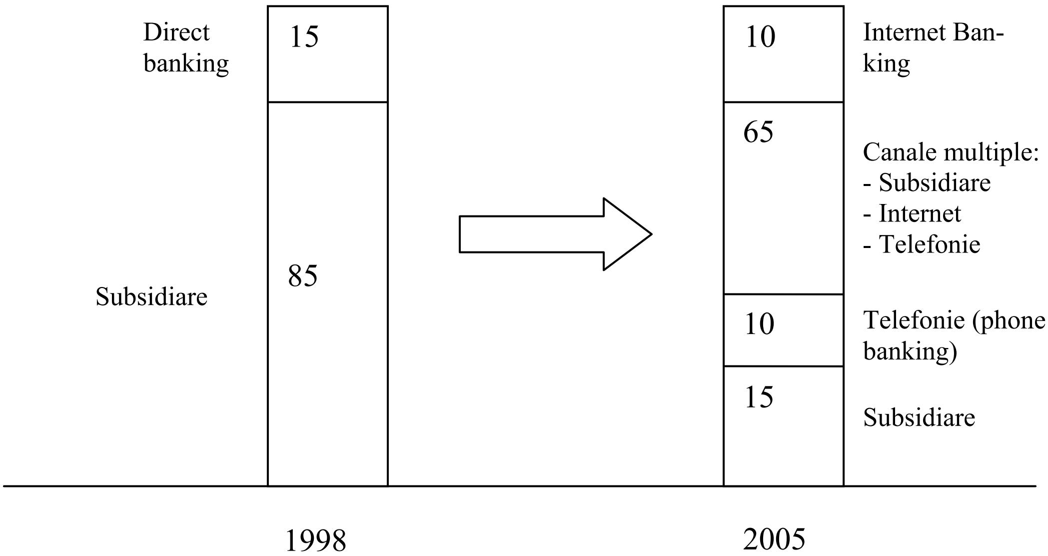


**Fig.3.** Customer structure evolution knowing the distribution channels of banking services (%), **Source**: Mocanu and Filip (2001)

Another point which must be taken into account when building an Internet Banking application is the cost. Based on the complexity of the applications developed, costs are placed in intervals such they are presented in Figure 4.

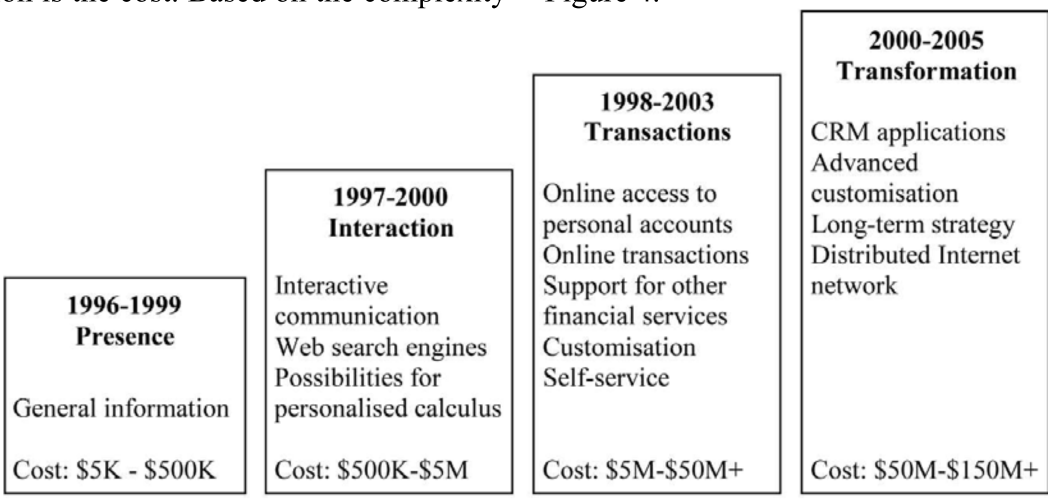


**Fig.4.** Costs and Web application for Internet Banking complexity relation
**Source**: Gartner Group, quoted in Tuchila (2000)

Internet banking application is like a black-box. Ideally, the communication with the back-end will be asynchronous. The reason for this type of communication is that the system will be able to run as a whole 24 hours out of 24. The Web application will run continuously, even if the back-end becomes unavailable. Of course, this is bidirectional, meaning when the Web is not available, the back-end will continue working (specific processes of the back-end application will run no matter the front-end is active or not). Also, the back-end sees the front-end as a number of services with big granularities. In this way a bigger generality is assured for the integration solution. This is the standard that SOA proposes to different businesses (Figure 5).

The back-end connector and the back-end message queue manager are components that assure the flow of messages in the system. They don't need the creation of new interfaces, because it already contains the necessary classes and objects necessary for the connection. IBM Websphere Message Queue Manager or JMS standard (Java Message Service) for Java application servers.

Services (web or beans, based on the application server– Websphere or .NET) are grouped in a Business Service layer (IBM). Services are meant to take messages from the queue, or to bring messages in the queue. Moreover, their role is to map the data in the queue according to the core business that will receive the data.

The message queue has a Message Broker that manages the message flow. Therefore, if the back-end is not functional, the message broker will retain the messages in the queue until the system is operational. The broker is comprised by the Business Services Governance component and is available within the IBM Websphere Message Queue Manager software component.

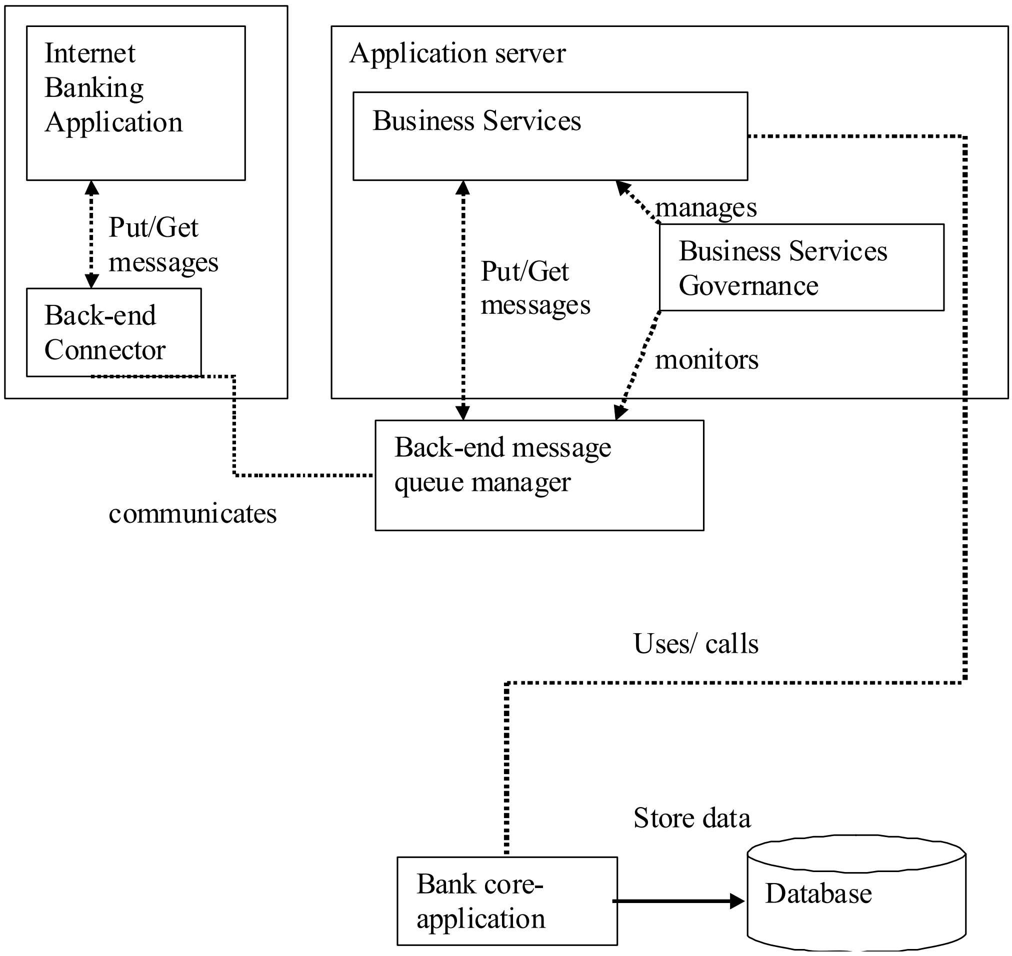


**Fig.5.** Integration of an Internet Banking application with a back-end

Along with the development of the Internet, banks needed to adapt their informatics systems in order to answer to customers' demands in an efficient manner. Therefore, there were several services oriented architectures implemented, that could integrate existing back-end applications completed by front-end applications, new from the building technology point of view.

A key element of front office applications is Internet Banking, because it allows remote access, it is secured, flexible, permits online transactions, in real time, as if operations were teller ones, without suffering from stress of queues.

Due to high costs of complex informatics systems, big companies and banks have started using SOA architectures (service-oriented architecture). SOA offers banks the possibility of connecting older applications to new ones, including the integration of Internet Banking in the current customized system.

SOA can be used for a wide range of operating systems, application servers and data bases, according to budget and performance limitations of the beneficiary (from open-source Linux/JBoss/MySql configurations to systems available on clusters (UNIX/Websphere/DB2).

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