

THE ARCHITECTURE OF TRANSIGO: TELSTRA'S ELECTRONIC BUSINESS SOLUTION FOR AUSTRALIAN GOVERNMENT AND INDUSTRY

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INTRODUCTION

The purpose of this paper is to examine the elements that make up what has been traditionally referred to as electronic commerce and is now coming to be referred to as electronic business. It will do this in the context of a major Australian initiative in the area.

For the purposes of this paper, electronic commerce is defined as Electronic Data Interchange (EDI) or EDI-type services, while electronic business is defined as any system that conducts any aspect of business in an online environment. Electronic business may make use of enabling technologies such as EDI.

An alternative way of viewing electronic business is as a system that automates the entire purchasing process, from the time that a purchaser identifies a need for an item, to the time that the final payment for that item is made and acknowledged. Thus electronic business covers the complete range of activities that are involved in two organisations conducting business between them. One necessary exclusion from this definition will be the actual delivery of a product, which can only be done electronically for so-called 'digital goods'.

THE COMPONENTS OF ELECTRONIC BUSINESS

The components that make up an electronic business system are defined as any technology or service that is needed to allow users of the service to carry out business in an electronic form. Some of the sub-systems that may be included in a system such as this are:

1. Access Control
2. Catalogues
3. An information handling system
4. EDI

5. Messaging Services
6. Directory Services
7. Payment Systems

A system that provides all of the above components will allow the full purchasing function to be automated as much as is physically possible. However, the above list is not exclusive and will change as new technologies allow new services to be delivered. An overview of the services provided by each of the above sub-systems is given below.

ACCESS CONTROL

Any system that intends to charge for its services or has to provide any form of security, needs some form of access control. This can range from a simple procedure requiring a user to identify themselves by means of a login ID and a password to a complex system based on digital signatures combined with a range of role-based means of access to the system. The latter type of service can be provided in such a way that every user who accesses the system is provided with a tailored access to the facilities within the system. This can provide a system whereby every user will see a slightly different view of the system.

An access control system may also be used to form the core of a billing system and as a central point of control for the use of the services provided as part of the system.

The implementation of this service will need to be done in such a way that it does not unduly inconvenience the users of the service, or restrict them from performing their functions.

CATALOGUES

For buyers to be able to purchase anything electronically, they must be able to be easily locate and identify goods and services. Thus, there must be available online catalogues that the purchaser is able to electronically search and then be able to view the results of that search, regardless of where that catalogue is located. In addition to this, graphics should be available so that the buyer can view an image of what they are purchasing. Depending on the standard of the image provided, this may also assist in overcoming any difficulties in effectively describing what the item is. Some form of standard nomenclature may also be needed to assist in identifying specific items, although the power of modern search engines may make this unnecessary. The catalogue should also easily interface to the other services within the system.

To enable this to occur at a level that is invisible to the user, standards for the construction and content of these catalogues are needed. At present these standards do not exist and will need to be created to ensure a successful take-up of electronic business. An end aim for a standard such as this is that the information provided in the catalogue will not need to be re-entered into any other part of the system.

INFORMATION HANDLING SYSTEM

To enable electronic business to occur, information must be able to be passed from purchaser to buyer and back again in a reliable manner. It is this service that will form the core of the electronic business system and be the most visible aspect of the service to users.

The information that will be passed between organisations can range from simple requests for a quotation that can be sent as an e-mail message or facsimile through to complex tender specifications that have special handling and security requirements, as well as payment related information that may make use of EDI technologies. Thus the service must be able to cater for a range of needs and be adaptable

to make the best use of the technologies available to the users of the system. Where required, it must also be tightly integrated with the security built into the system.

The other requirements of this service are to combine the capabilities of the other services making up the system into what appears to users of the system as a single integrated system, accessible via an easy to use, standards-based interface.

ELECTRONIC DATA INTERCHANGE

Electronic Data Interchange (EDI) has for some time been considered as being electronic commerce by itself. With the changes in technology that are now occurring, EDI can be viewed as one of a range of enabling technologies that can be used to construct an electronic business system.

Traditionally EDI has run over X.400 networks to provide the underlying security and assurance features required of this type of service. It has also required that users of an individual implementation of an EDI document agree to the format of the EDI messages that they are exchanging. This has inhibited the widespread adoption of EDI due to the inherent complexity that this has created and the need to negotiate new agreements whenever a new user wishes to adopt EDI. Despite a number of attempts to overcome this complexity a generally accepted solution has not yet been found.

With the technologies that are now emerging it is becoming possible to provide EDI and EDI-like services in different ways to those that have been traditionally used, while at the same time still receiving the benefits that have been realised by those that have successfully implemented EDI services.

However, any electronic business service will need some form of EDI included within it, or some means of providing an equivalent service. This will necessarily be limited to some extent by having to ensure continued connectivity to the existing user base of current technology EDI.

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MESSAGING SERVICES

As was discussed above, X.400 has been traditionally used as a means of transmitting EDI messages. In addition, X.400 has also been used as the 'universal interconnection service' for disparate e-mail systems. Therefore, it has been acknowledged as the accepted international e-mail standard.

With the advent of the Internet and its underlying standards, another e-mail standard has emerged, that is, Internet or SMTP-based e-mail. It is not uncommon now to find organisations that have e-mail connections to both X.400 and SMTP based networks.

As described above, the central service in an electronic business system will be an information handling system. For this to be able to effectively receive and transmit information, some form of messaging system will be needed. This could be based on either, or preferably both, of the existing accepted standard services, X.400 and SMTP. An interface may also be provided to other technologies such as facsimile to allow those without access to messaging facilities to still participate in the service.

DIRECTORY SERVICES

Directory services are essential to any electronic business system to allow for the users of the system to be able to find each other and therefore communicate, particularly via messaging systems. To enable full use of this type of service it should be based on the currently accepted international standard of X.500.

The other use of directory services is as a central repository of information about each user of the system so that the services provided can be tailored to that user, thus allowing the system to provide to each user the services that the user requires, or is authorised to have access to. This will also have to be able to be tied into the security services provided as part of the system.

Directory services can also provide the basis for building the necessary billing systems.

PAYMENT SYSTEMS

Another service that is needed as part of an electronic business system is some means of payment or transfer of funds. This must be based on a system that is able to ensure that the payments are handled in a secure manner.

The possibilities for providing this service range from the currently available credit card based services through to the use of emerging electronic cash technologies.

By providing some means of electronic payment this allows the final portion of any transaction to be automated, thus completing the purchasing process. This service may also be used to provide related banking services.

THE COMMONWEALTH ELECTRONIC COMMERCE SERVICE

The Commonwealth Electronic Commerce Service (CECS) is an initiative of the Australian Commonwealth Government whereby they are providing their information with the intention of creating a critical mass of users for the system. The system is being delivered by Telstra, Australia's dominant telecommunications carrier which, under the terms of the agreement with the Commonwealth is funding the project. Telstra will receive a return from charging subscriptions for access to the service. The service is being marketed under the brand-name of 'Transigo'.

Transigo will combine a number of different technologies and services to provide a full system, including use of the newer services that are becoming available such as the Internet and the World Wide Web (WWW). It will accordingly be one of the first real electronic business systems to become available.

The aim of Transigo is to automate all parts of the purchasing process, except for the actual delivery. The system will be based on the WWW and will as far as is feasible make use of existing services. The system is also designed so that it can be accessed by any person who has a PC, modem, connection to the Internet and a standard WWW browser such as those provided by Netscape and Microsoft. A restricted set of the facilities will also be available to those who only wish to use a phone and/or facsimile.

The facilities provided will evolve over the life of the system as new features become available.

TELSTRA'S PLANS FOR TRANSIGO

Telstra's plans for Transigo will initially be dictated by the requirements of the Commonwealth and the contract that has been put in place. Due to the fluid nature of the technologies that are being used in electronic business, the contract has been constructed in a way that allows the service to be developed in line with changes in technology. This will ensure that Transigo remains relevant to its users.

In addition to the core technology required to fulfil the Commonwealth's initial requirements, Telstra also intends to develop the system as a core system for electronic business within Australia. Once this has been completed it is then intended to take the system into the international marketplace.

During the development of Transigo it is planned that wherever possible, use will be made of accepted standards so that the system can become the core service that

is planned. The standards that are being used will be publicised to enable other organisations to take advantage of the core service and build other services that can be integrated with Transigo. This should also ensure that Australia does not end up with a number of competing, incompatible systems.

WHAT WILL TRANSIGO INCLUDE?

The core services to be provided for Transigo will be available to all subscribers to the system and will provide the components of an electronic business system described above. Where necessary, equivalent manual services will be provided to complement the electronic services.

In addition to the core services, a range of value-added services will also be provided. The core services that Transigo will provide initially are:

1. Request For Tender (RFT) Handling.
This will allow the handling of RFTs issued by both the Commonwealth and other users of the system. Facilities will be provided that will allow for tenders to be uploaded and downloaded to and from the system, the submission of tenders through an electronic tender box and the automatic matching of tenders to users by commodity categories.
2. Request For Quote (RFQ) Handling.
This will allow the handling of RFQs issued by any user of the system. As these are usually less formal than a tender, it is anticipated that the majority of RFQs will be handled using messaging services or E-forms.
3. X.500 Directory Services.
These services will be provided for two purposes. The first is that of identifying individual users, their roles and access rights, and the organisations that they belong to; and the second is that of providing the basis of the security architecture for the system.
4. Government Information.
Within Transigo, a range of publicly

available government information will be included to assist those users of the system who wish to deal with the Government. It is expected that this information will be expanded over time to include other information that may be of use to other users of the system.

5. Catalogues.

As described above, the ability to find and identify items is central to any electronic business system. Therefore, online catalogues will be an integral part of Transigo. They will be able to be searched and the information in them extracted for use in other parts of the system. To enable this to occur, work is underway on establishing standards for the construction and content of on-line catalogues.

6. EDI.

As described above EDI is an essential enabling technology. Transigo will include EDI as part of the initial implementation by means of an accreditation process for VANS that will ensure that the VAN operators meet a minimum set of requirements. This accreditation will be carried out by the Commonwealth and be based on standard implementations of a number of common EDI documents. The longer term aim for Transigo is to move into providing EDI over the Internet, possibly using E-forms.

7. Messaging.

As part of the implementation of Transigo, the ability to transmit X.400 and SMTP messages is being provided. This will enable users of the system to exchange information by using electronic mail.

8. Access Control.

This is an essential part of the system as it will control who can access the system and what facilities those users will then have access to. It is intended to base this system on the use of digital signatures and public / private key infrastructure.

The above core services will provide the basis of an electronic business system that will be available throughout Australia. As the system is developed, further services will be provided to ensure that Transigo remains current with the latest developments in technology and business practice.

A limited version of the scheme is already in operation, and a public launch has been scheduled for early in the second quarter of 1997.

CONCLUSION

Transigo will form the basis of the widespread introduction of electronic business throughout industry and government

Further information about the Transigo scheme is available at <http://www.transigo.net.au>.

within Australia. It is being designed to include all the components necessary for an electronic business system.

In providing this service, Telstra has moved from the use of EDI as being the only service used for electronic commerce to electronic business where a range of services and technologies are used to automate all interactions between two organisations.

THE ELECTRONIC MALL BODENSEE (EMB): AN INTRODUCTION TO THE EMB AND ITS ARCHITECTURAL CONCEPTS

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INTRODUCTION

On the way towards the information society all of us are challenged: large companies as well as small and medium ones, public authorities, private households and all other institutions and organisations. One strategy to utilise the potentials of the information age and their enabling technologies is to establish regional electronic marketplaces. The establishment of electronic marketplaces with a regional focus and a simultaneous vision of a 'global village' is not contradictory but complementary (Zimmermann 1997). The Electronic Mall Bodensee (EMB) is a regional, but multi-national project that realises an electronic marketplace for a specific region in the heart of Europe. It covers parts of Austria, Germany and Switzerland.

The term 'electronic marketplace' is used in this context to designate an open, virtual electronic marketplace in the sense of the ancient Agora. On this classical marketplace people gathered to buy and sell, but also to socialise, argue politics, and exercise all the other prerogatives of citizenship (McFarland, 1994).

The EMB project was launched in January 1995 to develop and implement a regional, electronic marketplace in the region around Lake Constance based on the vision of the "Bodenseeleitbild" (IBK, 1995). One major goal is to strengthen the economic power of the region by utilising the potentials of the new telematic infrastructures of the information age. Therefore the EMB provides a platform for electronic commerce activities – especially for small and medium sized enterprises (SME) – and enables private households to utilise the emerging new media for (at least parts of) their everyday life as consumers and citizens – e.g. as described in (Venkatesh, 1996).

The initiators of the project were the Cantonal Office for Industry, Commerce, and Employment (KIGA) as a government agency in St. Gallen, Switzerland, and the

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Institute for Information Management at the University of St. Gallen. From the very beginning further partners from science, for example the University of Constance, Germany, and business were part of the project team.

The realisation of the EMB has to be considered under two viewpoints. On the one side the platform should be accessible from the very beginning. Therefore, current state-of-the art technologies and available commercial hard- and software packages are utilised. Until now Since its announcement, emb.net EMB has received a reasonable reputation within the German speaking Internet community and is one of the leading electronic marketplaces in Europe. Examples are existing WWW database interfaces or security solutions. As a result of this procedure EMB can be accessed since June 1995 after a set-up period of six months. Since its announcement, emb.net has received a reasonable reputation within the German speaking Internet community and is one of the leading electronic marketplaces in Europe. Since summer 1996 the EMB is operated by a new founded company, the EMB Inc. In addition to that the research partners in the project are developing and implementing new concepts and solutions. Intelligent electronic product catalogues (Schmid, 1996), electronic payment solutions (Himmelspach/Zimmermann, 1996), logistic services on the base of the CIL model (Computer Integrated Logistics) (Alt/Klein/Cathomen, 1994), electronic con-