Appendix C The IT Strategy

Introduction

C.1 This appendix supplements the information provided in Chapter 8 of the DETI e-Business Strategy. It provides further details of the IT (Information Technology) Strategy underpinning the Department's electronic transactions with customers.

C.2 This appendix is set out under two main headings, namely:

- The IT Requirements for Electronic Transacting; and
- The Generic Transaction Processing Model – describing how electronic transactions will be catered for on a step-by-step basis for the different types of transactions.

The IT Requirements for Electronic Transacting

C.3 To provide customers with the facility to obtain services electronically at any time and from anywhere, there are a number of vital IT service components and principles to be delivered or addressed:

- ❑ A consistent interface;
- ❑ Authentication services;
- ❑ Manageable message handling facilities;
- ❑ Transaction handling / process management;
- ❑ A reliable physical infrastructure;
- ❑ Transaction auditing and recovery from failure;
- ❑ Data processing to consistent data standards;
- ❑ Storage management;
- ❑ Development tools; and
- ❑ Technical Standards.

There are other components which can provide further advantages:

- ❑ Personalisation of the customer interface;
- ❑ Integration of "traditional" channels of transaction;
- ❑ Workflow; and
- ❑ Knowledge management.

C.4 The sub-sections below define what is meant by these service components and principles. They also define the requirements or standards that DETI will fulfil in delivery of these service components.

Consistent Interface

C.5 To allow the customer the choice of time and place in interacting with the Department, it is necessary to provide access through a range of interfaces such as Internet, WAP device, kiosk, etc. This requires that the management of those interfaces must take account of the user side environment and must rationalise the information flows into a single internal stream.

C.6 A further interface issue which must be dealt with is that of navigation through the range of services which are available. In terms of service delivery, any disparity in the "look and feel" of the customer's "window" into the Department will suppress take-up, thus reducing the efficiency savings which can be achieved through the introduction of process automation.

Authentication Services

C.7 Authentication services have two elements:

- Certification: provides the trust that an individual appearing to be involved in a process is, in fact, that person and, conversely, that the customer can be assured that they are dealing with the Department; and

- Permission Management: maintains the matrix of roles that an individual has within any business process being supported.

C.8 These assurance provided via authentication are vital in dealing with businesses and with members of the public.

C.9 It is preferable to have authentication services provided by the Departmental NOS (Network Operating System) so that changes of role are invoked from a single point of access. This requires the NOS directory service to have an extensible roles capability and to have secure delegation facilities to allow these roles to be managed at the business level.

C.10 Furthermore, it is important that authentication is not related to the specific service being sought, otherwise the customer will have to remember as many different logon procedures (passwords, PIN numbers, tokens) as they have services to deal with.

C.11 It is expected that the Government Gateway will provide a single authentication service and will therefore be the preferred route for access. The Government Gateway offers the possibility of reducing the complexity of the interface to the external customer and, combined with message handling, controls the access of those customers' transactions into the Departmental network.

Notes on DETI Progress in this Area

C.12 Work on electronic forms and workflow has been used to demonstrate the options available to introduce Authentication to replace a hand written signature. The benefits of doing so are evident, but a lack of guidance centrally and confusion on the impact of the differing legislation (Freedom Of Information, PD0008, Data Protection Act, 2005 e-Government initiatives, Sarbanes-Oxley, etc.) covering the responsibilities of organisations using and retaining personal electronic information has had a serious impact on development of systems.

C.13 DETI work has shown what can be done at minimal cost, but also highlights the point that standards need to be adopted NICS wide before any intra Departmental exchanges of personnel or customer data can be exchanged. DETI are being pro-active in bringing all the relevant NICS parties together to accelerate any resolution.

Message Handling

C.14 Message handling provides several facilities:

- **Message routing** supports the concepts of "joined-up government", whereby communication for one purpose can initiate other business processes.

- **Transformation** allows processes using different data structures to interact as part of a business process.

- **Asynchronous messaging** allows any interacting processes to be "unlinked", thereby facilitating their upgrading or replacement without disturbance to other elements of the processing matrix.

C.15 Message handling is at the core of electronic transacting and if it were left to the designers of each application to provide the message handling services, the ability to support those services would degrade rapidly with the proliferation of differing techniques. It is therefore strategically important that the message handling services are considered as a part of the infrastructure into which each application is plugged.

Transaction Handling / Process Management

C.16 An examination of the types of transactions involved in supporting e-Business processes provides a means of defining the elements required in the IT infrastructure. The model is developed by tracking the interactions needed to allow a customer to deal electronically with the Department. A model for transaction processing can be found in the next section of this appendix.

C.17 The any time nature of electronic transacting means that the initiation of any process must not be dependent upon real time human intervention. This demands that the processing steps are defined to a management process which ensures a consistent response to any processing incident which occurs and that those steps are auditable for any selected transaction. As with message handling, to leave this service to the development of each application would result in a proliferation of differing techniques so it is important that process management services are considered as a part of the infrastructure.

Reliable Physical Infrastructure

C.18 The Physical Infrastructure comprises:

- The communication links necessary to connect, with sufficient bandwidth, all of the Department's locations plus the Departmental element of any connections to external services accessed by DETI staff or internal services accessed externally.
- The network topology necessary to facilitate all interconnecting processes plus the means of efficiently managing that topology.
- The computing hardware, within the Departmental network, which supports its business processes. This hardware should consist of as few variants as possible, within the limits of the processes supported, in order to rationalise the associated management tasks and reduce interoperability issues.
- The Network Operating System (NOS) providing the software foundation and account management for all of the Departmental IT services. The aim is for a single NOS, applied consistently, thereby eliminating security and access issues arising from the use of multiple environments.
- Security policies and procedures to ensure the integrity of all IT services and confidence in the veracity of the data being processed.
- Resilience services which ensure that all Departmental IT services are available when customers require them. This includes network and hardware redundancy as well as on- and off-site contingency.

C.19 Resilience is key: if the expectation is that the customer can access Departmental services at any time, it is vital that the IT infrastructure is totally reliable. This means that the infrastructure needs to provide:

- Resilience: single points of potential failure are eliminated;
- Contingency: any failed element is out of service for the minimum amount of time;
- Performance: responses are not intrusive to the customer's interaction. This requires facilities both to monitor performance and to ensure that information not necessary for transaction support is taken offline.

Transaction Auditing and Recovery from Failure

C.20 Whilst the resilience services of the physical infrastructure are intended to maintain continuity of services in the event of failure, it is also necessary to guard against any loss of information when such failures occur. It is therefore necessary to maintain a backup regime which provides sufficient granularity to reconstitute information stores to any point in the processing calendar. Additionally, these restore procedures must not, in themselves, be the main contributor to service downtime. Restore processes also require a level of granularity which minimises the administration overhead of recovering user-deleted information.

Data Processing Standards

C.21 Apart from "soft" information of an intelligence variety, it is transaction processing which generates all of the Department's data from which its information needs are drawn. It is therefore vital that consistent data processing standards are applied to the different projects and applications arising out of the e-Business Strategy.

Storage Management

C.22 Consolidating the Departmental information store allows the computing hardware within the physical infrastructure to be specified in terms of performance, thus tending to reduce the variations required. It also allows the Department's physical storage to be efficiently managed, both in terms of availability and capacity. Allied with the burgeoning capacity requirements of various e-Business services, there is the need to move aged data from on-line to near- and far-offline in order to ensure that the volumes of information being handled do not degrade the performance of the services.

Development Tools

C.23 Electronic service delivery forces interaction between all elements of the IT infrastructure. This, in turn, demands that the infrastructure support staff be capable of servicing the spectrum of those elements. It is therefore essential to try to keep the toolset standard across all applications and at the minimum required to deliver the services, thus maximising the effectiveness of the support staff.

Technical Standards

C.24 e-Business requires that a total view is taken of the Department's information, data and process needs and to define common technical standards. This allows manageable portions of the whole service to be developed and/or modified without affecting other parts of that service.

C.25 The availability of such standards also allows flexibility in the means of development of services.

Personalisation of the Interface

C.26 The retention of all of the Department's information in electronic form allows for, and volumes demand, that services are provided to present a personalised view to authenticated customers. In order to present this personalised view (the **portal concept**), the information must be collected and collated using standard structures.

C.27 This concept is one which DETI will aspire to as it delivers its various e-Business projects.

Integration of Traditional Channels

C.28 Electronic service delivery, as defined in this document, requires that there be a holistic view of the information being processed and involves an end-to-end view of the business processes. Given the consistency which can be derived by the application of standards to transaction and information processing, those benefits can be extended to other "traditional" channels of customer contact by their conversion to electronic form at the point of user interface, e.g. post room facilities to capture and issue paper-based material. The processing facilities of the electronic channel can be used for internal processing purposes.

C.29 Without applying such integration, electronic business acts as an additional transaction channel with the customer and its introduction reduces the efficiency of the business operations.

C.30 This integration of traditional channels should be addressed by the DETI EDRMS rollout project.

Workflow

C.31 Workflow management would be a powerful technical facility that could encapsulate the Department's business processing rules. In order to have maximum effect, a workflow capability would need:

- An interface which allows business managers to describe the processes undertaken. This would, for preference, be graphical and capable of use by non-technical staff;

- A facility for building in interfaces with other processes. Most particularly the processes will include the human interfaces (e-mail, browser) and the data processes;

- The ability to trap events occurring in other processes and trigger the succeeding event(s) according to the encoded business rules. The latter will require access to the staff role descriptions in order to have the triggers correctly issued; and

- A facility for securely collecting an audit trail for each process managed.

C.32 It is preferable to have a single workflow management service in order to maximise the efficiency of use (single interface to be learnt) and support.

C.33 At present, the implementation of **user** workflow tools is not specifically defined in the e-Business and IS Strategy (although the DETI EDRMS rollout project may provide some workflow capability). However, DETI is continually assessing the technical options and business benefits of introducing such a system. Note, however, that the **technical architecture** deployed to handle electronic transactions with the Department will include some form of (perhaps basic) workflow engine (see Section below entitled 'The Generic Transaction processing Model').

Notes on DETI Progress in this Area

C.34 Several workflow products have been evaluated in-house and a trial Purchase Order system is being prepared for rollout in IT Branch to educate development staff and users alike. Development staff are learning what information on business functions is required to design an electronic workflow. Also, the skills required to manage re-engineering of business processes to gain maximum benefit (rather than producing an electronic clone of an existing system) are being highlighted.

C.35 In addition to assessing functionality, in-house users will provide candid feedback on the "look and feel" of trial products and any early implementation of workflow. This will be to ensure that easy-to-use systems are deployed, thereby increasing user acceptance and reducing the scope for user error or confusion.

C.36 Already it is clear that a methodology needs adopted to allow mapping of business processes and to deal with the possible overlap between Business Analysts and Programmer Analysts.

Knowledge Management

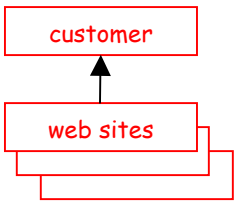
C.37 A variety of regulatory demands (e.g. Freedom of Information) and business imperatives demand that date generated within the Department's business processes be collated according to various sets of rules (e.g. records management for PRONI, geographically for New Targeting Social Need, by company for Customer Relationship Management, etc.). The processing functions must therefore include these rules in order that the data can be transformed into knowledge.

The Generic Transaction Processing Model

C.38 This section provides step-by-step details of how electronic transactions with both external and internal customers will be handled by the technical architecture.

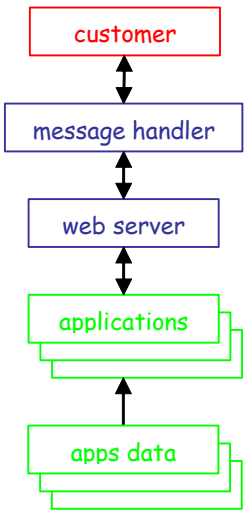
Electronic Transactions with the External Customer

First Contact - Anonymous User



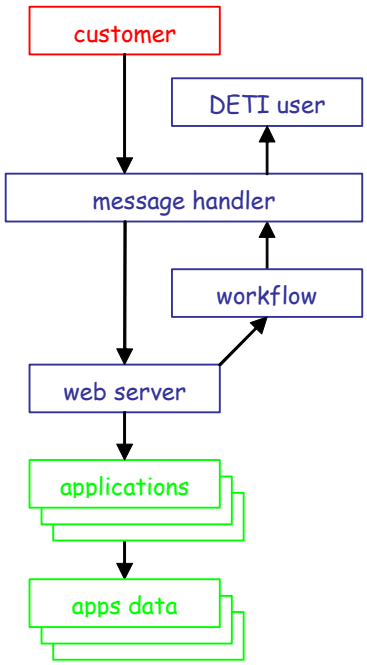
To the external customer, the face of the Department will be its web site(s). It (they) must therefore act as a register of all services available to the anonymous (to DETI) company or member of the public. These sites provide, without undertaking any authentication processes (i.e. they are in the public domain), access to static reference information, blank forms and facility for initiating processes.

Accessing Active Reference Information - Anonymous User



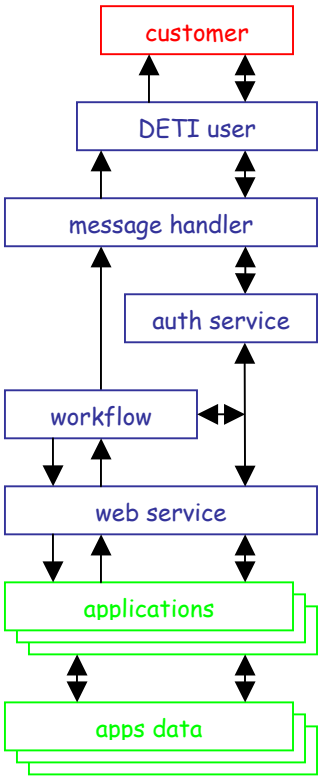
The anonymous customer may be seeking active information (e.g. current rates of fees) without necessarily wanting to transact business with the Department. The facility must therefore exist to provide, without compromising security, information from the reference tables contained within the Department's application systems. The model applying is that of web-based transaction to obtain the information with asynchronous messaging to prevent access into application systems from beyond the limits of the Departmental network.
Note that the same transaction model applies to pre-populating forms for authenticated customers.

Initiating a Process - Anonymous User



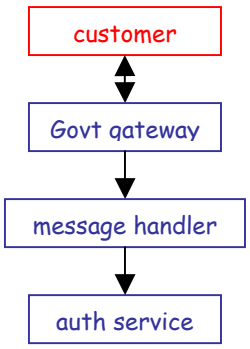
A facility must exist for an anonymous customer to initiate a business transaction (e.g. complaint to a regulatory branch, request for further information, etc.). In this situation the arrival of the electronic trigger must activate process control as well as carry out any data processing needed to log the information. Thus, as well as updating the database(s) appropriate to the nature of the transaction, the business rules designed to deal with it are invoked by means of the workflow engine which holds the definition of those rules. The workflow engine then proceeds to trap events and trigger appropriate actions required to progress the transaction as well as building an audit trail. The traps and triggers involve both automatic processes and DETI staff in the relevant service units.

Process Progression - Anonymous User



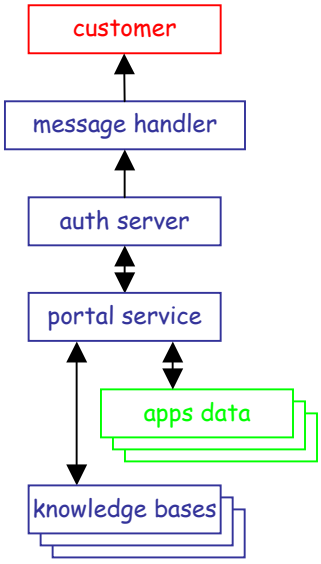
Once a submission has been made, the workflow engine provides the control of the subsequent business process. This can involve automatically triggering processes in the relevant applications, notifying staff occupying relevant roles that action is required, and monitoring that action. The staff may be required to contact the customer and take appropriate action depending on the response – the customer, being unregistered, is unable to interact directly with the data processing applications.

Authentication



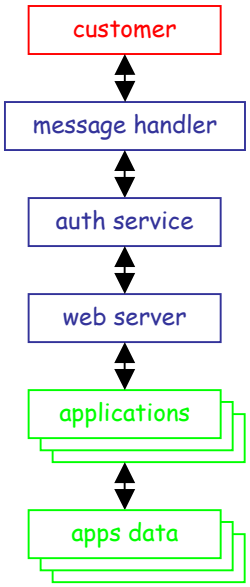
In the situations where a customer has previously registered for carrying out business with the Department (e.g. return of company annual accounts) or where a business process has been initiated by the Department (e.g. completion of business surveys), the business model seeks to provide maximum assistance in the preparation of material to be submitted. This may possibly involve the provision of commercially sensitive material (e.g. providing the previous year's details and requiring only changes to be notified). In this case, a strong authentication regime is required and the Departmental preference is to invoke the facilities of the Government Gateway.

The Personalised Window – Authenticated User



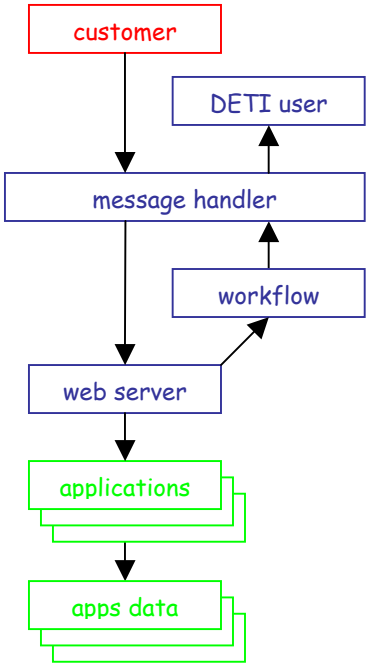
Once a customer has been authenticated, it is possible to provide a view specific to that user of available information and services. This portal service is able to extract information from all of the information stores available to the Department and provides a facility for the customer to subscribe to any services which they feel would be of benefit.

Preparing a Submission – Authenticated User



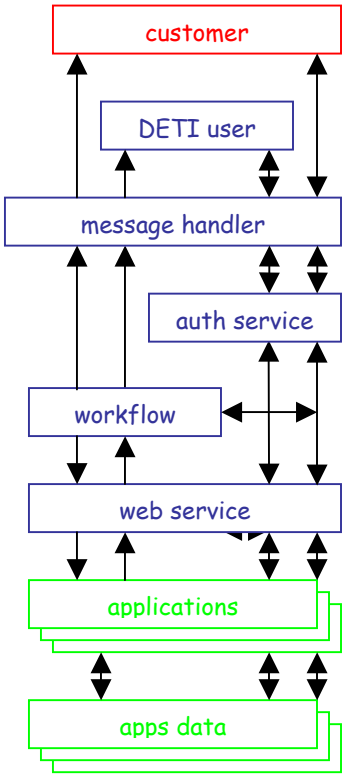
The authenticated customer will be getting assistance in preparing submissions due to the established trusts allowing the passing of information, including sensitive items, to pre-populate fields (e.g. addresses, previous submitted values).

Making the Submission – Authenticated User



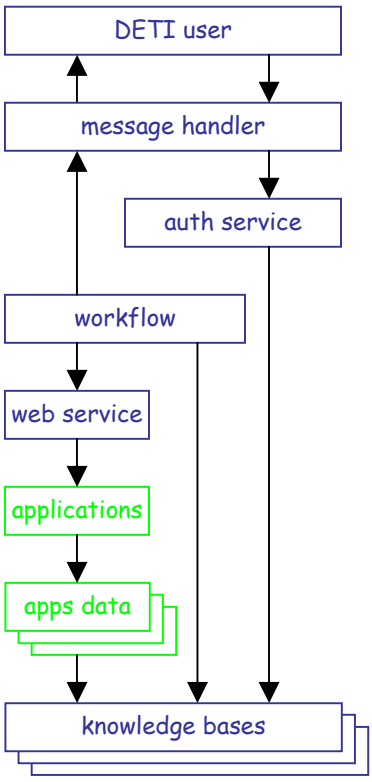
When the authenticated customer submits the form, the process is identical to that for the unregistered customer, with the possible exception that the detail could be resident in the relevant application, awaiting the submission instruction. This case would arise when the form is completed in a multi-pass manner (e.g. employment survey forms which require input from a number of post-holders within a company).

Process Progression – Authenticated User



As with the anonymous customer, it is the workflow engine which controls the progress according to the relevant business rules. The difference in dealing with the registered customer is that they can be involved in that process, the presence of message handling and authentication services ensuring the integrity of the Departmental services.

Maintaining the Knowledge Bases



No matter what process is dealing with a transaction, there will be, in addition to updating the relevant database(s), a need to gather information relating to that business process. This information can be generated within the data processes, the business processes or as intelligence identified by DETI staff servicing the process.

It will require storing data, as knowledge, in appropriate repositories (EDRMS, CRM, etc.) according to rules governing its purposes (Public Record, holistic customer views, performance monitoring, etc.). The rules governing that storage will need to be incorporated into the feeder processes.

Electronic Transactions with the Internal Customer

C.39 Just as the external customer is seeking to receive service from the Department, so DETI staff can be doing the same. The place of the DETI user in the preceding diagrams will more specifically lie in the internal service provision branches (e.g. Personnel, Accounts, etc). The same model applies with three exceptions:

- Services will be sought from within the Departmental IT infrastructure;
- Services will be available through the Departmental Intranet rather than public web sites; and
- Authentication will be by an internal mechanism rather than the Government Gateway.

C.40 In addition to seeking internal services, DETI staff, in their involvement with externally initiated processes, will need to submit to an internal authentication process to provide assurance that they have the required authorities for the functions which they have to carry out.