Quality aspects of software product supply and support using the Internet

Bruce Shaun Braude

A dissertation submitted to the Faculty of Engineering, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master of Science in Engineering.

Johannesburg, 1998

DECLARATION

This dissertation is my own work. It is being submitted for the degree of Master of Science in Engineering in the University of the Witwatersrand, Johannesburg. It has not been submitted before any degree or examination in any other University.

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(Signature of candidate)

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ABSTRACT

This project explores the use of the Internet to supply and support software products within a quality management system. The Software Engineering Applications Laboratory (SEAL) at the University of the Witwatersrand is in the process of developing various software products that will be commercially distributed in the near future. The SEAL has chosen to use the Internet to supply and support these products. A system has been developed for this task and has been named the Internet System for the Supply and Support of Software (IS^4).

The SEAL is committed to developing and supplying software within a quality management system. Consequently an investigation was undertaken into the quality characteristics and requirements based on the ISO 9001 standard for quality assurance and the ISO/IEC JTC1/SC7 software engineering standards. The investigation focused on quality requirements for processes related to supplying and supporting software as well as on the quality characteristics of the IS^4 and the IS^4 development process. These quality concerns have been incorporated into the SEAL's quality management system, the design and development of the IS^4 and the development process for SEAL products.

Major technical issues that have influenced the design of the IS^4 have been the control of the supply and licensing of the supplied products and the transaction processing of the on-line sales. To control the supply and licensing of the supplied products, various issues such as unlock keys, Internet based registration, controlled access and hardware control have been investigated. The advantages and disadvantages of each have been investigated and a suitable implementation has been used in the IS^4. To process the on-line transactions the IS^4 will be developed to be compliant with the recently released 'Secure Electronic Transactions' (SET) standard.

The project has been managed in accordance with the SEAL's Quality Management System (QMS) which is ISO 9001 compliant. The system contains a Shopper Interface for purchasing of SEAL products and a Manager Interface for administration of the system. The Microsoft BackOffice ® set of software has formed the foundation on which the system has been developed. One of the focuses of the project was maintainability of the IS^4. Documentation and procedures have been developed to aid in administration and perfective maintenance in the future.

TABLE OF CONTENTS

C: Design Documentation

D: Administrative Documentation

FOREWORD

The format for this Masters Dissertation differs from the conventional format in that it comprises a short body (in the form of a paper) and a number of appendices. The substance of this project is in documents comprising the appendices. It is therefore considered helpful to provide the reader with guidance regarding the order in which these should be reviewed.

The reader is directed to the paper entitled "Quality aspects of software product supply and support using the Internet" (QSI 122-31) to gain a broad perspective on this project.

The paper entitled "The use of the Internet in an academic environment to commercially supply and support software products" (QSI 121-31) provides the reader with a more focused view of the research conducted into technical issues necessary for the development of the Internet system. This paper was prepared for and presented at SAICSIT (South African Institute of Computer Scientists and Information Technologists) 97.

The appendices within the dissertation are discussed below:

a. The Management Products were developed at the onset of the project and are used to manage the development of the project.

   i. The Master Document List (QSI 001) is a register of all documents created or anticipated to be created within this project.

   ii. The Quality Plan (QSI 003) specifies the product quality objectives and the process quality objectives used in developing the product. The management tasks and responsibilities related to quality and the systems used to maintain quality are described.

   iii. The Product Description (QSI 004) defines the dependencies of the project and the requirements that the project aims to address. The document specifies the standards to which the project development and final product are to comply. The review procedure for the project and a high-level project structure are detailed.

   iv. The Project Management Plan (QSI 005) provides an overview of the resources needed to undertake the project and the Work Breakdown Structure (QSI 005-10) provides a list of tasks performed and a time scale for the performance of these tasks.

   v. The Configuration Management Plan (QSI 006) defines the configuration management used on the artefacts forming part of the project and the procedures used for managing and storing of the artefacts.

b. The Quality Investigation documentation details the findings of the investigation into the quality issues relating to software product supply and support using the Internet.

   i. QSI 330 contains the detailed research results of the investigation.

   ii. The requirements for software developers and suppliers using the IS^4 (QSI 340) details how the results of the quality investigation impacts on software developers and suppliers wishing to use the IS^4 to supply and support their products.

c. The Design documentation was developed in the design of the IS^4.

   i. The Product Functional Specification (QSI 200) identifies the functional requirements of the system.

   ii. The High Level Design series defines the modular structure of the IS^4 and the purpose, functionality, inputs and outputs of each module. The designs for the System and Database, the Shopper Interface and the Manager Interface have been detailed in separate documents.

   iii. The Low Level Design series details the detailed design of each of the modules comprising the IS^4. The designs for the System and Database, the Shopper Interface and the Manager Interface have been detailed in separate documents.

   iv. The User Reference Manual series consists of User Reference Manuals for the Shopper and Manager interfaces respectively.

   v. The Product Test Specification series and associated Product Test Report Templates consist of separate Test Specifications for the System and Database, Shopper Interface and Manager Interface respectively. Each Test Specification outlines tests to be performed on the respective part of the system in order to facilitate the acceptance of the system.

d. The Administrative documentation consisting of the IS^4 Administrator Procedures (QSI 310) details procedures for administering the server and software on which the IS^4 runs. The document serves as a guide for normal running and maintenance of the system as well as for use in disaster recovery.

Quality aspects of software product supply and support using the Internet

B.Braude

Software Engineering Applications Laboratory, Electrical Engineering,
University of the Witwatersrand, Johannesburg, South Africa

Summary: *This paper explores the quality aspects of using the Internet to supply and support software products. The Software Engineering Applications Laboratory (SEAL) at the University of the Witwatersrand is in the process of developing various software products that will be commercially distributed in the near future. The SEAL has chosen to use the Internet to supply and support these products. A system has been developed for this task and has been named the Internet System for the Supply and Support of Software (IS^4). The SEAL is committed to developing and supplying software within a quality management system. Consequently an investigation was undertaken into the quality characteristics and requirements based on the ISO 9001 standard for quality assurance and the ISO/IEC JTC1/SC7 software engineering standards. The investigation focused on quality requirements for processes related to supplying and supporting software as well as on the quality characteristics of the IS^4 and the process of developing the IS^4. These quality concerns have been incorporated into the SEAL's quality management system, the design and development of the IS^4 and the development process for SEAL products.*

Keywords: *software quality management, software engineering standards, secure electronic transactions, Internet commerce*

1. Introduction

The Software Engineering Applications Laboratory (SEAL) at the University of the Witwatersrand is in the process of developing various software products that will be commercially distributed in the near future. The SEAL has investigated various means for supplying and supporting these products. The SEAL will use the Internet for this task. An Internet based system was selected due to suitability and advantages of using such a system. The system was named Internet System for the Supply and Support of Software, (IS^4).

The SEAL is an organisation committed to software quality and is extensively involved in the development and application of software quality standards and procedures. A number of products to be supplied via the IS^4 are related to software quality standards and their application. In view of this a number of SEAL customers will probably come from a software quality environment. In order to meet the expectations of the customers, it is imperative that the software supplied and supported by the SEAL, be done so in a quality controlled manner compliant with all the relevant quality standards. The quality of service determines whether agreed services are delivered to the customer and the delivery of agreed services determines whether or not the customer perceives the supplier as a reliable partner [1]. According to Robinson et al customers are demanding full and continued confidence in the ability of a supplier to deliver products and services to the required specifications [2]. This has the following implications:

a. The processes used in supplying and supporting software have to comply with the quality standards' requirements and;

b. the Internet system used has to be a quality system

An investigation was undertaken into the ISO 9001 standard for quality assurance and the relevant ISO/IEC JTC1/SC7 software engineering standards. The investigation into the quality standards firstly examined issues that impacted on, or are part of the processes of supplying and supporting a software product. The investigation examined only the parts of the standards relating to the supply and support of software. The information found in the investigation was then interpreted and applied to the processes of supplying and supporting software in an Internet environment.

Secondly the investigation examined the ISO/IEC 15504 [3] and the ISO/IEC 9126 [4] standards respectively in order to define process and product quality objectives. The process quality objectives were for the processes used in developing the Internet system. The product quality objectives were for the Internet system being developed as a software product. The investigation and definition of the process and product quality objectives were necessary in ensuring quality in the Internet system.

2. Initial requirements and advantages of an Internet based system

2.1 Initial system requirements

The initial requirements included:

a. Low maintenance with minimal human intervention

b. Automated electronic supply mechanism

c. Automated electronic payment mechanism

d. Secure from unauthorised entry and actions

e. Compliance to all relevant software process and product quality standards

f. Development within a quality management system

One of the key considerations in the formulation of these requirements was that the SEAL has limited manpower and resources. The main business of the SEAL is education and human and economic resources could not justifiably be allocated to support an expensive infrastructure for the supply of tangible product. Point a) was therefore a key issue in the initial stages of system description. After examining the different options for supplying software (section 2.2) the use of the Internet was the only feasible choice. This consideration lead to the identification of further requirements for the supply and support system. Along with the decision to use an Internet based system, came the security requirement.

The requirements relating to the Software Quality Management arose due to the SEAL's commitment to quality.

2.2 Comparison between physical and electronic based systems

Various options were reviewed for supplying software products in the selection of a process to supply and support SEAL software products. These considerations are detailed in Table 1 in the Appendix. As can be seen, the use of the Internet was the obvious choice in the SEAL's environment.

2.3 Developed system

The developed system allows for the sale of SEAL software products via the Internet. The IS[4] serves as a fully automated system for capturing a user's details, allowing the user to select from the various products, acquiring the user's order information, processing the order and then providing the user with access to the selected software product. The system also provides support to the users for the respective purchased software products.

The system contains a store manager interface in order to update the system with regards to products and to be able to monitor the transactions that the system has performed. The system has also attempted to automate the transaction processing with banking institutions as far as possible. This has however not been fully achievable in the current version of the system but will be implemented in a subsequent release. The two interfaces of the system, namely the manager and shopper interfaces are connected via the system's underlying database.

2.3.1 Shopper interface

The shopper interface of the IS[4] is accessed over the Internet using a personal computer (PC) and a Web browser. The internet connection between the IS[4] and the shopper's web browser is over a secure link (SSL) thereby protecting the transmitted information from any unauthorised access.

When accessing the system the user is presented with a welcome web page and a main menu. Before logging into the system the shopper has the following options from the main menu:

a. **Login** - If the shopper has not previously registered with the system the Login sectio allows the shopper to input contact information and register with the system. The shopper also selects whether to be on the SEAL mailing list. Upon registration the shopper is assigned a username and password pair allowing the shopper to log in to the system. Once the shopper has logged in to the system he may proceed with purchases and other actions as described below.

b. **View Products** - The View Products section serves as a catalogue for potential customers, allowing them to browse the 'goods on display' without requiring them to register with the system. This section also supports downloading of the software products.

c. **Information** - The Information section contains information relating to the use of the IS[4], the security and transaction processing used in the IS[4] and contact details for the IS[4] administrator.

Once a shopper logs in to the system using his username and password, he is then presented with the following additional options to the ones listed above:

a. **View Products** - The View Products section is the same catalogue as the one accessible to non-logged in shoppers however if the shopper is logged in, he may select products for purchase by adding them to his shopping basket.

b. **Shopping Basket** - The Shopping Basket is

analogous to a shopping basket used in a supermarket. The shopper may add and remove items from the basket and when satisfied select to purchase the items in the basket. On selection to purchase, the shopper is presented with an invoice that must be printed out and included with any payment made to the SEAL.

c. **Registered Products** - The Registered Products section is used to view details of purchases made by the shopper. Included in these details are details for unlocking purchased products for full usage. In this section the shopper may subscribe to and unsubscribe from mailing lists relating to the respective purchased products.

d. **Feedback** - The Feedback section is used for the shopper to input various types of feedback to the SEAL.

e. **User Information** - The User Information section is used for modifying registration and mailing list information entered when registering with the system.

f. **Logout** - The Logout option is used to log out of the system.

2.3.2 Manager Interface

The manager interface of the IS^4 is accessed over the Internet using a personal computer (PC) and a Web browser. The internet connection between the IS^4 and the manager's web browser is over a secure link (SSL) thereby protecting the transmitted information from any unauthorised access. Furthermore a username and password is needed to access the manager interface.

On accessing the interface the manager is presented with a main menu containing links to the various sections. The interface has the following sections:

a. **Products Section** – The Products Section lists all the products in the system. The section allows for the addition and deletion of products. The IS^4 manager can view a product's details as well as the details of the product's entities (Information items, documentation, downloads and dependencies). The user can edit the product as well as any of its entities. Furthermore entities can be added or deleted

b. **Feedback section** - The Feedback Section lists all the feedback items received from shoppers according to selectable criteria. The IS^4 manager can view selected feedback items' details

c. **Mail section** - The Mail section allows the manager to compose a mail message and send it to a selected group of registered shoppers. Furthermore the Mail section lists all the mail items sent to shoppers according to selectable criteria. The IS^4 manager can view a selected mail item's details and delete the item if required.

d. **Orders section** - The Orders Section lists orders received from shoppers according to selectable criteria. From this list the manager can select to view the details of a selected order and approve selected orders as being paid for. Furthermore the manager can select to view order statistics.

e. **Purchased products section** - The Purchased Products Section lists the products that have been purchased by the respective shoppers according to selectable criteria. From this list the manager can select to view the details of a selected purchase. Furthermore the manager can update details relating to a purchase as well as delete a purchase.

f. **Shoppers section** - The Shoppers Section lists all the shoppers in the system according to selectable criteria. The section allows for the addition and deletion of shoppers. The IS^4 manager can view a shopper's details as well as the details of the shopper-related entities (shopping basket, receipts and purchased products). The user can edit the shopper's details as well as add, delete and edit purchases for the shopper. Furthermore the manager can view statistics for the shoppers

g. **Events section** - The Events Section lists events that have been incurred by shoppers interacting with the shopper interface. The interface allows the manager to select criteria for which to list the events.

3. Quality issues relating to the software supply and support processes

An investigation was carried out into the processes of supplying and supporting of software products. The investigation was undertaken into the relevant quality standards and into how the requirements of the standards can be addressed in an Internet based supply and support system. The ISO 9000 related series and the ISO/IEC JTC1 SC7 software engineering standards have been investigated. The investigation examined only the parts of the quality standards relating to the supply and support of software.

The investigation examined issues that impacted on, or are part of the supply and support of the software product. The investigation assumed that the organisation developing and supplying the software is already compliant with the standards in

the tangible environment. The investigation only explored the application of the standards to the supply and support of software using the Internet.

The discussion of each clause of each standard and the discussion of the applicability of each clause to the IS[4] is beyond the scope of this paper. The requirements derived from the investigation into each of the standards are listed below.

3.1 ISO 9001 [5]and related standards

a. The products supplied by the IS[4] are to be treated as 'shrink wrapped' products. A contract will be developed and will be a non-negotiable contract that is developed by the supplier. Any contract negotiation will have to be conducted outside the scope of the IS[4].

b. All documentation supplied via the IS[4] must be handled in the same manner as all other organisational documentation, that is in compliance with ISO 9001

c. All product identification and traceability used on the organisational level must be reflected in all products and artefacts supplied via the IS[4]

d. ISO 9000-3 states that "to protect the integrity of the product and provide a basis for the control of change, it is essential that software items be held in an environment which:

   i. Protects them from unauthorised change or corruption

   ii. Permits the controlled retrieval of a copy of the controlled master" [6] (Section 4.15.3).

e. Precautions must be taken due to the material on which the software is stored, deteriorating. The storage area will be the server on which the product is stored. ISO 9001 and ISO 9000-3 further state that access control must be instituted.

f. Issues that are applicable to replication in the supply of software via the Internet are:

   i. The master and other copies must be identified

   ii. Disaster recovery plans must be developed.

   iii. The period of obligation of the supplier to supply copies of the respective products must be determined

   iv. Virus checking must be carried out

   v. The required documentation to be supplied must be stipulated

   vi. Copyright concerns must be addressed and agreed to (in the contract)

   vii. The environment must be controlled to ensure repeatability of replication

g. Only released products must be made available through the IS[4].

h. The control of non-conforming product requirements must be followed on the project and organisational levels to ensure that no products are unintentionally released to the IS[4].

i. Installation of the purchased product falls beyond the scope of the IS[4] and if installation is to be carried out by the supplier, it is to be handled outside the scope of the IS[4]. This must be specified in the contract.

j. Procedures must be developed within the IS[4] to receive and handle (pass on to the relevant party) customer complaints.

3.2 ISO/IEC 12207 – Software lifecycle processes

a. The contract is to "address proprietary, usage, ownership, warrantee and licensing rights associated with the reusable off the shelf products" [7] (Section 5.1.3.4).

b. The delivery and support of the product by the supplier must be specified in the contract and carried out as specified.

c. It must be specified in the contract that the supplier cannot install the product, assist the acquirer with set-up activities or support of any parallel running activities when the installed software product is replacing an existing system.

d. The resources and information necessary to install the software product must be determined by the supplier and be made available to the acquirer.

e. It must be specified in the contract that the developer cannot support the acquirer's acceptance review and testing of the software product.

f. The initial and continuing training and support to be provided to the acquirer must be specified in the contract

g. The IS[4] must provide a means for the users of purchased products to report problems and request modifications. Once the report is received, the maintainer is to record and track the problem.

h. The IS[4] must facilitate the communication of change requests between the developer/modifier and the user (acquirer).

i. The IS[4] must provide for a means to provide feedback to the users.

j. The IS^4 must provide a mechanism to communicate with the users and provide them with migration information. When the scheduled migration arrives, notification must be given to all concerned. A post-operation review must be performed.

k. The IS^4 must provide a mechanism to communicate with the users and provide them with retirement information. When the scheduled retirement arrives, notification must be sent to all concerned.

l. It must be specified in the contract what records of quality assurance activities and tasks shall be made available to the acquirer. The applicable records must be made available via the IS^4.

3.3 ISO/IEC 9126 – Software product evaluation – Quality characteristics and guidelines for their use

The standard discusses Quality Characteristics that relate to software products. The standard does not discuss the supply and support of software in particular but discusses generic quality characteristics as they apply to all software products.

These characteristics have been investigated and applied to the IS^4 as a software product itself (refer to section 5).

3.4 ISO/IEC 9127 –User documentation and cover information for consumer software packages

The software supplied and supported using the IS^4 is a typical consumer software package except that the traditional physical packaging is not present. Due to the user still obtaining the product as a 'ready-made package' the same information requirements apply.

The standard described two types of documentation:

a. User documentation - "This documentation provides users with all the information they need to install and run the software" [8] (Section 1). In the traditional sense this documentation is included within the software packaging and the user only has access to this information after purchasing the product. Similarly in the IS^4, this documentation need only be provided to the user after the product has been purchased.

b. Cover information - "Its purpose is to enable prospective purchasers to decide on the applicability of the software to their requirements" [8] (Section 1). This information is traditionally provided on the external product packaging. In the IS^4, this information should be available to prospective purchasers prior to purchasing the product.

The standard categorises the information into three categories, namely Essential, Conditional and Optional. The same three categories will apply to the information when supplied by the IS^4.

Due to the standard being directly applicable to the IS^4, the details of the standard have not been repeated herein. The standard [5] applies as is to the IS^4.

3.5 ISO/IEC TR 9294 – Guidelines for the management of software documentation

The management of documentation for the IS^4 and the products supplied using the IS^4 will be handled on the organisational and project levels.

All the guidelines that are applied to documentation on the organisational and project levels must however be reflected in the documentation supplied by and developed for the IS^4.

Documentation developed by the IS^4 processes must also comply with the guidelines. Ensuring the documentation complies with the organisational and project standards can ensure this compliance.

3.6 ISO/IEC 15504 – Software process assessment

The ISO/IEC 15504 standard is used to assess processes and determine their respective levels of capability. The processes as detailed in the standard have been rated with the required level of capability for the relevant processes that the IS^4 is to perform. In applying the standard, the processes have been assessed not for the processes of developing the IS^4 system but for the processes that the IS^4 will perform when fully functional and complete. (For the application of ISO/IEC 15504 to the processes of developing the IS^4, refer to section 4). The standard has been used to assess the processes that the system will perform but has not described any new processes that need to be incorporated into the system.

4. Process quality objectives

As has been motivated above, the Internet system used by the SEAL has to be a quality system complaint with the quality standards for all the processes that it performs. In order for the system to be a quality system, it had to be developed using a quality management system consisting of quality controlled processes. Bevan suggests that a quality system is a desirable condition for achieving quality

of the end product. It is difficult to achieve product quality in a large project without an effective quality system [9].

In order to achieve this objective, the entire project of developing the IS^4 was carried out in accordance with the SEAL's Quality Management System (QMS). The SEAL is an ISO 9001 accredited organisation and its QMS is ISO 9001 compliant. The IS^4 was therefore developed using processes that are ISO 9001 compliant.

Furthermore the IS^4 development project was planned in accordance with processes defined in ISO/IEC 15504 [3]. The planned capability levels for the various processes were evaluated for risk according to the capability level ratings as defined in ISO/IEC 15504.

In general, the capability levels assigned to the various processes were based on the capability levels of the SEAL QMS. For processes where the SEAL QMS did not provide the capability levels that were deemed to be necessary for the respective processes, alternative capability levels were defined for the processes and the means for achieving these levels were defined. Refer to Table 2 in the Appendix for the capability levels assigned to each ISO/IEC 15504 process.

5. Product Quality objectives

In order for the system developed to contain quality attributes, quality objectives for the system itself had to be defined. Quality of use is defined as the extent to which a product satisfies stated and implied needs when used under stated conditions [9]. Bevan indicates that quality of use is the objective and software product quality is the means of achieving it [9].

Product Quality objectives for the IS^4 system were based on quality characteristics as defined in the ISO/IEC 9126 standard [4]. For each of the quality characteristics defined in ISO/IEC 9126, the requirements for the system in terms of each characteristic were defined. Refer to Table 3 in the Appendix for the defined system requirements in terms of the quality characteristics.

It has been subsequently realised that the terms in which the requirements were specified were inappropriate. The requirements were specified in general terms as opposed to through the use of metrics. The use of generic terms allows subjectivity to influence the degree of attainment of the quality objectives. Furthermore subjectivity can influence the subsequent evaluation of whether the objectives have been achieved. Neil indicates that in order to apply product measurement we must have criteria of conformance to measure against. Clear objectives set by standards bodies and management must be provided to the development project, in measurable terms. [10]. The 1991 version of ISO/IEC 9126 was used in developing the product quality objectives. This version of the standard provided minimal guidance in the use of metrics. This has however been addressed in the latest version of the ISO/IEC standard (still under development) which addresses the use of metrics extensively.

The specification of the requirements in terms of the quality characteristics did however aid in the development of the specifications for the system. Even though exact metrics were not used, the analysis of the system in terms of the quality characteristics resulted in issues being considered in the design of the system that would otherwise possibly have been overlooked.

One of the product quality objectives defined in ISO/IEC 9126 is that of security. Security on the Internet is a major concern and extensive research was carried out in order to ensure the security of the IS^4. The first security concern in using the Internet in the supply of software products was the prevention of unauthorised duplication and use of the products. This issue has been investigated in the design of the IS^4 and a method has been developed to prevent the unauthorised use of SEAL software products.

The second major security issue investigated has been the use of the Internet for financial transaction processing. Automated transaction processing was one of the key reasons for selecting to use the Internet to supply software products. A secure method for carrying out this process had to be incorporated into the IS^4. In the design of the IS^4 various methodologies for conducting business on the Internet have been investigated. VISA International and Mastercard International in conjunction with major software vendors have developed a standard for Secure Electronic Transactions (SET) [11]. This standard is in the process of being implemented by the concerned parties. The IS^4 is being developed to be SET compliant.

The IS^4 has been developed as part of an MSc and the product developer will not form part of the permanent SEAL team. The administration and maintenance of the system will be the responsibility of other members of the SEAL. Another key product quality objective was therefore that of maintainability. A fundamental task has been the documentation of detailed procedures for general IS^4 maintenance as well as for disaster recovery of the IS^4 should the need arise.

6. Impacts of the quality requirements on the SEAL and on software developers

The investigation into the software quality issues as discussed above resulted in issues that impact on software developers developing software to be supplied by the IS[4] as well as on the SEAL itself.

The main areas that are impacted upon by the results of the investigation are:

a. The product information that must be supplied via the Internet

b. The contract for purchasing of the product

c. Communication channels between the SEAL and its customers

d. The security encryption system used to protect the software products.

6.1 Product Information

The following information must be developed and compiled by the SEAL and software developers and then made available via the IS[4]:

a. The details of the product

b. Product Documentation

c. The QA records as specified in the contract

d. Details regarding future support of the product.

ISO/IEC 9127 [8] describes information and documentation that needs to be supplied to a potential and actual customer of a consumer software package (refer to section 3.4). The developers and suppliers must refer to this standard and then stipulate what documentation will be supplied with the software product. This documentation must then be developed in order to be supplied via the IS[4].

All documentation supplied via the IS[4] must be SEAL QMS compliant, approved and must be the latest approved revisions of the respective documents.

6.2 Contract

A contract is to be drawn up by the product developers and the contract will be made available via the IS[4]. A customer will only be able to purchase the respective product if he/she agrees to the contract. Contract negotiation is outside the scope of the IS[4] system and any sales base on a negotiated contract will be handled outside the scope of the IS[4].

The following must be present in the contract:

a. Proprietary, usage, ownership, warrantee and licensing rights

b. Procedures for initial and subsequent product releases.

c. Details regarding acceptance criteria and testing (or the non-availability thereof).

d. Product delivery details.

e. Details regarding installation obligations (or the absence thereof). Installation will not however be handled by the IS[4] and if required, must be handled outside the scope of the system.

f. The extent to which the developer shall (or shall not) assist the acquirer with set-up activities.

g. Support details.

h. The training to be (or not to be) provided.

i. When the product is replacing a current product, the extent to which the developer shall (or shall not) support any parallel running activities of the acquirer.

j. The QA records that will be made available to the acquirer

6.3 Communication

The investigation into the quality standards revealed the necessity for two-way communications channels between the SEAL and the customers.

6.3.1 Feedback from Customers

The following types of customer feedback are to be received from the customers:

a. Customer complaints

b. Problem reports (for a specific product)

c. Improvement Recommendations

The development team and/or supplier (SEAL) must develop procedures for handling the above types of feedback. These will be received via IS[4] and must be passed on to the responsible party. The responsible party must have procedures for recording and tracking of the feedback and if applicable, controls must be in place to ensure that corrective action is taken and that it is effective

Procedures are also to be in place for providing feedback to the users.

6.3.2 Providing information to customers

The SEAL in conjunction with the software developers must provide migration and retirement information to the customers.

A migration plan must be developed for relevant

software products. When the time of migration arrives, notification must be given to the users. A post-migration review must be performed and users' responses to the post-migration review must be obtained.

A retirement plan must be developed and when the time of retirement arrives, notification must be given to the users.

6.4 Encryption system

Any products made available through the IS[4] contain the SEAL encryption system as described in section 5.

The supplied product must either be inoperable or have only limited features prior to the insertion of the unlocking information. The degree of inoperability will be determined by the product developers.

Once the customer has purchased the product through the IS[4], the following will be presented to the customer on the web site:

a. The registered username (input by the customer on registration)

b. The copy number.

c. The encryption key. This is based on the product copy number and on the registered username.

When the customer runs the purchased product and selects to register the product, the customer must be presented with a form built in to the application. The form must have place to enter the information as listed above. Once the customer obtains this information off the IS[4] and inputs it in to the application, the application must then be opened up for normal usage.

The product developer must draw up a set of instructions detailing how to enter the registration information in the respective application. This can be based on a generic instruction set but must be tailored for the specific application.

7. Impacts of the quality requirements on the IS[4]

The investigation into the quality issues as discussed above and the requirements that have been imposed on the software developers and the SEAL, have both imposed requirements on the IS[4]. The IS[4] has been designed and developed to meet these requirements.

The following are the main categories of requirements resulting from the quality investigations and the requirements imposed on the SEAL and on software developers:

a. Contract agreement mechanisms.

b. Supply of product information

c. Identification and traceability

d. System environment

e. Communication channels

f. Security encryption system

7.1 Contract agreement mechanisms

The IS[4] must contain a mechanism to present the products' contracts to the customer and for the customer to agree to the contract as described in section 6.2.

The system must only allow the customer to purchase the product after agreeing to the respective product's contract.

7.2 Supply of product information

The IS[4] must contain facilities to provide the product information as required by the SEAL and the product developers (refer to section 6.1). The system must contain the flexibility to provide any information as determined necessary by the SEAL and the product developers.

7.3 Identification and traceability

Identification and traceability used on the product's development project level must be usable in the IS[4].

7.4 System Environment

The following are the requirements on the system's environment that have been imposed by the quality standards:

a. Disaster recovery plans must be in place.

b. Virus checking must be implemented.

c. Deterioration of storage material must be taken into consideration.

d. The environment must protect the products from change or corruption.

e. The environment must permit a controlled retrieval of a copy of the product.

f. Repeatability of the replication of software must be ensured.

7.5 Communication channels

Section 6.3 specifies the two-way communication that is necessary between the SEAL and its

customers. The IS[4] has to contain features in order to make this two-way communication possible.

7.6 Security encryption system

The IS[4] must contain the functionality to provide the required encryption information to a customer after a product has been purchased. Refer to section 6.4 for details regarding the information that must be provided.

8. Discussion

The use of the Internet to supply and support software products presents advantages and opportunities to software developers and suppliers. This facility has only recently become a viable option due to the recent rapid growth in the use of the Internet.

The system as discussed herein has been fully developed and meets the initial requirements of the Software Engineering Applications Laboratory in being a quality system requiring low maintenance and support with minimal human intervention.

The investigation into the quality aspects of supplying and supporting software products using the Internet has been performed. The investigation has resulted in the IS[4] being developed using quality processes in order for the system to meet the defined product quality objectives. All the processes that the system performs in supplying and supporting software are compliant with the requirements of the relevant quality standards. The investigations have resulted in requirements being imposed on the SEAL and the development team responsible for respective products that are to be supplied and supported via the IS[4]. Guidance documentation has been developed for use by the development teams when developing products for the IS[4].

The investigation into the supply and support of software using the Internet and the development of the IS[4] has made the use of the Internet in other Academic areas possible. One of these areas is for the registration for and support of Academic courses. This will be implemented in the near future for the support of SEAL software courses.

Internet commerce is an immature field which will continue to be driven by consumer needs for convenient and secure shopping, by merchant needs to securely conduct business in the global market place and by banking needs to provide an effective service to meet consumers' and merchants' needs.

The development of Internet Commerce systems within quality management systems and the operation of the systems according to quality defined processes will ensure that the needs of the consumers, merchant and banks are met. This will ensure that the Internet Commerce systems meet the success for which they are destined.

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10. Author contact details

Bruce Braude is currently a postgraduate student in the Department of Electrical Engineering at the University of the Witwatersrand studying towards the degree of MSc in Software Engineering. Bruce's MSc is entitled "Quality Aspects of Software Product Supply and Support using the Internet." Bruce has obtained his BSc (Hons) in Electrical Engineering and has completed further courses in Software Quality Management. During his studies Bruce has been involved in part time Internet and Intranet development for the Software Engineering Applications Laboratory and for commercial institutions. Bruce is a member of the SEAL Management Board and the Young Members Committee of the South African Institute of Electrical Engineers.

Contact details: Bruce Braude, Software Engineering Applications Laboratory, Department of Electrical Engineering, University of the Witwatersrand, Private Bag 3,P O Wits, 2050 Johannesburg. Office Phone: +27-11-716-5379, Fax: +27-11-403-1929, Internet E-mail: b.braude@ee.wits.ac.za; WWW: http://www.seal.ac.za/

11. Appendix

Table 1 Comparison of the costs of tangible and intangible software product supply			
	Physical Store	**Mail order**	**Electronic – internet based**
Replication	Require tangible storage devices (disks or CDs).	Require tangible storage devices (disks or CDs).	No tangible material
	High machinery or subcontracting costs	High machinery or sub-contracting costs	Cost of file server.
	Costs of material and manpower	Costs of material and manpower	No material and manpower costs
Payment processing	Use of cheques, credit cards or cash.	Use of credit card numbers, cheques, postal orders.	Use of SET
	People required to process the above means of payment	People required to process the above means of payment	Fully automated process
	Possibility of fraud	High level of fraud and all the risk falls on the merchant.	Almost risk free and most of the risk that is present, falls on the banks and clearing houses (Refer to section on SET)
Packaging	Physical packaging required.	Physical packaging required.	No packaging required.
	Cost of packaging material	Cost of packaging material	Packaging costs.
	Cost of labour	Cost of labour	No labour
Delivery	Delivery from manufacturer to wholesaler to store.	Delivery from manufacturer to warehouse to customer	Delivery is via HTTP or FTP on the Internet.
	Costly	Costly	Only cost is the cost of the Internet link for the download period (maximum a few hours)
	Time delay	Time delay	Only a few hours download time
	Human labour required	Human labour required	No human labour
	Can deliver very large product (amount of data)	Can deliver very large product (amount of data)	Practically the product to be delivered must be small to medium in size
Storage and Store Infrastructure	Warehouse and store required	Warehouse required	Storage facility is a single harddrive
	Costly	Costly	Effectively no storage cost
Customers	Customers are bound by location (limited to local customers)	World-wide accessibility	World-wide accessibility
	Must travel to the store	Can shop from any location	Can shop from any location
	High cost and effort to shop (travelling to the shop)	High cost and effort to order a product (international postage and phone calls)	Low order costs (Internet access is free or a local phone call) and minimal effort (assuming potential market is Internet connected)
	Low risk (shop has an infrastructure and is therefore considered to be legitimate)	High risk to customer – store could be a front collecting credit card or other information.	Very low risk to customer (Refer to SET)

Table2 Planned ISO/IEC 15504 Capability levels for IS[4] development project			
ID	Process name	Required level	Risk addressed
CUS.1	Acquire Software	2	No organisation wide procedure. Process will be developed and documented for this project.
CUS.2	Manage customer needs	3	Must support the stated business goals of the organisation. Uses organisation wide procedures (PD, PFS, QP)
CUS.3	Supply software	2	No organisation wide procedure. Installation will form part of the development and is unique to this project.
CUS.4	Operate software	2	The operation of the software is specific to this project and not to the business wide procedures.
CUS.5	Provide customer service	N/A - beyond the scope of this project	-
ENG. 1	Develop system requirements and design	3	Organisation wide process of software development that will be tailored for this process. (Product Functional Specification, User Reference Manual)
ENG.2	Develop software requirements	3	Organisation wide process of software development that will be tailored for this process. (Product Functional Specification, User Reference Manual)
ENG.3	Develop software design	3	Organisation wide process of software development that will be tailored for this process. (High Level Design, Low Level Design)
ENG.4	Implement software design	2	The implementation of the design is specific to this project and does not follow any standard procedure.
ENG.5	Integrate and test software	3	Organisation wide process of software development that will be tailored for this process. (Product Test Specification,)
ENG.6	Integrate and test system	3	Organisation wide process of software development that will be tailored for this process. (Product Test Specification)
ENG.7	Maintain system and software	Not applicable - beyond the scope of this project.	-
SUP.1	Develop documentation	3	Based on organisational wide procedures (Master Document List)
SUP.2	Perform configuration management	3	Based on organisational wide procedures (Configuration Management Plan)
SUP.3	Perform quality assurance	3	Based on organisation wide procedures (Quality Plan)
SUP.4	Perform work product verification	3	Based on organisation wide procedures (Requirements Verification and Validation Template)
SUP.5	Perform work product validation	3	Based on organisation wide procedures (Requirements Verification and Validation Template)
SUP.6	Perform joint reviews	3	Based on organisational wide procedures (Student/ Supervisor meetings)

Table2 Planned ISO/IEC 15504 Capability levels for IS[4] development project			
ID	**Process name**	**Required level**	**Risk addressed**
SUP.7	Perform audits	3	Based on organisational wide procedures (SEAL project audits)
SUP.8	Perform problem resolution	3	Based on organisational wide procedures (SEAL QMS)
MAN.1	Manage the project	3	Based on organisational wide procedures (SEAL QMS)
MAN.2	Manage quality	3	Based on organisational wide procedures (SEAL QMS)
MAN.3	Manage risks	2	Process is specific to this project and not carried out on an organisation wide basis.
MAN.4	Manage subcontractors	2	Process is specific to this project and not carried out on an organisation wide basis.
ORG.1	Engineer the business	N/A on the project level	-
ORG.2	Define the process	N/A on the project level	-
ORG.3	Improve the process	N/A on the project level	-
ORG.4	Provide skilled human resources	N/A on the project level	-
ORG.5	Provide software engineering infrastructure	N/A on the project level	-

Table3 Product Quality objectives for the IS[4]	
Quality characteristic	**Product requirements**
1. Functionality	
1.1 Accuracy	1.1.1 The credit card, username and password and software encryption key information is to be 100% accurate. 1.1.2 Statistics presented to the system administrator are to be as accurate as required by the customer. This will be specified further after the development of a Product Functional Specification. 1.1.3 The accuracy of information input by a user is dependant on the specific user being accurate. This is to be enhanced as far as possible by creating user friendly and well commented user interfaces. Input masks can also be used to enhance user input accuracy.
1.2 Suitability	1.2.1 The software to be developed is to meet the customer's requirements as specified in the Product Description. 1.2.2 The system is also to be suitable to users for the use of the system. Other payment systems are to be investigated and researched in order to determine market norms prior to the development of the QSI system.
1.3 Interoperability	1.3.1 The system is to interoperate with other facilities such as the larger SEAL Web facility and the specific product pages. 1.3.2 The system is also to interoperate with the international system used for the payment mechanism. 1.3.3 The system is also to interoperate with the SPICE encryption tool mechanism. 1.3.4 The system is to interoperate with standard Web browsers such as Internet Explorer 3 and Netscape Navigator 3. 1.3.5 The system is to interoperate with any standard secure web server.
1.4 Compliance	1.4.1 The system is to comply with any requirements as required by the selected international payment mechanism.
1.5 Security	1.5.1 The system is to be sufficiently secure so that the effort required to break into the system and obtain information far outweighs the gain obtained by receiving the information.
2. Reliability	
2.1 Maturity	2.2.1 The process that the product is to perform is to be at a level 4 for Cus.3 (Supply software) in the ISO/IEC 15504 standard.
2.2 Fault tolerance	2.2.2 Due to the financial nature of the tasks of the system, the system is to have zero tolerance in errors in critical user information such as credit cards, usernames and passwords.
2.3 Recoverability	2.3.1 The system is to be totally recoverable in the event of a disaster such as hardware failure or fire. 2.3.2 The recovery time is to be the standard time for a backup restoration. 2.3.3 The recoverability a specific transaction, should the system fail during a transaction must be investigated.
2.4 Availability	2.4.1 The system is to be available permanently. 2.4.2 Breaks in availability can however be tolerated in the event of a power failure or system failure. The break in availability is not to be more than a few hours.
3. Usability	
3.1 Understandability	3.1.1 The system is to contain features, technology and documentation in order to ensure user confidence in the use of the system for payment of the supplied product over the Internet. 3.1.2 On the Web interface, QSI system is to be described.

Table3 Product Quality objectives for the IS[4]	
Quality characteristic	Product requirements
	3.1.3 The functions and use of the QSI system is to be described in detail.
3.2 Learnability	3.2.1 The Web interface and administrator's interface are to use standard layouts and standard controls in order to make the learnability of the interfaces as simple as possible. 3.2.2 Detailed User Reference Manuals are also to be developed.
3.3 Operability	3.3.1 The system is to be simple to use and instructions are to be present within the system (on the Web and administrative interfaces) to guide the user through the use of the system. 3.3.2 The system must be able to function fully with as minimal administrative human intervention as possible.
4. Efficiency	
4.1 Time behaviour	4.1.1 The system is to have a time response as can be considered reasonable for Internet usage. 4.1.2 During usage, the system is to provide information and respond to user inputs at a reasonable speed, that is the processing and download speeds are to be reasonable for Internet norms. 4.1.3 Further more the speed of confirmation or reply to users via e-mail is to be reasonable (a few hours).
4.2 Resource utilisation	4.2.1 The system must be designed and have sufficient resources in order to allow multiple users to use the system simultaneously.
5. Maintainability	
5.1 Analysability	5.1.1 The system will be supported by the standard documentation as prescribed by the SEAL QMS in order to provide details required for maintenance and updating. This documentation will aide in the analysis of the QSI system.
5.2 Changeability	5.2.1 The system will be required to be changed in order to meet changing on-line payment standards. 5.2.2 By developing the system within the Process quality objectives, the changeability of the system will be maximised.
5.3 Stability	5.3.1 The system must be well designed and documented in order to minimise the unexpected affects of modifications.
5.4 Testability	5.4.1 The system is to be well designed and documented in order to ensure testability of modifications. 5.4.2 The system is to be modularised. Therefore modification to a module can be tested in that module.
6. Portability	
6.1 Adaptability	6.1.1 The system need not be adaptable to run in other environments. The system is to be developed for use by the SEAL in a stable non-changing environment.
6.2 Installability	6.2.1 The system need not have a high level of installability as the development of the system includes the installation of the system in its final environment.
6.3 Co-existence	6.3.1 The system should be able to co-exist with any other software in the same environment. 6.3.2 However due to security concerns, the system will probably not co-exist with any other software in the same environment.
6.4 Conformance	6.4.1 Due to no requirement for portability existing, standards relating to portability are not applicable.
6.5 Replaceability	6.5.1 Not applicable. The system will not be replacing any other software.

The use of the Internet in an academic environment to commercially supply and support software products

B.Braude

Software Engineering Applications Laboratory, Electrical Engineering,
University of the Witwatersrand, Johannesburg, South Africa

Summary: *This paper explores the use of the Internet to supply and support software products within a quality management system. The Software Engineering Applications Laboratory (SEAL) at the University of the Witwatersrand is in the process of developing various software products that will be commercially distributed in the near future. The SEAL has chosen to use the Internet to supply and support these products. A system has been developed for this task and has been named the Internet System for the Supply and Support of Software (IS^4). Issues that have influenced the design of the IS^4 have been the service processes within a quality management system, the control of the supply and licensing of the supplied products and the transaction processing of the on-line sales. The SEAL is committed to developing and supplying software within a quality management system. Consequently an investigation was undertaken into the quality characteristics and requirements based on the ISO 9001 standard for quality assurance and the ISO/IEC JTC1/SC7 software engineering standards. These quality concerns have been incorporated into the SEAL's quality management system and the development process for SEAL products. To control the supply and licensing of the supplied products, various issues such as unlock keys, Internet based registration, controlled access and hardware control have been investigated. The advantages and disadvantages of each have been investigated and a suitable implementation has been used in the IS^4. To process the on-line transactions the IS^4 will be developed to be compliant with the recently released 'Secure Electronic Transactions' (SET) standard*

Keywords: *software quality management, software engineering standards, secure electronic transactions, Internet commerce*

1. Introduction

The Software Engineering Applications Laboratory (SEAL) at the University of the Witwatersrand is in the process of developing various software products that will be commercially distributed in the near future. The SEAL has investigated various means for supplying and supporting these products. The SEAL will use the Internet for this task. An Internet based system was selected due to suitability and advantages of using such a system. The system was named Internet System for the Supply and Support of Software, (IS^4). Issues that have influenced the design of the IS^4 have been the service processes within a quality management system, the control of the supply and licensing of the supplied products and the transaction processing of the on-line sales.

The SEAL is an organisation committed to Software Quality and is extensively involved in the development and application of software quality standards and procedures. Some of the applications to be supplied by the IS^4 are used in the application of software quality standards. One of the initial requirements of the IS^4 was therefore that the system complies with all the relevant software quality standards relating to the supply and support of software. An investigation was undertaken into the quality standards dealing with the supply and support software and their application in the Internet environment.

An issue that is a major concern in the supply of software products is the prevention of unauthorised duplication and use. In the IS^4 the product is supplied over the Internet and this problem is compounded further. This issue has been investigated in the design of the IS^4 and a method has been developed to prevent the unauthorised use of SEAL software products.

In the design of the IS^4 various methodologies for conducting business on the Internet have been investigated. VISA International and Mastercard International in conjunction with major software vendors have developed a standard for Secure Electronic Transactions (SET). This standard is in the process of being implemented by the concerned parties. The IS^4 is being developed to be SET compliant.

The results of these investigations have been taken into account in the development of the IS^4.

2. Initial requirements and advantages of an Internet based system

2.1 Initial system requirements

The initial requirements included:

a. Low maintenance with minimal human intervention

b. Automated electronic supply mechanism

c. Automated electronic payment mechanism

d. Secure from unauthorised entry and actions

e. Compliance to all relevant software process and product quality standards

f. Development within a quality management system

One of the key considerations in the formulation of these requirements was that the SEAL has limited manpower and resources. The main business of the SEAL is education and human and economic resources could not justifiably allocated to support an expensive infrastructure for the supply of tangible product. Point a) was therefore a key issue in the initial stages of system description. After examining the different options for supplying software (section 2.2) the use of the Internet was the only feasible choice. This consideration lead to the identification of further requirements for the supply and support system. Along with the decision to use an Internet based system, came the security requirement.

The requirements relating to the Software Quality Management arose due to the SEAL's commitment to quality (Section 3).

2.2 Comparison between physical and electronic based systems

Various options were reviewed for supplying software products in the selection of a process to supply and support SEAL software products. These considerations are detailed in Table 1. As can be seen, the use of the Internet was the obvious choice in the SEAL's environment.

2.3 Developed system

The developed system allows for the sale of SEAL software products via the Internet. The IS^4 serves as a fully automated system for capturing a user's details, allowing the user to select from the various products, acquiring the user's order information, processing the order and then providing the user with access to the selected software product. The system also provides support to the users for the respective purchased software products.

The system contains a store manager interface in order to update the system with regards to products and to be able to monitor the transactions that the system has performed. The system has also attempted to automate the transaction processing with banking institutions as far as possible. This has not been fully achievable in the current version of the system but will be implemented in a subsequent release. The two interfaces of the system, namely the manager and shopper interfaces are connected via the system's underlying database.

2.3.1 Shopper Interface

The shopper interface of the IS^4 is accessed over the Internet using a personal computer (PC) and a Web browser. The internet connection between the IS^4 and the shopper's web browser is over a secure link (SSL) thereby protecting the transmitted information from any unauthorised access.

When accessing the system the user is presented with a welcome web page and a main menu. Before logging into the system the shopper has the following options from the main menu:

a. **Login** - If the shopper has not previously registered with the system the Login section allows the shopper to input contact information and register with the system. The shopper also selects whether to be on the SEAL mailing list. Upon registration the shopper is assigned a username and password pair allowing the shopper to log in to the system. Once the shopper has logged in to the system he may proceed with purchases and other actions as described below.

b. **View Products** - The View Products section serves as a catalogue for potential customers, allowing them to browse the 'goods on display' without requiring them to register with the system. This section also supports downloading of the software products.

c. **Information** - The Information section contains information relating to the use of the IS^4, the security and transaction processing used in the IS^4 and contact details for the IS^4 administrator.

Once a shopper logs in to the system using his username and password, he is then presented with the following additional options to the ones listed above:

Table 1 Comparison of the costs of tangible and intangible software product supply

	Physical Store	Mail order	Electronic – Internet based
Replication	Require tangible storage devices (disks or CDs).	Require tangible storage devices (disks or CDs).	No tangible material
	High machinery or subcontracting costs	High machinery or sub-contracting costs	Cost of file server.
	Costs of material and manpower	Costs of material and manpower	No material and manpower costs
Payment processing	Use of cheques, credit cards or cash.	Use of credit card numbers, cheques, postal orders.	Use of SET
	People required to process the above means of payment	People required to process the above means of payment	Fully automated process
	Possibility of fraud	High level of fraud and all the risk falls on the merchant.	Almost risk free and most of the risk that is present, falls on the banks and clearing houses (Refer to section on SET)
Packaging	Physical packaging required.	Physical packaging required.	No packaging required.
	Cost of packaging material	Cost of packaging material	No packaging costs.
	Cost of labour	Cost of labour	No labour
Delivery	Delivery from manufacturer to wholesaler to store.	Delivery from manufacturer to warehouse to customer	Delivery is via HTTP or FTP on the Internet.
	Costly	Costly	Only cost is the cost of the Internet link for the download period (maximum a few hours)
	Time delay	Time delay	Only a few hours download time
	Human labour required	Human labour required	No human labour
	Can deliver very large product (amount of data)	Can deliver very large product (amount of data)	Practically the product to be delivered must be small to medium in size
Storage and Store Infrastructure	Warehouse and store required	Warehouse required	Storage facility is a single harddrive
	Costly	Costly	Effectively no storage cost
Customers	Customers are bound by location (limited to local customers)	World-wide accessibility	World-wide accessibility
	Must travel to the store	Can shop from any location	Can shop from any location
	High cost and effort to shop (travelling to the shop)	High cost and effort to order a product (international postage and phone calls)	Low order costs (Internet access is free or a local phone call) and minimal effort (assuming potential market is Internet connected)
	Low risk (shop has an infrastructure and is considered to be legitimate)	High risk to customer – store could be a front collecting credit card or other information.	Very low risk to customer (Refer to SET)

a. **View Products** - The View Products section is the same catalogue as the one accessible to non-logged in shoppers however if the shopper is logged in, he may select products for purchase by adding them to his shopping basket.

b. **Shopping Basket** - The Shopping Basket is analogous to a shopping basket used in a supermarket. The shopper may add and remove items from the basket and when satisfied select to purchase the items in the basket. On selection to purchase, the shopper is presented with an invoice that must be printed out and included with any payment made to the SEAL (refer to section 5).

c. **Registered Products** - The Registered Products section is used to view details of purchases made by the shopper. Included in these details are details for unlocking purchased products for full usage (refer to section 4). In this section the shopper may

subscribe to and unsubscribe from mailing lists relating to the respective purchased products.

d. **Feedback** - The Feedback section is used for the shopper to input various types of feedback to the SEAL.

e. **User Information** - The User Information section is used for modifying registration and mailing list information entered when registering with the system.

f. **Logout** - The Logout option is used to log out of the system.

2.3.2 Manager Interface

The manager interface of the IS^4 is accessed over the Internet using a personal computer (PC) and a Web browser. The Internet connection between the IS^4 and the manager's web browser is over a secure link (SSL) thereby protecting the transmitted information from any unauthorised access. Furthermore a username and password is needed to access the manager interface.

On accessing the interface the manager is presented with a main menu containing links to the various sections. The interface has the following sections:

a. **Products Section** – The Products Section lists all the products in the system. The section allows for the addition and deletion of products. The IS4 manager can view a product's details as well as the details of the product's entities (Information items, documentation, downloads and dependencies). The user can edit the product as well as any of its entities. Furthermore entities can be added or deleted

b. **Feedback section** - The Feedback Section lists all the feedback items received from shoppers according to selectable criteria. The IS4 manager can view selected feedback items' details

c. **Mail section** - The Mail section allows the manager to compose a mail message and send it to a selected group of registered shoppers. Furthermore the Mail section lists all the mail items sent to shoppers according to selectable criteria. The IS4 manager can view a selected mail item's details and delete the item if required.

d. **Orders section** - The Orders Section lists orders received from shoppers according to selectable criteria. From this list the manager can select to view the details of a selected order and approve selected orders as being paid for. Furthermore the manager can select to view order statistics.

e. **Purchased products section** - The Purchased Products Section lists the products that have been purchased by the respective shoppers according to selectable criteria. From this list the manager can select to view the details of a selected purchase. Furthermore the manager can update details relating to a purchase as well as delete a purchase.

f. **Shoppers section** - The Shoppers Section lists all the shoppers in the system according to selectable criteria. The section allows for the addition and deletion of shoppers. The IS4 manager can view a shopper's details as well as the details of the shopper related entities (shopping basket, receipts and purchased products). The user can edit the shopper's details as well as add, delete and edit purchases for the shopper. Furthermore the manager can view statistics for the shoppers.

g. **Events section** - The Events Section lists events that have been incurred by shoppers interacting with the shopper interface. The interface allows the manager to select criteria for which to list the events.

3. Software quality issues and their impact on the IS^4 system

The SEAL is committed to supplying and supporting software within a quality management system. The SEAL is an ISO 9001 rated organisation and is involved in extensive research in the field of Software Quality. A number of products to be supplied via the IS^4 are related to Software Quality Standards and the application thereof. A number of SEAL customers will also come from a Software Quality environment. It is imperative that the software supplied and supported by the SEAL, be done so in a quality controlled manner compliant with all the relevant quality standards.

An investigation has been undertaken into the relevant quality standards and into how the requirements of the standards can be addressed in an Internet based supply and support system. The ISO 9000 related series and the ISO/IEC JTC1/SC7 software engineering standards have been investigated.

The investigation examines issues that impacted on, or are part of the supply and support of the software product. The investigation assumes that the organisation developing and supplying the software is already compliant with the standards in the physical environment. The investigation only explores the application of the standards to the supply and support of software using the Internet.

The discussion of each of the standards and the discussion of the applicability of each clause to the IS[4] is beyond the scope of this paper. The requirements derived from the investigation into each of the standards are listed below.

3.1 ISO 9001 [1] and related standards.

a. The products supplied by the IS[4] are to be treated as 'shrink wrapped' products. A contract will be developed and will be a non-negotiable contract that is developed by the supplier. Any contract negotiation will have to be conducted outside the scope of the IS[4].

b. All documentation supplied via the IS[4] must be handled in the same manner as all other organisational documentation, that is in compliance with ISO 9001

c. All product identification and traceability used on the organisational level must be reflected in all products and artefacts supplied via the IS[4]

d. ISO 9000-3 states that "to protect the integrity of the product and provide a basis for the control of change, it is essential that software items be held in an environment which:

   i. Protects them from unauthorised change or corruption

   ii. Permits the controlled retrieval of a copy of the controlled master" [2] (Section 4.15.3).

e. Precautions must be taken due to the material on which the software is stored, deteriorating. The storage area will be the server on which the product is stored. ISO 9001 and ISO 9000-3 further state that access control must be instituted.

f. Issues that are applicable to replication in the supply of software via the Internet are:

   i. The master and other copies must be identified.

   ii. Disaster recovery plans must be developed.

   iii. The period of obligation of the supplier to supply copies of the respective products must be determined

   iv. Virus checking must be carried out

   v. The required documentation to be supplied must be stipulated

   vi. Copyright concerns must be addressed and agreed to (in the contract)

   vii. The environment must be controlled to ensure repeatability of replication

g. Only released products must be made available through the IS[4].

h. The control of non-conforming product requirements must be followed on the project and organisational levels to ensure that no products are unintentionally released to the IS[4].

i. Installation of the purchased product falls beyond the scope of the IS[4] and if installation is to be carried out by the supplier, it is to be handled outside the scope of the IS[4]. This must be specified in the contract.

j. Procedures must be developed within the IS[4] to receive and handle (pass on to the relevant party) customer complaints.

3.2 ISO/IEC 12207 – Software lifecycle processes

a. The contract is to "address proprietary, usage, ownership, warrantee and licensing rights associated with the reusable off the shelf products" [3] (Section 5.1.3.4).

b. The delivery and support of the product by the supplier must be specified in the contract and carried out as specified.

c. It must be specified in the contract that the supplier cannot install the product, assist the acquirer with set-up activities or support of any parallel running activities when the installed software product is replacing an existing system.

d. The resources and information necessary to install the software product must be determined by the supplier and be made available to the acquirer.

e. It must be specified in the contract that the developer cannot support the acquirer's acceptance review and testing of the software product.

f. The initial and continuing training and support to be provided to the acquirer must be specified in the contract

g. The IS[4] must provide a means for the users of purchased products to report problems and request modifications. Once the report is received, the maintainer is to record and track the problem.

h. The IS[4] must facilitate the communication of change requests between the developer/modifier and the user (acquirer).

i. The IS[4] must provide for a means to provide feedback to the users.

j. The IS[4] must provide a mechanism to

communicate with the users and provide them with migration information. When the scheduled migration arrives, notification must be given to all concerned. A post-operation review must be performed.

k. The IS[4] must provide a mechanism to communicate with the users and provide them with retirement information. When the scheduled retirement arrives, notification must be sent to all concerned.

l. It must be specified in the contract what records of quality assurance activities and tasks shall be made available to the acquirer. The applicable records must be made available via the IS[4].

3.3 ISO/IEC 9126 – Software product evaluation – Quality characteristics and guidelines for their use

The standard discusses Quality Characteristics that relate to software products. The standard does not discuss the supply and support of software in particular but discusses generic quality characteristics as they apply to all software products.

These characteristics have been investigated and applied to the IS[4] as a software product itself.

3.4 ISO/IEC 9127 –User documentation and cover information for consumer software packages

The software supplied and supported using the IS[4] is a typical consumer software package except that the traditional physical packaging is not present. Due to the user still obtaining the product as a 'ready-made package' the same information requirements apply.

The standard described two types of documentation:

a. User documentation - "This documentation provides users with all the information they need to install and run the software" [4] (Section 1). In the traditional sense this documentation is included within the software packaging and the user only has access to this information after purchasing the product. Similarly in the IS[4], this documentation need only be provided to the user after the product has been purchased.

b. Cover information - "Its purpose is to enable prospective purchasers to decide on the applicability of the software to their requirements" [4] (Section 1). This information is traditionally provided on the external product packaging. In the IS[4], this information should be available to prospective purchasers prior to purchasing the product.

The standard categorises the information into three categories, namely Essential, Conditional and Optional. The same three categories will apply to the information when supplied by the IS[4].

Due to the standard being directly applicable to the IS[4], the details of the standard have not been repeated herein. The standard [4] applies as is to the IS[4].

3.5 ISO/IEC TR 9294 – Guidelines for the management of software documentation

The management of documentation for the IS[4] and the products supplied using the IS[4] will be handled on the organisational and project levels.

All the guidelines that are applied to documentation on the organisational and project levels must however be reflected in the documentation supplied by and developed for the IS[4].

Documentation developed by the IS[4] processes must also comply with the guidelines. Ensuring the documentation complies with the organisational and project standards can ensure this compliance.

3.6 ISO/IEC 15504 – Software process assessment

The ISO/IEC 15504 standard is used to assess processes and determine their respective levels of capability. The processes as detailed in the standard have been rated with the required level of capability for the relevant processes that the IS[4] is to perform. In applying the standard, the processes have been assessed not for the processes of developing the IS[4] system but for the processes that the IS[4] will perform when fully functional and complete. The standard has been used to assess the processes that the system will perform but has not described any new processes that need to be incorporated into the system.

4. Internet management of the software supply and licensing

In the supply of tangible products, whether from a tangible or virtual store, unauthorised replication and use is not a concern for suppliers due to the difficulty and cost of replicating the product.

With digital products, replication is simple and cheap and measures have to be implemented in order to prevent the unauthorised replication and use of the product. In the supply of digital products on physical media (disks and CDs) unauthorised use is controlled to an extent through the localised

dispersion of the physical media containing the data. To replicate a CD, one has to have access to another CD containing the data.

In the supply of data over the Internet, the problem becomes a far more serious one. Access to the data is world-wide and methods of obtaining data off the Internet are common (FTP). In order to combat this unauthorised use of data (products), control can be exercised on two levels. Firstly the access to the location to download the data can be restricted and secondly use of the product once obtained can be restricted.

4.1 Access control

Access to download a product can be controlled by:

a. Password protecting the pages used to download the product. Either a unique password for each customer will provide access to the pages or a generic password can be used.

b. Hiding the location (URL) of the Web pages used to download the product and providing the address to customers after the purchase of the product.

The problem with the above methods is that the information necessary to download the product (password or URL) can be passed on to unauthorised people or even be posted on the Internet. Furthermore, once a copy of the product is obtained, it can be copied or made available on the Internet without any traceability. Between the options above, the unique password for each customer would be the most preferably as dissemination of access information to unauthorised parties could then be traced to a particular customer.

4.2 Use control

The use of digital products can be controlled through requiring the user to 'unlock' the product before being able to use it. Prior to unlocking the product, use can be fully restricted or limited use can be granted.

The following different types of unlock systems can be used:

a. The product can require the user to input some type of password.

b. The product can require a type of hardware key to be attached to the computer in order to unlock the product.

c. Internet based unlocking

4.2.1 Password key

Password keys can be implemented in a number of ways. Firstly the product can be totally locked prior to insertion of the password key. In this case the product can either require the user to input the key during installation of the product or each time the product is used. The more common method is during installation as this is a once off procedure and thereafter the product can be used normally. The product can only be installed by running the installation procedure and if anyone obtained a copy of the program they would have to run the installation and input the unlock key.

In the situation where limited access to the product is granted prior to insertion of the key, the product is installed and run. Only limited access to product functionality is provided. Once the user obtains the key (after purchase) the key is input into the running application and access to all the functionality is provided. This is a once off procedure and the product is thereafter fully functional every time it is used. If the product is installed again the unlock key has to be reinserted.

The actual key can be implemented in a number of ways.

a. A single key for use by all users. This implementation is the most simplistic. The main drawback of this implementation is that the key can be distributed illegally on a wide scale without any traceability.

b. A specific key per user per product. This is described in detail in section 4.3.

4.2.2 Hardware key

Hardware keys, commonly known as dongles, are devices that attach to the PC or network on which the software runs. When the product is run, it checks for a specific key and will only run if the key is present. The keys normally attach to the parallel port of the PC. Software protected with hardware keys is practically totally secure.

The disadvantage of a hardware key in the Internet environment is that the hardware key becomes a physical product that has to be delivered and defeats the advantages of digitally supplying the product over the Internet (Refer to section 2.2 above) The use of hardware keys has therefore not be investigated any further in the supply and support of software over the Internet.

Hardware keys may become a viable option in the future. With the emerging use of smartcards for commerce, the Internet purchasing system may eventually incorporate the use of smartcard readers on PCs for Internet payments instead of users paying with a software based digital wallet. The smartcard could then be used as the hardware key. During purchase the supplier can read the user's smartcard information. This information can then

be incorporated into the protection system on the supplied product. After purchase the smartcard would then be used to unlock the product for use. This would alleviate the supplier having to supply a unique hardware key to each customer.

4.2.3 Internet based unlocking

A system can be implemented where the purchased product is automatically unlocked over the Internet. The system would work as follows:

a. The customer would download the product

b. The customer would purchase the product on-line.

c. The customer would run the product installation. During installation the product would prompt the user for his IS[4] username and password. Using this information the product would connect to the server and the server would unlock the product by passing it some encryption string.

If the system allows each customer purchase to only unlock the product once, it makes the system secure to unauthorised use of the products. This cannot however be used because the customer cannot then reinstall the product in the event of a hardware upgrade, computer failure etc.

Another disadvantage of this system is that the product has to be installed on a machine connected to the Internet. The other methodologies discussed herein allow the product to be downloaded and purchased on an Internet connected machine and then installed on an isolated machine.

This methodology can be carried out with installation on a non-Internet-connected machine as follows, however the disadvantage of a once only installation still holds:

a. The customer downloads the product

b. The customer purchases the product on-line

c. The customer runs the installation program. During installation the program generates a random number.

d The customer then manually inputs this number into the Internet based purchasing system using his username and password.

e. The Internet system encrypts the number and presents it to the customer. The customer then inputs the encryption number into the application.

f. The application then decrypts the number and if it matches the original random number, it then unlocks the application.

g. The Internet system will be set to only encrypt one number per customer per purchase.

This method still has the disadvantage of allowing a once only unlocking.

If the server allows for the product to be unlocked multiple times in this manner, the system reduces the methodology of 4.2.1b above.

4.3 Method to be used by the IS[4]

The SEAL uses a control system where it allows the user to download the product and use it with limited features for a limited period. After evaluation the user can decide to purchase the product.

On the IS[4] the user selects the product and purchase it. After the purchase has been processed, the user is given a product number for that product (a sequential number for each copy of the product purchased) and an unlock key. This key is based on the following being passed through a one way hash function:

a. The registered username which has been input by the customer during registration on the IS[4]

b. The product identification, which is a unique code specific to each product name. This number is hard coded into the application.

c. The product version which is hard coded into the application.

d. The product number as given to the customer. The product number is necessary should a specific user want to purchase multiple copies of the product (a large company).

With this information in hand the user can then open the registration window in the already installed product and input the username, product number and key. The product contains the same hash function and will generate the key. If the generated key matches the input key, the product opens up with full functionality.

Due to the customer requiring access to the product in order to evaluate it prior to the purchase, access control as described in section 4.1 cannot be used.

The only way to bypass this system is for a user of a particular product to pass on his username, product number and key to an unauthorised user for use on the same product. Authorised users will hesitate to do this, especially publicly, as the information is traceable back to the offending customer. This then reduces the control problem back to a localised dispersion problem as has been described regarding the distribution of digital products on physical media.

Once off installations, and Internet based unlocking have not been used due to the disadvantages

discussed in section 4.2.3 above.

5. Secure electronic transactions

5.1 Standard transaction process

After a shopper browses an Internet store and selects the products for purchasing, the following is the process for completing the transaction:

a. The customer's order and payment details are sent to the merchant.

b. An Internet based receipt is then issued to the customer.

c. On receipt of the order and the payment details the merchant passes the payment details to the bank.

d. If available (as is the case with SET) approval is then obtained from the bank.

e. The merchant then supplies the goods to the customer (ships or makes available via the Internet) and charges the customer for the goods.

5.2 Overview of the SET standard

"Visa and MasterCard have jointly developed the Secure Electronic Transaction (SET) protocol as a method to secure payment card transactions over open networks. SET is being published as an open specification for the industry. This specification is available to be applied to any payment service and may be used by software vendors to develop applications.

Advice and assistance in the development of this specification have been provided by GTE, IBM, Microsoft, Netscape, RSA, SAIC, Terisa, and VeriSign" [5].

The SET standard is specified in three books namely a Business Description, Programmer's guide and Formal Protocol Definition. This discussion only investigates the SET standard on the business level.

Through using well defined procedures, SET uses cryptography to:

- provide confidentiality of information,
- ensure payment integrity, and
- authenticate both merchants and cardholders.

The following implementations of cryptography are used in order to achieve the requirements above:

a. Symmetric key encryption

b. Public key encryption

c. Digital signatures using public keys and message digests

d. Digital Certificates

A detailed description of the use and interactions of the above-mentioned cryptographic implementations is beyond the scope of this paper. Refer to reference [5] for more details.

5.3 Advantages of SET to merchants and customers

Currently prior to the availability of SET, there are other methods for carrying out Internet based transactions. These methods are relatively secure but have some disadvantages when compared to SET. Even though the non-SET systems have disadvantages as tabled below, the level of credit card fraud on these systems is far lower than the fraud level in the physical world.

Table 2 SET considerations

	Non-SET	SET
Encryption between customer and merchant	None or low level 40-bit SSL	Very high levels of encryption
Access to payment information (credit card details)	Merchant has access to credit card details and these can be stored on the merchant server in large volumes	Merchant receives credit card details in encrypted format, which only the bank can decrypt.
Integrity of data	Data can be altered without the merchant or bank knowing.	Data is digitally signed throughout the entire process
Customer Identity	Customer could be using fraudulent credit card details	Customer has a digital certificate containing the credit card details and uses digital signatures.
Merchant Identity	Merchant could be a fake collecting credit card details.	Merchant has a digital certificate and uses digital signatures.
System Interoperability	Merchant must manually process transactions or use a proprietary system to the bank.	Standardised protocols and message formats.

5.4 Implementation of a SET compliant system

The following three software components make up a SET system:

a. SET compliant consumer wallets

b. SET merchant software

c. A SET payment gateway connected up to the banks' credit card systems.

Currently SET software developers are developing the above three software components. Using standard protocols and message formats the three components interact with each other as defined by the SET standard.

The SET payment gateway is set up by or on behalf of a banking institution that signs up credit card merchants. This gateway communicates with the SET merchant software to receive authorisation requests and thereafter for the merchant to capture payments.

The SET merchant software is used firstly to accept customers' purchase requests and reply to the customer's purchase requests. Thereafter it is used to communicate with the payment gateway as described above. The SET merchant software does not contain the software for the store itself. The merchant must set up the store and thereafter the merchant connects the SET merchant software to the on-line store.

The SET consumer wallet is used to submit SET compliant purchase requests to the merchant. SET consumer wallets will be available freely off the Internet or at a minimal charge (depending on the brand.)

Currently the software components have been developed to be SET version 1 compliant. Due to the formal description of protocols and messaging, all three SET components from any software vendor should interoperate with any of the components from any other SET compliant software vendor.

Prior to conducting any SET transactions using the software components described, the merchant and the consumer have to register and obtain digital certificates. The merchant must register with an Acquiring Bank and the consumer must have a credit card issued by its Issuing Bank. Certificates are then issued by Certificate Authorities (CA). The CAs can be the Acquiring and Issuing banks respectively or third parties acting on behalf of these financial institutions. These certificates contain merchant and user details respectively in order for all parties to be identifiable during transactions.

"A certificate is only issued to the cardholder when the cardholder's issuing financial institution approves it. This certificate is transmitted to merchants with purchase requests and encrypted payment instructions. Upon receipt of the cardholder's certificate, a merchant can be assured, at a minimum, that the account number has been validated by the card-issuing financial institution or its agent" [5].

Likewise a certificate is only issued to a merchant with the approval of the merchant's acquiring bank. "These certificates are approved by the acquiring financial institution and provide assurance that the merchant holds a valid agreement with an Acquirer" [5].

The consumer's SET wallet and the merchant's SET software contain functionality to obtain the required digital certificates from the respective CAs.

Once the software and certificates are in place, the merchant can begin with SET compliant transactions.

SET implementations are currently in pilot testing stages with a few banks setting up bank gateways for use with a few merchants and limited customers. After this pilot test phase, more merchants and consumers will be brought into the testing until the gateway is opened up for use by any merchants (subject to standard banking requirements) and all customers. This is predicted to take place towards the end of 1998 or early in 1999.

5.5 SET Compliance in the IS4

During the design and development of the IS4, it has been the aim to incorporate SET compliance into the system. Due to delays in the development of the SET payment infrastructure, it has not yet been possible to SET enable the IS4. This is still an aim for the future.

Due to the unavailability of SET, an alternative arrangement had to be implemented in order to enable software products to be purchased on the IS4. Because the future aim is to SET enable the IS4, it was decided not to invest time and resources implementing a different payment technology. As a temporary measure, a procedure has been implemented where a shopper is presented with an Internet based invoice for the products to be purchased. The shopper must then print the invoice and include this invoice with a traditional means of payment (cheque, cash etc). Upon processing of the payment, the IS^4 manager then approves the purchase in the IS^4 Manager interface and the encryption details necessary to unlock the purchased products are made available to the shopper.

6. Current Status of the IS4

The investigations into the various aspects as discussed in this paper have been carried out. Based on the findings and conclusions of these

investigations the IS[4] system has been fully designed and subsequently developed. Furthermore the investigations into the quality standards and the prevention of unauthorised usage of products have resulted in requirements being imposed on the SEAL and the development teams responsible for respective products that are to be supplied and supported via the IS[4]. Reference documentation has been developed detailing these requirements.

The IS4 has been developed as part of an MSc and the product developer will not form part of the permanent SEAL team. As a result of this the administration and maintenance of the system will be the responsibility of other members of the SEAL. A fundamental task has been the documentation of detailed procedures for general IS4 maintenance as well as for disaster recovery of the IS4 should the need arise.

Discussions have been and are continuing to be held between the SEAL, Internet Service Providers and Banks over the implementation of SET in the IS[4]. With these discussions continuing, at the earliest availability the SEAL will be in a position to achieve SET compliance in the IS[4].

7. Discussion

As has been discussed, the use of the Internet to supply and support software products presents numerous advantages and opportunities to software developers and suppliers. This facility has only recently become a viable option due to the recent rapid growth in the use of the Internet.

The system as discussed herein has been fully developed and meets the initial requirements of the Software Engineering Applications Laboratory in requiring low maintenance and support with minimal human intervention. Once SET is fully implemented, the payment mechanism will be totally automated.

The investigation into the Quality aspects of supplying and supporting software products using the Internet has been carried out and the requirements have been incorporated into the IS[4] and the SEAL's development and administrative procedures. The major issues in the supply and support of software that have been influenced by the investigation have been:

a. The information and documentation that needs to be supplied.

b. The contract information that needs to be agreed to by the customer

c. The feedback mechanism and communication with the customers

d. The management and security of the system's server.

Various ways of minimising the unauthorised replication and use of the software products have been investigated and a system has been developed for use by the IS[4]. This methodology and system is to be built into the software products that are being developed by the SEAL.

The IS[4] will in the future be SET compliant. SET will provide major security advantages to the SEAL and the SET standard will be the basis on which Internet commerce will develop into a publicly accepted means of conducting business.

Through the investigation into the supply and support of software using the Internet and through the development of the IS[4], other areas of possible use of the Internet in an Academic environment have become evident. One of these areas is for the registration for and support of Academic courses. This will be implemented in the near future for the support of SEAL software courses.

Internet commerce is a very immature field which will continue to grow driven by consumer needs for convenient and secure shopping, merchant needs to securely conduct business in the global market place and banks needs to provide an effective service to meet consumers' and merchants' needs.

Smartcards will further affect Internet Commerce and can further be applied to controlling the use of digital products. Digital wallets will most probably be incorporated into smartcards allowing consumers to conducted secure Internet commerce from locations other than their private computers. Eventually smartcards will be as common as the credit card is today (probably replacing the credit card) and with the customer's digital identification built into the card, smartcards can serve as a means of user verification in preventing the unauthorised use of digital products in the digital market place.

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9. Author contact details

Bruce Braude is currently a postgraduate student in the Department of Electrical Engineering at the University of the Witwatersrand studying towards the degree of MSc in Software Engineering. Bruce's MSc is entitled "Quality Aspects of Software Product Supply and Suppo[illegible]he Internet." Bruce has obtained his B[illegible] in Electrical Engineering and has comple[illegible]ier courses in Software Quality Management. During his studies Bruce has been involved in part time Internet and Intranet development for the Software Engineering Applications Laboratory and for commercial institutions. Bruce is a member of the SEAL Management Board and the Young Members Committee of the South African Institute of Electrical Engineers.

Contact details. Bruce Braude, Software Engineering Applications Laboratory, Department of Electrical Engineering, University of the Witwatersrand, Private Bag 3,P O Wits, 2050 Johannesburg. Office Phone: +27-11-716-5379, Fax: +27-11-403-1929, Internet E-mail: b.braude@ee.wits.ac.za; WWW: http://www.seal.ac.za/

QSI Research Review

1. Introduction

This document reviews the research undertaken as part of the QSI project entitled "Quality Aspects of Software Product Supply and Support using the Internet". The main areas of research were the quality aspects of supplying and supporting software in an Internet environment, the use of the Internet for commercial purposes and the prevention of the unauthorised use of software products.

2. Quality aspects of software product supply and support using the Internet

The investigation into the quality aspects of supplying and supporting software in an Internet environment involved the examination and investigation of relevant quality standards. These consisted of the ISO 9001 standard for quality assurance and the ISO/IEC JTC1/SC7 software engineering standards. The purpose of the investigation was to determine the quality characteristics required of a software product supply system. This was necessary in order to ensure that the SEAL's software supply system using the Internet comply with the relevant software standards.

The need for the investigation arose due to the SEAL being committed to supplying and supporting software within a quality management system. The SEAL is an ISO 9001 rated organisation and is involved in extensive research in the field of Software Quality. A number of products to be supplied via the IS^4 are related to Software Quality Standards and their application. A number of SEAL customers will come from a Software Quality environment. It is therefore imperative that the software supplied and supported by the SEAL, be done so in a quality controlled manner compliant with all the relevant quality standards. This has the following implications:

a. the processes used in supplying and supporting software have to comply with the quality standards' requirements and;

b. the Internet system used has to be a quality system

The investigation into the quality standards firstly examined issues that impacted on, or are part of the processes of supplying and supporting a software product. The investigation examined only the parts of the standards relating to the supply and support of software. The information found in the investigation was then interpreted and applied to the processes of supplying and supporting software in an Internet environment.

Secondly the investigation examined the ISO/IEC 15504 [1] and the ISO/IEC 9126 [2] standards respectively in order to define process and product quality objectives. The process quality objectives were for the processes used in developing the Internet system. The product quality objectives were for the Internet system being developed as a software product. The investigation and definition of the process and product quality objectives were necessary in ensuring quality in the Internet system.

The investigation did not examine quality characteristics of the products to be supplied or the development thereof but only examined the supply of completed products.

The detailed results of the investigation are documented in the Quality Aspects of Software Product Supply and Support using the Internet, [3] and the QSI Quality Plan, [4]. The investigation imposed requirements on the following aspects of the project:

a. Functional requirements for the IS^4. These requirements were incorporated into the IS^4 Product Functional Specification [5].

b. Requirements for the SEAL acting as the product supplier and requirements for software developers developing products to be supplied via the IS^4. These requirements are listed in the QSI document entitled Requirements for Software Developers and Suppliers using the IS^4 [6].

c. Requirements for the processes used in developing the Internet system. These requirements are reflected in the project's Master Document List [7] and the project's Work Breakdown Structure [8].

The research into the quality standards provided valuable input into the development of the IS^4 and into procedures that are to be followed in supplying and supporting software using the IS^4. In order for the system and procedures to be fully compliant with the quality standards, they must be implemented in an organisation which already complies with the standards. An organisation's supply and support system cannot comply with the relevant quality standards if the organisation as a whole does not. This is due to other organisational processes impacting on the supply and support processes. An assumption that the organisation is already compliant with the standards in its other processes was made prior to researching the supply and support of software. If this assumption was not made, research would have had to be undertaken into broader issues of compliance with the standards. This would eventually have led to the development of general procedures for compliance with the standards.

The investigation examined only a select set of

standards. As has been stated above, these standards in themselves provided a significant input to the project. A question that can be asked is: "Shouldn't a wider range of standards from other standards authorities have been investigated." As has been discussed above, an organisation's supply and support system cannot comply with the relevant quality standards if the organisation as a whole does not. The SEAL is involved with and aims to comply with the ISO/IEC series of applicable standards. Other standards are not being complied with in the SEAL's other processes and therefore these standards could not have been effectively complied with in the software supply and support processes.

One area that could have been further investigated is the supply and support of software from a business perspective. This could have involved the investigation of supply and support processes of current operational businesses. Even though the businesses would not have contributed to the research and subsequent compliance with the quality standards, the research may have provided further insight into system and process attributes that may have made the resultant IS^4 a more effective and efficient business tool.

In future, any changes in the quality standards will have to be monitored and investigated for any new requirements that they impose on the supply and support of software in the SEAL. On the business side of the supply and support of software, requirements that may have been identified in a business investigation will become evident once the SEAL uses the IS^4 system. The procedural aspects of these additional requirements can be incorporated into the procedures developed in this project. Any additional technical requirements that are identified will be able to be incorporated into subsequent versions of the IS^4.

3. Internet Commerce

One of the initial requirements of an Internet-based software supply and support system was that the entire supply system be automated as far as possible. One of the key areas for automation was the processing of the transactions for purchasing of the software products. Researching Internet Commerce, and Internet based transaction processing in specific, involved discussing the relevant issues with appropriate people in industry and searching for information on the Internet. Due to the immaturity of the topic and the rapid pace at which it is developing library material was of no use in this research.

The initial research involved searching the Internet and questioning people in order to obtain an overview of the topic and of the issues involved in developing a commercial Internet system. Meetings were held with all the major Internet Service Providers and Banking groups (Refer to the Project Management Plan [9] section 4.4 for a list of the consulted companies). The initial research revealed that besides for a few small proprietary methods, no wide-scale technology had been implemented for transaction processing on the Internet. At the stage of this initial research Internet Commerce was a very new field and most interested parties were in the process of discovering this new territory.

The various new technologies were developing at different rates (with the more complex technologies developing more slowly). At this stage the project of developing the IS^4 was in its initial research and design stage and it was possible to wait for more complicated but superior technology. After thoroughly researching the different technologies and evaluating which one would be accepted by the major financial institutions, it was decided to wait for the availability of the Secure Electronic Transactions (SET) technology. (Refer to [10] for an overview of SET). At this initial stage SET technology was scheduled to be available between late 1997 and early 1998. It is technically possible to develop ones own SET compliant technology implementation however due to the complexity of the standard this task would have taken a few years in itself. It was decided to wait for this technology to become commercially available. While waiting for the SET technology further meetings were held with the Internet Service Providers and Banks in order to evaluate the best method and best partner in industry for providing the technology.

As time progressed, the release of SET technology was delayed and currently it has still not been released beyond trial testing phases. In recent months one of the Internet Service Providers offered to make available test SET software for a test implementation in the IS^4. If this software was implemented it would have been possible to demonstrate SET in the IS^4 but no live transactions would have been possible. When this was balanced up with the effort to implement this demonstration it was decided not to proceed with this test implementation.

Developments and circumstances in the SEAL have resulted in a need to begin using the IS^4. No large amount of transactions is however expected in the near future. A temporary manual solution for transaction processing has been implemented in the IS^4. If large amounts of transactions were expected it would have been relatively simple to implement a temporary simpler automated transaction processing mechanism. These simpler mechanisms do pose certain risks and it is therefore not worth implementing them for the small amount of initial expected transactions. Once SET technology becomes available it will be incorporated into a subsequent version of the IS^4. This is due to the advantages that SET presents and all major Banks will require that their Internet merchants be SET compliant.

4. Internet Management of the Software Supply and Licensing

Due to the ease of duplicating digital material and due to

the global accessibility of the Internet it was necessary to research and implement a method to prevent the unauthorised use of supplied products.

Prior to the conceptualisation of the IS^4, the SEAL's Software Process Assessment Tool had already been developed with its own protection system. This system was examined along with other available methods and systems. (Refer to [10] for an overview of the results of the investigation.) The method used in the Software Process Assessment Tool was found to be the best method for preventing the unauthorised use of software products supplied via the Internet.

The tool requires an encrypted number to be entered in order to unlock the tool for full usage. This number is based on the encryption of the name of the registered product user, the product identification number, the product version and a copy number. This method was incorporated into the IS^4 in order for the IS^4 to provide the encrypted number after the shopper has purchased the product.

Based on current available technologies, the currently used method is the best implementation that meets the SEAL's needs of digital delivery. One area that can be improved upon is the encryption algorithm used to generate the encrypted number. The algorithm currently used is the one used in the Software Process Assessment Tool. The algorithm is a simple one that is relatively easy to crack. A more sophisticated algorithm should be used. This would require the algorithm in the tool and in the IS^4 being replaced. It will be easier to replace the algorithm at an early stage as opposed to after numerous products and numerous product versions have been developed to contain the simple algorithm.

As has been stated in the technical paper, [10], smart-cards will provide a more secure product protection system. The implemented encryption system should be re-examined once smart-cards become wide spread. When smart-cards are widely available and used for Internet purchases, they will provide an ideal solution for software protection and licensing.

5. References

[1] ISO/IEC 13504:1-9: Information Technology – Software Process Assessment, November 1996.

[2] ISO/IEC 9126 – Information Technology – Software product evaluation – Quality characteristics and guidelines for their use, December 1991.

[3] Quality Aspects of Software Product Supply and Support using the Internet, QSI 330.

[4] QSI Quality Plan, QSI 003.

[5] IS^4 Product Functional Specification, QSI200.

[6] Requirements for Software Developers and Suppliers using the IS^4, QSI 340.

[7] QSI Master Document List, QSI 001.

[8] QSI Work Breakdown Structure, QSI 005-10.

[9] QSI Project Management Plan, QSI 005.

[10] The use of the Internet in an academic environment to commercially supply and support software products, QSI 121-31.

■

Learning from the QSI project

1. Introduction

This document details the learning that has been gained from the QSI project from the perspective of Software Project Management and the application of the SEAL Quality Management System (QMS) to the QSI project. The document firstly examines the general application of the SEAL QMS to manage the project. Thereafter the specification of process and product quality objectives is discussed. The success in meeting these objectives is examined. Finally the software design process within the SEAL QMS is examined.

The SEAL is an ISO 9001 rated organisation and is involved in extensive research in the field of Software Quality. The SEAL is compliant with all the requirements of ISO 9001 and aims to comply with all the relevant issues in the ISO/IEC JTC1/SC7 software engineering standards.

2. Use of the SEAL QMS to manage the project

The SEAL QMS proved to be a fundamental necessity in conducting this project. All of the SEAL QMS processes that form part of the management of a project were applied seamlessly to the QSI project.

At the start of the project the Master Document List (MDL) [1] was developed from the SEAL QMS Master Document List Template [2]. The Master Document List is a register of all documents created or anticipated to be created within the project. This document was used without any major modifications in the QSI project. One change that did prove to be useful was to separate certain longer lists off into sub-lists of the MDL. These were contained in separate documents for manageability purposes. Such lists are the Literature Reference Documentation list [3] and the Software Source List [4], which are referenced in the MDL.

The Document Creation template [5] proved to be useful when creating necessary documents that were not provided for by the SEAL QMS series of templates.

The Configuration Management Plan [6] used for this project was based on the Configuration Management Plan Template in the SEAL QMS [7] with very minimal changes to the template. The Configuration Management Plan defines the configuration management used on the artefacts forming part of the project and the procedures used for managing and storing of the artefacts. The only fundamental changes that were necessary to the template was the incorporation of a file naming convention for 32-bit word processors and the incorporation of the use of DAT tapes for project backups.

The next document developed was the Product Description [8]. This was developed based on the SEAL QMS Product Description Template [9]. The Product Description defines the dependencies of the project and the requirements that the project aims to address. The document specifies the standards to which the project development and final product are to comply. The review procedure for the project and a high level project structure are also detailed. The Product Description proved to be fundamental to the project as through development of the document discussions were held between the product's customer (the project supervisor) and product developer (the project developer). Through these discussions it was found that there were some substantial differences in perceptions in what the project would involve. These differences were eliminated and this provided a foundation on which to develop a product that would meet the customer's needs.

The Quality Plan [10] was developed. The Quality Plan specifies the product quality objectives and the process quality objectives used in developing the product. The management tasks and responsibilities related to quality and the systems used to maintain quality are also described. The Quality Plan for this project was used as a prototype for implementation of the Process Quality Objectives and Product Quality Objectives sections. These sections were derived from ISO/IEC 15504 [11] and ISO/IEC 9126 [12] respectively. The use of these sections is discussed in more detail in sections 3 and 4 below.

The Project Management Plan [13] and the associated Work Breakdown Structure (WBS) [14] were developed using the Project Management Plan Template [15]. The Project Management Plan was used to outline the resources necessary and available for the development of the project. Furthermore the plan was used to outline the responsibilities of all people associated with the project and how the project would be controlled. The Work Breakdown Structure was used to outline all of the tasks comprising the project and how these tasks would be scheduled. The WBS also required the estimated and actual times for each task to be entered.

Initially the WBS was strictly followed for each task and it was attempted to conduct each task according to the schedule as detailed in the WBS. Due to the research nature of the project, the WBS could not be exactly followed and after a while the project tasks were not being carried out according to the WBS schedule. From this point on the WBS ceased to be a working document

used to manage the scheduling of the project. The WBS rather became a document in which task start and completion dates were recorded after the tasks were completed. Furthermore the actual times spent on each task were not measured and not recorded in the WBS. This was due to the tasks as listed in the WBS being undertaken over numerous intervals. The recording of these task times over multiple periods requires extreme discipline.

Even though the WBS was not strictly followed and updated, the document still served as a useful overview of what tasks had been completed and which ones were still outstanding. For a WBS to serve as an effective scheduling document in a research project, the tasks have to be broken up in to more minor tasks. The document also has to be constantly updated by adding and removing minor tasks as the project progresses. By breaking the tasks up into minor tasks and constantly updating the tasks in the WBS, the document can be used on a daily and weekly basis for tracking progress. The recording of times for each task then also becomes far simpler.

Other major documentation developed during the management of the project was the quality assurance records. These included minutes, agendas, correspondence records, backup registers, audit reports, document issue notices and calls for review. Besides for the backup registers, which were created from custom created templates, and correspondence records which consist of the correspondence itself, all of the records were created using SEAL QMS templates. Due to the use of tapes instead of diskettes for archiving, custom templates were created for recording backups. All of the records proved to be extremely useful in serving their obvious but fundamental purposes.

In applying the SEAL QMS to the management of the project, the templates from the QMS cannot simply be blindly used. For each project and each situation, the suitability and effectiveness of the respective templates need to be assessed. Thereafter the templates must be modified where necessary in order to obtain maximum benefit from developing the resultant documents.

3. Process Quality Objectives

In defying the process quality objectives in the project's Quality Plan [10] required capability levels were assigned to various processes as defined in the ISO/IEC 15504 standard [11]. The capability level ratings used were those defined in the ISO/IEC 15504 standard. The capability levels assigned to the various processes were based on the capability levels of the SEAL QMS in general. For processes where the SEAL QMS did not provide the capability levels that were deemed to be necessary for the respective processes, alternative capability levels were defined for the processes and the means for achieving these levels were defined.

In reviewing these capability levels at the completion of the project, all processes have been carried out and meet the objectives as defined. The strict compliance with the SEAL QMS was fundamental in ensuring that the processes were carried out at the intended levels. For the processes not covered at the required levels by the SEAL QMS, the development of defined documentation specific to the project (refer to the Master Document List [1]) ensured that the required levels for the processes were achieved.

4. Product Quality Objectives

Product Quality objectives for the IS^4 system were based on quality characteristics as defined in the ISO/IEC 9126 standard [12]. For each of the quality characteristics defined in ISO/IEC 9126, the requirements for the system in terms of each characteristic were defined.

It has been subsequently realised that the terms in which the requirements were specified were inappropriate. The requirements were specified in general terms as opposed to through the use of metrics. The use of generic terms allows subjectivity to influence the degree of attainment of the quality objectives. Furthermore subjectivity can influence the subsequent evaluation of whether the objectives have been achieved.

The specification of the requirements in terms of the quality characteristics did aid in the development of the specifications for the system. Even though exact metrics were not used, the analysis of the system in terms of the quality characteristics resulted in issues being considered in the design of the system that would otherwise possibly have been overlooked.

As has been discussed, because metrics were not used it is difficult to asses whether the developed system meets the quality objectives intended for the system. However, in subjectively overviewing the quality objectives, the developed system appears to meet all of these objectives.

5. Use of the SEAL QMS in software design and development

One of the major parts of the QSI project was the design and development of the IS^4. As was the case with all other aspects of the project, the design and development phases were carried out in accordance with the SEAL QMS, making use of the SEAL QMS templates. The templates used in the design and development phases of the project were the:

a. Product Functional Specification template [16]

b. User Reference Manual template [17]

c. High Level Design template [18]

d. Low Level Design template [19]

e. Product Test Specification template [20]

Based on the above templates, documents were developed. Initially a Product Functional Specification for the IS[4] was developed. This required the analysis and specification of the overall problem that the product is to address, the environment in which the product is to operate, the inputs to the products, the processes that the product is to perform and the outputs from the product.

User Reference Manuals were developed for the Manager and Shopper interfaces of the IS[4]. The development of User Reference Manuals at this stage in the design process aided in the conceptualisation and visualisation of the external interfaces of the system. This in turn aided in the specification of the actual functionality of the system. High and Low Level design documents were developed for the System and Database, the Shopper Interface and the Manager Interface respectively. The High Level designs specify the modular structure of the IS[4] and the purpose, functionality, inputs and outputs of each module. The Low Level designs detail the detailed design of each of the modules comprising the IS[4]. Multiple documents were also developed to comprise the Product Test Specification series of documents. Each Test Specification document outlines tests to be performed on the respective parts of the system in order to facilitate the acceptance of the overall system.

In designing the IS[4], it has been found that a cyclical design approach was necessary. The documents above were developed prior to system development and as development of the system took place, it was necessary to return to the documents and modify them. The need for modifications was mainly due to the project being a research one with the developer not having experience in the technology being used. The design and development was an iterative process.

Due to the project involving the development of a system as opposed to a single application, multiple documents of the same type had to be developed for different parts of the system. It was found that based on the templates, the use of one document to address all the parts of the system was not feasible. The development of multiple documents in this manner proved to be effective in breaking up the system into manageable portions and developing separate comprehensible separate designs for each part of the system.

The use of the templates provided a document infrastructure in which to carry out the system design. The templates did not however provided sufficient guidance in the actual approach to be taken in designing software. This shortcoming can be attributed firstly to the templates being aimed in particular at documenting procedural programming designs as opposed to Object Orientated Designs. Due to this the IS[4] was designed using a procedural programming approach. A better design may have, and probably would have been achieved if a formal Object Oriented Design approach was used.

Secondly and more fundamentally, the SEAL QMS does not contain sufficient infrastructure and guidance necessary for the actual design phase of the project. Over and above simply providing design templates, which have been discussed above, the SEAL QMS should contain additional procedures and require that these procedures be followed in order to ensure that a formal design approach is used prior to the development of software.

6. References

[1] QSI Master Document List, QSI 001.

[2] Master Document List Template, QST 001-10.

[3] Literature Reference Documentation List, QSI 001-10.

[4] Software Source List, QSI 001-20.

[5] QSI Document Creation Template, QSI 002.

[6] QSI Configuration Management Plan, QSI 006.

[7] Configuration Management Plan Template, QST 128-70.

[8] QSI Product Description, QSI 004.

[9] Product Description Template, QST 124-20.

[10] QSI Quality Plan, QSI 003

[11] ISO/IEC 15504:1-9: Information Technology – Software Process Assessment, November 1996.

[12] ISO/IEC 9126 – Information Technology – Software product evaluation – Quality characteristics and guidelines for their use, December 1991.

[13] QSI Project Management Plan, QSI 005.

[14] QSI Work Breakdown Structure, QSI 005-10.

[15] Project Management Plan Template, QST 124-10.

[16] Product Functional Specification Template, QST324-20.

[17] User Reference Manual Template, QST 324-30.

[18] High Level Design Template, QST 324-40.

[19] Low Level Design Template, QST 324-50.

[20] Product Test Specification Template, QST 330-10.

■

QSI References and Bibliography

1. Introduction

This document lists the references and bibliography for the QSI project. The document lists only the fundamental documents used. For a more extensive list of reference material refer to the Literature Reference Documentation List, QSI 001-10.

2. References and Bibliography

[1] ISO 9001, Quality systems – Model for quality assurance in design, development, production, installation and servicing, 1994

[2] ISO 9000-3, Quality Management and Quality Assurance – Part 3: Guidelines for the use of ISO 9001:1994 to the Design, Development, Supply, Installation and Maintenance of Computer Software, DIS, February 1996

[3] ISO/IEC 12207, Information Technology – Software Life Cycle Processes, August 1995.

[4] ISO/IEC 9126 – Information Technology – Software product evaluation – Quality characteristics and guidelines for their use, December 1991.

[5] ISO/IEC 9127 – Information processing systems – User documentation and cover information for consumer software packages, 1994

[6] ISO/IEC 15504:1-9: Information Technology – Software Process Assessment, November 1996

[7] ISO/IEC TR 9294 – Information technology – Guidelines for the management of software documentation, November 1990.

[8] Secure Electronic Transaction Specification, Book 1 Business Description, Version 1.0, May 31 1997.

[9] Adels H., Beelaard R. and Symons A.,, Delivering quality in global IT services, Software Quality Journal Vol. 6 Num. 3, Chapman and Hall, London, 1997, pp. 247 –257.

[10] Bevan N. Measuring usability as quality of use, Software Quality Journal Vol. 4 Num. 2, Chapman and Hall, London, 1995, pp. 115 - 130.

[11] Scholtz J. Usability: what's it all about? Software Quality Journal Vol. 4 Num.2, Chapman and Hall, London, 1995, pp. 95-100.

[12] Robinson K. and Simmons P. The value of a certified quality management system: the perception of internal developers, Software Quality Journal Vol.5 Num. 2, Chapman and Hall, London, 1996, pp. 61-73.

[13] Neil M. Measurement as an alternative to bureaucracy for the achievement of software quality, Software Quality Journal Vol. 3 Num. 2, Chapman and Hall, London, 1994, pp. 65-78.

[14] Electronic Commerce: The Next Business Frontier, Foundation report 108, CSC Index Research and Advisory Services, July 1996.

[15] Digital Strategy, Index Review, CSC Index Research and Advisory Services, Third Quarter 1996.

[16] Report on Electronic Commerce, Mastercard International, 14 January 1997, http://www.mastercard.com/newways/ecommerce.html.

[17] Report on Electronic Commerce, BRP Publications, 11 February 1997, http://brp.com.

[18] On Internet Security, Netscape, http://www.netscape.com/info/security-doc.html

[19] Windows NT4 Web Development, Sanjaya Hettihewa, Sams Publishing, First edition, 1996.

[20] Cryptography Frequently Asked Questions, 11 January 1994, crypt-comments@math.ncsu.edu

[21] Frequently Asked Questions about today's cryptography, Version 3.0, RSA Data Securities Inc.

[22] Microsoft Site Server White Paper, Microsoft Corporation, http://www.microsoft.com/siteserver/

[23] Microsoft Internet Commerce Strategy White Paper, Microsoft Corporation.

[24] Microsoft SQL Server Internet deployment and planning guide, Microsoft Corporation, 1997.

[25] VPOS Merchant Software User's Guide, Verifone Internet Commerce, Verifone Inc, 1997.

[26] Hovenden F.M., Walker S.D. , Sharp H.C. and Woodman M. Building quality into scientific software, Software Quality Journal Vol. 5 Num.1, Chapman and Hall, London, 1996, pp 25-32.

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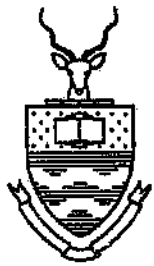

QSI

Master Document List

Management Product

Revision 1.04

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Master Document List
Doc. Reference:	C:\QSI\MP\QSI001.100
Created by:	B.Braude
Creation Date:	15 January 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	19970115	Draft	BB	qsi001.001
1.00	97\02\20	Approved	BB	qsi001.100
1.01	97\03\25	Approved	BB	qsi001.101
1.02	97\04\23	Approved	BB	qsi001.102
1.03	97\08\25	Approved	BB	Qsi001.103.doc
1.04	98\06\04	Approved	BB	Qsi001.104.doc

Revision History

Version	Date	Changes
0.01	19970115	New document created using QST00110.105
1.00	97\02\20	Document updated as per QSI2003 section 2.4
1.01	97\03\25	Added in QSI310 and QSI320
1.02	97\04\23	Added in approval information for minutes and agendas. Also added the QSI 320 series of documents. Also made modifications with regard to QSI 140 and 145.
1.03	97\08\25	Revised document with latest updates
1.04	98\06\04	Updated during Msc preparation.

Management Authorisation

Version	Date	Status	Management Board Minute Reference
1.00	97\02\20	Approved	QSI2003 section 2.4

Change Forecast

This document will be updated each time a new documented element is added into the QSI project.

1 Scope

1.1 Introduction

An essential feature of a quality management system is that it documents the procedures used to implement and maintain the system. This document is the Document Master List which provides a directory of all documents which have the status of Draft, Provisional or Approved.

1.2 Purpose

This Document Master List provides the cross reference to all documents comprising the QSI project.

1.3 Applicability

This document is an essential reference to all documents supported in the QSI project.

1.4 Definitions

1.5 Audience

The audience for this document comprise the various stakeholders of the SEAL, including:

- The product developer
- The Product manager
- All full-time and part-time post-graduate students associated with the SEAL
- Members of the SEAL Management Board
- Head of the Department, Electrical Engineering
- Individuals who will perform internal and external surveillance audits of the SEAL Quality Management System

1.6 Applicable Documents

1.6.1 Standards

a. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994.

1.7 Assumptions

It is assumed that the reader is familiar with the ISO 9000 series standard for quality systems management.

1.8 Requirements Traceability

This document addresses the following requirements:

a) ISO 9001 (1994) 4.5 Document and Data Control

b) ISO 9001 (1994) 4.16 Quality Records

1.9 Procedures

1.9.1 Entering data in the Summary Information File (Alt FI)

a) Title: Enter the name of the document being created

b) Subject: Enter the name of the project or abbreviate the name of the project QMS

c) Author: The name of the person creating this file

d) Keywords: The document code and serial number

e) Comments: The document revision number.

1.9.2 Document Front Page

a) Document project title: Instantiate from Summary Information File data SIF) using left mouse button to select field, click on right mouse button to bring up menu, select 'update field' and click on that item. The field selected will then be automatically updated with the data in the SIF.

b) Document title: Select field and instantiate from SIF.

c) Management/Technical Product: Edit to read Technical or Management Product.

d) Version: Select field and instantiate from SIF.

e) Document Status: Edit to read Draft, provisional or approved.

1.9.3 Using the Configuration Control Table

All elements of the table are instantiated from the SIF.

1.9.4 Using the Document History Table

a) Version: The revision number of the new document

b) Date: The date on which the new revision was created.

c) Status: The status of the created document

d) Who: The author of the updated revision

e) Saved as: the file name (only - no path) of the new document

1.9.5 Using Document Revision Table

a) Version: The revision number of the current document

b) Date: The date on which this revision was updated.

c) Changes: A short description of the nature and location of the changes to the document

1.9.6 Entering details in Master Document List Table

The List is used as follows:

a) Document Name: A descriptive name for the document

b) Document Number: A unique serial number for the artefact

c) Revision Date: The date on which the artefact was modified, or entered into the system, as appropriate.

d) Document Status: For Management and Technical Products this will be Draft, Provisional or Approved. For records this field a '-' is entered since records are not subjected to revision.

e) Date approved: This will be the date of the Management Review meeting.

f) Minute reference: The date of the review meeting and the section of the minutes in which approval for the artefact was recorded.

g) File reference: If the document is in electronic format, the full file path and document name is entered, starting from the SEAL project number as the root. If the document is available in hard copy format only, the term 'Hard copy' is entered.

1.9.7 Revision Control of this document

a) When this document is created from QST 001-10 it is assigned a Revision of 0.01.

b) Once it is approved by the appropriate authority it is raised to Rev 1.00

c) After each internal audit the revision level is raised by a minor point i.e. following the first audit the revision number will be raised to 1.01. (This allows the MDL to be used to record the document baseline to be recorded immediately preceding the audit.)

d) In a one-person project the Project Initiation Audit is used to raise the document to 1.00 status.

e) For each revision change a new file is created.

f) Between document revisions the Change Control element (Revision History) is used to record the changes to the entries in the List, typically in terms of documents (or records) added or updated. These changes will typically refer to new artefacts (records) added in terms of document number, or the identify of which artefacts have been subjected to updates (technical and management products) This list of changed or updated documents is used to create the entries for the project Document Issue Notices, which are issued periodically to advise clients of the QMS of new or updated artefacts available.

2 Master Document List

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
MANAGEMENT PRODUCTS							
Master Document List	QSI 001	1.04	98\06\04	Approved	97\02\20	QSI2003 - section 2.4	\mp\QSI001.104.doc
Literature Reference Documentation List	QSI001-10	1.00	98\06\02	Approved	98\06\02	QSI 2053 section 2.3	\mp\qsi00110.100.doc
Software Source List	QSI 001-20	1.00	98\06\02	Approved	98\06\02	QSI 2053 section 2.3	\mp\qsi00120.100.doc
Document Creation Template	QSI 002	1.00	97\02\20	Approved	97\02\20	QSI2003 - section 2.5	\mp\QSI002.100
Project Quality Plan	QSI 003	1.00	97\03\12	Approved	97\03\12	QSI 2008 section 2.3	\mp\QSI003.100.doc
Product Description	QSI 004	1.00	97\02\20	Approved	97\02\20	QSI2003- section 2.3	\mp\QSI004.100
Project Management Plan	QSI 005	1.01	97\05\27	Approved	97\03\25	QSI 2010 section 2.4	\mp\QSI005.101

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Work Breakdown Structure, obligations and schedule	QSI005-10	1.03	98\06\09	Approved	97\05\13	QSI 2017 section 2.3	\mp\QSI00510.103.doc
Configuration Management Plan	QSI 006	1.02	98\06\04	Approved	97\02\20	QSI2003 section 2.6	\mp\qsi006.102.doc
Contract	QSI 007	-	-	-	-	-	Hardcopy
Binder Labels	QSI 008	1.00	97\02\20	Approved	97\02\20	QSI2003-section 2.7	\mp\qsi008.100
Archive Diskette Labels	QSI 009	Due to size CD ROM's will be used.					
Minutes of meetings Template	QSI 010	1.00	97\02\20	Approved	97\02\20	QSI2003-section 2.7	\mp\qsi010.100
Document Issue Notice Template	QSI 011	1.00	97\02\20	Approved	97\02\20	QSI2003-section 2.7	\mp\qsi011.100
Call for Review Template	QSI 012	0.01	97\04\30	Draft			\mp\\qsi012.001
Product Exception Report Template	QSI 014	Supported by the system itself.					
TECHNICAL PRODUCTS (Project Overview)							
Project: Preliminary Pages	QSI 100	0.23	98\06\02	Draft	-	-	\tp\reports\qsi1[illegible].023.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
150 word abstract required for Msc submission	QSI 110	0.01	98\06\09	Draft	-	-	\tp\reports\qsi110.001.doc
Project Technical Paper	QSI 120						
Technical Paper PD: The use of the Internet in an Academic environment to commercially supply and support software products.	QSI120-10	1.00	97\08\14	Approved	97\08\01	QSI 2033 section 2.5	\tp\reports\qsi12010.100.doc
Technical Paper summary: The use of the Internet in an Academic environment to commercially supply and support software products.	QSI120-20	0.20	97\08\14	Draft	-	-	\tp\reports\qsi12020.020
SEAL format of Technical Paper as submitted to SAICSIT: The use of the Internet in an Academic environment to commercially supply and support software products.	QSI120-30	0.04	97\11\10	Draft	-	-	\tp\reports\qsi12030.004.doc
Powerpoint presentation of Technical Paper	QSI120-50	0.03	97\10\17	Draft	-	-	\tp\reports\qsi12050.ppt
Powerpoint presentation of technical paper for Open Day	QSI 120-60	0.03	97\10\23	Draft	-	-	\tp\reports\qsi12060.ppt

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Powerpoint presentation of technical paper for Open Day with modified colours	QSI 120-61	0.01	97\10\27	Draft	-	-	\tp\reports\qsi12061.ppt
Updated Technical PD at the completion of project development (modified from Qsi 120-10 revision 1.00): The use of the Internet in an Academic environment to commercially supply and support software products.	QSI 121-10	0.01	98\05\04	Draft	-	-	\tp\reports\qsi12110.001.doc
Updated SEAL format of Technical Paper at the completion of project development (modified from QSI 120-30 revision 0.04): The use of the Internet in an Academic environment to commercially supply and support software products.	QSI121-30	0.03	98\06\03	Draft	-	-	\tp\reports\qsi12130.003.doc
MSc Technical paper: The use of the Internet in an Academic environment to commercially supply and support software products. (Identical to QSI 121-30 revision 0.03 with only single authorship)	QSI121-31	0.01	98\06\10	Draft	-	-	\tp\reports\qsi12131.001.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Technical paper PD: Quality aspects of software product supply and support using the Internet.	QSI 122-10	0.01	98\05\13	Draft	-	-	\tp\reports\qsi12210.001.doc
Technical paper: Quality aspects of software product supply and support using the Internet.	QSI122-30	0.03	98\06\02	Draft	-	-	\tp\reports\qsi12230.003.doc
MSc Technical paper: Quality aspects of software product supply and support using the Internet. (Identical to QSI 122-30 revision 0.03 with only single authorship)	QSI122-31	0.01	98\06\08	Draft	-	-	\tp\reports\qsi12231.001.doc
Project: QSI Research Review	QSI 130	0.22	98\06\02	Draft	-	-	\tp\reports\qsi130.022.doc
Project: Learning from the QSI Project	QSI140	0.02	98\06\02	Draft	-	-	\tp\reports\qsi140.002.doc
Project: Bibliography and references	QSI 150	0.01	98\05\14	Draft	-	-	\tp\reports\qsi150.001.doc
TECHNICAL PRODUCTS (Software Product Development)							
Product Functional Specification	QSI 200	1.00	97\07\07	Approved	97\07\16	QSI 2031 section 2.6	\tp\software\qsi200.100

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
IS4 Shopper User Reference Manual	QSI 210	1.00	98\06\02	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi210.100.doc
Edge Diagrammer Diagram of Shopper Interface – shopper logged out	QSI 210-01	0.01	97\12\04	Draft	-	-	\tp\software\qsi21001.edg
Edge Diagrammer Diagram of Shopper Interface – shopper logged in	QSI 210-02	0.01	97\12\04	Draft	-	-	\tp\software\qsi21002.edg
IS4 Manager User Reference Manual	QSI 211	1.00	98\06\02	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi211.100.doc
Edge Diagrammer Diagram of Manager interface	QSI 211-01	0.01	98\04\15	Draft	-	-	\tp\software\qsi21101.edg
Product Test Specification 2 – Shopper Interface	QSI 220	1.00	98\06\06	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi220.100.doc
Test Report Template 2 – Shopper Interface	QSI220-10	1.00	98\06\06	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi22010.100.doc
Product Test Specification 3 – Manager Interface	QSI 221	1.00	98\06\06	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi221.100.doc
Test Report Template 3 – Manager Interface	QSI 221-10	1.00	98\06\06	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi22110.100.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Reference	File Reference
Product Test Specification 1 – System and Database	QSI 222	1.00	98\06\06	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi222.100.doc
Test Report Template 1 – System and Database	QSI 222-10	1.00	98\06\06	Approved	98\06\02	QSI 2053 section 2.4	\tp\software\qsi22210.100.doc
IS4 High Level 2 – Shopper Interface	QSI 230	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi230.100.doc
Edge Diagrammer Diagram of Shopper Interface Modules – shopper logged out	QSI 230-01	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi23001.edg
Edge Diagrammer Diagram of Shopper Interface Modules – shopper logged in	QSI 230-02	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi23002.edg
IS4 High Level Design 3 – Manager Interface	QSI 231	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi231.100.doc
Edge Diagrammer Diagram of Manager Interface Modules	QSI 231-01	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi23101.edg
IS4 High Level Design 1 – System and Database	QSI 232	1.01	98\04\17	Approved	98\06\02	QSI 2053 section 2.10	\tp\software\qsi232.101.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
IS4 Low Level Design 2 – Shopper Interface	QSI 240	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi240.100.doc
IS4 Low Level Design 3 – Manager Interface	QSI 241	1.00	98\04\08	Approved	98\04\08	QSI 2049 section 2.3	\tp\software\qsi241.100.doc
IS4 Low Level Design 1 – System and Database	QSI 242	1.01	98\04\08	Approved	98\06\02	QSI 2053 section 2.10	\tp\software\qsi242.101.doc
Code elements	QSI 250	Refer to QSI 001-20					
Technical Reference Manual	QSI 270	Incorporated in the High and Low level design series.					
Product Verification and Validation	QSI 280	Not created					
TECHNICAL PRODUCTS *(Project specific)*							
Operating System Investigation	QSI300	0.01	97\03\06	Draft	-	-	\tp\software\qsi300.001
IS4 Administrator Procedures	QSI310	1.00	98\04\22	Approved	98\04\22	QSI 2051 section 2.3b	\tp\software\qsi310.100.doc
Quality Issues Relating to Software Product Supply and Support using the Internet	QSI330	1.03	98\05\28	Approved	97\05\13	QSI 2017 section 2.5	\tp\software\qsi330.103.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Requirements for software developers and suppliers using the IS4	QSI 340	1.00	97\09\11	Approved	97\08\20	QSI 2035 section 2.4	\tp\software\qsi340.100
TECHNICAL PRODUCTS (Tools used on the project)							
	QSI 380						\tp\tools
Microsoft BackOffice (4 CDS)	QSI 381	-	-	-	-	-	Contained on CD
Microsoft Site Server	QSI 382	-	-	-	-	-	Contained on CD
Microsoft Visual Studio	QSI 383	-	-	-	-	-	Contained on CD
Edge Diagrammer	QSI 384	-	-	-	-	-	\tp\tools\Edgwin.zip
TECHNICAL PRODUCTS (Server certification) *(QSI 400-450)*							
IS4 Certificate Request file	QSI 400	0.01	98\04\15	-	-	-	\tp\software\certificate\is4.001.req
IS4 Key set backup	QSI 401	0.01	98\04\15	-	-	-	\tp\software\certificate\is4.001.key
IS4 Certificate file	QSI 402	0.01	98\04\15	-	-	-	\tp\software\certificate\is4.001.cert.txt
IS4 Key set and certificate backup	QSI 403	0.01	98\04\15	-	-	-	\tp\software\certificate\is4cert.001.key
IS4 Certificate Request file	QSI 404	1.00	98\04\15	-	-	-	\tp\software\certificate\is4.100.req
IS4 Key set backup	QSI 405	1.00	98\04\15	-	-	-	\tp\software\certificate\is4.100.key

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
IS4 Certificate file	QSI 406	1 00	98\04\20	-	-	-	\tp\software\certificate\is4.100.cert.txt
IS4 Key set and certificate backup	QSI 407	1.00	98\04\20	-	-	-	\tp\software\certificate\is4cert.100.key
TECHNICAL PRODUCTS (*Reference Material) (QSI500 – QSI699) Refer to QSI001-10 for Literature Reference Documentation List*							
TECHNICAL PRODUCTS (*Reference Material) (QSI700 – QSI899) Refer to QSI001-20 for Software Source List*							
TECHNICAL PRODUCTS (Project Web support)							
Project personnel information page	QSI 900	-	98\06\04	-	-	-	\www\qsi900.htm
Image(s) of project member(s)	QSI 910	-	98\06\04	-	-	-	\www\qsi910.jpg
Project Information Page(s)	QSI 940	-	98\06\04	-	-	-	\www\qsi940.htm
QUALITY RECORDS (Correspondence)							
	QSI 1000						\qa\corres\
BB confirming commitment to MSc and reply from AW	QSI 1001	0.01	96\08\02	-	-	-	\qa\corres\960802aw.bb1
Title and summary of proposed MSc	QSI1002	0.01	96\08\29	-	-	-	\qa\corres\960829aw.bb1
Enquiry about FRD funding and reply from AW	QSI1003	0.01	96\09\09	-	-	-	\qa\corres\960909aw.bb1

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Further information from AW regarding funding	QSI1004	0.01	96\09\10	-	-	-	\qa\corres\960910aw.bb1
Information regarding PGP fro[illegible]mpbell	QSI1005	0.01	97\02\12	-	-	-	\qa\corres\970212ic.[illegible] 1
Initial correspondence from Hannes van Rensburg at Sanlam	QSI1006	0.01	97\02\17	-	-	-	\qa\corres\970217hv.bb1
Message from BB to Hannes van Rensburg outlining his MSc	QSI1007	0.01	97\02\20	-	-	-	\qa\corres\970220bb.hv1
E-mail from Hannes van Rensburg outlining his work in this field	QSI1008	0.01	97\02\25	-	-	-	\qa\corres\970225hv.bb1
E-mail from BB to Hannes van Rensburg	QSI1009	0.01	97\02\26	-	-	-	\qa\corres\970226bb.hv1
E-mail from Hannes to BB outlining Desk top Broadcasting	QSI1010	0.01	97\02\27	-	-	-	\qa\corres\970227hv.bb1
Advice from Steve Shulman regarding the use of Java	QSC1011	0.01	97\04\29	-	-	-	\qa\corres\970428ss.bb1
Proposed letter from BB to Microsoft regarding sponsoring of software	QSI1012	0.01	97\05\15	-	-	-	\qa\corres\970521bb.ms1
E-mail from BB to Gordon Ashby	QSI 1013	0.01	97\05\26	-	-	-	\qa\corres\970519bb.ga1

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Second E-mail from BB to Gordon Ashby	QSI 1014	0.01	97\05\26	-	-	-	\qa\corres\970519bb.ga2
E-mail from BB to Tony Lewis regarding VISA in SA	QSI 1015	0.01	97\05\26	-	-	-	\qa\corres\970519bb.tl1
Reply e-mail from Gordon Ashby to BB	QSI1016	0.01	97\05\26	-	-	-	\qa\corres\970519ga.bb1
Reply E-mail from Tony Lewis to BB regarding VISA in SA	QSI 1017	0.01	97\05\26	-	-	-	\qa\corres\970519tl.bb1
Further e-mail from BB to Gordon Ashby	QSI1018	0.01	97\05\26	-	-	-	\qa\corres\970520bb.ga1
Reply e-mail from Gordon Ashby	QSI1019	0.01	97\05\26	-	-	-	\qa\coress\970520ga.bb1
Reply e-mail from Gordon Ashby	QSI 1020	0.01	97\05\26	-	-	-	\qa\coress\970520ga.bb2
Letter of confirmation of registration from AW	QSI1021	0.01	97\05\26	-	-	-	\qa\coress\970521aw.xx1
E-mail from BB to Christo Vrey at ABSA	QSI1022	0.01	97\05\26	-	-	-	\qa\corres\970523bb.cv1
E-mail from BB to Christo Vrey at ABSA	QSI1023	0.01	97\05\26	-	-	-	\qa\corres\970526bb.cv1
Reply e-mail from Christo Vrey at ABSA	QSI1024	0.01	97\05\26	-	-	-	\qa\coress\970526cv.bb1

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Letter from BB to Richard Bowsher at First Conferences	QSI 1025	0.01	97\05\29	-	-	-	\qa\corres\970529bb.rb1
E-mail from BB to Johann Bezuidenhout at IBM	QSI 1026	0.01	97\06\03	-	-	-	\qa\corres\970603bb.jb1
Telephonic conversation between BB and Val English of IBM	QSI 1027	0.01	97\06\03	-	-	-	\qa\corres\970603ve.bb1
E-mail to John V at Bankgate.	QSI 1028	0.01	97\06\04	-	-	-	\qa\corres\970604bb.jv1
Telephonic conversation between BB and Darren Harris of IS Security	QSI 1029	0.01	97\06\12	-	-	-	\qa\corres\970612bb.dh1
Telephonic conversation between BB and Paddy Grey of ECNET	QSI 1030	0.01	97\06\12	-	-	-	\qa\corres\970612bb.pg1
E-mail from BB to Verifone concerning partners in RSA	QSI 1031	0.01	97\06\17	-	-	-	\qa\corres\970617bb.vf1
E-mail from BB to Paddy Grey of ECNet requesting a meeting	QSI 1032	0.01	97\06\18	-	-	-	\qa\corres\970618bb.pg1
E-mail from BB to Val English requesting SET pricing	QSI 1033	0.01	97\06\19	-	-	-	\qa\corres\970619bb.ve1

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
E-mail from BB to Val English	QSI 1034	0.01	97\06\20	-	-	-	\qa\corres\970620bb.ve1
E-mail from Val English to BB concerning IBM's product pricing	QSI 1035	0.01	97\06\20	-	-	-	\qa\corres\970620ve.bb1
E-mail from Val English with more info regarding IBM SET pricing	QSI 1036	0.01	97\06\20	-	-	-	\qa\corres\970620ve.bb2
Telephonic conversation between BB and Tim Price of Mastercard regarding further SET development.	QSI 1037	0.01	97\06\26	-	-	-	\qa\corres\970626bb.tp1
E-mail from BB to Tim Price at Mastercard	QSI 1038	0.01	97\06\30	-	-	-	\qa\corres\970630bb.tp1
Letter from BB to Tim Price at Mastercard. Attached to QSI 1038	QSI 1039	0.01	97\06\30	-	-	-	\qa\corres\970630bb.tp2
Discussion between BB, Ursula and Prof. Landy and Cathy Cutayar of Microsoft	QSI 1040	0.01	97\07\01	-	-	-	\qa\corres\970701bb.ms1
Fax from Microsoft	QSI 1041	0.01	97\07\01	-	-	-	hardcop
E-mail from Stephan Brandt regarding services offered by Destiny	QSI 1042	0.01	97\07\09	-	-	-	\qa\corres\970709sb.bb1

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
E-mail to David Marcus at Microsoft regarding Site Server	QSI 1043	0.01	97\07\10	-	-	-	\qa\corres\970710bb.ms1
E-mail to David Marcus requesting follow up information regarding Site Server	QSI 1044	0.01	97\07\23	-	-	-	\qa\corres\970723bb.ms1
Telephonic conversation between BB and Altmaar Visser of FNB	QSI 1045	0.01	97\07\31	-	-	-	\qa\corres\970731bb.av1
Registration card sent to Microsoft for Site Server	QSI 1046	0.01	97\08\08	-	-	-	hardcopy
Telephonic conversation between BB and Colin Mills of Standard Bank	QSI 1047	0.01	97\08\08	-	-	-	\qa\corres\970808bb.cm1
Proposed list of people to invite to EE Open Day	QSI 1048	0.01	97\08\25	-	-	-	\qa\corres\970825bb.ee1
Thank you letter from AW to Microsoft	QSI 1049	0.01	97\08\30	-	-	-	\qa\corres\970830aw.mso
Letter of acceptance to SCISCIT	QSI 1050	-	97\08\26	-	-	-	Hardcopy
Thank you letter from BB to Microsoft	QSI 1051	-	97\10\13	-	-	-	\qa\corres\971013bb.ms1.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
E-mail from Darren Harris to BB regarding release dates of Set version 1 software	QSI 1052	-	97\09\08	-	-	-	\qa\corres\970908dh.bb1
E-mail from Darren Harris to BB offering the trial use of Verifone software	QSI 1053	-	97\09\16	-	-	-	\qa\corres\970916dh.bb1
Microsoft Registration Card for Site Server	QSI 1054	-	97\10\21	-	-	-	Hardcopy
Letter of thanks from AW to David Marcus at Microsoft	QSI 1055	-	97\10\23	-	-	-	Hardcopy
E-mail from BB to Darren Harris at Internet Solutions regarding SET	QSI 1056	-	98\01\13	-	-	-	\qa\corres\980113bb.dh1.txt
Reply from Darren Harris to BBs e-mail	QSI 1057	-	98\01\16	-	-	-	\qa\corres\980116dh.bb1.txt
E-mail from BB to Darren Harris at Internet Solutions regarding SET and SSL	QSI 1058	-	98\01\16	-	-	-	\qa\corres\980116bb.dh1.txt
E-mail from BB to RHL regarding the software in ssa300.001	QSI 1059	-	98\01\19	-	-	-	\qa\corres\980119bb.rh1.txt
Document from BB to RHL with questions relating to the code in ssa300.001	QSI 1060	-	98\01\19	-	-	-	\qa\corres\980119bb.rh2.doc

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
E-mail from BB to Verisign enquiring about an SSL certificate.	QSI 1061	-	98\02\03	-	-	-	\qa\corres\980203bb.vs1.txt
Letter of enquiry from Verisign to BB	QSI 1062	-	98\02\03	-	-	-	\qa\corres\980203vs.bb1.txt
Reply from Verisign regarding BBs enquiry (QSI 1061)	QSI 1063	-	98\02\03	-	-	-	\qa\corres\980203vs.bb2.txt
Reply from BB to Verising in connection with QSI 1062	QSI 1064	-	98\02\04	-	-	-	\qa\corres\980204bb.vs1.txt
Message from Darren Harris to BB concerning the Verifone SET products	QSI 1065	-	98\02\06	-	-	-	\qa\corres\980206dh.bb1.txt
Message from BB to Darren Harris with questions about the Verifone products	QSI 1066	-	98\02\11	-	-	-	\qa\corres\980211bb.dh1.txt
Reply from Darren Harris with answers to BBs questions	QSI 1067	-	98\02\11	-	-	-	\qa\corres\980211dh.bb1.txt
Message from BB to Darren Harris requesting a meeting	QSI 1068	-	98\02\11	-	-	-	\qa\corres\980211bb.dh2.txt
Message from Verisign to BB indicating that they cant provide a price reduction	QSI 1069	-	98\02\12	-	-	-	\qa\corres\980212vs.bb1.txt

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Message from DH to BB saying that they couldn't meet	QSI 1070	-	98\02\11	-	-	-	\qa\corres\980211dh.bb2.txt
Message from BB to DH with questions about VPOS	QSI 1071	-	98\02\11	-	-	-	\qa\corres\98021 1bb.dh3.txt
Mail from Darren Harris with answers to BBs questions about VPOS	QSI 1072	-	98\02\18	-	-	-	\qa\corres\980218dh.bb1.txt
Mail from Verisign to BB confirming the order of a digital ID	QSI 1073	-	98\04\15	-	-	-	\qa\corres\980415vs.bb1.txt
Mail from RHL to SQO Team regarding the SOQ encryption	QSI 1074	-	98\05\06	-	-	-	\qa\corres\980506rl bb1.txt
Mail from BB to SOQ team regarding the QSI encryption	QSI 1075	-	98\05\06	-	-	-	\qa\corres\980506bb.soq1.txt
Mail from BB to SOQ team regarding the QSI encryption	QSI 1076	-	98\05\06	-	-	-	\qa\corres\980506bb.soq2.txt
Mail from RHL to BB regarding the SOQ encryption	QSI 1077	-	98\05\07	-	-	-	\qa\corres\980507rl.bb1.txt
QUALITY RECORDS (Agenda's and Minutes)							
	QSI 2000						\qa\minutes\

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Minutes of meeting held with BB and AW.	QSI 2001	-	97\01\10	Approved	97\02\19	QSI2003 section 2.2	\qa\minutes\970110-1.min
Agenda for meeting between BB and AW	QSI2002	-	97\01\10	Approved	97\02\19	QSI2003 section 2.1	\qa\minutes\970219-1.agd
Minutes of meeting held with BB and AW.	QSI2003	-	97\02\19	Approved	97\02\28	QSI2005 section 2.2	\qa\minutes\970219-1.min
Agenda for meeting between BB and AW	QSI2004	-	97\02\27	Approved	97\02\28	QSI2005 section 2.1	\qa\minutes\970228-1.agd
Minutes of meeting held with BB and AW	QSI2005	-	97\02\28	Approved	97\03\12	QSI2008 section 2.2	\qa\minutes\970228-1.min
Minutes of meeting held with Smartnet ISP	QSI2006	-	97\03\01	Draft	-	-	\qa\minutes\970301-1.min
Agenda for meeting between BB and AW	QSI2007	-	97\03\11	Approved	97\03\12	QSI2008 section 2.1	\qa\minutes\970312-1.agd
Minutes of meeting between BB and AW	QSI2008	-	97\03\12	Approved	97\03\25	QSI2010 section 2.1	\qa\minutes\970312-1.min
Agenda for meeting between AW and BB	QSI2009	-	97\03\23	Approved	97\03\25	QSI2010 section 2.1	\qa\minutes\970325-1.agd

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Minutes of meeting between AW and BB	[illegible]10	-	97\03\25	Approved	97\04\21	QSI2013 section 2.2	\qa\minutes\970325-1.min
Agenda for meeting between AW and BB	QSI2011	-	97\04\15	Approved	97\04\21	QSI2013 section 2.1	\qa\minutes\970421-1.agd
Minutes of meting between BB and VWV Interactive.	QSI2012	-	97\04\17	Draft	-	-	\qa\minutes\970417-1.min
Minutes of meeting between AW and BB	QSI2013	-	97\04\21	Draft	97\04\30	QSI2015 section 2.2	\qa\minutes\970421-1.min
Agenda for meeting between AW and BB	QSI2014	-	97\04\28	Approved	97\04\30	QSI2015 section 2.1	\qa\minutes\970430-1.agd
Minutes of meeting between BB and AW	QSI2015	-	97\04\30	Approved	97\05\13	QSI2017 section 2.2	\qa\minutes\970430-1.min
Agenda for meeting between AW and BB	QSI2016	-	97\05\12	Approved	97\05\13	QSI2017 section 2.1	\qa\minutes\970513-1.agd
Minutes of meeting between BB and AW	QSI2017	-	97\05\13	Approved	97\05\27	QSI2019 section 2.2	\qa\minutes\970513-1.min
Agenda for meeting between AW and BB	QSI2018	-	97\05\26	Approved	97\05\27	QSI2019 section 2.1	\qa\minutes\970527-1.agd

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Minutes of meeting between BB and AW	QSI2019	-	97\05\27	Approved	97\06\17	QSI 2025 section 2.2	\qa\minutes\970527-1.min
Minutes of meeting between BB and Internet Solutions	QSI 2020	-	97\05\29	-	-	-	\qa\minutes\970529-1.min
Minutes of meeting between BB and Bruce Whitby of IAfrica.com	QSI 2021	-	97\06\02	-	-	-	\qa\minuts\970602-1.min
Minutes of meeting between BB and Howard Henson of Nedcor and Wayne Friedman of Digital Mall	QSI 2022	-	97\06\04	-	-	-	\qa\minutes\970604-1.min
Minutes of meeting between BB and Val English of IBM	QSI 2023	-	97\06\10	-	-	-	\qa\minutes\970610-1.min
Agenda for meeting between BB and AW	QSI 2024		97\06\10	Approved	97\06\17	QSI 2025 section 2.1	\qa\minutes\970617-1.agd
Minutes of meeting between BB and AW	QSI 2025	-	97\06\17	Approved	97\07\16	QSI 2031 section 2.2	\qa\corres\970617-1.min
Minutes of meeting between BB and Jacko Van Vuuren of ABSA	QSI 2026	-	97\06\17	-	-	-	\qa\corres\970617-2.min
Minutes of meetings with exhibitors at the Wired World Exhibition	QSI 2027	-	97\06\18	-	-	-	\qa\corres\970618-1.min

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Meeting between BB and Collin Mills and Neil Champion of Standard Bank	QSI 2028	-	97\07\08	-	-	-	\qa\corres\970708-1.min
Meeting between BB and Stephan Brandt of Destiny	QSI 2029	-	97\07\09	-	-	-	\qa\corres\970709-1.min
Agenda for meeting between BB and AW	QSI 2030	-	97\07\13	Approved	97\07\16	QSI 2031 section 2.1	\qa\corres\970716-1.min
Minutes of meeting between BB and AW	QSI 2031	-	97\07\16	Approved	97\08\01	QSI 2033 section 2.2	\qa\corres\970716-1.agd
Agenda for meeting between BB and AW	QSI 2032	-	97\07\29	Approved	97\08\01	QSI 2033 section 2.1	\qa\corres\970731-1.agd
Minutes of meeting between BB and AW	QSI 2033	-	97\08\01	Approved	97\08\20	QSI 2035 section 2.2	\qa\corres\970801-1.min
Agenda for meeting between BB and AW	QSI 2034	-	97\08\19	Approved	97\08\20	QSI 2035 section 2.1	\qa\corres\970820-1.agd
Minutes of meeting between BB and AW	QSI 2035	-	97\08\20	Approved	97\09\17	QSI 2037 section 2.2	\qa\corres\970820-1.min
Agenda for meeting between BB and AW	QSI 2036	-	97\09\15	Approved	97\09\17	QSI 2037 section 2.1	\qa\corres\970917-1.agd

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Minutes of meeting between BB and AW	QSI 2037	-	97\09\17	Approved	97\10\09	QSI 2039 section 2.2	\qa\corres\970917-1.min
Agenda for meeting between BB and AW	QSI 2038	-	97\10\07	Approved	97\10\09	QSI 2039 section 2.1	\qa\corres\971009-1.agd
Minutes of meeting between BB and AW	QSI 2039	-	97\10\09	Approved	97\10\23	QSI 2041 section 2.2	\qa\corres\971009-1.min
Agenda for meeting between BB and AW	QSI 2040	-	97\10\21	Approved	97\10\23	QSI 2041 section 2.1	\qa\corres\971023-1.agd
Minutes of meeting between BB and AW	QSI 2041	-	97\10\23	Approved	97\12\04	QSI 2043 section 2.2	\qa\corres\971023-1.min
Agenda for meeting between BB and AW	QSI 2042	-	97\12\02	Approved	97\12\04	QSI 2043 section 2.1	\qa\corres\971203-1.agd
Minutes of meeting between BB and AW	QSI 2043	-	97\12\04	Approved	98\01\14	QSI 2045 section 2.2	\qa\corres\971204-1.min
Agenda for meeting between BB and AW	QSI 2044	-	98\01\12	Approved	98\01\14	QSI 2045 section 2.1	\qa\corres\980114-1.agd

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
Minutes of meeting between BB and AW	QSI 2045	-	98\01\14	Draft	98\03\10	QSI 2047 section 2.2	\qa\corres\980114-1.min
Agenda for meeting between BB and AW	QSI 2046	-	98\03\09	Approved	98\03\10	QSI 2047 section 2.1	\qa\corres\980310-1.agd
Minutes of meeting between BB and AW	QSI 2047	-	98\03\10	Approved	98\04\08	QSI 2049 section 2.2	\qa\corres\980310-1.min
Agenda for meeting between BB and AW	QSI 2048	-	98\04\06	Approved	98\04\08	QSI 2049 section 2.1	\qa\corres\980408-1.agd
Minutes of meeting between BB and AW	QSI 2049	-	98\04\08	Approved	98\04\22	QSI 2051 section 2.2	\qa\corres\980408-1.min
Agenda for meeting between BB and AW	QSI 2050	-	98\04\20	Approved	98\04\22	QSI 2051 section 2.1	\qa\corres\980422-1.agd
Minutes of meeting between BB and AW	QSI 2051	-	98\04\22	Draft	98\06\02	QSI 2053 section 2.2	\qa\corres\980422-1.min
Agenda for meeting between BB and AW	QSI 2052	-	98\05\12	Approved	98\06\02	QSI 2053 section 2.1	\qa\corres\980513-1.agd
Minutes of meeting between BB and AW	QSI 2053	-	98\06\02	Draft			\qa\corres\980602-1.min

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
QUALITY RECORDS (Audit reports)							
	QSI 3000						\qa\auditrep
Project initiation Audit report	QSI3001	0.01	97\03\26	Draft	-	-	\qa\auditrep\9706pi01.par
Project in progress Audit Report	QSI 3002	0.01	97\06\25	Draft	-	-	\qa\auditrep\9706ip01.par
Project in progress Audit Report	QSI 3003	0.01	97\09\25	Draft	-	-	\qa\auditrep\9706ip02.par.doc
Project in progress Audit Report	QSI 3004	0.01	98\01\16	Draft	-	-	\qa\auditrep\9706ip03.par.doc
Project in progress Audit Report	QSI 3005	0.01	98\03\18	Draft	-	-	\qa\auditrep\9706ip04.par.doc
QUALITY RECORDS (Document Issue Notices)							
	QSI 4000						\qa\notices\
DIN for 18 February 1997	QSI4001	0.01	97\02\18	Draft	-	-	\qa\notices\970218-1.din
DIN for 20 February 1997	QSI4002	0.01	97\02\20	Draft	-	-	\qa\notices\970220-1.din
DIN for 3 March 1997	QSI4003	0.01	97\03\03	Draft	-	-	\qa\notices\970220-1.din
DIN for 19 March 1997	QSI4004	0.01	97\03\19	Draft	-	-	\qa\notices\970319-1.din
DIN for 26 March 1997	QSI4005	0.01	97\03\26	Draft	-	-	\qa\notices\970326-1.din

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
DIN for 18 April 1997	QSI4006	0.01	97\04\18	Draft	-	-	\qa\notices\970418-1.din
DIN for 29 April 1997	QSI4007	0.01	97\04\29	Draft	-	-	\qa\notices\970429-1.din
DIN for 13 May 1997	QSI4008	0.01	97\05\13	Draft	-	-	\qa\notices\970513-1.din
DIN for 17 July 1997	QSI 4009	0.01	97\07\17	Draft	-	-	\qa\notices\970717-1.din
DIN for 10 December 1997	QSI 4010	0.01	97\12\10	Draft	-	-	\qa\notices\971210-1.din.doc
QUALITY RECORDS (Call for Review)							
	QSI 5000						\qa\reviews\
Call for review to SOQ group for document QSI200 revision 0.02	QSI5001	0.01	97\04\30	Draft	-	-	\qa\reviews\970430-1.cfr
QUALITY RECORDS (Project Issue reports)							
	QSI 6000						\qa\issuerep\
QUALITY RECORDS (Product Problem Reports)							
	QSI 7000						\qa\problems\
QUALITY RECORDS (Inspection and Review Records)							

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
	QSI 8000						\qa\inspectns\
QUALITY RECORDS (Backup and archives)							
	QSI 9000						\qa\backups\
Weekly backup register template	QSI 9100	0.01	97\08\08	Draft	-	-	\qa\backups\qsi9100.doc
Weekly backup register	QSI 9101	0.01	97\08\08	Draft	-	-	\qa\backups\qsi9101.doc
Six monthly backup register template	QSI 9200	0.01	97\08\08	Draft	-	-	\qa\backups\qsi9200.doc
Six monthly backup register	QSI 9201	0.01	97\08\08	Draft	-	-	\qa\backups\qsi9201.doc
Source code Archive Register template	QSI 9300	0.01	97\09\16	Draft	-	-	\qa\backups\qsi9300.doc
Source code Archive Register	QSI 9301	0.01	97\09\16	Draft	-	-	\qa\backups\qsi9301.doc
Weekly backup register of the Dolphin workstation	QSI 9401	0.01	98\02\12	Draft	-	-	\qa\backups\qsi9401.doc
QUALITY RECORDS (Financial Records)							
	QSI 10000						\qa\finance\
QUALITY RECORDS (Software Product Test Records)							

Document Name	Document Number	Revision Number	Revision Date	Document Status	Date approved	Minute Refer-ence	File Reference
	QSI 11000						\qa\tests\
Test of the IS4 Shopper Interface	QSI 11001	0.01	98\06\06	Draft			\qa\tests\980606-1.tes.doc
Test of the IS4 Manager Interface	QSI 11002	0.01	98\06\06	Draft			\qa\tests\980606-2.tes.doc
Test of the IS4 System and Database	QSI 11003	0.01	98\06\09	Draft			\qa\tests\980609-1.tes.doc

QSI

Quality Plan

Management Product

Version 1.00

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Quality Plan
Doc. Reference:	C:\QSI\MP\QSI003.001
Created by:	B. Braude
Creation Date:	21 January 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\01\21	Draft	BB	qsi003.001
1.00	97\03\12	Approved	BB	qsi003.100

Revision History

Version	Date	Changes
0.01	97\01\21	Document created using qst122-10 revision 1.00
1.00	97\03\12	Document approved.

Management Authorisation

Version	Date	Status	Project Minute Reference
1.00	97\03\12	Approved	QSI2008 section 2.3

Change Forecast

1. Scope

1.1 Introduction

This document defines the contents and format of a Quality Plan for this project, in terms of the quality requirements of the SEAL Quality Management system, as defined in QS 122 SEAL QMS Quality Policy.

This document specifies management tasks and responsibilities related to quality, and describes the tools and/or systems that will be used to maintain product quality.

1.2 Product Overview

The QSI project will involve the investigation of the quality aspects of software product supply and support using the Internet. Based on the investigation into the quality standards, an electronic Internet system is to be developed to supply SEAL software products via the Internet.

1.3 Audience

The audience for this document comprise the various stakeholders of the SEAL, including:

- fulltime members of the SEAL
- All fulltime and parttime post-graduate students associated with the SEAL
- Members of the SEAL Management Board
- Head of the Department, Electrical Engineering
- individuals who will perform internal and external surveillance audits of the SEAL Quality Management System.
- Product developer
- Product Manager

1.4 Applicable Documents

1.4.1 Standards

SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994

1.5 Requirements Traceability

a. ISO 9001 (1994) Clause 4.2

2. Quality Objectives

2.1 Process Quality Objective

a. The QSI system is to be developed within the SEAL QMS and comply with all of the relevant SEAL QMS requirements.

b. The system is to comply with Standards requirements for the supply of software via the Internet, as determined in the investigation into the relevant Quality Standards (Refer Product Description, QSI004)

c. With reference to ISO/ IEC 15504 part 2, the project is to be developed using processes that comply to the following capability levels for the following process dimensions:

ID	Process name	Required level	Risk addressed
CUS.1	Acquire Software	2	No organisation wide procedure. Process will be developed and documented for this project.
CUS.2	Manage customer needs	3	Must support the stated business goals of the organisation. Uses organisation wide procedures (PD, PFS, QP)
CUS.3	Supply software	2	No organisation wide procedure. Installation will form part of the development and is unique to this project.
CUS.4	Operate software	2	The operation of the software is specific to this project and not to the business wide procedures.
CUS.5	Provide customer service	N/A - beyond the scope of this project	
ENG. 1	Develop system requirements and design	3	Uses organisation wide process of software development that will be tailored for this process. (Product Functional Specification, User Reference Manual)
ENG.2	Develop software requirements	3	Uses organisation wide process of software development that will be tailored for this process. (Product Functional Specification, User Reference Manual)

ID	Process name	Required level	Risk addressed
ENG.3	Develop software design	3	Uses organisation wide process of software development that will be tailored for this process. (High Level Design, Low Level Design)
ENG.4	Implement software design	2	The implementation of the design is specific to this project and does not follow any standard procedure.
ENG.5	Integrate and test software	3	Uses organisation wide process of software development that will be tailored for this process. (Product Test Specification,)
ENG.6	Integrate and test system	3	Uses organisation wide process of software development that will be tailored for this process. (Product Test Specification)
ENG.7	Maintain system and software	Not applicable - beyond the scope of this project.	
SUP.1	Develop documentation	3	Carried out based on organisational wide procedures (Master Document List)
SUP.2	Perform configuration management	3	Carried out based on organisational wide procedures (Configuration Management Plan)
SUP.3	Perform quality assurance	3	Carried out based on organisation wide procedures (Quality Plan)
SUP.4	Perform work product verification	3	Carried out based on organisation wide procedures (Requirements Verification and Validation Template)
SUP.5	Perform work product validation	3	Carried out based on organisation wide procedures (Requirements Verification and Validation Template)
SUP.6	Perform joint reviews	3	Carried out based on organisational wide procedures (Student/ Supervisor meetings)
SUP.7	Perform audits	3	Carried out based on organisational wide procedures (SEAL project audits)

ID	Process name	Required level	Risk and Priority
SUP.8	Perform problem resolution	3	Carried out based on organisational wide procedures (SEAL QMS)
MAN.1	Manage the project	3	Carried out based on organisational wide procedures (SEAL QMS)
MAN.2	Manage quality	3	Carried out based on organisational wide procedures (SEAL QMS)
MAN.3	Manage risks	2	Process is specific to this project and not carried out on an organisation wide basis.
MAN.4	Manage subcontractors	2	Process is specific to this project and not carried out on an organisation wide basis.
ORG.1	Engineer the business	N/A on the project level	
ORG.2	Define the process	N/A on the project level	
ORG.3	Improve the process	N/A on the project level	
ORG.4	Provide skilled human resources	N/A on the project level	
ORG.5	Provide software engineering infrastructure	N/A on the project level	

2.2 Product Quality Objectives

Quality characteristic	Product requirements
1. **Functionality**	
1.1 Accuracy	1.1.1 The credit card, username and password and software encryption key information are to be 100% accurate. 1.1.2 Statistics presented to the system administrator are to be as accurate as required by the customer. This will be specified further after the development of a Product Functional Specification. 1.1.3 The accuracy of information input by a user is dependant on the specific user being accurate. This is to be enhanced as far as possible by creating user friendly and well commented user interfaces. Input masks can also be used to enhance user input

Quality characteristic	Product requirements
	accuracy.
1.2 Suitability	1.2.1 The software to be developed is to meet the customer's requirements as specified in the Product Description. 1.2.2 The system is also to be suitable to users for the use of the system. Therefore other payment systems are to be investigated and researched in order to determine market norms prior to the development of the QSI system.
1.3 Interoperability	1.3.1 The system is to interoperate with other facilities such as the larger SEAL Web facility and the specific product pages. 1.3.2 The system is also to interoperate with the international system used for the payment mechanism. 1.3.3 The system is also to interoperate with the SPICE encryption tool mechanism. 1.3.4 The system is to interoperate with standard Web browsers such as Internet Explorer 3 and Netscape Navigator 3. 1.3.5 The system is to interoperate with any standard secure web server.
1.4 Compliance	1.4.1 The system is to comply with any requirements as required by the selected International payment mechanism.
1.5 Security	1.5.1 The system is to be sufficiently secure so that the effort required to break into the system and obtain information far outweighs the gain obtained by receiving the information.
2. Reliability	
2.1 Maturity	2.1.1 The process that the product is to perform, is to be at a level 4 for Cus.3 (Supply software) in the ISO/IEC 15504 standard.
2.2 Fault tolerance	2.2.1 Due to the financial nature of the tasks of the system, the system is to have zero tolerance in errors in critical user information such as credit cards, usernames and passwords.
2.3 Recoverability	2.3.1 The system is to be totally recoverable in the event of a disaster such as hardware failure or fire. 2.3.2 The recovery time is to be the standard time for a backup restoration. 2.3.3 The recoverability a specific transaction, should the system fail during a transaction must be investigated.

Quality characteristic	Product requirements
2.4 Availability	2.4.1 The system is to be available permanently. 2.4.2 Breaks in availability can however be tolerated in the event of a power failure or system failure. The break in availability is not to be more than a few hours.
3. Usability	
3.1 Understandability	3.1.1 The system is to contain features, technology and documentation in order to ensure user confidence in the use of the system for payment of the supplied product over the Internet. 3.1.2 On the Web interface, QSI system is to be described. 3.1.3 The functions and use of the QSI system is to be described in detail.
3.2 Learnability	3.2.1 The Web interface and administrator's interface are to use standard layouts and standard controls in order to make the learnability of the interfaces as simple as possible. 3.2.2 Detailed User Reference Manuals are also to be developed.
3.3 Operability	3.3.1 The system is to be simple to use and instructions are to be present within the system (on the Web and administrative interfaces) to guide the user through the use of the system. 3.3.2 The system must be able to function fully with as minimal administrative human intervention as possible.
4. Efficiency	
4.1 Time behaviour	4.1.1 The system is to have a time response as can be considered reasonable for Internet usage. 4.1.2 During usage, the system is to provide information and respond to user inputs at a reasonable speed, that is the processing and download speeds are to be reasonable for Internet norms. 4.1.3 Further more the speed of confirmation or reply to users via e-mail is to be reasonable (a few hours).
4.2 Resource utilisation	4.2.1 The system must be designed and have sufficient resources in order to allow multiple users to use the system simultaneously.
5. Maintainability	
5.1 Analysability	5.1.1 The system will be supported by the standard documentation as prescribed by the SEAL QMS in order to provide details required for maintenance and updating. This documentation will aide in the analysis

Quality characteristic	Product requirements
	of the QSI system.
5.2 Changeability	5.2.1 The system will be required to be changed in order to meet changing on-line payment standards. 5.2.2 By developing the system within the Process quality objective as defined in section 2.1 above, the changeability of the system will be maximised.
5.3 Stability	5.3.1 The system must be well designed and documented as defined in section 2.1 in order to minimise the unexpected effects of modifications.
5.4 Testability	5.4.1 The system is to be well designed and documented in order to ensure testability of modifications. 5.4.2 Also the system is to be modularised. Therefore modification to a module can be tested in that module.
6. Portability	
6.1 Adaptability	6.1.1 The system need not be adaptable to run in other environments. The system is to be developed for use by the SEAL in a stable non-changing environment.
6.2 Installability	6.2.1 The system need not have a high level of installability as the development of the system includes the installation of the system in its final environment.
6.3 Co-existence	6.3.1 The system should be able to co-exist with any other software in the same environment.. 6.3.2 However due to security concerns, the system will probably not co-exist with any other software in the same environment.
6.4 Conformance	6.4.1 Due to no requirement for portability existing, standards relating to portability are not applicable.
6.5 Replaceability	6.5.1 Not applicable. The system will not be replacing any other software.

3. Quality Requirements

3.1 Responsiblity for Organisation and management of Quality Activities

This is defined in the Project Management Plan (QSI005) for the project, as derived from QST124-10.

3.2 Contract Arrangements

QSI007 - Post graduate MSc proposal is the contract in hardcopy form in the project binder.

3.3 Design Management

Refer to the Master Document List (QSI001) for details regarding the design documentation that will be developed in this project.

Refer to the Project Management Plan - Work Breakdown Structure for details regarding the process that will be followed for the design of the system.

3.4 Document and Data Control

Document and data control will follow the requirements set out in QS 125, and will comply with QS195.

3.5 Supplier Control

Purchase of product and services will comply with the requirements of QS126, QSP126-10 and will source product and services using the list of Preferred Suppliers given in QS190.

3.6 Control of Customer Product

The requirements of QS127 and QSP327-10 will be followed.

3.7 Configuration Management

The requirements for product identification and traceability as defined in QS128 and QSP 128-10 will be followed using the template QST128-70 for developing the Configuration Management Plan for this project.

Refer to the Configuration Management Plan (QSI006) for details regarding configuration management for this project.

3.8 Process Management

3.8.1 Documentation Management

The standard required for documentation management will be applied as defined in QS 195.

3.8.2 For Education and Training

Refer to the Project Management Plan (QSI005) for details regarding education and training.

3.8.3 For Software Development

Refer to the Master Document List (QSI001) and the Work Breakdown Structure (QSI005) for details regarding the documentation that will be developed for software development.

3.8.4 Test Procedures, Reviews and Inspections

All acceptance points, acceptances and releases required for the project, together are identified in the Project Management Plan for this project.

3.9 Test Environment

Refer to the Product Test Specification for details regarding the testing of the system.

3.10 Test Records

Refer to the Master Document List (QSI001) and the Product Test Specification for this project.

3.11 Corrective and Preventative Action

Problems will be reported in meeting and recorded in the minutes of meetings.

Audits will be carried out to ensure compliance with the SEAL QMS.

Testing of the QSI system will be carried out according to the Product Test Specification and all results will be documented (Refer to the Master Document List (QSI001)

3.12 Media Control

During development of the project, media will be controlled as per details in the Configuration Management Plan (QSI006).

Delivery of the product will be in the form of installation of the product on the required Web server.

The final product will be stored as per standard requirements of the SEAL.

3.13 Records

Refer to the Master Document List (QSI001)

3.14 Project Audits

These will be conducted in terms of the requirements of

a. QS137 - Internal Quality Audit Policy

b. QS137-10 Internal Quality Audits Procedure

c. QST137-10 Templates for Internal Quality Audits.

3.15 Training Needs

Specific training needs will be identified as per QS 138 SEAL QMS Training Policy, and conducted accordingly, and recorded in QSI005 section 4.7 , Training Needs Identification

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QSI

Product Description

Management Product

Version 1.00

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Product Description
Doc. Reference:	C:\QSI\MP\QSI004.100
Created by:	B. Braude
Creation Date:	9 November 1996

Document History

Version	Date	Status	Who	Saved as:
0.01	96\11\09	Draft	BB	QSI004.001
0.02	97\02\13	Draft	BB	qsi004.002
1.00	97\02\20	Approved	BB	qsi004.100

Revision History

Version	Date	Changes
0.01	96\11\09	Document created using template qst12420.102
0.02	97\02\13	Document revised based on clarification of the Product Description with AW
1.00	97\02\20	Document updated and approved as per QSI2003 section 2.3

Management Authorisation

Version	Date	Status	Project Minute Reference
1.00	97\02\20	Approved	QSI2003 section 2.3

Change Forecast

1 Scope

1.1 Introduction

The main purpose of this document is to define a framework for the development of the QSI product. The QSI project will involve the investigation of the quality aspects of software product supply and support using the Internet. Based on the investigation into the quality standards, an electronic Internet system is to be developed to supply SEAL software products via the Internet.

1.2 Applicability

This document is applicable as a Management Product for the SEAL QSI project. The document defines the dependencies of the project and the requirements that the project is to address. This document further specifies the standards to which the project development and final product are to comply. The review procedure for the project and a high level project structure are also detailed.

1.3 Definitions

SEAL - Software Engineering Applications Laboratory

WWW - World Wide Web

FTP - File Transfer Protocol

OLTP - On-line Transaction Processing

LAN - Local Area Network

ISO - International Standards Organisation

IEC - International Electrotechnical Commission

TC - Technical Committee

JTC - Joint Technical Committee

SC - Sub-committee

system - The product as to be developed in the QSI project

1.4 Audience

The following comprise the audience for this document:

a. The developer of this product.

b. The manager of this product development.

c. Members of the SEAL OQ project.

d. Members of the SEAL Management Board

e. Head of Department of Electrical Engineering

f. Individuals who perform internal and external audits on projects undertaken within the SEAL Quality Management System.

1.5 Applicable Documents

1.5.1 Specifications

None

1.5.2 Standards

a. SEAL QMS Document Creation Template, QS 002, Revision 1.00, 11 Feb. 1995

b. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 11 Feb.1995

1.5.3 Procedures

a. SEAL QMS Product Review Procedure, QS 004, Revision 1.00, 11 Feb.1995

b. SEAL QMS Exception Reporting Procedure, QS 006, Revision 1.00, 11 Feb.1995

1.5.4 Guidelines

None

1.5.5 Other Documents

None

1.6 Assumptions

None

1.7 ISO 9001 Requirements Traceability

a. ISO 9001 (1994) 4.4 Design Control

b. ISO 9001 (1994) 4.5 Document Control

c. ISO 9001 (1994) 4.8 Product Identification and Traceability

d. ISO 9001 (1994) 4.9 Process Control

e. ISO 9001 (1994) 4.16 Quality Records

2 Dependencies

2.1 The SEAL QSI project is dependant on the WWW facilities developed to support the SEAL and the SPICE product. The QSI system will be developed to interface with these Web facilities.

2.2 The SEAL QSI project and final system are dependant on the Wits Electrical Engineering LAN and Internet connection in order to provide access to the QSI system via the Internet.

2.3 The QSI system is dependant on the software product being supplied having encryption key technology as used by the SPICE product.

3 Requirements to be Addressed

3.1 Functional Requirements to be met

3.1.1 Investigation of the quality aspects of software product supply and support using the Internet

The SEAL QSI project will involve the investigation of the quality aspects of software product supply and support using the Internet. The investigation will involve the examination of the quality characteristics and requirements arising from the ISO TC 176 (9000 related series) and the ISO/IEC JTC1 SC7 software engineering standards.

3.1.2 Electronic support for SEAL software applications

Based on the investigation into the standards as discussed above, an electronic Internet system is to be developed to supply SEAL software products and upgrades.

The system is to meet the following functional requirements (These requirements will be modified and updated based on the investigation discussed above):

a. The QSI system is to allow a user to acquire a SEAL software product.

b. In order to allow for payment of the SEAL software product, this project will involve an investigation into on-line transaction processing (OLTP).

c. Once the user has access to the software product, the Internet system is to provide a means of providing fixes, upgrades and enhancements for the relevant products. This will require the provision of an encryption key different to that of the original software product.

d. The system is to provide automatic (e-mail) confirmation to users in connection with actions and requests made in the system (Refer points a and c above).

e. The system is to require user identification on entering the system. The user access is to be limited based on this identity.

f. The facilities that the Internet system provides to a user, are to be customised based on the user's characteristics. This is based on the user's identification and the information available on the user in the system's database. That is, elements discussed in point c above are

only to be provided for products for which the user is already registered.

g. The entire SEAL QSI project is to be carried out within the SEAL QMS infrastructure.

h. The Internet QSI system is to comply with the SEAL Web design specifications as defined in the SEAL WWW project.

i. The system is to be secure from unauthorised entry and actions.

3.2 Non-functional requirements to be met

a. This system is to serve as the key mechanism for SEAL software product supply.

b. The system is to provide user confidence in the use of the system as a secure mechanism for the payment of the supplied product over the Internet.

c. The system is to enhance the reputation of the SEAL as being a leading academic software development institution committed to the development of software within a Software Quality Management System.

d. The system is to promote the reputation of the SEAL as being an institution committed to the development and promotion of standards and methodologies for the development of software within a Software Quality Management System.

4 Compliance to Standards

4.1 Compliance required to ISO 9001 Clauses

To be defined after the investigation into the relevant ISO9001 standards as discussed in section 3.1

4.2 Compliance required to other Standards\Guides

a. The system is to be developed to comply with SEAL file server requirements.

b. The system is to comply with SEAL Web page requirements.

5 Product Review

5.1 Purpose

To define the requirements by which this product is to be validated.

5.2 Responsibility

This section will detail the authority (body) and individuals responsible for the satisfactory operation of validation.

This group will consist of the project's core group of members:

- Project Leader
- Project Developer

Authorisation of the project and the products thereof is the responsibility of the Project Manager.

5.3 Review Procedure

a. The review procedures are to be carried out by the core group as described in section 5.2 and the extended core group consisting of the members of the SEAL of Quality SPICE tool team.

b. The core group is to meet periodically to discuss the project's progress and provide the project with specific direction.

c. All discussion records from the core group meetings are to be recorded in minutes of meetings.

d. All documents are to be approved by means of approval of the minutes of the meetings in which the relevant documents were approved.

e. All meeting minutes and document issue notices are to be distributed to the extended core group via the 1997_06@seal.ee.wits.ac.za mailing list.

f. All project documentation is to be made available to the extended core group via the SEAL server's FTP facility.

6 Structure of this project

6.1 Purpose

The purpose of the product being developed in the SEAL QSI project is to provide on-line Internet acquisition and upgrades for the software products that have been and are being developed within the SEAL. The actual methods of support are defined in section 3 of this document.

6.2 Scope

The scope of the project is defined by section 3 of this document and by the Project Management Plan and Work Breakdown structure (QSI005).

6.3 Field of Application

a. The system being developed is to be used by the SEAL in order to supply software products developed by the SEAL.

b. The system is to be designed and developed to allow for the customisation of the system to allow for the supply of any SEAL software product.

c. The system to be developed in this project will form part of a wider Internet facility supporting the supplied tool (e.g. SPICE Web site)

6.4 Limitations

a. The system is furthermore limited by limitations imposed by the Project Management Plan and the Work Breakdown Structure (Refer QSI005)

b. The project is limited by the international arrangements for the payment mechanism, which may not be complete and operational by the end of this project.

6.5 How this project will be structured

TASK	Scheduled Start Date	Scheduled End Date
1. Training (SEAL Summer School)	1997\01\27	1997\02\14
2. Preparation of Management Products: ■ QSI004 Product Description ■ QSI001 Master Document List ■ QSI006 Configuration Management Plan ■ QSI005 Project Management Plan ■ QSI003 Quality Plan ■ QSI008 Binder Labels ■ QSI009 Archive Diskette Labels	1997\01\10	1997\02\28
3. Preparation of Technical Products: ■ PFS - Product Functional Specification ■ URM - User Reference Manual ■ PTS - Product Test Specification ■ HLD - High-level Design ■ LLD - Low-level Design ■ Coding ■ Integration ■ Testing	1997\02\28	1997\11\31

TASK	Scheduled Start Date	Scheduled End Date
■ Customer Acceptance Testing		
4. Technical paper to present at SAICSIT 1997	1997\08\01	1997\09\31
5. Assemble MSc and submit	1998\01\01	1998\02\28

■

QSI

Project Management Plan

Management Product

Version 1.01

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Project Management Plan
Doc. Reference:	C:\QSI\MP\QSI005.001
Created by:	B. Braude
Creation Date:	21 January 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\01\21	Draft	BB	QSI005.001
1.00	97\03\26	Approved	BB	QSI005.100
1.01	97\05\27	Approved	BB	qsi005.101

Revision History

Version	Date	Changes
0.01	97\01\21	New document created using qst124-10.101
1.00	97\03\26	Document Approved
1.01	97\05\27	Added in names under Human Resources

Management Authorisation

Version	Date	Status	Management Board Minute Reference
1.00	97\03\25	Approved	QSI 2010 section 2.4

Change Forecast

This document will be updated each time there is a change to one of the tables in this Plan i.e. resources, task element, or schedule.

1 Scope

1.1 Introduction

This Plan provides an overview of the required resources to produce the QSI product. It will form the terms of reference for all contributing parties during the project.

- This Plan outlines the human resources requirements.
- It provides a list of tasks to be performed and a time scale.
- It provides a means for capturing important project metrics regarding estimated and actual effort to perform allocated tasks.

The costs associated with the development of the product are outside the scope of this Plan.

1.2 Purpose

The purpose of this Plan is to:

- Present a clear statement of all deliverables.
- Present a clear statement of work allocation and responsibilities to be undertaken by all parties.

Present details of resources associated with this product.

1.3 Definitions

SEAL - Software Engineering Applications Laboratory

WWW - World Wide Web

FTP - File Transfer Protocol

OLTP - On-line Transaction Processing

LAN - Local Area Network

ISO - International Standards Organisation

IEC - International Electrotechnical Commission

TC - Technical Committee

JTC - Joint Technical Committee

SC - Sub-committee

system - The product as to be developed in the QSI project

1.4 Audience

The audience for this document comprise the various stakeholders of the SEAL, including:

- full-time staff members of the SEAL
- All full-time and part-time post-graduate students associated with the SEAL
- Members of the SEAL Management Board
- H f the Department, Electrical Engineering
- Individuals who will perform internal and external surveillance audits of the SEAL Quality Management System.
- Members of this product work group

1.5 Applicable Documents

1.5.1 Specifications

None

1.5.2 Standards

a. SEAL QMS Document Creation Template, QS 002, Revision 0.01, 5 April 1994.

b. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 0.01, 1 April 1994.

1.5.3 Procedures

None

1.5.4 Guidelines

None

1.5.5 Other Documents

All QSI Management series of documents (Refer Master Document List (QSI001))

1.6 Assumptions

It is assumed that the reader is familiar with the QSI Product Description (QSI004)

1.7 ISO 9001 Requirements Traceability

a. ISO 9001 (1994) 4.1 Management Responsibility

b. ISO 9001 (1994) 4.2 Quality System

c. ISO 9001 (1994) 4.3 Contract Review

d. ISO 9001 (1994) 4.4 Design Control

e. ISO 9001 (1994) 4.5 Document and Data Control

f. ISO 9001 (1994) 4.8 Product Identification and Traceability

g. ISO 9001 (1994) 4.9 Process Control

h. ISO 9001 (1994) 4.10 Inspection and Testing

i. ISO 9001 (1994) 4.13 Control of Non-conforming Product

j. ISO 9001 (1994) 4.14 Corrective and Preventative Action

k. ISO 9001 (1994) 4.16 Quality Records

l. ISO 9001 (1994) 4.18 Training

2 Product Quality Plan

The team associated with this project is totally committed to quality and all system documentation produced as part of the product will be reviewed internally by the Review team and produced in accordance with the standards and formats associated with the SEAL QMS.

The Quality Plan associated with this project is identified as QSI003, as defined in QS 195 SEAL QMS Project Documentation and Support Standard.

3 Project Management Plan

3.1 Overview

The aim of this Project Management Plan is to define the structure of this project and to create the technical products.

This resource plan must be formally approved by the Product Manager before work on the Technical products is undertaken.

3.2 Product Development Team

The development team comprises:

- The Product Manager of QSI
- The developer(s) of this project

3.3 Roles and Responsibilities

3.3.1 Product Developer

- Establish and maintain a product plan for developing this project
- Ensure all Technical Exceptions are properly reported.
- Prepare Detailed Work Plans as necessary.
- Prepare and present regular Checkpoint Reports to the Project Manager.
- Take direction from the Project Manager for matters related to the project.
- Act as the Project Editor for the product.

3.3.2 Product Manager

- Monitor progress and resource utilisation of the Product Team, and initiate corrective action where necessary.
- Identify required resources and make these available to the team.
- Act as the focal reporting point for the product

- Ensure that Product Reviews are held as planned..
- Interface to the SEAL Management board.
- Be responsible for the timely delivery of the product.
- Give direction to the Product development team.

4 Product Development Plan

4.1 Work Breakdown Structure

4.2 Dependencies

4.2.1 Internal dependencies

Refer to section 2 in the Product Description, QSI004.

4.2.2 External dependencies

Refer to section 2 in the Product Description, QSI004.

4.3 Required Human Resources

The following resources are required to develop the product:

Number	Resource	Commitment
1	Product Manager	5% throughout the project
1	Product Developer	100% throughout the project

4.4 Available Human Resources

The following human resources are available as on 27 May 1997:

Who	Contact Details(postal address, phone, fax, e-mail addresses)	QSI role
A. J. Walker	P O Box 278, WITS, 2050 Phone: (011) 716-5469 (W) (011) 403-1929 (W-Fax) (082) 452-0933 (Cell) e-mail: walker@odle.ee.wits.ac.za	Project Manager
B.S.Braude	Postal address: P.O.Box 2433 Pretoria 0001 Residential address: 2d Krans street Linksfield 2192	Project Developer

Who	Contact Details(postal address, phone, fax, e-mail addresses)	QSI role
	Phone: (011) 640-6398 (H) (011) 640-2044 (H) (011) 716-5379 (W) (082) 883-1545 (Cell) e-mail: braude@odie.ee.wits.ac.za	
External Contacts		
ABSA Christo Vrey	(011) 350-4372 vreyc@absa.co.za	Head of SET development at ABSA
FNB Lianne Byrne	(011) 889-9170	Involved with SET development for FNB
FNB Altmaar Visser	(011) 889-9170	Head of SET development at FNB
Nedcor Howard Henson	(011) 881-4911	Security specialist involved with SET
Standard Bank Collin Mills	(011) 636-4352	Project Manager at Standard Bank
Iafrca.com Steve Lightbody	(011) 807-5600	Head of IAfrica.com
Infodoor Bruce Whitby	(082) 566-3900	Involved in Internet commerce development
Gordon Ashby	gashby@icon.co.za	Consultant to EDS and Standard Bank regarding OLTP
VISA International (South Africa) Tony Stewart	(011) 728-0840	Involved with SET implementation for VISA in South Africa.
VWV Interactive Jarred Cinman	jarred@vwv.com	Technical Director of VWV Interactive
Smartnet ISP Lance Terner	(012) 998-5291	Director of Smartnet

Who	Contact Details(postal address, phone, fax, e-mail addresses)	QSI role
Mastercard International Tim Price	(011) 780-3962	Chip Card Technical Project Director (In charge of SET)
Microsoft South Africa David Marcus and Cyril Berlklof	(011) 445-0000	Microsoft SA – Internet Customer Unit
Destiny Electronic Commerce Stephen Brand	(011) 315-7720	Sales at Destiny Electronic Commerce
IBM South Africa Val English	(011) 302-8218	Sales - Networking Computing Solutions Unit
Digital Mall Wayne Friedman	(011) 885-1700	Director of Digital Mall
EC-NET Paddy Grey	(011) 445-9667	
Internet Solutions Darren Harris	(011) 447-7171	Involved with SET at Internet Solutions

4.5 Human Resource allocation

The allocation of individuals to specific tasks is given in WBS and Schedule.

4.6 Hardware and Software Resources.

The following hardware and software resources are required:

Hardware/software items	Quantify	Date required	Date supplied
1 Development PC	1	97\01\08	97\01\08
1 test server (standard PC)	1		
Web server software (SSL?)	1		
Server software (Linux or NT4?)	1		
Development software (still to be determined - possibly : Microsoft Front Page 97, Microsoft Visual J++,			

Hardware/software items	Quantity	Date required	Date supplied
Microsoft Visual C++ or VB,)			
Database software	1		

4.7 Training Needs Identification.

The following training is required for this project:

Project Member	Course Title	Offered by	Course date	Attended?
BB	SEAL course 97-01: Software Quality Management: Principles and Practices.	SEAL	97\01\27 - 97\01\128	YES
BB	SEAL course 97-02: Software Quality Management: ISO 9001 Principles.	SEAL	97\01\29- 97\01\31	YES
BB	SEAL course 97-04: Software Quality Management: Software Process Assessment and Capability Determination.	SEAL	97\02\05- 97\02\07	YES
BB	SEAL course 97-05: Software Quality Management: ISO 9001 Project Practices.	SEAL	97\02\10- 97\02\14	YES

5 Project Control

5.1 Planning

The planning of different tasks of this project will be performed by the Product developer under the approval of the Product Manager.

Any detailed plan will not be executed without the approval of the Product Manager.

5.2 Reviewing

- All draft versions of the product will be reviewed by the Product Manager.
- In addition, certain versions which are so specified in the Work Breakdown Structure will be reviewed by the members of other product groups.

5.2.1 Planned Arrangements for Reviews

All project artefacts (i.e. Management, Technical, and Quality Assurance Products) are subject to review. Management and Technical Products may be subject to a number of revisions before a product is approved by the Product Manager. QA Products are not normally changed after being produced and are simply approved by the Project Manager. (Changes are only made if there are factual errors in the first revision.)

The obligations of Project Manager and Product Develop(s) associated with each review activity are listed in the Work Breakdown Structure, Obligations and Schedule (Section 7).

5.2.2 Scheduling of Reviews

Each Management and Technical Product identified in the Work Breakdown Structure (Section 7) will be reviewed by the Product Manager. This will normally take place in a review meeting. These meetings will be listed in the Project Schedule, and typically identified with the product(s) (or WBS item(s)) under review.

5.2.3 Records of Reviews

Records of review meetings are maintained as minutes taken at the meetings. These review meeting minutes will be listed as entries in the QA Products in the Project Master Document List (QSI 001).

5.3 Reporting

Control is affected by both monitoring and reporting upon progress to management and members of the team.

5.3.1 Responsibilities of the Product Developer

The product developer(s) will report to the Product Manager at intervals defined in the Minutes of Product Review Meetings detailing:

- Progress to date
- Effort required to complete
- Problems encountered and action taken

5.3.2 Responsibilties of the Product Manager

- The Product Manager will initiate corrective action as necessary to keep the project on schedule.
- The Product Manager will report the progress of the project to the SEAL Management Board.

5.4 Document control

Document control will be performed as per SEAL QMS policy and procedures:

- QS125 SEAL QMS Document and Data Control
- QS 195 SEAL QMS Project Documentation Standard
- In accordance the requirements of QS 195, this document will be numbered as QSI005.
- The Management and Technical products identified in the WBS in Section 7 will be reflected in the Master Document List for this project (QSI 001)

5.5 Change Control

Any work outside of the Product Description (QSI004) will be formally approved by the Project Manager.

6 Budget

<Optional>

WBS Task	Description	Labour Cost	Equip. Cost	Material Cost	Office Space	Support Staff	Training Cost	Total
Totals								

7 Work Breakdown Structure, Obligations and Schedule

Refer to QSI005-10, Work Breakdown Structure.

Work Breakdown Structure, Obligations and Schedule

Project Artefact (WBS Item)	Doc. No	Who	Obligations		Effort (hours)		Start Date		End Date	
			Developer	Manager	Est.	Act	Sched-uled	Actual	Sched-uled	Actual
1.Development of Product Sub-system							970301	970301	970801	980609
1.1.Product Functional Specification	QSI200	BB	Develop document, perform verification and validation.	Review and approve documentation.	25	-	970317	970317	970404	970716
1.2.Quality Issues Relating to Software Product Supply and Support using the Internet	QSI330	BB	Develop Document	Review and Approve document	25	-	970407	970407	970415	970513
1.3.User Reference Manual Series	QSI210 and QSI211	BB	Develop document, perform verification and validation.	Review and approve documentation.	25	-	970416	970429	970422	980602
1.4.Technical Reference Manual - Database design (Incorporated into High and Low level design series)	QSI270	BB	Develop document, perform verification and validation.	Review and approve documentation.	20	-	970423	N/A	970430	N/A

Project Artefact (WBS item)	Doc. No	Who	Obligations		Effort (hours)		Start Date		End Date	
			Developer	Manager	Est.	Act	Sched-uled	Actual	Sched-uled	Actual
1.5.Product Test Specification Series	QSI220, QSI221, QSI222	BB	Develop document, perform verification and validation.	Review and approve documentation.	25	-	970501	980122	970509	980602
1.6.Register: Requirement verification and validation	QSI280		Develop document	Review and approve documentation.	25	-	970512	-	970516	-
1.7.High Level Design Series	QSI230, QSI231, QSI232	BB	Develop document, perform verification and validation.	Review and approve documentation.	25	-	970519	970811	970528	980408
1.8.Low Level Design	QSI240, QSI241, QSI242	BB	Develop document, perform verification and validation.	Review and approve documentation.	25	-	970529	971117	970611	980408
1.9.Code Design/ Description (Incorporated into the Low Level Design series)	QSI250	BB	Develop document, perform verification and validation.	Review and approve documentation	25	-	970612	N/A	970620	N/A
1.10.Implementation of databases	NA	BB	Develop databases, testing, verification and validation	Manage the processes	30	-	970623	970901	970704	980609

Project Artefact (WBS item)	Doc. No	Who	Obligations		Effort (hours)		Start Date		End Date	
			Developer	Manager	Est.	Act	Sched-uled	Actual	Sched-uled	Actual
1.11.Implementation of code design	NA	BB	Develop code, testing, verification and validation	Manage the processes	40	-	970707	970901	970801	980609
2.Integration into Web framework							970221	970221	970926	980609
2.1.Evaluation of Web support requirements	QSI200	BB	Evaluate and document	Review and approve	40	-	970221	970221	970430	970716
2.2.Installation and setting up of Web server	NA	BB	Install and set up server.	Manage the processes	15	-	970804	970715	970815	970730
2.3.Development of Web pages and database connectivity	NA	BB	Develop software, perform verification, validation and testing.	Manage the processes	40	-	970818	970901	970912	980609
2.4.Development of Administrator procedures	QSI310	BB	Develop software, perform verification, validation and testing.	Manage the processes	15	-	970915	970725	970926	980422
3.Integration and customer acceptance testing							970929	970901	971215	

Project Artefact (WBS item)	Doc. No	Who	Obligations		Effort (hours)		Start Date		End Date	
			Developer	Manager	Est.	Act	Sched-uled	Actual	Sched-uled	Actual
3.1.Integration of code modules		BB	Integrate Web server, databases, web pages, connectivity between web server and databases and administrator interface.	Manage the processes	10	-	970929	970901	971010	980609
3.2.Module test	NA	BB	Test the modules	Manage the processes	10	-	971013	980606	971031	980609
3.3.Customer acceptance testing - System test - offline	NA	AW	Present the system	Review and accept the system	10		971103		971114	
3.4.Customer acceptance testing - Feedback from community - online	NA				10		971117		971212	
4.MSc compliance requirements							970501	970628	980228	980610
4.1. Prepare Technical paper to present at SAICSIT 1997	QSI120 series	BB	Prepare paper	Review and approve paper.	65	-	970501	970628	970930	971110
4.1.1.Development of Technical Paper PD	QSI120-10	BB	Prepare document	Review and approve document	10	-	970501	970628	9/0601	970814
4.1.2. Development of Technical Paper-Summary	QSI120-20	BB	Prepare document	Review and approve document	10	-	970501	970718	970601	970814

Project Artefact (WBS item)	Doc. No	Who	Obligations		Effort (hours)		Start Date		End Date	
			Developer	Manager	Est.	Act	Sched-uled	Actual	Sched-uled	Actual
4.1.3. SEAL format of Technical Paper	QSI120-30	BB	Prepare paper	Review and approve paper	30	-	970825	970814	970912	971110
4.1.4.SAICSIT format of Technical paper (Not applicable – SEAL format used – refer to QSI 120-30)	QSI120-31	BB	Prepare paper	Review and approve paper	5	-	970915	N/A	970930	N/A
4.1.5.Powerpoint presentation of Technical Paper	QSI120-50	BB	Prepare presentation	Review and approve presentation	10	-	971001	971017	971010	971110
4.2.Project: Preliminary Pages	QSI100	BB	Assemble and submit	Review and approve.	15	-	980105	980602	980109	980609
4.3.Project Summary/ Overview	QSI110	BB	Assemble and submit	Review and approve.	20	-	980112	980609	980123	980609
4.4.Project Technical Papers	QSI121 and QSI122	BB	Assemble and submit	Review and approve.	20	-	980126	980505	980130	980610
4.5.Project: Research Review	QSI130	BB	Assemble and submit	Review and approve.	30	-	980202	980506	980216	980609
4.6.Lessons learnt from the project	QSI140	BB	Assemble and submit	Review and approve	30	-	980216	980507	980220	980609
4.7.Project: Bibliography and references	QSI145	BB	Assemble and submit	Review and approve.	15	-	980223	980514	980227	980609

QSI

Configuration Management Plan

Management Product

Revision 1.02

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Configuration Management Plan
Doc. Reference:	C:\QSI\MP\QSI006.100
Created by:	B.Braude
Creation Date:	21 January 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\01\22	Draft	BB	qsi006.001
1.00	97\02\20	Approved	BB	qsi006.100
1.01	98\05\12	Approved	BB	Qsi006.101.doc
1.02	98\06\04	Approved	BB	Qsi006.102.doc

Revision History

Version	Date	Changes
0.01	97\01\22	New document created using QST12870.107
1.00	97\02\20	Document updated as per QSI2003 section 2.6 and approved.
1.01	98\05\12	Plan modified to accommodate 32-bit files and tape backups
1.02	98\06\04	Naming convention for corrected test report problems

Management Authorisation

Version	Date	Status	Project Minute Reference
1.00	97\02\20	Approved	QSI2003 section 2.6

Change Forecast

1 Scope

1.1 Introduction

This document describes the configuration management plan applying to all artefacts supporting this project.

Such artefacts will include hardcopy and electronic representations of documents.

This document reviews the procedure which applies to the management and storage of these artefacts.

1.2 Purpose

Configuration items are individual documents and forms in electronic and hardcopy format. They comprise:

- management products and procedures
- technical products,
- quality records, and
- world wide web support pages

1.3 Applicability

To be referenced by all individuals who engage in product development for this project.

1.4 Limitations

This configuration management plan template is limited to use on two person projects were one member is the developer and the other member is the Product Manager.

1.5 Audience

The following comprise the audience for this document:

a. The developer of this product.

b. The manager of this product development.

c. Members of the SEAL Management Board

d. Head of Department of Electrical Engineering

e. Individuals who perform internal and external audits on projects undertaken within the SEAL Quality Management System.

1.6 Applicable Documents

1.6.1 Standards

a. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994.

1.7 Requirements Traceability

a. ISO9001 (1994) 4.5 Document Control

b. ISO9001 (1994) 4.8 Product Identification and Traceability

c. ISO9001 (1994) 4.13 Control of Non-conforming Product

d. ISO9001 (1994) 4.16 Quality Records

1.8 Procedures for document updates

See QST001-10 for details on the use of the Change Control elements of this document.

2 Documentation Structure

The documents are categorised to reflect the nature of their content. The key categories of documents include:

- mp (management products),
- tp (technical products),
- qa (quality records),
- www (world wide web pages)

3 Artefact Identification

This section defines a consistent referencing system that shall be used for all artefacts. All artefacts are identified by both an artefact filename followed by a artefact file extension in the following format, as described in the following paragraphs.

<name>.<extension>

3.1 File Naming Convention

3.1.1 Project Products - Multiple word processor types present

The file name will be structured as follows:

QSIXXXYY.ZZZ

Where QSI is a 3-letter acronym for this project,

XXX is the 3 digit sequence number of this document,

YY is a file type identifier as follows:

- WS - Wordstar
- WP - Word Perfect
- - Word for Windows (No extension - default word processor type)
- AS - pure ascii text
- HC - hard copy file (no source present)
- PS - postscript file

ZZZ is the version number, starting from 001 as the initial version.

Example: QSM001AS.001, and interpreted as the document QSM001 of type AScii and the first version in the sequence.

If the 32 bit versions of word processors are used, the file naming convention will be that as detailed above however the default 3-letter extension for the word processor type will be added to the end of the file name. For example a file that would be named QSI001.100 in the 16-bit

version of the application will be named QSI001.100.doc in the 32-bit version.

3.1.2 Code\ line art\ image\HTL page files

The file name will be structured as follows:

QSIXXXYY.BBB

where QSI is a 3 letter acronym for this project,

XXX is a 4, 3 or 2 serial number

YY is a two digit version number, in the range 01 to 99, and starting from 01.

BBB is the file extension and will be whatever the particular compiler/tool demands.

In particular:

- HTM - hypertext markup language pages
- GIF - graphics interface format - for image support in html pages
- JPG - JPEG files for picture images in HTML pages

3.1.3 Records - Naming Conventions

3.1.3.1 Correspondence

The file naming convention is as follows:

<YYMMDD><SS>.<RR><N>

Where YYMMDD is the date on which the correspondence items were received,

SS - two characters are allowed for the initials of the sender, and

RR - two characters are allowed for the receivers initials, and

N - a number between 1 and 9 used for more than 1 correspondence item between the same sender and receiver on the same day.

3.1.3.2 Minutes of Project Meetings

The application of QSI010 results in records of which the filename conventions are as follows:

<YYMMDD>-<N>.AGD, or MIN

where YYNMMDD is the date on which the meeting was held,

N is a serial number between 1 and 9, and

AGD identifies Agenda's, and MIN identifies Minutes.

3.1.3.3 Audit Reports

The file naming convention of the SEAL QMS is used when the SEAL QMS templates (QST 137-20 QST 137-30, QST 137-40) are applied:

<Project Year Serial Number><Audit Type><Audit serial number>.PAR

where Project Year and Serial number for this project is 9706 (i.e. SEAL Project 06 registered in 1997),

Audit type - can be PI (Project Initiation) IP (Project in Progress) and PC (Project Closure).

If the audit is an IP type, then the serial number will be in the range 01 to 99.

The filename extension PAR refers to Project Audit Report.

3.1.3.4 Document Issue Notices

The application of QSI 011 generates records which have the naming convention of:

<YYMMDD>-<N>.DIN, where

<YYMMDD> is the date on which the notice was generated,

N is a serial number, allowing for multiple notices to be issued on one date, and

DIN refers to Document Issue Notice.

3.1.3.5 Call for Reviews

When QSI 012 is applied, the quality records generated have the filename conventions of:

<YYMMDD>-<N>.CFR, where

YYMMDD is the date on which the Call for Review was issued,

N is a serial number in the range 1 - 9, and

CFR - Call for Review.

Response to Call for Reviews are stored as:

<YYMMDD>-<N>.RCR

where YYMMDD is the date on which the response to the Call for Review was received,

N is a serial number of the responses received on a particular date, and

RCR refers to Response to Call for Review.

3.1.3.6 Project Issue Reports

Responses to the application of QSI 013 have the naming convention of:

<YYMMDD>-<N>.PIR, where

<YYMMDD> is the date on which the report was received,

N is a serial number, allowing for multiple reports to be received on one date, d

PIR refers to Project Issue Report.

3.1.3.7 Product Exception Reports

Responses to the application of QSI 014 have the naming convention of:

<YYMMDD>-<N>.PER, where

<YYMMDD> is the date on which the report was received,

N is a serial number, allowing for multiple reports to be received on one date, and

PER refers to Product Exception Report.

3.1.3.8 Product Inspections and Reviews

The application of QSI 015 generates records which have the naming convention of:

<YYMMDD>-<N>.IRR, where

<YYMMDD> is the date on which the review record was received,

N is a serial number, allowing for multiple reports to be received on one date, and

IRR refers to Inspection and Review Record.

3.1.4 Backups and Archives

The template for the register of backups and archives is derived from QST 128-71. The register will be designated:

QSI 9000.DOC (for a WW6 document type)

3.1.5 Financial Records

Since most of these will hard copies, the document number will simply be written on top right hand corner of the document.

In the instance of a request for quotation, these will usually be of the nature of a correspondence item, and so the naming convention described in Section 3.1.4.1 applies.

3.1.6 Software test records

QSI 220, QSI 221 and QSI 222 will support checklist templates which when applied will generates records which have the naming convention of:

<YYMMDD>-<N>.TES, where

<YYMMDD> is the date on which the test record was generated,

N is a serial number, allowing for multiple tests to be generated on one date, and

TES refers to software TESt record.

After corrective action is taken on the findings of the test records the records will be named:

<YYMMDD>-<N>.COR, where

<YYMMDD> is the date on which the test record was generated,

N is a serial number, allowing for multiple tests to be generated on one date, and

COR refers to a CORrected software test record.

3.2 Project document and record sequence numbering

- The MP series will be from 001 to 099
- The TP series will be from 100 - 899
- The WWW series will be from 900 - 999
- The QA series will be from 1000 ->

4 Artefact Management

The controls adopted for this project are as follows:

4.1 Development Computer used for creating the files

SEAL Lab Computer System S-22 is the resident computer.

4.2 Directory Structure of the Development Computer

4.2.1 Drive Partition

The C Drive partition is used (Local hard drive).

4.2.2 Project Directory of files on the Development Computer

- K:\QSI\MP - for the storage of the management series documents
- K:\QSI\TP - used for the storage of technical product, including
  - * REPORTS - storage for project reports
  - * SOFTWARE - storage for project software items including documentation and code artifacts
  - * TOOLS - tools to support the development activity
- K:\QSI\QA - used for the storage of quality records including minutes of review meetings, audits, correspondence etc.

  The sub-directories of the QA directory are as follows:
  - * CORRES - storage for correspondence items
  - * MINUTES - storage of agendas and minutes of Core Group meetings
  - * AUDITREP - storage for project audit reports
  - * NOTICES - Storage for Document Issue Notices
  - * REVIEWS - storage for Call for Review Notices and responses
  - * ISSUEREP - storage for Project Issue Reports

  - PROBLEMS - storage for Product Exception Reports
  - INSPECTN - Storage inspections and review records.
  - BACKUPS - storage for backup and archive records
  - FINANCES - storage for records associated with financial transactions on the project
  - TESTS - storage for records emanating from software testing activity
- K:\QSI\WWW - for the storage of the project world wide web artifacts

4.3 Directory Structure of files supported on the SEAL File Server

4.3.1 Project Directory

The 1997_06 directory is used.

4.3.2 Project Directory Structure

- *1997_06/*mp - for the storage of the management series documents
- *1997_06/*tp - used for the storage of technical product, including:
  - reports - storage for project reports
  - software - storage for project software items including documentation and code artifacts
  - tools - tools to support the development activity
- *1997_06/*qa - used for the storage of quality records including:; including:
  - corres - storage for correspondence items
  - minutes - storage of agendas and minutes of Core Group meetings
  - auditrep - storage for project audit reports
  - notices - Storage for Document Issue Notices
  - reviews - storage for Call for Review Notices and responses

  - * Issuerep- storage for Project Issue Reports
  - * problems - storage for Product Exception Reports
  - * inspectn - storage inspections and review records
  - * backups - record of backups and archives on the project
  - * finances - records of financial transactions on the project
  - * tests - records of software test results
- *1997_06/www* - for the storage of the project world wide web artifacts

5 Archiving of Artefacts

5.1 Electronic Artefacts

On project completion an archive copy of all electronic artefacts supporting this projects will be supplied on or more stiffy diskettes using the ARJ.EXE utility. These diskettes will be kept in the official SEAL plastic folders immediately inside the SEAL Project Binder.

5.2 Backup procedure on computers in the SEAL Post-graduate Laboratory Facility

Computers in the SEAL Laboratory Facility are subject to the following back-up procedure:

a. **Local Backup:** Project files are archived to tapes. *(Risk covered: Failure on the hard disk or inadvertent loss or corruption of data.)*

b. **Remote Backup:** Project files are archived to the SEAL File Server (See next section) *(Risk covered: Failure on the hard disk or inadvertent loss or corruption of data.)*

5.3 Backup of files to the SEAL FILE Server

All projects associated with the SEAL are required to archive project files to the SEAL Server project directory on a regular basis.

a. **Backup Frequency to SEAL Server:** The frequency of backups from this project to the SEAL File Server will be daily.

b. **Backup to the File Server:** All project files are archived to the assigned SEAL Directory for this project. This action ensures that these project artefacts are archived offsite from the Development Computer. *(Risk covered: Destruction or loss of the development computers by theft, fire or other disaster.)*

5.4 Backup procedure on computers outside of the Chamber of Mines Building

Not Applicable

5.5 Records of Backups\ Archives

Records of backups\archives shall be maintained. These records may be maintained as an electronic files which resides in the /qa/backup of this project or as hardcopy records using the templates supplied in Section 7 of this document.

5.6 Hardcopy Documents and Records

5.6.1 While the Project is in Progress

Are maintained which the project is in progress in an official SEAL Project Documentation Binder in the SEAL

5.6.2 On Project Closure

Are submitted following project closure for lodging as a project record in the SEAL Project Repository in CM 3-232.

6 Configuration Status Accounting

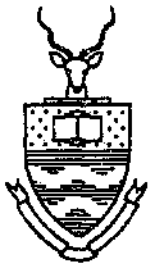
The Project Manager is responsible for ensuring that status of artefacts recorded in the Master Document List corresponds to the:

- identify of the artefacts in the file directories, and
- The revision numbers are correct.

7 Backup Archive Register

Refer to QSI 9100, QSI 9200 and QSI 9300 for the templates used for backup archives.

■



QSI

Quality Issues Relating To Software Product Supply And Support Using The Internet

Technical Product

Version 1.03

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Quality Issues Relating to Software Product Supply and Support using the Internet
Doc. Reference:	C:\QSI\TP\SOFTWARE\QSI330.001
Created by:	B. Braude
Creation Date:	7 April 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\04\07	Draft	BB	QSI330.001
0.02	97\04\30	Draft	BB	QSI330.002
1.00	97\05\13	Approved	BB	qsi330.100
1.01	97\05\30	Approved	BB	qsi330.101
1.02	97\07\24	Approved	BB	qsi330.102
1.03	98\05\28	Approved	BB	Qsi330.103.doc

Revision History

Version	Date	Changes
0.01	97\01\21	Document created using qsi002.100
0.02	97\04\30	Incorporated the inclusion of section 7
1.00	97\05\13	Document approved
1.01	97\05\30	Revised document and added in summary at the end
1.02	97\07\24	Revisited and reviewed document while developing QSI 340
1.03	98\05\28	Reviewed before final submission.

Management Authorisation

Version	Date	Status	Management Board Minute Reference
1.00	97\05\13	Approved	QSI 2017 section 2.5

Change Forecast

1 Scope

1.1 Introduction

This document investigates the quality issues relating to the supply of software and how they pertain to the supply of software over the Internet. The document investigates the following quality standards:

a. ISO 9001 and ISO/DIS 9000-3

b. ISO/IEC 12207 Information Technology - Software Lifecycle Processes

c. ISO/IEC 9126 Information Technology - Software Product Evaluation - Quality Characteristics and guidelines for their use

d. ISO/IEC 9127 Information Processing Systems - User documentation and cover information for consumer software packages

e. ISO/IEC TR 9294 - Information technology - Guidelines for the management of software documentation

f. ISO/IEC 15504 - Software Process Assessment

The document does not investigate and discuss and quality aspects of the supplied products or the development thereof, but only discusses the supply of the completed product. The investigation may however impact on what artefacts and information are produced as part of the product development.

1.2 Purpose

The purpose of this document is to determine the quality characteristics required of a product supply system in order to ensure that the SEAL's software supply system using the Internet complies with all relevant software standards.

1.3 Applicability

a. This document forms part of the technical documentation for the SEAL QSI project (1997_06).

b. The results of the investigation contained herein will be adhered to where applicable in the QSI system that is to be developed.

c. The results will however have an impact on the SEAL Web facility and also on the projects dedicated to the development of a particular software product (for example the SPICE project).

d. The specific software development projects will be responsible for the development of the artefacts and information as determined by this investigation.

e. The SEAL Web facility will be responsible to make these artefacts and information available to the customer in a method that complies with the results of this investigation.

1.4 Definitions

SEAL - Software Engineering Applications Laboratory

WWW - World Wide Web

FTP - File Transfer Protocol

OLTP - On-line Transaction Processing

LAN - Local Area Network

ISO - International Standards Organisation

IEC - International Electrotechnical Commission

TC - Technical Committee

JTC - Joint Technical Committee

SC - Sub-committee

IS^4 - Internet System for the Supply and Support of Software

1.5 Audience

The following comprise the audience for this document:

a. The developer of this product.

b. The manager of this product development.

c. Members of the SEAL OQ project.

d. Members of the SEAL Management Board

e. Head of Department of Electrical Engineering

f. Individuals who perform internal and external audits on projects undertaken within the SEAL Quality Management System.

1.6 Applicable Documents

1.6.1 Specifications

1.6.2 Standards

a. SEAL QMS Document Creation Template, QS 002, Revision 0.02, 3 October 1994

b. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994

1.6.3 Procedures

1.6.4 Guidelines

1.6.5 Other Documents

1.7 Assumptions

It is assumed that the reader of this document has access to all the standards as listed in section 1.1 of this document.

1.8 Requirements Traceability

2 ISO 9001 and ISO/DIS 9000-3

It is assumed that the development processes for the software product and the organisation from which the products are supplied comply with ISO 9001. Therefore only issues relating specifically to the supply of the product are discussed.

2.1 Section 4.1 Management Responsibility

This section is not relevant to the supply of the product. This is handled on the management level of product development.

2.2 Section 4.2 Quality System

This does not impact directly on the method of supply of the product. The Quality system requirement is met on the organisational and project level.

2.3 Section 4.3 Contact Review

a. The software supplied using the Internet is treated as 'shrink wrapped' software and is not developed based on a contract with a customer. However a non-negotiable contract will be applicable.

b. The contract will be developed by the supplier (the SEAL).

c. The customer will have to agree to the contract prior to be being allowed to purchase the product.

d. Section 4.3 is intended as issues to be adhered to by the supplier when reviewing a contract. Because the supplier (SEAL) is going to be developing a non-negotiable contract and not reviewing a customer developed contract or customer changes, the section does not apply to the supply of a software product over the Internet.

e. The points listed in ISO 9000-3 section 4.3.2 must however be considered in the development of the contract by the supplier.

f. The section makes no mention of the approval of a contract. Mechanism should however be implemented on the Internet system to make the contract binding on both parties (the customer and supplier (SEAL)).

2.4 Section 4.4 Design Control

a. Due to the supplied product being a 'shrink wrapped' product, design control is not applicable in the supply and support of the product over the Internet.

b. Requirements emerging from this document may however identify design outputs that may be required to be supplied to the customer. These are not however identified in this section of the standard.

2.5 Section 4.5 Document and Data control

a. All documentation presented on the Internet or via the Internet relating to the supply and support of the respective product must comply with document and data control requirements.

b. Due to the SEAL being ISO 9001 compliant, all documents and data must be managed according to the SEAL Quality Management System. Therefore the management of the documentation according to the SEAL QMS will result in the system complying with this section of the standard.

c. Section 4.5.2 states that all documents must be approved prior to issue. All documentation and data supplied on or via the Internet must be treated as "issued" and therefore must first be approved. Also any changes must be approved and identified where applicable (Section 4.5.3).

d. Due to the SEAL QMS being an electronic based ISO 9001 compliant system, the SEAL approval mechanism should be sufficient for the approval of the data and documentation supplied via the Internet.

e. To ensure the unintended use of invalid or obsolete documents or data (ISO 9001 section 4.5.2 b) only the latest approved document must be available via the Internet. All obsolete documentation or data may be stored in a location inaccessible to the customer.

f. Due to only the latest revision of a document or data being available on the Internet, a 'master list' is not necessary for the customer's usage. A master list should be used by the supplier to control the obsolete documentation that is invisible to the customer.

g. Issues relating to the approval mechanism are not applicable in this document as the approval is handled on the organisation or project level and does not impact on the supply mechanism.

2.6 Section 4.6 Purchasing

a. The Purchasing section relates to the supplier purchasing for the purpose of software development. This is covered on the organisational or project level and is not applicable to the sale of the completed product.

b. However, in assuming that a client is ISO 9001 compliant, the software sales system must enable the customer to meet the requirements of this section when purchasing software via the Internet.

c. Therefore in the relationship of the client purchasing a product from the supplier (the SEAL), in order to enable the client to meet the requirements of this section, the client in the SEAL relationship becomes the supplier in the ISO 9001 context and supplier in the SEAL relationship (the SEAL itself) becomes the sub-contractor.

d. Section 4.6.1 and 4.6.2 are applicable to the client (in the SEAL - client relationship) and therefore will not impact on the Internet software supply system.

e. In section 4.6.3 "Purchasing data", "purchasing documents" can be seen as the order form that the client will complete on the purchasing system's WWW form. The applicable items listed in section 4.6.3 namely:

   i. the type, class, grade or other precise identification,

   ii. the title or other positive identification, and applicable issues of specifications, drawings, process requirements, inspection instructions and other relevant technical data, including requirements for approval or qualification of product, procedures process equipment and personnel,

   iii. the title, number and issue of the quality system standard to be applied,

must be included in the order form where applicable. These inclusions will enable the clients purchasing mechanism to be ISO 9001 compliant.

f. With regard to the clause "The supplier shall review and approve purchasing documents for adequacy of specified requirements prior to release," the submission of the order form in the purchasing system can be considered the client (supplier in the ISO 9001 terminology) approving the purchase document.

g. Section 4.6.4 "Verification of purchased product" is beyond the scope of the Internet supply and support system and will have to be arranged and handled outside the scope of electronic supply and support.

2.7 Section 4.7 Control of customer- supplied product

This is not applicable in the supply of "shrink wrapped" software.

2.8 Section 4.8 Product identification and traceability

a. Due to the product being developed with an ISO 9001 compliant system (the SEAL QMS), product identification and traceability are handled on the organisational and project levels and therefore no additional requirements are necessary in the supply and support system.

b. The sales and support system should however reflect the identification and traceability management used in the product development. This is not specified in the standard but is implied through the use of "identification."

2.9 Section 4.9 Process Control

f. ISO 9001 states that "the supplier shall identify and plan the production, installation and servicing processes which directly affect quality and shall ensure that these processes are carried out under controlled conditions.

g. ISO 9000-3 states that "the process control element as applied to software development is applicable to the replication, delivery and installation of software items or products." Therefore the process control element applies directly the Internet software supply and support system.

h. Control of the delivery process is discussed further in section 4.15.6 of the standard (2.15 of this document).

i. With regard to replication, ISO 9000-3 lists the following that should be considered when replicating software:

   i. "identification of the master and copies including format, variant and version" - the location of the master copy on the server for each software item must be identified. Also all copies must be appropriately identified.

   ii. "the number of copies of each software item to be delivered" - not applicable in the Internet environment where software is downloaded.

iii. "disaster recovery plans including custody of master and back-up copies where applicable" - this is handled by the SEAL QMS on the organisational and project levels and is therefore not a concern of the supply system.

iv. "the period of obligation of the supplier to supply copies and the capability of reading master copies"

v. "the type of media for each software item" - not applicable in the Internet environment where software is downloaded.

vi. "checks against the possibility of software viruses" - this must be implemented.

vii. "the stipulation of required documentation such as manuals and user guides, including identification and packaging" - this must be stipulated. Packaging is not applicable as the documentation will be available for downloading in electronic format.

viii. "copyright and licensing concerns addressed and agreed" - these will be developed as non-negotiable concerns by the supplier. A method must be implemented to obtain customer agreement with the concerns.

ix. "controlling the environment under which the replication is effected to ensure repeatability" - this is a major concern for the Internet supply system as the replication will be occurring on a demand basis and not as a once off batch. The server environment under which the software is downloaded must therefore be controlled to ensure repeatability.

e. ISO 9000-3 states that "for software product releases, the supplier and customer should agree and document procedures for initial and subsequent releases." In the IS4 environment the customer will be purchasing 'shrink wrapped' software and therefore this is not applicable. No negotiation can take place prior to or during development. If it does, it must be handled outside the scope of the IS4.

f. ISO 9000-3 recommends that the release of software establish a baseline for tests etc. This will be handled on the software project level.

g. ISO 9000-3 lists requirements for the installation of software if it is contractually required. In the IS[4], installation of the software will not form part of the contract.

2.10 Section 4.10 Inspection and Testing

a. Inspection and testing will be carried out on the project level and will therefore not form part of the IS[4].

b. Because the supplied software is 'shrink wrapped' software, there are no "previously agreed criteria" for the software and therefore customer acceptance testing is not applicable and will not form part of the contract.

2.11 Section 4.11 Control of inspection, measuring and test equipment

a. This is handled on the organisational or product development project level and therefore does not form part of the IS[4] requirements.

2.12 Section 4.12 Inspection and test status

a. Only released products will be available through the IS[4].

b. The inspection and test status will therefore not have any bearing on the requirements of the IS[4]. The inspection and test status requirements must however be followed on the project and organisational levels to ensure that no products are unintentionally released to the IS[4].

2.13 Section 4.13 Control of non-conforming product

a. Only released products will be available through the IS[4].

b. The control of non-conforming product requirements will therefore not have any bearing on the requirements of the IS[4]. The control of non-conforming product requirements must however be followed on the project and organisational levels to ensure that no products are unintentionally released to the IS[4].

2.14 Section 4.14 Corrective and preventative action

a. Corrective and preventative action will on the whole be handled on the organisational and project levels.

b. Section 4.14.2 states that procedures for corrective action shall include the effective handling of customer complaints and reports of product non-conformities. Therefore procedures must be developed within the IS[4] to receive and handle (pass on to the relevant party) customer complaints.

c. Section 4.14.2 further states that procedures for corrective action shall also include the application of controls to ensure that corrective action

is taken and that it is effective. This will be handled on the organisational and project levels.

2.15 Section 4.15 Handling, storage, packaging, preservation and delivery

a. Section 4.15.1 states that "the supplier shall establish and maintain documented procedures for handling, storage, packaging, preservation and delivery of product." Therefore the entire IS[4] must be fully documented.

b. With regard to handling (section 4.15.2) ISO 9000-3 states that the supplier must establish and maintain procedures to prevent software product damage by viruses. These procedures must therefore be established.

c. ISO 9000-3 section 4.15.2 further states that precautions must be taken due to the material on which the software is stored, deteriorating.

d. With regard to storage (section 4.15.3) the storage area will be the server on which the product is stored. ISO 9001 and ISO 9000-3 state that access control must be instituted. In the IS[4], access to the product must therefore be controlled. This is applicable for physical and electronic access.

e. ISO 9000-3 further stipulates that the storage system must be established to maintain "versions of products in established baselines." This will be handled by the SEAL QMS on a project or organisational level.

f. ISO 9000-3 further states that "to protect the integrity of the product and provide a basis for the control of change, it is essential that software items be held in an environment which:

   i. protects them from unauthorised change or corruption

   ii. permits the controlled retrieval of a copy of the controlled master.

These security requirements of ISO 9000-3 must be adhered to by the SEAL server and the IS[4].

g. The standard further states that consideration must be given to the storage environment of the computer media, particularly with respect to electrostatic and electromagnetic environments.

h. Section 4.15.4 on packaging is not applicable as the software will not be supplied in physical packaging.

2.16 Section 4.16 Control of Quality records

a. This will be handled on an organisational and project level by the SEAL QMS.

2.17 Section 4.17 Internal Quality Audits

a. This will be handled on an organisational level by the SEAL QMS.

3 ISO/IEC 12207 Information Technology - Software Lifecycle Processes

3.1 Section 5 Primary Life Cycle processes

3.1.1 Section 5.1 Acquisition process

a. As is stated in the standard "the acquisition process contains the activities and tasks of the acquirer." This process is not directly applicable to the IS[4]. The acquisition process does however place certain implicit requirements on the supplier in order to enable the acquirer to comply with this process.

b. Section 5.1.1.7 states that 'when an off-the-shelf product is to be acquired, the acquirer will ensure the following conditions are satisfied:

   i. The requirements for the software product are satisfied

   ii. The documentation is available

   iii. Proprietary, usage, ownership, warrantee and licensing rights are satisfied

   iv. Future support for the software product is planned.

   Therefore the IS[4] must make sufficient information available to the acquirer in order to enable him to ensure the above conditions are satisfied.

c. Section 5.1.3.4 states that "the acquirer will then prepare and negotiate a contract with the supplier." In the IS[4] the contract will be prepared by the supplier and will not be negotiable within the scope of the IS[4]. Should contract negotiation and modification be required by the acquirer, the process is to be handled outside the scope of the IS[4]. The section also states that the contract is to "address proprietary, usage, ownership, warrantee and licensing rights associated with the reusable off the shelf products."

d. Section 5.1.3.5 discusses the mechanism for modifying the contract. As has been discussed above, the contract will not be modifiable within the scope of the IS[4].

e. Sections 5.1.1.9 and 5.1.5.2 discuss acceptance criteria and testing. This will not be possible within the IS[4].

3.1.2 Section 5.2 Supply Process

a. The supply process "contains the activities and tasks of the supplier." Generally this will be assumed to apply directly to the IS^4. However the focus of the Supply Process requirements in ISO 12207 is to supply a product using a process that " may be initiated either by a decision to prepare a proposal to answer an acquirer's request for proposal or by signing and entering into a contract with the acquirer to provide the system, software product or software service." The Supply Process therefore covers the supply of a product through the following activities:

   i. Initiation

   ii. Preparation of response

   iii. Contract

   iv. Planning

   v. Execution and Control

   vi. Review and evaluation

   vii. Delivery and Completion

   Therefore in the SEAL and IS^4 scenario, most of the above activities will be undertaken on the product development project level and not on the IS^4 level.

b. Due to products that will be supplied by the IS^4 being "off the shelf products" initiation will take place when the developer decides to develop the product for whatever reason. This will not impact on the IS^4.

c. Due to the product being "off the shelf", a request for proposal by the acquirer does not apply and therefore neither does the preparation of a response.

d. As has been mentioned above, the contract will be determined by the supplier (the SEAL) and will not be negotiable within the scope of the IS^4. Any negotiation of the contract and the supply of a product based on a negotiated customised contract will have to take place outside the scope of the IS^4.

e. Planning, Execution and control and Review and evaluation will take place on the product development level and will therefore not impact on the IS^4.

f. Section 5.2.7, Delivery and completion states that the supplier must deliver and support the product as specified in the contract. This must therefore be specified in the contract provided by the IS⁴.

3.1.3 Section 5.3 Development Process

a. Except for sections 5.3.12, Software installation and 5.3.13, Software acceptance support, the Development process applies to the product development project and not to the IS⁴.

b. Section 5.3.12 states that "the developer shall develop a plan to install the software product in the target environment as designated in the contract." The installation of the product must therefore be specified in the contract that is presented by the IS⁴. The IS⁴ is only used to supply the product and associated artefacts. Developer installation must therefore be handled outside the scope of the IS⁴, if required by the contract.

c. The section further states that "the resources and information necessary to install the software product shall be determined and be available." This information must therefore be determined and must be available on or via the IS⁴.

d. "As specified in the contract, the developer shall assist the acquirer with the set-up activities." The extent to which the developer shall assist must therefore be specified in the contract. Also the assistance as specified in the contract must either be supported by the IS⁴ or be handled outside of the scope of the IS⁴.

e. "When the installed software product is replacing an existing system, the developer shall support any parallel running activities that are specified by the contract." This must therefore be specified in the contract and either the IS⁴ must be modified to support such activities or this must be handled outside the scope of the IS⁴ (i.e. by human support).

f. "The installation plan shall be documented."

g. Section 5.3.12.2 states that "the developer shall install the software product in accordance with the installation plan." This cannot be accomplished by the IS⁴ and must be handled outside the scope of the IS⁴.

h. Section 5.3.13 states that the developer shall support the acquirer's acceptance review and testing of the software product. This cannot be

supported in the IS^4 environment and this must therefore be specified in the contract.

i. "The developer shall complete and deliver the software product as specified in the contract." This must therefore be specified in the contract. The delivery of the product by the IS^4 must therefore be specified in the contract.

j. "The developer shall provide initial and continuing training and support to the acquirer as specified in the contract." This must be specified in the contract. If training and support beyond the ability of the IS^4 is required, this must then be handled manually outside the scope of the IS^4.

3.1.4 Section 5.4 Operation Process

a. The operation of the product is to be performed by the client (acquirer) and therefore does not impact on the IS^4.

3.1.5 Section 5.5 Maintenance Process

a. The maintenance process is to be handled by either the original developer or another party. This process does not apply to the IS^4 except where interaction with the user (acquirer) is needed as specified below.

b. Section 5.5.12 states that "the maintainer shall establish procedures for receiving, recording and tracking problem reports and modification requests from the users and providing feedback to the users. Whenever problems are encountered they shall be recorded and entered into the Problem Resolution Process." This section applies to the maintainer except for the receiving of problem reports and modification requests and for the provision of feedback. Once the report is received, the maintainer is to record and track the problem. Therefore the IS^4 is to provide a means to report problems and request modifications. Also the system is to provide for a means to provide feedback to the users.

c. Section 5.5.5 discusses migration. The section states that a migration plan shall be developed. This will be handled by the product maintainer. The section lists information that must be provided to a user before migration occurs. This information is the responsibility of the maintainer however the IS^4 is to provide a mechanism to communicate with the users and provide them with this information.

d. The section also states that when scheduled migration arrives, notification must be given to all concerned. The IS^4 must provide the mechanism to provide this notification to all users.

e. The section further stipulates that a post-operation review shall be performed. The IS^4 should provide for a mechanism for obtaining the user responses to the review.

f. Section 5.5.6 discusses retirement. The section states that a retirement plan shall be developed. This will be handled by the product maintainer. The section lists information that must be provided to a user before retirement occurs. This information is the responsibility of the maintainer however the IS^4 is to provide a mechanism to communicate with the users and provide them with this information.

g. The section further states that when the scheduled retirement arrives, notification must sent to all concerned. Once again, the IS^4 must provide this mechanism for the maintainer to notify all users.

3.2 Section 6 Supporting life cycle processes

The supporting life cycle processes will in general be handled by the organisational infrastructure (SEAL QMS) in which the IS^4 product and the relevant supplied products are developed. However issues specific to the IS^4 that impact on the Product Functional Specification of the IS^4 are specified below.

3.2.1 Section 6.1 Documentation process

a. The SEAL QMS and the projects relating to the development of the specific products will handle all documentation processes relating to the documentation for the IS4 and the products supplied by it.

3.2.2 Section 6.2 Configuration Management process

a. All configuration management for the IS^4 will be dealt with on the organisational and project levels. This also applied to products that are supplied and supported by the IS^4.

b. The section discusses change requests and the handling thereof. This will be handled on the project level for the product under change. The IS^4 will only facilitate the communication between the developer/modifier and the user (acquirer).

c. Point b above applies to the release management and delivery (section 6.2.6 in the Standard)

3.2.3 Section 6.3 Quality assurance process

a. Quality assurance will be handled on the project and organisational levels.

b. Section 6.3.1.5 states that "records of quality assurance activities and tasks shall be made available to the acquirer as specified in the contract." This must therefore be specified in the contract and the necessary records must be made available via the IS[4].

c. Section 6.3.3, Process assurance states that "it shall be assured that the acquirer and other parties are provided the required support and co-operation in accordance with the contract, negotiations and plans." The support must therefore be specified in the contract and provided either by means of the IS[4] or otherwise.

3.2.4 Section 6.4 Verification process

a. The verification process will be handled on the organisational and respective project levels.

3.2.5 Section 6.5 Validation process

a. The Validation process will be handled on the organisational and project levels.

3.2.6 Section 6.6 Joint review process

a. Due to the "off the shelf" nature of the supplied products, joint reviews are handled on the organisational and product levels and do not impact on the IS4.

3.2.7 Section 6.7 Audit process

b. Due to the "off the shelf" nature of the supplied products, audits are handled on the organisational and product levels and do not impact on the IS4.

3.2.8 Section 6.8 Problem resolution process

a. The problem resolution process is to be carried out on the project level for the product for which the problem is being reported.

b. The IS^4 is to serve as a means of communication between the product's project members and the users of the product.

3.3 Section 7 Organisational life cycle processes

a. The organisational life cycle processes are generally applicable on the organisational level. Therefore the processes will impact on the IS^4 but do not need to be directly addressed by the IS^4.

b. These processes will however impact on the implementation of the supporting and primary life cycle processes.

4 ISO/IEC 9126 Information Technology - Software Product Evaluation - Quality Characteristics and guidelines for their use

a. The standard discusses Quality Characteristics that relate to software products. The standard does not discuss the supply and support of software in particular but discusses generic quality characteristics as they apply to all software products.

b. The application of these quality characteristics as they apply to the IS[4] is discussed in the project's quality plan QSI003, section 2.2 Product Quality Objectives.

5 ISO/IEC 9127 Information Processing Systems - User documentation and cover information for consumer software packages

5.1 Introduction

a. The software supplied and supported using the IS[4] is a typical consumer software package except that the traditional physical packaging is not present. However due to the user still obtaining the product as a "ready-made package" the same information requirements should apply.

b. The standard described two types of documentation:

   i. User documentation - "This documentation provides users with all the information they need to install and run the software." In the traditional sense this documentation is included within the software packaging and therefore the user only has access to this information after purchasing the product. Similarly in the IS[4], this documentation need only be provided to the user after the product has been purchased.

   ii. Cover information - "Its purpose is to enable prospective purchasers to decide on the applicability of the software to their requirements." This information is traditionally provided on the external product packaging. Therefore in the IS[4], this information should be available to prospective purchasers prior to purchasing the product.

c. The standard categorises the information into three categories, namely Essential, Conditional and Optional. The same three categories will therefore apply to the information when supplied by the IS[4].

d. Due to the standard being directly applicable to the IS[4], the details of the standard will not be repeated in this document. The standard applies as is to the IS[4].

6 ISO/IEC TR 9294 - Information technology - Guidelines for the management of software documentation

a. The management of documentation for the IS[4] and the products supplied using the IS[4], will be handled on the organisational and project levels.

b. All the guidelines that are applied to documentation on the organisational and project levels must however be reflected in the documentation supplied by and developed for the IS[4].

c. Documentation developed by the IS[4] processes must also comply with the guidelines. This compliance can be ensured by ensuring the documentation complies with the organisational and project standards.

7 ISO/IEC 15504 - Software Process Assesment

The ISO/IEC 15504 standard is used to assess processes and determine their respective levels of capability. The processes as detailed in the standard and listed below have been rated with the required level of capability for the relevant processes that the IS^4 is to perform.

Note: The processes as listed below are not for the processes of developing the IS^4 system but for the processes that the IS^4 will perform when fully functional and complete.

Process ID	Process name	Target capability level	Risk addressed in this project
Product Customer - Supplier Relationship			
CUS.1	Acquire Software	N/A	The IS^4 will not acquire software and therefore this is not applicable.
CUS.2	Manage customer needs	2	The customer's needs will be managed according to a documented procedure however the procedure is unique to this system and therefore the needs cannot be managed according to the SEAL QMS procedures for managing customer needs during software development.
CUS.3	Supply software	4	The supply software processes as carried out by the IS^4 must be continually measured according to attributes and modified based on the recorded measurement information. The system is not based on an organisational wide procedure for supplying software however this system will become the organisational wide procedure and therefore level 3 is covered.
CUS.4	Operate software	3	The system will be operated according to documented procedures (User reference manual) which are based on organisational wide procedures (User reference manual template).

Process ID	Process name	Target capability level	Rationale for selection
CUS.5	Provide customer service	2	Customer service and support will be provided based on documented procedures. However no procedures of this nature exist on an organisational level.
Product Engineering			
ENG. 1	Develop system requirements and design	N/A	
ENG.2	Develop software requirements	N/A	
ENG.3	Develop software design	N/A	
ENG.4	Implement software design	N/A	
ENG.5	Integrate and test software	N/A	
ENG.6	Integrate and test system	N/A	
ENG.7	Maintain system and software	N/A	
Project Support			
SUP.1	Develop documentation	3	All documentation developed by system processes (such as quality assurance processes, audits etc.) will be developed according to SEAL QMS procedures. This only applies to documentation developed by human elements of the processes. Automated computer generated records will be developed according to documented procedures however these procedures will not be based on organisational wide procedures. This is due to no organisational procedures being in place for the automated computer generation of records.
SUP.2	Perform configuration management	3	Configuration management will be carried out on all applicable outputs of the system processes. The configuration management will be based on the SEAL QMS but will be tailored where required.

Process ID	Process name	Target Capability Level	Risk addressed within project
SUP.3	Perform quality assurance	2	A quality assurance procedure will be developed for the system. It will not be based on organisational wide procedures. Organisational wide procedures are in place to perform quality assurance during development but not for the processes that a developed system performs.
SUP.4	Perform work product verification	N/A	The processes that the system performs are standard already developed processes and therefore verification is not applicable in this context.
SUP.5	Perform work product validation	N/A	The processes that the system performs are standard already developed processes and therefore validation is not applicable in this context.
SUP.6	Perform joint reviews	N/A	Joint reviews are not applicable as there are many customers and the customers are in remote locations
SUP.7	Perform audits	2	An audit procedure will be developed for the system. It will not be based on organisational wide procedures. Organisational wide procedures are in place to perform audits for development but not for the processes that a developed system performs.
SUP.8	Perform problem resolution	2	Problem resolution for the IS[4] product will be handled on the product project development level. The system itself must however have a problem resolution mechanism if users have problems using the system (not problems with the system as a product). This mechanism will not be based on organisational wide procedures as the organisational wide procedures are for problems with a product itself and not for problems with the use of a system.
Project Management			

Process ID	Process name	Target Capability Level	Risks addressed in this project
MAN.1	Manage the project	3	The project will be managed according to the SEAL QMS. However the procedures will be tailored as the management of the IS[4] is a continual process with no development, only maintenance. Any further development of the system will be handled on the IS[4] product's development project level.
MAN.2	Manage quality	4	The management of quality in this context involves the management of the system to ensure the initially implemented quality characteristics are maintained. This involves measurement. The management of quality will be based on the SEAL QMS but must be taken beyond the SEAL QMS by measuring the quality (that is level 4)
MAN.3	Manage risks	2	Due to the system already being operational and developed, there are no developmental risks normally associated with software development. However risks still remain such as the system crashing, someone breaching the system's security and so on. These risks have to be continually monitored and tracked. The capability level should therefore be one of level 4 however level 3 cannot be achieved due to this risk management occurring only in this system and not on an organisational level.
MAN.4	Manage subcontractors	N/A	There are no subcontractors for the continual maintenance of the system. If any further development or maintenance of the system occurs beyond the normal functioning of the system, this will be handled on the IS[4] product's project level.

7.1.1 Maturity level definitions

There are six capability levels in the reference model, incorporating nine process attributes.

Level 0; *Incomplete:* There is general failure to attain the purpose of the process. There are no easily identifiable work products or outputs of the process.

Level 1; *Performed:* The purpose of the process is generally achieved. The achievement may not be rigorously planned and tracked. Individuals within the organization recognize that an action should be performed, and there is general agreement that this action is performed as and when required. There are identifiable work products for the process, and these testify to the achievement of the purpose.

Level 2; *Managed:* The process delivers work products of acceptable quality within defined timescales. Performance according to specified procedures is planned and tracked. Work products conform to specified standards and requirements. The primary distinction from the Performed Level is that the performance of the process is planned and managed and progressing towards a defined process.

Level 3; *Established:* The process is performed and managed using a defined process based upon good software engineering principles. Individual implementations of the process use approved, tailored versions of standard, documented processes. The resources necessary to establish the process definition are also in place. The primary distinction from the Managed Level is that the process of the Established Level is planned and managed using a standard process.

Level 4; *Predictable:* The defined process is performed consistently in practice within defined control limits, to achieve its goals. Detailed measures of performance are collected and analyzed. This leads to a quantitative understanding of process capability and an improved ability to predict performance. Performance is objectively managed. The quality of work products is quantitatively known. The primary distinction from the Established Level is that the defined process is quantitatively understood and controlled.

Level 5; *Optimizing:* Performance of the process is optimized to meet current and future business needs, and the process achieves repeatability in meeting its defined business goals. Quantitative process effectiveness and efficiency goals (targets) for performance are established, based on the business goals of the organization. Continuous process monitoring against these goals is enabled by obtaining quantitative feedback and improvement is achieved by analysis of the results. Optimizing a process involves piloting innovative ideas and technologies and changing non-effective processes to meet defined goals or objectives. The primary distinction from the Predictable Level is that the defined process and the standard process undergo continuous refinement and improvement,

based on a quantitative understanding of the impact of changes to these processes.

7.1.2 Process purposes

7.1.2.1 Customer-Supplier process category (CUS)

The *Customer-Supplier* process category consists of processes that directly impact the customer, support development and transition of the software to the customer, and provide for its correct operation and use.

CUS.1 Acquire software

The purpose of the *Acquire software* process is to obtain the product and/or service which will satisfy the need expressed by the customer. The acquisition process is enacted by the acquirer. The process begins with the identification of a customer need and ends with the acceptance of the product and/or service needed by the customer.

CUS.2 Manage customer needs

The purpose of the *Manage customer needs* process is to manage the gathering, processing, and tracking of ongoing customer needs and requirements throughout the operational life of the software; to establish a software requirements baseline which serves as the basis for the project's software work products, and activities; and to manage changes to this baseline.

CUS.3 Supply software

The purpose of the *Supply software* process is to package, deliver, and install the software at the customer site; and to ensure that quality software is delivered as defined by the requirements.

CUS.4 Operate software

The purpose of the *Operate software* process is to support the correct and efficient operation of the software for the duration of its intended usage in its installed environment.

CUS.5 Provide customer service

The purpose of the *Provide customer service* process is to establish and maintain an acceptable level of service to the customer to support effective use of the software.

7.1.2.2 Engineering process category (ENG)

The *Engineering* process category consists of processes that directly specify, implement, or maintain a system and software product and its user documentation. In circumstances where the system is composed totally of software, the Engineering process deals only with the construction and maintenance of such software.

ENG.1 Develop system requirements and design

The purpose of the *Develop system requirements and design* process is to establish the system requirements (functional and non-function , and architecture, identifying which system requirements should be allocated to which elements of the system and to which releases. This process should be achieved by a group of people representing the diverse components of the system such as users, operators, hardware, software, etc.

ENG.2 Develop software requirements

The purpose of the *Develop software requirements* process is to establish the requirements of the software component of the system.

ENG.3 Develop software design

The purpose of the *Develop software design* process is to define a design for the software that accommodates the requirements and can be tested against them.

ENG.4 Implement software design

The purpose of the *Implement software design* process is to produce executable software units and to verify that they properly reflect the software design.

ENG.5 Integrate and test software

The purpose of the *Integrate and test software* process is to integrate the software units with each other producing software that will satisfy the software requirements. This process is accomplished step by step by individuals or teams.

ENG.6 Integrate and test system

The purpose of the *Integrate and test system* process is to integrate the software component with other components, such as manual operations or hardware, producing a complete system that will satisfy the users expectations expressed in the system requirements. This process is managed step by step by a group of people including a software expert.

ENG.7 Maintain system and software

The purpose of the *Maintain system and software* process is to manage modification, migration and retirement of system components (such as hardware, software, manual operations, network if any) in response to user requests. The origin of requests might be a discovered problem or the need for improvement or adaptation. The objective is to modify and/or retire existing systems and/or software while preserving the integrity of organizational operations.

7.1.2.3 Support process category (SUP)

The *Support* process category consists of processes which may be employed by any of the other processes (including other supporting processes) at various points in the software life cycle.

SUP.1 Develop documentation

The purpose of the *Develop documentation* process is to develop and maintain documents recording information produced by a process or activity within a process.

SUP.2 Perform configuration management

The purpose of the *Perform configuration management* process is to establish and maintain the integrity of all of the work products of a process or project.

SUP.3 Perform quality assurance

The purpose of the *Perform quality assurance* process is to ensure that work products and activities of a process or project comply with all applicable standards, procedures, and requirements.

SUP.4 Perform work product verification

The purpose of the *Perform work product verification* process is to confirm that each work product of a process or project properly reflects the requirements for its construction.

SUP.5 Perform work product validation

The purpose of the *Perform work product validation* process is to confirm that the specific requirements for a particular intended use of the work product are fulfilled.

SUP.6 Perform joint reviews

The purpose of the *Perform joint reviews* process is to maintain a common understanding with the customer of the progress against the objectives of the contract and what should be done to help ensure development of a product that satisfies the customer.

SUP.7 Perform audits

The purpose of the *Perform audits* process is to confirm independently that the products and processes employed conform with the specific requirements defined.

SUP.8 Perform problem resolution

The purpose of the *Perform problem resolution* process is to ensure that all discovered problems are analyzed and removed, and trends are identified.

7.1.2.4 Management process category (MAN)

The Management process category consists of processes which contain practices of a generic nature which may be used by anyone who manages any sort of project or process within a software life cycle.

MAN.1 Manage the project

The purpose of the *Manage the project* process is to define the processes necessary to establish, coordinate and manage a project and the resources necessary to produce a product.

MAN.2 Manage quality

The purpose of the *Manage quality* process is to manage the quality of the project's products and services and to ensure that they satisfy the customer. The process involves establishing a focus on managing the quality of product and process at both the project and organizational level.

MAN.3 Manage risks

The purpose of the *Manage risks* process is to continuously identify and mitigate the project risks throughout the life cycle of a project. The process involves establishing a focus on management of risks at both the project and organizational levels.

MAN.4 Manage subcontractors

The purpose of the *Manage subcontractors* process is to select qualified subcontractor(s) and manage their performance.

8 Summary of Investigation

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS[4] ,development project or SEAL)
2.3	9001 - section 4.3	A contract must be developed by the supplier	Development project
2.3	9001 - section 4.3	The contract for the software must be supplied on the Internet and a mechanism must be put in place for the customer to agree to the contract	IS[4]
2.5	9001-section 4.5	All documentation made available via the Internet must: ■ comply with the SEAL QMS documentation standards ■ be approved ■ be the latest revision	IS[4] ,development projects and SEAL
2.6 e	ISO 9001 - section 4.6.3	The items as identified in this section of the standard must be included in the order form for the software	IS[4]
2.8 b	ISO 9001 - section 4.8	The identification and traceablility management used on the project level must be reflected in the supply and support system.	IS[4]
2.9 di	ISO 9000-3 section 4.9	The master copy and copies must be identified	IS[4]

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS[4] ,development project or SEAL)
2.9 d iii	ISO 9000-3 section 4.9	Disaster recovery plans must be made	IS[4]
2.9 d iv	ISO 9000-3 section 4.9	The period of obligation of the supplier to supply copies and the capability of reading master copies must be determined.	SEAL, development project and IS[4] . The SEAL and the development project must specify the period of obligation to supply copies. The capability of reading the master copy must be determined by the IS[4] and the SEAL.
2.9 d vi	ISO 9000-3 section 4.9	Virus checking must be implemented for the supplied software	Development project and IS[4]
2.9 d vii	ISO 9000-3 section 4.9	Required documentation to be supplied must be stipulated.	Development project, SEAL QMS and IS[4]
2.9 d viii	ISO 9000-3 section 4.9	Copyright and licensing concerns must be addressed and agreed to by the customer	Development project for developing the contract and IS[4] for agreement
2.9 d ix	ISO 9000-3 section 4.9	The environment must be controlled to ensure repeatability of the replication of the software	IS[4]
2.14 b	ISO9000-3 section 4.14.2	Procedures must be in place to handle and pass on customer complaints	IS[4]

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS^4 ,development project or SEAL)
2.14 c	ISO 9000-3 section 4.14.2	Controls must be in place to ensure that corrective action is taken and that it is effective	SEAL, development project and possibly IS^4
2.15 a	ISO 9000-3 section 4.15.1	The IS^4 system must be fully documented. This may also impact on the WWW system	IS^4 and SEAL QMS
2.15 b	ISO 9000-3 section 4.15.2	Virus protection must be in place	IS^4
2.15 c	ISO 9000-3 section 4.15.2	Storage material (hard drive) deterioration must also be taken into consideration	IS^4
2.15 d	ISO 9000-3 section 4.15.3	Access to the stored product must be controlled (electronic and physical).	IS^4
2.15 f	ISO 9000-3 section 4.15.3	The products must be held in an environment which: ■ protects them from change or corruption ■ permits the controlled retrieval of a copy. ■ is satisfactory with regard to electrostatic and electromagnetic environments.	IS^4

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS[4] ,development project or SEAL)
3.1.1	ISO/IEC 12207 section 5.1	The following must be made available via the web site: ■ the details of the product ■ documentation ■ proprietary, usage, ownership, warrantee and licensing rights ■ Details regarding future support of the product.	IS[4] for availability. The Development project will be involved in the development of such information.
3.1.1 e	ISO/IEC 12207 section 5.1.1.9 and 5.1.5.2	Details regarding acceptance criteria and testing or the non-availability thereof must be addressed, possibly in the contract	The Development project will be responsible for specifying this in the contract
3.1.2 f	ISO/IEC 12207 section 5.2.7	Delivery and support details must be specified in the contract	The Development project will be responsible for specifying this in the contract
3.1.3 b	ISO/IEC 12207 section 5.3.12	Details regarding installation obligations must be specified in the contract. Installation will not however be handled by the IS[4] and must be handled outside the scope of the system.	The Development project will be responsible for specifying this in the contract

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS^4 ,development project or SEAL)
3.1.3 c	ISO/IEC 12207 section 5.3.12	The resources and information necessary to install the product must be determined.	To be determined by the Development project in co-ordination with the IS^4
3.1.3 c	ISO/IEC 12207 section 5.3.12	The resources and information necessary to install the product must be made available to the customer.	IS^4
3.1.3 d	ISO/IEC 12207 section 5.3.12	The extent to which the developer shall assist the acquirer with set-up activities must be specified in the contract. The assistance must then be provided as specified in the contract	Development project
3.1.3 e	ISO/IEC 12207 section 5.3.12	When the product is replacing a current product, the extent to which the developer shall support any parallel running activities of the acquirer must be specified in the contract. The support must then be provided as specified in the contract	Development project
3.1.3 f and g	ISO/IEC 12207 section 5.3.12	The installation plan for the supplied software product must be documented. It must be documented that the developer shall not install the software	Development project

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS[4] ,development project or SEAL)
3.1.3 h	ISO/IEC 12207 section 5.3.13	It must be specified in the contract that the developers cannot support the acquirers acceptance review and testing of the product.	Development project
3.1.3 i.	ISO/IEC 12207 section 5.3.13	The delivery of the product must be specified in the contract	IS[4] and development project
3.1.3 j	ISO/IEC 12207 section 5.3.13	The training and support to be provided must be specified in the contract and supplied where required.	Development project
3.1.5 b	ISO/IEC 12207 section 5.5.12	The IS[4] is to provide a means to report problems and request modifications. Once the report is received, the maintainer is to record and track the problem. Also the system is to provide for a means to provide feedback to the users	IS[4] and maintainer (SEAL and/ or development project)
3.1.5 c	ISO/IEC 12207 section 5.5.5	A migration plan must be developed and the system must provide a mechanism for the maintainer to provide migration information to the users.	Development project for migration plan development and IS[4] for the provision of migration information.
3.1.5 d	ISO/IEC 12207 section 5.5.5	The system must provide the mechanism to provide migration notification to the users.	IS[4]

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS[4] ,development project or SEAL)
3.1.5 e	ISO/IEC 12207 section 5.5.5	A post-migration review must be performed. The system must provide a mechanism for obtaining users' post-operation responses to the migration	The development project must perform the review and the IS[4] must be used as the response mechanism.
3.1.5 f	ISO/IEC 12207 section 5.5.5	A development plan must be developed and the system must provide a mechanism for the maintainer to provide product retirement information to the users.	The product maintainer must develop the plan and the IS[4] must provide the facility of communicating this information to users.
3.1.5 g	ISO/IEC 12207 section 5.5.5	The system must provide the mechanism to provide product retirement notification to the users.	IS[4]
3.2.2 b	ISO/IEC 12207 section 6.2	The system must facilitate change requests	IS[4] will receive the change requests and the development project will handle the change requests.
3.2.3 b	ISO/IEC 12207 section 6.3.1.5	It must be specified in the contract which QA records will be made available to the acquirer. These records must then be made available	Development project must determine which QA records will be supplied and the development project must then specify this in the contract. The IS[4] must then supply these records.
3.2.3 d	ISO/IEC 12207 section 6.3.3	The support to be provided must be specified in the contract	Development project and possibly IS4

QSI 330 section number	ISO Standard and clause	Requirement	System that will comply (WWW, IS[4] ,development project or SEAL)
3.2.8 b	ISO/IEC 12207 section 6.8	Problem resolution is to be carried out .	The development team or maintainer is to carry out problem resolution. The IS[4] is to be used as a means of communication during problem resolution
4	ISO 9127	All cover information and user documentation as specified in the standard must be made available via the supply system.	The development project will specify this information and IS[4] will provide the information
7 sup.8	ISO/IEC 15504 sup.8	A mechanism for problem reporting about the system must be present in the system	IS[4]

QSI

Requirements For Software Developers And Suppliers Using The IS4

Technical Product

Version 1.00

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Requirements for software developers and suppliers using the IS4
Doc. Reference:	D:\QSI\TP\SOFTWARE\QSI340.001.DOC
Created by:	B. Braude
Creation Date:	23 June 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\06\23	Draft	BB	QSI340.001
1.00	97\09\11	Approved	BB	Qsi340.100

Revision History

Version	Date	Changes
0.01	97\06\23	Document created using qsi002.100
1.00	97\09\11	Document updated and approved.

Management Authorisation

Version	Date	Status	Management Board Minute Reference
0.01	97\08\20	Approved	QSI 2035 section 2.4

Change Forecast

1 Scope

1.1 Introduction

The IS^4 system serves as a system for the sale of SEAL software products via the Internet. The system serves as a fully automated procedure for acquiring a user's details and order information, processing the order and then providing the user with access to the selected software product. The software purchased via the system is freely available for downloading, however the product is locked and requires and encryption number to unlock the software. This encryption number is made available via the web site after a user has purchased the product.

1.2 Purpose

The purpose of this document is to define the procedures to be followed by the software developers and suppliers in order to supply their products via the IS4. The required characteristics of a newly developed software product are also defined in order to enable it to be supplied using the IS^4.

1.3 Applicability

This document is applicable as a technical product for the QSI project. The document is also applicable as a reference document for software developers and suppliers wishing to use the IS^4 to supply and support their software over the Internet.

1.4 Definitions

SEAL - Software Engineering Applications Laboratory

WWW - World Wide Web

FTP - File Transfer Protocol

OLTP - On-line Transaction Processing

LAN - Local Area Network

ISO - International Standards Organisation

IEC - International Electrotechnical Commission

TC - Technical Committee

JTC - Joint Technical Committee

SC - Sub-committee

IS4 – Internet System for the Supply and Support of Software.

1.5 Audience

The following comprise the audience for this document:

a. The developer of this product.

b. The manager of this product development.

c. Members of the SEAL OQ project.

d. Members of the SEAL Management Board

e. Head of Department of Electrical Engineering

f. Individuals who perform internal and external audits on projects undertaken within the SEAL Quality Management System.

1.6 Applicable Documents

1.6.1 Specifications

1.6.2 Standards

a. SEAL QMS Document Creation Template, QS 002, Revision 0.02, 3 October 1994

b. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994

1.6.3 Procedures

1.6.4 Guidelines

1.6.5 Other Documents

1.7 Assumptions

1.8 Requirements Traceability

2 General

2.1 The period of obligation of the supplier to supply copies must be determined. This information is required in order to ensure that the storage device is capable of storing the software for the required period of time.

2.2 All software must be checked for viruses before being placed on the IS[4]

3 Supply of Product information

3.1 The following must be developed by the suppliers and developers and made available via the IS4:

a. The details of the product (Refer to section 3.3)

b. Documentation (Refer to section 3.3)

c. The QA records as specified in the contract

d. Details regarding future support of the product. (This is evident from the feedback mechanism (refer to section 5) and need not be specified)

3.2 All documentation supplied via the IS^4 must be SEAL QMS compliant, approved and must be the latest approved revisions of the respective documents.

3.3 ISO/IEC 9127 describes information and documentation that needs to be supplied to a potential and actual customer of a consumer software package. The developers and suppliers must refer to this standard and then stipulate what documentation will be supplied with the software product. This documentation must then be developed in order to be supplied via the IS4.

3.3.1 The items of information needed to be supplied are divided into three categories:

a. Essential (ESS) – this information needs to be supplied for every software product.

b. Conditional (CON) – this information is to be supplied for every product to which it is relevant

c. Optional (OPT) – this information is to be supplied at the discretion of the SEAL and the development team.

3.3.2 Refer to ISO/IEC 9127 section 2 for information that must be presented to potential customers of a product.

3.3.3 Refer to ISO/IEC 9127 section 1 for information and documentation that must be presented to actual customers of a product.

4 Contract

A contract is to be drawn up by the product developers. This contract will be made available via the IS^4. A customer will only be able to purchase the respective product if he/she agrees to the contract. Contract negotiation is outside the scope of this system and any sales base on a negotiated contract must be handled outside the scope of the IS^4.

The following must be present in the contract:

4.1 Proprietary, usage, ownership, warrantee and licensing rights

4.2 Procedures for initial and subsequent product releases.

4.3 Details regarding acceptance criteria and testing (or the non-availability thereof) must be addressed.

4.4 Delivery details must be specified in the contract (Reference may be made to an applicable IS^4 web page describing the IS^4 delivery mechanism)

4.5 Details regarding installation obligations (or the absence thereof) must be specified in the contract. Installation will not however be handled by the IS^4 and if required, must be handled outside the scope of the system.

4.6 The extent to which the developer shall (or shall not) assist the acquirer with set-up activities must be specified in the contract.

4.7 Support details must be specified in the contract (Reference may be made to an IS^4 web page explaining the feedback mechanism of the IS4.)

4.8 The training to be (or not to be) provided must be specified in the contract

4.9 When the product is replacing a current product, the extent to which the developer shall (or shall not) support any parallel running activities of the acquirer must be specified in the contract.

4.10 It must be specified in the contract which QA records will be made available to the acquirer

5 Communication with Customers

5.1 Standard Feedback from Customers

5.1.1 The IS4 is developed to obtain the following types of customer feedback:

a. Customer complaints

b. Problem reports (for a specific product)

c. Improvement Recommendations

.2 The development team and / or supplier (SEAL) must develop procedures for handling customer complaints. These will be received via the IS^4 and will be passed on to the responsible party. Controls must be in place to ensure that corrective action is taken and that it is effective

5.1.3 The IS^4 is to provide a means to report problems. Once this channel has been used as a means of communication, the information is to be forwarded to the party responsible for the product. The responsible party (the maintainer) is to have procedures for recording and tracking problem reports. The development or maintenance team should carry out problem resolution compliant with ISO/IEC 12207 section 6.8. Procedures are also to be in place for providing feedback to the users. This feedback is to be carried out using the product mailing lists in the IS^4 (See section 5.2 below).

5.1.4 Improvement Recommendations will be received via the IS4 and the supplier and / or development project must handle the recommendations. Procedures are also to be in place for providing feedback to the users. This feedback is to be carried out using the product mailing lists in the IS^4 (See section 5.2 below).

5.2 Providing information to customers

5.2.1 The customers have the option whether or not (default is yes) to be on a general products mailing list and on specific products' mailing lists. These mailing lists are to be used as a means of communication with customers.

5.2.2 A migration plan must be developed. IS^4 mailing lists must be used to supply migration information to users. When the time of migration

arrives, notification must be given to the users using the relevant IS4 mailing list. A post-migration review must be performed. The IS4 is to be used to obtain users' responses to the post-migration review.

5.2.3 A retirement plan must be developed. The IS^4 mailing lists must be used to supply retirement information to users. When the time of retirement arrives, notification must be given to the users using the relevant IS^4 mailing list.

6 Product unlocking system

6.1 Any products made available through the IS^4 must contain the SEAL encryption system as used in the SOQ product.

6.2 The product must either be inoperable or have only limited features prior to the insertion of the unlock information. The degree of inoperability is to be determined by the product developers.

6.3 Once the customer has purchase the product through the IS^4, the following will be presented to the customer on the web site:

a. The registered username (input by the customer on registration)

b. The product ID. This consists of three letters specific to the product itself, two numbers indicating the version of the product and a subsequent four digits based on a sequential set of numbers for each license issued for the specific product.

c. The unlock key. This is based on the product I.D. and on the customer's username.

6.4 When the customer runs the purchased product and selects to register the product, the customer is to be presented with a form built in to the application. The form is to have place to enter the information as listed in section 4.3. Once the customer obtains this information off the IS^4 and inputs it in to the application, the application is to then be opened up for normal usage.

6.5 A set of instructions must be drawn up by the product developer detailing how to enter the registration information. This can be based on a generic instruction set but must be tailored for the specific application.

7 Upgrades and new versions

- Upgrades will be treated in the same way as a new product.
- Ownership of the previous product will be checked through dependencies in the database.
- Upgrades must not however technically depend on the previous version.
- The upgrades must have their own registration procedures.

■

QSI

Product Functional Specification

Technical Product

Version 1.00

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	Product Functional Specification
Doc. Reference:	QSI200
Created by:	B.Braude
Creation Date:	17 March 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\03\17	Draft	BB	QSI200.001
0.02	97\04\02	Draft	BB	QSI200.002
0.03	97\06\01	Draft	BB	qsi200.003
1.00	97\07\07	Approved	BB	Qsi200.100.doc

Revision History

Version	Date	Changes
0.01	97\03\17	New document created using QST324-20.100
0.02	97\04\02	Added in tables in sections 4 and 6
0.03	97\06\01	Document updated to accommodate requirements of QSI330
1.00	97\07\07	Document approved

Management Authorisation

Version	Date	Status	Management Board Minute Reference
1.00	97\07\07	Approved	QSI 2031 section 2.6

Change Forecast

This document will be updated each time new requirements are identified or changed in existing documents.

1 Scope

1.1 Purpose

This document provides a checklist of questions for identifying the functional requirements of the QSI product.

1.2 Applicability

This document will normally be the first in the series of technical documents to be developed in support of a software development project. It builds on the functional requirements identified in the Product Description.

Reference is made in the document to key sections of the Management Products already developed to support this project.

1.3 Audience

The audience for this document comprise the various stakeholders of the SEAL, including:

- The product developer
- The Product manager
- All full-time and part-time post-graduate students associated with the SEAL
- Members of the SEAL Management Board
- Head of the Department, Electrical Engineering
- Individuals who will perform internal and external surveillance audits of the SEAL Quality Management System

1.4 Applicable Documents

1.4.1 Standards

a. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994.

1.5 Assumptions

It is assumed that the reader is familiar with the ISO 9000 series standard for quality systems management.

1.6 Definitions

URL - Universal Resource Locator

WWW - World Wide Web

1.7 Requirements Traceability

This document addresses the following requirements:

a. ISO 9001 (1994) 4.4 Design Control

2 Problem Statement

2.1 Product Title

Quality aspects of software product supply and support using the Internet.

2.2 What problem is the product meant to solve?

The product is to serve as a system for the sale of SEAL software product via the Internet. The system is to serve as a fully automated procedure for acquiring a user's details and order information, processing the order and then providing the user with access to the selected software product. The system is to also provide for an administrator interface in order to update the system with regards to products and to be able to monitor the transactions that the system has performed. The system is also to automate the transaction processing with banking institutions as far as possible.

2.3 Where does this product fit into the "big picture"?

The product is to serve as a sub-system of the larger SEAL WWW facility. The SEAL WWW Facility is to provide information regarding various SEAL software products and the QSI sub-system is to serve as a means for registering for and purchasing of the respective software product.

2.4 Product History

The QSI purchasing system does not have any history. However the SEAL WWW Facility has been developed as a separate SEAL project. For details regarding this project and the SEAL WWW Facility refer to the SEAL project number 1996_25.

3 Environment

3.1 Cost

3.1.1 What is the limit of expenditures to be used to create the product? (i.e. dollars and/or engineering hours)

Refer to the Project Management Plan, QSI 005 section 6.

3.1.2 What is the limit of expenditures to be used to maintain the product? (i.e. dollars and/or engineering hours per unit time of use).

The maintenance of the product should be limited as far as possible. The payment mechanism will be automated as far as possible and the administrator interface will be as simple as possible in order to minimise maintenance of the product.

3.1.3 What facilities are available for the product development?

The SEAL and Wits Electrical Engineering facilities are available for the development of the product. Further facilities may be required. These will be specified in the Project Management Plan, QSI 005 section 4.6 Hardware and Software resources.

3.1.4 What personnel are available to support the product development

Refer to section 4 of the Project Management Plan, QSI 005.

3.1.5 What other resources are available for maintenance use during the product service life? (i.e., facilities/personnel and quantitative or qualitative limits)

Professor A.J.Walker is to administer the product after the development and implementation of the product has occurred. The administrator interface that is to be developed as part of the product is to be used to administer the product.

3.1.6 What methods of progress measurement does the customer require to track the development task? (e.g. status reports, progress reports)

Refer to QSI005-10, Work Breakdown Structure for the tasks and schedule for the development of the product. The tasks are to be tracked in review meetings held between the developer and the manager (customer).

3.1.7 What are the milestones that shall be met? (i.e. schedules, deliveries)

Refer to QSI005-10 Work Breakdown Structure.

3.2 Hardware/Software

3.2.1 What computers shall the product run on? (e.g. makes, models, particular installations).

The product shall run on a standard PC acting as a server. The details of the PC are still to be determined.

3.2.2 What peripherals are required to interface with the product? (e.g. terminals, hardcopy devices, tape drives, disk drives, displays, etc. Specify makes and models).

a. Users will require the following to interface with the user interface of the product:

i. A separate PC.

ii. An Internet connection on the PC.

iii. A Web browser.

b. The administrator will require the following to interface with the administrator interface of the product:

i. A keyboard, mouse and monitor connected to the hardware on which the product shall run.

3.2.3 What unique interfaces does the product need to access? (e.g. cockpit hardware, microcomputer, test benches, etc. Specify makes and models).

None

3.2.4 On what operating system shall the product run? (i.e. operating system ID, revision level).

Windows NT 4 server.

3.2.5 What database methods shall this product use? (e.g. Dbase, SQL etc.)

The product shall use a database server, namely Microsoft SQL Server.

3.2.6 With which specific database management products shall the product interface? (e.g. products protocol, etc.)

3.2.7 With what other external (foreign to this product) software products shall this product interface? (e.g. routines, libraries, product names, manufacturers, suppliers, revision levels, etc.)

The product shall interface with a Web server (Microsoft Internet Information Server (IIS)) and a database server (Microsoft SQL Server.)

The product will also possibly interface with SET compliant payment software.

These interfaces will form part of the final product.

3.2.8 What are the size restrictions for the finished product? (e.g. bytes of code, text, embedded data, etc.)

The information passed to a user via a web browser shall be sufficiently small so as not to create an unreasonable delay in the transfer of the information over the Internet.

3.2.9 How transportable shall the product be?

The product need not be transportable.

3.3 Required Design Restrictions

3.3.1 What are the language restrictions for the product? (e.g. language names, versions; or maximum number of languages, etc.)

The product is to use English.

3.3.2 To what standards shall the product conform? (e.g. document titles, sources, revision levels, etc.)

This is defined in QS 003 Document Layout, Typesetting and Presentation Standard.

3.4 Customers

3.4.1 Who is commissioning this product? (e.g. identify signatures of authority, etc.)

Professor A.J.Walker for the SEAL.

3.4.2 Who is to accept delivery? (e.g. identify signatures of authority, etc.)

Professor A.J.Walker

3.4.3 What is the profile of the typical end user? (e.g. years of experience in some specified job, years of schooling, etc.)

a. The Web interface

The users will most probably be involved in software development or the management thereof and will therefore be proficient in the use of computers and the Internet. These will be the users purchasing the SPICE product. The system is to be designed to support the purchasing of other software products. However all SEAL software products will be acquired by people proficient in the use of computers.

b. The administrator interface

The user of the administrator interface will be the SEAL administrator, who will be an electrical engineer with experience in the use of computer software.

3.4.4 What are the human factors criteria and how shall the success of the product in meeting the criteria be determined? (e.g. non-direct paths, non-standard user- interface, etc.)

Refer to QSI003, Quality Plan section 2.

3.4.5 Cultural Dependencies

3.4.5.1 Language

a. The initial and main language of the system is to be UK English.

b. The administrative language is to remain UK English.

c. Other language options will not be incorporated into the first version of the system, however in the design and development of the system the future ability to provide users with different language options must incorporated as far as possible.

3.4.5.2 Currency

a. Credit card payments can be charged for in any currency and the international credit card infrastructure will charge the customer in their local currency (at the current exchange rate)

b. Due to the above point the products sold over the system can technically be charged for in any currency.

c. The majority of the users of the system will probably be South African and therefore charging for products in South African Rand will probably suite most customers. (This is dependant on the product being sold).

d. However the products will also be purchased internationally and due to the global nature of the Internet consideration must also be given to international customers.

e. For international customers, the most global international currency is the US Dollar and therefore the product should either be charged for in US Dollars or the US Dollar equivalent should be given next to the actual price in South African Rands. The international credit card infrastructure will then charge the customer for the product in their local currency (at the current exchange rate to either the Rand or US Dollar (depending what currency the product is actually charged in)).

3.4.5.3 Cultural Sensitivities

a. The Internet is a global system and is accessed world-wide. In the same way, the IS[1] will be accessed world-wide.

b. Due to the above point, the system must be sensitive to theoretically all cultures.

c. If English is used as the initial language for the system, terms must be used that will be understood by people of all nationalities who have only a basic understanding of English.

d. Before images and symbols are used in the system, it must be assessed what the symbols and images may mean in various cultures and religions and care must be taken not to offend members of these cultures and religions.

3.5 Performance factors

3.5.1 What human support is required to operate the product? (e.g. Identify any runtime operations which the user or support personnel shall physically carry out in order to achieve any specified results, etc.)

The aim of the system is to remove any required human support. However due to limitations imposed by international payment mechanisms, human intervention may be required in order to process the credit card payment.

3.5.2 What periods of time shall the product be available for operation? (e.g. hours per day, weekly schedule, etc.)

The product shall be permanently available.

3.5.3 What criteria must the product meet regarding reliability of operation?

The product is to be totally reliable with regard to software performance. Failures due to power failures and network failures can be tolerated on condition that these failures are not too lengthy or frequent. A down time of a few hours per month during weekdays can be tolerated.

3.6 Operational Considerations

3.6.1 What methods shall be used to deliver the product? (e.g. data storage or transfer medium, etc.) (See also QSP 335-10 Software Development: Handling, Storage, Packaging and Delivery).

The product shall not be delivered. The product shall be installed as part of the development of the product.

3.6.2 What are the restrictions on the installation of the product? How easily shall the product be to install? (e.g. classes of users, numbers of users, access limitations etc.)

The product shall be installed by the developer therefore ease on installation is not applicable.

3.6.3 To what degree shall the operation of the product be successfully restricted to authorized users only? (e.g. classes of users, numbers of users, access limitations etc.)

a. Operation is to be restricted to operation via either the web or administrator interfaces. Security measures are to be implemented to prevent operation of the product from any other interface. Access to system information via an unauthorised interface will be restricted by encrypting the data between the server and the web interface.

b. Access to the web interface is to be open to anyone. However secure areas of the web interface will be developed which will be limited to users who have been allocated a username and password.

c. A user with a valid username and password is to be allowed access to information pertaining to only himself and not to any other users.

d. Access to the administrator interface is to be limited to the SEAL administrator. Access to the product via the administrator interface is to be limited by password protection, physical security as well as possibly encryption.

3.6.4 How shall product integrity be ensured? (e.g. data recovery source code recovery, etc.)

a. After implementation of the system, a full system backup is to be created. Thereafter backups of the database are to be performed on a daily basis. These backups are to be stored onsite as well as offsite.

b. The recovery of a transaction should the system fail during a transaction is to be investigated further.

3.7 Maintainability

3.7.1 What support of the product after turnover to the customer is required? (e.g. training support, computer personnel, etc.)

a. Procedures for maintaining the system are to be documented as part of the development of the system.

b. The system is to be supported by the SEAL administrator after product turnover to the customer. (The product will however be tested and administered in a live environment by the product developer during the on-line customer acceptance testing.)

3.7.2 Where might the requirements for the product expand in the future? (i.e. percentage chance of change).

The requirements for the product will most probably change in the future in the following areas,

a. Support for new payment mechanisms (SET)

b. Support for higher encryption levels

c. The possibility to register and pay for courses and events.

4 Inputs

4.1 What are the input media? (e.g. touch screen, keyboard, tape, etc.)

a. Users will require the following to input into the web interface of the product:

i. A separate PC.

ii. An Internet connection on the PC.

iii. A Web browser.

b. The administrator will require the following to input into the administrator interface of the product:

I. A keyboard, mouse and monitor connected to the hardware on which the product shall run.

4.2 What is the format of the input? (e.g. record layout).

4.2.1 Web Interface

a. The web interface is to have three sections, a registration section a pricing section and a purchasing section.

4.2.1.1 Main menu

a. The main menu is the screen that will be viewed when the user opens the interface. The menu will options for all the other sections and sub-sections

4.2.1.2 Registration Section

a. The registration section is to be used to obtain the user's information (excluding credit card information). This section is also to be used to enrol a person onto a 'SEAL products' mailing list.

4.2.1.3 Pricing section

a. The pricing section is to be used to provide purchasing details to prospective customers. This section is to allow access to users without requiring them to register as discussed above. This section is to be used as a 'catalogue' and the user will not be able to input any

information besides for the standard web browser navigation. In this section the user will be able to follow links to download the required product.

4.2.1.4 Purchasing section

a. The purchasing section is to be used to select products for purchasing, to purchase the selected products, to view products for which the user is registered for, to provide feedback and to change user information. Access to this section is to be password protected. The purchasing section is to have 5 subsections.

b. All five sub-sections are to be accessible via a web interface main page.

c. All information transmitted between the interface and the system is to be encrypted.

4.2.1.4.1 Selection sub-section

In this sub-section the user is to select the products for purchasing. The user is to have a virtual "shopping basket" and is to add or remove items to purchase. The user has to agree to the contract before being allowed to purchase the product (add the product to the shopping basket).

4.2.1.4.2 Payment sub-section

This section is to be used to enter payment details (credit card information) in order to purchase the selected products.

4.2.1.4.3 Current products sub-section

This section is to be used by the user to view products for which he/she is already registered and to retrieve encryption numbers for software products that have previously been purchased. This section will also be used to subscribe or un-subscribe from a particular product mailing list where applicable.

4.2.1.4.4 Feedback sub-section

This section is to be used by the users to report problems of the following nature:

a. Customer complaints

b. Problem reports (for a specific product)

c. Improvement Recommendations

4.2.1.4.5 User information sub-section

This section is to be used to modify selected user information such as contact details.

4.2.2 Administrator Interface

a. The administrator interface is to consist of a standard Windows application display with drop down menus and toolbars.

b. The administrator interface is to consist of the following sections:

i. New Products Section

ii. Approval of Payments Section

iii. SEAL Products Section

iv. Transactions Section

v. User Profiles Section.

4.2.2.1 New Products Section

a. The New Products section will allow for the input of new product details.

4.2.2.2 Approval of Payments Section

a. If the payment mechanism is not automated, an input mechanism will be developed in order for the administrator to approve a payment after manually processing the payment through a financial institution.

4.2.2.3 SEAL Products Section

a. This section will serve mainly as an output interface for the administrator to view the SEAL products in the section.

b. The administrator will however be able to update product information (such as an updated price) in this section.

4.2.2.4 Transaction Section

This section will serve only as an output for all the transactions that the system has processed. The administrator will not be able to input any information into this interface.

4.2.2.5 User Profile Section

a. This section will serve mainly as an output for all user information stored in the database.

b. The administrator will however be able to modify user information via this interface.

4.3 What are the input items?

4.3.1 Web interface

4.3.1.1 Main menu

The main menu will have only 1 input. This will be a selection of the required section or sub-section.

4.3.1.2 Registration section

To register as a SEAL software buyer and user the user must complete the following details on the web form:

a. Surname

b. Firstname

c. Company

d. Telephone number

e. Fax number

f. Cell number

g. e-mail address

h. Registered SEAL software user (individual or company name)

i. A password.

j. Whether or not the user wishes to be on the SEAL products mailing list (Y\N) (Default is to be YES).

4.3.1.3 Pricing section

The pricing section is to have no input items. It is to only have output items.

4.3.1.4 Purchasing section

a. In order to access the purchasing section, the user is to input a username and password.

4.3.1.4.1 Selection sub-section

Once inside the selection sub-section the user is to input the following input items:

a. Items to be purchased (selected from a list - Note users will only be allowed to access products if they meet all dependencies for the product - refer to section 4.3.2.1e. Provision must be made for a user purchasing a product and its dependencies in one transaction)

b. For each purchased item, whether or not the user agrees to the product's contract

c. The user must be able to view the contract for the particular product.

d. Whether or not the user wishes to be on the mailing list for the particular product (Default is to be YES).

4.3.1.4.2 Payment sub-section

Once the user is finished selecting products, the user is to input the following information in order to pay for the products:

a. Credit card number

b. Registered owner of credit card

c. Expiry date of credit card

d. Credit card brand name (VISA, MC, AMEX) Note: The brands that the site will support must be determined.

4.3.1.4.3 Current Products sub-section

This section is used mainly for outputs. The only input for each product will be whether or not the user wishes to be on the product's mailing list.

4.3.1.4.4 Feedback sub-section

The following information will be input by a user providing feedback:

a. The type of feedback - customer complaints, problem reports or Improvement Recommendations

b. The applicable product (where applicable)

c. Text containing the feedback.

4.3.1.4.5 User information sub-section

Users will be able to modify the following information in this sub-section:

a. Surname

b. Firstname

c. Company

d. Telephone number

e. Fax number

f. Cell number

g. e-mail address

h. password.

i. Whether or not the user wishes to be on the SEAL products mailing list (Y\N) (Default is to be YES)

The following information will not be modifiable:

a. Registered SEAL software user (individual or company name)

4.3.2 Administrator interface

4.3.2.1 New product section

The following information is to be input by the administrator for every new product:

a. Product name

b. Product number

c. Product version

d. Unit price

e. The contract for the particular product

f. The dependencies of this product, that is, any other products that a user must be registered for, before being given access to this product. This will be used to deny a user to download a product upgrade if he is not registered for the original product.

4.3.2.2 Approval of payment section (manual transaction processing)

If the payment mechanism is not automated, then the administrator is to be prompted whether or not to approve a transaction. (Before approving or denying the transaction the administrator will attempt to process the transaction manually through a financial institution.) The administrator will have one of the following options:

a. Approve - the system will grant the user access to the licensed product.

b. Deny - the system will not grant the user access to the licensed product.

c. If the Deny option is selected, the administrator will be able to enter a few lines of text indicating the reason for the denial.

4.3.2.3 SEAL Products Section

The section will serve mainly as an output. The administrator will however be able to modify the following information about a product:

a. Unit price

b. The contract

c. The dependencies of this product, that is, any other products that a user must be registered for, before being given access to this product. This will be used to deny a user to download a product upgrade if he is not registered for the original product.

d. The product name, number and version will not be modifiable.

4.3.2.4 Transactions Section

a. This section will serve only as an output.

b. The user will only be able to input different queries on the information. The following queries will be possible:

i. All successful transactions

ii. All failed transactions

iii. Transactions per day or month or year.

iv. Transactions per registered user.

v. Transactions per product.

4.3.2.5 User Profiles Section

The section will serve mainly as an output. The administrator will however be able to modify the following information about a user:

a. Surname

b. Firstname

c. Company

d. Telephone number

e. Fax number

f. Cell number

g. e-mail address

h. username

i. password.

j. Whether or not the user wishes to be on the SEAL products mailing list (Y\N)

k. Registered SEAL software user (individual or company name)

4.4 What are the characteristics, accuracy, descriptions and range for each input item ?

Refer to Appendix A

5 Process

5.1 Function

5.1.1 What processes is the product to perform?

5.1.1.1 Entering of required section or sub-section

i. Trigger: User selecting the link in the Main Menu of the User interface

ii. Input: The selected link

iii. Process: Loading of the required interface

iv. Output: The required interface

5.1.1.2 Submission of registration information into database

i. Trigger: The user pressing the 'submit' button on the registration form.

ii. Input: Details input by the user

iii. Process: Creation of another user record in the database.

iv. Output: Another user record in the database.

5.1.1.3 Generation of username and password pair

i. Trigger: An addition of a user record into the database.

ii. Input: Users details from the database

iii. Process: Creation of a username and password pair in the system's login files.

iv. Output: The presentation of the username and password to the user via a web page.

5.1.1.4 Addition / removal of a user onto the SEAL products mailing list

i. Trigger: The mailing list option being selected/ deselected

ii. Input: Users details from the database

iii. Process: Creation/ deletion of the user on a mailing list

iv. Output: The presence / absence of the user on the mailing list.

5.1.1.5 Presentation of updated pricing section

i. Trigger: The user selecting the relevant web pages.

ii. Input: Product information from the database

iii. Process: Creation of a web page containing a list of all products and their respective prices.

iv. Output: The web page is presented to the user.

5.1.1.6 Presentation of customised purchasing information

i. Trigger: A successful login into the purchasing section with the correct username and password and the entering of the selection sub-section.

ii. Input: Username and relevant user's details in the database.

iii. Process: Query of the database for which products the user is registered for and the exclusion of relevant products based on product dependencies. (Refer to section 4.3.2.1e)

iv. Output: The creation of a purchasing catalogue with purchasing options for only the products which the user is entitled to.

5.1.1.7 Addition of an item to the shopping basket

i. Trigger: The user selecting to add a product to the shopping basket

ii. Inputs: The users details and whether or not the user has agreed to the contract

iii. Process: If the user has agreed to the contract, the item is added to the shopping basket

iv. Output: An additional item in the shopping basket or a message denying purchase because the user has not agreed to the contract

5.1.1.8 Submission of purchasing information into the database

i. Trigger: The user pressing the submit button on the purchasing form in the payment sub-section.

ii. Input: Information input or selected by the user.

iii. Process: Creation of another purchase record in the database.

iv. Output: An additional purchase record in the database.

5.1.1.9 Transaction processing

i. Trigger: The additional of another purchase record into the database.

ii. Input: The transaction details from the database.

iii. Process: Contacting the financial institution and processing the transaction.

iv. Output: A confirmation or rejection of the transaction.

5.1.1.10 Encryption key generation

i. Trigger: A confirmation of the transaction processing process (refer to section 5.1.1.7 above)

ii. Input: Product and user details required for the encryption algorithm

iii. Process: Generation of the encryption number

iv. Output: The insertion of the encryption number into the database.

5.1.1.11 Addition / removal of a user onto a specific products mailing list

i. Trigger: The confirmation of the transaction processing process (refer to section 5.1.1.7 above) and the selection of the mailing list option or the deselection of the mailing list option.

ii. Input: Product and user details.

iii. Process: Addition or removal of the user from the mailing list.

iv. Output: The presence or absence of the user on the mailing list.

5.1.1.12 Transaction failure notification

i. Trigger: A rejection of the transaction processing process.

ii. Input: The user's details and e-mail address

iii. Creation of an e-mail message to the user informing him of the failure of the transaction.

iv. Output: The sending of the message.

5.1.1.13 Encryption key availability notification

i. Trigger: Insertion of the encryption number into the database.

ii. Input: The user's details (name and e-mail address)

iii. Process: Creation of a e-mail message informing the user that his encryption number is available.

iv. Output: An e-mail message being sent to the user.

5.1.1.14 Presentation of product information and respective encryption keys

i. Trigger: The user logging in to the purchasing section of the web site with the correct username and password and opening the Current Product: sub-section.

ii. Input: The user's username and details regarding purchases.

iii. Process: The reading of all of the user's product details and respective encryption numbers from the database and the placing of the information within a web page within the purchasing section.

iv. Output: A customised web page with the user's encryption numbers.

5.1.1.15 Presentation of the feedback sub-section

i. Trigger: Use selecting a link to enter the feedback sub-section

ii. Input: Users details and any other information about a product etc depending on how the user entered the sub-section

iii. Process: The creation of a customised feedback form.

iv. Output: The output of a customised feedback form.

5.1.1.16 Input of feedback information from a user

i. Trigger: The user pressing the submit button on the form

ii. Input: Information from all the fields in the form.

iii. Process: The creation of another feedback record in the database

iv. Output: Another feedback item in the database.

5.1.1.17 Forwarding of feedback information to the correct person

i. Trigger: Another feedback item created in the database

ii. Input: All information from the feedback item

iii. Process: The creation of a mail message to the designated person.

iv. Output: The sending of the mail message.

5.1.1.18 Presentation of user information in the User Information sub-section.

i. Trigger: The user logging in to the purchasing section of the web site with the correct username and password and opening the User information sub-section .

ii. Input: The user's username.

iii. Process: The reading of all of the user's details from the database and the placing of the numbers within a web page form.

iv. Output: A customised web page with the user's information.

5.1.1.19 Modification of registration information in database

i. Trigger: The user pressing the 'submit' button on the modification of user information form in the purchasing section of the web interface.

ii. Input: Modified user's details.

iii. Process: The modification of the information in the database.

iv. Output: A modified record in the database.

5.1.1.20 Addition (or edition) of a product by the administrator

i. Trigger: The administrator adding (or editing) a product via the administrator interface

ii. Input: The new (or updated) product details

iii. Process: The addition of the details into the system database.

iv. Output: An additional (or updated) record in the database.

5.1.1.21 Review of the database by the administrator

i. Trigger: The administrator selecting a query via the administrator interface.

ii. Input: The query details.

iii. Process: The examination of the database as specified by the query

iv. Output: The records in the database complying with the query

5.1.2 What are the algorithms?

Encryption algorithm to be obtained from R Him Lock and modified in conjunction with R Him Lock in order to provide for multiple revisions of a product.

5.1.3 What are the associations between algorithms and processes?

The encryption algorithm is used in the encryption key generation process.

5.1.4 What are the modes of operation? (e.g. interactive, batch, etc.)

All system operations are interactive.

The processing of the transactions via a financial institution may however be a batch operation.

5.1.5 What options are available prior to startup? (e.g. switches, job parameters, etc.)

None

5.1.6 What options are available during runtime? (e.g. selection of I/O, job parameters, etc.)

The user has the option to select which product he wishes to purchase.

5.1.7 How does the product use all the input data?

5.1.8 How does the product define all output data?

5.2 Timing

5.2.1 What are the constraints on response time? (e.g. acknowledge time, results time, etc.)

a. Entering of required section or sub-section - instantaneous

b. Submission of registration information into database - instantaneous

c. Generation of username and password pair - instantaneous

d. Addition / removal of a user onto the SEAL products mailing list - instantaneous

e. Presentation of updated pricing section - instantaneous

f. Presentation of customised purchasing information - instantaneous

g. Addition of an item to the shopping basket - instantaneous

h. Submission of purchasing information into the database - instantaneous

i. Transaction processing - maximum 24 hours but as fast as possible.

j. Encryption key generation - instantaneous

k. Addition / removal of a user onto a specific products mailing list - instantaneous

l. Transaction failure notification - reasonable period for e-mail transmission, that is a few hours at maximum.

m. Encryption key availability notification - reasonable period for e-mail transmission, that is a few hours at maximum.

n. Presentation of product information and respective encryption keys - instantaneous

o. Presentation of the feedback sub-section - instantaneous

p. Input of feedback information from a user - instantaneous

q. Forwarding of feedback information to the correct person - instantaneous (but dependant on the delay caused in sending the e-mail via the Internet)

r. Presentation of user information in the User Information sub-section - instantaneous

s. Modification of registration information in database - instantaneous.

t. Addition (or edition) of a product by the administrator - instantaneous

u. Review of the database by the administrator - instantaneous

5.2.2 What are the constraints on iteration rate? (e.g. frames per second).

N/A

5.2.3 What is the latency required? (e.g. data transmission in multi-processing).

N/A

5.2.4 What are the CPU usage constraints for each process?

N/A

5.2.5 What are the CPU usage constraints for the product?

N/A

5.3 Error Handling

5.3.1 What defines an error? (internal, user induced, system induced, disaster recovery, etc.)

a. A user not completing all the required information in a Registration section or New Product sub-section form.

b. A user submitting an invalid username and password

c. The administrator not completing all the required information in the New Product section.

d. The server or Internet connection being down.

5.3.2 How is each error communicated? (e.g. setting error flags sending message to user, etc.)

a. User not completing all required information - A web page will be presented to the user informing the user that not all the required information has been completed and that the user should go back to the form and complete all the information.

b. User submitting an invalid username and/ or password - A default web page will be presented to the user informing him/her of the problem.

c. Administrator not completing all required information - a message will be presented to the administrator informing him of the problem.

d. Server or Internet connection being down - the default error message will be presented to the user by his web browser.

5.3.3 How does the product handle error condition? (e.g. program abort, require new input, restore original environment, etc.)

a. For 5.3.2 a and b above the user has to return and input the correct information.

b. For 5.3.2 c the administrator has to return and complete all the required details.

c. For 5.3.2 d the user will have to keep trying until the problem is rectified by either the administrator or the person responsible for the problem.

6 Outputs

6.1 What are the output media? (e.g. touch screen, keyboard, tape, etc.)

a. Users will require the following to view outputs via the web interface of the product:

i. A separate PC.

ii. An Internet connection on the PC.

iii. A Web browser.

b. The administrator will require the following to view outputs via the administrator interface of the product:

i. A keyboard, mouse and monitor connected to the hardware on which the product shall run.

6.2 What is the format of the output? (e.g. record layout, etc.)

6.2.1 Web Interface

a. The web interface is to have three sections, a registration section a pricing section and a purchasing section.

6.2.1.1 Main menu

a. The main menu is the screen that will be viewed when the user opens the interface. The menu will options for all the other sections and sub-sections

6.2.1.2 Registration section

a. The registration section is to be used to obtain the user's information (excluding credit card information).Once the user has submitted his information, the system is to generate a page that is presented to the user. The page is to contain the user's username and password to be used to access the purchasing section.

6.2.1.3 Pricing section

a. The pricing section is to be used to provide purchasing details to prospective customers. This section is to output to the user all products and their respective prices. The links to download the products are also to be output.

6.2.1.4 Purchasing section

a. The purchasing section is to be used to select products for purchasing, to purchase the selected products, to view products for which the user is registered for, to provide feedback and to change user information. Access to this section is to be password protected. The purchasing section is to have 5 subsections.

b. All five sub-sections are to be accessible via a web interface main page.

c. All information transmitted between the interface and the system is to be encrypted.

6.2.1.4.1 Selection sub-section

In this sub-section the user is to select the products for purchasing.

6.2.1.4.2 Payment sub-section

In this sub-section the user is to enter payment details (credit card information) in order to purchase the selected products.

6.2.1.4.3 Current Products sub-section

This section is to be used by the user to view products for which he/she is already registered and to retrieve encryption numbers for software products that have previously been purchased. This section will also be used to subscribe or unsubscribe from a particular product mailing list where applicable.

6.2.1.4.4 Feedback sub-section

This section is to be used by the users to report problems of the following nature:

a. Customer complaints

b. Problem reports (for a specific product)

c. Improvement Recommendations

6.2.1.4.5 User Information sub-section

This section is to be used to modify selected user information such as contact details. The sub-section will also be used to subscribe or unsubscribe from the SEAL products mailing list.

6.2.2 Administrator Interface

a. The administrator interface is to consist of a standard Windows application display with drop down menus and toolbars.

b. The administrator interface is to consist of the following sections:

i. New Products Section

ii. Approval of Payments Section

iii. SEAL Products Section

iv. Transactions Section

v. User Profiles Section.

6.2.2.1 New Products Section

a. The New Products section will allow for the input of new product details.

6.2.2.2 Approval of Payments Section

a. If the payment mechanism is not automated, an input mechanism will be developed in order for the administrator to approve a payment after manually processing the payment through a financial institution.

b. This section will list (output) all of the transactions that have not been processed in a tabular form.

c. The administrator will then select each transaction individually and either approve or deny the transaction.

6.2.2.3 SEAL Products Section

a. This section will serve mainly as an output interface for the administrator to view the SEAL products in the section.

b. The administrator will however be able to update product information (such as an updated price) in this section.

c. The output of the SEAL Products will be in a tabular form. Once a product in the table is selected the user will be able to switch to the transaction section to view all the purchases of the selected product.

6.2.2.4 Transaction Section

a. This section will serve only as an output for all the transactions that the system has processed. The administrator will not be able to input any information into this interface.

b. Subsets (queries) and sorting of the transactions will be possible, such as:

i. All successful transactions

ii. All failed transactions

iii. Transactions per day or month or year.

iv. Transactions per registered user.

v. Transactions per product.

c. If transactions per user or per product are selected, the administrator will be able to switch to the User Profile section or SEAL Products section to view the information for the selected user or product.

6.2.2.5 User Profile Section

a. This section will serve mainly as an output for all user information stored in the database.

b. The administrator will however be able to modify user information via this interface.

c. The user profiles will be listed in a tabular format. The administrator will be able to select a user and switch to the transactions section to view the set of transactions that the user has performed (all the products that the user has purchased).

6.2.3 E-mail output

6.2.3.1 Users

Users will be notified via e-mail for the following:

a. When the encryption number is available on the web site.

b. If the transaction fails for any reason. The reason is to be supplied in the e-mail message.

6.2.3.2 Relevant SEAL members

SEAL personnel will be notified of user feedback when a user eneters information into the feedback sub-section of the purchasing section of the User interface

6.3 What are the output items?

6.3.1 Web interface

6.3.1.1 Main menu

The mail menu will output a standard web page containing links to all the sections and sub-sections.

6.3.1.2 Registration section

After submitting the registration information into the system, the system is to output the following information to the user via the web page:

a. Username

b. Password.

6.3.1.3 Pricing section

For each product available from the SEAL, the following information is to be output and presented by the pricing section:

a. Product name

b. Product number

c. Product version

d. Unit price

e. Contract

f. Dependencies of the product.

g. Links to download the product.

6.3.1.4 Purchasing section

6.3.1.4.1 Selection sub-section

When entering the selection sub-section the system is to output the catalogue interface. The following is to be dynamically output about each product:

a. Product name

b. Product number

c. Product version

d. Unit price

e. Contract

f. Dependencies of the product

6.3.1.4.2 Payment sub-section

Once the user has finished selecting products to purchase, the list of items in the shopping basket is to be output to a standard purchasing form.

6.3.1.4.3 Current Products sub-section

If the user opens the Current Products sub-section the following is to be displayed for every product for which the user is registered:

i. The product name.

ii. The product number

iii. The product version

iv. The registered username

v. The encryption number based on the above 3 points.

vi. Whether or not the user is on the mailing list for the particular product.

6.3.1.4.4 Feedback sub-section

This sub-section is an input sub-section. However for inputting information, drop down lists are to be output for the following form fields:

a. The type of feedback

b. The applicable product

6.3.1.4.5 User Information sub-section

The following information is to be dynamically displayed from the database. Only items as indicated in section 4.3.1.3.3 will be modifiable:

i. Surname

ii. Firstname

iii. Company

iv. Telephone number

v. Fax number

vi. Cell number

vii. e-mail address

viii. password.

ix. Whether or not the user wishes to be on the SEAL products mailing list (Y\N).

x. Registered SEAL software user (individual or company name)

6.3.2 Administrator interface

The administrator will be able to view the following information via his interface:

6.3.2.1 New Products Section

a. This section will have no output items except for a list of all products in the system for the administrator to select a dependency if necessary.

6.3.2.2 Approval of payments section

a. For each non-processed transaction the following information will be listed:

i. The registered user

ii. Product name

iii. Product number

iv. Product version

v. Credit card number

vi. Credit card owner

vii. Expiry date of credit card

viii. Credit card brand name

ix. Transaction amount

6.3.2.3 SEAL products section.

a. The product name

b. The product number

c. The product version

d. The unit price

e. The dependency of the product.

f. All registered users of a particular product

6.3.2.4 Transactions section

a. For each transaction the administrator will be able to view the following:

i. The registered user

ii. Product name

iii. Product number

iv. Product version

v. Credit card number

vi. Credit card owner

vii. Expiry date of credit card

viii. Credit card brand name

ix. Transaction amount

x. Transaction processed (Y/N)

xi. Date processed

xii. Time processed

xiii. Card credited - transaction approved (Y/N)

xiv. Whether or not the user is on the products mailing list

6.3.2.5 User profiles section

For any user the administrator will be able to view the user's registration details (contact details) and all products that the user has purchased.

a. For each user the administrator will be able to view the following:

i. Surname

ii. Firstname

iii. Company

iv. Telephone number

v. Fax number

vi. Cell number

vii. e-mail address

viii. Registered user

ix. Username

x. password

xi. Whether or not the user is on the SEAL products mailing list.

xii. Products for which the user is registered (Refer to section 6.3.2.2d)

6.3.3 E-mail output

6.3.3.1 Encryption number is availability notification

The following information is to be output in the e-mail message:

a. User's e-mail address

b. Date (generated by mail application)

c. Time (generated by mail application)

d. Username

e. Product name

f. Product number

g. Product version

h. A standard message indicating the availability of the encryption number on the web site.

i. The web site URL

6.3.3.2 Transaction failure notification

The following information is to be output in the e-mail message:

a. User's e-mail address

b. Date (generated by mail application)

c. Time (generated by mail application)

d. Username

e. Product name

f. Product number

g. Product version

h. The reason for the transaction failure

6.3.3.3 User feedback

The following information is to be input into the mail message:

a. The type of feedback - customer complaints, problem reports or change requests

b. The applicable product (where applicable)

c. Text containing the feedback.

6.4 What are the characteristics, accuracy, descriptions and range for each output item

Refer to Appendix A.

7 Documentation

7.1 Requirements

7.1.1 What documents have been referenced in the requirements document?

QSI 001, Master Document List

QSI 003, Quality Plan

QSI 005 Project Management Plan

QSI 005-10 Work Breakdown Structure

7.1.2 What additional documents are recommended for the development of the product? Refer to QSI 001, Master Document List and QSI005-10, Work Breakdown Structure for details regarding the other documentation that will be developed as part of this project.

7.1.3 What are the definitions of all the acronyms and technical terms?

These are defined in Section 1.6 of this document.

7.1.4 What technical or legal authorisations are required to develop the product?

This is defined in QSI 007 Contract

7.1.5 Who has created and revised the requirements document and what are the dates of creation and revision?

This information is provided in the Change Control segments of the document created using this template.

7.2 Support

7.2.1 What type of support documentation shall the developer provide with the product?

This is defined in QS195 Project Documentation and Support Standard.

7.2.2 To what standards shall the support documentation for the product conform?

The supplied documentation is conformant to the Quality Management System Requirements of the SEAL Quality Management System, which is traceable in its requirements to ISO 9001 (1994).

8 Appendix A Input and Output Item Characteristics

Key

xyz

for x: i.- Input

o. - output

for yz: Web Interface

wr - registration section

wi - pricing section

wp - purchasing section

wn - new products sub-section

wc - current products sub-section

wu - user information sub- section

Administrator interface

an - new product input section

aa - approval of transaction input section

ap - products output section

at - transactions output section

au - user information output section

8.1 Input Item Characteristics

Removed "acceptable accuracy, significant digits

Input item – xyzdescription	Description	Data type	Units	Input mask	Range or maximum field size	Input method	Default value
lwrsurname	The user's surname	text	-	-	20	Text box	blank
lwrfirstname	The user's firstname	text	-	-	20	Text box	blank
lwrcompany	The user's company (where applicable)	text	-	-	30	Text box	blank
lwrtelephone	The user's telephone number	text or digits	-	+XXX-(XXX)-yyy-yyyy	-	text boxes	blank
lwrfax	The user's fax number	text or digits	-	+XXX-(XXX)-yyy-yyyy	-	text boxes	blank
lwrcell	The user's cell phone number	text or digits	-	+XXX-(XXX)-yyy-yyyy	-	text boxes	blank
lwrmail	The user's e-mail address	text		-	50	text box	blank
lwrreguser	The name under which the software is to be registered (company or individual name or other)	text	-	-	30	text box	blank
lwrpassword	A selected password to access restricted areas	text	-	-	20	password box	blank
lwrpassword2	A repetition of the selected	text	-	-	20	password box	blank

Input item – xyzdescription	Description	Data type	Units	Input mask	Range or maximum size	Input method	Default value
	password to access restricted areas						
lwrmaillist	Whether or not the user whishes to be on the SEAL products mailing list.	binary	-	Y or N	-	Check box	Y
lwpusername	The allocated username	text	-	-	30	text box	blank
lwppassword	The user's password	text	-	-	20	password box	blank
lwnproduct	The selected new product to be purchased	text	-	List of all products in the system	-	Drop down menu	First product on the list
lwncardnumber	The credit card number to be charges.	Text (or whatever the bank requires)	-	Standard credit card input mask	-	text boxes	blank
lwncardowner	The registered card owner	text	-	-	Get from bank	text box	blank
lwncardexpire	The credit card expiry date	date	-	get standard credit card date format	-	text box/s	blank
lwncardbrand	The card brand name (VISA, AMES, MC etc)	text	-	List of available brands (VISA, AMEX etc)	-	Radio button	VISA
lwnproductmail	Whether or not the user wishes to be on the mailing list for the selected product.	binary	-	Y or N	-	Check box	Y
lwcproductmail	Whether or not the user wishes to be on the mailing list for the respective product.	binary	-	Y or N	-	Check box	Y
lwusurname	The user's surname	text	-	-	20	Text box	Current dbase

Input item – xyzdescription	Description	Data type	Units	Input mask	Range or maximum size	Input method	Default value
							text
lwufirstname	The user's firstname	text	-	-	20	Text box	Current dbase text
lwucompany	The user's company (where applicable)	text	-	-	30	Text box	Current dbase text
lwutelephone	The user's telephone number	text or digits	-	+XXX-(XXX)-yyy-yyyy	-	text boxes	current dbase telephone number
lwufax	The user's fax number	text or digits	-	+XXX-(XXX)-yyy-yyyy	-	text boxes	current dbase fax
lwucell	The user's cell phone number	text or digits	-	+XXX-(XXX)-yyy-yyyy	-	text boxes	current dbase cellphone number
lwumail	The user's e-mail address	text	-	-	50	text box	Current dbase e-mail address
lwupassword	A selected password to access restricted areas	text	-	-	20	password box	Current dbase value displayed as stars (*)
lwupassword2	A repetition of the selected password to access restricted areas	text	-	-	20	password box	Current dbase value displayed as stars (*)
lwumaillist	Whether or not the user whishes to be on the SEAL products mailing list.	binary	-	Y or N	-	Check box	Current dbase value
lanproductname	Product name	text	-	-	20	text box	blank
lanproductnum	Product number	text	-	mask for seal product numbers?	-	text box	blank
lanproductver	Product version	number	-	X.XX	-	text box	blank
lanproductprice	Product price	number	Rands and	RXXXX.XX	-	text box	blank

Input item – xyzdescription	Description	Data type	Units	Inputmask	Range or maxlength size	Input method	Default value
			cents				
laindependency	Dependency of the product	text		list of products currently in database	-	drop down menu	blank
laaapprove	Administrator transaction approval	binary	-	-	-	button	-
laadeny	Administrator transaction denial	binary	-	-	-	button	-
laareason	The reason for the denial of a transaction	text	-	-	250	text	blank
lapproductprice	The updated product price	number	Rands and cent	RXXXX.XX	-	text box	current price of the product
lapdependency	Any modification in the product dependancy	text	-	list of products currently in database	-	drop down menu	currently selected dependency for the respective product.
lausurname	The user's surname	text	-	-	-	text box	value currently in dbase
laufirstname	The user's firstname	text	-	-	-	text box	value currently in dbase
laucompany	The user's company	text	-	-	-	text box	value currently in dbase
lautelephone	The user's telephone number	text	-	-	-	text box	value currently in dbase
laufax	The user's fax number	text	-	-	-	text box	value currently in dbase
laucell	The user's cell number	text	-	-	-	text box	value currently in dbase
laumail	The user's e-mail address	text	-	-	-	text box	value currently in dbase

Input item – xyzdescription	Description	Data type	Units	Input mask	Range or maximum size	Input method	Default value
laureguser	The registered software username	text	-	-	-	text box	value currently in dbase
lauusername	The username for logging into the system	text	-	-	-	text box	value currently in dbase
laupassword	The user's password	text	-	-	-	password box	value currently in dbase
laumaillist	Whether or not the user is on the SEAL products mailing list	binary	-	-	-	check box	value currently in dbase

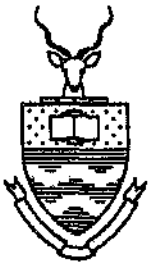
8.2 Output Item Characterisitcs

Input item – xyzdescription	Description	Data type	Units	Range or maximum size	Output method	Default value
Owrusername	The username to be used to access restricted areas	text	-	-	read only text	-
Owrpassword	The password to access restricted areas	text	-	-	read only text	-
Owiproductname	The product name	text	-	-	read only text	-
Owiproductnum	The product number	text	-	-	read only text	-
Owiproductver	The product version	number	-	-	read only text	-
Owiproductprice	The product price	number	Rands and cents	-	read only text	-
Owidependancy	The dependency of the product	text	-	-	read only text	-
Owneligibility	The products for which the user is	text	-	-	drop down menu	first product on the list

Input item – xyzdescription	Description	Data type	Units	Range or maximum size	Output method	Default value
	eligible to purchase					
Owcproductname	The product name	text	-	-	read only text	-
Owcproductnum	The product number	text	-	-	read only text	-
Owcproductver	The product name	text	-	-	read only text	-
Owcreguser	The registered user for the software	text	-	-	read only text	-
Owcencryptionno	The encryption number	text	-	-	read only text	-
Owcproductmail	Whether or not the user wishes to be on the respective product's mailing list	binary	-	-	check box	Current value in dbase
Owusurname	The user's surname	text	-	-	text box	Current value in dbase
Owufirstname	The user's firstname	text	-	-	text box	Current value in dbase
Owucompany	The user's company	text	-	-	text box	Current value in dbase
Owutelephone	The user's telephone number	text	-	-	text boxes	Current value in dbase
Owufax	The user's fax number	text	-	-	text boxes	Current value in dbase
Owucell	The user's cell phone number	text	-	-	text boxes	Current value in dbase
Owumail	The user's e-mail address	text	-	-	text	Current value in dbase
Owupassword	The user's password to access restricted areas	text	-	-	password box	Current value in dbase
Owupassword2	The repeat of the user's password to access restricted areas	text	-	-	password box	Current value in dbase
Owumaillist	Whether or not the user wishes to be on the SEAL products mailing list	binary	-	-	Check box	Current value in dbase
Owureguser	The registered user of the software	text	-	-	read only text	Current value in dbase
Oandependancy	The dependency of the product	text	-	-	read only text	-
Oapproductname	The product name	text	-	-	table and text box	Current value in dbase
Oapproductnum	The product number	text	-	-	table and text box	Current value in dbase

Input item – xyzdescription	Description	Data type	Units	Range or maximum size	Output method	Default value
Oapproductver	The product version	number	-	-	table and text box	Current value in dbase
Oapproductprice	The product price	number	-	-	table and text box	Current value in dbase
Oapdependancy	The dependancy of the product	text	-	-	table and drop down menu	Current value in dbase
Oatdatesubmit	The date that the request was submitted	date	-	-	table	-
oattimesubmit	The time that the request was submitted.	Date	-	-	table	-
oatreguser	The registered user for the transaction	text	-	-	table	-
oatproductname	The name of the purchased product	text	-	-	table	-
oatproductnum	The product number	text	-	-	table	-
oatproductver	The product version	number	-	-	table	-
oatcardnumber	The credit card number	text	-	-	table	-
oatcardname	The credit card name	text	-	-	table	-
oatcardexpire	The expiry date of the card	date	-	-	table	-
oatcardbrand	The card brand name	text	-	-	table	-
oatamount	The transaction amount	number	-	-	table	
oatprocess	Whether the transaction was processed.		-	-	-	
oatdate	The date of the transaction	date	-	-	table	-
oattime	The time of the transaction	date	-	-	table	-
oatsuccess	Whether the transaction was successful or failed.	Binary	-	-	Table	-
oatmaillist	Whether or not the user is on the respective product's mailing list	binary	-	-	table and check box	-
oausurname	The user's surname	text	-	-	table and text	-

Input item – xyzdescription	Description	Data type	Units	Range or maximum size	Output method	Default value
					box	
oaufirstname	The user's firstname	text	-	-	table and text box	-
oaucompany	The user's company	text	-	-	table and text box	-
oautelephone	The user's telephone number	text	-	-	table and text box	-
oaufax	The user's fax number	text	-	-	table and text box	-
oaucell	The user's cell number	text	-	-	table and text box	-
oaumail	The user's e-mail address	text	-	-	table and text box	-
oaureguser	The registered software username	text	-	-	table and text box	-
oauusername	The username for logging into the system	text	-	-	table and text box	-
oaupassword	The user's password	text	-	-	table (hidden) and password box	-
oaumaillist	Whether or not the user is on the SEAL products mailing list	binary	-	-	table and check box	-



QSI

IS4 High Level Design 1 - System And Database

Technical Product

Revision 1.01

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	IS4 High Level Design 1 - System and Database
Doc. Reference:	C:\QSI\TP\SOFTWARE\QSI232.001.DOC
Created by:	B. Braude
Creation Date:	28 August 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\08\28	Draft	BB	Qsi232.001
0.02	97\11\05	Draft	BB	QSI232.002.doc
1.00	98\04\08	Approved	BB	QSI232.100.doc
1.01	98\04\17	Approved	BB	QSI232.101.doc

Revision History

Version	Date	Changes
0.01	97\08\28	New document created using qst324-40.100
0.02	97\11\05	Changed the document from being only a database high level design to being a system and database high level design
1.00	98\04\08	Document approved
1.01	98\04\17	SEAL Component added

Management Authorisation

Version	Date	Status	Management Board Minute Reference
1.00	98\04\08	Approved	QSI 2049 section 2.3
1.01	98\06\02	Approved	QSI 2053 section 2.10

Change Forecast

This document will be updated each time new design requirements are identified.

1 Scope

1.1 Introduction

The IS4 System and Database High Level Design details the design of the IS4 system, the tabular structure of the IS4 database and the high level design of the SEAL encryption component. The document provides an overview of the server software used to run the IS4 and then defines the structure of the database used to store the IS4 information. Lastly the document defines the functional structure of the SEAL encryption component.

1.2 Applicability

This document is applicable as the system and database high level design for the IS4 and is a technical product in the QSI project. This document forms part of the following series of documents:

a. IS4 High Level Design 1 - System and Database (QSI 232)

b. IS4 High Level Design 2 - Shopper Interface (QSI 230)

c. IS4 High Level Design 3 – Manager Interface (QSI 231)

d. IS4 Low Level Design 1 – System and Database (QSI 242)

e. IS4 Low Level Design 2 – Shopper Interface (QSI 240)

f. IS4 Low Level Design 3 – Manager Interface (QSI 241)

1.3 Definitions

D - Data

E - Event

IS^4 – Internet System for the Supply and Support of Software

SEAL - Software Engineering Applications Laboratory

WWW - World Wide Web

FTP - File Transfer Protocol

ASP – Active Server Pages

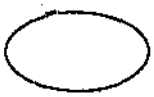
IIS – (Microsoft) Internet Information Server

HTTP – Hypertext Transfer Protocol

HTML – Hypertext Markup Language

DLL – Dynamic Link Library

1.4 Diagram Conventions

Diagram	Meaning
	Function
	Calls

1.5 Audience

- The Product Manager
- The Customer or Client
- The Product Developers
- Individuals who perform 2nd and 3rd party surveillance on SEAL QMS.
- Fulltime members of SEAL Management Board.

1.6 Applicable Documents

1.6.1 Standards

a. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994

1.6.2 Procedures

1.6.3 Guidelines

1.6.4 Exemplar Documents

An example of this use of this template can be found in:

a) TMP 126 Task Management Package High Level Design, Revision 1.02, 12 December 1995 (See project 1995_34).

1.7 Assumptions

It is assumed that the reader uses this document in conjunction with the entire series of IS4 High and Low Level Design documents (Refer to section 1.2).

1.8 Requirements Traceability

2 Hardware and Operating System

The IS4 runs on the Microsoft Windows NT 4 operating system with the Microsoft Windows NT 4 Service Pack 3. The operating system and server software runs on the following hardware:

a. Intel P200 Processor

b. 64MB RAM

c. 4 GB SCSI Hard Drive

d. 8 speed CD-ROM Drive

e. SCSI DAT Drive

f. Ethernet Network Card

3 Microsoft Internet Information Server with Active Server Pages

The IS4 uses the Microsoft Internet Information Server (IIS) version 3.0 with support for Microsoft Active Server Pages (ASP) technology. The IIS is used to publish WWW information using the Hypertext Transfer Protocol (HTTP) as well as to provide File Transfer Protocol (FTP) and Gopher services.

The WWW functions fundamentally by means of requests and responses. Web browsers request information by sending a URL to a Web server. The Web server responds by returning a Hypertext Markup Language (HTML) page. HTML pages can be either static or dynamic. Static pages are stored on the web site already containing all the formatting and content that is delivered to the requesting Web browser. A dynamic page is one that is created dynamically on request and is based on information provided by either the user requesting the page or by other variables on the web site.

All the web pages used in the IS4 are dynamic pages implemented by using the Microsoft Active Server Pages technology. ASP provides a server-side scripting environment to create and run dynamic, interactive Web server applications. With server-side scripting, the customised Web pages are generated on the server and the results are presented as normal HTML to the client's Web browser. ASP technology is implemented by creating pages with the .asp extension instead of the .htm or .html extension. These pages are then called from a web browser in the same way as normal web pages. ASP files can include HTML, scripts, and ActiveX server components. Active Server Pages supports ActiveX scripting thereby providing support for Visual Basic Script and Java Script. Scripts can reference ActiveX components running on the local server. These components can access databases or applications, or process information.

The ADO (ActiveX Data Objects) component forms part of ASP and allows one to access and manipulate data in the database. The component contains numerous objects, collections and methods used in the access and manipulation of data. The main objects used in the IS4 are the following:

- Connection object - represents an open connection to a data source.
- Command object - definition of a specific command that you intend to execute against a data source

- Recordset object - represents the entire set of records from a base table or the results of an executed command

4 Microsoft Commerce Server

"Commerce Server is an Internet and extranet server application built on the Microsoft Windows NT Server network operating system that enables businesses to create and manage cost-effective online selling sites that provide customers and business trading partners with a convenient, compelling, and secure buying experience."

Commerce Server provides ActiveX components that are used in conjunction with Active Server Pages. These components "supply the basic set of services for access to product-related content in a database, access to shopper information, and creation of an order form for presentation to and processing by the order processing pipeline. In addition, Commerce Server components for traffic collection, message management, and store debugging are provided."

The following table from the Commerce server documentation summarises the Commerce Server components:

Component	Description
Content	Simplifies the store's interaction with the database management system (DBMS) in which store data is stored, by providing a cache in which one can store string variables that are associated with data source names (DSNs) and SQL queries.
DataFunctions	Supports a collection of methods that perform locale-based, data-type conversion, and range validation on data. These methods are intended primarily to ensure the validity of data that stores pass to the order processing pipeline or attempt to store data in databases.
Datasource	Executes specified queries. These can be SQL queries that are constructed at run time or that have been associated with string variables and stored in a Content component cache.
DBStorage	Supports flexible interaction with the database, primarily for the storage of receipt and order information.

Component	Description
MessageManager	Provides a cache in which to store shopper messages that are displayed to store users.
OrderForm	Maintains shopper purchase information for the current shopping session, supporting the addition and deletion of purchase items.
OrderPipeline	Loads the pipeline configuration file (.pcf file) that contains the pipeline configuration information for the store.
Page	Simplifies the layout of HTML pages and the interaction between these pages and the data sources used by the store.
ShopperManager	Supports the creation, deletion, and retrieval of unique shopper identifiers.
TrafficLogFile	Supports logging store events to a text file.
TrafficTable	Supports logging store events to database tables and text files

In addition to the Commerce Server ActiveX components, the Commerce Server provides the merchant with an order processing system. This order processing system is named the Order Processing Pipeline (OPP) and performs certain processing tasks on the shopper's order form. After the shopper places an order, the order is passed through the pipeline, each stage of which consists of some number of OPP components. The OPP components in each stage of the processing pipeline can be specified and configured according to the business requirements of the store.

A single pipeline is called in various modes. Depending on the mode, different stages are executed. In particular, a single pipeline can perform any one or all of the following functions:

a. Product mode: Updates the product information in the order form.

b. Plan mode: Checks the information in the order form for correctness. Computes tax, shipping, handling and the final total.

c. Purchase mode: Commits the order as a purchase.

For more information regarding the Commerce Server Components and the OPP refer to the Commerce Server Documentation on the IS4 Server.

5 Microsoft SQL Server

Microsoft SQL Server is a multi-user relational database management system (DBMS). The server is used to store all the user and store information for the IS4. According the to SQL server documentation, "client workstations communicate with SQL Server across a network, such as a Windows NT Server, Novell NetWare, Banyan VINES, or TCP/IP network." In the IS4, the data in SQL server is accessed by the ASP components through the Open Database Connectivity (ODBC) interface through the use of Structured Query Language (SQL).

All information in SQL Server is stored on drives in devices in databases. Devices are operating system files used to store databases, transaction logs, and their backups. Databases reside on database devices. A database can reside on one or more database devices, and each database device can hold a portion of one or more databases. All is IS4 information is stored in multiple tables in a single database, in a single database device on a single harddrive. The data can be distributed between drives and even servers in order to improve performance however in the case of the IS4, additional measures were not incorporated at this stage for improving performance using additional hardware. The following tables have been created in a database for use by the IS4:

Table No.	Table Name	Description
1.	Ssoft_basket	Stores the baskets for the shoppers. A shopper can leave the store and on return his items will still be in his basket.
2.	Ssoft_product	Stores products available in the store
3.	Ssoft_product_info	Stores the items of information applicable to the respective products
4.	Ssoft_receipt	Stores the receipts issued.
5.	Ssoft_receipt_item	Stores the items that make up the receipts
6.	Ssoft_shopper	Stores the personal and contact

Table No.	Table Name	Description
		information for the shoppers
7.	Ssoft_traffic	Stores a log of user requests for specific modules.
8.	Ssoft_downloads	Stores links to software products for downloading
9.	Ssoft_documents	Stores information and links for all documentation that is available for downloading for purchased software products.
10.	Ssoft_purchased	Stores the products that the customers have purchased along with the information for each purchased product (unlock key, product number)
	Ssoft_feedback	Stores the feedback items received from customers.
12.	Ssoft_mail	Stores mail items sent by the IS4 store manager
13.	Ssoft_depend	Stores the dependencies (products that the user has to have in order to purchase the selected product) for the system's products

6 Microsoft Personalisation Server

The Personalisation System is a collection of three ActiveX server components that allows the presentation of personalised web content to site users based on their profiles. The ActiveX server components are:

Component	Description
User Property Database	Used to acquire users' profiles and to present customised information based on these profiles
SendMail	Sends e-mail from the Web server using an SMTP (Simple Mail Transport Protocol) server
Voting	Allows users to vote on an issue and store the results in a database

All of these components reside on the Web server and are accessed using ASP scripting.

The IS4 makes use of only the SendMail component in Personalisation Server. It is used for sending mail messages from the IS4 administrator to IS4 users

7 Seal Encryption Component

The SEAL encryption component is a dll that resides on the IS4 server and is used to generate encryption numbers used for the unlocking of SEAL software products.

The component takes the username and product number of a particular product and generates a unique encryption string. This string is then input into the purchased product along with the username and product number. The product contains the same encryption algorithm and if the input username and product number encrypt to the same input encryption string, then the product is unlocked for use. The SEAL encryption component is used by the Shopper and Manager interfaces of the IS4 for generation of encryption numbers for products purchased on the system.

The SEAL encryption component is written in Visual Basic 5.0. and consists of a single "Register" class. The class contains a function "Encrypt" which is passed the username and product number and in turn returns the encryption string. This function calls other functions to implement the encryption and for the conversion of data between Hex, Ascii, and character formats. The encryption algorithm used in this component is an exact copy of the algorithm used in the SEAL Software Process Assessment Tool developed by the SEAL in the 1995_45 SEAL project.

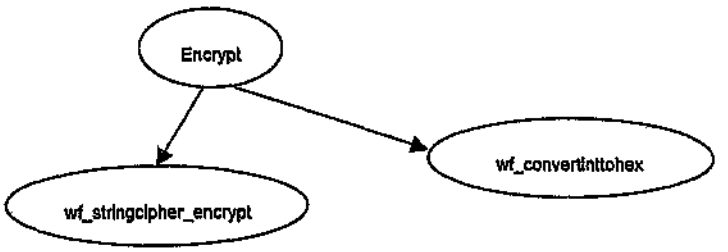
The following are the functions that form the component:

7.1 Encrypt

7.1.1 Purpose

The Encrypt function accepts the username and product number. The function converts the 2 strings to be equal in length and then calls the wf_stringcipher_encrypt functions to implement the encryption. The Encrypt function then calls the convertinttohex function to convert the encryption string to Hex values. Thereafter the function returns the encryption string.

7.1.2 Function diagram



7.1.3 Function interface

Function Encrypt					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
Username	D	Shopper or Manager Interface			
Product ID	D	Shopper or Manager Interface			
Product version	D	Shopper or Manager Interface			
Product number	D	Shopper or Manager Interface			
			E	Calling of function	Wf_stringcipher_encrypt
			D	Wf_stringcipher_encrypt	Registration number
			D	Wf_stringcipher_encrypt	Customer name
The encryption string in char format	D	Wf_stringcipher_encrypt	E	Calling of function	Wf_convertinttohex
			D	wf_convertinttohex	Ascii value of each character in

Function Encrypt					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
					encryption string
The Hex value of each character in the encryption string.	D	wf_convertintt ohex	D	Return of the value	The encryption string in Hex format.

7.1 4 Comments

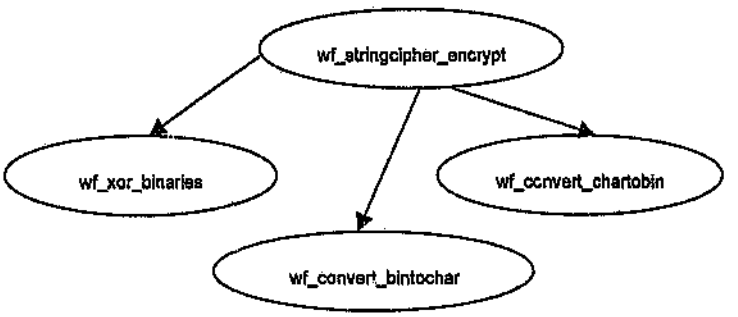
None

7.2 Wf_stringcipher_encrypt

7.2.1 Purpose

The function reads in the 2 strings passed to it by the Encrypt function. For each character in the strings the function calls the wf_convert_chartobin function to convert each respective character to the binary representation of its ASCII value. T e 2 binary values of each respective character in the 2 strings are then XOR'd together. The resultant binary value is then converted to the character represented by the resultant binary value. The characters from each respective initial string characters are appended to each other to form the encryption string.

7.2.2 Function diagram



7.2.3 Function interface

Wf_stringcipher_encrypt					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
Username	D	Encrypt function			
Registration number	D	Encrypt function	E	Calling of the function	wf_convert_chartobin
			D	wf_convert_chartobin	Each character from the 2 strings
The binary value of each character	D	wf_convert_chartobin	E	Calling of the function	wf_xor_binaries
			D	wf_xor_binaries	The binary values of the respective character from each string
The XOR value of the 2 characters' binaries	D	wf_xor_binaries	E	Calling of the function	wf_convert_bintochar
			D	wf_convert_bintochar	The value of the 2 characters' binaries
The character representation of the binary value	D	wf_convert_bintochar	D	The return of the value	The encryption string in character format

7.2.4 Comments

None

7.3 Wf_convert_chartobin

7.3.1 Purpose

The function returns the binary representation of the ASCII value of the character passed to it.

7.3.2 Function diagram

7.3.3 Function Interface

Wf_convert_chartobin					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
character	D	wf_stringciph er_encrypt	D	The return of the value	The binary representation of the character

7.3.4 Comments

None

7.4 Wf_xor_binaries

7.4.1 Purpose

The function returns the XOR value of the 2 binary strings passed to it.

7.4.2 Function diagram

7.4.3 Function Interface

Wf_xor_binaries					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
2 binary values	D	wf_stringciph er_encrypt	D	The return of the value	The XOR of the 2 binary strings

7.4.4 Comments

None

7.5 Wf_convert_bintochar

7.5.1 Purpose

The function return the character represented by the ASCII value equivalent to the binary number.

7.5.2 Function diagram

7.5.3 Function Interface

Wf_convert_bintochar

Input			Output		
Label	Nature	Source	Nature	Destination	Label
Binary number	D	wf_stringciph er_encrypt	D	The return of the value	The character representation

7.5.4 Comments

None

7.6 Wf_convertinttohex

7.6.1 Purpose

The function returns the Hex value of an integer passed to it.

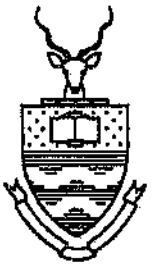
7.6.2 Function diagram

7.6.3 Function interface

Wf_convertinttohex					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
Integer value	D	Encrypt function	D	The return of the value	The nex representati on of the integer value.

7.6.4 Comments

None



QSI

Is4 High Level Design 2 - Shopper Interface

Technical Product

Revision 1.00

Document Status: Approved

Table of Contents

Change History

Configuration Control

Project:	QSI
Title:	IS4 High Level Design 2 - User Interface
Doc. Reference:	C:\QSI\TP\SOFTWARE\QSI230.001.DOC
Created by:	B.Braude
Creation Date:	11 August 1997

Document History

Version	Date	Status	Who	Saved as:
0.01	97\08\11	Draft	BB	Qsi230.001
0.02	98\03\24	Draft	BB	Qsi230.002.doc
1.00	98\04\08	Approved	BB	Qsi230.100.doc

Revision History

Version	Date	Changes
0.01	97\08\11	New document created using qst324-40 revision 1.00
0.02	98\03\24	Update to document after final development of system
1.00	98\04\08	Document approved

Management Authorisation

Version	Date	Status	Management Board Minute Reference
1.00	98\04\08	Approved	QSI 2049 Section 2.3

Change Forecast

This document will be updated each time new design requirements are identified.

1 Scope

.1 Introduction

The IS4 High Level Design details the modular structure of the IS4 Shopper interface and associated functionality. The document describes each module. Each Active Server Page comprising the application (Refer to QSI 232) is treated as a separate module. The document defines the purpose, functionality and the inputs and outputs of each module.

1.2 Applicability

This document is applicable as the Shopper Interface High Level Design for the IS4 and is a technical product in the QSI project. This document forms part of the following series of documents:

a. IS4 High Level Design 1 - System and Database (QSI 232)

b. IS4 High Level Design 2 - Shopper Interface (QSI 230)

c. IS4 High Level Design 3 – Manager Interface (QSI 231)

d. IS4 Low Level Design 1 – System and Database (QSI 242)

e. IS4 Low Level Design 2 – Shopper Interface (QSI 240)

f. IS4 Low Level Design 3 – Manager Interface (QSI 241)

1.3 Definitions

D - Data

E - Event

IS^4 – Internet System for the Supply and Support of Software

SEAL - Software Engineering Applications Laboratory

WWW - World Wide Web

FTP - File Transfer Protocol

ASP – Active Server Pages

IIS – (Microsoft) Internet Information Server

HTTP – Hypertext Transfer Protocol

HTML – Hypertext Markup Language

1.4 Diagram Conventions

Diagram	Meaning
	Module
	Submodule
	Calls
	Includes

1.5 Audience

- The Product Manager
- The Customer or Client
- The Product Developers
- Individuals who perform 2nd and 3rd party surveillance on SEAL QMS.
- Fulltime members of SEAL Management Board.

1.6 Applicable Documents

1.6.1 Standards

a. SEAL QMS Document Layout, Presentation and Typesetting Guide, QS 003, Revision 1.00, 3 October 1994

1.6.2 Procedures

1.6.3 Guidelines

1.6.4 Exemplar Documents

An example of this use of this template can be found in:

a) TMP 126 Task Management Package High Level Design, Revision 1.02, 12 December 1995 (See project 1995_34).

1.7 Assumptions

It is assumed that the reader has access to the entire High and Low level design series (Refer to section 1.2) and has read and is familiar with the High and Low Level Designs for the System and Database (QSI 232 and QSI 242).

1.8 Requirements Traceability

2 List of modules

Table 2.1: List of all modules in the application

Module No.	Module Name	Description
1.	About.asp	This module presents a brief abstract about the store and provides links to the other 'about' Modules.
2.	About_contact	This module presents contact information for the store.
3.	About_security	This module presents security information for the store.
4.	About_urm	This module presents an on-line User Reference Manual for using the IS4.
5.	Basket.asp	This module displays the customers order form
6.	Closed.asp	This is the default module used to display information to a user if the store is closed.
7.	Confirmed.asp	This module presents a purchase confirmation and gives the user an order number after the product has been purchased.
8.	Contract.asp	This module is used to display a contract for a particular product. If the user selects to purchase the product, the contract gives the user the option to agree or disagree with the contract.
9.	Default.asp	This module defines the frame structure for the user interface.

Module No.	Module Name	Description
10.	Download.asp	This module lists all the files comprising the product and allows the customer or potential customer to download the product.
11.	Feedback.asp	This module presents a form to a customer allowing him/her to provide feedback to the supplier.
12.	Feedback_menu.asp	This module presents a feedback menu to the customer allowing the selection of the type of feedback to be given
13.	Global.asa	This module defines the global variables and creates the global objects for the application
14.	Global_closed.asa	This module defines the global variables and creates the global objects for the application when the store is closed.
15.	I_country.asp	This module presents a list containing countries allowing the shopper to select his/her country of location.
16.	I_footer.asp	This module presents a standard page footer.
17.	I_header.asp	This module presents a standard page header
18.	I_shop.asp	This module defines the global variable as local ones and verifies that the shopper is identified, otherwise it directs the shopper to enter his identity.

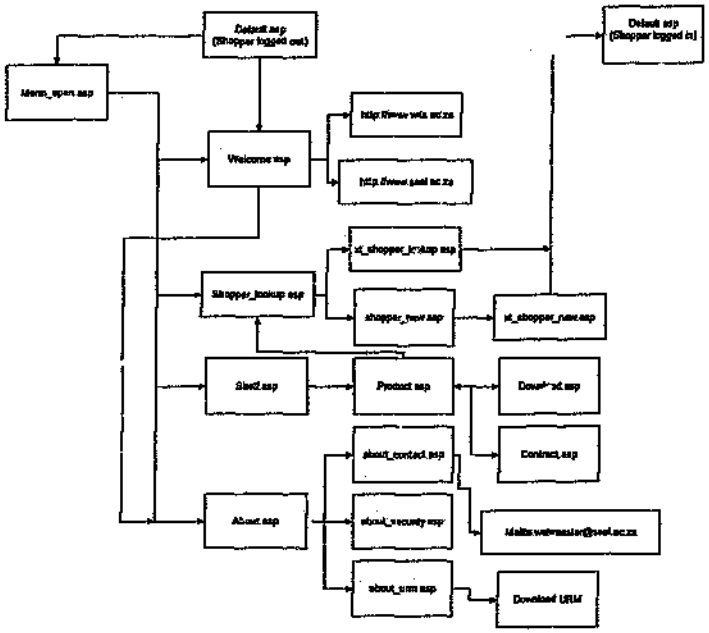
Module No.	Module Name	Description
19.	i_shop_open.asp	This shop defines the global variables as local ones. This serves the same function as i_shop except that it does not require that t e shopper's ID be known.
20.	Invoice.asp	This module outputs an invoice for the shopper.
21.	Menu_closed.asp	The module presents a menu page to a user who is logged in to the system
22.	Menu_open.asp	The module presents a menu page to a user who is not logged in to the system.
23.	Product.asp	This module displays details about the selected product
24.	Registered.asp	This module is used to display a list of products for which the user is registered.
25.	Registered_product.asp	This module is used to display the details and documentation for a selected registered product.
26.	Shelf.asp	This module displays a list of products available for purchasing
27.	Shopper_lookup.asp	This module is used to allow a user to input his username and password in order to identify the shopper and allow access to restricted areas.
28.	Shopper_new.asp	This module is used by a new customer in order to enter his/her details in order to register as a

Module No.	Module Name	Description
		shopper on the system.
29.	Shopper_update.asp	This module is used to allow a shopper to update his registration information
30.	Thanks.asp	This module presents a thank-you message to the customer after he has performed certain tasks
31.	Welcome.asp	This is the default module loaded when someone accesses the store. This is the starting page from where all other sections can be accessed.
32.	Xt_exit.asp	This module defines the shopper's ID as "" thereby logging him out of the store.
33.	Xt_feedback.asp	The module carries out the process of adding the customer's feedback item into the database
34.	Xt_orderform_addItem.asp	This module carries out the process of adding an item to the shopper's order form
35.	Xt_orderform_purchase.asp	This module processes the contents of the shopper's basket. The module checks that all the dependency requirements are met and if so, converts the basket contents to a receipt.
36.	Xt_orderform_update.asp	This module updates the order form after a user makes any changes to it (quantity, deleting etc)

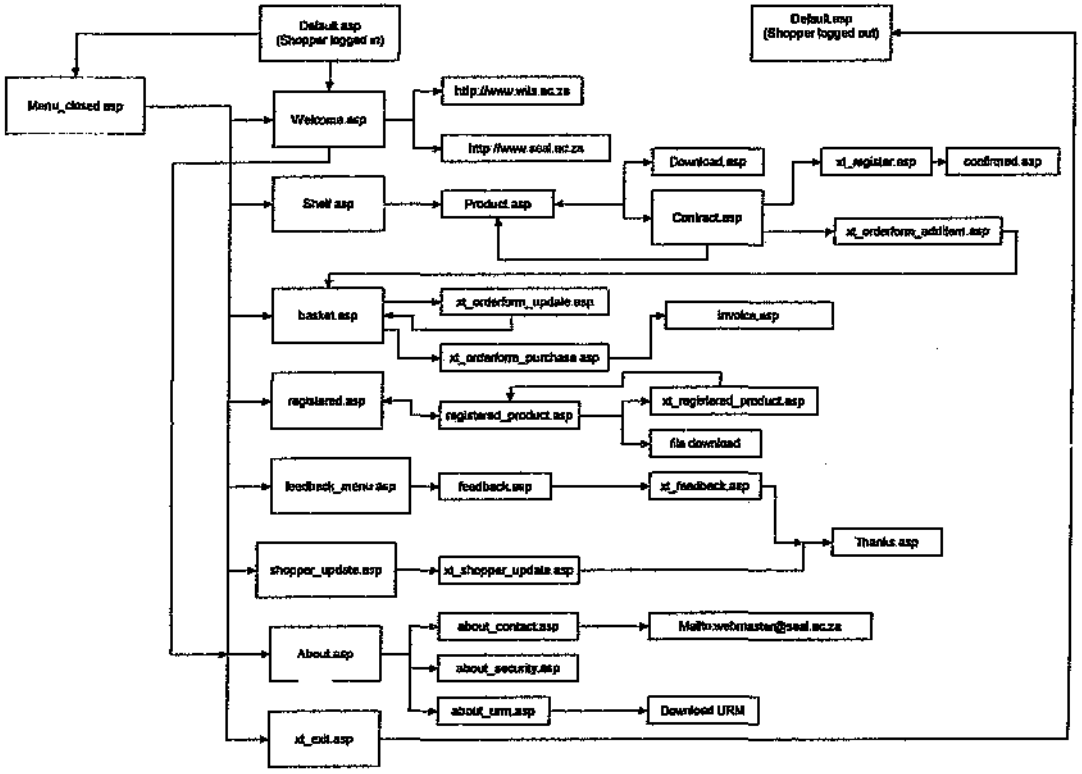
Module No.	Module Name	Description
37.	Xt_register.asp	This module checks dependencies and then registers a free product that the user has purchased as a registered product in the database.
38.	Xt_registered_product.asp	This module is used to update the information on the registered_product.asp page.
39.	Xt_shopper_lookup.asp	This module looks up if the shopper exists in the database and if so, retrieves the shopper id.
40.	Xt_shopper_new.asp	This module processes the information entered in the shopper_new page and if no errors are present, commits the data to the database.
41.	Xt_shopper_update.asp	This module processes the information entered in the shopper_update page and commits the data to the database.

3 User Interface Application Diagrams

Shopper Interface - 1: Shopper Logged Out



Shopper Interface - 2: Shopper Logged In

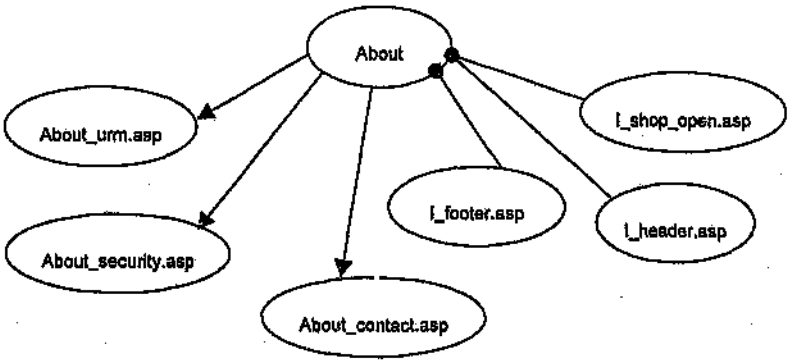


4 About.asp

4.1 Purpose

This module presents a brief abstract about the store and serves as a menu page providing links to lower level information pages about the store

4.2 Module diagram



4.3 Module interface

Table 4.1: A description of all inputs to and outputs from the module

About.asp					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
Module being loaded	E	User selection	D	Web browser	The abstract and list of links
A link to a lower level page being selected	E	The customer's selection	E	The web browser	The selected page being called.

4.4 Comments

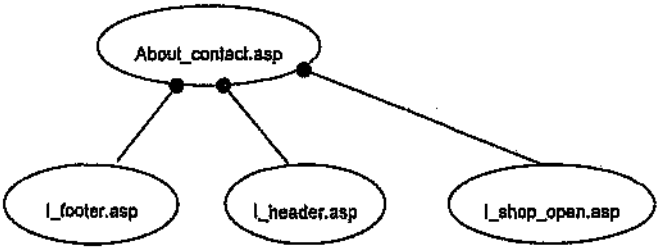
None

5 About_contact.asp

5.1 Purpose

This module presents contact information for the store administrator.

5.2 Module diagram



5.3 Module Interface

Table 5.1: A description of all inputs to and outputs from the module

Module 7: About_contact.asp					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
Module being called	E	User selection	D	Web browser	The contact information
The e-mail address tag	E	User selection	E	E mail application	The generation of an e-mail to the selected address

5.4 Comments

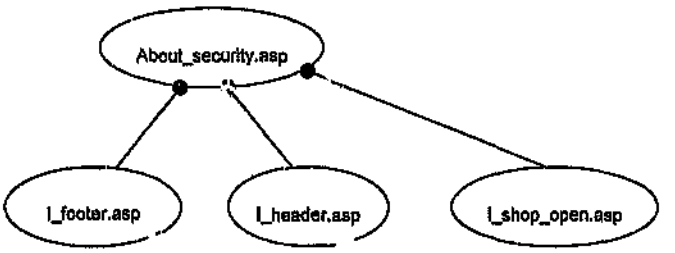
None

6 About_security.asp

6.1 Purpose

This module presents the user with a detailed description of the security of the store and the security used in the on-line transaction processing

6.2 Module diagram



6.3 Module interface

Table 6.1: A description of all inputs to and outputs from the module

About_security.asp					
Input			Output		
Label	Nature	Source	Nature	Destination	Label
Module being called	E	User selection	D	Web browser	The security information

6.4 Comments

None