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Process Industries Data Handover Guide - Part 1

Abstract:
This document provides guidelines for establishing the requirements for the exchange of facilities information between engineering contractors and owner/operators.

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Executive Summary

This guide is intended to support you in the development of a suitable information handover strategy and plan for a process plant engineering project.

Information created during an engineering project is of value for subsequent lifecycle stages of the process plant, in particular for operations, maintenance and engineering. The handover strategy must be based on the business requirements for the future use of this information.

The process for handing over information from the project to the operator consists of the following main stages;

- Establish a strategy for handover, which will form part of the overall project information strategy. The strategy should be aligned with the relevant company information policies.

- Determine the business requirements for information to be handed over, including;
    - what information is required
    - what format should the information be in
    - how the information is to be used
    - how the information will be stored
    - the reusability and retention of the information
    - the quality of the information

- Develop a handover plan, which forms part of the overall project information plan, to include;
    - methods of data handover
    - responsibilities
    - timing
    - media for handover
    - quality management

- Implement the handover, which requires;
    - educating the staff
    - checking for compliance against the strategy and plan

Developments in the way in which engineering information can be managed mean that the handover of information can be greatly improved, particularly in relation to its reusability and its quality assurance. This document covers developments, such as new ISO standards, which greatly enable this process.

1. Introduction

1.1 Purpose

This document is a guide for handing over process plant information during an engineering project. It is written in the terminology of the lifecycle of a process plant but the principles could be applied equally to any other industry sector.

This guide should be used by the owner/operator of the process plant asset and the contractors who will be involved in the project to build or modify the asset. The emphasis is on the owner/operator establishing their requirements for the lifecycle support of the asset and using this as the basis for agreeing the content and form of the information handover with the contractor(s).

Use of this guide will assist the capture of data in a consistent and useful format to enable data exchange or data sharing between parties in a cost-effective, quality-assured manner. The guide discusses the issues in selecting what data is required, what form it is in and how it should be handed over.

This guide has been produced based on the Process Plant Engineering Activity Model published by the Process Industries STEP Consortium (PISTEP). The Process Plant Engineering Activity Model (PPEAM) provides an overview of the main activities and data flows associated with the lifecycle of process plants. An overview of the PPEAM is shown in Figure 1.

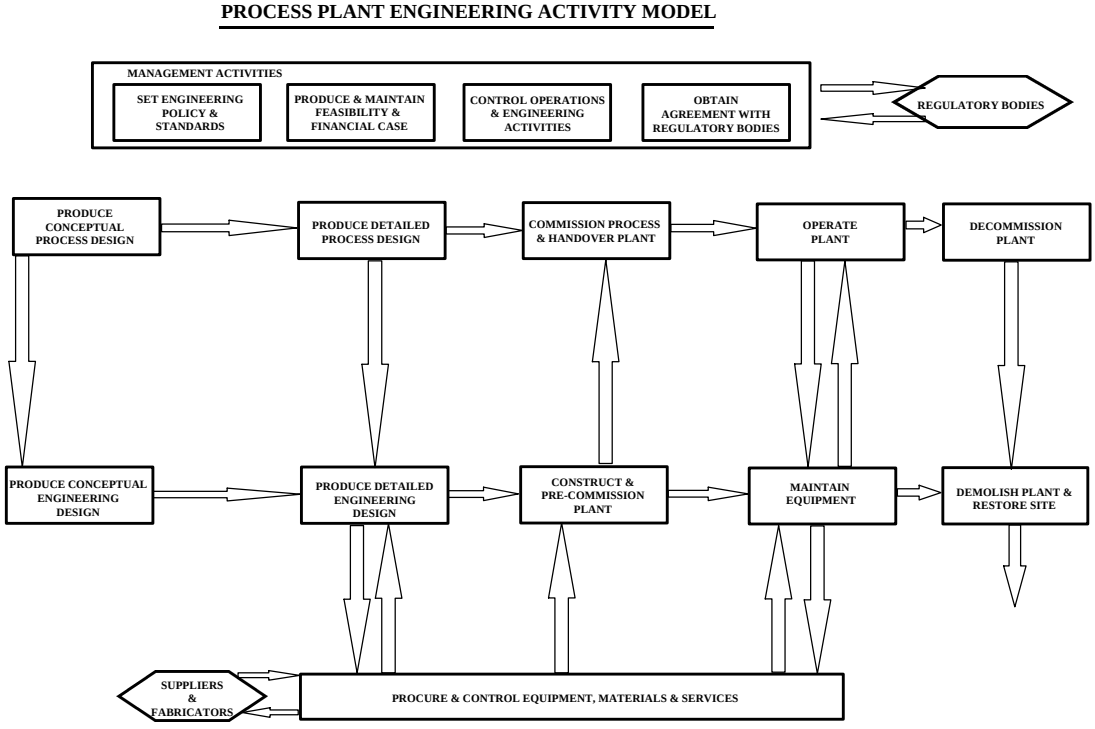

Figure 1: PISTEP Process Plant Engineering Activity Model

1.2 Target Audience

This guide is written for business and IT managers who are involved in or responsible for one or more lifecycle stage of a process plant. The Executive Summary is written for business managers.

This guide has received input from organisations responsible for all the lifecycle stages of a process plant from construction, operations and maintenance.

You are invited to consider adopting this document as a basis for your data exchange/sharing requirements.

1.3 Scope

The options available to an engineering project and its participants in handing information over to the owner/operator are so great that a single document such as this can not provide universal guidance. Therefore, this guide is intended to highlight the main issues in determining a strategy for the handover of information.

The scope of this guide is:

- Business process — handover of physical asset from design and construction to operations and maintenance;
- Industry sectors — process industries (as defined by PRIMA) including oil, chemical, food and beverage, steel and metal processing, utilities, pulp and paper, construction materials;
- Information — business and technical information in any form relating to the physical asset;
- Information Management — preparation, handover and acceptance and storage of information.

The following is outside the scope of this guide:

- information management during the project and post-project
- Security — where it is recommended that consideration be given to the BSI "A Code of Practice for Information Security Management" which addresses the security of data and systems.
- Legal admissibility of information stored in various formats

1.4 How the Guide is set out

This document contains general guidance on handover of information.

Section 2 describes the overall handover process and section 3 describes the handover strategy.

Section 4 deals with developing the business requirements and identifying the handover information and its requirements.

Section 5 describes the handover plan and section 6 covers the implementation of information handover.

Appendix A discusses the formats and media to be used for data sharing and exchange. It identifies those in common use in the industry today to establish some preferred types. Appendix A should be seen as a living annex and updated regularly to reflect best current practice.

Appendix B is a bibliography.

Part 2 of this guide contains lists of typical information types that will be produced during a process plant project and gives some suggested lifecycle codes and formats. This part can be used as a “starter pack” for creating your own handover information requirements.

1.5 Acknowledgements

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BP International Ltd
I+C=S
Intergraph (UK) Ltd
PDT Solutions
Shell Information Services Ltd
SNR Pernis BV

Part 2 of this document is based on handover requirements produced by BP and has been generalised for wider use.

2. The Handover Process

The overall sequence for the handover of information is shown in Figure 2.

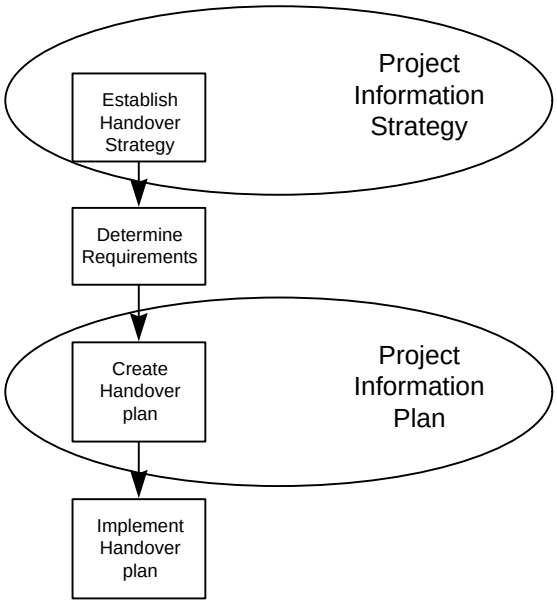

Figure 2: Overall handover process

The main stages are as follows;

Establish a handover strategy: this document will provide the guidance to the project for the handover of information. It is described in Section 3. It should form part of the overall project information strategy. It should be consistent with the Company's information policies particularly with regard to security.

Determine handover requirements: these requirements specify what information should be handed over and the attributes of the information (such as form, quality, etc.). Section 4 covers the identification of these requirements.

Create handover plan: the handover plan covers not only the handover requirements, but also responsibilities and implementation methods. This plan should be an integral part of the overall project information plan. This is described in section 5.

Implement handover plan: this is the stage at which the handover actually takes place. It is described in section 6.

3. The Handover Strategy

A written strategy document must be available to all personnel responsible for data handover, either through data exchange or data sharing. This may be a company specific strategy or an intra-company strategy related to a specific project. It should contain, as a minimum, the following guidance:

1. A definition of information handover — its overall objectives and scope — and its importance as an enabling mechanism for support of the asset lifecycle.

2. A statement of management intention, supporting the goals and principles of information handover.
3. An explanation of how the information handover relates to specific company security policies, principles, standards and compliance requirements including:
    - compliance with legislative and contractual requirements
    - A definition of general management responsibilities and specific company responsibilities for all aspects of information management.
    - An explanation of the process for reporting suspected security incidents.

4. Business Requirements for Handover Information

4.1 The Business Focused Approach

The requirements for information to be handed over during and at the end of a project should be based on the business use for that information throughout the lifecycle of the asset. The following sections discuss the key issues relating to these.

A study will be necessary to identify all of the activities during the asset's operational phase, which should cover normal operations, abnormal situation management, maintenance and engineering works. For each activity, the engineering information required (for both read and update) should be identified. The information requirements for health, safety, environmental protection and quality assurance must also be carefully considered. The deliverable of this study will be a business requirements' specification that sets out the requirements for information to be handed over.

The typical information requirements for an operating asset are shown in Table 1.

Access to design information
Access to schematic drawings
Access to engineering drawings
Access to operational manuals
Access to maintenance information
Access to spares information
Managing maintenance workflow
Managing hazardous substances (including access to material safety data)
Managing spares and purchasing
Advanced control development and tuning (including on-line simulation)
Managing work permits and access
Managing process changes
New engineering developments and modifications
Product accounting and apportionment
Managing safety records
Managing equipment history and inspection records and reports
Production planning and scheduling
Operational monitoring and review

Table 1: Typical requirements for an operating asset

The study is vital to the success of the handover of information. It must be done early on in the project so that the whole project information strategy can be developed to support the requirements.

The following sections describe the considerations that need to go into the study and the business requirements' specification.

4.2 The Types of Information

Information can be presented in the form of documents or as data held in a structured form.

Part 2 of this guide lists some of the documents and data that will typically be collected in a process plant project and handed over to the owner/operator. Part 2 is not exhaustive and is intended to be a start point for you to assemble your own list of information types that are required for the ongoing support of the asset lifecycle.

In the requirements study (see section 4.1), the information types required by each business activity should be identified.

4.3 The Uses of Handover Information

The way in which information is to be used determines both the required content and format of the information. Issues that need to be considered include;

- Whether the information is kept up to date or frozen at the point of handover
- How frequently the information will be accessed and updated
- How long the information will be retained for
- What legal requirements are there for the retention of the information

The information may be used just within the client organisation or shared with other organisations during the asset lifecycle. The need to share and exchange the information in the future will impact the requirements.

For the information identified by the requirements study (see section 4.1), you should identify who will use the information, how they will use it and where they will need to access it (e.g. in an office, in a control room or offsite). You should also determine whether it needs to be shared outside of the client organisation.

As part of the usage, you should identify who needs to access information and who needs to update it (along with some assessment of the frequency of access and update).

4.4 Storage of Handover Information

The method of storing the information will impact the requirements. The information may be stored on physical media (paper, microfiche) or electronically. If it is stored electronically, the software applications to be used (or in the case of an existing asset, those already in use) will impose requirements on the form of the information.

For the information identified by the requirements study (see section 4.1), you should identify how and where the information is to be stored and the software applications to be used.

4.5 Information Forms

4.5.1 Overview

Paper has been the traditional medium used for the transfer and storage of engineering design information. However, it has proved particularly unsuitable for its use, management and maintenance of engineering design information.

The development database systems has provided the basis for a solution to this problem by allowing the management to be supported by a computer. Even graphics and drawings can increasingly be managed in a structured form through deployment of standards such as STEP. Managing information in a structured form allows a greater use of computer tools to assist managing, using and checking the data.

However, much information is still held in documents that do not have a formal structure. For these documents, the only way to interpret the contents and to check their quality is for someone to actually read them.

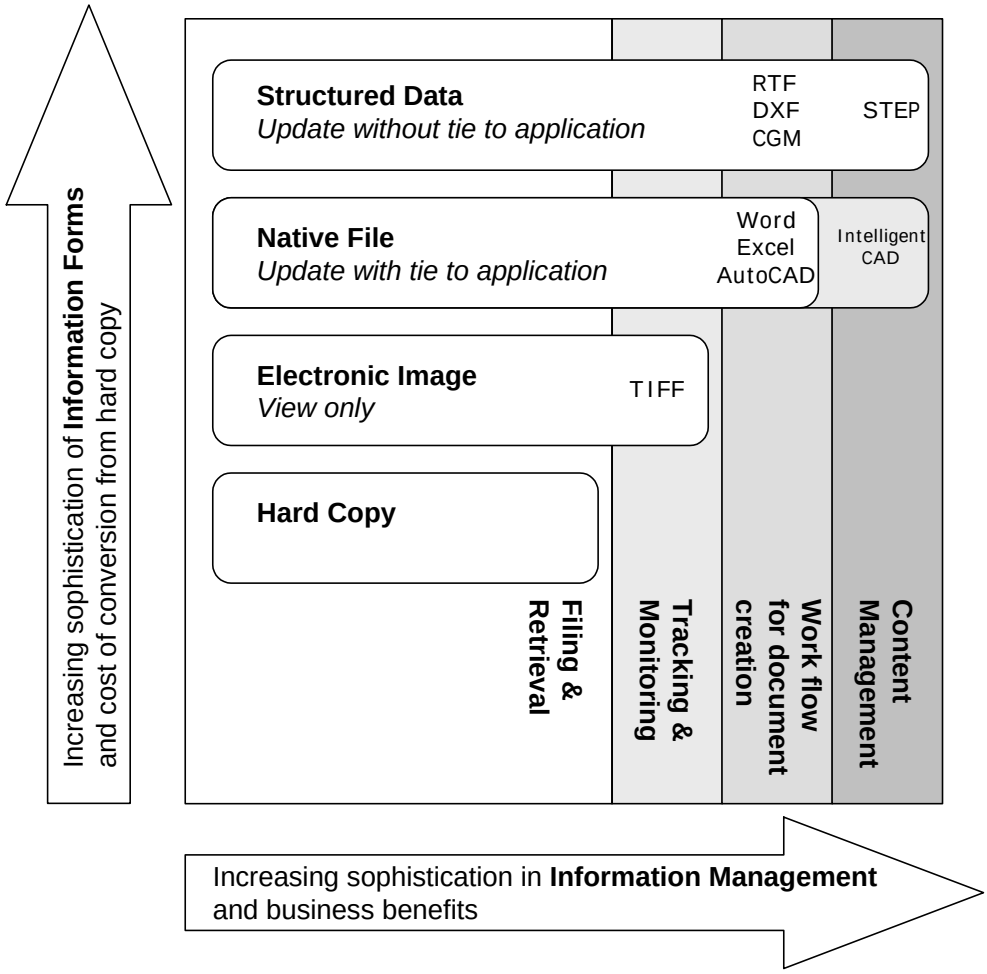

Figure 3: Information Forms

Information can be categorised in to one of four **Information Forms.** With each **Information Form** different levels of Information Management can be delivered with relatively little effort. Figure 3 shows what is possible with the different information forms.

4.5.2 Structured Data

In this form, information is held in a structured manner that adheres to a well-defined model. This model may be proprietary, however increasingly we are seeing the appearance of common models that adhere to ISO standards (see section Information Form Standards).

The information may be database information (such as equipment data or line information) or graphical information such as intelligent schematic diagrams or 3D CAD models.

This information form allows for cost effective editing while maintaining the intelligent information content and hence it is the only information form that allows content management. When ISO standards are employed, this form also avoids data being locked into a specific software application.

4.5.3 Native File

This is the form created by specific software applications such as AutoCAD or Microsoft Word.

If the information has any structure then it will only be interpretable by the original application that created it (or other software that can translate it). Not all native files will give much structure to the information. For example, the information in an equipment data sheet in a spreadsheet form will generally not be interpretable by the computer.

Where the owner/operator has particular software applications in wide use, requesting information in native file format will enable re-use throughout the asset lifecycle but may limit the ability to share it with other organisations or to use the information when the current generation of software is replaced.

4.5.4 Electronic Image

This form is simply an image of a document that can be read by a viewer. Typically it will be created by physically scanning the document or creating a rendition through software. Although this is suitable for read only access, updating information in image form is difficult.

The electronic image is the simplest form that allows controlled multiple access of information from one master source. By maintaining a common electronic image standard the cost for information upgrading for future innovations in file format can be minimised. With information in electronic image form, filing and retrieval and tracking and monitoring can easily be supported but workflow and content management is increasingly more difficult or even impossible.

4.5.5 Hard Copy

Hard copy has real value in current information management activities but this is dependent on the nature of the use and purpose of the information. It is of course cheap to create but it is not secure.

4.5.6 Considerations in selecting preferred form

The use of the data through the lifecycle of the asset should be the prime consideration in selecting the preferred form of the information to be handed over. This should be offset against the cost of delivering the information in that form.

The greatest business benefit comes from having as much information as possible in a structured data form. However, unless the contractor originally creates the information in this form, it may be very difficult and expensive to convert it. Therefore, it is essential that the handover requirements be established early in the project so that all information can be created in the appropriate form.

Information that will be regularly accessed and/or updated during normal operations and maintenance should be in structured data form. However, information that is kept for archive purposes only (e.g. for audit purposes) can more readily be accepted as electronic image.

Hard copy should only be accepted where it is necessary to maintain originals with signatures or other approvals for legal purposes.

For the information identified by the requirements study (see section 4.1), you should identify the preferred form of the information, taking into account;

- The use of the information
- The software application that will support the information
- Whether the information is to be updated or is archive only
- The costs and difficulties in getting the information into the preferred format
- The capabilities of the Contractor to deliver information in a given format
- The need to share the information with others

4.5.7 Information Form Standards

There are a number of standards that may apply;

- International standards
- National standards
- De facto standards/Industry standards
- Company supplements to International standards
- Company standards

The aims in using standards are;

- repeatability both during the project and across projects
- long-life accessibility and usability of data
- independence of data from applications (and software vendors), particularly for data that must exist beyond the life of a particular software application and/or that must be shared between two or more applications
- independence of data from the organisations that created them
- efficient and effective exchange of data and documents between different parties

Although use of standards is recommended, it is always important to assess the capabilities of the parties to meet the requirements. Furthermore, standards are still evolving and this may cause some problems unless the exact release or version is agreed.

The standards shown in Table 2 may apply from the commencement of the project:

Area	Applicable Standard	Comment
Data exchange	ISO 10303 (STEP)	STEP AP221/AP227[1] and STEP Part 21 exchange file format. Other AP's should be utilised as they become agreed and available.
Storage	ISO 15926	This standard, which is closely aligned to STEP AP221, covers the storage of facilities information.
Data classification and coding values	ISO 10303, ISO 15926, DEPs	Definitions and values of classes of equipment and their associations are to conform to the Process Industries Class Library. Coding of specific instances of equipment (i.e. syntax and content of tag numbers) will be provided later in this document.
Drawing systems	ISO 10303 exchange	Intelligent 2D and 3D drawing systems are preferred. STEP exchange formats as they become available in commercial products. Vector formats (either vendor proprietary such as AutoCad or industry standard such as CGM) are preferred for graphics files. Bit-mapped exchange of drawings is discouraged.
Document format and exchange	Structured electronic	SGML (ISO8879), DTDs, HTML, (XML in future)
Original Electronic: File formats, templates and Attributes		Original electronic format documents should be compliant with the owner/operators standard desktop environment and by preference exchanged using Microsoft RTF.
All		All documents should be structured using (agreed) document templates. Document attributes should be co-ordinated between the project parties to facilitate exchange between EDMS systems.

Table 2: standards for information form

It should be recognised that standards will evolve and change over time and it is therefore necessary to agree the rate and method of take-up of emerging standards (particularly ISO's 10303 and 15926).

Information on selecting appropriate forms is given in Appendix A.

4.6 Information Categories

4.6.1 Overview

The aim of this section is to explain a classification of information based on its business value.

Not all information has the same value to a business. There should be a systematic approach to categorise the information so that the appropriate information management strategy is applied, based on the value of information.

All information can be split into either dynamic or static information.

Dynamic information that can be updated to reflect the current status of say a plant is different from static information where it is invalid to update it at all.

For example an inspection report, when it is complete, should not be updated. In this case only a new report can be created.

[1] These Application Protocols are still in development and there is a risk that commercial software may be developed against different specifications.

For each information type identified in the business requirements study (see section 4.1), it will be necessary to assign a lifecycle code (section 4.6.6) and an archive code (section 4.6.8).

4.6.2 Dynamic Information

Dynamic information is information that is valid to update. The update must be tracked (when it is a legal requirement) and the latest version of the information made explicitly clear to the end user. The business value of dynamic information is in how much it represents the present actual situation.

Examples: process engineering flow diagrams, equipment data sheets, loop diagrams, list of safety-critical equipment.

4.6.3 Static Information

When the creation of this information has been completed it is never updated (but it can be superseded). The business value of static information is in how well it represents a certain moment in time.

All information that is still part of the creation cycle is by definition dynamic information, it is the consideration of final issued version that is used to classify the information as dynamic or static.

Examples: Certificates, Standard Drawings, Inspection Reports, Technical Specifications

4.6.4 Comparison between Dynamic Information and Static Information

Dynamic information requires more formal information management than static information and generally has a greater frequency of access, hence it should have a more sophisticated information form.

The simple categorisation of dynamic/static information is still insufficient for the volume and diversity of information that exists in a typical project.

4.6.5 Business Consequence of Unavailability

All Information should explicitly have a purpose and when information is not available there should be a consequence to the business. Information should be able to provide answers to possible questions that a user of the information could ask. Although this may seem obvious, much information that is managed does not meet this basic requirement.

Example: It is difficult to imagine a purpose for transportation and packing details for equipment that has arrived safely on site and has been successfully commissioned. I.e. there would be no consequence if this information were not available.

4.6.6 Lifecycle Codes

The lifecycle codes shown in Table 3 identify the use of particular information throughout the lifecycle of the asset.

Category		Description
1	Legally Mandatory	Without this information, the organisation would not meet its legal obligation to operate the plant.
2	Essential	Concerns information essential to the operation of the facility. Without this information, an unacceptable risk would be created with regard to the integrity and safety of a plant. Most of this data is initiated in design, manufacture and construction periods. The Operations group commits to keeping this data current through the life of the field. An new revision of the information and change to its lifecycle code should record any change to this commitment.
3	Interest	Concerns design, manufacture and construction activities. Information will be frozen prior to (or at the commencement of) the operations phase. Caution should be therefore observed if data is used in operations functions as inconsistencies may develop progressively through the life of the asset
4	Transitory	Concerns data of a transient nature, necessary to execute a specific task and having no long-term value. There is no consequence resulting from this information not being available

Table 3: Lifecycle codes

4.6.7 Business Status

The combination of the categories dynamic/static information and business consequence creates the classification of business status. This approach forms the basis of records and information management.

	Dynamic	Static
Legally Mandatory		
Essential		
Interest		
Transitory		

The resulting eight business status types allow the business to consistently select the most appropriate information management tool with the correct level of sophistication. The selected tool defines the minimum required information form.

4.6.8 Archive Retention Codes

Archive retention codes should be assigned by the owner operator to indicate the level of accessibility required to data and documents. Codes are not included on the documents themselves but rather assigned on registers and/or databases. Note the use of such archive codes is only relevant *after* handover and so is included here in Table 4 for information only.

Code	Description
1	Data that is considered necessary for plant operation. It will be stored electronically and retained throughout the life of the installation.
2	Data developed in the Project phase that is deemed useful during commissioning and start up activities but not long term operations. This data will be temporarily stored electronically. A nominal retention period of 1 year is assumed.
3	Data that is not expected to be referenced on a regular basis in the operations phase. However, the Originator is required (by legal or contractual obligations) to hold data in retrievable archive form.
9	Data that is not required to be referenced in the operations phase. This data may be destroyed when the originator considers it redundant.

Table 4: Archive Retention Codes

4.7 Information Status

As information moves through a project, its status is changed, normally under configuration control. For example, a drawing may start as “issued for comment”, after review an authorised person might change it to “issued for construction” and finally at the end of the project it will be updated to “As built”.

For each information type identified in the business requirements study (see section 4.1), it will be necessary to identify the final status of handover information required. Some important information (e.g. lifecycle codes 1 and 2) will be required in “As Built” status. Whereas less important information can be supplied as “Issued for Construction”.

4.8 Information Quality

Properties of information for which quality requirements should be assessed include:

Relevance:	the usefulness of the data in the context of the business — does the information need to be retained? What activities does it support?
Clarity:	the availability of a clear and shared definition for the data — do creators and users of information use the same codes and terms with the same meaning?
Accessibility:	where, how, and to whom the information is available or not available — is the data easily accessible?
Compatibility:	the compatibility of the same type of data from different sources — if the same type of data comes from different sources, is it created in the same way? Are there multiple copies or versions of this data and if so, is there a master copy from which the others are derived?
Consistency:	the consistency of data from different sources — is the information about particular objects consistent in terms of naming, values and relationships?
Completeness:	how much of the required information is available — is the entire mandatory information supplied?
Timeliness:	the availability of the data at the time required and how up-to-date that data is — is the data you require available, and available when you need it?
Accuracy:	how close to the truth the data is — is the accuracy of the data known and does it meet your requirements?
Cost:	the cost incurred in obtaining the data, and making it available for use — is the information supplied in a form that means the cost of maintaining it throughout the life of the asset has been minimised?

Note that the first four of the above list are more strongly related to the *definition* of the data whilst the rest are more strongly related to the data *values*.

Processes must be agreed and put in place to ensure the quality of the information to be handed over and should form a part of the project’s overall quality plan.

The form of the data will impact the ease in which the quality can be managed. For example, hard copy documents will need to be manually checked, including all cross-references between documents. However, the quality checking for structured data can be automated to a large extent. The large benefits in ensuring quality more easily may be a significant justification for the extra cost in using structured data.

5. The Handover Plan

5.1 Overview

The handover plan will bring together the business requirements for information to be handed over (section 4) and the implementation issues described it the following sections.

5.2 Impact on the Project Information Strategy

The above considerations will form part of the overall project information strategy. Although this guide is not concerned with the information strategy for the project, there are some points that should be considered in order to meet the handover requirements.

The key point is that information should be managed for the whole life of the asset and not just for its immediate use. Information created during the design phase of the project, e.g. for specifying and ordering an item of equipment, is also of use during the operational phase of the asset for other purposes. Therefore, the information must be created and managed not just to meet the immediate procurement need but also for its re-use throughout the lifetime of that item of equipment.

Where possible, data should only be stored and maintained in one place, to minimise the effort to achieve consistency. Where integration between systems is required, the selected products should conform to a consistent data structure.

This should ensure that:

- Data required by future information systems will be available, in the right format and structure.
- All project deliverables will be suitable for passing into the owner/operator.

The Contractor should establish an electronic environment that supports the consistent capture, management, use and exchange of all information related to both the execution of the project and the information required to design, procure, construct, commission, operate and maintain the facilities delivered as a result of the project. To preserve the integrity of the information both over the full duration of the project, and over the full life cycle of the facility, the Contractor should take a long-term view on the classification and structuring of information. This shall be complemented by a strategy for the management of changes in systems and technology.

5.3 Handover Methods

The method of handover will depend to a certain extent on the form of the information to be handed over. For example, in the case of hard copy, there is no alternative to physically transporting the material.

For electronic handover, there are a number of approaches that can be adopted.

1. The Contractor implements an agreed information system which is populated with information throughout the project and then hands over the whole system, complete with its information to the owner operator. This approach is best where the Contractor does not have preferred in house information systems, and where the asset does not have an existing engineering information infrastructure (e.g. a new process plant)

2. The Contractor uses his own in-house systems to assemble the information, populates a system for the owner/operator and then hands over the populated system at the end of the project. This approach can be used where the Contractor already has a well-established infrastructure but the owner/operator does not.

3. The Contractor uses his own in-house systems to assemble the information and then transfers the information in an electronic format to the owner/operator to load into existing operational systems. Transfer can be via transmission or using some media such as tape, disk, etc. In this case, the use of standards for data exchange (e.g. STEP) is particularly important.

5.4 Responsibilities

When the requirements for handover information have been specified, the parties in the project need to agree responsibilities for;

- creation of information
- security of information
- quality of information
- gathering third party information (e.g. equipment vendor documentation)
- getting information into the right format
- managing the information through the project
- implementation of operations' systems
- handover and population of operation's systems

5.5 Timing

The point in the project at which information will be handed over needs to be determined and agreed. Issues to be covered include;

- Will it be a "big bang" at the end of the project, or will the information be built up throughout the project lifecycle?
- Will trial handovers be required
- Will handover of "issued for construction" information be required for commissioning?
- How soon after plant start-up will "As Built" information be required.

5.6 Physical Media for Data Handover

The physical media is the form in which the information is handed over, e.g. 3.5-inch floppy disks using DOS file format. It includes both the physical forms of the medium, and the encoding (file system) of information on the medium.

The physical medium to be used shall be agreed by the parties prior to the exchange of any information. It may be necessary to hand over a single copy of certain design information in paper form to meet with legal requirements. The requirements for this need to be carefully considered in relation to the ability to create verifiable copies of information from electronic storage and the legal admissibility of such information.

5.7 Information Quality Management Framework

The parties should agree and document an Information Quality Management Framework that describes the information delivery in terms of scope, content, constraints, coding, timing and process for asset information required by the owner/operator. The level of detail should be such that receiving applications can be designed and configured to hold all expected data.

The Data Quality Management Framework should address:

- what is to be handed over (Asset Data: PID's, Reference Data, Design Details, Tags, etc.; Asset Documents, their indexing, classification etc.) and the relationships between the data items
- how the information is to be handed over
- when the information will be loaded, when the information will be re-sent / updated
- quality of the data loaded and the process which ensures that the data loaded has the required quality
- the process to be followed if and when incorrect data is found at any stage in the engineering and hand over phase
- Inventory of reference data types, ownership and usage
- Reference Data distribution processes, possibly supported by tools, between the parties.
- Process for identifying and resolving inconsistencies.
- Reference Data Coding Structures.

6. Implementing the Handover Process

6.1 Educate staff

All persons involved in information generation and handover should have received training in at least the following:

- an understanding of the purpose and use of the information involved
- information management
- the lifecycle aspect of information (in particular the need for information to satisfy future lifecycle requirements as well as its immediate use)
- quality assurance issues (how to verify information)
- use of the systems used to create and use the information
- relevant media preparation, reading, writing
- security issues such as confidentiality, virus checking and backup

6.2 Check for compliance

The results of implementing the plan should be checked against the published strategy and any discrepancies resolved.

Where the strategy has been implemented to facilitate data exchange or sharing with other companies or organisations, checks should be made that they are running to the same strategy.

7. Conclusions

The main points to remember in the data handover are as follows;

- The information requirements must be driven by the long term business needs of the owner/operator.
- The information types and formats must be selected in relation to the long-term use of the information. Lifecycle and archive coding of information will greatly assist in selecting appropriate forms.
- The creation of information during the project must be driven by the business requirements of the owner/operator, otherwise there will be an expensive and time-consuming process to convert (or re-create) information into the required form
- Following on from above, the strategy for the handover must be established early, before significant amounts of information are created.
- The handover strategy and plan form an integral part of the project information strategy and plan.
- The implementation of the handover plan must be monitored to ensure that all parties are complying with the agreed information forms, quality process and exchange methods

Appendix A - Information Forms

A1 Overview

This appendix gives further detail on the possible and preferred information forms for information to be handed over.

A2 "Intelligent" vector drawings (CAD)

Description: "Intelligent" vector drawings (CAD) i.e. drawings created by Computer Aided Design software (CAD) embracing use of typical CAD techniques such as Layers, Blocks, Attributes, Views, Dimensions etc.

Possible formats: DXF[2], Autodesk's de facto standard (Data eXchange Format, which is proprietary but in the public domain).Vendor specific, ISO 10303.

Preferred format: ISO 10303-221, ISO 10303-227, ISO 10303-231 (as appropriate to scope) encoded in ISO 10303-21 file format

Quality checklist:

- The sender and the receiver should define initial procedures that must be adhered to e.g. layer discipline, entities and standard data allowed etc.
- Test data should be sent and received prior to actual data exchange.

A3 Vector graphics

Description: Other vector drawings i.e. diagrams or drawings maintained as two-dimensional graphics "objects", for which internal links to what is represented is not maintained.

Possible formats: Computer Graphics Metafile (CGM) to ISO 8632 or DXF,

Preferred format: CGM for diagrams where only viewing and scaling is required , DXF for diagrams where editing is required.

Note: CGM by itself is not always precise enough to ensure satisfactory transfer. A draft oil industry for CGM (CGM*PIP) is under discussion by a consortium of Exploration and Production member companies of the Petrotechnical Open Software Corporation (POSC). Until available, use the US DOD specified CALS MIL-28003A as the CGM DAP.

A4 Raster images

Description: Raster images, i.e. drawings or documents maintained as pixel maps.

Possible formats: CCITT Facsimile Group IV or Tagged Image File Format (TIFF) which is proprietary but in the public domain.

Preferred formats: CCITT Facsimile Group IV or Tagged Image File Format (TIFF).

[2] DXF is halfway between being a vector graphics format and a simple but structured 2D CAD drawing format.

Most products use CCITT fax 4 but with different headers and resolution. The large file sizes are unmanageable at higher resolutions such as 400 dpi. Therefore, consistent use of 200dpi is recommended.

Short term to medium term: CALS type 2 compliant format, TIFF revision 6 using 512 by 512 pixel tiles (published in July 92 by Aldus Corporation Seattle). This can be regarded as a proprietary but public domain, CALS conformant DAP.

Long term: The preferred CALS DAP; MIL spec CALS MIL-R-28002A, requires 200 dpi resolution. CALS Type 2 raster specifies a header in MIL-STD-1840 wrapped around a document specified in NIST ODA Raster DAP.

A5 Technical publications and text exchange:

Description: Technical publications and text exchange i.e. exchange of text and technical publications produced in electronic or paper format.

Possible formats: Standard Generalised Markup Language (SGML) ISO 8879 or Rich Text Format (RTF) which is supported by standardised templates e.g. Microsoft Office. (Note: a specified version and platform will be required).

Preferred formats: Standard Generalised Markup Language (SGML) ISO 8879 or Microsoft Office.

A6 Tabular data:

Description: Data items such as found on an equipment data sheet, a line list, a cable schedule, etc. Includes characteristic types (pressure, temperature), values and Units of Measure

Possible formats: Extended ASCII format according to Structured Query Language (SQL) ISO 9075, MS-EXCEL, ISO 10303-21 files to ISO 10303-221 data model.

Preferred formats: For engineering data, ISO 10303-21 files to ISO 10303-221 data model, and EPISTLE Class Library standard data. For other data format to be agreed prior to transfer.

Quality checklist:
1. Version of ISO 10303-221 and EPISTLE Class Library to be agreed prior to the creation of data.
2. Conformance to ISO 10303-221 and EPISTLE Class Library confirmed on delivery.

A7 External information

Description: information produced by an external source which must be adhered to e.g. vendor document and data, codes and standards, safety or regulatory requirements.

Possible formats: As per A2 to A6 above depending on capability of supplier to produce in these formats.

Preferred formats: In practice, until more third parties can provide structured data, intelligent CAD or even electronic files, it is likely that third party information will have to be scanned and delivered as raster image.

Quality checklist:

1. Ensure standard and version adhered to are the correct ones and such detail is noted.

Appendix B - Bibliography

This guide is based on material taken from:

1. Managing Data Quality: Shell Internationale Petroleum Maatschappij B.V.
2. Electronic Exchange of Facilities Documents and Drawings: Shell International Petroleum
3. STEP in the Process Industries - Process Plant Engineering Activity Model: Process Industries STEP Consortium (PISTEP)
4. STEP: The future of engineering management: by Matthew West SIPC-ICT/47, Shell International Petroleum Company Limited.
5. The Exchange Agreement: Guidelines for the successful exchange of product data: CAD-CAM Data Exchange Technical Centre Management of Data Exchange Special Interest Group
6. Information Security Management, BSI 1993, DISC PD0004
7. A Code of Practice for Information Security Management, BSI, DISC PD0003