Proposed Usability Engineering Assurance Scheme

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Proposed Usability Engineering Assurance Scheme

N Bevan, N Claridge, J Earthy, J Kirakowski

Version 2
Date 31/1/98

Abstract

The technical and business background to assurance of usability are summarised. Specific requirements for suitable schemes are defined. The process by which the proposed schemes were developed is described. Further work is identified. A scheme for the accreditation of providers of usability services is presented. A scheme for the certification of products against ISO 13407 is presented.

Keywords: Human-Centred, Assurance, Product Assessment, Organisational Accreditation, Competence, ISO 13407

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Executive summary

As usability becomes widely recognised as a requirement for IT-based systems, such as telematics systems, purchasers and users of such systems will start to need some guarantee that the claims for the usability of a product are valid. At the same time, the developers of IT-based systems who purchase usability services for developing and testing systems will require assurance of the quality of the usability service. The need for assurance of other attributes of product or services is well known, examples are CE marking, ISO 9001 certification, driver's licence etc. This document takes the results of work on the assurance of other attributes of products and services and extends it into the area of usability.

A market breakdown, based on the experience of the INUSE project members, identifies the following potential users of assurance schemes for quality in use or human-centredness of design or of the schemes:

- **users of IT.** They are likely to take account of the existence of a **mark** which they associate with reduced effort and high quality in use.
- **purchasers of IT products.** They are likely to want a mark which provides evidence that the product has been developed to have these attributes, in organisations comparable to their own.
- **purchasers of usability services.** They will look for **accreditation** of the processes and staff in the unit which provides this information to them.
- **purchasers of usability support services.** They will look for accreditation of the competence of the organisation which provides this service to them.

As a result of this review and a survey of user requirements (reported in INUSE D5.2.2) it was decided:

1/ to develop a product certification scheme based on the conformance of the specify/build/test cycle of the product to the requirements of ISO 13407

2/ to develop a service provider accreditation scheme based on organisational competence in defined areas of the INUSE Usability Maturity Model.

The documentation for the proposed schemes is presented in the last two sections of the document. The proposed schemes form part of the necessary infrastructure for Human Computer Interaction and/or Usability Engineering as a professional discipline. They will be tested as far as is possible in the remainder of the INUSE project, but further work is obviously needed to validate and establish such schemes as a secure basis for the assurance of Usability.

1.1.1 Changes

01	First version 21-23/5/97	N Bevan, N Claridge, J Earthy, J Kirakowski	All	D523_01f.DOC
02	Second version 18-20/6/97	J Earthy, J Kirakowski	All	D523_02b.DOC
03	Review version 30/6/97	J Earthy	First section	D523_03.DOC
1	Final version 3/7/97	J Earthy	Typos, Addition of scheme	D523_1.DOC
2	Updated version 31/1/98	N Bevan, J Kirakowski, J Earthy	Consultants, Addition of revised scheme	D523_2.DOC

1.1.2 Approval

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(approval of sections: Lloyd's Register did not generate and has not reviewed the Service Provider Accreditation scheme. This section is not subject to LR approval procedures.)

1.1.3 Disclaimers

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Introduction

2.1 Background to this document

INUSE workpackage 5.1 addresses the assessment of the maturity of human-centred processes. Workpackage 5.2 investigates the aspects of the assurance of quality of use of IT products most relevant to the INUSE project (WP5.2).
Assurance is performed in order to know that a given level of some quality has been achieved in a product or service. In order to have meaning, any statement of assurance should specify the degree of certainty of each factor (the quality attribute being assessed, the level of assurance given and the accuracy of the statement). The following diagram, Figure 1, provides a graphical illustration of these three parameters.

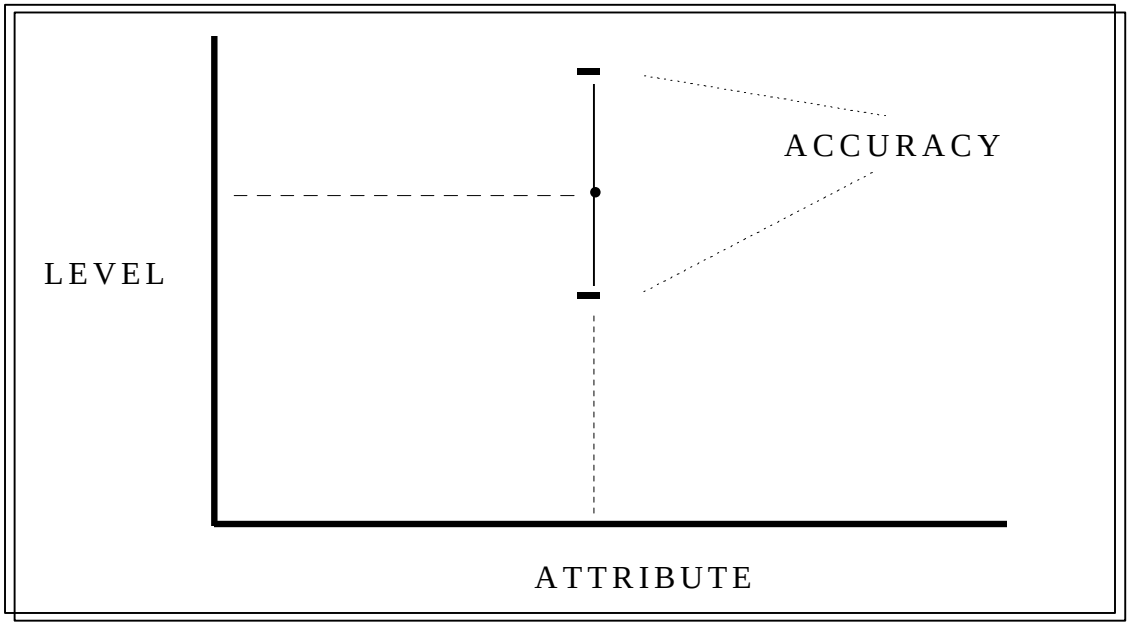

Figure 1 Relationship between quality, level and accuracy

For any type of assessment it is important to have the right set of measures and the right profile of criteria to measure. For each individual measure the accuracy, validity and correctness of the measure should be assessed and the performance of the measurement tool(s) should be known.
As usability becomes widely recognised as a requirement for IT-based systems, such as telematics systems, purchasers and users of such systems will start to need some guarantee that the claims for the usability of a product are valid. At the same time, the developers of IT-based systems who purchase usability services for developing and testing systems will require assurance of the quality of the usability service. The need for assurance of other attributes of product or services is well known, examples are CE marking, ISO 9001 certification, driver's licence etc. This document takes the results of work on the assurance of other attributes of products and services and extends it into the area of usability.

2.2 'Usability' certification

2.2.1 Attribute

Certification of usability is a means of providing assurance that a product has achieved a certain level of *quality in use*. The quality in use of a product depends on the quality of implementation and integration of all of the human-centred processes in the product's lifecycle[1]. This quality attribute can be achieved in the most reliable fashion through timely assessment of the product and its development processes against appropriate standards. There are three quality attributes which should be assessed when assuring the quality in use of a product. Each of these gives a different type of confidence in the quality in use. The quality attributes to assess are as follows:

- measurement of the quality in use of the IT product itself,
- assessment of the quality of human-centred processes performed on a project (or in an organisation),
- assessment of the quality of any services provided by usability/HCI consultants.

The benefits and risks associated with each of these quality factors are reviewed in this document and recommendations are made for the most appropriate approaches for INUSE to take in providing assurance of usability engineering.

2.2.2 Level

The levels of assurance of product usability is related to the effort invested in usability during the development of the product. The range is as follows:

1. general principles of (software) ergonomics applied on a project
2. 1. plus input from experts vs. defined criteria
3. 2. plus input from typical users working in context with a subjective debriefing
4. 3. plus input from significant numbers of users in managed, measured trials against defined targets for usability.

Where 1 takes the least effort and 4 the highest. There is no 'right' level for usability effort or degree of assurance. The required level and hence the effort allocated, depends on the importance of usability as a guaranteed attribute of the final product. The required level of assurance of usability should be defined for the product during the specification process. A similar range of levels can be defined for the assurance of the quality of usability services.

2.2.3 Accuracy

[1] Roles for HF Practitioner. There are three roles for HCI/HF experts (or expertise) in the assessment of usability in the lifecycle:

- member of or consultant to the development team
- tester/evaluator of the product
- auditor of human-centred processes

The accuracy of the assessment will depend on the quality of the procedures and tools used in the assessment and the competence of the staff performing the assessment. Standards exist for the performance of assessments. These standards are used as a basis for the proposed INUSE assurance schemes.

Attributes that can be measured include:

- the products produced (intermediate and final)
- the quality and maturity of the process
- the capabilities of staff
- the quality management system that is in place.

In order to ensure the quality of assessment of the above attributes a credible and valid assessment organisation[2] has:

- a verifiable assessment process
- a verifiable maintenance process
- quality records
- liability insurance
- staff accreditation.

[2] There are three levels of independence of assessors:

- first party - same department
- second party- independent department
- third party - independent organisation

3. Requirements for the Schemes

3.1 Definitions

Certification of Conformity: *Action by a third party demonstrating that adequate confidence is provided that a duly identified product, process or service is in conformity with a specific standard or other normative document.*
Assessment: *Evaluation of the HC lifecycle processes and products to ensure that the system is of the required usability and is fit for its intended purpose.*
Accreditation: *A systematic and independent examination to certify an individual's skills in a specified process or activity or an organisation's qualification to carry out certification (e.g. compliance to EN 45011).*

3.2 Product and process assessment

Traditional assurance takes a product and tests it against an agreed Standard. The more complex a product, the less valid an evaluation based on fixed performance or feature attributes will be. This is often the case with an attribute as complex as quality in use. A process-based assessment, which checks that a project or organisation develops an understanding of the goals for their product and assesses whether these goals have been met, is much more likely to provide real assurance of fitness for purpose. This represents a shift in role for organisations providing assurance services and the split of V&V activities between internal V&V, through the developer's quality system, and external V&V of the development process. Because the V&V is more tightly coupled to the development there is a greater likelihood that the required quality of product will be achieved. Because the majority of V&V effort is under direct control of the project the costs can be managed to best effect.

3.3 Need for assurance in the area of HCI

Industrial sectors and/or organisations, and even individuals, have different emphasis on what is considered the key aspect which delivers quality in their products and organisations. Some consider that suitably motivated **People** are the key. Others concentrate on **Product** measurement and an increasing number focus on the **Processes** which their organisation performs. In fact all three aspects need to be present in order to achieve **Total Quality** in products and services. Even if organisations take one of the aspects as key, in order to achieve a quality product the other two aspects still have to be performed. People use processes to develop and test products, Processes are performed by people developing and testing products etc. The following composition diagram (Figure 2) unites the three points of view. Relating these points of view on such a diagram clarifies their contribution to a common goal of total HCI quality in a product or organisation. The areas covered by the different INUSE tools or workpackages are indicated in italics.

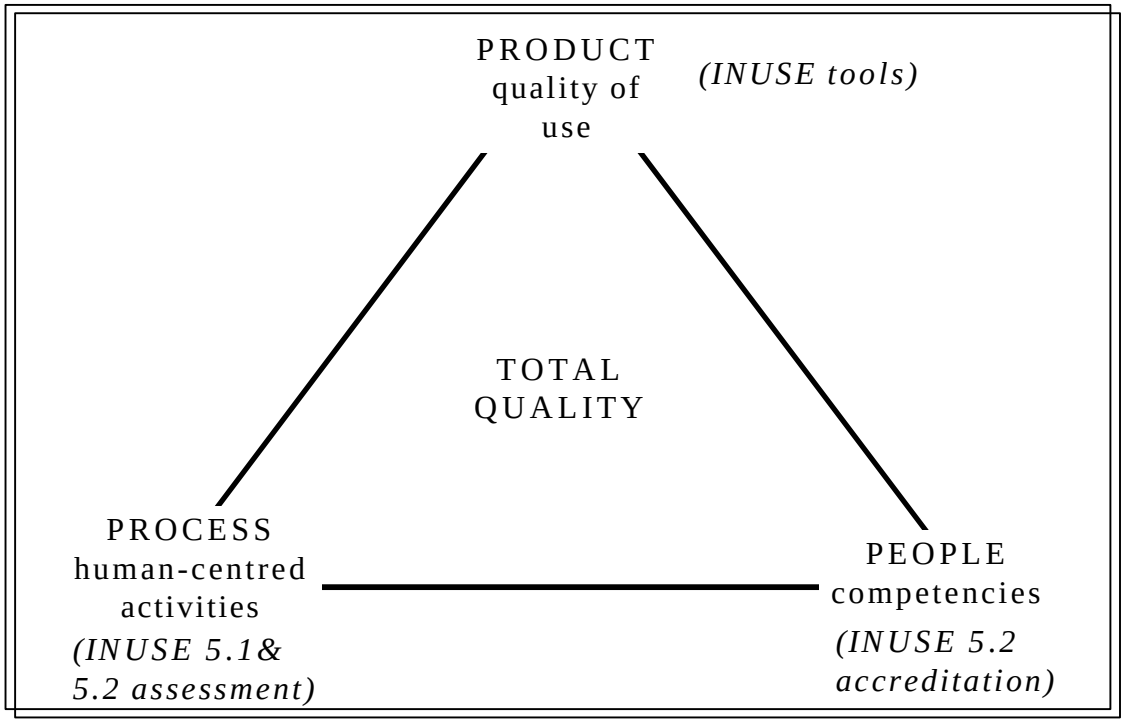

Figure 2 Relationship between the factors contributing to total HCI quality

This relationship and the various viewpoints presents a potentially wide range of assurance schemes. The INUSE project carried out two exercises to scope its work and identify the schemes of most benefit to INUSE clients and the European HCI community in general. These are described in the following sections.

3.3.1 Users and user requirements for the schemes

A market breakdown, based on the experience of the INUSE project members, identified the following potential users of assurance schemes for quality in use or human-centredness of design or the schemes:

- **users of IT products.** this group wants to be able to do their job with minimum extra effort. They are likely to take account of the existence of a **mark** which they associate with reduced effort and high quality in use.
- **purchasers of IT products.** this group wants staff/organisational productivity, least risk of harm and best return on investment. They are likely to want a mark which provides evidence that the product has been developed to have these attributes, in organisations comparable to their own.
- **purchasers of usability services.** this group want to be sure that they get the right design advice and feedback during development. They will look for **accreditation** of the processes and staff in the unit which provides this information to them.
- **purchasers of usability support services.** this group wants to be sure that the products and consultancy which they purchase are technically sound and cost effective and that the service is of high quality. They will look for accreditation of the competence of the organisation which provides this service to them.

The second Human Centred Process Improvement meeting held at the NPL on 20th May 1997 (reported in INUSE D5.2.2) included a workshop to identify requirements for the infrastructure of Human Computer Interaction as a professional discipline. The following lists summarise the Group's main requirements for Verification and Validation in the area of HCI.

Assurance of usability should be:
- recognised by a certificate,
- based on evidence,
- based on a reliable assessment.

Assurance of human-centredness should be:
- based on an unambiguous standard,
- demonstrate user involvement,
- given by a reproducible assessment (such as conformance to 13407).

Accreditation of organisations should be:
- based on a widely recognised scheme,
- based on actual results,
- given grades or levels of maturity.

Accreditation of people should:
- be based on an accepted/recognised scheme,
- be based on defined competencies,
- recognise experience as well as qualifications.

3.3.2 Review of INUSE needs for assurance schemes

After considering the technical and user requirements for assurance of usability the following detailed requirements were defined for the draft schemes to be defined by INUSE workpackage 5.2.

1/ Organisations offering usability services should be able to demonstrate the following:
- availability of at least minimum knowledge
- availability of at least minimum skills
- demonstrate levels of experience in usability and human-centred development from core/base to expert
- evidence of the above competencies
- an ability to select criteria for assessment
- use of a scheme or process for assessments
- a mechanism for the selection of staff for work
- competence in recommending appropriate human-centred activities
- an ability to take account of professional ethics
- the ability to train staff (optional)
- the usefulness to the INUSE network (optional)

2/ The assurance of the usability of a client's products should include:
- reference to a defined standard,
- a procedure for assessment,
- a list of (process) criteria (i.e. a model) against which the product will be evaluated. This is to include:
    - a quality system
    - skills/competencies
    - tools and methods
    - user activities
    - V&V requirements
    - deliverables/products
    - standards,

- levels or pass/fail criteria,
- trained assessors,
- a quality procedure for the assessment organisation,
- evidence of the above.

3.4 Consultancy services and their assessment

Usability is a new and expanding area in systems development. Many organisations will acquire usability services through consultants. This section reviews how consultancy is provided.

3.4.1 Areas of usability service provision

Figure 3 shows the relationship between the areas of usability service provision, the required competence characteristics and the possible forms of assessment. The usability service provider scheme (USP) described in this document is one possible implementation of an accreditation scheme for usability service provision.

Entity which has this competence	**Characteristics of competence**	**Area(s) of competence**	**Typical approaches to assessment**
Any organisation	• operate • attract • account • employ • contract • resource	Operational management[3]	ISO 9001 (part) Investors in People (part) USP scheme (part)
Any service provider	• diagnose • assess • support • transfer	Consultancy Technology Transfer[4]	USP scheme
Usability service provider	• perform • provide • manage • undertake • staff • specify context[5]	Planning User Centred Design Evaluation and Testing Requirements Engineering Product Design Support	USP scheme (part) UMM process assessment

Figure 3 Areas of usability service provision

3.4.2 Types of consultancy

[3] The complete set of criteria at this level would be as for the USP scheme plus control of documents, money and staff, negotiation of contracts. These will not be assessed since USP's seeking accreditation are assumed to be competent organisations.

[4] Training is one means or part of technology transfer.

[5] For use in a specified area.

The following list identifies the various types of consultancy which are likely to be required of a usability service provider. The proposed scheme supports all forms of consultancy. It is important to be clear about which form one is offering in any contact with a client or potential client. More than one service may be offered to one client.:

1. **Specialist technical service.** Joining an existing team, project or organisation on a temporary (possibly very short term) basis to provide a particular, widely recognised skill. This role may entail working in a well-defined and recognised special position within a team or simply offering advice or opinion on material provided. Examples of this form of consultancy are consulting engineers, lawyers, accountants, academic experts. Expert evaluation and standards advice are two examples from human factors.
2. **Body shopping.** The supply of (skilled) staff to a client organisation to perform work specified by the client. The payment, personnel management and representation of those staff. Examples are provision of contract programmers to a project. Provision of staff to work in a client's evaluation team is an example from human factors.
3. **'Management' consultancy.** Provision of advice or expertise to a client which results in the client making changes to their technical, personnel or business processes. Examples of this form are, of course, management consultants or business process re-engineering consultants. Many human factors interventions by consultants are covertly on this basis.

4. Designing the schemes

4.1 EN45000 as a framework

The European standardisation organisation (CEN) has produced a set of standards which define requirements for testing and certification schemes. The standards most relevant to this project are:

- EN45001 General criteria for the operation of testing laboratories
- EN45011 General criteria for certification bodies operating product certification

The broad requirements of these standards require the operators of such schemes to have: a quality system, defined methods, verifiable processes, verifiable maintenance processes, quality records, insurance, staff accreditation, fee recovery mechanisms.

The evidence which could be used in the assessment of people or organisations can come from: log books, examinations, panel examinations, publications, professional development schemes, case studies, observation of performance, complaint records, surveys of client satisfaction, etc.

The evidence which could be used in the assessment of processes can come from: work products/deliverables, quality record, product evaluations, project plans, records of staff/organisational competence, interviews with staff, audits, etc.

In order to be credible schemes must demonstrate impartiality and uniformity. This is partially achieved through quality assurance of certification bodies and accreditation of individual assessors, but the independence of schemes is also a key issue in this area. This issue is reviewed below:

- **Service provider accreditation**: This scheme could apply to a client's usability unit, third party usability consultants or EUSCs. As long as there is a published scheme, public criteria, a defined complaints procedure and a quality system for the scheme it is not absolutely necessary for a third party to operate the scheme. However, there will always be a question about independence when EUSCs are assessed. It is advisable for EUSC assessments to be approved by a third party or operated by an organisation able to establish a suitable 'glass wall'. The maintenance of lists of accredited service providers and accredited assessors should be centralised.
- **Product certification**: This scheme applies to clients and therefore could be operated by an EUSC, provided that the assessors have sufficient training and that the requirements of EN45011 for organisations offering certification are followed. However, one of the major benefits of certification schemes for products (which this is) is the existence of a maintained register of approved products. Prospective purchasers of IT products with a "13407 G" mark can query this register to check the currency of the certificate and the version of the product to which it applies. This would have to be centralised and managed.

These issues are important if the schemes are operated commercially. The work in INUSE WP 5.2 is only intended to develop draft schemes. This document will go no further than raising the importance of independence if the proposed schemes are put into practice.

4.2 Testing the schemes

Schemes have different risks and benefits, depending on exactly what is assessed and the reference against which it is assessed. In order to identify the most credible schemes, the claims which effectively underlie a variety of schemes were reviewed from the point of view of either an organisation trying to gain certification 'on the cheap' (*KludgeSoft inc. test*), or an inept service provider attempting to gain accreditation (*InSult s/a test*). The following sections summarise the results of the review. Two draft schemes based on the safest alternative in each area (Product and Service Provider) are given at the end of this document.

4.2.1 Product assurance Schemes

'This product has passed <defined> usability tests'

- process - usability statement
- base standard - ISO 9241 part 11
- scope - parts of a product
- based on - usability tests of the product either a/performance or b/checklist
- Fails to bar Kludge Soft because it is possible to scope and run tests to create non-representative results.
- Not safe to operate at reasonable cost because scheme operator may be misled by accident or intent.

'The development of this product has followed a human centred development process'

- process - analysis of evidence
- base standard - ISO 13407
- scope - parts of a development process for a particular product
- based on - examination of the activities carried out by a client either: a/audits and interviews b/ inspection of work products
- Passes Kludge Soft test because it requires too much effort to create process evidence.
- Safer to operate because the effort required to falsify the required evidence in a convincing fashion is close to the cost of performing human-centred design.

4.2.2 Service provider accreditation

'This organisation employs staff who have <defined> skills and experience'

- process - professional accreditation
- base standard - professional society accreditation scheme
- scope - approval of particular individuals
- based on - academic examination and/or verified log of experience *vs.* professional development programme
- Fails InSult test because, for a variety of reasons, appropriately qualified staff may not be allocated to work which requires their level of competence. Furthermore, the evidence that actual work has been completed to an acceptable standard is very sparse.
- Not safe to operate at reasonable cost because scheme operator may be misled by accident or intent, especially at times of high workload for the service provider.

'This organisation does <defined> processes to a <defined> degree of competence'

- process - organisational accreditation
- base standard - base practices in the INUSE Usability Maturity Model

- scope - approval of the procedures used by the service provider
- based on - attestation and follow-up audits of the service provider's quality system
- Passes InSult test because the scope of the assessment requires them to establish and provide evidence of fully competent work on each project.
- Safe to operate at reasonable cost because: a/ the knowledge and effort required to falsify evidence in a convincing fashion for un-announced audits is very high, and b/ the cost of loosing accreditation is high in terms of remedial action and loss of image.

As a result of this review it was decided:

1/ to develop a product certification scheme based on the conformance of the specify/build/test cycle of the product to the requirements of ISO 13407 and

2/ to develop a service provider accreditation scheme based on organisational competence in defined areas of the INUSE Usability Maturity Model.

The documentation for the proposed schemes is presented in the last two sections of this document.

5. Developing the Schemes

The work described in this document was carried out in a one-week workshop hosted by NPL Usability Services. Participants (the contributors to this document) prepared for the workshop using the material supplied in INUSE D5.2.1, briefing materials on usability assurance. The goal for the workshop was the production of schemes for client assurance and service provider assurance.

The first day of the workshop was spent reviewing material, collecting further information from the Web and defining working practices. On the second day NPL hosted the second Human Centred Process Improvement Group (HCPIG) meeting. This meeting was used in part to define the specific needs of industry for assurance in this area. On the third day the scope of the schemes was defined and tested. The fourth day was spend drafting the schemes which were reviewed and revised on the last day. Editorial changes, the introductory section to this document and part of the Service Provider scheme were completed after the workshop.

The first draft of the usability service provider scheme was reviewed and tested by NPL between July 1997 and January 1998 through trial assessments of the existing EUSCs. Prior to the trials the structural basis of the scheme was reviewed and one more optional section was added. The trials with the EUSCs took the form of questions based on each of the items in the checklist. The trials revealed that the competency criteria in the draft USP scheme are largely applicable to the (probably typical) range of usability support providers within the existing network.

The depth of assessment was reviewed but no firm decisions were made as to a recommended or acceptable degree of rigour for an assessment. The issue of scope of accreditation was discussed. In particular, whether accreditation covers all sectors of industry. Some aspects of the practice of usability differs significantly between sectors.

6. Conclusion

6.1 Progress

How far have the user requirements listed above been achieved by the current work?
Assurance of usability (certificate, evidence, reliability) and Assurance of human-centredness (based on unambiguous standard, demonstrating user involvement, reproducible assessment (such as conformance to ISO 13407)). These are both met by the *13407 G* scheme in that the standard requires that usability is measured as part of the human-centred development of products. Reliability and reproducibility will have to be proved by use of the scheme.
Accreditation of organisations (widely recognised scheme, based on actual results, graded/maturity based). Wide recognition will depend on use. Use by the INUSE consortium partners and in follow-on projects will establish a scheme. The USP scheme is based on a broadly-based set of best practices. Gradings are not currently offered but the scheme includes optional areas of assessment.
Accreditation of people (accepted/recognised scheme, defined competencies, recognition of experience). This is not addressed in this workpackage.

6.2 Review

There are a number of ways of providing assurance that a product will be usable. These range from a specific product certificate to a general organisational maturity assessment.
The level and type of assurance required depends on the business sector and application of the product.
The cost rises with the degree of assurance.
The product, the process, the staff or the quality system can be assessed.
Assurance level and method should be specified in contracts or, for a generic product, in a statement of usability.
A workshop approach to the development of complex, new usability engineering products or services is highly effective.
Two schemes have been defined. One for the accreditation of service providers and one for the certification of the usability of products. The proposed schemes form part of the necessary infrastructure for Human Computer Interaction and/or Usability Engineering as a professional discipline. These schemes have been tested as far as is possible in the INUSE project, but further work is obviously needed to validate and establish such schemes as a secure basis for the assurance of Usability.

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8. Usability Support Provider Accreditation Scheme, USP

8.1 Overview

This document presents a scheme of accreditation for organisations wishing to certify themselves as Usability Support Providers. In order to be certified, an organisation must show evidence that it possesses the following core competencies:

Usability consultancy

Planning user centred design

Evaluation and testing.

The following areas of competency may also be accredited at the organisation's request:

Requirements engineering

Product design support

Training

Technology transfer.

Criteria for acceptable competency levels are described below. Organisations wishing to be accredited as a usability support provider will either be visited by an auditor, or need to send the accreditation body the information that will allow an auditor to decide whether or not accreditation should be granted.

8.2 Assessment criteria

It is up to each organisation to show that it possesses the necessary skills, tools and established processes to meet the assessment criteria detailed below for each group of required competencies. Each group of required competencies submitted must be represented by at least one individual in the organisation possessing the requisite skills (including the skill to use any tools appropriately), and one established process covering part or all of the required competence.

Definitions

Tool A tool is defined as an artefact (hardware, software, or both) that can be used to gather data or to compress and summarise data.

Skill A skill is recognised with reference to an individual's attainment of educational or training criteria (awarded by an appropriate organisation) combined with relevant experience leading to the demonstration of excellence (by means of publications, commercial reports, etc., some of which may be labelled 'commercial in confidence') for the necessary competency.

Process An established process is a set of steps, supported by appropriate methods, which achieves the stated goal of the process.

8.2.1 Usability consultancy

Competency: to actively represent the usability service provision concept in their catchment area and to provide appropriate assistance to clients within the domain areas for which they are accredited.

The Organisation can:

1. attract clients from its designated catchment area;
2. assess the organisation's degree of expertise and familiarity with usability (usability maturity);
3. analyse the client's organisational and work practices as well as the client's needs;
4. suggest, instantiate, and operate the necessary practices, tools, and support required by the client within the framework required by the client;
5. obtain meaningful corrective feedback on its own technical and professional performance, which feedback is fed into the mode of operation of the Support Provider in future.

8.2.2 Planning user centred design

Competency: to select and use methods which provide the most cost-beneficial user input to the appropriate stages of the design process.
The Organisation can:

1. recommend how to fit UCD to the client's organisation and specific development work;
2. show how user centred development work can resolve critical business issues;
3. plan for the use of appropriate requirements engineering, product design support and evaluation and testing methods (HCD 2.1 - 2.6) at all stages of the development cycle.

8.2.3 Evaluation and testing

Competency: to assess which aspects of a product can be evaluated for usability and quality of use, to determine the appropriate procedures for testing, carry out the tests, analyse and report the results.
The Organisation can:

1. Formulate goals for the usability evaluation or testing;
2. Select tools and techniques which are appropriate for assessing the extent to which the goals have been achieved;
3. Define an appropriate context of evaluation which takes account of the context of use;
4. Design and carry out evaluation and testing procedures, analyse and report the results, and produce diagnostics to improve the product;
5. Assess whether goals have been achieved.

8.2.4 Requirements engineering

Competency: to identify the intended context of use, to elicit the users' requirements and to state them in such a way that the user requirements can be easily amalgamated with technical (system) requirements and to obtain feedback on the adequacy of the proposed design for the designated user categories in order to clarify and elaborate the user requirements.
The Organisation can:

1. elicit the relevant context of use at the necessary level of detail as part of the requirements;

2.elicit and verify the user-based requirements;

3.state user-based requirements so they can be incorporated with system (technical) requirements.

8.2.5 Product design support

Competency: to assist in the development of the product, system or service which meets the user requirements.
The Organisation can:

1.generate a range of design options to support the users' tasks;

2.recommend the most suitable guidelines and style guides and national and international standards for the interface when required;

3.assist the client in instantiating these standards, guidelines, and style guides;

4.use the most appropriate methods for evaluating prototypes.

8.2.6 Training courses

Competency: to determine what the training need and achievement level of the client is with regard to areas such as requirements, UCD, and evaluation and testing, and to supply training modules, examples, and practical experience in order to bring the client to the necessary level.
The Organisation can:

1.set out a syllabus of instruction appropriate to the expertise of the trainees in usability and user centred design;

2.carry out a self-assessed training course following the syllabus;

3.supply coursework documentation (notes, selected reading, bibliographies, URLs etc.);

4.refer to appropriate previous experience in the course topic(s);

5.set up a practical exercise in the coursework topic (if relevant);

6.use appropriate training materials.

8.2.7 Technology transfer

Competency: to provide training and assistance to enable a client organisation to obtain competency in one or more of the areas described above, to an acceptable professional standard.
The organisation can:

1.assess a client's technology transfer and support needs;

2.organise and run training courses;

3.provide appropriate reference documentation, which is improved though feedback on its use;

4.provide support and assistance at the client's premises, until the client demonstrates an acceptable level of skill;

5.provide appropriate tools and methods to a client;
6.provide remote support to a client as required during the transfer period[6].
A checklist including the relevant HCD base practices is given in Annex A of this section.

[6] This may be achieved in a number of ways including telephone or Email helplines, mentoring etc.

8.3 Usability Support Provider accreditation request form

This proforma may be copied or scanned into an electronic document.
All sections must be completed by the applying organisation.
This proforma must appear on the page following the title page of the first volume of the portfolio.

Contact Details
Applicant company's name and normal business address

Individual in company processing the application (name, usual work address, telephone & extension, fax, Email address)

Address of site to be inspected (if applicable)

Names and usual work addresses of additional individuals mentioned in the application.

Type of Application
Please indicate which of the following competencies this application is relevant for:
Mandatory:
- Usability consultancy
- Evaluation and testing
- Planning user centred design

Optional:
- Requirements engineering
- Product design support
- Training courses
- Technology transfer

Type of request:
- new certificate
- extension of certificate

Method of assessment
- visit/postal

For a postal assessment, state the name and location of the document which provides an index to the documents in this application portfolio.

If a previous certificate has been granted, please state the name (and location) of the document detailing the changes in the current submission.

If a previous certificate has been refused, please state the names (and locations) of the documents detailing (1) the grounds for previous refusal, and (2) changes in the current submission.

Type of business activity(activities)
State the name (and location) of the document which outlines which business activities the organisation intends to address with its service provision.

Information in support of application

For each of the criteria in the relevant competencies, please ensure that the listed information is available for assessment. In the following list please delete the competencies for which the candidate organisation is not applying.

For a postal application, state the name (identifier) and location of the information required.

Usability consultancy
- advertising and promotional material
- client need assessment procedure
- list of services available
- customer/client list (confidential)
- list of tools and documented practices available for consultation work
- self-assessment scheme
- client satisfaction survey results.

Evaluation and testing
- goals for usability evaluation and testing statement procedure
- suitable tool(s) and techniques
- personnel skills to employ tool(s)
- definition of the context of evaluation
- sample design and testing procedure
- sample analysis and report of evaluation and testing result
- sample assessment of goal achievement
- sample diagnostics to improve the product.

Planning user centred design
- ISO 13 407 text (latest version) and/or UCD principles statement
- client-centred explanation of application of 13 407 and/or UCD principles to business activity
- business issues analysis procedure
- suitable range of tools, skills, and/or procedures to support UCD in all phases as outlined

Requirements engineering:
- context of use elicitation procedure
- user-based requirements elicitation tools and/or procedures
- user-based requirements with end users verification tools and/or procedures
- requirements statement with end users verification tools and/or procedures.

Product design support:
- interface standard(s) relevant to business activity(activities) document(s)
- guideline(s) and style guide(s) relevant to business activity(activities) document(s)
- example(s) of instantiating standards, guidelines, and style guides in business activity(activities)
- assess, diagnose, and rank severity of interface problems procedure.

Training courses
- client maturity level assessment procedure
- training syllabus with achievement criteria documentation
- personnel with presentation and training skills
- coursework documentation (notes, selected reading, bibliographies, URLs etc.)
- list of practical projects carried out in training area.

Technology transfer
- examples of client socio-technical needs analysis
- examples of assessment of client's technology requirements

examples of transfer plan
lists of documents, tools and methods provided
examples of training programmes
examples of final reports on transfer exercise.

8.4 Assessment procedure

8.4.1 General

The assessment procedure is based on a review of material gathered together by the organisation in support of its claims to meet the specific criteria outlined above. The assessment will normally be carried out on site by an auditor appointed by the Usability Support Provider Accreditation Board, who will interview named skilled personnel at the site.
For a postal assessment:

The organisation will submit the material in one or more bound volumes, produced to the in-house standard of the organisation.

It is the duty of the candidate organisation to make all necessary material available in a form suitable for review by an auditor. The material will be retained by the Usability Support Provider accreditation board whether or not a certificate is issued.

Unless otherwise agreed with the Accreditation Board and noted in an exchange of letters before the submission, all documentation shall be in the English language.

8.4.2 Application procedure

Application for assessment should be made on the Usability Support Provider Accreditation Request form which should be completed in full by the organisation.
For a postal assessment, the organisation should also prepare a portfolio of evidence that is submitted to the Usability Support Provider Accreditation Board at the same time. The Board will consider the evidence and may make a site inspection of the applicant, including interviews (if necessary) with named skilled personnel at the site. All information provided by the candidate organisation is treated by the Board as 'Commercial in Confidence'.

8.4.3 Assessment inspections

The Accreditation Board may make a site inspection at any time, giving no less than one calendar month's notice. During the inspection, the Board will satisfy itself that the organisation is able to perform at the level at which it has claimed and that the associated documentation submitted can be used for providing the services for which it is intended.

8.4.4 Acceptance and Rejection

The Accreditation Board will make a report recommending either acceptance of the candidate organisation, or rejection of the candidate organisation.
The following areas of operation are mandatory in order to be recommended for acceptance:

Usability consultancy

Planning user centred design

Evaluation and testing

The following areas of operation are optional:

Requirements engineering

Product design support

Training courses

Technology transfer

In cases of acceptance, the Accreditation Board will clearly state which services it recommends that the candidate organisation is capable of providing. In cases of rejection, the grounds for rejection will be supplied to the rejected candidate organisation.

8.4.5 Resubmission

An organisation may request reassessment only if all the non compliances have been addressed. An organisation that wishes to up-grade itself may likewise request reassessment at any time after a successful submission.

8.5 Certification procedure

8.5.1 General

If an organisation satisfies the requirements given above the Accreditation Board will issue a certificate.

8.5.2 Issue of the Usability Support Provider certificate

The certificate will contain the following information at minimum:

name and address of the organisation's registered office

address of business (if different)

identification of the accredited services exactly by description

identification of tools used and documentation supplied to clients exactly by description

industrial context in which service is offered

a statement to the effect that the certificate has been awarded

references to any non-conformances found in the assessment criteria

certificate number and date of issue

expiry date of certificate

a statement of the terms and conditions covering the assessment.

The certificate will be signed *by all members of* the Accreditation Board.

8.5.3 Period of validity

Certificates are normally valid for a maximum period of two years from date of issue after which they are deemed null.

8.5.4 Extending a certificate

A certificate may be extended by nullifying the current certificate if it is still valid and issuing a replacement certificate. Certificates may be extended because:

an organisation wishes to extend the period of validity of the certificate

an organisation wishes to cover additional services

an organisation has removed causes of non-compliance

In order to extend a certificate, the organisation must clearly state the services it wishes to add to the current certificate, include the current certificate number, and the additional supporting evidence necessary in a portfolio. The procedures for recommending an extended certificate are the same as for recommending a certificate.

An extended certificate is valid for two years from the date of issuing of the extended certificate.

8.5.5 Cancellation

The Accreditation Board reserves the right to cancel a certificate if:

any changes are made to the certificated services offered by the organisation which adversely affect these services

improper use is made of the certificate

the organisation no longer wishes to be an accredited usability support provider.

8.5.6 Appeals

If a dispute arises the applicant should first of all address itself to the Accreditation Board in writing and attempt to resolve the impasse. If this does not resolve itself within three months of the date of the letter from the applicant to the Accreditation Board, the applicant may formally appeal to the Accreditation Board in writing, stating the history of the application procedure and the problems encountered.

8.5.7 Accreditation mark

<A Mark will be defined if the USP scheme is put into operation.>

The Mark may be included in all documentation, papers, and software relating to the accredited services provided by the organisation.

8.5.8 Fees

Once the scheme is established, fees will be changed to cover the costs of the assessment activity. At the outset of the scheme, until enough organisations have been accredited to constitute an accreditation board, fees will not be charged.

8.5.9 Organisation’s Responsibility

The organisation's responsibility is to provide services in accordance with the criteria which have been successfully accredited. The organisation may only make reference to the accreditation in relation to services for which it is certified. The organisation shall make available to the Accreditation Board its self-evaluation results, any complaints from its clients, and their resolutions. The organisation should notify if there has been any change in staff, circumstances, or procedures, which necessitate application for an extended certificate.

8.5.10 Publication

The Accreditation Board will maintain a list of organisations which have been accredited. This list will be first published in the month the accreditation board has come into being, and will be published annually thereafter.

8.5.11 Definitions

Publication means issuing a list which is available to any reasonable request, and if possible, posting it on a publicly available notice space (e.g. on the Web, in trade magazines, at conferences and exhibitions of relevance).
Portfolio means a collection of documents which support the candidature of the organisation, placed in a semi-permanent binding, and which are prepared to the house style of the candidate organisation.
Location means reference within the portfolio to a unique set of pages, or other publicly accessible URL.

8.6 Annex A Assessment Criteria

No	Criteria	Rating
1	**Usability consultancy**	
1.1	Attract clients from its designated catchment area	
1.2	Assess the organisation's degree of expertise and familiarity with usability (usability maturity)	
1.3	Analyse the client's organisational and work practices as well as the client's needs.	
1.4	Suggest, instantiate, and make to operate within the consultancy framework required by the client the necessary practices, tools, and support as required by the client.	
1.5	Obtain meaningful corrective feedback on its own technical and professional performance, which feedback is fed into the mode of operation of the Support Provider in future	
2	**Planning user centred design**	
2.1	Recommend how to fit UCD to the clients organisation and specific development work.	
2.2	Show how user centred development work can resolve critical business issues.	
2.3	Plan for the use of appropriate requirements engineering, product design support and evaluation and testing methods (HCD 2.1 - 2.6) at all stages of the development cycle.	
HCD.2.1	**8.6.1 Identify stakeholders.** Define and analyse the roles of all user stakeholders likely to be affected by a system. Assess the significance of the system to each stakeholder group.	
HCD.2.2	**8.6.2 Consult stakeholders.** Establish structures, mechanisms and procedures to ensure that relevant stakeholders are effectively involved and consulted in all significant aspects of the system implementation.	
HCD.2.3	**8.6.3 Identify and plan user involvement.** Decide on the most effective way to elicit user input at each stage of the project, taking best advantage of established good practice in team working and user involvement.	

HCD.2.4	**8.6.4 Select human-centred methods and techniques.** Decide which methods will be included and how they will link together in the development process. Define how this will interface to the particular lifecycle methodology being used in the development of the system.	
HCD.2.5	**8.6.5 Ensure a human-centred approach within the project team.** Establish a multi-disciplinary culture in the project team. Maintain staff focus on human-centred development. Identify the specialist skills required and plan how to provide them.	
HCD.2.6	**8.6.6 Plan human-centred design process.** Develop a plan specifying how the human-centred activities integrate into the overall system development process.	
3	**Evaluation and Testing**	
3.1	Formulate goals for the usability evaluation or testing.	
3.2	Select tools and techniques which are appropriate for assessing the extent to which the goals have been achieved.	
3.3	Define an appropriate context of evaluation which takes account of the context of use (activities HCD 3.1, 4.1 - 4.5 and 6.1).	
HCD.3.1	**Clarify and document system goals.** Describe the objectives which the user or user organisation wants to achieve through use of the system.	
HCD.4.1	**Identify and document user's tasks.** Describe the tasks by which stakeholders will achieve system goals.	
HCD.4.2	**Identify and document significant user attributes.** Describe the relevant characteristics of the end-users of the system. This will include knowledge, language, physical capabilities, level of experience etc.	
HCD.4.3	**Identify and document organisational environment.** Describe the relevant social and organisational milieu, management structure and practices etc.	
HCD.4.4	**Identify and document technical environment.** Describe the relevant characteristics of equipment to be used.	
HCD.4.5	**Identify and document physical environment.** Describe the location, workplace equipment and ambient conditions.	
HCD.6.1	**Specify and validate context of evaluation.** Describe and verify the conditions under which a system was tested or otherwise evaluated. Describe the relationship, and especially discrepancies, between the context of measurement and the context of use.	

3.4	Design and carry out evaluation and testing procedures, analyse and report the results, and produce diagnostics to improve the product	
HCD.6 .3	**Evaluate prototypes in order to improve the design.** Collect user input on the quality in use of the developing system. Present the results to the design team(s) in the most appropriate format.	
3.5	Assess whether goals have been achieved.	
HCD.6 .4	**Evaluate the system in order to check that the system requirements have been met.** Check systems against organisational, user and usability requirements.	
HCD.6 .5	**Evaluate the system in order to check that the required practice has been followed.** Check systems for adherence to applicable good practice, style guides, standards, guidelines and legislation.	
HCD.6 .6	**Evaluate the product in use in order to ensure that the product continues to meet organisational and user needs.** Test the final and/or operational system to ensure that it meets the requirements of the users, the tasks and the environment, as defined in its specification.	
4	**Requirements engineering**	
4.1	Elicit the relevant context of use at the necessary level of detail as part of the requirements (HCD 3.1, 4.1 - 4.5).	
HCD.3 .1	**Clarify and document system goals.** Describe the objectives which the user or user organisation wants to achieve through use of the system.	
HCD.4 .1	**Identify and document user's tasks.** Describe the tasks by which stakeholders will achieve system goals.	
HCD.4 .2	**Identify and document significant user attributes.** Describe the relevant characteristics of the end-users of the system. This will include knowledge, language, physical capabilities, level of experience etc.	
HCD.4 .3	**Identify and document organisational environment.** Describe the relevant social and organisational milieu, management structure and practices etc.	
HCD.4 .4	**Identify and document technical environment.** Describe the relevant characteristics of equipment to be used.	
HCD.4 .5	**Identify and document physical environment.** Describe the location, workplace equipment and ambient conditions.	
4.2	Elicit and verify the user-based requirements (HCD 3.3 - 3.5, 6.2).	
HCD.3 .3	**Define the system.** Set and agree goals for the system from commissioning to de-commissioning in terms of the total experience of the user and/or user organisation with the system.	
HCD.3 .4	**Generate the user and organisational requirements.** Creation of an explicit statement of the user and organisational requirements for the system.	
HCD.3 .5	**Set usability objectives.** Generate and agree measurable criteria for the required quality in use of the system.	
4.3	State user-based requirements so they can be incorporated with system (technical) requirements.	

5	**Product design support**	
5.1	Generate a range of design options to support the users' tasks (HCD 5.2, 5.3)	
HCD.5.2	**Produce composite task model.** Develop a feasible model of the user's new tasks from existing knowledge of best practice, the requirements, context of use, allocation of function and design constraints for the system.	
HCD.5.3	**Produce system design.** Generate and analyse a range of design options for all stakeholder-facing aspects of the system.	
5.2	Recommend the most suitable guidelines and style guides and national and international standards for the interface when required (HCD 5.4).	
HCD.5.4	**Use existing knowledge to develop design solutions.** Analyse best practice for applicability to the system. Include the user and organisational requirements, context of use, international standards, legislative requirements, existing patents, good practice, style guides and project standards etc. in the design.	
5.4	Assist the client in instantiating these standards, guidelines, and style guides.	
5.5	Use the most appropriate methods for evaluating prototypes (HCD 5.6).	
HCD.5.6	**8.6.7 Develop prototypes.** Make the design solution more concrete using simulations, models, mock-ups etc. Development of some trial implementation of some aspect of the system for the purposes of testing with users or user representatives.	
6	**Training courses**	
6.1	Set out a syllabus of instruction appropriate to the expertise of the trainees in usability and user centred design.	
6.2	Carry out a self-assessed training course following the syllabus.	
6.3	Supply coursework documentation (notes, selected reading, bibliographies, URLs etc.).	
6.4	Refer to appropriate previous experience in the course topic(s).	
6.5	Set up a practical exercise in the coursework topic (if relevant).	
6.6	Use appropriate training materials.	
7	**Technology transfer**	
7.1	Assess a client's technology transfer and support needs	
7.2	Organise and run training courses	
7.3	Provide appropriate reference documentation, which is improved though	

	feedback on its use	
7.4	Provide support and assistance at the client's premises[7], until the client demonstrates an acceptable level of skill	
7.5	Provide appropriate tools and methods to a client	
7.6	Provide remote support to a client as required during the transfer period[8]	

[7] This may be achieved in a number of ways including in- and out-placement of staff, visits, audits etc.

[8] This may be achieved in a number of ways including telephone or Email helplines, mentoring etc.

8.7 Annex B Human-Centred Development processes

Extract from INUSE Deliverable D5.1.4(p) Usability Maturity Model: Processes, v 1.0 30/1/98.

8.7.1 The Human-Centred Development process category (HCD)

The *Human-Centred Development* category consists of **processes** which address the consideration of end-users and other stakeholders in the specification, development and operation of a system. These processes always relate to the whole system under development, not just the details of the software. The processes cover human-centred activities throughout the whole life of a system.

Processes are enacted through the implementation of a set of component **base practices**. Base practices are sub-processes of a process. They describe what needs to be done in order to achieve the process. Practices are enacted through the use of methods, techniques and tools. Particular human-centred methods, techniques and tools are not described in this model[9]. However, some explanatory notes to the practices illustrate the requirements of methods, techniques and tools.

Processes use and produce **associated work products**. Associated work products can be in many forms, including the following: pieces of information, documents, hardware, software, training courses, awareness in individuals. Lists of typical associated work products from each of the processes described below are given in Annex 2 of D5.1.4(p).

The processes belonging to the Human-Centred Development category are:

HCD.1 Ensure HCD content in system strategy
HCD.2 Plan the human-centred design process
HCD.3 Specify the user and organisational requirements
HCD.4 Understand and specify the context of use
HCD.5 Produce design solutions
HCD.6 Evaluate designs against requirements
HCD.7 Facilitate the human-system implementation

These are described in the following sections.

8.7.2 HCD.2 Plan the HCD process

The purpose of the process *Plan the human-centred design* is to specify how the human-centred activities fit into the whole system lifecycle process and the organisation. As a result of successful implementation of this process:

- the project plan will allow for iteration and incorporation of user feedback
- resources will be allocated for effective communication between the design team participants
- potential conflicts and trade-offs between human-centred and other issues will be reconciled
- human-centred processes will be incorporated into quality systems, procedures and standards.

[9] Many informative texts which describe how to carry out the base practices are available. These include the INUSE guides listed in the References section of this document.

- human-centred issues will be supported and promoted within the organisation.

Note

This process is directly related to ISO 13407, clauses: 7 'Planning the human-centred process'; 8.4.6 'Manage the iteration of design solutions'; 8.5.2 'Evaluation plan'.

Some practices in this process overlap with the management practices in the ISO 15504 capability scale. This also occurs in ISO 15504 Part 5.

Base Practices:

HCD.2.1 Identify stakeholders. Define and analyse the roles of all user stakeholders likely to be affected by a system. Assess the significance of the system to each stakeholder group.

HCD.2.2 Consult stakeholders. Establish structures, mechanisms and procedures to ensure that relevant stakeholders are effectively involved and consulted in all significant aspects of the system implementation.

HCD.2.3 Identify and plan user involvement. Decide on the most effective way to elicit user input at each stage of the project, taking best advantage of established good practice in team working and appropriate user involvement.

HCD.2.4 Select human-centred methods and techniques. Decide which methods will be included and how they will link together in the development process. Define how this will interface to the particular lifecycle methodology being used in the development of the system.

HCD.2.5 Ensure a human-centred approach within the project team. Establish a multi-disciplinary culture in the project team. Maintain of staff focus on human-centred development. Identify the specialist skills required and plan how to provide them.

HCD.2.6 Plan human-centred design process. Develop a plan specifying how the human-centred activities integrate into the overall system development process.

Note

An HCD plan should establish that input from HCD processes has been used in the design. An HCD plan allows for iteration where necessary. An HCD plan includes long term monitoring of the use of the system. (see HCD.6.6)

HCD.2.7 Manage human-centred process. Take specific account of user issues in management of projects and development departments. Ensure that the system development process takes account of user input. Take account of stakeholder and user issues support activities (e.g. contracts management and purchasing).

HCD.2.8 Champion human-centred activities. Promote a human-centred approach within the organisation. Establish and communicate a policy for human-centredness within the organisation.

HCD.2.9 Provide support for human-centred design. Include human-centred elements in support procedures (e.g. quality assurance, change control, process and method maintenance, resource management). Ensure that these are carried out as an integral part of the infrastructure management for the organisation.

8.7.3 HCD.3 Specify the User and Organisational Requirements

The purpose of the process *Specify the user and organisational requirements* is to establish the organisational and user requirements for the system. This process should take full account of the needs, competencies and working environment of all relevant stakeholders in the system. As a result of successful implementation of the process, the following will be defined:

- required performance of new system against operational and financial objectives
- relevant statutory or legislative requirements
- co-operation and communication between users and other relevant parties
- the users' jobs (including the allocation of tasks, users' comfort, safety, health and motivation)
- task performance
- work design, and organisation practices and structure
- feasibility of operation and maintenance
- objectives for the operation and/or use of the software and hardware components of the system.

Note

This process is directly related to ISO 13407 clause 8.3 'Specify user and organisational requirements'.

HCD.3.1 and 3.2 determine high-level requirements for the system. HCD 3.3-3.5 define detailed requirements for the system. The definition of detailed requirements requires an understanding of the context of use. This is defined in HCD 4. The two processes therefore overlap in the lifecycle.

Base Practices:

HCD.3.1 Clarify and document system goals. Describe the objectives which the user or user organisation want to achieve through use of the system.

HCD.3.2 Assess risk to stakeholders. Review the safety, health and well-being risks to the stakeholders of the system. Relate this to the overall risk assessment for the system.

HCD.3.3 Define the system. Set and agree goals for the system from commissioning to de-commissioning in terms of the total experience of the user and/or user organisation with the system.(e,g, goals for suitability, acceptability and efficiency).

HCD.3.4 Generate the user and organizational requirements. Create an explicit statement of the user and organisational requirements for the system.

Note

Requirements may ranked in order of importance.

Statutory requirements regarding working environment and workload should be taken into account.

HCD.3.5 Set usability objectives. Generate and agree measurable criteria for the required quality in use of the system.

Note

The quality in use may be stated as required levels of usability for the system or its component parts in the context of particular tasks based on performance requirements.

8.7.4 HCD.4 Understand and Specify the Context of Use

The purpose of the process *Understand and specify the context of use* is to identify, clarify and record the characteristics of the stakeholders, their tasks and the organisational and physical environment in which the system will operate. As a result of successful implementation of this process the following will be defined:

- the characteristics of the intended users
- the tasks the users are to perform
- the organisation and environment in which the system is used.

Note

This process is directly related to ISO 13407 clause 8.2 'Understand and specify the context of use'.

Base Practices:

HCD.4.1 Identify and document user's tasks. Describe the activities which users perform to achieve system goals.

Note

Task descriptions are not solely in terms of equipment functions or features.
Tasks may change (or evolve) during the lifecycle of the system.

HCD.4.2 Identify and document significant user attributes. Describe the relevant characteristics of the end-users of the system. This will include knowledge, language, physical capabilities, level of experience etc.

HCD.4.3 Identify and document organisational environment. Describe the relevant social and organisational milieu, management structure and practices etc.

HCD.4.4 Identify and document technical environment. Describe the relevant characteristics of equipment to be used.

HCD.4.5 Identify and document physical environment. Describe the location, workplace equipment and ambient conditions.

8.7.5 HCD.5 Produce Design Solutions

The purpose of the process *Produce design solutions* is to create potential design solutions by drawing on established state-of-the-art practice, the experience and knowledge of the participants and the results of the context of use analysis. As a result of successful implementation of the process:

- the whole socio-technical system in which any technical components operate will be considered in the design
- user requirements will be taken into account in the purchasing of system components
- user requirements will be taken into account in the design of the system
- existing knowledge of best practice from socio-technical systems engineering, ergonomics, psychology, cognitive science and other relevant disciplines will be integrated into the system
- communication between stakeholders in the system will be improved because the design decisions will be more explicit
- the development team will be able to explore several design concepts before they settle on one
- stakeholder and end-user feedback will be incorporated in the design early in the development process

- it will be possible to evaluate several iterations of a design and alternative designs
- the interface between the user and the software, hardware and organisational components of the system will be designed
- user training and support will be developed.

Note

This process is directly related to ISO 13407 clause 8.4 'Produce design solutions'.

Base Practices:

HCD.5.1 Allocate functions. Analyse the task model and the context of use to distribute functions between the human, machine and organisational components of the system best suited to doing the work.

HCD.5.2 Produce composite task model. Develop a feasible model of the user's new tasks from existing knowledge of best practice, the requirements, context of use, allocation of function and design constraints for the system.

HCD.5.3 Produce system design. Generate and analyse a range of design options for all stakeholder-facing aspects of the system.

HCD.5.4 Use existing knowledge to develop design solutions. Analyse best practice for applicability to the system. Include the user and organisational requirements, context of use, international standards, legislative requirements, existing patents, good practice, style guides and project standards etc. in the design.

HCD.5.5 Specify system. Produce a design for the user-related components of the system. Change design in the light of feedback from evaluations.

Note

Depending on the type of system, the specification can include, but is not limited to, one or all of the following: design of user's jobs, user's tasks, working environment, hardware, software, user documentation, packaging design, interface functionality etc.

HCD.5.6 Develop prototypes. Make the design solution more concrete using simulations, models, mock-ups etc. Develop simulation or trial implementation of key aspects of the system for the purposes of testing with users or user representatives.

HCD.5.7 Develop user training. Identify, specify and produce the training required to enable relevant stakeholders to perform tasks effectively using the new system. Cover or include any proposed changes in business processes, job design and tasks.

HCD.5.8 Develop user support. Identify, specify and produce the user support services for the system. Take into account any proposed changes in business processes and job design.

8.7.6 HCD.6 Evaluate Designs against Requirements

The purpose of the process *Evaluate designs against requirements* is to collect feedback on the developing design. This feedback will be collected from end users and other representative sources. As a result of successful implementation of this process:

- feedback will be provided to improve the design
- there will be an assessment of whether user and organisational objectives have been achieved or not
- long-term use of the system will be monitored

In the case of evaluation to identify improvements to the design, successful implementation of the process will reflect:

- potential problems and scope for improvements in: the technology, supporting material, organisational or physical environment and the training
- which design option best fits the functional and user requirements
- feedback and further requirements from the users.

In the case of evaluation to assess whether objectives have been met, successful implementation of the process will demonstrate:

- how well the system meets its organisational goals
- that a particular design meets the human-centred requirements
- conformity to international, national and/or statutory requirements.

Note

This process is directly related to ISO 13407 clause 8.4 'Evaluate designs against requirements'.

Evaluation may be carried out in the short term (e.g. trials by potential users during design in order to compare features of prototypes) or in the long term (e.g. a post-installation study to validate the specification, monitoring of sickness records for health and safety problems or a survey to identify the requirements for the next version of a system).

For all evaluations the opportunities for end user involvement should be investigated. If end users are not involvement the risks should be assessed.

Base Practices:

HCD.6.1 Specify and validate context of evaluation. Describe and verify the conditions under which a system is tested or otherwise evaluated. Describe the relationship, and especially discrepancies, between the context of measurement and the context of use.

Note

This practice is performed prior to each of HCD 6.2 to 6.6.

HCD.6.2 Evaluate early prototypes in order to define the requirements for the system. Benchmark appropriate systems using relevant criteria. Test the usability of competing/alternative systems and/or system concepts. Use prototypes to stimulate stakeholder input to system requirements. Test stability of requirements.

HCD.6.3 Evaluate prototypes in order to improve the design. Collect user input on the quality in use of the developing system. Present the results to the design team(s) in the most appropriate format.

HCD.6.4 Evaluate the system in order to check that the system requirements have been met. Check systems against organisational, user and usability requirements. (see also HCD 3.4 and 3.5)

HCD.6.5 Evaluate the system in order to check that the required practice has been followed. Check systems for adherence to applicable good practice, style guides, standards, guidelines, and legislation.

HCD.6.6 Evaluate the system in use in order to ensure that it continues to meet organisational and user needs. Test the final and/or operational system to ensure that it meets the requirements of the users, the tasks and the environment, as defined in its specification. (see also HCD 3.4 and 3.5)

Note

This includes routine contact with a representative number of users using a defined procedure to elicit information about human-centred aspects of the system by means of questionnaires, reports, logs, interviews etc. This also includes feedback to stakeholders.

Evaluation of the system in use can also be used to assess whether the requirements and the resulting specification were correct.

8.8 Annex C: Guidance for on-site assessments

It is recommended that the assessor asks the following questions:

1. What is the area and purpose of your business?
2. How many staff do you have, of which how many fall within the scope of the accreditation?
3. For which areas are you seeking accreditation?
4. What quality procedures to you follow to ensure that work is carried out reliably to a professional standard?
5. For each area:
    - Which staff have expertise in this area?
    - How often do you do this type of work?
    - How do you go about it?
    - Take me through an example (tick off issues as they arise)
    - or answer the individual questions

9. ISO 13407 Conformity Assessment Scheme, 13407 G

9.1 Overview

The scheme provides a procedure and set of criteria which can be used to assess how closely a development process has followed the spirit of ISO 13407, Human-Centred Design Processes for Interactive Systems. A product which follows a human-centred design process is expected to have the following benefits:

> user well-being, health and safety, smoother development process, more attractive product for users, closer match to business objectives, and better match to a user's task.

This document contains criteria for process certification. The Standard leaves the information to be provided and the specification of the procedures to be used to evaluate conformance as a matter of negotiation between vendors and purchasers of IT products. In many cases it is not possible for the supplier and purchaser to establish such a relationship. In cases where negotiation is not possible e.g. generic software, off-the-shelf products, low margin contracts etc. a defined procedure is required. This scheme defines a level of specification which can be applied to a wide range of types of IT product.

Unless otherwise indicated in the scope, a *13407 G* assessment will cover all clauses of the standard judged to be relevant to the system being assessed within its particular context of use.

9.2 Assessment procedure

9.2.1 General

The assessment procedure is based on the review of information produced during a product lifecycle. This material can be in many locations and forms and the terms used to describe such information may vary between organisations and projects. For this scheme the most appropriate form and location are defined. For projects which are in their early stages it is advisable to consider the use of these defined forms on the project. For projects which are under way or complete it may be necessary to provide a table or checklist which indicates the location of the required information in the documents provided to the assessors.
Inspection can be carried out at the Producer's premises if required by the client or the Certification Body. For products still under development the assessment process can be partitioned and timed to suit the constraints of the Producer's system development lifecycle.

9.2.2 Application procedure

Application for assessment should be made on a request for *13407 G conformity assessment form* which should be completed in full by the client. A separate request form should be completed for each product and every place of production where the application is being made. The completed form should be submitted to the Certification Body. Documentation should be provided in the language requested by the Certification Body or its agents.

A *13407 G Conformity Certificate* may be sought for more than one platform or for more than one version of the product. In this case the Producer must ensure that the submitted documentation shows how any variations are handled in the development process.

9.2.3 Assessment inspections

An assessment will be carried out in several phases. The exact details will depend on the documentation provided, the particular development lifecycle and the product to be assessed. However, there will always be an initial scoping phase in which the submission will be reviewed and discussed and a precise scope of assessment will be established. This will address the project activities to be covered, the information required, the programme for the assessment and the resources required.
Each lifecycle activity will then be assessed against the criteria given in the section Assessment Certification below. Because of the diversity of Producers, products and particular lifecycles the identification and provision of suitable information is likely to be iterative.

9.2.4 Assessment report

On completion of the assessment, a preliminary assessment report will be produced which presents the detailed findings of the assessment. The client will be given the opportunity to comment on any factual errors concerning the evidence assessed.
A final assessment report will be issued which takes into account any comments from the client. It will summarise the findings of the assessment. It will indicate whether the assessment organisation is satisfied that all the requirements of the scheme have been met.
The assessment report is valid only for the version(s) of the product and the operating environments that are identified in it.

9.2.5 Resubmission

The report may indicate that the requirements have not been met. In this case the client may take remedial action to address the non-conformances and re-submit the product.

9.3 Certification

9.3.1 General

If the development of the product satisfies the requirements of the scheme a certificate will be authorised.

9.3.2 Issue of a certificate

The *13407 G Conformity Certificate* will contain the following information:

- name and address of the Producer's registered office
- place of production (if different)
- unambiguous identification of the certified product
- specification of the context(s) of use for which the product is intended

- precise scope of the assessment performed on the development of the product
- name of the Certification Body
- references to any non-conformances with the assessment criteria
- certificate number and date of issue
- expiry date of certificate
- statement of the terms and conditions covering the *13407 G Conformity Certificate*

9.3.3 Period of validity

13407 G Conformity Certificates are normally awarded for a period of one year.

9.3.4 Extending a certificate

A certificate may be extended by an extension document at the request of the Producer for the following reasons:

- extension of the period of certification
- a new version of the product
- a new context of use for the product
- an amendment to the original certificate

Upon request for an extension, the Certification Body will advise the client of any additional provisions such as additional information or changes to the criteria which need to be fulfilled in order that an extension may be awarded. In particular user feedback and customer complaints will be examined.

Provided that the application is accepted and any additional provisions fulfilled, an extension to *13407 G Conformity Certificate* will be issued which supplements the original certification. Additional provisions will be included in the extension certificate.

An extension certificate is normally valid for a period of one year. Applications for extension should be made two months before expiry of a certificate or immediately if changes to the product are required.

The maximum period for all extensions is up to seven years from the date of issue of the original certificate. After this time a full re-assessment of the development process will be required.

9.3.5 Cancellation

The Certification Body reserves the right to cancel a certificate if:

- any changes are made to the development process which are deemed to adversely affect the provisions under which the certificate was awarded
- the quality in use of the product is found to be unsatisfactory in practice
- the client fails to retain assessed documentation for the lifetime of the certificate
- improper use is made of the certificate or the conformity mark or of the name of the Certification Body
- due settlement of fees is not completed
- the Producer moves from the address detailed in the certificate without informing the Certification Body in writing
- the Producer fails to fulfil the responsibilities detailed in the section ‘Producer’s responsibility’ below.

In addition a certificate will be cancelled if:

- a Producer does not wish to extend certification
- the product is no longer marketed

If the Certification Body considers that a certificate should be cancelled the Producer will be informed in writing and requested to respond by a specified date. If adequate explanation or corrective action is not received by the Certification Body on or before that date the Producer will be reminded of the situation together with a proposed date of cancellation.
The certifying bodies have the right to publish details of cancelled certificates together with the reasons.

9.4 Appeals

If a dispute arises concerning the conduct, outcome or cancellation of a *13407 G Conformity Certificate* the Producer should first discuss the matter with the assessor who leads the assessment. If the Producer is not satisfied the matter should be brought to the attention of the scheme manager.

9.5 Conformity mark

Upon receipt of the *13407 G Conformity Certificate* the Producer can use *the Scheme Conformity Mark*. This may be included on user documentation, packaging, promotional literature or the product itself with the following minimum information:

- name of Producer
- name and version of the IT product
- the number of the certificate
- the name of the Certification Body

The *Mark* must be used in compliance with the applicable specification for the *Mark* and only for software designed and manufactured in strict conformity with the assessed processes during their period of certification validity.
The *Mark* must only be issued by a Certification Body accredited to certify against *the 13407 G Conformity Scheme*.
<If the scheme is used a conformant Mark should be designed>

9.6 Fees

This section is not applicable to a draft scheme. However, it is suggested that single, inclusive fees for each certificate and each extension certificate are preferred. There should be provision for expenses if site visits are made. There should also be provision for charges if clients withdraw an application during the assessment process.

9.7 Producer's responsibility

In supplying an IT product which has been awarded *13407 G* conformity it is the Producer's responsibility to ensure that:

- each unit supplied is in strict conformity with that certified by the Certification Body.

- each unit is supplied with appropriate instructions for the product, its installation, purpose, use and intended context of use. These should include any warnings with respect to doing or refraining from doing anything with or in relation to the product, its installation and its purpose or its use.

The Producer may only make reference to the Certification Body or the *13407 G Mark* or the Certification Body's name, in advertising or otherwise, for IT products which have been certified by that body. The Producer should not attempt to mislead purchasers concerning the *13407 G conformity assessment* by claiming functions, purposes or contexts of use for the product not covered by the certification.
The Producer must retain all assessed documentation until at least seven years after the expiry of the associated certificate.
The Producer must provide reasonable access to premises for visits in connection with assessment and must maintain and make available to the Certification Body, on request, records of discovered faults and customer complaints concerning the IT product.
The Producer must annually re-submit a description of its human centred processes to the Certification Body, if these processes have changed since the last submission.
Subject to written approval from the Certification Body the Producer may reprint some or all of the assessment report for advertising or marketing purposes.
The Producer shall agree to the terms and conditions under which the Certification Body performs the work.

9.8 Publication

All software certified under the Scheme will be included in a *List of 13407 G Certified Products* which will be updated annually.

9.9 Declaration

Precise details of the quality procedures followed by the Certification Body for the operation of the *13407 G Conformity Scheme* must be made available. EN 45011 gives the general requirements for the operation of product certification.
The Certification Body shall maintain the strictest confidentiality of information received in the course of an assessment.
The Certification Body shall define the terms and conditions under which it performs the work related to assessment.
13407 G Conformity Certificates must only be issued by a Certification Body accredited to certify against *the 13407 G Conformity Scheme*.

9.10 Definitions

Certification Procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements. (ISO/IEC Guide 2:1991, General terms and their definitions concerning standardisation and related activities)
Certification Body An organisation accredited to perform Certification. (ISO/IEC Guide 2:1991, General terms and their definitions concerning standardisation and related activities)
Conformity The fulfilment by a product, process or service of specified requirements. (ISO/IEC Guide 2:1991, General terms and their definitions concerning standardisation and related activities)

Producer The organisation which produced the product, abstracted it or carried out the industrial or other processes which gave it its essential attributable characteristics. (LR Type Approval: Procedure, Lloyd's Register of Shipping, 1990) In the case of this document the Producer is also the Applicant for Certification and, following award of a certificate is a Licensee. These terms are defined in EN 45011.

Product All goods or services including a product which is comprised in another product, whether by virtue of being a component part or the entire product.

9.11 Submission information

9.11.1 *I3407 Lite* Conformity Assessment Form

All section must be completed in full by the Applicant.

Applicant's name and normal business address (including name of nominated contact)	
Producer's name and normal business address if different from Applicant (including name of nominated contact)	
If the Applicant is not the Producer please state Applicant's relationship to the Producer	
Place of production (including nominated contact)	
Type of request: • new certificate • extension of certificate Have any changes been made since previous certificate? Where is the assessment to be conducted? Is the assessment to take place at the end of development or during development?	
Description of Product	
Configuration information (name and version of all software and hardware and intended contexts of use)	

9.11.2 Location of information

The second column in the checklist should be used to record the location(s) of the required information in the documentation provided. Documentation should be provided in the language requested by the Certification Body or its agents.

9.11.3 Planning the human-centred development process for IT products

Information item	Location of information
List of human-centred activities to be carried out with suitable timescales	
Procedure for integrating human-centred activities with other development activities (including appropriate milestones)	
Individuals and organisation(s) responsible for the human-centred development activities and the range of skills they provide	
Procedures for establishing feedback and communication on human-centred development activities.	

9.11.4 Specifying the context of use

Information item	Location of information
Specification of the range of intended users, tasks and environments support design activity	
Sources from which the context of use information was derived	
Evidence of context of use information in the non-functional specification	
Evidence that the context of use is one of the driving forces in the development process	

9.11.5

9.11.6 Specifying user and organisational requirements

Information item	Location of information
The range of representative users and other stakeholders in the development process	
Identification of key user requirements	
A statement of the human-centred design goals	

Benchmarks against which the design can be tested	

9.11.7 Production of design solutions

Information item	Location of information
The sources of existing knowledge and standards, with an indication of applicability/non applicability	
Steps taken to ensure that the prototype covered key requirements and followed good practice	
Features of which version of the product were subject to evaluation	
Evidence that the requirements are one of the driving forces in prototype development	

9.11.8 Evaluation of design solutions against user and organisational requirements

Information item	Location of information
Human-centred design goals to be evaluated	
The parts of the IT product which are to be evaluated	
Evidence of how the evaluation is to be performed and the procedures for performing it, including the number of users taking part and their representativeness, resources required for evaluation and analysis of results	
Evidence of appropriateness of testing and data collection methods for the IT product given its context of use	
Evidence of the appropriateness of the treatment of test results	
The content and format of the feedback to the designers including recommendations of 'where next', ranked findings and a list of actions agreed/taken	
Evidence that evaluation results have been used to improve and refine the IT product	
Feedback and use of results in other corporate development activities	

9.12 Assessment Criteria

9.12.1 Introduction

These principles and criteria are for use in the assessment of evidence submitted to Certification Bodies in request of a *13407 G Conformity Certificate*. They are to be used only for that purpose.

9.12.2 References

ISO DIS 13407, Human-Centred design process for interactive systems.
Lloyd's Register Software Conformity Assessment System Procedure SC94, Lloyd's Register of Shipping.
EN 45011:1989, General criteria for certification bodies operating product certification.
ATOMOS II, 1997, Programmable System Development Guidance, ref. A225.01.08.055.002, Lloyd's Register of Shipping.

9.12.3 Definitions

The definitions in ISO DIS 13407 apply.

9.12.4 Principles and criteria

1. Sound evidence must be provided to show that the criteria for the assessment have been satisfied. This could include but should not be limited to documentation, files and other records.

a) There is to be a list which identifies submitted documents and files and indicates their relationship to the submission information listed in the 'location of information' section of the submission form.
b) All documents and files are to be uniquely identified including the version. A change history is to be included in the document or on attachments.
c) All documents, files and records are to be clearly approved, signifying review and acceptance. Where computer files are submitted, the approval mechanism is to be made clear.
d) There is to be clear definition of dependencies between document, files and records. For example, parent documents are to be fully referenced by name, reference, issue number and date.
e) If tables, figures or illustrations are used, their relationship to the text is to be defined.
f) Items or concepts are to be referred to by the same name throughout the document.
g) All documents within the project document set should be consistent in their use of terms, acronyms, abbreviations and notations.

Any deviations or differences between terms, acronyms, abbreviations and notations used in project documentation and standards applied in the project, are to be identified and described.

2. User centred activities shall be employed throughout the lifecycle.

a) A clear definition of user tasks and goals shall be obtained by involving users in specifying the PES requirements.
b) User characteristics shall be taken into account throughout the PES development.
c) Preliminary design solutions shall take account of existing human factors knowledge.
d) User feedback shall be obtained by appropriate means to evaluate design solutions.
e) There shall be iteration throughout the lifecycle to ensure that user feedback is effectively utilised.
f) The design team shall have appropriate multi-disciplinary skills.

3. There shall be an appropriate allocation of function between user and technology.

a) Functions that are outside the capabilities and limitations of human operators shall be allocated to the PES.
b) The complexity of user allocated functions shall be matched to user skills and abilities.
c) The functions allocated to the user shall form a meaningful set in terms of the task goals and user workload.

4. A plan should be developed to specify how the human-centred activities fit into the overall product development process. It should form part of the overall project plan and should be subject to the same project disciplines as other key activities. The plan should allow for effective design team communication, iteration and feedback into the design activities.

a) Human-centred activities must be carried out and suitable timescales should be defined.
b) There must be evidence that evaluation results have been used to improve and refine the IT product.
c) There must be individuals and organisation(s) responsible for the human-centred development activities. The range of skills which they provide should be described.
d) The resources required for evaluation and analysis of results should be known.
e) There should be procedures for establishing feedback and communication on human-centred development activities.
f) There should be a procedure for integrating human-centred activities with other development activities.

5. The context of use is to state the range and relevant characteristics of intended users, tasks, equipment and environments of the system in sufficient detail to support design and evaluation activities. Particular attention should be given to those characteristics which are judged to have significant impact on the performance of the users.

a) The range of intended users, tasks and environments must be specified.
b) The sources from which the context of use information was derived should be described.
c) There should be context of use information in the non-functional specification.
d) The context of use should be one of the driving forces in the development process.

6. A thorough understanding of the goals for the product, the tasks to be supported, the capabilities of the users, and the organisational and physical environment of the product are required in order to apply ergonomics principles. The user, ergonomic and usability requirements in relation to the context of use of the product must therefore be stated and understood clearly, fully and consistently.

a) The range of representative users and other stakeholders in the development process shall be known.
b) There must be a statement of the human-centred design goals and their target values.
c) There should be a statement of the objectives which the intended users have for the IT product and the performance of the tasks which will be carried out with the product.
d) The user and ergonomic requirements should be prioritised, unambiguous and stated in sufficient detail to support design and evaluation activities.

7. Characteristics of a well-designed solution include achieving the goals for the system, facilitating task performance, safeguarding the users' health and safety, recognising the experience and capabilities of the user population, fitting into the organisational and physical environment, and implementing applicable ergonomics principles. It must be demonstrated that the user and ergonomic requirements, context of use, technology constraints and the applicable principles of software ergonomics have been synthesised into the design through the involvement of users in the development process.

a) The requirements must be one of the driving forces in prototype development.
b) Existing knowledge and applicable standards should be known and applied. Evidence supporting the rejection of existing knowledge and standards should be provided.
c) Steps should be taken to ensure that prototypes cover key requirements and follow good practice.
d) For all evaluations there should be a list of the features to be evaluated. The product version to be evaluated should be known.

8. Evaluation of adherence to ergonomic requirements must be carried out to ensure that applicable requirements have been appropriately addressed in the design and use of the product. The evaluation is to use suitable methods, take account of the context of use of the product and to cover sufficient parts of the product so that it is representative of the assessed product.

a) There must be a description of the parts of the IT product which are to be evaluated.
b) The human-centred design goals to be evaluated must be defined.
c) The procedures for performing the evaluation must be defined.
d) The number of users taking part must be defined and their representativeness should be known.
e) There should be a clear understanding of the appropriateness of testing, data collection and data analysis methods for the IT product given its context of use.
f) The content and format of the feedback to the designers should be clear and phrased in an appropriate manner. Feedback should include recommendations of how to proceed, ranked findings and a list of actions agreed/taken.
g) There should be evidence of feedback and use of results in other corporate development activities.