ABSTRACT
The tutorial presents a structured approach to user centred
design, based on the principles of the International Standard
“Human centred design processes for interactive systems”
(ISO 13407) and other related standards. A core set of
practical methods which support the approach are described.
These have been selected by the European Usability Sup-
port Centres on the basis of their applicability, maturity,
availability, and cost-effectiveness. The tutorial gives an
overview of each method, and describes criteria which can
be used for selecting appropriate methods. The benefits of
demonstrating conformance to ISO 13407 are explained.

Keywords
User-centred design, usability evaluation, standards

OBJECTIVES
Many organisations now recognise the need for usability in
interactive systems, and the benefits that usable systems de-
deliver. But guidance about how to “do” usability tends to be
technique-centred, concentrating on specific approaches for
designing or evaluating systems. How can organisations at
different levels of usability maturity, and with different cri-
teria for usable systems, discover how to improve the us-
ability of their systems?
ISO 13407 [11] describes how a human-centred design pro-
cess can be used to achieve usable systems. The standard
provides a framework for applying human-centred design
and evaluation techniques, and is intended to supplement
existing lifecycle models.

Different organisations are at different levels of usability
maturity – from not recognising usability as an issue, to
having processes in place which ensure the development of
consistently usable systems. The principles of ISO 13407
can be integrated into their existing development process
incrementally, to achieve an appropriate maturity level.
ISO 13407 specifies types of activity to be performed dur-
ing the development of an interactive system, but does not
demand nor recommend particular techniques or methods.
The European Usability Support Centres (set up by the EU
INUSE project [8] have agreed a set of core techniques to
support the human-centred design process, selected on the
basis of their applicability, maturity, availability, and cost-
effectiveness. These are described in a handbook [6] which
accompanies the tutorial.

USER CENTRED DESIGN PRINCIPLES
The tutorial starts by explaining the approach to usability
and user centred design which is now embodied in a set of
related international standards. Usability is defined as a
high level quality objective: to achieve effectiveness, effi-
ciency and satisfaction [10]. This requires not only ease of
use, but also appropriate functionality, reliability, computer
performance, etc. It is thus synonymous with “quality in
use”, which is the user’s view of software quality [2,3,9,
12]. ISO software quality standards make quality in use the
ultimate objective of systems design, thus providing the
authority for giving usability a very strategic role in the de-
velopment process. Achieving quality in use requires a user
centred design process, and the use of appropriate usability
evaluation techniques.

1. Plan the human
centred process
2. Specify the
context of use
3. Specify user
and organisational
requirements
4. Produce design
solutions
5. Evaluate
designs against
user requirements

Figure 1. User centred design process

The steps in the process are illustrated in Figure 1 (based on
ISO 13407), and involve an iterative cycle of specifying the
context in which the product will be used and the user and
organisational requirements, and then producing design so-
lutions which can be evaluated against these requirements.
Early in design the requirements will be at a high level and
the design solutions are likely to be mock ups. As design
progresses higher fidelity prototypes will be evaluated
against more detailed requirements.

USER CENTRED DESIGN METHODS
The first step is to plan which methods are expected to be
used at different stages of development. This will depend
on the business case for usability, and will take account of
the budget, timescales, resources, skills and other con-
straints. For each potential method, the handbook [6] pro-
vides information which includes when the method should
be used, the type of results provided, the number of usability
experts and users required, and the typical range of person
days involved.
Planning may also include assessing the usability capability maturity of the organisation and identifying where improvements are required. The stages are [7]:

- Ignorance: We don’t have problems with usability
- Uncertainty: We don't know why we have problems with usability
- Awakening: Must we always have problems with usability?
- Enlightenment: Through management commitment and improvement of human-centred processes we are identifying and resolving our problems
- Wisdom: Usability defect prevention is a routine part of our operation

One essential prerequisite for user centred design is to define in detail the context of use of the product. The method recommended in this tutorial, Usability Context Analysis [4], is based on ISO 9241-11, and provides a structured approach to gathering and documenting information about the characteristics of the intended users, tasks and environments. The resulting specification of context of use can be used to inform design, and to specify valid and consistent evaluations.

GUIDANCE AND STANDARDS

Style guides and standards can be used as an input to design, or as a means of evaluating whether a product conforms to requirements. The ISO 9241 applicability workshop uses the ISO 9241 parts 12-17 dialogue design guidelines as the basis for producing a style guide customised to specific organisational requirements.

EARLY DEVELOPMENT METHODS

Rapid prototyping is a collection of formal and informal techniques for developing, demonstrating and evaluating user interface designs to support rapid iteration early in the lifecycle. The techniques can be categorised depending on whether the prototypes are passive paper, animated paper or machine, and whether the user interaction with the prototype is naturalistic, prompted or participative.

Usability inspection methods include inspection by human factors experts (“heuristic evaluation”), by designers, by users or by an appropriate combination. The choice of method depends on the skills available and the potential benefits of involving designers or users in each situation.

LATE DEVELOPMENT METHODS

The type of usability testing method used should depend on the relative importance of obtaining design feedback, or obtaining measures which can be compared with alternative products or pre-determined criteria.

The Performance Measurement Method [14] is a structured technique for delivering meaningful and objective metrics of the performance of the user-system combination in accordance with ISO 9241-11. The metrics can be used for acceptance criteria, and to compare the performance of alternative designs and products.

User satisfaction methods can be used for eliciting the subjective opinion of users. These include the SUMI questionnaire [13] where results can be compared against the industry norm, and the public-domain SUS questionnaire.

ASSURING USABILITY

How can a purchaser judge whether a product is usable? The supplier could state the results of a usability test, but it can be difficult for the purchaser to know whether the results are valid or relevant. A partial solution is to use a Common Industry Format usability test report [5]. Another approach is to provide evidence that a user centred design process was used when developing the product. The ISO 13407* lite conformity scheme can provide this assurance.

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REFERENCES

8. INUSE (1997) see http://www.npl.co.uk/inuse