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Ergonomics of human-system interaction —

Part 220: Processes for enabling, executing and assessing human-centred design within organizations

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Ergonomie de l'intéraction homme-système —
Partie 220: Processus de validation, d'exécution et d'évaluation de la conception centrée sur l'opérateur humain au sein des organisations

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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This document was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human–system interaction*.

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This first edition of ISO 9241-220 cancels and replaces ISO/TR 18529:2000.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

This document describes processes that represent good practice for human-centred design within and across projects. Human-centred design is an approach to system design and development that aims to improve usability, accessibility and user experience and avoid harm from use, by focussing on the use of the system.

The primary intended users of this document are professionals responsible for institutionalising human-centred design in an organization, who need to specify, assess and improve human-centred design in the organization. This application needs the clear and consistent structure that is provided by process definitions, as described in ISO/IEC TR 24774. For an introduction to human-centred design, see ISO 9241-210 (described below).

Process models were developed to provide:

— the potential to analyse the ability of an organization to deliver and/or maintain a system that meets a required level of performance and quality;

— a description of the factors that hinder this ability; and

— a means of addressing such shortcomings and mitigating associated risks of adverse consequences.

These have led to the widespread adoption of process modelling and assessment as an element in the assurance of timely and effective system delivery. Processes are defined at the level of **what** is done to develop and operate a system or organization.

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The processes in this document represent good practice in human-centred design from a range of industries. They are described from the perspective of those who analyse, design and evaluate the human use of interactive systems. This includes associated requirements for project management and top management support for human-centred design.

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This document uses the same structured format as other International Standards for process models (such as ISO/IEC/IEEE 12207 and ISO/IEC/IEEE 15288). ISO/IEC/IEEE 12207 refers to this document for information on human-centred design and usability.

Human-centred design aims to achieve required levels of human-centred quality. In this document, human-centred quality is the collective term used to refer to usability, accessibility, user experience, and avoidance of harm from use (see Annex E).

This document can be used to:

— implement human-centred design as part of a system development or procurement process and/or support life cycle;

— assess an enterprise's existing capability to carry out the human-centred processes;

— improve the application of human-centred design as part of an existing system development process;

— develop competence in human-centred design.

For executives/top management, this document gives guidance on governance in the area of human-centred quality. Use of this guidance gives confidence that interactive systems developed and used by an organization are usable and accessible.

For managers, this document facilitates integration of human-centred design into the system life cycle and quality management system. Human-centred activities can be specified, assessed and improved as required for projects.

This document enables efficient interaction between human-centred design and other disciplines. The services and information that human-centred design staff provide to projects are defined so that their value and purpose can be understood.

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Relationship to ISO 9241-210

ISO 9241-210 describes the principles of a human-centred approach and the activities necessary for human-centred design of an interactive system. Conformance is achieved by carrying out all the required activities and those recommended activities that are identified as being relevant. ISO 9241-210 describes HCD activities in less detail than this document and can be used to provide an overview of a project's basic capabilities in human-centred design.

This document extends the model in ISO 9241-210, and elaborates the principles and activities as structured processes with defined outcomes for the execution of human-centred design within a project.

Annex C identifies the specific aspects of the processes in this document that are associated with the requirements and recommendations in ISO 9241-210 by mapping between them. Application of relevant HCD processes as described in document can be used as a means of showing conformance to ISO 9241-210. The extra detail can provide a basis for organizational improvements in human-centred design where any non-compliances are identified.

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Ergonomics of human-system interaction —

Part 220: Processes for enabling, executing and assessing human-centred design within organizations

1 Scope

This document describes the processes and specifies the outcomes by which human-centred design (HCD) is carried out within organizations. Human-centred design aims to meet requirements for human-centred quality (see Annex E) throughout the life cycle of interactive systems. The processes are described from the viewpoint of those responsible for the analysis, design and evaluation of the human use of interactive systems. The process descriptions include the purpose, benefits, outcomes, typical activities and work products for each process, and are for use in the specification, implementation, assessment and improvement of the activities used for human-centred design and operation in any type of system life cycle. They can also provide the basis for professional development and certification.

The processes are associated with the domains of ergonomics/human factors, human–computer interaction, usability and user experience. This document does not include specific methods for human-centred design, nor does it describe processes for organizational redesign.

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The scope of this document does not include other aspects of ergonomics, which include the design of organizations as well as systems for human use, and which extend beyond the domain of design; for example in the forensic analysis of the causes of accidents and in the generation of data and methods of measurement.

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NOTE 1 ISO/TS 18152 is a related standard with a broader scope than this document. It includes the organizational processes for the identification and handling of issues related to both users and other stakeholders.

The intended application of this document is computer-based interactive systems. While the processes apply to interactive systems that deliver services, they do not cover the design of those services. The relevant aspects of the processes can also be applied to simple or non-computer–based interactive systems.

NOTE 2 Human-centred design concentrates on the human-centred aspects of design and not on other aspects of design such as mechanical construction, programming or the basic design of services.

The process descriptions in this document provide the basis for a rigorous assessment of an enterprise's capability to carry out human-centred processes in compliance with the ISO/IEC 33000 family of standards.

This document is intended for use by organizations that want to address and improve their treatment of human-centred design of either their internal systems or the products and services they provide, and the procurement of systems and parts of systems. The processes can be applied by small- and medium-sized enterprises as well as by large organizations.

Copyright release for the process descriptions

Users of this document may freely reproduce the process descriptions contained in Clause 9 as part of any process assessment model, or as part of any demonstration of compatibility with this document, so that it can be used for its intended purpose.

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2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
accessibility
extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of user needs, characteristics and capabilities to achieve identified goals in identified contexts of use

Note 1 to entry: Context of use includes direct use or use supported by assistive technologies.

[SOURCE: ISO 9241-112:2017, 3.15]

3.2
context of use
combination of users, goals and tasks, resources, and environment

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Note 1 to entry: The "environment" in a context of use includes the technical, physical, social, cultural and organizational environments.

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Note 2 to entry: This can apply to an existing context of use or an intended context of use.

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[SOURCE: ISO 9241-11:2018, 3.1.15, modified — Note 2 to entry has been added.]

3.3
decomposition
breaking of a complex problem or system into smaller parts that are more manageable and easier to understand

3.4
effectiveness
accuracy and completeness with which users achieve specified goals

[SOURCE: ISO 9241-11:2018, 3.1.12]

3.5
efficiency
resources used in relation to the results achieved

Note 1 to entry: Typical resources include time, human effort, costs and materials.

[SOURCE: ISO 9241-11:2018, 3.1.13]

3.6
enterprise
that part of an organization with responsibility to acquire and to supply products and/or services according to agreements

Note 1 to entry: An organization may be involved in several enterprises, and an enterprise may involve one or more organizations.

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[SOURCE: ISO/TS 18152:2010, 4.4]

3.7
ergonomics
human factors
scientific discipline concerned with the understanding of interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance

[SOURCE: ISO 26800:2011, 2.2, modified — The Note has been omitted.]

3.8
evaluation
systematic determination of the extent to which an entity meets its specified criteria

[SOURCE: ISO/IEC 25041:2012]

3.9
goal
intended outcome

[SOURCE: ISO 9241-11:2018, 3.1.10]

3.10
harm from use
negative consequences regarding health, safety, finances or the environment that result from use of the system

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Note 1 to entry: The negative consequences can be for the user or for any other stakeholder.

Note 2 to entry: Although avoidance of harm from use, i.e. eliminating any exposure of risk that poses a potential harm, cannot be achieved completely, designing an interactive system can aim at mitigating risks to an acceptable minimum (see Annex E).

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[SOURCE: ISO 9241-11:2018, 3.2.4, modified — Note 2 to entry has been added.]

3.11
human-centred design
HCD
approach to system design and development that aims to make interactive systems more usable by focussing on the use of the system; applying human factors, ergonomics and usability knowledge and techniques

Note 1 to entry: The term "human-centred design" is used rather than "user-centred design" in order to emphasize that this document also addresses impacts on a number of stakeholders, not just those typically considered as users. However, in practice, these terms are often used synonymously.

Note 2 to entry: The objectives of human-centred design include identification of the technical functionality that is a prerequisite for human-centred quality.

Note 3 to entry: In this document, "human-centred design" is used as a noun phrase, and "HCD" as an adjective phrase.

[SOURCE: ISO 9241-210:2010, 2.7, modified — Note 2 to entry has been replaced and Note 3 to entry has been added.]

3.12
human-centred quality
extent to which requirements for usability, accessibility, user experience and avoidance of harm from use are met

Note 1 to entry: Provision of the necessary technical functionality is a prerequisite for human-centred quality.

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Note 2 to entry: Usability, accessibility, user experience and avoidance of harm from use can only be managed to the extent that they can be controlled by designed aspects of the interactive system.

Note 3 to entry: Human-centred quality is a collective term for the intended outcomes of interaction of the user with the system.

3.13
human-centred quality objective
objective for the design of an interactive system facilitating achievement of intended outcomes with appropriate usability, accessibility, user experience and avoidance of harm from use arising from the use of the system

Note 1 to entry: Human-centred quality objectives are statements of outcomes to be achieved for the users of the system in general. They are often provided by the sponsor of the system taking the perspective of its future users.

3.14
human factors data
information about humans and human behaviour

Note 1 to entry: This includes existing knowledge or new user related research. For example, anthropometric data, health and safety data, psychometric measurements, ergonomics standards, accessibility standards, and expert knowledge in human sciences (e.g. psychology, sociology, medicine, human computer interaction, behavioural science, anthropology, management science, education, personnel and staffing management), and codifications of this information and knowledge (e.g. international standards, legislative requirements, existing patents, good practice, style guides and project standards) as appropriate.

3.15
inspection-based evaluation
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evaluation based on the judgment of one or more evaluator(s) who examine or use a system to identify potential usability problems and/or deviations from established criteria

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Note 1 to entry: Established criteria typically include user requirements, usability guidelines in standards, design conventions contained in manufacturer guidelines and style guides, task models to be supported as well as standardized principles.

Note 2 to entry: Inspection-based evaluation is a generic term for methods that include, but are not limited to, heuristic evaluation, cognitive walkthroughs, standards inspection, pluralistic walkthroughs, and consistency inspections.

[SOURCE: ISO/IEC 25066:2016, 3.10, modified — Notes to entry 1, 3 and 5 were deleted and the remaining Notes renumbered.]

3.16
interaction object
<interactive system> control or component (including information) assisting the user in achieving specified goals using an interactive system

3.17
interactive system
combination of hardware and/or software and/or services and/or people that users interact with in order to achieve specific goals

Note 1 to entry: This includes, where appropriate, packaging, user documentation, on-line and human help, support and training.

[SOURCE: ISO 9241-11:2018, 3.1.5]

3.18
life cycle
evolution of a system, product, service, project or other human-made entity from conception through retirement

[SOURCE: ISO/IEC/IEEE 15288:2015, 4.1.23]

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3.19
process
set of interrelated or interacting activities that use inputs to deliver an intended result

[SOURCE: ISO 9000:2015, 3.4.1]

3.20
process activity
activity that, when consistently performed, contributes to achieving a specific process purpose

Note 1 to entry: In ISO/IEC 33001:2015 this is called a base practice.

Note 2 to entry: For some process activities, the need for the performance of the activity will depend on the project context.

3.21
process assessment
disciplined evaluation of an organization's processes against a process assessment model

[SOURCE: ISO/IEC 33001:2015, 3.2.15]

3.22
process benefit
positive achievement from the execution of a process

Note 1 to entry: Benefits are often spread broadly across the business and not necessarily related to the technical or business intent of executing a process.

Note 2 to entry: A benefit can provide the motivation to execute a process, but it may not be the primary reason to do so.

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3.23
process capability
capability of a process to meet its purpose as managed by an organization's management and process definition structures

Note 1 to entry: This usage differs from human capability, military capability and operational capability.

Note 2 to entry: Process capability levels are described in ISO/IEC 33002.

3.24
process category
set of processes addressing the same general area of activity

[SOURCE: ISO/TS 18152:2010, 4.15]

3.25
process improvement
set of actions taken to improve the quality of the organization's processes aligned with the business needs and the needs of other concerned parties

[SOURCE: ISO/IEC 33001:2015, 3.1.7, modified — The words "set of" have been added to the definition.]

3.26
process outcome
observable result of the successful achievement of the process purpose

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.34]

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3.27
process purpose
high level objective of performing the process and the likely outcomes of effective implementation of the process

Note 1 to entry: The implementation of the process is to provide benefits to the stakeholders.

[SOURCE: ISO/IEC/IEEE 12207:2017, 3.1.35]

3.28
project
endeavour with defined start and finish criteria undertaken to create a product or service in accordance with specified resources and requirements

Note 1 to entry: The term "project" is not intended to be exclusive to the development of a system. Projects include long-term activities related to a system, such as training, maintenance and support.

[SOURCE: ISO/IEC/IEEE 15288:2015, 4.1.33, modified — Note 1 to entry has been changed.]

3.29
prototype
<interactive system> representation of all or part of an interactive system, that, although limited in some way, can be used for analysis, design and evaluation

Note 1 to entry: A prototype can be as simple as a sketch or static mock-up or as complicated as a fully functioning interactive system with more or less complete functionality.

[SOURCE: ISO 9241-210:2010, 2.9]

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3.30
requirement
condition or capability that must be met or possessed by a system, system component, product, or service to satisfy an agreement, standard, specification, or other formally imposed documents

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[SOURCE: ISO/IEC/IEEE 24765:2017, 3.3431 meaning 2, modified — The Note and the Example have been deleted.]

3.31
risk
effect of uncertainty on objectives

Note 1 to entry: An effect is a deviation from the expected — positive and/or negative.

Note 2 to entry: Objectives can have different aspects (such as financial, health and safety, and environmental goals) and can apply at different levels (such as strategic, organization-wide, project, product and process).

Note 3 to entry: Risk is often characterized by reference to potential events and consequences, or a combination of these.

Note 4 to entry: Risk is often expressed in terms of a combination of the consequences of an event (including changes in circumstances) and the associated likelihood of occurrence.

Note 5 to entry: Uncertainty is the state, even partial, of deficiency of information related to, understanding or knowledge of an event, its consequence, or likelihood.

[SOURCE: ISO Guide 73:2009, 1.1]

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3.32
satisfaction
extent to which the user's physical, cognitive and emotional responses that result from the use of a system, product or service meet the user's needs and expectations

Note 1 to entry: Satisfaction includes the extent to which the user experience that results from actual use meets the user's needs and expectations.

Note 2 to entry: Anticipated use can influence satisfaction with actual use.

[SOURCE: ISO 9241-11:2018, 3.1.14]

3.33
service
means of delivering value for the customer by facilitating outcomes the customer wants to achieve

Note 1 to entry: Services can include both human-system interactions (e.g. accessing a word processor through the web) and human-human interactions (e.g. a citizen interacting with a clerk at the post office counter).

Note 2 to entry: The "customer" is a user, and does not necessarily have a financial relationship.

[SOURCE: ISO/IEC 20000-1:2018, 3.2.15, modified — The Notes to entry have been replaced.]

3.34
stakeholder
person or organization that can affect, be affected by, or perceive themselves to be affected by a decision or activity

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Note 1 to entry: Stakeholders can include: users, systems owners or managers and people who are indirectly affected by the operation of a system, product or service.

Note 2 to entry: Different stakeholders can have different expectations, needs, or requirements.

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[SOURCE: ISO 31000:2018, 3.3, modified — Note 1 to entry has been replaced and Note 2 to entry has been added.]

3.35
system
combination of interacting elements organized to achieve one or more stated purposes

Note 1 to entry: A system is sometimes considered as a product or as the services it provides.

Note 2 to entry: A complete system includes all of the associated equipment, facilities, material, computer programs, firmware, technical documentation, services and personnel required for operations and support to the degree necessary for self-sufficient use in its intended environment.

Note 3 to entry: A system can be composed of a product, service, built environment or combination thereof, and people.

[SOURCE: ISO/IEC/IEEE 15288:2015, 4.1.46, modified — Note 2 has been replaced and Note 3 added.]

3.36
task
set of activities undertaken in order to achieve a specific goal

Note 1 to entry: These activities can be physical, perceptual and/or cognitive.

Note 2 to entry: While goals are independent of the means used to achieve them, tasks describe particular means of achieving goals.

[SOURCE: ISO 9241-11:2018, 3.1.11]

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