6. Overview of Assessment Methods

In principle all aspects of a system are candidates for assessment in all phases of the system's development. In practice, some aspects are more prominent in some of the phases than in others. During its life cycle, the assessment may change in nature from being prognostic (during planning), to screening and diagnosing (prior to switching over to daily operation), to treating (in the handling of known error situations or shortcomings). Be aware, therefore, that even if a method is not listed under a specific phase, an information need may arise that requires inspiration from the methods listed under other phases.

Note that few of the references given include a discussion of the weaknesses, perils, and pitfalls of the method described.

6.1 Overview of Assessment Methods: Explorative Phase

The methods included in this section are particularly relevant to the assessment of issues raised during the establishment of a User Requirements Specification, such as objectives, requirements, and expectations.

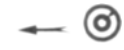
Method	Areas of application	Page no
Analysis of Work Procedures	Elucidation of how things are actually carried out within an organization.	73
Assessment of Bids	Comparative assessment of a number of offers from one or more bidders/vendors.	78
Balanced Scorecard	Ongoing optimization of the outcome of a development project by balancing focus areas by means of a set of indicators for a set of strategic objectives.	85
BIKVA	Critical, subjective assessment of an existing practice.	88

Delphi	• (Qualitative) assessment of an effect – for instance, where the solution space is otherwise too big to handle • Exploration of development trends • Elucidation of a problem area – for instance, prior to strategic planning.	106
Field Study	Observation of an organization to identify its practice and to clarify mechanisms controlling change.	111
Focus Group Interview	This is in principle used for the same purposes as other interview methods. In practice, the method is most relevant during the early Explorative Phase – for instance, where attitudes or problems of social groups need elucidation or when a model solution is being established.	116
Future Workshop	Evaluation and analysis of an (existing) situation in order to identify and focus on areas for change – that is, aiming at designing future practices.	125
Grounded Theory	Supportive analytical method for data acquisition methods that generate textual data, such as some open questionnaire methods and interviews (individual and group interviews).	128
Heuristic Evaluation	This is used when no other realizable possibilities exist – for instance, when: • The organization does not have the necessary time or expertise • There are no formalized methods • There is nothing tangible to assess yet.	132
Interview (nonstandardized)	This is particularly suited for elucidation of individuals' opinions, attitudes, and perceptions regarding phenomena and observations.	142
KUBI	Optimization of the outcome of a long-term development project, based on a set of user or customer/client-defined value norms and objectives.	147
Logical Framework Approach	Situation analysis to support the choice of focus for a development but at the same time a simple technique for incorporation of risk handling within project planning.	149
Organizational Readiness	Assessment of the readiness of a healthcare organization for a clinical information system.	154

Pardizipp	Preparation of future scenarios.	156
Questionnaire (nonstandardized)	Questionnaires are used to answer a wide range of questions, but its main area of application is (qualitative) investigations of subjective aspects requiring a high level of accuracy.	163
Requirements Assessment	Within the European culture the User Requirements Specification is the basis for purchasing an IT-based solution or engaging in a development project. Consequently, the User Requirements Specification is a highly significant legal document that needs thorough assessment.	180
Risk Assessment	Identification and subsequent monitoring of risk factors, making it possible to take preemptive action.	185
Social Network Analysis	Assessment of relations between elements within an organization (such as individuals, professions, departments or other organizations), which influence the acceptance and use of an IT-based solution.	190
Stakeholder Analysis	Assessment of stakeholder features and their inner dynamics, aiming to identify participants for the completion of a given task, problem-solving activity, or project.	192
SWOT	Situation analysis: establishment of a holistic view of a situation or a model solution.	196
Usability	Assessment of user friendliness in terms of ergonomic and cognitive aspects of the interaction (dialogue) between an IT system and its users. In this phase the concern is a planning or purchasing situation.	207
Videorecording	Monitoring and documenting as a means of analysis of what/how the work procedures or the users' activities are actually carried out or for investigation of complex patterns of interaction.	219
WHO: Framework for Assessment of Strategies	Assessment of different (development) strategies either individually or as a comparative analysis.	222

6.2 Overview of Assessment Methods: Technical Development Phase

The methods listed in this section are particularly suited to user activities during the development and installation of an IT-based solution and may be used to provide feed-back for the technical development.



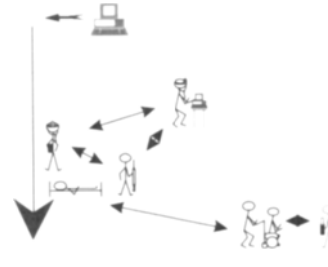
Assessment in this phase is typically carried out under experimental conditions and not during real operation. The phase is usually completed with a technical verification to make certain that all necessary functions and features are present and work properly in compliance with the established agreement.

Method	Areas of application	Page no
Balanced Scorecard	Ongoing optimization of the outcome of a development project by balancing focus areas by means of a set of indicators for a set of strategic objectives.	85
Clinical/Diagnostic Performance	Measurement of diagnostic 'correctness' (for instance, measures of accuracy and precision) of IT-based expert systems and decision-support systems.	91
Cognitive Assessment	Assessment of cognitive aspects of the interaction between an IT system and its users – for instance: • Identification of where and why operational errors occur • Identification of areas to be focused on for improvement in user friendliness.	96
Cognitive Walkthrough	Assessment of user 'friendliness' on the basis of system design, from specifications, muck-ups, or prototypes, aimed at judging how well the system complies with the users' way of thinking – for instance: • Identification of where and why operational errors occur • Identification of causes behind problems with respect to user friendliness and consequently identification of areas for improvement.	102

Heuristic Evaluation	This is used when no other realizable possibilities exist – for instance, when: • The organization does not have the necessary time or expertise • There are no formalized methods • There is not something tangible to assess yet.	132
Risk Assessment	Identification and subsequent monitoring of risk factors, making it possible to take preemptive action.	185
SWOT	Situation analysis: establishment of a holistic view of a situation or a model solution.	196
Technical Verification	Verification that the agreed functions are present, and work correctly and in compliance with the agreement. This may take place, for instance, in connection with delivery of an IT system or prior to daily operations and at any subsequent change of the IT system (releases, versions, and patches).	199
Think Aloud	An instrument for gaining insight into the cognitive processes as feed-back to the implementation and adaptation of IT-based systems.	204
Usability	Assessment of user friendliness in terms of ergonomic and cognitive aspects of the interaction (dialogue) between an IT system and its users.	207

6.3 Overview of Assessment Methods: Adaptation Phase

In this phase, evaluation has the purpose of providing support for the modification or refinement of the IT-based solution, work procedures, and functions implemented within the IT system to make them work optimally as a whole during daily operations. This phase should be fairly short, provided that the implemented solution is functioning well from the beginning.



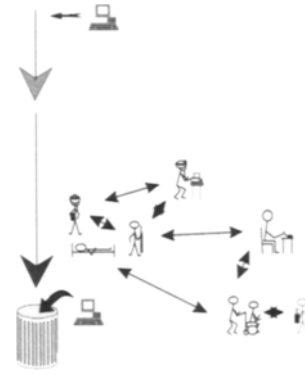
Now that real operational assessment can take place, ergonomic, cognitive, and functionality assessment will gain much more focus, as potential inadequacies or shortcomings will show themselves as operational errors, misuse, or the like.

Method	Areas of application	Page no
Analysis of Work Procedures	Elucidation of how things are actually carried out, in comparison with the expected. This includes the actual use of the IT system in relation to its anticipated use.	73
BIKVA	Critical, subjective assessment of an existing practice.	88
Clinical/Diagnostic Performance	Measurement of diagnostic 'correctness' (for instance, measures of accuracy and precision) in IT-based expert systems and decision-support systems.	91
Cognitive Assessment	Assessment of cognitive aspects of the interaction between an IT system and its users – for instance: • Identification of where and why operational errors occur • Identification of areas to be focused on for improvement in user friendliness.	96
Cognitive Walkthrough	Assessment of user 'friendliness' on the basis of system design, from specifications, muck-ups, or prototypes, aimed at judging how well the system complies with the users' way of thinking – for instance: • Identification of where and why operational errors occur • Identification of causes behind problems with respect to user friendliness and consequently identification of areas for improvement.	102
Equity Implementation Model	Examine users' reaction to the implementation of a new system, focusing on the impact of the changes such a system brings about for the users.	109
Field Study	Observation of an organization to identify its practices and to expose mechanisms that control change.	111
Focus Group Interview	This is in principle used for the same purposes as other interview methods. In practice, the method is most relevant during the early Explorative Phase – for instance, where the attitudes or problems of social groups need elucidation or when a model solution is being established.	116

Functionality Assessment	1. Validation of fulfillment of objectives (realization of objectives) – that is, the degree of compliance between the desired effect and the actual solution 2. Impact Assessment (also called effect assessment) 3. Identification of problems in the relationship between work procedures and the IT system's functional solution The method will expose severe ergonomic and cognitive problems, but it is not dedicated to capture details of this type.	120
Grounded Theory	Supportive analytical method for data acquisition methods that generate textual data, such as some open questionnaire methods and interviews (individual and group interviews).	128
Heuristic Evaluation	This is used when no other realizable possibilities exist – for instance, when: • The organization does not have the necessary time or expertise • There are no formalized methods • There is not something tangible to assess yet.	132
Interview (nonstandardized)	Is in particular suited for the elucidation of individual opinions, attitudes, and perceptions regarding phenomena and observations.	142
Prospective Time Series	Measurement of development trends, including the effect of an intervention.	159
Questionnaire (nonstandardized)	Questionnaires are used to answer a wide range of questions, but its main area of application is (qualitative) investigations of subjective aspects requiring a high level of accuracy.	163
RCT, Randomized Controlled Trial	Verification of efficacy – that is, that the IT system – under ideal conditions – makes a difference to patient care. Particularly used in studies of decision-support systems and expert systems.	172
Risk Assessment	Identification and subsequent monitoring of risk factors, making it possible to take preemptive action.	185
Root Causes Analysis	Exploration of what, how, and why a given incident occurred to identify the root cause of undesirable events.	188

Social Network Analysis	Assessment of relations between elements within an organization (such as individuals, professions, departments, or other organizations), which influence the acceptance and use of an IT-based solution.	190
SWOT	Situation analysis: establishing a holistic view of a situation or a model solution.	196
Technical Verification	Verification that the agreed functions are present, and work correctly and in compliance with the agreement. This may take place, for instance, in connection with delivery of an IT system or prior to daily operations and at any subsequent change of the IT system (releases, versions, and patches).	199
Think Aloud	An instrument for gaining insight into the cognitive processes as feed-back to the implementation and adaptation of IT-based systems.	204
Usability	Assessment of user friendliness in terms of ergonomic and cognitive aspects of the interaction (dialogue) between an IT system and its users.	207
User Acceptance and Satisfaction	Assessment of user opinion, attitudes, and perception of an IT system during daily operation.	215
Videorecording	Monitoring and documenting as a means of analyzing how work procedures and user activities, respectively, are actually carried out or for investigation of complex patterns of interaction.	219

6.4 Overview of Assessment Methods: Evolution Phase



The starting point in time of this phase is usually considered to be when the entire IT-based solution has reached a state of sufficient stability with respect to bugs and corrections and when evolutionary activities are started. Consequently, the shift between this and the previous phase may be fluid.

Method	Areas of application	Page no
Analysis of Work Procedures	Elucidation of how things are actually carried out, in comparison with the expected. This includes its use in relation to measures of effect.	73
Balanced Scorecard	Ongoing optimization of the outcome of a development project by balancing focus areas by means of a set of indicators for a set of strategic objectives.	85
BIKVA	Critical, subjective assessment of an existing practice.	88
Clinical/Diagnostic Performance	Measurement of diagnostic 'correctness' (for instance, measures of accuracy and precision) of IT-based expert systems and decision-support systems.	91
Cognitive Assessment	Assessment of the cognitive aspects of the interaction between an IT system and its users – for instance: • Identification of where and why operational errors occur • Identification of areas to be focused on for improvement in user friendliness.	96
Cognitive Walkthrough	Assessment of the user 'friendliness' on the basis of system design, from specifications, muck-ups, or prototypes of the system, aimed at judging how well the system complies with the users' way of thinking – for instance: • Identification of where and why operational errors occur • Identification of causes behind problems with respect to user friendliness and consequently identification of areas for improvement.	102
Delphi	1. (Qualitative) assessment of an effect – for instance, where the solution space is otherwise too big to handle 2. Exploration of development trends 3. Elucidation of a problem area – for instance, prior to strategic planning.	106
Equity Implementation Model	Examine users' reaction to the implementation of a new system, focusing on the impact of the changes such a system brings about for the users.	109
Field Study	Observation of an organization to identify its practices and to expose mechanisms that control change.	111

Focus Group Interview	It is in principle used for the same purposes as other interview methods. In practice, the method is most relevant during the early analysis stage – for instance, where attitudes or problems of social groups need clarification or elucidation or when a model solution is being established.	116
Functionality Assessment	1. Validation of fulfillment of objectives (realization of objectives) – that is, the degree of compliance between the desired effect and the actual solution 2. Impact Assessment (also called effect assessment) 3. Identification of problems in the relationship between work procedures and the IT system's functional solution The method will expose severe ergonomic and cognitive problems, but it is not dedicated to capture details of this type.	120
Grounded Theory	Supportive analytical method for data acquisition methods that generate textual data, such as some open questionnaire methods and interviews (individual and group interviews).	128
Heuristic Evaluation	This is used when no other realizable possibilities exist – for instance, when: • The organization does not have the necessary time or expertise • There are no formalized methods • There is not something tangible to assess yet.	132
Impact Assessment	Measurement of the effect – that is, the consequence or impact in its broadest sense – of an IT-based solution, with or without the original objective as a frame of reference.	135
Interview (nonstandardized)	This is in particular suited for elucidation of individual opinions, attitudes, and perceptions regarding phenomena and observations.	142
KUBI	Optimization of the outcome of a long-term development project, based on a set of user or customer/client defined value norms and objectives.	147
Prospective Time Series	Measurement of development trends, including the effect of an intervention.	159

Questionnaire (nonstandardized)	Questionnaires are used to answer a wide range of questions, but its main area of application is (qualitative) investigations of subjective aspects requiring a high level of accuracy.	163
RCT, Randomized Controlled Trial	Verification of efficacy – that is, that the IT system – under ideal conditions – makes a difference to patient care. In particular used for studies of decision-support systems and expert systems.	172
Risk Assessment	Identification and subsequent monitoring of risk factors, making it possible to take preemptive action.	185
Root Causes Analysis	Exploration of what, how, and why a given incident occurred to identify the root cause of undesirable events.	188
Social Network Analysis	Assessment of relations between elements within an organization (such as individuals, professions, departments, or other organizations), which influence the acceptance and use of an IT-based solution.	190
Stakeholder Analysis	Assessment of stakeholder features and their inner dynamics, aiming to identify participants for the completion of a given task, problem-solving activity, or project.	192
SWOT	Situation analysis: establishment of a holistic view of a situation or a model solution.	196
Technical Verification	Verification that the agreed functions are present, work correctly, and are in compliance with the agreement. This may take place, for instance, in connection with delivery of an IT system or prior to daily operations, and at any subsequent change of the IT system (releases, versions, and patches).	199
Think Aloud	An instrument for gaining insight into the cognitive processes as feed-back to the implementation and adaptation of IT-based systems.	204
Usability	Assessment of user friendliness in terms of ergonomic and cognitive aspects of the interaction (dialogue) between an IT system and its users.	207
User Acceptance and Satisfaction	Assessment of users' opinion, attitudes, and perception of an IT system at daily operation.	215

Videorecording	Monitoring and documenting as a means of analyzing how work procedures and user activities, respectively, are actually carried out or for investigation of complex patterns of interaction.	219
WHO: Framework for Assessment of Strategies	Assessment of different (development) strategies either individually or as a comparative analysis.	222

6.5 Other Useful Information

There is certain information that cannot be categorized under 'methods' but that should be included nevertheless because an understanding of these issues is valuable. In general, the areas of application outlined in the table below are valid for all phases within the life cycle.

Information	Areas of application	Page no
Documentation in an Accreditation Situation	Planning of assessment activities in connection with the purchase of a 'standard' IT system when the user organization is or considers becoming certified or accredited.	227
Measures and Metrics	Measures and metrics are used throughout evaluation, irrespective of whether it is constructive or summative. Planning of an assessment/evaluation study includes the conversion of an evaluation purpose to specific measures and subsequent establishing metrics for their measurement.	232
Standards	A number of de facto and de jure standards exists, which each defines a series of issues such as the contents of a User Requirements Specification, verification of an IT system, quality aspects of an IT system, as well as roles and relations between a user organization and a vendor in connection with assessment.	238