TECHNICAL REPORT

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Information technology — Process assessment — Guide for process improvement

Technologies de l'information — Évaluation des procédés — Guide de l'amélioration des procédés

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

In exceptional circumstances, when the joint technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide to publish a Technical Report. A Technical Report is entirely informative in nature and shall be subject to review every five years in the same manner as an International Standard.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC TR 33014 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

This first edition technically revises clauses of ISO/IEC TR 15504-4:2004.

Introduction

This Technical Report provides guidance on using process assessment as part of a complete framework and method for performing process improvement as part of a continual improvement activity. The guidance covers:

— invoking a process assessment;

— using the results of a process assessment;

— identifying improvement actions aligned to business goals;

— cultural issues in the context of process improvement;

— dealing with management issues for process improvement.

The overall goal of this Technical Report is to strengthen these needed abilities for continual improvement of processes in organizations. Organizations too often struggle with process improvement because of lack of focus on necessary process improvement abilities. This Technical Report will help an organization ensure benefits are realized from process improvement. It will also help an organization prepare for success with specific process improvement initiatives, programmes or projects. The Technical Report also describes the process improvement basics vital for performing a process improvement programme or project.

ISO/IEC TR 33014 deals with process improvement on three levels:

— Strategic, what goals to achieve, the motivation and direction.

— Tactical, how to achieve the goals of process improvement.

— Operational, how to perform the process improvement.

ISO/IEC TR 33014 has three improvement perspectives:

— Process perspective: Process improvement as a programme or project.

— Organizational perspective: Improvement of organizational improvability in order to ensure success with improvement projects.

— Project perspective: Improve a project´s improvability and reach improvement success.

This Technical Report is part of a set of International Standards designed to provide a consistent and coherent framework for the assessment of process quality characteristics, based on objective evidence resulting from implementation of the processes. The overall aim is to establish a framework for consistent and reliable assessment covering processes employed in the development, maintenance and use of systems across the information technology domain, and to the delivery and management of services employing IT-based systems. The set of standards, as a whole, addresses process quality characteristics of any type. Results of assessment can be applied for improving process performance, or for identifying and addressing risks associated with application of processes.

The set of International Standards ISO/IEC 33001 – ISO/IEC 33099 defines the requirements and resources needed for process assessment. The overall architecture and content of the set is described in ISO/IEC 33001.

Information technology — Process assessment — Guide for process improvement

1 Scope

This Technical Report provides informative guidance on using process assessment as part of a complete framework for performing process improvement as part of a continual improvement activity. It also provides guidance on how to strengthen and maintain the organization's abilities to ensure success with continual process improvement.

This Technical Report does not presume specific organizational structures, management strategies, life cycle models or development methods.

This Technical Report has its focus on continual process improvement, and the support for succeeding in continual process improvement – organizational improvability. Improvability is addressed both at the organizational perspective and at the project perspective. The organizational perspective is for large process improvement programmes and project perspective is for process improvement projects.

In the case of process improvement, the concepts and principles are appropriate for the full range of different business goals, application domains and sizes of organization, so that all types of organizations may use them. It is the same in the case of improvability.

Although the focus for this Technical Report is continual process improvement based on using process assessment as part of a complete framework and method for performing and ensuring success with continual process improvement, this Technical Report can also be used in related areas. One such related area is where continual improvement of processes takes a part in the development of the business. An example of this is when a process improvement initiative is identified in IT Service Management (ISO/IEC 20000). Continual process improvement can also be used to strengthen an organization's ability to carry out the improvement of services.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9000:2005, *Quality management systems — Fundamentals and vocabulary*

ISO/IEC 33001:—[1], *Information technology — Process assessment — Concepts and terminology*

[1] To be published.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 33001:—, ISO 9000:2005 and the following apply.

3.1
continual process improvement
on-going cycle of process improvement programmes to strengthen and improve the processes supporting business and include one or several improvement projects or initiatives, which can be implemented in series or in parallel

3.2
process improvement support element
way that an organization expresses support for process improvement projects or initiatives

3.3
improvability
inherent ability of an organization to support continual process improvement

4 Introduction and overview of continual process improvement

This Technical Report focuses on process improvement, based on utilising the results of a process assessment. This process improvement may be in the context of an improvement programme, improvement project or improvement initiative perspective.

Process assessment is carried out to characterise the performance of a process with respect to a specific process quality characteristic; this may be done as part of an initiative to improve this aspect of the process, or to determine the risks associated with the level of achievement of the characteristic in a particular context. Process assessment is the basis for the process improvement initiatives or programs supported by this Technical Report.

Improved business goals (or change in goals) are the main driver for improvement initiatives in an organization (clause 6.2). Process improvement programmes or improvement projects are the work carried out to realise the change (see Bibliography [35]). Process improvement also affects the strategies, requirements for competences, processes and sometimes the relation to the customers.

Continual process improvement is a cycle based upon the premise that in order to always meet or exceed customer needs, organizations must continuously improve. Besides providing guidance on process improvement, this Technical Report also focuses on how continual process improvement can be enhanced with organizational support.

The set of elements supporting improvement indicates improvability in this Technical Report. Improvability can be evaluated, strengthened and maintained. Improvability closely links business, people and change. .In order to accelerate improvements, it is important that an organization is aware of the various support elements that can affect improvement. Improvement means change and an organization needs to choose a change strategy that is appropriate to the way the organization works, and it needs to choose appropriate approaches and methods for organizing the improvement activities. During an improvement programme a change of strategy and methods has to be considered.

In relation to this Technical Report, ISO 9004:2009 (see Bibliography [20]) is relevant for the formulation of a business strategy, identification of business goals, performing resource management, learning from and following up on on-going improvement programmes and projects.

Additional knowledge about process improvement can be found in the assessment indicators of any process assessment model conformant with ISO/IEC 33004.

All necessary roles have to be enacted in any improvement initiative to reach success. For that reason a set of roles are defined in this Technical Report, and the roles are related to success with process improvement and organizational improvability.

Because of this broad organizational involvement, the audience and usage of this standard are accordingly broad.

Audience:

— Process assessors

— Process improvement leaders in organizations

— Process improvement leaders in process improvement training

— Consultants (organizational external and internal) supporting in process improvement

— Project managers

— Process experts

— Service managers

— Training practitioners

— Service improvement managers

— Process improvement sponsors (may be the same person as assessment sponsor in ISO/IEC 33002, but not necessarily).

— Process improvement project managers

Usage:

— Advice in relation to improvement following a process assessment

— General advice on how to ensure success with improvement initiatives

— Advice on change methods

— Training interest

— Organizational marketing of improvement initiatives internal and external

— Post improvement review to identify risks

— Determining the organizational improvability

— Improvement of processes in projects

— Consulting to enhance improvability

4.1 Framework

This standard deals with process improvement on three levels:

— Strategic, what goals to achieve, the motivation and direction;

— Tactical, how to achieve the goals of process improvement;

— Operational, how to perform the process improvement.

This standard also has three improvement perspectives:

— Process perspective: Process improvement as a programme or project;

— Organizational perspective: Enhancement of organizational improvability in order to ensure success with improvement projects;

— Project perspective: Enhance a project´s improvability and reach improvement success.

The three levels and three perspectives are combined in Table 1, and illustrate the entire framework.

All three perspectives have a common operational level, including the activities that implement the improvement.

The tactical level describes the support elements which best bolster a process improvement project's success rate, or an organizational success rate with process improvement programs in general. The tactical level differs for the perspectives on how to identify what to improve. For process improvement a process assessment is used.

The strategic level gives the basis for setting up an improvement programme, including definition of scope of change and identification of the overall change strategy.

Table 1 — Framework for process improvement and its support

LEVEL / PERSPECTIVE	PROCESS Process improvement	ORGANIZATIONAL Organizational improvability	PROJECT Project improvability
STRATEGIC		ENHANCE ORGANIZATIONAL IMPROVABILITY **Clause 6 Step 1 to 4**	
TACTICAL	IMPROVE PROCESSES **Clause 5 Step 1 to 3**	ENHANCE ORGANIZATIONAL IMPROVABILITY **Clause 6 Step 5 to 7**	ENHANCE PROJECT IMPROVABILITY **Clause 7 Step 1 to 2**
OPERATIONAL	IMRPOVEMENT PROJECTS **Clause 5 Step 4 to 8**		

This Technical Report can be used in three ways:

1) As a guide to perform process improvement that at the Process perspective includes both the Tactical and Operational levels.

2) As a guide to enhance an organization's improvability, which at the Organizational perspective includes all three levels of the framework: Strategic, Tactical and Operational levels.

3) As a guide to improve a project's improvability, which at the Project perspective includes both the Tactical and Operational levels.

Each improvement perspective has several steps. The steps and their relations are presented in Figure 1. These steps involve many important roles in an organization. This addresses the different types of roles in clause 4.2, and Informative Annex A discusses how their daily problems and solutions can be related to process improvement.

Clause 4.3 highlights the basics in process improvement, and clause 4.4 highlights the basics in enhancement of improvability for continual improvement of processes.

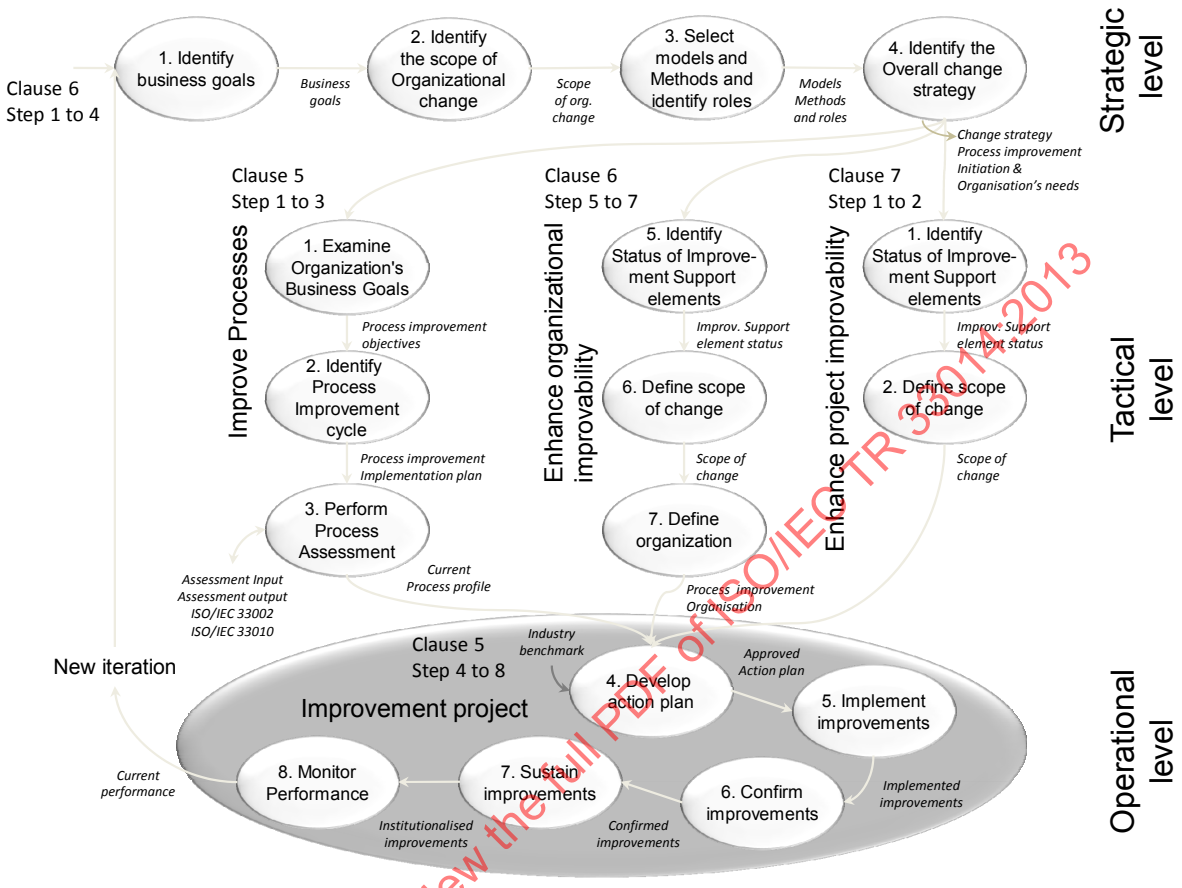

Figure 1 — Improvement framework of activities with steps and relations

4.2 Roles

When aiming for process improvement in an organization the project members, project managers, process owners, project organizers, top managers, users, experts and consultants, all have different roles to play in supporting process improvement and organizational improvability. This variety of perspectives needs to be coordinated and enacted.

There are three main roles: Performer, User, and Supplier, which are seen in at different levels within the organization.

The Performer is responsible for designing and implementing the improvement activities in the organisation. In a typical organization a process improvement unit or department (or the equivalent) or an Engineering Process Group (EPG) is responsible for carrying out the process improvement – thus having the role of Process Improvement (PI) performers at the organizational level. At the project level it could be a PI manager, and at the individual level it could be a PI Team member.

Sometimes the result of performing an activity is something useful for the performer him/herself, but most often another person will use these results — the User. The process improvement user will typically be an internal customer or end-user (e.g. quality or process department), a project manager or an individual practitioner. When it comes to change in an organization, the users (of the change) can be anyone in the organization (customer, project manager, practitioners, suppliers or performers). Only external organizational

experts are not regarded as users. So in this context the users include those who receive the results of the improvement work.

The Performer very often does not act alone. There may be a Sponsor supplying funding, a Champion helping with a technology transfer, and a Manager who makes sure that this specific activity is delegated to the Performer. In general a Supplier role is characterised by distributing resources, knowledge, and power. The PI supplier will be someone from management enacting the role as sponsor and/or champion. It could be a Manager or Sponsor at the organizational level, the project organization at the project level, and internal or external organizational experts at the individual level.

Table 2 (inspired by Bibliography [16]) gives an overview of the roles at the three different levels mentioned. Below, an account of how each role is enacted in the process improvement arena is described.

Table 2 — Three Process Improvement roles at three levels

Role / level	Organization level	Project level	Individual level
Supplier role	Management/ sponsor	Project Organisation	Expert
Performer role	Process Improvement Unit	Process Improvement Manager	PI Team member
User role	Customer	Project Manager	Practitioner

In an organization all these roles must be defined to be successful. They have to work closely together to "push" a process improvement through.

The nature of the problems perceived by each role is also very different. One of the keys to a more successful improvement initiative in an organization is to focus on this difference. If you have a Performer role, for example, then the less you focus on your "own" problems, the more you can help to solve problems for other roles, and thus achieve mutual success. See Informative Annex A for more information on roles, related problems and solutions in process improvement.

It is important to identify the various vital roles on the scene. Doing so makes visible which resources are available, who does what, and most importantly, who must cooperate in these important projects for the organization. Once these conditions are visible, the different roles can be used to create the greatest success.

All these roles must be defined in an organization to be successful in process improvement. All roles have to work closely together to successfully carry an improvement through.

4.2.1 Management / Sponsor

The Sponsor has the overall responsibility for aligning the improvement program according to the actual business goals. The responsibility for initiating and supporting the improvement activities in the organization is located here. The sponsor – typically a person from top management - is the person (or group) that endorses the improvement programs or projects and demands the results. This type of role is found among top managers with responsibility for business, product and process development. Only at such a level of the organization is there is enough power and influences to make the necessary impact.

4.2.2 Project Organization

The Project Organization (or Steering Committee) is the body responsible for defining, scoping and controlling projects in the organization. They have to follow the project closely, and if unexpected problems or necessary changes occur they have to make decisions on changes of the basis or direction of the project. An important task is to ensure results – which often require continued contact with, and on-going involvement of, different groups of stakeholders. Normally this group is selected from management. Depending on the situation, this group of people could be supported by external experts.

4.2.3 Experts

Experts can be internal or external experts or consultants. They have the necessary competencies to support Management or the Project Manager.

4.2.4 Process Improvement Unit (Process owners)

The Process Improvement Unit could be the department for Quality Assurance, a department for Methods or a less formal part of the organization such as a process improvement group. This Unit is the owner of the processes in the organization. It has the responsibility – often not clearly defined – to maintain the formal set up of processes in the organization, to develop new processes, and facilitate the deployment of processes. This role is often staffed by employees with strong interests in quality, efficiency and continual process improvement.

4.2.5 Process Improvement Manager

The Process Improvement Manager is the person (or persons) that prepares and carries out the improvement project in practice, sometimes even including the diffusion and adoption of the change in the organization. The manager must perform within the chartered course set by the PI top manager and is the facilitator for the PI effort. An important task is to run the project, including all normal project activities and disciplines such as planning, teaming, managing, monitoring and controlling the project and its risks. This role is often manned with an influential, high status, and knowledgeable project manager from within the organization.

4.2.6 Process Improvement Team Member

A Process Improvement Team Member is the person or group (or groups of persons) that forms the project team together with the Project Manager. The project is manned with people from across the organization, providing they possess the necessary competencies and qualifications.

4.2.7 Customer

Customers are stakeholders who are important to successful process improvement. The customer could be an internal organization like a method, process or quality department. It is important to perform a stakeholder analysis to identify the customers and make them a part of the improvement initiatives.

4.2.8 Project Manager

A Project Manager in every type of project is a typical user of the result of process improvement initiatives. They are users of process descriptions, methods for specific processes, and are usually employees with relevant competences. They need to be heard and involved, and often they are aware of the problems to be solved.

4.2.9 Practitioner

The Practitioner (or practitioners) are part of every project team and are using the results of process improvement initiatives. They use the results in their development of new products, and services. It is important to involve practitioners in identification of problems, and in the solution of the problems.

4.3 Basics in continual process improvement

Successful changes are initiated from the top of the organization. Senior management leadership is required to launch a change effort and to provide continuing resources and impetus, although ultimately, everyone in the organization is involved.

Key critical success factors of process improvement include:

— effective change requires an understanding of the current process and a goal – to use a map, you must know where you are and where you want to get to;

— process improvement demands investment, planning, dedicated people, management time and capital investment;

— process improvement is a team effort – those not participating may miss the benefits and may even inhibit progress;

— change is continual not a one-shot effort – it involves continual learning and evolution;

— process changes will not be sustained without conscious effort and periodic reinforcement.

The needs and business goals of the organization determine the process improvement goals that help to identify improvement actions and their priorities. Process improvement is accomplished in a series of steps or specific improvement actions such as introducing new or changed practices into, or removing old practices from, product development processes. The process reference models in ISO/IEC 33040 to ISO/IEC 33059 and the process assessment models in ISO/IEC 33060 to ISO/IEC 33079 may be used to identify practices to be included to improve the process. Achievement of process improvement goals should be measured quantitatively.

The basic principles of continual process improvement are:

— process improvement is conducted on the basis of process assessment and / or process effectiveness measures;

— process assessment produces a process profile which may be compared with a target process profile based on the organization's needs and business goals;

— process effectiveness measures relate the identification and priorities of improvement actions to the organization's needs and business goals, and also to the achievement of product development process goals;

— process improvement is a continual activity or process. Improvement goals identified and agreed within the organization are realised through a process improvement programme that continues through multiple cycles of planning, implementing and monitoring activities;

— improvement actions identified within a process improvement programme are implemented as process improvement projects;

— measures are used for monitoring the improvement project/programme in order to indicate progress and to make necessary adjustments;

— process assessment may be repeated in order to confirm that the improvements have been achieved;

— mitigation of risks is a component of process improvement and should be addressed from two viewpoints:

  — the risk inherent in the current situation;

  — the risk of failure in the improvement initiative.

4.4 Basics in improvability

Many organizations fail when they try to improve their processes. They may go through an assessment. They may start one or more improvement initiatives. They may measure what is done. They may even improve their development processes. But somehow their improvement results are limited, and the improvement process itself is ineffective.

Several organizational abilities have high influence on the success or failure of process improvement programs or projects. These abilities are expressed in a set of support elements for process improvement.

Critical success factors of improvability:

— understand that success of process improvement depends on the organizational improvability, i.e. how well the organization supports the improvement;

— demands investment, planning, dedicated people, management time and capital investment.

The basic principles of enhancing improvability are:

— using models and methods which involve the necessary roles in the organization from the early beginning of the initiated improvement and who support ongoing action;

— identification of the scope for the desired change;

— identification of the most important process improvement support elements to be enhanced in relation to the change; (See table 5 to table 8 with description of the elements).

— prioritising the process improvement support elements of improvability:

  — if the scope is at the organizational level – PI is based on the influence on business goals;

  — if the scope is at the project or programme level – PI is based on contingency factors;

— identification of the overall change strategy is critical to successful change implementation;

— improvement of the abilities to improve is a continual process which involve several type of roles and competences in an organization;

— methods for improvement actions are selected based on the selected overall change strategy;

— improvement actions identified are implemented as process improvement projects;

5 Process Improvement

5.1 Overview

Process assessment is carried out to characterise a process implemented in an organization with respect to a specific process quality characteristic; this may be done as part of an initiative to improve this aspect of the process, or to determine the risks associated with the level of achievement of the characteristic in a particular context. The results may be used to drive process improvement by analyzing the results in the context of the organization's business needs, and by identifying strengths, weaknesses and risks inherent in the processes.

Figure 2 illustrates the steps of process improvement utilising a conformant process assessment - as described in ISO/IEC 33002.

The ovals in Figure 2 represent steps in the process, and the arrows represent information being passed between steps.

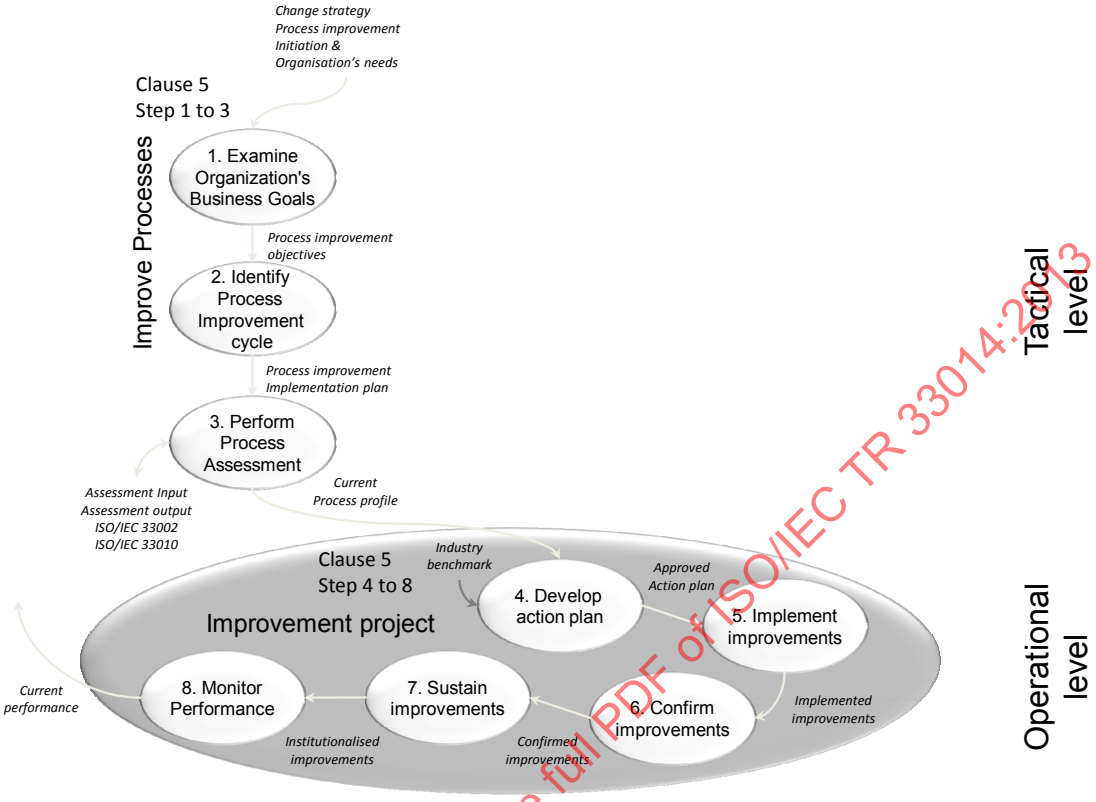

Figure 2 — Steps of process improvement

Each of these steps is elaborated in the following clauses.

5.2 Steps of process improvement

5.2.1 Step 1 - Examine organization's business goals

At strategic level step 1 clause 6.2 the business goals and existing stimuli for improvement, (the objectives of process improvement), are set.

Setting improvement objectives involves first determining which process reference model(s) will best address the organization's business goals. It also includes defining a set of target process profiles, which present the choice of the processes to be assessed and the improvement targets set, and which will guide identification of the most effective improvement actions.

It is necessary to analyse business goals found in step 1 clause 6.2 in the context of the improvement initiative to ensure the initiative has a sound foundation in budget, in the main process improvement priorities, and in relation to the improvement strategy.

5.2.2 Step 2 - Initiate process improvement cycle

The process improvement programme should be implemented as a project in its own right, with defined sponsorship, project management, budget, milestones and accountability. In short, the project should be managed according to a project management process, aligned to the process assessment model being used.

Sponsorship may be implemented in a variety of ways, according to the culture of the organization. In non-hierarchical or higher maturity organizations for example, sponsorship and project management may both be delegated to working level, although authorities, roles and responsibilities should always be clearly defined.

A Process Improvement Programme Plan should be produced and used to monitor progress. The plan should include:

— background, history and current status of organizational process improvement activities;

— improvement objectives derived from organizational business goals;

— organizational scope - the organizational boundaries for the improvement programme;

— stakeholder analysis;

— process scope - the processes to be improved;

— process improvement lifecycle;

— key roles and responsibilities;

— resources;

— appropriate milestones, review points and reporting mechanisms;

— risks associated with the programme, and the selected risk management process;

— activities to be performed to keep all those affected by the improvement programme informed of progress.

The Process Improvement Programme Plan should show how process change is to be implemented with least disruption to the on-going business of the company. It should show how the progressive implementation is to be introduced into existing organizational systems, and it should identify training required as a prerequisite to implementation of the change.

5.2.3 Step 3 – Perform a process assessment

A process assessment is performed in accordance with the requirements of ISO/IEC 33002 to characterise the performance of a process with respect to a specific process quality characteristic.

A plan and schedule for the assessment is developed which documents:

a) the required inputs for the assessment;

b) the activities to be performed in conducting the assessment;

c) the resources and schedule assigned to these activities;

d) the identification and defined responsibilities of the participants in the assessment;

e) the criteria to verify that the requirements of have been met;

f) a description of the planned assessment outputs.

The assessor(s) carry out assigned activities identified in the assessment approach and plan. Data is collected on the basis of direct or indirect evidence that is sufficient for the Class of assessment. Three Classes of assessment are defined with the following purposes:

— Class 1 - Results are suited for comparisons across different organizations.

— Class 2 - Results indicate the overall level of performance of the key processes in the organization unit.

— Class 3 - Results provide a general indication of process rating of the organizational unit.

The quantity and type of objective evidence needed to support each process attribute rating will depend upon the purpose and scope of the assessment.

The ownership of the assessment outputs and any restrictions on their use, plus any controls on information resulting from a confidentiality agreement, must be defined within the assessment input, reflecting any confidentiality agreements in place that affect the overall process improvement programme or process capability determination.

5.2.4 Step 4 - Develop action plan

The assessment results are analysed against the organization's business goals to:

— identify, analyse and list improvement areas;

— define specific improvement objectives and set targets;

— derive an action plan.

5.2.4.1 Identify improvement areas

Process improvement should be strongly supported by leadership, communication and motivation throughout the whole organization. Improvement actions can only be carried out efficiently if the appropriate cultural issues are acknowledged and addressed at all levels.

Improvement areas should be identified and prioritised based on a number of factors:

— analysis of the assessment output identifying strengths, weaknesses and risks related to the assessed processes;

— the organization's business goals, which provide general improvement objectives to be achieved through the improvement programme;

— client and customer expectations, which provide opportunities for improving customer satisfaction;

— industry norms and benchmarks that provide a basic comparison framework for assessment results;

— measurement results which, if already in place, identify improvement opportunities for the organization generally related to the improvement drivers;

— any risks associated with not achieving the stated improvement objectives or not successfully implementing identified improvement actions.

5.2.4.2 Analyse process strengths and weaknesses

Analysis of the current strengths and weaknesses of the process identifies process-related risk and indicates opportunities for improvement.

Strengths are identified as the processes with the highest process level ratings. Strengths may support process improvement as follows:

— strong processes may provide experience of good practices that could be adopted and institutionalized in the organization;

— processes with the highest process level ratings within a set of interrelated processes may show an opportunity for improving the effectiveness of the rest of the process category or set of interrelated processes.

Weaknesses derive from:

— processes with low process attribute ratings;

— processes with missing practices that are needed to enable the process to achieve a process purpose aligned with a specific need of the organization;

— unbalanced process attribute ratings within process levels that are necessary to achieve a specific business goal;

— low process attribute ratings across assessed processes that may indicate weakness in specific sets of interrelated processes.

Weakness is said to exist, whenever a gap is identified. For each identified gap, the analysis team may determine and record, with respect to the specified requirement or business goals:

— the nature of the weakness;

— the source or cause of the weakness;

— the potential consequences of the weakness;

— what would have to be done to correct the weakness;

— what the cost and benefit of correcting the weakness would be.

Similarly, the process attribute ratings of related processes should be compared. Improvement actions may be needed to correct any imbalance.

5.2.4.3 Review organizational improvement objectives

The processes and their relationships should be analysed in order to evaluate which processes have direct impact on the organizational improvement objectives identified in the Process Improvement Programme Plan. Specific relationships between single processes should be considered in order to identify processes which should be addressed together to fulfil certain improvement objectives. In this way, a priority list of processes to be improved may be derived. The processes in this list with low process level ratings may provide the best opportunity for improvement.

5.2.4.4 Analyse effectiveness measurements

Organizations with previous experience in process improvement may already have a base level of measurement experience in place, (e.g. based on ISO/IEC 15939). Where these are related to the existing organization's business goals and derived improvement objectives, it may be beneficial to analyse the current measurements to better understand what improvement is needed.

5.2.4.5 List improvement areas

A prioritised list of improvement areas should be compiled from all of the factors listed above. The selected improvement areas define the scope of the improvement actions. The scope could include:

— processes to be included;

— organizational boundaries for improvement;

— processes or projects to be either included or excluded.

5.2.4.6 Define detailed improvement objectives and set targets

Targets for improvement should be set for each improvement area. These may be either quantitative objectives for process performance, or target process profiles, or a combination of the two. They should be set with regard to the organization's business goals. This will typically require the iteration of a number of steps until a set of targets has been identified which meet the organization's business goals, which can be objectively measured, and which can reasonably be achieved. The key steps are:

— to define detailed objectives for each priority area for improvement;

— to devise suitable metrics to measure achievement of these objectives;

— to set appropriate target values for these metrics, taking due account of risks.

Higher maturity organizations and those which have already carried out previous improvement cycles, may already have established objectives, metrics and targets. These should be reviewed for their continuing suitability and adjusted as appropriate with regard to a current assessment of the organization's business goals.

When setting target process profiles, the following points should be considered:

— it is desirable for related processes to be at the same process level, unless there are over-riding considerations;

— it is generally unrealistic to seek to increase by more than one process level in a single cycle of improvement, since each level builds on the process level below.

5.2.4.7 Derive action plan

A set of actions to improve processes should be developed to meet the objectives and targets set in the previous step. Care should be taken to select a set of actions that support each other in achieving the complete set of objectives and targets. It is also desirable to include some improvement actions which yield clear short term benefits, particularly if the organization is new to process improvement, in order to encourage acceptance of the process improvement programme.

When carrying out this task the organization should:

— evaluate a number of scenarios to arrive at a set of actions which best meets the organization's business goals (risk reduction and incremental approach should be considered);

— use the assessment indicators in the process assessment model being used, as a basis for improvement actions;

— define success criteria for each action and state how progress will be measured (the metrics used to set the targets may provide suitable measurements);

— evaluate initial estimates of costs and benefits, schedule and risks for the proposed actions;

— identify responsibilities for the actions, and agree the responsibilities with those affected by the actions;

— identify recruitment and training needs.

The set of agreed actions should be documented as an Action Plan containing the following information:

— improvement actions with associated process objectives and improvement targets;

— responsibilities for actions;

— initial estimates of costs, benefits and schedule;

— risks to products and to the organization if actions are taken or not taken, and the implications for any schedule changes.

The Action Plan is a tactical plan, developed to meet the organization's business goals, which supplements the Process Improvement Programme Plan established at Step 2. The Process Improvement Programme Plan should be reviewed at this point and updated if necessary. Management should approve the updated Process Improvement Programme Plan and Action Plan, thereby committing the organization to undertake the planned improvements. The Action Plan should be communicated clearly to all affected staff.

5.2.5 Step 5 - Implement improvements

The Action Plan is next implemented in order to improve the organization's processes. Implementation may be simple or complex depending on the contents of the Action Plan and the characteristics of the organization. In general several implementation projects may be initiated, each concerned with implementing one or more actions from the Action Plan. Four main tasks are involved in each implementation project:

— selecting the implementation strategy;

— preparing and agreeing a detailed Implementation Plan;

— putting the Implementation Plan into effect;

— monitoring progress against the plan.

5.2.5.1 Implementation strategy

The overall change strategy is selected at the strategic level, as described in clause 6.5. In the detailed implementation a refining is necessary.

For the improvement to be successful, it is also important to choose the best organization for the implementation. In clause 6.8 a number of possible organisations are listed.

Where alternative implementation strategies are feasible, they should be evaluated and the most suitable selected. For instance, it may be possible to implement a given action either in small steps through piloting in a selected unit, or throughout the whole organization at the same time, or somewhere between these two extremes. Among the factors to consider are costs, time scales, and risks.

5.2.5.2 Detailed implementation planning

An Implementation Plan should be developed to identify:

— the objectives of the implementation project;

— the selected implementation strategy;

— the organization, responsibilities and organization change champions;

— the schedule for the progressive introduction of the process improvement;

— the resources needed;

— changes to the job descriptions of employees who are expected to implement, monitor, maintain or supervise the process change;

— risk management, including assessment, monitoring and mitigation;

— arrangements for monitoring progress;

— specification of success criteria, including process objectives and improvement targets.

The implementation project may need to carry out further analysis of improvement opportunities; where appropriate, the Implementation Plan should include:

— any further data collection and analysis needed to establish the underlying causes of unsatisfactory current measures of effectiveness and process profiles;

— evaluation of alternative proposals for corrective action, including analysis of costs and benefits;

— arrangements to capture cost and resource usage data, for instance if it is desired to carry out cost-benefit analysis.

Staff who will be required to implement the actions or be affected by them should be involved or consulted during development of the Implementation Plan and during evaluation of alternative approaches, in order to draw on their expertise and enlist their co-operation.

5.2.5.3 Implementing improvement actions

It is critical for successful improvement that due account is taken of human and cultural factors. In particular the following should be considered:

— how management can give support and leadership;

— what changes may be needed in values, attitudes and behaviour;

— how to establish commitment to objectives and targets;

— how to foster open communication and teamwork, including implications for organizational structures and reporting lines;

— whether changes are needed to recognition and reward systems;

— what education and training is required.

5.2.5.4 Monitoring implementation

Implementation projects should be monitored by the organization's management against Implementation Plans in order to:

— ensure that tasks progress as planned, and that appropriate corrective action is taken when necessary;

— check that achievement of the planned objectives and targets continues to be both realistic and relevant to the organization's business goals;

— gather data on effort and resources expended, in order to improve estimates for future process improvement projects;

— evaluate the impacts of the implemented improvement actions on the process attribute ratings and process level ratings;

— determine the extent to which the defined success criteria for the improvement project have been achieved.

Records should be kept for use both to confirm the improvements, and to improve the process improvement process itself.

5.2.6 Step 6 - Confirm improvements

When the implementation projects have been completed, the organization should:

— confirm that the planned objectives and targets have been achieved and that the expected benefits have been delivered;

— check that appropriate processes and practices have been adopted;

— confirm that the organizational culture has changed where appropriate;

— consider requesting a process assessment to confirm that the target process profile has been established;

The organization should also:

— re-evaluate risks associated with the process improvement programme

— re-evaluate costs and benefits.

Management should be involved both to approve the results and to evaluate whether the organization's business goals have been met.

If, after improvement actions have been taken, measurements show that process objectives and improvement targets have not been achieved, it may be desirable to redefine the process improvement project by returning to an appropriate earlier step.

5.2.7 Step 7 - Sustain improvements

After improvement has been confirmed, the processes need to be sustained at the process level. The improved processes should be used by all staff for which they are applicable. This requires management to monitor institutionalization of the improved process, and to give encouragement when necessary. Responsibilities for monitoring should be defined, as well as how this will be done, for instance by using appropriate measurements.

If an improved process has been piloted in a specific area or on a specific project or group of projects, it should now be deployed across all areas or projects in the organization where it is applicable. This deployment should be properly planned, resourced, and documented as part of the Process Improvement Programme Plan as appropriate. Consideration should be given to:

— who is affected;

— how to communicate both the changed process and the benefits expected from it (note: changes should be properly documented and approved);

— what education and training are necessary;

— when to introduce changes to the different areas of the organization, taking business goals into account;

— how to ensure that the changes have been made (for instance by conducting audits);

— how to ensure that the improved process performs as expected.

5.2.8 Step 8 - Monitor performance

The performance of the organization's processes should be continuously monitored, and new process improvements should be initiated as part of the continual process improvement programme.

The measures used for process monitoring should be chosen to suit the organization's business goals. Management should regularly review their continuing suitability. The risks to the organization and its products from using the processes should also be monitored and action taken as risks materialize or become unacceptable.

The process improvement programme should be reviewed regularly by management to ensure that:

— both the improvement programme and individual improvement projects, including their objectives and targets, remain appropriate to the organization's business goals;

— further improvement projects are initiated when and where appropriate as previous improvement projects have been completed;

— the process improvement process is itself improved based on experience;

— continual improvement becomes and remains a feature of the organization's values, attitudes and behaviour.

Further process assessments can be an important component of the continual improvement programme, for instance in the following circumstances:

— where a long term goal to achieve higher process levels is to be approached by stages;

— when changing organizational business goals indicate a requirement to achieve higher process levels;

— when there is a need to give a fresh impetus to improvement.

The extent to which improved processes have been institutionalized should be considered before scheduling further process assessments. It may be more cost-effective to delay assessing a process until improvements have been fully deployed, rather than expend resources assessing a process, which is in transition, when the results can be difficult to interpret.

6 Improvability basics – Organizational support for process improvement

Successful process improvement programmes or improvement projects are those aligned with the business goals of the organization.

An organization's ability for achieving success and avoiding failure—its improvability —depends on how well the organization copes with four groups of improvement support elements, listed in Table 3 and defined in clause 6.6.1:

Table 3 — Four groups of fundamental improvement support elements

1. Improvement support elements related to the enterprise *foundation* that the process improvement programmes or projects are instituted in.
2. Improvement support elements related to the *initiation* of projects, typically ideas for new PI or innovation projects.
3. Improvement support elements related to *projects*, from inception to delivery.
4. Improvement support elements related to results *in use*, from inception to full deployment.

Depending on the situation it will vary a lot which process improvement support elements will be the most important. An organization that has successfully deployed its processes, and a novice organization can have the same important support elements to focus on to enhance their improvability, (e.g. management support).

Identification of the most important process improvement support elements to enhance includes an evaluation. This evaluation can be carried out in an organizational perspective or in an improvement project (or programme) perspective.

When the status of the process improvement support elements is understood, a prioritising of which elements to enhance takes place. This may be done differently depending on whether the focus is on the organization or the project, and selected overall change strategy

Finally the improvement project or program is established, including action plan, organization, deployment and periodic review.

Depending on the overall change strategy, the scope and the process improvement support elements for improvement, many different solutions, tools and methods can be choosen. This Technical Report does not support this, but the knowledge of change strategy, scope, support elements helps the decision making.

6.1 Overview

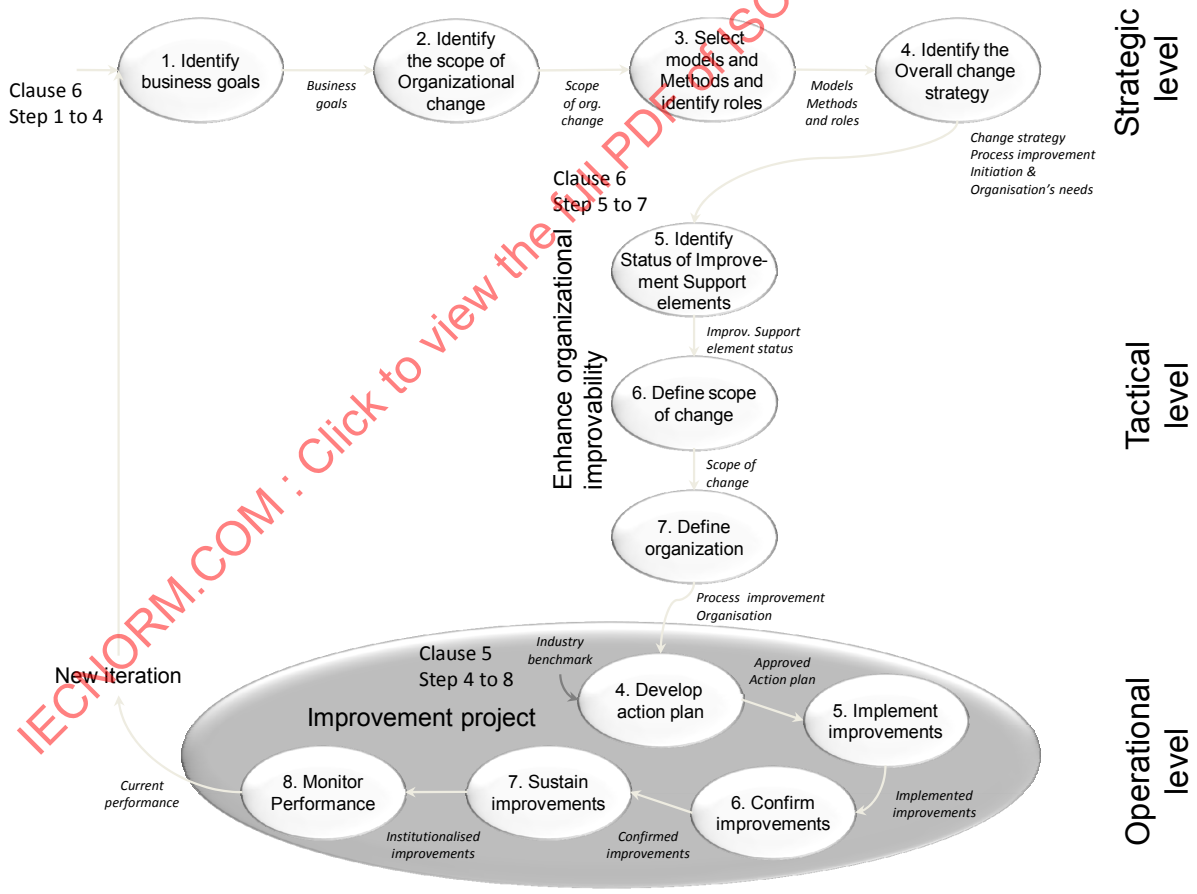

Figure 3 — Enhance improvability from organizational perspective - main steps

In Figure 3 the activities related to enhancement of the process improvement support elements at the organizational perspective are shown including all three levels: strategic, tactical and operational.

6.2 Step 1 - Identify business goals

Business goals are tightly linked to the organization's strategy, which is the implementation of the vision for the organisation. Any decision to be taken can be evaluated against its alignment with the business goals. Improvement of an organization includes a lot of important decision making. Because of this business goals are vital as basis for success with process improvement.

The business goals are often motivated by financial (e.g. profit level and/or turnover, greater cash flow), personal goals (e.g. Maslow's hierarchy of needs) or asset goals (e.g. creative urge), and are formulated as operational business goals centred on:

— achieving organizational growth with economical liberty of action;

— achieving customer satisfaction;

— achieving greater competitiveness;

— achieving improved business value associated with delivery of products or services.

These key management concerns become drivers that initiate process improvement throughout the organization with objectives of:

— increasing product and service quality;

— decreasing development and maintenance costs;

— decreasing time to market;

— increasing predictability and controllability of processes;

— decreasing variability between projects;

The business goals are the drivers for visions, strategies, decisions and many fundamental elements that support improvements. From an analysis of the organization's business goals and existing stimuli for improvement, the objectives of improvement are set. The more clearly the business goals link to objectives of improvement, the higher the probability of success for the improvement programme.

It is essential to build executive awareness of the necessity for a process improvement programme, which requires both managerial and financial commitments. The objectives of such a process improvement programme should be clearly stated and understood, and expressed using measurable objectives. The improvement programme should form part of the organization's overall strategic business plan.

The executive decision to undertake the process improvement programme, together with the identification of a preliminary improvement programme budget and the main process improvement priorities, enable the improvement process to progress. Organizational support for process improvement is described in greater detail in Clause 5.

6.3 Step 2 - Identify the scope of organizational change

To ensure the best possible setup of a process improvement project (or program) it is important to clarify the situation, the scope and the vision for the change at organizational level. Once this is clear for all involved, a common basis for communication during the work with the change is available.

The following steps can help with this clarification:

— Identify importance to the organization: e.g. vision for the change including goals and relation to business;

— Identify the involvement of the organization: e.g. involved stakeholders, organizational unit, and degree of involvement;

— Identify type of change: e.g. well known new, process or technology driven.

The scope at the program level could be the recommendations from a process assessment undertaken using a process assessment model conformant to ISO/IEC 33004.

6.4 Step 3 - Select models and methods and identify roles in process improvement

Depending on the scope, process improvement programmes can benefit from many different models and methods. It is necessary to take into account, which models and methods will give the best basis for success, eg. the process assessment models defined in the ISO/IEC 330xx series, or other models such as:

— COBIT® (Control Objectives for Information and related Technology, see Bibliography [19]),

— ITIL® (Information Technology Infrastructure Library, see Bibliography [22] and ref. [23]),

— GMP (Good Manufacturing Practice, see Bibliography [11]),

— SCRUM (see Bibliography [3]),

— TQM (Total Quality Management, see Bibliography [6]),

— CMMI®-DEV (Capability Maturity Model® Integration, see Bibliography [9]),

— CMMI®-AQC (see Bibliography [8]),

— CMMI®-SVC (see Bibliography [10]), or

— EFQM ®(European Foundation for Quality Management, see Bibliography [13]).

Use models and methods which involve the necessary roles in the organization from the early beginning of the initiated improvement and who support ongoing ation. Select the models and methods – e.g. in relation to business objectives and type of type of organization.

In clause 4.2 the different types of roles in process improvement is explained. This can be used in the identification of the roles.

6.5 Step 4 - Identify the overall change strategy

The overall change strategy is only relevant in an organizational perspective.

6.5.1 Overall change strategy

Changing an organization usually means selecting a change strategy from among a myriad of available change models. These change strategies differ in essential ways. It is the type of change and the organizational context that determines whether a change strategy is useful. Table 4 lists different change strategies and conditions that assist the selection of an organizational change strategy.

Table 4 — Change Strategies

Change strategy	Definition	Conditions
Attitude-driven	Change is driven by a focus on organizational learning, individual learning, and what creates new attitudes and behaviours. See Bibliography [17] – approach “Teaching”	*Where* employees learn from the experience of others. *Where* there is a need for change in attitudes, behaviour, or both. *Where* relationships between means and goals are unclear.
Commanding	Change is driven and dictated by (top) management. Management take on the roles of owner, sponsor, and change agent. See Bibliography. [17] – approach “Commanding”	*Where* formal structures need change. *Where* change is needed fast.
Employee-driven	Change is driven from the bottom of the organizational hierarchy when needs for change arise among employees. See Bibliography [1] and ref. [27]	*Where* the need for change arises among the employees. *Where* the result is more important than the process; no need for a standardised approach. *Where* an open management style allows change to arise from the bottom.
Exploration	Change is driven by the need for flexibility, agility, or a need to explore new markets, technology, or customer groups. See Bibliography [4] and ref. [30]	*Where* dynamic and complex surroundings make it important to explore opportunities.
Measures-driven	Change is driven by measures and measurements. See Bibliography [31] and ref. [32]	*Where* there are relatively stable surroundings so measurements from the past can be used to decide the future. *Where* the result of change is measurable and measurements are performed.
Optionality	Change is driven by the motivation and need of the individual or group. To a large degree, whether the individual takes the innovation into use is optional. See Bibliography [33]	*Where* target group is very diverse and has large individual or contextual differences. *Where* individuals that could (or should) change are highly educated, very knowledgeable, and self-aware.
Production-organized	Change is driven by the need for optimisation, cost reduction, or both. See Bibliography [17] – approach “Engineering” and ref. [4]	*Where* there are many homogeneous resources and workflows. *Where* there are relatively stable surroundings.

Change strategy	Definition	Conditions
Reengineering	Change is driven by fundamentally rethinking and redesigning the organization to achieve dramatic improvements. See Bibliography [2], ref. [5], ref. [12], ref. [14], ref. [15], ref. [28], ref. [29] and ref. [36]	*Where* a need exists for major change, e.g., when the organization has ground to a halt. *Where* nothing new happens. *Where* decisions are made but not carried out. *Where* a crisis is imminent.
Specialist-driven	Change is driven by specialists with either professional, technical, or domain knowledge. See Bibliography [7] – especially "adhocracy", ref. [30], ref. [34], ref. [37] and ref. [38]	*Where* work has such vast complexity and variety that there really is a need for special knowledge. *Where* there is access to the necessary specialists, possibly by in-sourcing them.
Socialising	Change in organizational capabilities is driven by working through social relationships. Diffusion of innovations happens through personal contacts rather than through plans or dictates. See Bibliography [17] – approach "Socialising"	*Where* organizational skills and capabilities need to be developed. *Where* no unhealthy power struggles occur (so people *can* talk). *Where* exemplary employees can be found.

Selection of a strategy depends on the scope of change and the situations and culture of the organization.

6.5.2 Identify the overall change strategy

The identification can lead to more than one relevant strategy. It will as well identify several irrelevant strategies. To ensure the right understanding of the situation of the organization this identification has to be done together with management. This also supports consistent top management support.

Identify and communicate the overall change strategy:

— Identify the overall change strategy in collaboration with top management

— Depending on the available knowledge, risks and the actual situation a selection is carried out.

— Verify the alignment between the overall change strategy and the business strategy for the organization.

— Describe and communicate the selected overall change strategy.

6.6 Step 5 - Identify status of improvement support elements

An organization's improvability depends on its ability to cope with the improvement support elements. Below is a description of four categories of the improvement support elements that can be identified and used to increase the possibility for success of process improvement projects.

6.6.1 Process improvement support elements

Tables 5, 6, 7 and 8, below, provide a detailed description of four groups of process improvement support elements. These elements are those who are evaluated, to identify the weak and strong elements.

These process improvement support elements can be used in an organizational perspective, an improvement programme or project perspective. If they are used in a project perspective, 3 elements are out of scope, because they are based outside the project: Idea creation, Vision and strategy and Organization culture.

Table 5 — Foundation category of process improvement support elements

Foundation process improvement support elements	Process improvement support elements related to the enterprise *foundation* that the projects are instituted in
Vision and strategy	To what extent does the company have a strategy or a vision that has been decided and communicated? A strategy can include a plan for the future, a deliberate selected positioning, a company design or perhaps just an idea of which key competences the company has and how they are used. Is the strategy supported and is it robust to changes in management?
Organization culture	To what extent does the company have a culture that promotes improvement and innovation? This includes such different things as "It can't be done in our company", if there is sufficient confidence between stakeholders, the frequency of organizational changes, if the culture is open and trusting or if there is a lot of politics and whether you decide more than can be completed.
Expectation management	Does the project align expectations with its surroundings – the management, users and other stakeholders? Are adequate incentives such as rewards, prestige, carrot and stick etc. used to manage expectations? Is there feedback to the employees and are their results made visible?
Knowledge management	Does the project systematically collect and share their knowledge and experiences both quantitative (e.g. measurements) and qualitative (e.g. retrospectives, interview)? Are there internal or external networks for experience exchange and cooperation across projects? Will the project use knowledge and experiences from others?
Management competence	Do the project owners have the proper competence with respect to the change / improvement i.e. do they make the right decisions in the right time. Does the steering group ask the right and difficult questions and are their decisions and actions consistent and visible? Do the management / steering group assign the right people and provide the necessary support and sparring to the project? Does the project inform and have dialogue with the management, so they can act competent and make the right decisions?

Table 6 — Initiation category of process improvement support elements

Initiation process improvement support elements	Process improvement support elements related to the initiation of improvement projects (or programme), typically ideas for new PI or innovation projects
Sensing urgency	To what extent established mechanisms were used to recognise the need for the project e.g. that existing work processes were inadequate or inefficient, that existing products or IT-systems were outdated, that the cooperation between business unit and IT development revealed a need or that the outside world requested it (customers, authorities etc.)

Idea creation	To what extent is there a breeding ground for new ideas? Do the ideas come from many different sources e.g. user needs, strategy and vision, customers, marked, new technology or new methods? Are the ideas sorted so it is possible to make decisions about which ones needs further processing?
Idea processing and communication	Has the idea been processed in a pre-investigation or business case prior to starting the project? Has the rationale behind the project been communicated to the rest of the organizations?

Table 7 — Project category of process improvement support elements

Project process improvement support elements	**Process improvement support elements related to improvement *projects (or programme)*, from the very first hour until a result is put into use**
Project goal and requirements	Does the project have clearly expressed goals, requirements and expected advantages? Are the requirements expected to be stable? Do the project team and the future users see the rationale behind the project as sensible?
Project team	Are the project team members highly motivated and have a proper attitude and profile for the project both professionally and personally? Does the project manager have the necessary project management skills and competence? Is the project team located physically close to each other and also close to the users? Does the project team practice efficient teamwork?
Project competence and knowledge	Does the project possess the necessary technical skills, the necessary application domain knowledge and knowledge about the development processes to be used? (e.g. development model, quality model, project management model, development standard)
Project process	Do the project apply sensible estimates, plans, follow-up (incl. established key measurements), risk management, test and quality reviews?
Project prioritising	Is the project prioritised in relation to other projects? Is the priority communicated and understood? Is there a reasonable coherence between the project's calendar time, resources, functionality and quality?
Management support	Do management support the project? The support can be about allocating the right resources at the right time and about acting as a steering group. Do management request results and do they assist whenever a crisis occurs?
Involvement of others	Are the users involved properly and at the right time? Are other stakeholders involved? If external resources are needed (e.g. consultants or other products) are they involved properly and at the right time?

Table 8 — Deployment category of process improvement support elements

Deployment process improvement support elements	Process improvement support elements related to results *in use*, from the moment the first user applies the new process or product until full deployment
Product quality	Is the product or process expected to be flawless, user friendly, simple, compatible with other relevant products, effective and efficient, fulfilling the requirements and provide advantages for the users in their work?
Deployment strategy	Does the project prepare a strategy for deployment (e.g. big bang, parallel, stepwise, voluntarily, when needed)? Does the project prepare a plan based on the strategy? Is it likely, that the plan will be followed when/if time presses?
Deployment means	Does the project consider a suitable combination of relevant information, communication, education and training, support and marketing of the product or process to be used?
Roles and responsibility	Are the roles and responsibilities regarding deployment well defined and manned? Are there appointed and trained ambassadors, change agents or champions who in reality will ensure, that the target group are able to and actually uses the product / process? Are roles for operations and maintenance clear and manned? Do management request results from deployment?
Operations and Maintenance	Will the product or process be operable in daily use? Is it possible to maintain the product or process as needed? Will transitions between development, operations and maintenance pass off smoothly?

The process improvement support elements of Product quality relates to quality aspects addressed in ISO/IEC 25010.

6.6.2 Identify and use the improvement support elements

For an organizational change it is important to have the scope in mind, when the improvement support elements are discussed. For process improvement projects or programs, the process improvement support elements should be evaluated in the context of this type of project. The Sensing urgency element for the process improvement project could be revealed by a process assessment (conformant with ISO/IEC 33002), or by an internal process for checking the suitability of the development processes.

Start with an opening meeting for all involved persons in the event evaluating the process improvement support elements.

Identify the status of the elements through interviews. If the perspective is organizational, then interview management and a representative group of projects. If the perspective is at the project level it is only the project and management just above the project which is interviewed.

Annex B elaborates on the use of process improvement support elements in an assessment to answer how good you are at improvement.

6.7 Step 6 - Define scope of change – and what to change

After the evaluation of the improvability elements, the identification of which elements to enhance has to be made and prioritized in light of their impact on business. To be able to do that, a scoping has to take place together with management. It is important to have the same scope in mind during the evaluation.

6.8 Step 7 – Define organization for enhancement and process improvement

Two important issues, organization of process improvement and bringing the right roles in play, are very important.

— To ensure successful enhancement of improvability, enhance the support elements. Perform an evaluation of the improvability for the planned enhancement project.

— Then design an organization, which involves the necessary roles, select the improvement methods and run the enhancement project.

6.8.1 Enhance the improvability – the improvement support element

During the evaluation of the improvability factual data about the organization and its current strategic improvement initiatives are gathered. Use this to describe and illustrate the scope for the planned or already initiated changes.

When the process improvement support elements for enhancement have been selected, then identify the most effective change approaches. There are many possibilities depending on the situation and focus, e.g. training, workshops, introduction of methods or tools, new competences through education or new employees, champion driven change, seminars, train-the-trainer, use of consultants, collaboration with other departments or companies, hotline …

Methods for enhancement actions are chosen based on the selected overall change strategy described in clause 6.5.

Improvement actions identified can be implemented as process improvement projects. This is described in clause 5 where process, assessment and improvement has to be interpreted as respectively improvability elements, evaluation and enhancement.

6.9 Organization of process improvement work

Successful change is highly dependent on the way improvement work is organized in an organization. Improvement work should aim to enhance communication, keep improvers bound to practice and deploy the improvements in the organization.

The identified overall change strategy in step 4 – clause 6.5 combined with the status of the process impovement support elements in step 5 – clause 6.6 and the identified scope of change – clause 6.7 can be used to select one of the five different ways to organize the improvement programme or project described in clause 5:

1) **Centralised Process Improvement** the classic way of organizing PI. Thus in one organization — no matter how large — there is one central organizational unit having the sole responsibility for improvement work in the organization.

2) **Decentralised Process Improvement work** attempts to take advantage of decentralisation. Positioning oneself close to the customer—the users themselves—is one example. Another way is to dispatch PI personnel or process consultants to the projects; yet another is to delegate process related tasks to the existing project team.

3) **Cross-organizational teams** - a strategy for getting people from different organizational units together to share knowledge, prioritise improvements, or solve problems. A team is continuous and a visible entity in the organization, whereas projects are more temporary. A cross-organizational team can be a valuable communication channel and link to the organization for management or a central PI group.

4) **Knowledge agents** - a structure built on the fact that key knowledge resides in the minds of people. Therefore it is often recommended to rotate individuals between PI and traditional IS development,

partly to bring new experience into PI work, but also to bring updated PI knowledge into development practice.

5) **Targeted Process Improvement projects** or Process Improvement Teams. The projects are initiated and completed according to the organization's improvement plan. Depending on the scope of the improvement (and the scope of the project), different competencies are required, thereby calling upon different members of the organization.

Consider thoroughly these five different ways to organize process improvement in relation to the main tasks implementing the change or process improvement.

In Annex C an example on an organization including the defined roles (except the role experts) in clause 4.2 is given.

7 Enhance project improvability

An improvement project's ability to achieve success and avoid failure—its improvability —depends on its essential improvement support elements. The knowledge about the status of these elements is important to strengthen the projects ability to succeed.

Enhancing the project's improvability includes an evaluation of the elements, definition of scope and finally an enhancement initiative.

Enhancement of the elements can be treated as a process improvement project – described in clause 5.

7.1 Overview

In Figure 4 the activities in relation to enhancement of the improvement support elements at project perspective are shown including the two levels: tactical and operational.

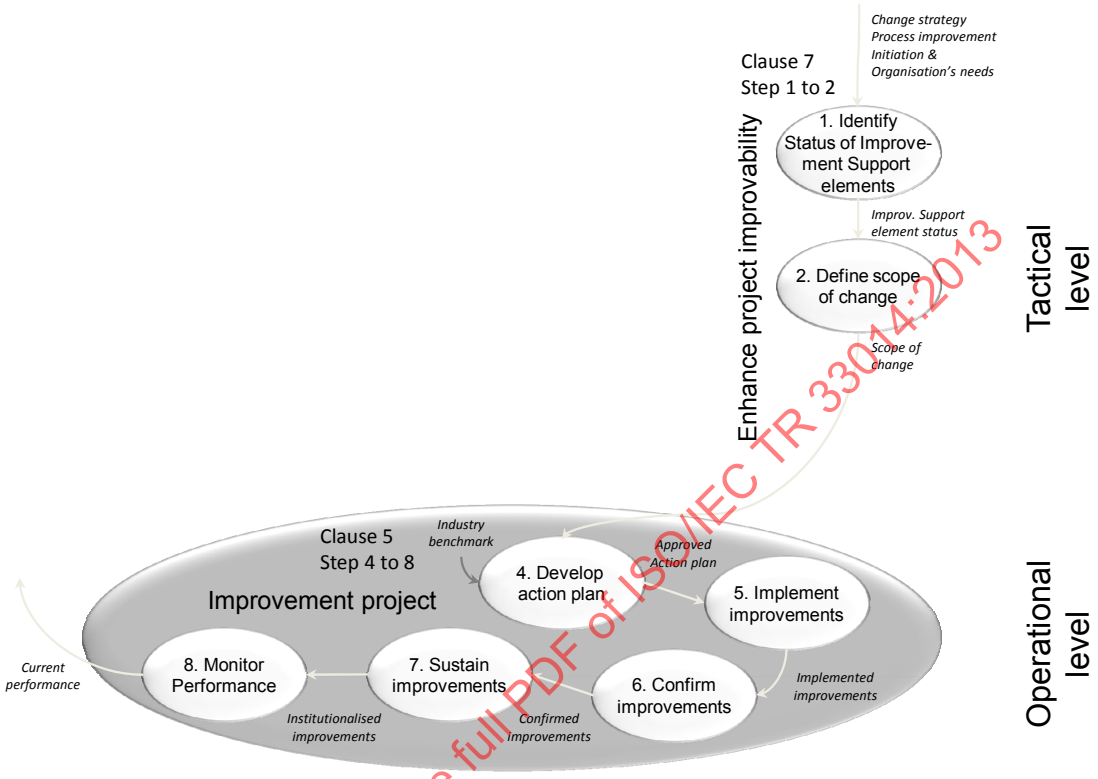

Figure 4 — Improve project improvability – main steps

7.2 Step 1 - Identify status of improvement support elements

The scope is a project and achieving the project goals.

The elements are described in clause 6.6. The following elements are not relevant in a project assessment of the improvability, because they are controlled/defined outside the project:

— Idea creation;

— Vision and strategy;

— Organization culture.

The identification of the status on the process improvement support elements is done through interviews with the project group, and in case of business critical projects possibly supplemented with an interview with the project owner.

It is important that the 17 elements in the project model are well understood, and that everyone is familiar with the process and their role, before moving on to the interview.

Project participants are interviewed about the 17 elements, which are discussed one at a time – and rated.

Annex B elaborates on using the assessment to answer how good you are at improvement, and indirectly performs a risk assessment on the project, telling which elements will eventually give rise to problems in reaching success.

7.3 Step 2 - Define scope of change – and what to change

After the status of the process improvement support elements is identified, a scoping has to take place.

When an evaluation of improvability is performed at the project perspective, then the following described scoping mechanism is used to select the elements which are most important to improve.

Five contingency factors are essential for scoping an improvement project. These five factors are important and relevant to the four groups of elements in the model relating to the capacity for achieving success and avoiding failure. These five factors are listed below, illustrated in Figure 5 and subsequently described.

1) Project extent: project team size, duration, and complexity.

2) Project scope: number and diversity of the users.

3) Importance to organization.

4) Technology and domain knowledge.

5) Perceived change.

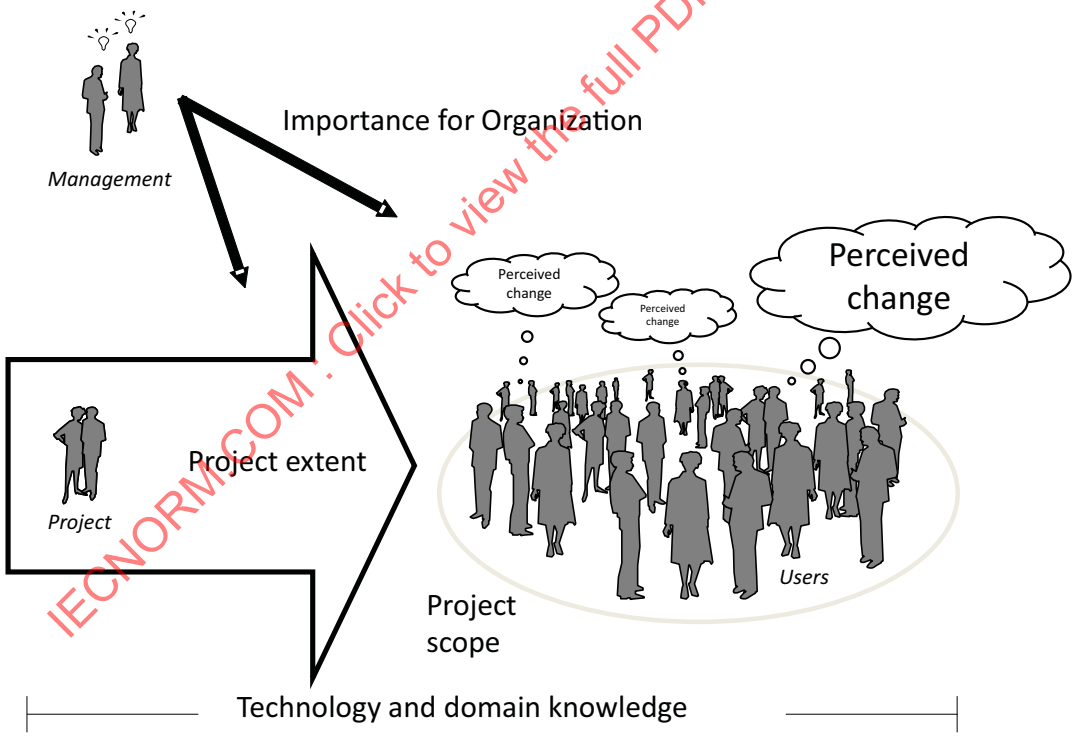

Figure 5 — The five contingency factors of importance

1. Project Extent. The extent of a project is about project team size, project duration, and complexity.

The number of people involved in and around a project determines the number of knowledge transfer pathways. A product development setting may be characterised by either a large or a small set of knowledge-transfer pathways. Any developers, users, marketers, or maintenance people added to the project increase the number of pathways. The communication task increases considerably with the extent of a project.

The perception of extent will also be influenced by the complexity of the task. The more complex a project is, the larger it will be perceived. Number of requirements for the project can express this condition.

The duration of a project is connected to the perception of extent as well, expressed in number of months.

2. Project Scope. The number and diversity of the users, has a significant effect. If a group is small and very homogeneous, then it is easy to target that specific group. If the group is homogeneous, one or a few representatives usually can talk on behalf of the group. On the other hand, if the user group is inhomogeneous or very large, then it is difficult to really target the group. In the latter case, segmentation is often necessary.

3. Importance of the project for the organization. This relates to factors like top-management support and commitment by the stakeholders. Commitment means attachment to or identification with the issue in question. For this contingency factor the coherence is that the more commitment and attention from management, the easier it is to be project manager. Because the more important the project, the more management attention. On the other hand, if the project is at the bottom of the attention list seen from top management or the project sponsor, then it is impossible to get anyone's attention. Thus, it is much harder to run a project of low importance to the organization.

4. Technology and application domain. Is the development team already familiar with the used technology and the application domain, or is it new for them? This factor includes three problem areas: the thin spread of application domain knowledge, fluctuating and conflicting requirements, communication bottlenecks and breakdowns and lack of technical knowledge, for example, about a new technology.

5. Perceived change, or the amount of change perceived by the users and their organization. The notion of perceived change is about factors affecting user acceptance of the result of the change.

The characteristics of a project as described above can be used to identify which elements in the model are important for the improvement project, and which are less important.

Table 9 — Relationship between characteristics of a project and the 17 improvability elements.

Contingency factors	High level of factor means HIGH importance for:	Low level of factor means LOW importance for:
Project extent	Project process Project team Project goals & requirements	Project process
Project scope	Involvement of others Product quality Deployment strategy Deployment means Roles and responsibilities	Deployment strategy Deployment means Roles and responsibilities
Organizational importance	Project prioritization	Management support
Technology and domain knowledge	Project competence Involvement of others Project goals & requirements	Project competence Involvement of others
Perceived change	Product quality Deployment strategy Deployment means Roles and responsibilities	Deployment strategy Deployment means Roles and responsibilities

Table 9 describes how the characteristics of a project relate to the 17 process improvement support elements in the model. High importance increases focus on the listed process improvement support elements. Low score decreases focus on the elements. This is used to select the elements for enhancement. E.g. for large-extended projects, the following elements (out of the 17 elements) become very important: Project process, Project goals and requirements, and Project team. For a small-size project with very few developers, the Project's process may be of lesser importance. If there are many different users, e.g. the project scope is broad, the deployment elements become important. If there are only a few users, e.g. the project scope is narrow; the deployment elements become less important.

7.4 Enhance improvability at project perspective

During the evaluation of the improvability factual data about the project are deducted. This is used to describe and illustrate the scope for the planned or already initiated changes.

When the elements for enhancement have been selected, then identify the most effective change approaches.

Methods for improvement actions are selected based on the elements for enhancement.

Improvement activities are initiated and implemented in the project. Where other projects in the organisation are in an equal situation improvement actions identified can be implemented as process improvement projects. This is described in clause 5, where process, assessment and improvement has to be interpreted as respectively improvability elements, evaluation and enhancement.