
**Systems and software engineering —
Information technology project
performance benchmarking
framework —**

**Part 2:
Requirements for benchmarking**

*Ingénierie des systèmes et du logiciel — Cadre de conduite de tests de
performance de projet de technologies de l'information —*

Partie 2: Exigences pour le marquage de référence



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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.

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 29155-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 7, *Software and systems engineering*.

ISO/IEC 29155 consists of the following parts, under the general title *Systems and software engineering — Information technology project performance benchmarking framework*:

- *Part 1: Concepts and definitions*
- *Part 2: Requirements for benchmarking*
- *Part 3: Guidance for reporting*
- *Part 4: Guidance for data collection and maintenance*

Further parts might follow.

Introduction

This part of ISO/IEC 29155 identifies the required activities and tasks that are necessary to successfully identify, define, select, apply, and improve benchmarking for information technology (IT) project performance.

This part of ISO/IEC 29155 is intended to provide guidance for organizations which are preparing to introduce and implement benchmarking techniques to evaluate performance of IT projects. This part of ISO/IEC 29155 assists organizations to establish a well-defined process to perform benchmarking. The process includes activities and tasks not only for data selection and comparison in IT project performance benchmarking but also for data collection, benchmarking repository management, and providing benchmarking instruments.

This part of ISO/IEC 29155 is developed as the second part of multiple parts which will complete the IT project performance benchmarking framework as is shown in [Figure 1](#). This part of ISO/IEC 29155 provides the requirements for a benchmarking process.

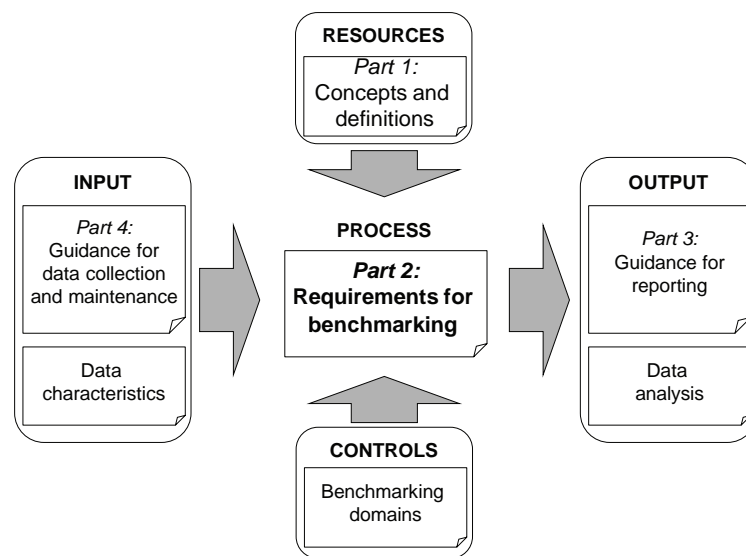


Figure 1 — IT project performance benchmarking standards overview

Systems and software engineering — Information technology project performance benchmarking framework —

Part 2: Requirements for benchmarking

1 Scope

This part of ISO/IEC 29155 provides general requirements for processes of “the information technology (IT) project performance benchmarking framework” by prescribing:

- the requirements for the processes for individual activities within the benchmarking framework (e.g. conduct benchmarking, maintain repository, submit data),
- the tasks necessary to successfully execute activities and equip them with components, both of which are defined in ISO/IEC 29155-1.

This part of ISO/IEC 29155 is intended for use by any stakeholder(s) of IT project performance benchmarking (e.g. benchmarking user, benchmark provider, benchmarking service provider, and IT project team).

NOTE The following are examples of how this part of ISO/IEC 29155 can be used:

- by a systems and software supplier to implement a benchmarking process to estimate and/or evaluate performance of an IT project,
- by a systems and software acquirer (or a third-party agent) for evaluating the performance of the supplier's IT project,
- by a benchmark provider to implement processes to collect and analyze IT project data and provide benchmarks,
- by a benchmarking service provider to implement various services (e.g. providing instruments for benchmarking, or conducting an instance of benchmarking for a benchmarking user).

This part of ISO/IEC 29155 does not prescribe how to utilize benchmarking results, nor does it prescribe the name, format, or explicit content of the documentation that results from the benchmarking processes.

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/IEC 29155-1, *Systems and software engineering — Information technology project performance benchmarking framework — Part 1: Concepts and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 29155-1 and the following apply.

3.1

data submitter

person or organization that provides IT project data to be included into a benchmarking repository

3.2

repository owner

person or organization that owns and maintains a benchmarking repository

3.3

task

smallest unit of work subject to management accountability; a well-defined work assignment for one or more project members

Note 1 to entry: Related tasks are usually grouped to form activities.

[SOURCE: IEEE 829-2008 IEEE Standard for Software and System Test Documentation, 3.1.38]

4 Abbreviated terms

CBa	“Conduct Benchmarking” activity
IBa	“Issue Benchmarks” activity
IT	Information Technology
MPa	“Measure IT Project” activity
MRa	“Maintain Repository” activity
MBLa	“Manage benchmarking Business Level” activity
MPLa	“Manage benchmarking Program Level” activity
PIa	“Provide Instruments” activity
SDa	“Submit Data” activity
URa	“Utilize benchmarking Results” activity

5 Benchmarking process model

5.1 Outline of the benchmarking process model

IT project performance benchmarking requires various mutually related activities to be executed systematically as presented in [Figure A.1](#). In addition, it outlines requirements for data retention and storage activities for an organizational benchmarking repository.

To ensure that all activities in the benchmarking framework will be managed and systematically executed, this part of ISO/IEC 29155 adopts a three-layered benchmarking management process model (see [Figure 2](#)) that consists of:

- **Businesslayer**, which takes responsibility for organizational business decision making and commitment,
- **Program layer**, which controls all benchmarking activities in the organization and supervises projects,
- **Project and operational layer**, which consists of various projects and/or operations to perform one or more allocated activities.

NOTE 1 The project and operational layer corresponds to the IT project performance benchmarking framework that was introduced in ISO/IEC 29155-1 (Concepts and definitions) of which an excerpted outline is included as [Annex A](#).

NOTE 2 Depending on the maturity of the organization, IT project performance benchmarking might include only the activities in the project and operational layer. For example, an organization might choose to pilot a benchmarking activity as a single instance of benchmarking.

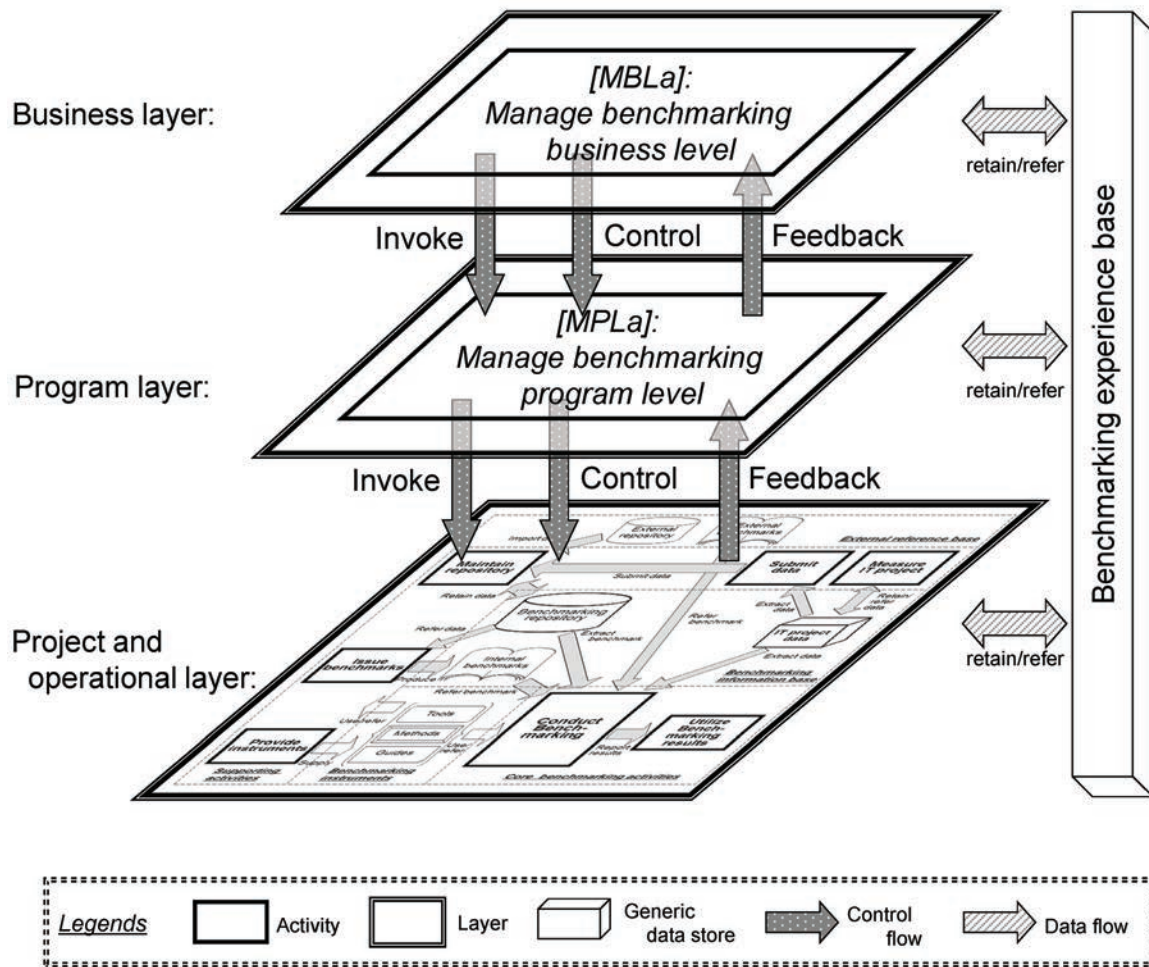


Figure 2 — Benchmarking process model

Table 1 presents a description of the activities for which each layer is responsible, and to which activities other layers participate.

NOTE 3 In this part of ISO/IEC 29155, the word “project” (except when it is prefixed with IT as in, IT project) means performing a benchmarking activity as a project.

Table 1 — Responsibility and activity assignments in benchmarking process model

Assignment (Action)	Responsibility		
	Business layer	Program layer	Project and operational layer
Identify organizational needs and priorities for benchmarking, establish long term benchmarking plan, identify and allocate the necessary resources, and commit to the execution of benchmarking plan.	R	C, I	I
Establish execution plan to implement the benchmarking plan, allocate the necessary activities to multiple projects and operations, invoke and manage progress.	C	R	C, I
Prepare and execute activity.	I	C, I	R
Responsibilities: R: Responsible, C: Consulted, I: Informed.			

The processes at each layer require the following task groups:

- [G1] “**Initiating**”, which launches a project,
- [G2] “**Planning**”, which establishes a project plan,
- [G3] “**Executing**”, which conducts one or more benchmarking activities,
- [G4] “**Evaluating**”, which evaluates processes and outcomes of the benchmarking activities,
- [G5] “**Improving**”, which plans the changes to be implemented for future benchmarking based on lessons learned.

5.2 Requirements and tasks for business layer

The following tasks should be performed:

- a) identify business goals for the organization,
- b) specify how benchmarking can provide information to support the business goals,
- c) launch a benchmarking program,
- d) create and maintain the benchmarking plan,
- e) receive and evaluate the benchmarking feedback against the business goal(s),
- f) decide improvement actions.

Strategic management of benchmarking is performed at the business layer. For this reason, the organization should execute a “manage benchmarking business level” activity.

The activity includes, but is not limited to, following tasks:

- specify the purpose of adopting IT project performance benchmarking,
- map the organizational focus on the aspects of IT project performance,
- define role(s) of the organization (e.g. benchmarking service provider and/or benchmarking user),
- check strategic programs to justify the business goals of organization,
- estimate the amount of resources to be invested in the benchmarking program,
- check and justify the organizational policy to allocate outsourced or in-house resources in various benchmarking activities.

- determine acceptance criteria for the program,
- assign the program to one or more organizational units,
- acquire commitments to ensure the execution of the program,
- evaluate the adequacy of human and financial resources to execute the program.

5.3 Requirements and tasks for program layer

At the program layer, a program steering committee shall be organized to activate and control each program.

The program steering committee shall:

- a) determine the total number of projects and operations within the program,
- b) establish a project and operational level work breakdown plan for the execution of the program,
- c) divide benchmarking activities into projects and operations,
- d) assign projects and operations to organizational units,
- e) launch projects and operations by allocating necessary resources,
- f) synchronize the management practices,
- g) supervise and control the progress,
- h) perform mutual adjustments to coordinate the project(s) and operation(s),
- i) indicate the observable improvements to business layer.

The organization should execute a “manage benchmarking program level” activity.

The activity includes, but is not limited to, following tasks:

- break the assigned mission (purpose) of the program into projects and operations,
- determine acceptance criteria for projects and operations,
- list the benchmarking activities which are essential for achieving the mission,
- determine which of the activities will be outsourced and which will be performed by the organization itself,
- appoint the activities to certain organizational units or individuals,
- initiate projects and operations to execute the activities,
- monitor progress and re-direct projects and operations if necessary.
- maintain the execution plan.

5.4 Requirements and tasks for project and operational layer

5.4.1 General requirements

Project and operational layer consists of one or more projects and operations, which may execute one or more benchmarking activities each. Projects and operations are categorized into two different types:

- **First-time project or operation**, which usually requires additional effort from a wider range of skilled resources from several organizational units to perform research and development of all the

instruments and procedures. They can be used within this project or operation and potentially re-used for future projects or operations.

- **Replicated project or operation**, which usually can build on the successful experiences by using established framework that was set up for previous benchmarking activities.

Within a benchmarking program, replicated projects or operations are usually executed several times and/or within several organizational units in parallel.

The following are general requirements throughout all activities in benchmarking framework:

- a) Inputs and outcomes of projects and operations shall be documented,
- b) Procedures defined in a first-time project or operation shall be documented in detail to ensure quality of replicated projects adopting the procedures,
- c) All projects and operations shall be continuously evaluated for not missing improvement opportunities,

NOTE 1 This includes continuously executed tasks such as daily routine work.

- d) Training and/or education materials should be prepared to ensure quality and efficiency of project or operation.

Individual requirements and examples of detailed tasks for each activity are described below.

NOTE 2 Benchmarking report requirements and data collection processes will be defined in other parts of ISO/IEC 29155.

5.4.2 “Conduct benchmarking” activity

The “conduct benchmarking” activity includes, but is not limited to, the tasks listed in [Table 2](#).

Table 2 — Tasks for “conduct benchmarking” activity

Task group	Task ID	Task name	Task description
Initiating			
	CBa010	Allocate resources	Assign resources, organize team(s), assign human and financial resources, and draft a schedule and milestones.
	CBa020	Perform training	Perform training and/or education of the benchmarking instruments, use of existing and/or ad hoc benchmark(s), use of IT project data, and reporting procedures.
	CBa030	Initiate control	Initiate the control process.
Planning			
	CBa040	Identify purpose	Identify the specific purpose of the benchmarking user to conduct an instance of benchmarking, and determine the goals of the benchmarking and the criteria by which it will be judged as being successful (e.g. “determine quality criteria” to judge delivery of the product).
	CBa050	Specify information needs	Specify information products of benchmarking user to fulfill the identified goals.
	CBa060	Determine evaluation method	Determine evaluation method (e.g. metrics, analysis method, judgment criteria) to provide the identified information products.
	CBa070	Define measures	Define input and output measures to be analyzed.

Table 2 (continued)

Task group	Task ID	Task name	Task description
	CBa080	Determine data sources	Determine how to gather benchmarks (i.e. extract from benchmarking repository, refer internal benchmarks and/or external benchmarks), and data from IT project. This task may include, but is not limited to: validation of data quality, and risk analysis to refer external benchmarks.
	CBa090	Select analysis method	Select the most appropriate analysis method, define the procedure to execute the method, and identify necessary instruments and check their availability. Instruments may need to be developed or sourced externally.
	CBa100	Determine judgment method	Determine judgment method and criteria by which the benchmarking analyst produces outcomes, define the procedure to execute the judgment, and identify necessary instruments and their availability.
	CBa110	Specify report contents	Determine the list of items to be included in the report, the presentation format, reporting media, and so on.
	CBa120	Design report procedure	Design when and how to create the report.
	CBa130	Design report review	Define the report review procedure. This task includes, but is not limited to, report review procedure, identify reviewer(s), document acceptance criteria, and dispute resolution process.
	CBa140	Determine report submission	Determine the procedure of when and to whom the report should be submitted.
Executing			
	CBa150	Define data gathering procedure	Define and document the procedure to gather benchmark and IT project data.
	CBa160	Assign data gathering resources	Determine assignment of resources to gather and manage the data.
	CBa170	Implement data gathering instruments	Implement necessary instruments to gather and manage data.
	CBa180	Define analyzing procedure	Define and document the procedure to analyze comparable data.
	CBa190	Implement analyzing instrument	Implement necessary instruments to analyze comparable data.
	CBa200	Define evaluating procedure	Define and document the procedure to evaluate the analyzed data.
	CBa210	Implement evaluating instruments	Implement necessary instruments to evaluate the analyzed data.
	CBa220	Define reporting procedure	Define and document the procedure for report creation and submission.
	CBa230	Gather data	Gather data from IT project(s).
	CBa240	Acquire benchmark	Acquire the benchmark by either: 1) referring internal and/or external benchmark(s), or 2) extracting a set of data from the benchmarking repository and processing it to be a benchmark.
	CBa250	Compare data	Compare gathered data against the selected benchmark by using analysis method, and evaluate the result by using evaluation method.

Table 2 (continued)

Task group	Task ID	Task name	Task description
	CBa260	Produce report	Produce the benchmarking report by documenting and/or diagrammatizing the results.
	CBa270	Submit report	Submit the benchmarking report.
Evaluating			
	CBa280	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	CBa290	Record evaluation results	Record the evaluation results to benchmarking experience base.
Improving			
	CBa300	Analyze and prioritize issues	Analyze detected issues and lessons learned and prioritize them.
	CBa310	Establish improvement plan	Establish and document plan to improve.
	CBa320	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	CBa330	Report immediate actions	Report immediately performed actions to program management.
	CBa340	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within the allocated resources.
	CBa350	Record improvement results	Record the results of improvement to benchmarking experience base.

5.4.3 “Utilize benchmarking results” activity

The “utilize benchmarking” activity includes, but is not limited to, the tasks given in [Table 3](#).

Table 3 — Tasks for “utilize benchmarking results” activity

Task group	Task ID	Task name	Task description
Initiating			
	URa010	Allocate resources	Assign resources, organize team(s), assign human and financial resources, and draft a schedule and milestones.
	URa020	Perform training	Perform training and/or education to understand and interpret the benchmarking outcomes.
	URa030	Initiate control	Initiate the control process.
Planning			
		<No tasks are defined>	
Executing			
		<No tasks are defined>	
Evaluating			
	URa810	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	URa820	Record evaluation results	Record the evaluation results to benchmarking experience base.
Improving			

Table 3 (continued)

Task group	Task ID	Task name	Task description
	URa830	Analyze and prioritize issues	Analyze detected issues and lessons learned and prioritize them.
	URa840	Establish improvement plan	Establish with a plan to improve.
	URa850	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	URa860	Report immediate actions	Report immediately performed actions to program management.
	URa870	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within the allocated resources.
	URa880	Record improvement results	Record the results of improvement to benchmarking experience base.

5.4.4 “Measure IT project” activity

The ISO/IEC 29155-1 benchmarking framework assumes that before an organization considers introducing IT project benchmarking, they would be already collecting project metrics as part of their standard project management practices. It is therefore assumed that:

- data required as input into the “conduct benchmarking” and “submit data” activity can be extracted from “IT project data” (data store), and
- necessary steps for the organization are to identify the process to extract data from “IT project data” (data store), to arrange the extracted data, to validate data quality, and then submit the extracted data to the repository owner..

Additional IT project measurement is necessary when requested data cannot be created from existing data in the “IT project data” (data store).

This part of ISO/IEC 29155 does not prescribe general requirements and/or recommendations on how to establish and execute measurement process(es) in IT projects.

NOTE Systems and software measurement process is standardized in ISO/IEC 15939.^[4]

This part of ISO/IEC 29155 concentrates on specifying tasks to ensure a set of data required by “conduct benchmarking” and/or “submit data” activity be ready to be extracted from “IT project data” (data store).

The “measure IT project” activity includes, but is not limited to, the tasks given in [Table 4](#).

Table 4 — Tasks for “measure IT project” activity

Task group	Task ID	Task name	Task description
Initiating			
	MPa010	Allocate resources	Assign resources, organize project team(s), assign human and financial resources, and draft a schedule and milestones.
	MPa020	Perform training	Perform training and/or education of procedures and instruments to classify and measure IT projects.
	MPa030	Initiate control	Initiate the control process.
Planning			

Table 4 (continued)

Task group	Task ID	Task name	Task description
	MPa040	Identify measurement purpose	Identify the practical purpose of the benchmarking user to measure IT project(s) (e.g. evaluate quality to judge delivery of the product) or the purpose of the repository owner to add data into the benchmarking repository.
	MPa050	Specify data needs	Specify the data needs of the benchmarking user to measure IT projects.
	MPa060	Determine data extraction method	Determine data extraction method (e.g. data gathering, arrangement, and validation method) to provide necessary data.
	MPa070	Define measures and data collection	Define input and output measures to be prepared, and determine how and when to gather input data (measures) from "IT project data".
	MPa080	Define data arrangement method	Define algorithm(s) to produce output data (measures), define the procedure to execute the algorithm, and identify necessary instruments and their availability (e.g. develop in organization, incorporate from data from outside of organization).
	MPa090	Define data validation method	Determine data quality validation method, criteria and reporting format, define procedure to execute the validation, and identify necessary instruments and their availability.
	MPa100	Design dataset format	Design the dataset format (e.g. list of data elements, presentation format, media) to implement data submission to the benchmarking user or the repository owner.
	MPa110	Design data creation procedure	Design the data creation procedure (e.g. when and how to create dataset) to implement data submission to the benchmarking user or the repository owner.
	MPa120	Design data submission procedure	Design the data submission procedure (e.g. when and to whom to submit dataset) to implement data submission to the benchmarking user or the repository owner.
Executing			
	MPa130	Implement data collection procedure	Define, document and implement procedure for collecting IT project data.
	MPa140	Determine measurement resources	Determine assignment of resources to gather and manage the data.
	MPa150	Implement measurement instruments	Implement necessary instruments (e.g. SQL) to gather and manage data.
	MPa160	Specify data arrangement procedure	Define and document procedure to arrange data.
	MPa170	Implement data arrangement instruments	Implement necessary instruments (e.g. program) to arrange data.
	MPa180	Specify data validation procedure	Define and document procedure to validate the quality of created data.
	MPa190	Implement data validation instruments	Implement necessary instruments (e.g. checklist, program) to evaluate the analyzed data.
	MPa200	Specify submission procedure	Define and document procedure to submit dataset.
	MPa210	Implement submission instruments	Implement necessary instruments (e.g. program), to submit dataset.
	MPa220	Collect data	Gather measurement data from "IT project data" (data store).

Table 4 (continued)

Task group	Task ID	Task name	Task description
	MPa230	Arrange data	Arrange extracted data to produce necessary dataset.
	MPa240	Validate data quality	Validate data quality of produced dataset and document findings.
	MPa250	Submit data	Submit the dataset and data validation report to benchmarking user or repository owner.
Evaluating			
	MPa260	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	MPa270	Record evaluation results	Record the evaluation results to benchmarking experience base.
Improving			
	MPa280	Analyze and prioritize issues	Analyze and prioritize detected issues and lessons learned.
	MPa290	Establish improvement plan	Establish a plan to improve.
	MPa300	Inform improvement plan	Inform all stakeholders of the issues identified and plans for improvement.
	MPa310	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	MPa320	Report immediate actions	Report immediately performed actions to program management.
	MPa330	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within the allocated resources.
	MPa340	Record improvement results	Record the results of improvement to benchmarking experience base.

5.4.5 “Submit data” activity

The benchmarking framework in ISO/IEC 29155-1 is based on the presupposition that:

- various data are already defined and measured in IT project for its management purpose (e.g. quality or risk management) before an organization consider submitting data to repository manager to add it to the benchmarking repository, and
- source data for “submit data” activity can be created from “IT project data” (data store) in usual case.

Therefore, this part of ISO/IEC 29155 concentrates on tasks to select one or more IT projects in the organization which:

- meet the needs of the repository owner to enrich the benchmarking repository, and
- provide feedback to the data submitter to encourage ongoing benchmarking participation (e.g. regarding data integrity or potential improvements to data submission) and increase benchmarking effectiveness.

The “submit data” activity includes, but is not limited to, the tasks given in [Table 5](#).

Table 5 — Tasks for “submit data” activity

Task group	Task ID	Task name	Task description
Initiating			
	SDa010	Allocate resources	Assign resources, organize project team(s), assign human and financial resources, and draft a schedule and milestones of the data submission.
	SDa020	Perform training	Perform training and/or education of procedures and instruments to extract and submit IT project data.
	SDa030	Initiate control	Initiate the control process.
Planning			
	SDa040	Identify data submission purpose	Identify the practical purpose to submit data.
	SDa050	Specify data submission impact	Specify the impact of data submission to the data submitter.
	SDa060	Determine data submission policy	Determine the basic policy, conditions and criteria to select IT project.
	SDa070	Review data submission policy	Review and document data submission policy.
	SDa080	Define data selection criteria	Define criteria to select IT project to be submitted from “IT project data” and document it to implement the data submission. Selection criteria include viewpoints such as: 1) whether the characteristics of selected IT projects meet the needs of the repository owner, 2) whether the submission of selected IT projects not infringe nondisclosure agreement, 3) whether the data quality of selected IT project meet the needs of the repository owner.
	SDa090	Define data selection procedure	Define procedure for selecting IT project, prepare data, submit data, and follow up it, and document it to implement the data submission.
	SDa100	Define data submission instruments	Define detailed procedure to list candidate IT projects, checklists for selection and validation, and so on for selecting IT projects to implement data submission to the repository owner.
	SDa110	Define data submission algorithms	Define algorithm and detailed procedure to extract, arrange, and validate IT project data to implement data submission to the repository owner.
	SDa120	Define data submission procedure	Define detailed procedure to submit and follow up it to implement data submission to the repository owner. To support data submission, define procedure to submit dataset, and record it.
Executing			
	SDa130	Implement data selection instruments	To support data selection, implement instruments (e.g. program, announcement document template) to list candidate IT projects from “IT project data” (data store).
	SDa140	Implement policy control instruments	To support data selection, implement checklist to judge and validate whether an IT project can be submitted or not.
	SDa150	Implement data extraction instruments	To support data preparation, implement necessary instruments (e.g. program) to extract data from “IT project data” (data store).

Table 5 (continued)

Task group	Task ID	Task name	Task description
	SDa160	Implement data formatting instruments	To support data preparation, implement necessary instruments (e.g. program) to arrange data to fit to the requested format.
	SDa170	Implement data validation instruments	To support data preparation, implement necessary instruments (e.g. checklist, program) to validate the data quality.
	SDa180	Implement data submission instruments	To support data submission, implement necessary instruments (e.g. program, database), to submit and record data.
	SDa190	Select IT projects	Create candidate IT project list which meet the needs of repository owner and select IT projects which satisfy selection criteria.
	SDa200	Prepare IT project data	Prepare IT project data by extracting, arranging and validating data.
	SDa210	Submit IT project data	Submit the dataset to repository owner and record it and follow up to the inquiry from the repository owner.
Evaluating			
	SDa220	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	SDa230	Record evaluation results	Record the evaluation results to benchmarking experience base.
Improving			
	SDa240	Analyze and prioritize issues	Analyze and prioritize detected issues and lessons learned.
	SDa250	Establish improvement plan	Establish a plan to improve.
	SDa260	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	SDa270	Report immediate actions	Report immediately performed actions to program management.
	SDa280	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within the allocated resources.
	SDa290	Record improvement results	Record the results of improvement to benchmarking experience base.

5.4.6 “Maintain repository” activity

The “maintain repository” activity includes, but is not limited to, the tasks given in [Table 6](#).

Table 6 — Tasks for “maintain repository” activity

Task group	Task ID	Task name	Task description
Initiating			
	MRa010	Allocate resources	Assign resources, organize project team(s), assign human and financial resources, and draft a schedule and milestones.
	MRa020	Perform training	Perform training and/or education of procedures and instruments to receive, enter, and maintain IT project data.
	MRa030	Initiate control	Initiate the control process.
Planning			

Table 6 (continued)

Task group	Task ID	Task name	Task description
	MRa040	Identify market	Identify the target market from the viewpoints of: 1) ranges (i.e. within a specific organization, across several specific organizations, national-wide, world-wide), 2) types of target industry (e.g. manufacturing, financial, retailing. services, public utilities, civil services, defense), 3) types of target benchmarking users (e.g. IT vendors, IT users, academic people, public organizations), 4) categories of target project (e.g. customer specific new development, new product development, version enhancement).
	MRa050	Identify repository management purpose	Identify purpose and scope of benchmarking repository management.
	MRa060	Identify common user needs	Identify the most common information needs of the target benchmarking users to achieve their purpose of benchmarking, and then narrow them down to feasible volume by prioritizing from both viewpoints of benchmarking users and repository owner.
	MRa070	Identify repository management methods	Identify necessary input (data) and evaluation methods to produce output answer selected information needs.
	MRa080	Identify data sources	Identify data source and feasibility of data collection.
	MRa090	Design data elements	To implement the data collection and repository management, define data elements (i.e. basic measures) in detail (e.g. name, measurement unit, precision, measurement timing, measurement method).
	MRa100	Define data stores	To implement the data collection and repository management, design data stores for repository owner to maintain data such as: 1) originally received source data set, 2) data set under or before data validation, 3) master repository to retain validated data set, 4) the benchmarking repository to be released.
	MRa110	Define data input interfaces	To implement the data collection and repository management, define the data gathering method and procedure. Example of methods are: 1) Receive necessary data elements filled in questionnaire or data entry form, 2) Extract necessary data elements from various reports used in IT project, 3) Extract necessary data elements from existing data store of IT project or organization.
	MRa120	Define data protection procedures	To implement the data collection and repository management, identify privacy sensitive data elements to be protected, and define privacy protection mechanism and procedure.
	MRa130	Define data quality criteria	To implement the data collection and repository management, define validation criteria (e.g. checklist) and procedure to ensure data quality.

Table 6 (continued)

Task group	Task ID	Task name	Task description
	MRa140	Define benchmarking repository product	To implement the data collection and repository management, define details of benchmarking repository product such as: <ul style="list-style-type: none"> 1) data elements to be included, 2) media and format to release, 3) tools to be attached to extract or manipulate (e.g. statistical analysis, mathematical calculation) data, 4) license-related documents and procedure.
	MRa150	Define product support	To implement the data collection and repository management, design contact point (e.g. Web site, e-mail, telephone, fax) to support data submitter and user.
Executing			
	MRa160	Implement data stores	Implement the data stores and its support tools to maintain various data.
	MRa170	Implement data input interfaces	Implement the data input interfaces, which include, but are not limited to: <ul style="list-style-type: none"> — media and tools to receive data (e.g. questionnaire, data entry form, data extraction program), — documents or tools to invite data submission, — documents to announce policy statements on treatment and disclosure of data, privacy protection, and so on.
	MRa180	Implement data protection tools	Implement the privacy protection tools which include, but are not limited to: <ul style="list-style-type: none"> — privacy policy statement, and so on. — detailed procedure in the form of guidelines manual, and so on.
	MRa190	Implement data validation tools	Implement the data validation tools which include, but are not limited to <ul style="list-style-type: none"> — validation criteria in the form of checklist, validation program, and so on. — detailed validation procedure in the form of guidelines manual, and so on.
	MRa200	Implement product packaging tools	Implement the benchmarking repository production tools which include <ul style="list-style-type: none"> — media and tools to release benchmarking repository. — detailed product release procedure in the form of guidelines manual, and so on.
	MRa210	Implement product support tools	Implement the product support tools which include <ul style="list-style-type: none"> — detailed contact point procedure in the form of guidelines manual, and so on. — tools and equipments to operate contact point — contents of web-site, if applicable.

Table 6 (continued)

Task group	Task ID	Task name	Task description
	MRa220	Launch product and services	<p>Launch contact point and begin to invite data submission. This task usually includes:</p> <ul style="list-style-type: none"> — distribute of invitation document through multiple channels (e.g. by sending letter, sending e-mail, uploading to web, submitting press release), — provide data submission media (e.g. questionnaire, data entry form, tool) through multiple channels. — announce policy statements on data treatment, data disclosure, privacy protection, and so on.
	MRa230	Receive data	<p>Receive IT project dataset from data submitter and transact it. This task usually include the following:</p> <ul style="list-style-type: none"> — Receive dataset and register reception. It might include putting agreements on data treatment and disclosure. — Register data submitter and perform privacy protection procedure. — Register received dataset to data stores (e.g. data store for recording original source data, data store for under validation). Data conversion or data entry might be occurred.
	MRa240	Validate data	<p>Validate received data to ensure data quality. This task usually includes the following:</p> <ul style="list-style-type: none"> — Apply predefined and ad hoc rules to validate data. — Correct errors or fill lacked data elements in consultation with data submitter. — Evaluate the data quality after validation. Low quality data might be rejected.
	MRa250	Enter new data	<p>Maintain master repository. This task usually includes the following:</p> <ul style="list-style-type: none"> — Registration and classification of newly received and validated data. — Update and/or deletion of existing data. — Repository maintenance (e.g. version management, backup, security control).
	MRa260	Produce new version	<p>Maintain the product version benchmarking repository. This task usually includes the following:</p> <ul style="list-style-type: none"> — Creation of master copy of the product version by extracting and modifying master repository. — Maintenance of master copy (e.g. version management, backup, security control) — Creation of package product by attaching accessories (e.g. data access tools, explanatory documents, execution manual).
	MRa270	Launch new version	<p>Launch new version of the benchmarking repository product. This task usually includes the following.</p> <ul style="list-style-type: none"> — Delivery by individual order, or publication (e.g. post on web site, distribute to contracted customers). — Registration and maintenance of customer information. — Response to inquiry from customer.
Evaluating			

Table 6 (continued)

Task group	Task ID	Task name	Task description
	MRa280	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	MRa290	Record evaluation results	Record the evaluation results into benchmarking experience base.
Improving			
	MRa300	Analyze and prioritize issues	Analyze and prioritize detected issues and lessons learned.
	MRa310	Establish improvement plan	Establish a plan to improve.
	MRa320	Inform Improvement plan	Inform all stakeholders of the issues identified and plans for improvement.
	MRa330	Record improvement results	Record the results of improvement to benchmarking experience base.
	MRa340	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	MRa350	Report immediate actions	Report immediately performed actions to program management.
	MRa360	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within allocated resources.
	MRa370	Record improvement results	Record the results of improvement to benchmarking experience base.

5.4.7 “Issue benchmarks” activity

The “issue benchmarks” activity includes, but is not limited to, the tasks given in [Table 7](#).

Table 7 — Tasks for “issue benchmarks” activity

Task group	Task ID	Task name	Task description
Initiating			
	IBa010	Allocate resources	Assign resources, organize project team(s), assign human and financial resources, and draft a schedule and milestones.
	IBa020	Perform training	Perform training and/or education of procedures and instruments to refer data and to produce benchmark(s).
	IBa030	Initiate control	Initiate the control process.
Planning			
	IBa040	Identify available benchmarks	Identify the available internal benchmarks.
	IBa050	Specify user needs	Specify information needs of benchmarking user for new internal benchmarks.
	IBa060	Determine production method	Determine production method for issuing new internal benchmarks.

Table 7 (continued)

Task group	Task ID	Task name	Task description
	IBa070	Determine type of benchmark	Determine the type of benchmark to be produced. It may be either: 1) A set of IT project data which is extracted from a specific benchmarking repository, 2) One or a set of derived measures which are produced by analyzing a specific IT project dataset.
	IBa080	Determine judgment criteria	Determine judgment criteria and method to adopt the resulting benchmark to be an internal benchmark.
	IBa090	Define measures for analysis	Define input and output measures to be analyzed, and determine from which benchmarking repository to gather those data and how.
	IBa100	Select analysis methods	Select the most adequate analysis methods, define procedure to execute the method, and identify necessary instruments and their availability (e.g. develop in organization, incorporate from out of organization).
	IBa110	Define judgment procedure and tools	Define procedure to execute the judgment, and identify necessary instruments and their availability.
	IBa120	Define release plan	Determine how to release benchmark(s). It includes but is not limited to: — Major report contents — Presentation format (e.g. graphical, textual, numerical) — Publication media (e.g. post on Website, distribute to contracted customers). — Timing and target audience.
Executing			
	IBa130	Implement data extraction procedure	Implement and document or update the data extraction procedure, to gather necessary data from a benchmarking repository.
	IBa140	Implement data extraction instruments	Implement the data extraction instruments.
	IBa150	Implement data analysis procedure	Implement and document the data analysis procedure to analyze data.
	IBa160	Implement data analysis instruments	Implement the data instruments.
	IBa170	Implement data evaluation procedure	Implement and document the evaluation procedure to evaluate the analyzed data.
	IBa180	Implement data evaluation instruments	Implement the evaluation instruments.
	IBa190	Implement data evaluation reporting procedure	Implement and document the reporting, procedure to create and submit the benchmark report.
	IBa200	Implement reporting instruments	Implement the reporting instruments.
	IBa210	Implement judgment procedure	Implement and document the adoption judgment procedure to judge result and register it as an internal benchmark.
	IBa220	Implement judgment instruments	Implement the adoption judgment instruments.
	IBa230	Extract data	Extract a set of data from the selected benchmarking repository.

Table 7 (continued)

Task group	Task ID	Task name	Task description
	IBa240	Analyze data	Analyze and evaluate data.
	IBa250	Produce report	Produce benchmark report.
	IBa260	Evaluate report	Evaluate the reported result and judge whether the result can be adopted as an internal benchmark.
Evaluating			
	IBa270	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	IBa280	Record evaluation results	Record the evaluation results to benchmarking experience base.
Improving			
	IBa290	Analyze and prioritize issues	Analyze and prioritize detected issues and lessons learned.
	IBa300	Establish improvement plan	Establish a plan to improve.
	IBa310	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	IBa320	Report immediate actions	Report immediately performed actions to program management.
	IBa330	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within the allocated resources.
	IBa340	Record improvement results	Record the results of improvement to benchmarking experience base.

5.4.8 “Provide instruments” activity

Though framework model of ISO/IEC 29155 series (see [Figure A.1](#)) includes “provide instruments” activity as an independent supporting activity, instruments (i.e. tools, methods, and guides) are indispensable to all the activities in the framework, and “provide instruments” activity is usually performed as a part of other six activities.

Therefore, this clause prescribes the tasks for “provide instruments” activities which are assumed to be embedded to be a part of tasks for other activities.

Since “provide instruments” activity is embedded to be a part of other activities, there are no independent tasks.

The “provide instruments” activity includes, but is not limited to, the tasks given in [Table 8](#).

Table 8 — Tasks for “provide instruments” activity

Task group	Task ID	Task name	Task description
Initiating			
	PIa010	Allocate resources	Assign resources, organize project team(s), assign human and financial resources, and determine schedule and milestones of the project.
	PIa020	Perform training	Perform training and/or education of initial user needs and current instruments.
	PIa030	Initiate control	Initiate the control process.
Planning			

Table 8 (continued)

Task group	Task ID	Task name	Task description
	Pla040	Identify user purpose	Identify the practical purpose of the benchmarking user to use instruments the activity that instruments serve.
	Pla050	Specify user needs	Specify practical user needs for instruments.
	Pla060	Define tool sets	Determine an adequate combination of tools, methods, and guides to provide solution to individual information and/or support needs.
	Pla070	Specify tool features	Specify functional and non-functional requirements for tools.
	Pla080	Define training materials	Define training materials for methods.
	Pla090	Design guides	Design outlines of guides and user manuals.
Executing			
	Pla100	Produce tools	Develop and/or procure required tools.
	Pla110	Produce training materials	Develop or acquire training materials.
	Pla120	Produce guides	Develop or acquire user guidance documents.
Evaluating			
	Pla130	Evaluate activity	Evaluate the behavior and outcomes of planning and executing tasks, and document the issues and lessons learned.
	Pla140	Record evaluation results	Record the evaluation results to benchmarking experience base.
Improving			
	Pla150	Analyze and prioritize issues	Analyze detected issues and lessons learned and prioritize them.
	Pla160	Establish improvement plan	Establish a plan to improve tools, training materials and guides.
	Pla170	Inform improvement plan	Inform all stakeholders of the issues identified and plans for improvement.
	Pla180	Perform immediate actions	Perform all actions that can be completed within the allocated resources.
	Pla190	Report immediate actions	Report immediately performed actions to program management.
	Pla200	Submit feedback to program layer	Submit feedback to program management about the recognized improvement needs that are not possible within the allocated resources.
	Pla210	Record improvement results	Record the results of improvement to benchmarking experience base.

Annex A (informative)

Framework model of IT project performance benchmarking

This Annex outlines the overall framework of IT project performance benchmarking (see [Figure A.1](#)).

NOTE See ISO/IEC 29155-1 for more information about the benchmarking framework and its concepts and definitions

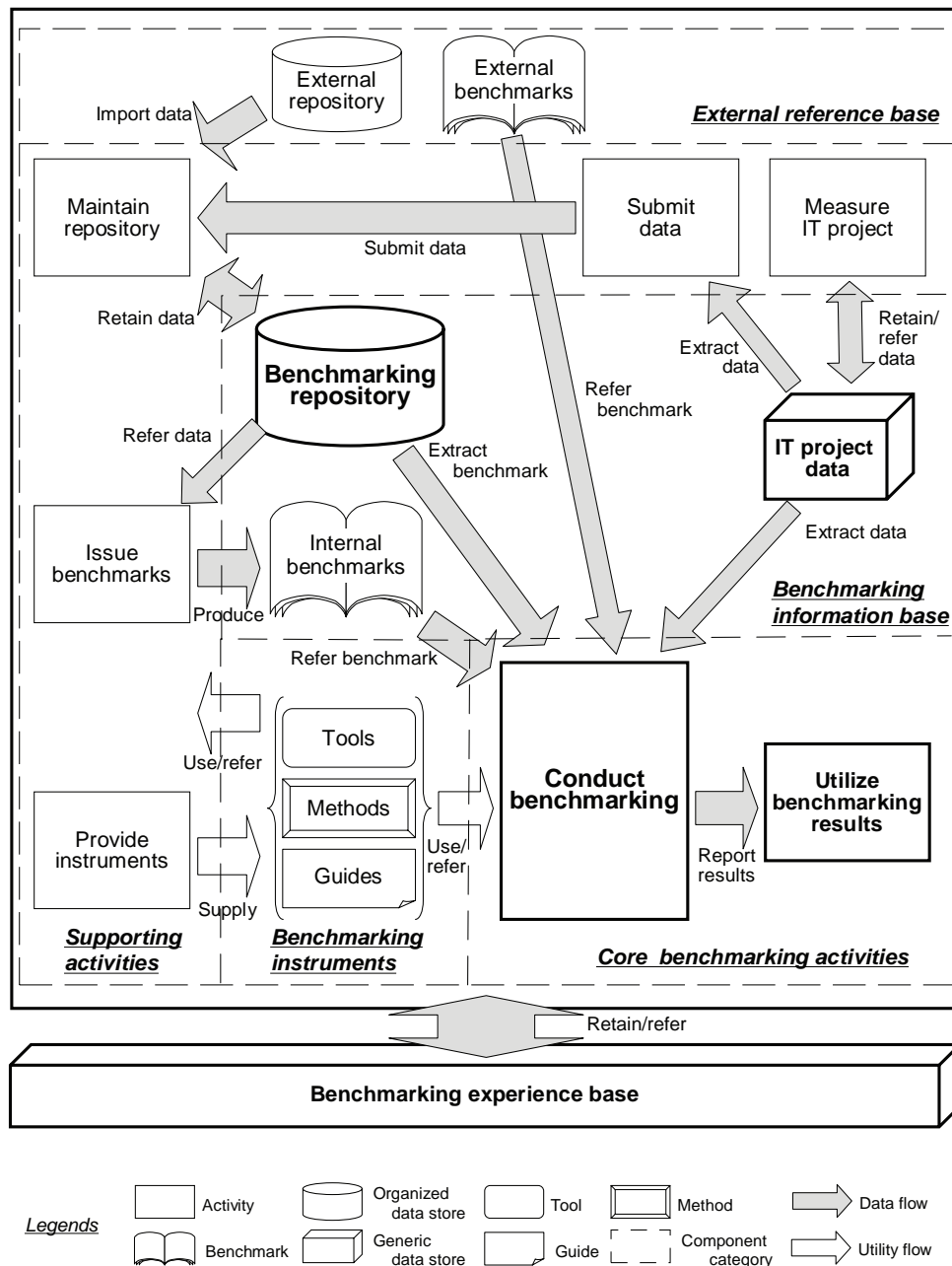


Figure A.1 — IT project performance benchmarking framework

The framework consists of the following six categories of activities or components:

- **[C1] “Core benchmarking activities”**, which collectively illustrates an instance of benchmarking,
- **[C2] “Supporting activities”**, which provides the benchmarking information base as well as instruments for use in an instance of benchmarking,
- **[C3] “Benchmarking instruments”**, used by stakeholders to conduct an instance of benchmarking,
- **[C4] “Benchmarking information base”**, which contains data for use during an instance of benchmarking,
- **[C5] “External reference base”**, which provides alternative or additional external data (i.e. repository and/or benchmarks) for an instance of benchmarking,
- **[C6] “Benchmarking experience base”**, which contains knowledge and lessons learned from present and/or past benchmarking experiences.

The first two categories (C1 and C2) introduce activities to conduct or support an instance of benchmarking. They consist of seven activities:

- a) **“Conduct benchmarking” activity (CBa)**, which initiates and executes an instance of benchmarking,
- b) **“Utilize benchmarking results” activity (URa)**, which utilizes benchmarking results for various business purposes,
- c) **“Measure IT project” activity (MPa)**, which measures IT project artefacts and retains data,
- d) **“Submit data” activity (SDa)**, which selects and provides IT project data to be included into the benchmarking repository,
- e) **“Maintain repository” activity (MRa)**, which accepts, verifies, and stores IT project data into the benchmarking repository, and later manages the repository,
- f) **“Issue benchmarks” activity (IBa)**, which analyzes IT project data within the benchmarking repository and provides internal benchmarks,
- g) **“Provide instruments” activity (PIa)**, which develops and provides tools, methods, and guides to support every activity in the benchmarking framework.

For effective benchmarking, all seven of the above activities need to be properly executed.

The third category (C3) defines three types of benchmarking instruments:

- h) **Tools**, which provide means to support stakeholders,
- i) **Methods**, which provide procedures,
- j) **Guides**, which provide instructive information.

The remaining three categories (C4, C5, and C6) consist of various types of information bases:

- k) **Benchmarking repository**, which retains reliable IT project data used to produce a benchmark,
- l) **IT project data**, which retains data related to various IT project,
- m) **Internal benchmarks**, which provide a group of commonly usable and authorized pre-determined benchmarks,
- n) **External repository**, which is a benchmarking repository maintained by an external organization,
- o) **External benchmarks**, which are issued in some external organizations by analyzing external repositories,

p) **Benchmarking experience base**, which archives benchmarking outcomes and lessons learned.

In the context of ISO/IEC 29155 series, the concepts of “internal” and “external” are subjective views by stakeholders, and it is dependent on the judgment of the stakeholder. For example, if Organization X decides to adopt IT project data of Organization Y, then the data of Organization Y is considered to be a part of Organization X’s internal data. Such adoption of out-of-organization data or benchmark often occurs within an enterprise group or between closely related business partners.

Bibliography

- [1] ISO/IEC 15939:2007, *Systems and software engineering — Measurement process*

