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Innovation management — Tools and methods for innovation operation measurements — Guidance

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Foreword

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

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This document was prepared by Technical Committee ISO/TC 279, *Innovation management*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 389, *Innovation management,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

Introduction

0.1 Why innovation operation measurements are critical for success

An organization's ability to innovate is recognized as a key factor for sustainability, competitiveness, economic success, increased well-being, and the development of society. However, one cannot understand and manage innovation operations without measuring them.

This document guides organizations on the design and implementation of measurements in managing their innovation operations. This document helps organizations think, design, implement, measure and take actions based on measurement results. It provides examples of innovation operation measurements, indicators and metrics, but does not prescribe any specific ones. It is a guidance standard applicable to innovation operations in organizations of all kinds, and sizes and for all types of innovation.

Innovation is characterized by novelty and value creation. Thus, by definition, it involves risk-taking in coping with the unknown and uncertain in a manner fundamentally different from that of established operational activities. Attempting to innovate without acknowledging the fundamentally non-linear, iterative, and high uncertainty-fraught nature of innovation operations invites costly errors, high probability of failure, and needless waste of time, material, and financial resources. Furthermore, in the light of our global and local challenges, as put forward in the UN Agenda 2030 for Sustainable Development, innovation is becoming more needed than ever. Hence, the need for organizations to be able to measure the value created by their innovation operations, their results and outcomes for themselves and their interested parties, while helping to determine the impacts (positive/negative, intended/unintended) they can have on the economy, society, and the environment with regards to the UN Sustainable Development Goals (SDGs).

Measurements, when designed, implemented, and reviewed properly, increase the success ratio of innovation operations. They participate in reducing uncertainty and validating key assumptions that are critical to the success of an innovation initiative (e.g. demand, feasibility, profitability, adaptability), while enabling evidence-based decisions for go/no-go/pivot/refine decisions along the innovation operations.

Measurements also help shape how organizations determine their objectives, generate, and maintain know-how, undertake tasks while monitoring the progress of projects/initiatives, operate with external factors, establish incentives, and assess the results, outcome, and impacts of their innovation operations.

A proper set of measurements contributes to an effective framework for strategic/tactical/operational decision making, planning, value-creation/impact assessment, and overall organizational learning. Such a set of measurements or innovation operation measurement framework, is useful at all levels of the organizations, from top management to people conducting innovation activities on the ground.

The quality of decision-making largely depends on how well the measurements are chosen, implemented, and interpreted. Therefore, organizations can consider the following questions:

— Why measure: Because measurements are essential for understanding the situation, making evidence-based decisions, and managing activities towards success.

— What to measure: Deciding on the indicators providing relevant information on either the situation or the system, or both.

— How to measure: Designing and selecting the appropriate metric for each indicator, i.e. formulae by which the indicator can be valued qualitatively or quantitatively; how to implement the measurement, i.e. select right tools, collect data and analyze it while considering the implied cost and benefits.

— Who should measure: Organizational entities related to the measurement processes and their roles (data retrieval, data synthesis, interpretation, responsibility, and accountability for the measurements).

— Who benefits: The measurements should be adapted to the needs and purpose of the persons implementing and interpreting them.

— When to measure: The appropriate time and duration for doing the measurement.

— Where to measure: In which part of the organization should the measurement be done.

— How to interpret measurements' results and act following the measurements to correct the situation if necessary and to draw relevant lessons.

Measuring is a key management action and should address the following fundamental inquiries concerning the status, evolution, and performance of an organization's innovation operations:

— Are we doing the right things?

  Are we aligned with respect to the organization's mission, innovation vision, strategy, policy, and objectives? Are we addressing the most critical innovation opportunities for our organization? Have we gathered the necessary evidence to reduce the uncertainties that are critical to the success of our innovation operations?

— Are we doing these things in the right way?

  Do we have the necessary and sufficient leadership, resources, capabilities, effective processes, required support, and organizational structures to proceed towards success legally and ethically? Do we generate sufficient evidence for effective and efficient evidence-based decision-making?

— Are we succeeding?

  How well (or poorly) are we doing? Are we achieving sufficiently valuable results and outcomes, thereby increasing our relevance to interested parties? Do we understand the value and impact our innovations are creating on society, the environment, and the economy?

The way people and their activities are assessed and measured has a significant impact on their behaviour, thus requiring careful design of innovation operations measurements to ensure that the right behaviours are nurtured and supported.

There is no universally appropriate collection of innovation operation measurements. Each organization can consider its own dynamic context, the evolving needs, and expectations of its interested parties, its objectives, and its innovation initiatives to devise its own appropriate set of measurements or innovation operation measurements framework.

0.2 Benefits of innovation operation measurements

The benefits of implementing a systematic approach to measuring innovation operations involve the following:

— strategic positioning to focus the efforts and innovation resources on the desired outcomes while optimizing opportunities versus risk;

— enabling an evidence-based decision-making process for determining innovation operational issues, along with their progress, results, and outcomes;

— ensuring adequate and timely resource allocation for innovation operations;

— monitoring the expected progress of innovation operations and adjusting them in time for meeting objectives efficiently;

— generating needed evidence to manage innovation processes for go/no-go/ pivot/ refine decisions to advance innovation activities concretely;

— ensuring that innovation operations management is relevant, ethical, effective, and efficient;

— nourishing an innovation culture that targets value creation, and rewarding and recognizing innovators;

— providing reliable, relevant and useful data on value creation opportunities for attracting investments and the engagement of interested parties;

— ensuring that the innovation results contribute to value creation and the intended impacts of the organization's Innovation Management System (IMS).

0.3 Structure of this document

This document is structured to present measurements concerning innovation operations within an organization. In addition to the Introduction (Clause 0), Scope (Clause 1), Normative references (Clause 2), and Terms and definitions (Clause 3), this document contains six clauses as shown in Figure 1. An introductory Clause 4 provides the fundamentals of innovation operation measurements. Clause 5 provides guidance on measurements related to the context, leadership, planning, and supporting elements of the organization that will trigger or impact innovation operations. Three central clauses provide guidance on measurements for innovation operations at the innovation process (Clause 6), innovation initiative (Clause 7), and innovation portfolio (Clause 8). Clause 9 is dedicated to continual review and improvement of the set of measurements and/or the innovation operation measurement framework. Additionally, Annexes A to E provide detailed examples of indicators and metrics related to Clauses 5 to 8 respectively.

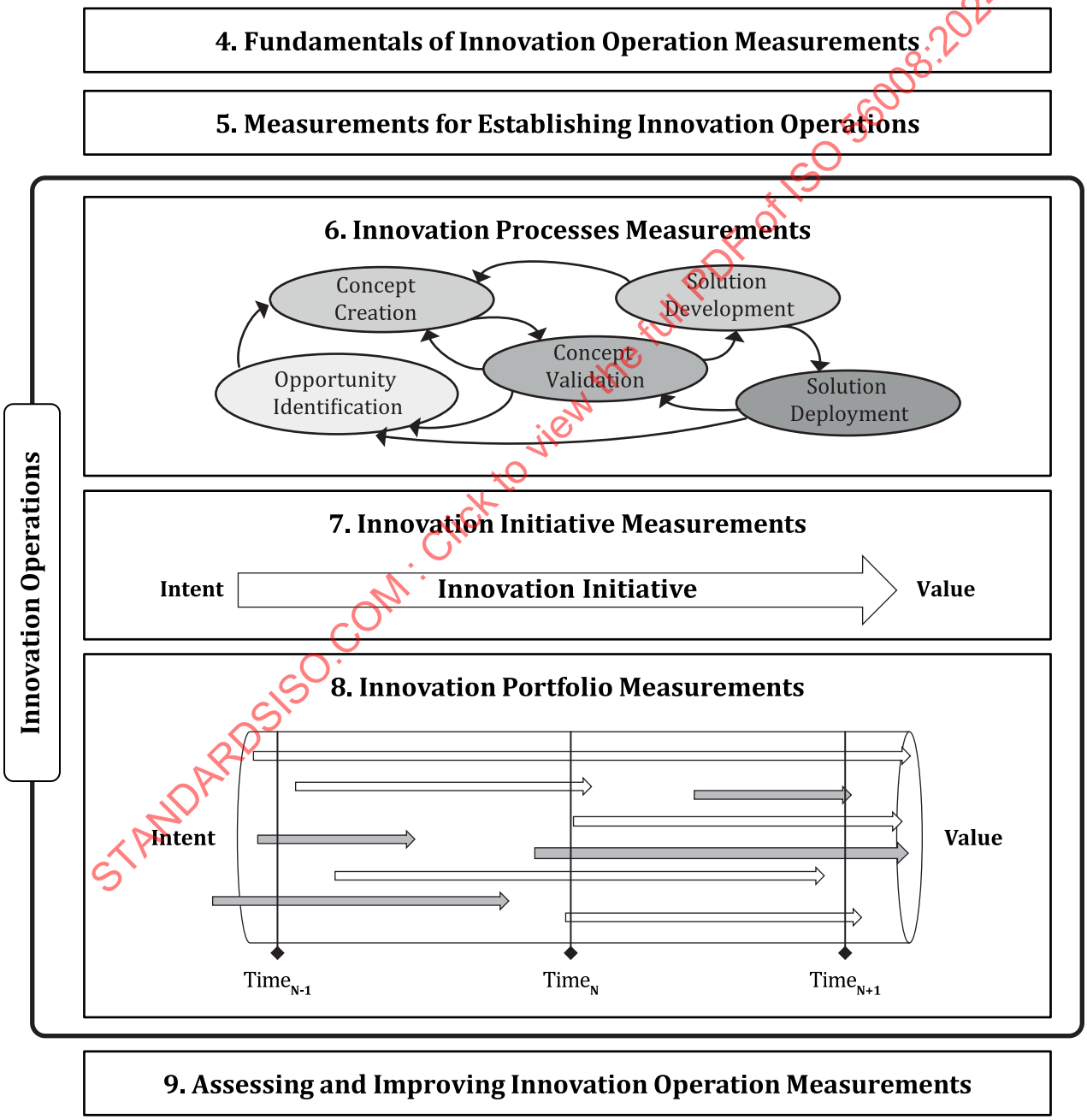


Figure 1 — Core clauses of ISO 56008 (this document)

The core ISO 56008 clauses on innovation operation measurements are as follows:

— Clause 4 *Fundamentals of innovation operation measurements* – provides guidance on the role of measurements in addressing the uncertainties and risks of innovation activities, the high-level processes involved, and the leadership, strategy, and planning for effective innovation measurements. This clause also gives guidance in determining what to measure and how to measure it, the design of innovation metrics, and the support required. Clause 4 also includes the basics of data gathering, analysis, learning, and corrective actions engendered by measurements.

— Clause 5 *Measurements for establishing innovation operations* – provides guidance on the measurements required to understand an organization's external and internal context, including the needs and expectations of interested parties. This clause aims to help to ensure the alignment of innovation operations with business objectives, the adequacy of innovation leadership, the organization's needed culture, and the effectiveness of innovation planning and support. Such measurements also help gather evidence on the relevant internal-and-external issues and the areas of opportunity for potential value redistribution and value realization that will trigger or impact the course of innovation operations.

— Clause 6 *Innovation processes measurements* – provides guidance on the measurements necessary to: support the identification of opportunities, the creation and validation of concepts, and the development as well as deployment of solutions. These measurements should enable better decision-making and advance innovation activities concretely from one innovation process to another based on evidence-gathering and hypotheses validation. Additionally, this clause provides guidance on the measurements needed to detect problems, decide on adequate corrective/improvement actions, and ensure the progress of the organization's innovation processes.

— Clause 7 *Innovation initiative measurements* – provides guidance on the measurements to be considered during the course of an innovation initiative in order to reduce uncertainties, detect issues, manage risks, undertake corrective/proactive action (including the abandonment of an initiative), and ensure progress towards achieving intended results.

— Clause 8 *Innovation portfolio measurements* – provides guidance on the measurements needed for assessment, management, and decision-making regarding the organization's portfolio(s) of innovations.

— Clause 9 *Assessing and improving innovation operation measurements* – provides guidance on improving the effectiveness and efficiency of the set or framework of measurements to reflect changes in the organization and its external context, along with changes to its innovation objectives and its activities, or in the case of inadequate choices of either measurements or metrics, or both.

Annexes A to E offer detailed examples of key questions to be asked, indicators and metrics related to various innovation operations measurements.

Details on an IMS can be found in ISO 56002. Details on innovation management assessment can be found in ISO/TR 56004. For details on specific innovation management tools or techniques, see ISO 56003, ISO 56005, ISO 56006 and ISO 56007. For common innovation management terminology see ISO 56000.

Innovation management — Tools and methods for innovation operation measurements — Guidance

1 Scope

This document provides guidance for the definition, implementation, evaluation, and improvement of the measurements necessary to effectively manage innovation activities in an organization. It establishes the fundamentals of innovation operation measurements and guides their application towards four areas:

— measurements for establishing and launching innovation initiatives;

— measurements for innovation processes;

— measurements for innovation initiatives;

— measurements of innovation portfolios.

This document is applicable to:

— organizations that are seeking to define and implement an innovation operations measurement approach;

— organizations and interested parties seeking to improve the areas of accountability, transparency, and evidence-based assessment of innovation operations;

— customers, investors, and other interested parties, seeking confidence in the organization's innovation operations management and its results;

— providers of training in innovation operations and measurements, including assessment of and consultancy for achieving results;

— experts in innovation operations evaluation and impact assessment, favoring the use of a harmonized international guidance standard;

— innovation policy makers and program managers who are looking to obtain evidence of progress and desired outcomes of innovation activities supported through public policies and programs.

All of the guidance provided within this document is generic and intended to be applicable to:

— all types of organizations regardless of sector or size, whether they be private, public, not-for-profit, governmental or societal;

— all types of innovations (e.g. product, service, process, model, and method) ranging from incremental to radical;

— all types of time horizons, from short-term to long-term evaluation and measurement.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 56000, *Innovation management — Fundamentals and vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 56000 and the following apply:

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

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

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

3.1
composite metric
metric (3.13) whose values are defined by a mathematical formula involving other metrics

Note 1 to entry: A composite metric can be created by weighted combinations of two or more metrics, with the weights chosen to emphasize the perceived relative significance of some of the components.

EXAMPLE Culture of Innovation Metric can be calculated as 0,25 x (percentage of people submitting valuable ideas) + 0,15 x (percentage of collaborations without complaints) + 0,35 x (percentage of communicated lessons drawn from failure) + 0,25 x (percentage of people rewarded for innovation).

3.2
evaluation
process of comparing results of analysis to established criteria

Note 1 to entry: Evaluation can be done to determine effectiveness, efficiency, performance, conformity or value.

Note 2 to entry: Evaluations determine the appropriate actions required.

3.3
framework
system of rules, ideas or principles that are used to plan or decide something

3.4
impact
significant effect resulting from a process or activity

Note 1 to entry: Impact can be positive and negative, intended or unintended.

3.5
improvement
activity to enhance performance

Note 1 to entry: The activity can be recurring or singular.

Note 2 to entry: Improvement can be a corrective action happening after *evaluation* (3.2).

Note 3 to entry: Improvement with regard to innovation *operations* (3.15) is a revision of operations and controlling the adequacy of the measurement framework.

Note 4 to entry: Improvement can apply to *metrics* (3.13) as well.

[SOURCE: ISO 9000:2015, 3.3.1, modified — Added Notes 2 to 4 to entry.]

3.6
indicator
specific information on a state, condition or *impact* (3.4)

Note 1 to entry: An indicator can be quantitative or qualitative.

3.7
innovation operation
operation (3.15) with regard to innovation

Note 1 to entry: Innovation operations are all the activities performed to achieve innovations.

Note 2 to entry: Within the context of innovation management, innovation operations encompass innovation activities, innovation processes, innovation initiatives and innovation portfolios.

3.8
innovation operations measurement
measurement (3.12) with regards to *innovation operations* (3.7)

Note 1 to entry: Innovation operation measurements are all the different types of measurements that are necessary and useful for the efficient and effective management of innovation operations.

3.9
innovation operation measurements framework
framework (3.3) with regard to *innovation operations measurements* (3.8)

Note 1 to entry: The innovation operations measurements framework is a system of guidelines that help to consider interrelated *indicators* (3.6), *metrics* (3.13), *measurements* (3.12), processes and policies that are used to make data-driven decisions about the management of innovation operations.

Note 2 to entry: Measurement framework is a way of structuring measurements around the strategy, goals and objectives of the innovation management system (IMS).

Note 3 to entry: This is a system built by each organization to express and interpret its state of innovation operations to guide its data-driven decisions.

3.10
innovation scorecard
assessment of the organization's innovation performance

3.11
input
resources, such as people (with their skills and attitudes), finance, data or knowledge (tacit or codified) that are put into a system, organization, *innovation operation* (3.7) or process

3.12
measurement
process to determine value

Note 1 to entry: The difference between measurement and measure as nouns is that measurement is the act of measuring, and measure is the *result* (3.18) of the measurement.

3.13
metric
defined measurement method and scale

Note 1 to entry: The speed of implementation can be the *indicator* (3.6), but the actual metric would be the amount of time from project initiation to project completion.

3.14
monitoring
determining the status of a system, a process or an activity

Note 1 to entry: To determine the status, there can be a need to check, supervise or critically observe.

Note 2 to entry: Monitoring is the function of using *measurements* (3.12) to observe and track innovation *operations* (3.15) at the levels of activities, processes, initiatives, and portfolios.

3.15
operation
performance of practical work or something involving the practical application of principles or processes

Note 1 to entry: An operation is also an activity planned to achieve something.

Note 2 to entry: An operation is an act or process of working, doing something, being in action or having an effect.

3.16
outcome
effect of *outputs* (3.17) (e.g. effect of innovations on firm performance) that follow as a *result* (3.18) or consequence

3.17
output
results (3.18) produced from a process or activity

3.18
result
something that occurs as a consequence, issue or conclusion

Note 1 to entry: A result is the output (3.17), outcome (3.16) or impact (3.4) of an operation (3.15).

4 Fundamentals of innovation operation measurements

4.1 Principles of innovation management and innovation operation measurements

The use of measurements for innovation operations is an intentional and thoughtful attempt to reduce uncertainty. It is necessary to recognize the critical differences between measuring a stable routine process versus measuring either a non-linear or non-sequential innovation process, or both.

Measurement is the basis for all evidence-based decision-making and planning, along with corrective actions, program adjustments, learning for improvement and changes in behaviour. Good measurements and monitoring of relevant indicators drive toward success by focusing on relevant aspects of innovation, reducing uncertainties, while improving communication. This success is based on an accurate assessment that enhances the innovation efforts success factors while avoiding errors and subjective judgment.

The following principles, derived from the IMS, provide a foundation for implementation of innovation operation measurements and can enable:

— realization of value, by being consistent with the organization's strategic direction for the creation of short-term and long-term value;

— future-focused leaders, by leveraging measurements to identify impactful trends, identify strategic opportunities, drive high quality trial and error innovation activities, and increase innovation performance;

— strategic direction, by being driven by the intended outcomes and innovation objectives, and enabling an evidence-based innovation operation management;

— culture, by enabling the development of organizational culture, innovation competencies, and inspiring ethical innovation-oriented behaviour;

— exploiting insights, by producing understandable, timely, sufficient, and actionable knowledge that is effective, efficient, and reliable for making evidence-based decisions, increasing objectivity;

— managing uncertainty, by balancing opportunities and risks in innovation operations minimizing waste of resources and efforts;

— adaptability, by enabling shared learning and agility; and

— systems approach, by being reviewed regularly to reflect learning while adapting to changing situations and updated innovation objectives and priorities of the IMS.

When undertaking innovation operations, organizations can consider:

— measuring items such as the quality of the process, along with the critical opportunities and risks related to the different milestones needed to be achieved to advance an innovation initiative;

— goals and the scope of innovation activities;

— impacts of leadership and innovation strategy;

— the adequacy of planning and measurement design;

— the capacity to manage the portfolio;

— needed support and risks in innovation operations;

— their capacity to capture the data to transform all the learning into the actions needed for value creation.

4.2 Innovation operation measurements process

Measurement is an essential part of processes to evaluate the progress of an activity, detect problems and enable timely management decisions for achieving intended objectives while avoiding undesirable effects. To this end, the organization can do the following:

a) Understand the intended effect of innovation activities on the organization, its stakeholders and other interested parties.

b) Design and determine the criteria for selecting appropriate indicators and implementing measurements for ensuring progress of innovation activities, as well as managing risks associated with them as follows:

   1) effectiveness in achieving intended objectives, with timely decisions for adjusting (enhancing, delaying, or even closing) innovation activities;

   2) efficiency in using allocated resources, with associated decisions on reducing waste while providing proper support;

   3) unintended effects impacting the organization, its routine operations, and its stakeholders and other interested parties;

   4) assuring all measurements are explicitly appointed to a person who is responsible for the quality, interpretation, analysis, and integration in the organization's data repositories.

c) Support decision making along each of the lifecycle stages of innovation activities as follows:

   1) helping define potential scenarios affecting innovation activities;

   2) generating evidence based on established criteria that are deemed critical to the success of innovation activities;

   3) acquiring and communicating learning about the organization, its strategy, its resources, its activities, and its opportunities and threats.

d) Provide knowledge for the evaluation and improvement of the innovation operations and their evolution.

The high-level process for addressing the organization’s innovation operations management framework should follow the cyclical Plan-Do-Check-Act (PDCA) methodology, with attention to changes in the organization’s context and its objectives:

— the organization can continuously monitor its context and update its strategy, redirect its innovation focus and reprioritize associated activities if necessary;

— leaders can decide what to measure and select the appropriate indicators;

— the measurement process to be applied (e.g. what, how, who, when) then needs to be established or updated;

— the resulting set of indicators, measurements, monitoring arrangements and practices should be communicated and deployed effectively throughout the organization;

— finally, as needed, the organization's leaders should evaluate the effectiveness of its innovation operation measurements and adjust them accordingly.

4.3 Innovation operation measurement framework, indicators and metrics

4.3.1 General

The innovation operation measurements can be set up based on the organization's innovation objectives. The purpose of measurements is to obtain evidence-based information concerning innovation operation activities and their results and outputs.

The innovation initiatives and the various types of uncertainties associated with them should be considered. Uncertainties which are neither recognized nor measured can become fundamental risk factors for all related innovation operation activities.

4.3.2 Frameworks for innovation operation measurements

The framework for innovation operation measurements links the domains of innovation management with considerations of preparation and inputs for each innovation activity, the progress and efficiency of that activity, and the outputs and outcomes at the conclusion of that activity, as shown in Figure 2.

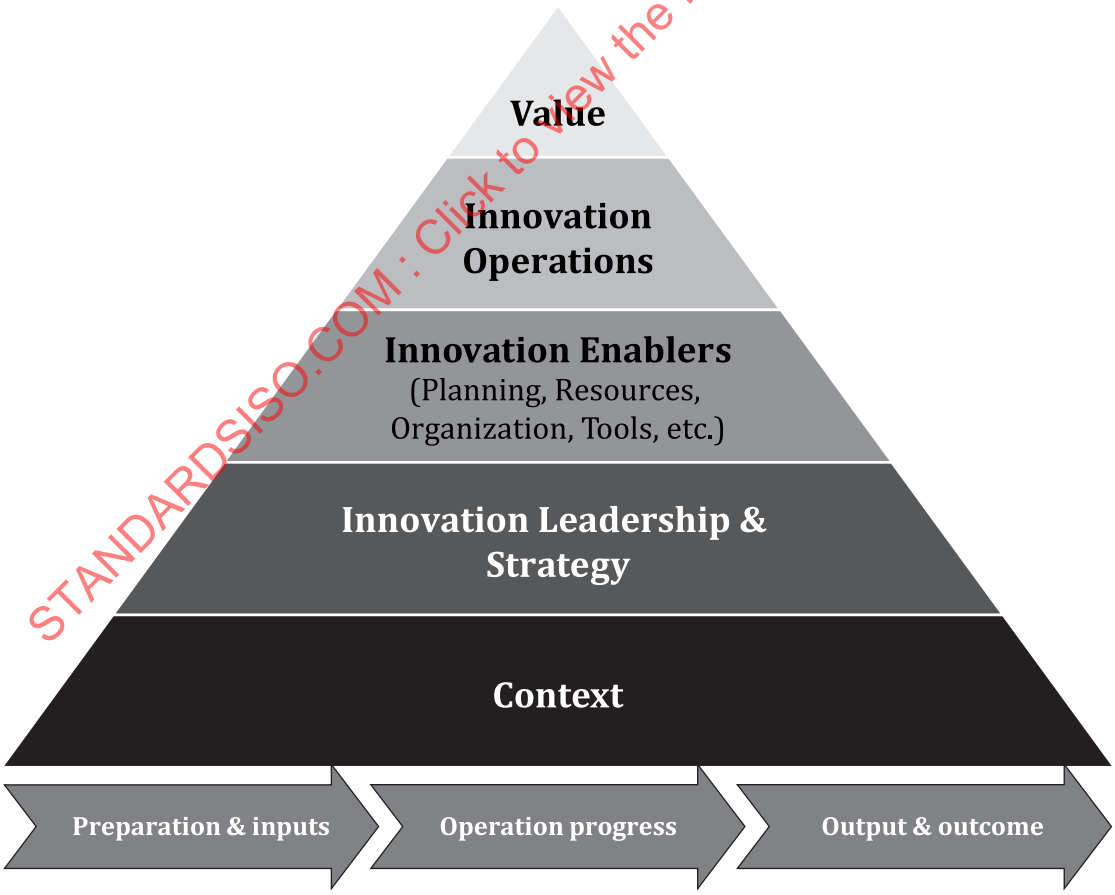


Figure 2 — Framework for innovation operation measurements

Organizations can select indicators for innovation operations and design measurements considering the specific domains appropriate with their innovation strategy, along with the objectives of their innovation initiatives as follows:

— context of the organization (COTO) comprises both the internal context that defines the organization as it is, the external context (customers, stakeholders and other interested parties, interaction models and comparative position vis-a-vis similar organizations) and how it drives its culture and collaboration;

— leadership for innovation in the organization, with the associated vision, strategy, planning;

— innovation enablers provided by the organization, for example, its operational management, its resources (e.g. its people and partners, their capabilities, facilities, tools, software, and how they are structured);

— innovation operations undertaken by the organization;

— value resulting from innovation efforts (e.g. economic, social, environmental).

4.3.3 Innovation indicators

The organization should identify those aspects of innovation operations that indicate if efforts are succeeding or failing. Lagging indicators, those that look at historical trend data to assess current situations, can address for example, preparations and inputs for the activity, its progress to date, costs incurred, outputs and outcomes achieved. Leading indicators, those that are future results-focused and potentially predictive, should be chosen to inspire action towards the realization of specific goals and behaviours in support of the organization's strategy and its innovation objectives.

Determining the right innovation indicators requires asking key questions about relevant aspects of innovation activities and their management, including:

— are the innovation strategy and selected innovation initiatives aligned with the organization's vision, mission and objectives;

— how effective is the planning and support for innovation initiatives;

— how effective and useful are the preparations, resources and inputs necessary for innovation initiatives;

— what is the progress of innovation processes, leading from inputs to outputs and outcomes;

— what are the results of innovation processes: outputs and outcomes, impacts and feedback to other innovation processes.

4.3.4 Innovation metrics

Measurement methods and measurement scales should be designed such that metrics and measurements:

— are unambiguous and easily understood;

— are reliable, relevant and valid;

— do not impede the innovation activities they measure;

— enable the organization to set meaningful targets;

— enable and facilitate the necessary management decisions regarding if and how to pursue innovation activities;

— are not too expensive in resources and time.

Composite (layered) metrics may be used to assess multi-faceted indicators. Composite metrics may be calculated as suitably weighted sums of simpler, more direct metrics of specific aspects of the indicator. The weights can be selected to emphasize those metric components associated with priority aspects of the indicator and stand to lead to the most desired changes, for example in individual or collective behaviours.

Measurements should consider the intent and preparations for an innovation activity, the progress and efficiency of the activity and the results (i.e. the outputs and outcomes) of the activity, as illustrated in Figure 3 below.

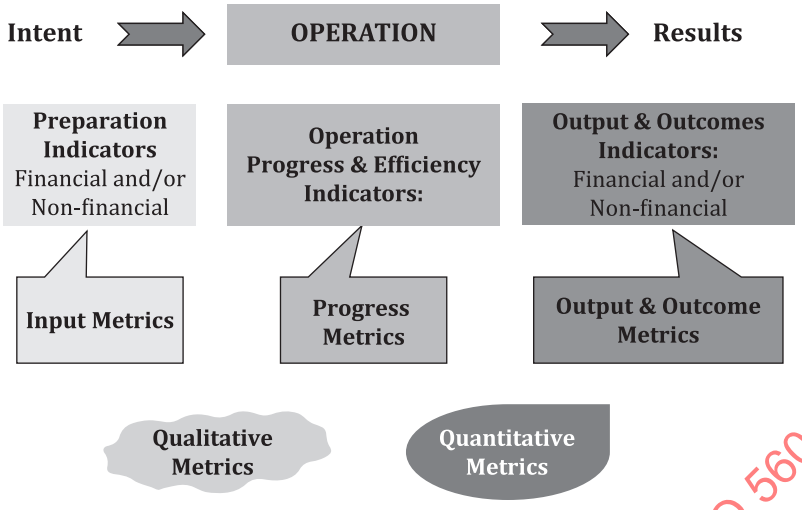


Figure 3 — Input, process and outcome indicators and metrics

Quantitative indicators are represented numerically in appropriate units of measurement. However, not all measurements can be assessed numerically. Important aspects, such as strategy, culture and management often require qualitative indicators with metrics based on questions (and surveys). For example, this can often allow other interested parties to understand complex measures in a simpler way for decision-making, planning or outreach purposes.

Annex A provides several examples of important indicators and several examples of metrics associated with these indicators.

4.4 Leadership and strategy for innovation operation measurements

4.4.1 Leadership

Organizational leaders should demonstrate awareness and commitment towards an innovation operations measurement approach. The organization can do the following:

a) Establish innovation strategy and objectives that translate the organization's top management concerns and goals.

b) Approve high-level measurements to assess innovation operation performance during management reviews. This ensures that innovation management achieves its outcomes.

c) Assign responsibilities and authority for measurement roles to ensure that findings are adequately communicated and understood.

d) Promote awareness of the importance of innovation operation measurements to help employees understand the rationale, processes and consequences.

e) Ensure the resources and capabilities required for innovation operation measurements are properly qualified, tool-enabled, available on time, and consistent with changes in innovation programs.

f) Foster a culture supporting innovation by aligning innovation measurements with performance evaluations and rewarding mechanisms to support it throughout the organization.

4.4.2 Innovation operation measurement strategy

An appropriate strategy is required to ensure that measurements are focused on meaningful aspects of innovation activities and are conducted in ways that provide reliable, replicable, verifiable data as well as appropriate and timely corrective actions. The innovation operation measurement strategy should consider that the number, complexity and costs of measurements is in proportion to the importance, uncertainties and risks associated with each specific innovation initiative. The organization should use measurements that are truly useful without adding unnecessary costs and delays to innovation processes.

As shown by Table 1, the innovation measurement strategy supports the above mentioned objectives and issues by addressing:

— strategic issues that concern the direction of the organization;

— tactical issues concerning the management of the organization's innovation portfolio and the need to adjust it dynamically;

— operational issues to ensure adequate progress is being made in the organization's innovation operation activities.

The measurement strategy can also be viewed from different perspectives, e.g.:

— the relevance of innovation, i.e. the proper focus of innovation targets;

— the enablement of innovation within the organization, ensuring it has the commitment, capabilities, competencies, culture and processes to innovate effectively and efficiently;

— the value results of innovation.

Table 1 — Perspectives of innovation operation measurements

Perspective level	Being relevant	Enabling the operation	Creating value
Strategic	Given our context, are we addressing the strategic opportunities for value creation and risk management?	Are we organized and executing innovation operations capable of meeting strategic objectives effectively and efficiently?	Are we pursuing effective value creation innovation operations aligned with the strategy?
Tactical	Are we addressing the key objectives of our innovation strategy?	Do we have an entrepreneurial culture and the necessary and sufficient resources?	Have we increased our innovation capabilities and manage emerging risks?
Operational	Are the target customers (buyers and/or users) interested in our innovation solutions?	Are the operational processes properly deployed and managed; and are the teams fully resourced and focused?	Have we met our innovation targets on time effectively and efficiently?

4.5 Planning and designing innovation operation measurements

4.5.1 Innovation operation measurements plan

The organization should design a plan to monitor, measure, analyze, prioritize and report on innovation operations in a timely manner, with the goal to maximize innovation success and value while integrating innovation operation measurements within the innovation management process towards strengthening its capabilities by:

— managing risks and minimizing wastage based upon well-timed measurements, decisions and adjustments;

— establishing the objectives for each innovation operation measurement metric and indicator;

— determining the criteria for selecting innovation key questions, indicators and associated metrics;

— recommending the expected targets of performance, along with procedures to follow if targets are not met;

— allocating necessary, sufficient and timely resources;

— evolving measurements in alignment with changes in the organization's objectives, processes and needs.

The innovation operation measurements plan can include an indication on what to measure, who will do the measurements, how to do them, where and when to do them, and to whom they should be reported for action.

4.5.2 Design of innovation operation measurements

Organizations are well served by designing their innovation operation measurements in an iterative process described by the following steps, as illustrated in Figure 4.

1) Define the goal of innovation operation measurements in alignment with the organization's innovation objectives and strategy.

2) Analyze the uncertainties, problems, threats and opportunities.

3) Consider the consequences of implementing potential metrics for the selected indicators.

4) Formalize the chosen metrics, including the sources of information, the methods of calculation, people, funds, and schedule to monitor, measure, analyze and report.

5) Establish challenging and yet achievable performance targets in the innovation activities' progress.

6) Recommend and communicate effectively the measurement action plan framework.

7) Explore the usage of the measurements (and their impact on behaviours and innovation progress).

8) Adopt and use the finalized set of metrics.

9) Monitor and evaluate the measurement results and compare them with expectations.

10) Reconsider the choice of metrics (informed by lessons learned) in order to improve the measurements.

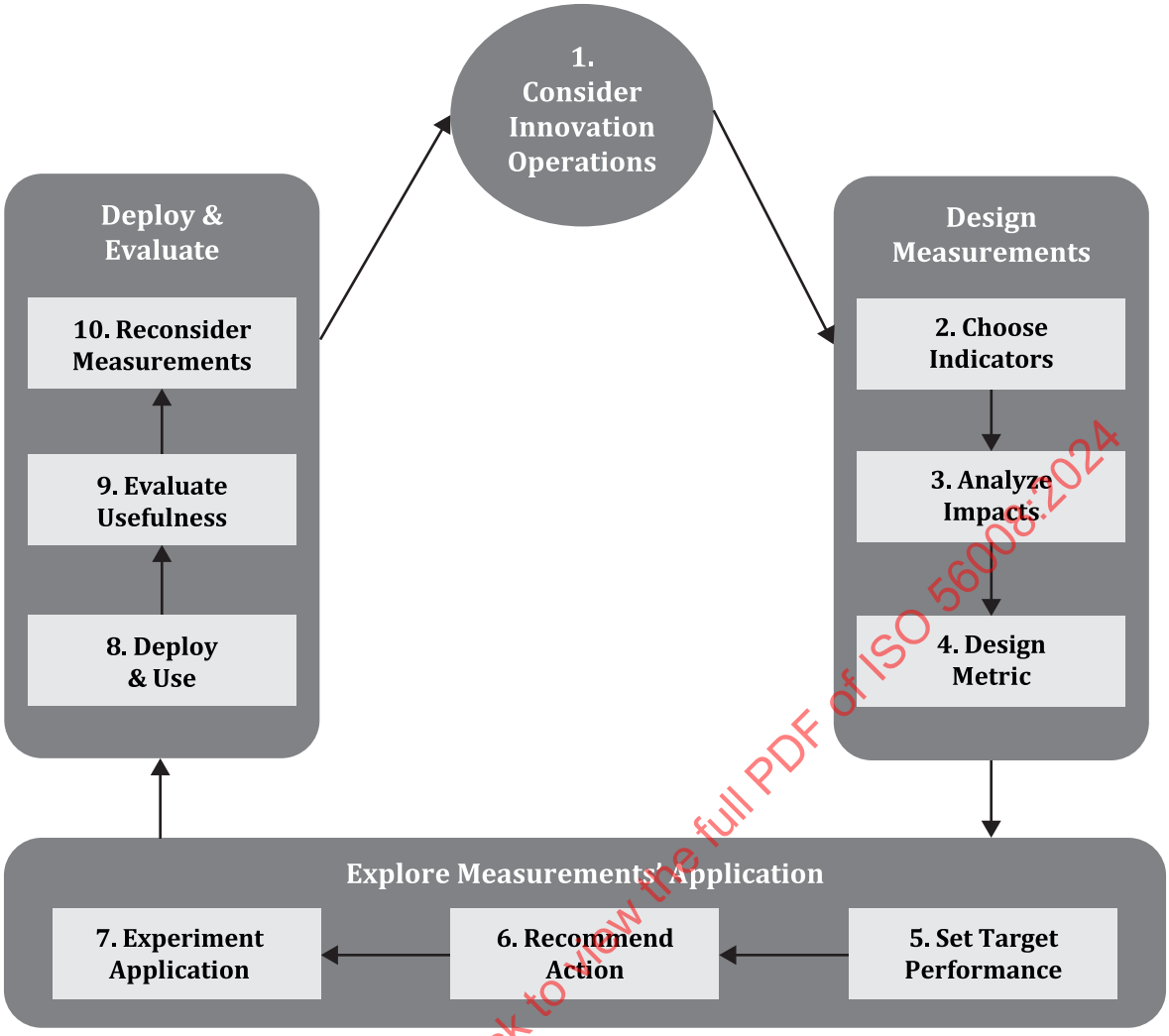


Figure 4 — Process of identification, exploration, usage, review and adjustment of innovation measurements

4.6 Support for innovation operation measurements

Successful deployment and implementation of an innovation operation measurement approach requires that organizations:

— have available resources, including financial or non-financial, that ensure its effective application;

— attract and retain people capable and with the needed competencies to adequately perform the selected measurements;

— allocate the time needed for effecting the measurements (collecting and analyzing data, reporting results, and taking corrective action) together with schedules of the times for measuring;

— identify, capture, absorb and use the knowledge relevant to each innovation operation measurement;

— communicate the results obtained and, if relevant, share the lessons learned;

— establish infrastructure for data management in planning and measuring innovation operations.

4.7 Data collection and action

4.7.1 General

The organization can:

— build and maintain an updated catalog of indicators that includes the quantitative and qualitative factors specifically relevant to innovations in that organization;

— have well-defined processes to measure innovation events, management, resources, and results at appropriate points in time to capture the evolution of innovation activities;

— follow established knowledge management approach to collect, codify, store and access the measurement data.

4.7.2 Gathering measurement data

The organization can establish and use measurements within an innovation operations measurement framework that ensures:

— correct use of data, including data quality, protection, traceability, reliability and integrity is achieved;

— formulae, scales and thresholds for each measurement are replicable, accurate and verifiable;

— collection frequency and time horizons are predefined (i.e. daily, weekly, monthly, quarterly, yearly or multiple years) to enable impact analysis;

— stakeholders and other interested parties impacted by data measuring are informed about the intended measurements and the times of data collection;

— measurement frameworks enable evaluation of the innovation initiatives' outcomes and impacts;

— manually collected measurements (non-automated) are provided adequate resources.

4.7.3 Analyzing measurement data

Measurement analysis focuses on using quantitative and qualitative methods and tools to describe the situation and the need for further action and learning. The organization can consider, among other factors:

— what will be measured, how measurements will be conducted, and the types of analysis to be performed (quantitative, qualitative or mixed methods);

— evaluation criteria for determining the usefulness, efficiency and value of each measurement;

— gaps that exist in the current collection methods and systems to determine if new tools can be acquired;

— type of reporting: descriptive, diagnostic or predictive.

To perform effective measurement analysis, organizations can:

— monitor for source data errors and perform any needed data cleansing;

— validate the meanings of measurements and their findings by using comparisons and verifiable methods;

— extract, transform and load data into data repositories, thereby integrating with the existing data and business intelligence processes and structures;

— organize and visualize data using logical groupings to facilitate analysis, learning and decision making;

The organization may test the effectiveness of measurements in terms of their accuracy and usefulness by:

— comparing measurements at different times to determine trends, if feasible;

— relating measurements at either a given time or statistically, or both;

— proposing, testing and validating causal relationships.

4.7.4 Measurement-based corrective action

Organizations can establish, as part of the innovation operation measurements planning process, the expected performance targets together with pre-defined corrective actions or contingency plans in case the pre-established performance targets are not met. In those cases, the organization can determine the following:

a) Why did the activity deviate from the expected performance:

   1) was it an issue with the measurement itself (in which case the measurement can be re-considered); or

   2) was it that the innovation activity really did not achieve the desired target (in which case the activity may need to be examined, with the goal of identifying its root cause)?

b) What are the potential consequences if the activity does not achieve its target level of performance?

c) How can the situation be remedied, who is responsible for the remedial action, and by when (what date) could the remedies take effect?

d) Can the underperforming activity be redesigned, or simply eliminated? If so, what are the consequences?

NOTE Organizations that manage these issues effectively are quick to undertake the necessary actions and thus to increase the resulting value capture and creation.

4.7.5 Measurement-based learning and improvement

The organization can ensure that a process exists for learning from each measurement. The organization can address all aspects of innovation activities, e.g. the people responsible for them, the matching of objectives to realities. The organization which aims to achieve effective innovation-focused learning, can ensure that:

— communication regarding the learnings is broadly encouraged and shared throughout the organization;

— collaboration between groups, individuals and leaders responsible for innovation is practiced;

— constant emphasis is placed on meaningful performance evaluation criteria;

— data visualization shows improvement (or not) and conveys alignment (or not) with strategic vision;

— measurement approaches always remain flexible and are updated as the learning occurs.

5 Measurements for establishing innovation operations

5.1 General

The organization can choose, implement, and analyze measurements that enable timely evidence-based decisions for establishing meaningful innovation initiatives in alignment with the reality of the organization's internal and external context. The measurements should consider the needs and expectations of its interested parties, effective leadership, culture, planning, and the support required to meet the innovation objectives. Determining the relevant indicators and metrics can be based on the following:

a) understanding potential impacts on the effectiveness and efficiency of the organization's innovation activities and the innovation portfolio;

b) timely knowledge of the situation;

c) challenges faced by the organization at that time.

Organizations can decide on the frequency, number and depth of measurements while balancing the costs of undertaking such measurements versus the risks and opportunities affecting their innovation activities.

5.2 Context measurements for establishing innovation initiatives

The organization should design measurements to understand the impact of its changing context, including the past and present situation, ongoing and future potential trends and current and subsequent changes to determine innovation initiatives in response to priority threats and opportunities.

In determining the relevant indicators and metrics to assess external or internal contexts (as well as the needs and expectations of interested parties), decisions should be based upon the timely understanding of potential impacts, in conjunction with reducing uncertainties and managing risks towards enhancing the effectiveness and efficiency of the organization's innovation activities.

Measurements to understand the context can be applied prior to establishing major innovation initiatives. They can be applied as often as needed, considering the speed of changes, the likelihood and potential impacts of trends and the cost/benefit analysis of doing the measurements.

To determine the relevant indicators and metrics concerning understanding its external context, the organization can ask key questions regarding the:

— economic situation, including financial and non-financial capital,

— social trends,

— political and regulatory context,

— technological developments,

— environmental concerns,

— competitive impacts, and

— market conditions.

Measurements for understanding internal context impacts on establishing innovation initiatives can be derived from key questions concerning

— leadership drive for innovation,

— financial situation,

— adequacy of organization processes and structure,

— organization culture,

— availability of resources and necessary competencies,

— required infrastructure and tools, and

— intellectual property (IP) assets.

To understand the potential influence of its interested parties for establishing its innovation initiatives, allocating resources and building stronger relationships, the organization can undertake measurements aimed at obtaining relevant information, such as:

— most innovation relvant stakeholders and other interested parties, including their value expectations;

— interactions within the organization's value chain or ecosystem;

— regulatory and legal compliance requirements and ethical considerations;

— effectiveness of communication channels and responses to interested parties.

NOTE Annex B provides tables with examples of relevant indicators and metrics that are useful to measure external and internal context impacts, as well as the potential impacts of the organization's interested parties.

5.3 Measurements of leadership and culture for establishing innovation initiatives

Leadership capabilities should be regularly monitored through measurements. The information from these measurements can be used to improve innovation management skills. Measurements of leadership and culture can be done prior to establishing innovation initiatives or periodically, following updates concerning the following:

— understanding of internal and external context;

— needs of interested parties;

— significant management changes.

The organization can consider measurements of how its leadership commitment and actions affect the innovation operations, analyzing, e.g.:

— the internal strategic alignment of the leadership team and its accountability for innovation;

— its focus on future value;

— its assignment of adequate resources for innovation;

— its commitment to evidence-based management;

— its effectiveness in assigning responsibilities;

— its fostering of a culture supportive of innovation;

— the adaptability of its innovation strategy;

— the alignment of innovation initiatives to strategic direction;

— the level of employee awareness concerning the organization's vision, strategy, and innovation policies.

The organization can also measure how its culture affects the innovation operations, answering the following key questions:

— how open are the leadership and employees to new ideas and new ways of working;

— how well do people collaborate internally and externally;

— how does the working environment affect the organization's innovation activities;

— how well does the organization learn from its past innovation successes and failures.

Measurements of culture should be applied across all employee levels (from the top to the bottom of the organization), focusing on factors that enable more effective innovation efforts.

NOTE Annex B provides examples of some suitable indicators and metrics for leadership and culture measurements in Tables B.4, B.5, and B.6.

5.4 Measurements of planning and support for establishing innovation initiatives

The organization should consider using measurements that enable evidence-based decisions concerning what is needed to properly plan its innovation initiatives. Some key questions to ask, for example, are how well the organization:

— aligns the detected opportunities with strategic direction,

— assesses risks in estalishing innovation initiatives,

— allocates resources, including infrastructure, tools, and partners,

— applies project management practices,

— monitors progress and intermediate results, and

— anticipates and supports taking action to make the most of situations that occur when measured results are below or are better than the expected performance levels.

Measurements of support for innovation operations aim to determine the realistic innovation support needed, along with efficient management of tangible and intangible resources, asking (for example) how well the organization

— attracts, retains, and motivates its people,

— identifies, reviews, and documents individual competencies,

— evaluates needs and potential sources for external resources,

— provides adequate time to stimulate innovations,

— makes available adequate infrastructure and needed tools for innovation,

— allocates adequate budgets for innovation initiatives, and

— uses internal and external knowledge and information sources.

The organization can undertake measurements to evaluate the impacts of the treatment of IP upon establishing (and managing) its innovation initiatives, including paying attention to

— protection of the existing portfolio of intellectual assets,

— speed of invention,

— relevance of technologies or processes protected or requiring further protection,

— adequacy of tools and methods in evaluating, negotiating, and using third party IP rights, and

— the organization's ability to create value from the new IP it generates (e.g. commercialization, licensing, brand value).

Measurements can be undertaken to monitor the organization’s awareness of its innovation activities and its communication processes in support of innovation initiatives, including

— how well people understand the innovation vision, mission, strategy, and associated policies,

— how adequate its internal communications are concerning innovation activities and their consequences,

— how effective the external communications are towards recognition of the organization’s innovation successes.

Organizations should determine the key issues, indicators and metrics to be selected and applied in a timely manner to better contribute to its selection and implementation of its innovation initiatives, along with effective innovation management and value creation. Depending on the complexity, nature and duration of the innovation initiatives, measurements of leadership, planning, and support can:

— contribute to enabling evidence-based decision making;

— accelerate time to action, providing relevant information to analyze progress;

— identify deviations or areas for improvement, while reporting relevant key indicators and metrics;

— help improve innovation management processes;

— nourish a culture of innovation in the organization.

NOTE Annex B contains examples of indicators and metrics for innovation planning and support.

6 Innovation process measurements

6.1 General

Innovation process measurements should be designed, implemented and analyzed to generate evidence that will reduce uncertainties related to key hypotheses or criteria specific to each innovation process. This can enable decisions to move innovation efforts forward, refine the concepts/solutions, or even abandon innovation activities due to lack of demonstrated potential. The measurements enable timely evidence-based adjustments to ensure reaching the organization's objectives, while avoiding wasting time and squandering resources on inadequate processes.

The organization can define and implement innovation process measurements considering:

— the organization's innovation scope, budget and risk tolerance;

— focusing the measurements according to the importance, uncertainties and risks of innovation processes;

— minimizing the number, complexity and costs of measurements to ensure they are useful and well understood;

— allocating responsibilities and resources for adequate and timely measurements to keep efforts focused, aligned and yielding appropriate results;

— understanding the measurements (and how valuable they are) in providing learning and helping improve the IMS;

— the timely communication of measurement results to the organization and the relevant interested parties in order to enable regular reviews of these activities.

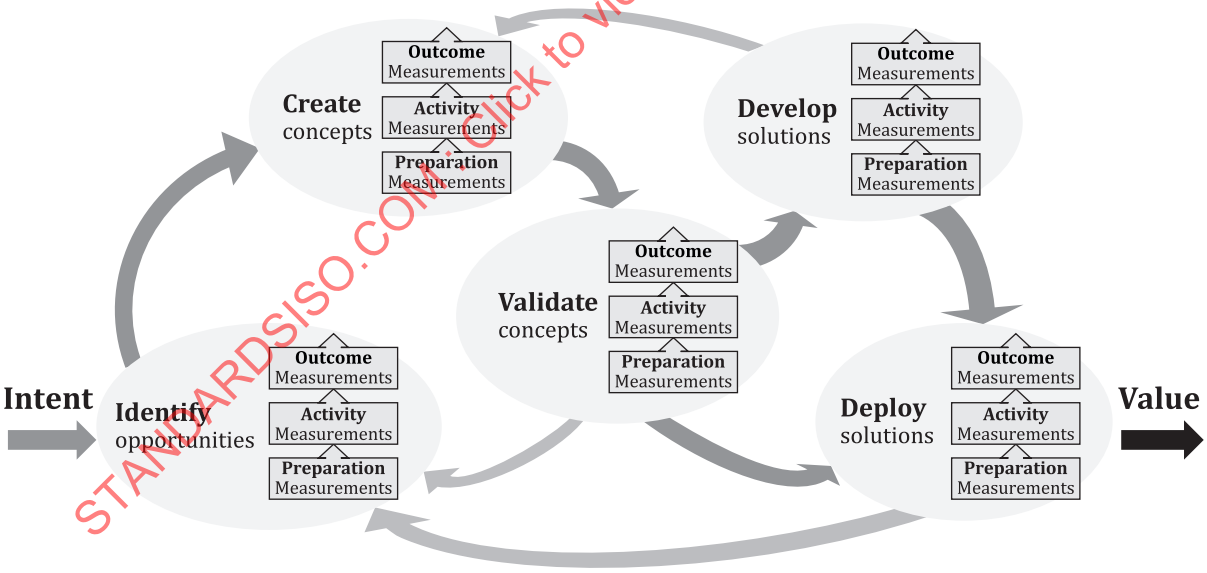


Figure 5 — Measurements of preparation, activities and outcomes of innovation processes

As shown in Figure 5, innovation process measurements can address:

— proper preparations for each innovation process, including necessary knowledge and resources;

— adequate activities during the innovation process, including performance, quality, value-model definition and IP management;

— achieving intended results, including outputs, outcomes, and impacts with due consideration for their effect on other innovation processes, the organization's IMS and its interested parties;

— acquiring learning for the continual improvement of innovation processes, the adequate assignment of responsibilities, the timely allocation of capable resources and the further development of a culture propitious to innovating successfully.

Measurements should be performed at properly planned times that are specific to each innovation process and initiative pursued and whenever the situation requires immediate progress assessment. Targets of expected performance should be determined in advance, together with the expected indicators of success and whatever timely corrective actions are needed if targets are not met.

Appropriate innovation process measurements can be determined by asking key questions that lead to relevant indicators and their associated metrics as outlined in 6.2 below and detailed in Annex C.

6.2 Measurements for identifying innovation opportunities

The organization can undertake the necessary measurements to achieve effective identification of short-term, medium-term, and long-term opportunities, along with assessing their potential for value realization, implied risks and alignment with strategic objectives. The organization may ask critical measurement questions concerning the preparation for opportunity identification, for example:

— Do we have enough knowledge about the external and internal context of our organization, and does this knowledge offer a steady stream of opportunities for value realization?

— Do we have the right culture, working environment and people competencies for the identification of opportunities?

— Do we have access to the relevant sources of information, processes and tools that are needed to identify valuable opportunities?

— Have we acquired enough information from relevant interested parties to ensure focus on priority opportunities?

Appropriate indicators and metrics for measuring opportunity identification activities to ensure proper opportunity priorioritization and selection can be determined by asking critical questions, for example:

— What is the leadership role, and how widespread in the organization is the participation in identifying innovation opportunities?

— Are we identifying innovation opportunities and generating ideas early enough for a timely response to context changes and new interested parties' requirements?

— Is our process for identifying innovation opportunities and generating ideas effective, efficient, and comprehensive enough?

Measurements of the output and outcomes of the opportunity identification process provide data for acceptance of the relevant innovation opportunities into the innovation concept creation process. This is done by considering the organization's context, its innovation intent and objectives, as well as lessons learned from previous innovation activities (see Annex C for details).

— Who are our potential customers or users, and what are the pain points we have identified?

— How future-focused and vision-aligned are our identified innovation opportunities?

— Are innovation opportunities covering the entire spectrum of potential users and influencers?

— Has there been learning from previous innovation activities, and have we provided feedback to other-innovation processes and relevant interested parties?

6.3 Measurements in creating innovation concepts

Measurements of preparation, activities and results of the innovation concept creation process should be designed and implemented to enable the generation of valuable innovation concepts in an effective, efficient, and timely manner while ensuring alignment with strategic objectives and development of new intellectual assets.

Concerning adequate preparation for concept creation, the organization can design and implement measurements enabling the resource allocation and effective management of knowledge and competencies of resources for undertaking the creation of innovation concepts out of identified opportunities and associated ideas for taking advantage of them. As outlined in Annex C, appropriate indicators and metrics for the preparation of concept creation can be determined by questions such as:

— What is our initial value proposition?

— Is there enough leadership commitment to energize the organization and direct innovation concept creation?

— Do we have the work environment, culture, competencies and skills necessary for effective innovation concept generation?

— Do we have the criteria for filtering and prioritizing opportunities to arrive at valuable innovation concepts and manage risks?

Relevant indicators and metrics for measuring idea generation and concept creation activities can be derived from the following questions:

— Do we have an effective systematic process for generating innovation ideas?

— Is the process of synthesizing concepts out of preferred ideas addressing novelty, risk, feasibility, viability, desirability, sustainability and IP rights?

— Are we balancing risks and opportunities when generating concepts?

— Do we have a comprehensive multi-disciplinary approach to concept creation?

— Do we understand our potential customers and the time constraints for serving them?

Measurements to evaluate the results of the concept creation should provide data for acceptance of concepts into the concept validation process by addressing the characteristics of the concepts created (e.g. value-cost models, strategic alignment, targeted customers, IP opportunities and risks, readiness for validation), the effectiveness/efficiency of the process and value of learnings achieved. The following are some examples of possible key questions to be asked:

— How aligned are our innovation concepts with ethical guidelines and strategic objectives, including an appropriate spread of incremental, radical, expanding, and disruptive innovations?

— How efficient and timely are the creative processes and resources?

— Have we sufficiently characterized the targeted customers and the value propositions of generated concepts?

6.4 Measurements in validating concepts

Concept validation is itself an overall measurement of the concept's suitability for being developed as a worthy innovation. Measurements concerning the concept validation process can ensure the viability of the concepts, reduce risks and enable evidence-based decisions on pursuing or not the development of associated innovation solutions.

Appropriate indicators and metrics for measuring preparations for concept validation can be determined by asking if the organization has

— sufficiently well-developed concepts to warrant validation,

— an adequate decision-making structure and criteria to validate concepts, and

— adequate resources to conduct validation for all (priority) innovation concepts.

Measurements of concept validation activities address, among other aspects,

— the validation process effectiveness and efficiency,

— the quality of the validation, and

— the sharing of validation learnings within the organization and relevant interested parties.

Measurements evaluating the results of concepts validation can address, among others,

— the quality, ethics, potential impacts and potential value/costs of validated concepts,

— the validation speed for timely development and deployment commensurate with the rate of changes in the organization's internal and external contexts, and

— the new knowledge concerning customers or users and other interested parties for both validated and non-validated innovation concepts.

6.5 Measurements in developing innovation solutions

Measurements of innovation solution development are concerned with the optimal allocation of resources and effective management for the timely availability of valuable innovations for deployment.

The effectiveness of preparation for the development of innovation solutions may focus on the resource allocation and availability of knowledge prior to proceeding to actual development. The following are some examples of possible questions:

— Are the concepts to be developed fully validated, and have they included any defined business cases?

— Is there an adequate budget and plan (e.g. responsibilities, milestones) for solution development?

— Is there sufficient support (e.g. resources, infrastructure, tools, partners) to proceed safely?

The organization can measure the activities involved in the development of solutions to manage risks and ensure effective and efficient progress. Measurements should be performed at properly planned times specific to each development program, with targets of expected performance set in advance together with timely corrective actions if targets are not met. The following are typical examples of key questions that can be asked for determining indicators and metrics:

— Is development proceeding on time and within budget?

— Do we have an efficient process to detect and manage failure?

— Are we protecting new intellectual assets and avoiding infringement of third party rights?

Measurements for evaluating results of the solution development process should collect data on development process adequacy, costs, speed and scalability for effective deployment. The following are examples of possible questions:

— How much do our developed solutions achieve stated intent (objectives)?

— Is our development process adequate in terms of management, resources, planning, and speedy adjustments?

— Are the developed solutions ready for deployment?

6.6 Measurements in deploying innovation solutions

Measurements of the solution deployment process should be designed and implemented to ensure effective progress or timely adjustments, including reconsideration of continuing or not the deployment to meet the intent of the organization. Measurements clarify trends, patterns and goal attainment with consideration of both the organization itself and long-term market, social and environmental impacts on relevant interested parties. Measurements can be performed at properly planned times specific to each step in the deployment process or whenever the situation requires immediate progress assessment, evaluation, and adjustments to meet those objectives.

The preparation for the deployment of innovation solutions should be measured prior to the actual deployment to avoid costly mistakes by addressing questions concerning, e.g.

— replicability and scalability of the developed solution large scale deployment,

— understanding of customers and regulatory situations in their territories, and

— readiness for marketing and customers reach, including resources for handling risks and opportunities.

Deployment activities may be measured to ensure effective and efficient achievement of organization innovation objectives by addressing issues, e.g.

— rate and costs of customer acquisition and support,

— social media and competitive reactions, and

— adequate collection of deployment data and provision of feedback to other innovation processes.

Measurements of deployment results are critical for the evolution of an organization's innovation objectives, strategy, and management processes. They address value outcomes and impacts, speed of adoption, market share, flexibility to scale, risk tolerance, supplier and partner availability and reliability, customer service, deployment roadmaps, generation of new knowledge for innovation management improvement as well as triggering further innovation opportunities, and feedback to other innovation processes.

The following are examples of questions to ask for determining appropriate indicators and metrics:

a) Are there any expansion opportunities in, e.g. new customers, solutions, business models?

b) What learning (e.g. on strategy, management processes, IP management, partnerships) have we gathered and communicated?

c) Have we got adequate returns on our innovation investments?

Annex C contains further examples of indicators and metrics for innovation processes.

7 Innovation initiative measurements

7.1 General

Measurements for innovation initiatives should be chosen, implemented and analyzed to provide timely information for making the necessary adjustments of the initiative to reach the organization's objectives or to abandon it to avoid wasting time, investments and resources on endeavors deemed unworthy at that time. Innovation initiative measurements can consider:

— the areas of greater uncertainties and risks to determine appropriate indicators and associated metrics that can help solve uncertainties and manage risks;

— the allocation of responsibilities for adequate and regular measurements of the innovation initiative to keep efforts focused, aligned and yielding the appropriate results;

— the number, complexity and costs of measurements to ensure that they are commensurate with the importance, uncertainties and risks associated with the specific innovation initiative;

— designing the measurements to ensure they are truly useful for decision making without adding unnecessary costs and delays while enabling valuable learning for other initiatives and for improving the IMS;

— the appropriate timetable for implementing the measurements (at planned intervals or when the situation requires it) to ensure timely adjustments of the initiative;

— establishing, in advance, targets of expected performance, together with corrective actions if the targets are not met;

— the communication of the results to the initiative team and to all relevant interested parties to:

  — effectively manage the progress of the initiative;

  — provide justification for rewarding innovation participants;

  — bring valuable feedback to other innovation initiatives.

NOTE Some organizations manage innovation initiatives as projects with all that is entailed in the matter of project management and measurements, including clear scope, objectives, constraints, expected deliverables, and outcomes, together with processes and responsibilities for capturing, documenting and communicating lessons learned from both failure and success.

Measurements for innovation initiatives should address all critical phases, including:

— the preparations for starting the initiative,

— the progress during the conceptualization and validation of the initiative solution,

— the progress during initiative solution development and preparations for scalability and deployment,

— the progress during the deployment of the innovation solution, and

— the achieving of desired results, including outcomes and impacts with due consideration for their effect on other innovation initiatives, the organization's culture, its IMS, and its interested parties.

7.2 Measurements in the preparation of innovation initiatives

The organization can determine the effectiveness of its preparation for the innovation initiative by measuring the critical areas of concern, e.g.:

— the justification for selecting the specific opportunity for pursuit as an innovation initiative;

— the clarity of scope, objectives, constraints, expected deliverables and outcomes;

— the soundness of the initiative plan, with work activities, schedules, measurements and criteria for acceptable progress, as well as procedures for moving forward to the next phase of the initiative;

— the team leadership and management structure with clear responsibilities and authorities for decision making;

— the necessary support, including internal and external resources with appropriate competencies, as well as infrastructure and tools for all phases of the initiative;

— the assessment of risks and plans for their management, including processes for meeting statutory requirements, protection of newly created IP and avoidance of infringement of third-party rights;

— the culture of the initiative team, including its creativity and agility in managing change;

— the allocation of responsibilities for adequate and regular measurements of innovation processes to keep efforts focused, aligned, and yielding the appropriate results.

Annex D provides examples of key questions, indicators and associated metrics for measurements in the preparation of innovation initiatives, as well as the initiative concept evolution towards validation, the development of the innovation solution, its deployment, and the outcomes/impacts of the initiative solution.

7.3 Measurements of activities towards initiative concept validation

Measurements of progress in defining the initiative concept and validating (or abandoning) the initiative prior to full-scale development could address the following:

— progress in the finalization of the innovation concept towards readiness for validation;

— the validation process and ensuing learning;

— the effectiveness and efficiency of the process;

— readiness for full innovation solution development.

See Table D.2 in Annex D for examples of key questions, indicators and associated metrics.

7.4 Measurements of activities in development of initiative solution

The organization can measure the progress of development activities to ensure effectiveness and efficiency in having an innovation solution worthy of being fully deployed for achieving the organization's innovation objectives. Some of the important areas for measuring progress towards deployment (including postponing or abandoning the initiative) are concerned with

— timely and cost-effective development process,

— availability and usefulness of development resources, including partners,

— IP management, protection against infringements and adherence to regulatory requirements, and

— readiness for deployment, including full customer characterization and complete marketing strategy.

See Table D.3 in Annex D for examples of key questions, indicators and associated metrics.

7.5 Measurements of activities in initiative solution deployment

Measurements of an initiative deployment should focus on allowing timely decisions for making suitable adjustments to scaling the solution, effectively approaching the right customers and territories, providing satisfactory customer support and concluding to stop wasting efforts and money on the deployment of this solution. Some important aspects of deploying the innovation solution concern

— customer/user acquisition and speed of adoption,

— customer/user satisfaction and support,

— media management,

— deployment impediments, including regulatory, environmental, and IP rights issues,

— deployment learning and feedback, and

— competitive reaction.

See Table D.4 in Annex D for examples of key questions, indicators and associated metrics.

7.6 Measurements of innovation initiative outcomes

The organization can undertake measurements to evaluate the results from the deployment of innovation solutions. These results can include value outcomes and impacts directly affecting the organization as well as their long-term market, social and environmental value, e.g.:

— return on innovation investment;

— solution adoption and satisfaction despite competitive reaction;

— solution lifespan and further opportunities for innovation expansion;

— outcomes and impacts affecting the organization, including learning from deployment;

— relevant social, environmental and economical impacts for third parties.

See Table D.5 in Annex D for examples of key questions, indicators, and associated metrics.

8 Innovation portfolio measurements

8.1 Measuring portfolios of innovation initiatives

Organizations can undertake more than one innovation initiative at the same time. Some are short-term, while others are medium-term or even long-term over several years. No organization can afford an unlimited budget for innovations. Organizations invest in portfolio(s) of innovation initiatives managed to diversify risk and achieve satisfactory results as a whole despite encountering failures in some of individual initiatives (projects). In addition to the organization's portfolio(s) of innovations, there may be other, locally funded innovation activities for achieving local value or exploring opportunities and ideas prior to bringing them into a formally constituted portfolio.

The organization, in addition to managing each innovation initiative with its own set of measurements, at times appropriate for that initiative, needs to manage the entire innovation portfolio with an appropriate set of measurements that are performed at planned intervals or when special events require them. For example, Figure 6 illustrates a portfolio that was started some time ago and continues with innovation initiatives of various lengths, some of which have been finished or closed by this point in time (T_N), while some others are continuing, and where other new ones may be added. Each organization can choose the measurement interval "X" best suited for their purposes, e.g. every month, every quarter, annually.

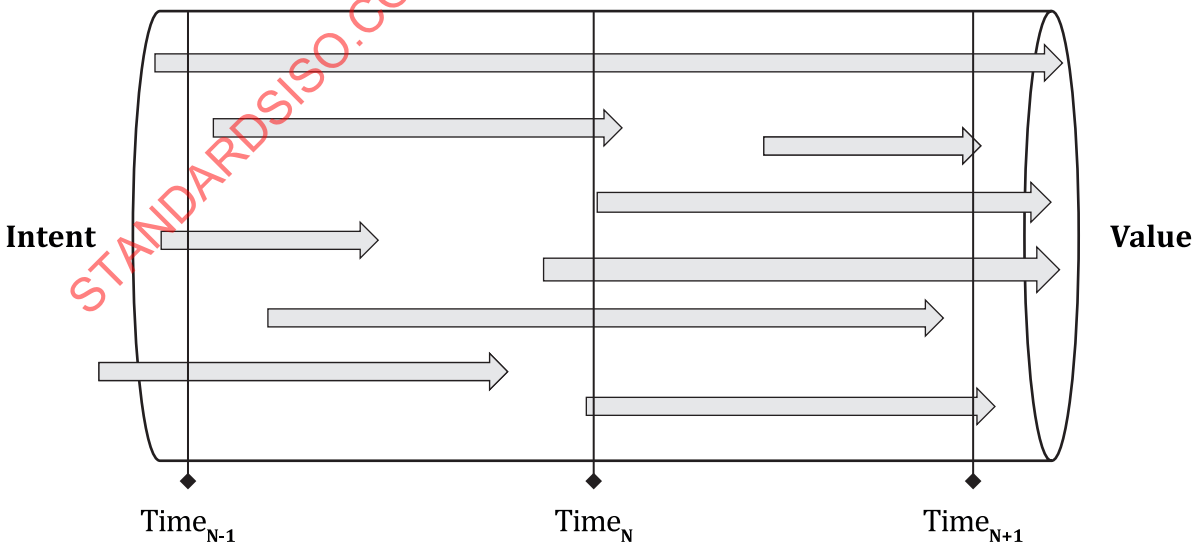


Figure 6 — Portfolio of innovation initiatives with the measurement at regular "X' time intervals.

The innovation portfolio-oriented measurements should reflect the contextual realities and strategic directions of the organization at the following specific measurement times:

— alignment with innovation strategy and the organization's objectives;

— status of progress in meeting portfolio implementation plan, including reasons for adjustments;

— effects of the portfolio on the organization, including its resources and processes;

— the estimated balance of risk and opportunities in the innovation portfolio in relation to the organization's risk appetite and tolerance for failure;

— value-driven outcomes and impacts.

The portfolio measurements should be selected based on their desired impact in driving people's behaviour towards achieving the organization's value objectives.

Using a single innovation portfolio metric is risky because the one-and-only chosen indicator might not represent the organization's strategic objectives and does not determine the actual level of progress in the organization's innovation efforts. At the other extreme, having too many metrics overburdens the organization with additional efforts to the point of wasting valuable time and resources.

Organizations stand to benefit from establishing expected targets of performance for each of their innovation portfolio indicators. Furthermore, time and resource benefits can be drawn by associating measurement targets with potential corrective actions if the respective targets are not met.

Top management can:

— review, at planned intervals, the progress of their innovation portfolio(s);

— balance the inherent risks and benefits of individual innovation initiatives in the portfolio(s);

— maintain their innovation portfolio(s) aligned strategically with the objectives of the organization.

Measurement-based innovation portfolio reviews enable timely decisions concerning appropriate corrective actions and portfolio investment adjustments. Portfolio reviews need to focus on the indicators that have been measured to be below expected targets by addressing the usual why, what, how, who and when questions.

a) Why did the innovation portfolio measurement show a below-target performance:

   1) was it an issue with the measurement, in which case the measurement needs to be re-considered; or

   2) was it because the innovation portfolio did not achieve the desired target, in which case the portfolio needs to be examined and the root causes discovered?

b) What are the potential impacts of the innovation portfolio not meeting its target of performance?

c) Where in the innovation portfolio does the situation that needs to be corrected appear?

d) How can the above situation be corrected:

   1) what corrective actions can be taken; or

   2) can the portfolio be adjusted with some innovation initiatives reduced or failed, while others are enhanced and new ones initiated?

e) Who is responsible for the corrective actions, portfolio adjustment, and the corresponding learnings?

f) When can the needed remedies take effect?

8.2 Selecting a balanced set of innovation portfolio measurements

A systematic approach to measuring an innovation portfolio requires a balanced perspective based on the innovation measurement framework described in 4.3, including the following:

— coverage of past, present, and future time perspectives of innovation in (and by) the organization;

— measurements that qualify the organization's understanding of its context (internal and external) addressing the organization's leadership, with emphasis on its capabilities of defining appropriate innovation policies, goals and strategies, along with its effectiveness in nourishing an entrepreneurial culture and the organizational structures propitious for innovation;

— measurements characterizing the evolving organization's innovation resources, its people, its platforms and tools, and its partners;

— measurements analyzing progress in the creation of innovation solutions: its products, its services, policies, programs, and its own processes, including the process of innovation management;

— measurements determining the value outputs achieved, along with the organization's innovation economic, social, educational and environmental outcomes.

The process of selecting a balanced set of indicators and metrics for the organization's innovation portfolio(s) can be guided by the methodology outlined in 4.4 on planning and support and proceed according to the following steps:

a) Identify the strategic innovation drivers and outcome priorities considering short-term (e.g. 0 months to 6 months H1 horizon), mid-term (e.g. 6 months to 24 months H2 horizon), and long-term (e.g. > 2 years H3 horizon) innovation goals, along with their impact on the evolution of the organization.

b) Determine the implementation enablers (IEs) necessary to ensure timely success, e.g. resources, project management, team spirit, risk mitigation, partnerships, customer knowledge, contextual restrictions, competitive situation, technology access.

c) Select the most meaningful indicators for each value-add domain of the innovation measurement framework. Without omitting critical aspects of the innovation portfolio, organizations can use composite (layered) indicators and associated metrics that are calculated as suitably weighted sums of simpler, more direct metrics. The weights can be selected to emphasize those metrics that stand to lead to the most desired changes in either individual or collective behaviours, or both. Annex E shows examples of composite innovation portfolio metrics that can provide an at-a-glance understanding of the situation.

d) Select a manageable set of high impact indicators and metrics that would enable a balanced review of the innovation portfolio progress, along with proper handling of the unintended consequences, either positive or negative. A set with too few metrics might not bring a comprehensive enough understanding of the portfolio situation, while a set with too many metrics can be too much of a burden to the organization.

e) Verify that the metrics selected are both understandable and measurable.

f) Determine the targets of performance for each of the metrics and propose corrective actions and responsibilities in case measurements are below targets.

g) Establish the schedule for evaluating the organization's innovation portfolio, including the processes and responsibilities for performing the measurements.

h) Document and communicate the measurement plan and responsibilities, along with a schedule for portfolio measurements, their review, and potential adjustment.

Annex E provides detailed examples of the kind of questions portfolio management can address to determine the indicators and associated metrics that can be used for measuring innovation portfolio(s).

Top management may limit the innovation portfolio analysis to fewer key management questions and then use composite indicators and metrics as shown by the examples in Table 2.

Table 2 — Example of top management composite indicators and associated composite metrics

Examples of key questions	Examples of composite indicators	Examples of composite metrics
Does the portfolio address the significant context dynamics and the needs and the requirements of interested parties?	Portfolio relevance	A complex metric formed by a suitably weighted composition of direct metrics addressing strategic alignment to innovation objectives, time-horizon balance, context knowledge, regulatory constraints, internal capabilities, competitive pressures, etc.
Is the organization providing the necessary leadership and support to undertake successfully the innovation initiatives in this portfolio?	Portfolio enabling support	A complex metric formed by a suitably weighted composition of direct metrics addressing dedicated human resources (HR), infrastructure and tools, portfolio teams' leadership, processes and culture, suitability of partnerships, etc.
Is the portfolio adhering to plan and if not, where are the impediments and what adjustments need to be made?	Portfolio progress	A complex metric formed by a suitably weighted composition of direct metrics addressing the status of each of the initiatives, deviations from the portfolio plans, significant impediments, etc.
Is the portfolio achieving desirable value objectives and how can it be enhanced?	Portfolio value outcomes	A complex metric formed by a suitably weighted composition of direct metrics addressing pipeline potential value, financial outcomes, social outcomes, environmental outcomes, organization outcomes, brand-competitive outcomes, etc.

8.3 Innovation portfolio constituent analysis (IPCA) maps and review scorecards

Organizations can use innovation scorecards based on weighted combinations of innovation indicators to obtain a rapid quantitative assessment of the organization's innovation performance and then benchmark its evolution over time. Benchmarking innovation portfolios is questionable because companies pursue innovation in diverse ways. Unless properly used, scorecards can oversimplify the situation and lead to poor innovation management decisions, which is why it is advisable to use innovation scorecards that are specific and unique to the organization.

NOTE Annex E provides an example of how an organization can build an innovation scorecard suiting its objectives and innovation management processes and capabilities.

Organizations can undertake a meaningful analysis of the progress of an innovation portfolio by pursuing a multi-dimensional constituent matrix approach that compares all innovation initiatives in the portfolio on selected perspective dimensions, as detailed in Annex E.

9 Assessing and improving innovation operation measurements

9.1 Establishing the assessment

9.1.1 Identification of reviewers

Assessment and improvement of the innovation operation measurements is an important task to be carefully planned and executed. Top management can appoint an objective group of reviewers with diverse backgrounds for this task.

The reviewers can include multidisciplinary experts across subject domains, innovation processes and business practices. There can be a mix of internal and external participants that are vested in the success and resilience of the organization, for example innovation managers, auditors, consultants, and/or third-party representatives.

The reviewers should be free of any conflicts of interest, and they should be empowered to recommend changes in the set of metrics, independent of either organizational pressures or resistance to change, or both. The reviewers can report directly to the top management of the organization.

If it is not possible to appoint a group of reviewers, top management may appoint only one person, who can engage others as appropriate to include above mentioned diverse perspectives in order to eliminate bias and blind spots.

9.1.2 Timing of the assessment

The measurements that represent the innovation outcomes can be assessed during the same cycle and timing as strategic planning. If the organization experiences a significant shift in the external context (requiring adjustment to the strategic plan), the metrics can be simultaneously assessed and revised under a new context.

For those measurements that represent stages of the innovation process, reviewers may assess those metrics along with other management reviews, internal audits, or when there is a change in the internal context.

9.1.3 Scope of the assessment

The scope of the measurement assessment should include metrics, measurements and indicators, as appropriate, to address any changes in internal and external context.

Any data-based assessment and data-driven changes should ensure data integrity prior to changing the affected metrics.

9.2 Assessing the suitability of innovation operation measurements

9.2.1 Assess the set of measurements and the innovation measurement framework

The reviewers can assess whether the innovation operation measurement framework and the set of innovation operation measurements are designed to reflect the organization's needs and purpose through outcomes and whether or not it is aligned with the strategic objectives within the organization's internal and external context.

The reviewers can ensure that the innovation operation measurements

— have balanced competing metrics to minimize any bias in outcomes,

— have metrics that create and sustain capabilities or competitive advantage by providing sufficiently relevant data in a timely manner,

NOTE Relevant data leads to useful, actionable information, with the ability to drill down and investigate the cause-effect relationships.

— include the impact on external environment and external influencers such as statutory, regulatory, compliance and safety,

— have the right quantity of metrics, as well as ensure accuracy and frequency for each measurement,

— have clearly identified unique ownership (e.g. responsibility, accountability, and traceability) for reporting and controlling the metrics,

— capture the data at the correct location in the process or value stream, such as external delivery or internal handoffs across organizational boundaries,

— have clearly identified timing/frequency of tracking, or specific triggers,

— have clear targets, with acceptable tolerances and limits, and

— account for the total cost-benefit analysis of tracking and processing the data.

The reviewers can assess whether the data gathering process is reliable, robust, transparent, promotes integrity in reporting, and highlights any unintended adverse outcomes without negative consequences towards individuals in the process. The reviewers can assess how well the measurements help the organization thrive under normal operating conditions and survive through operational volatility or crisis.

9.2.2 Optional additional assessment

The organization can consider whether the measurements include:

— quantification of risk, considering the direct, indirect, or hidden impact on growth, business resiliency or contingency, pandemics or other public health crises;

— impact on social responsibility, sustainable development and sustainability;

— promotion of an innovation culture through appropriate leadership, management, and employee behaviour, reflective of the persona (organization, industry, sector) and purpose;

— capture of negative external impacts as well as constructive/positive collateral impact;

— segregation of strategic, tactical or contingency metrics;

— any cross-linkage or direct statistical correlation across metrics.

9.3 Improving the set of innovation operation measurements

9.3.1 General

When the assessment reveals a shortcoming, management can revise, add or remove metrics as appropriate. The change may be temporary, for example, for a period of time, or permanent, or while conducting a pilot operation (temporary with a success criterion to become permanent).

9.3.2 Removing metrics

Top management can decide to remove metrics due to one or more of the following situations:

a) metrics undermine the purpose of innovation activities, objectives or organizational strategy;

b) metrics are redundant because similar data is being tracked by other metrics;

c) organization is not able to capture meaningful data that is useable in decision-making;

d) effort in tracking exceeds the value derived through control;

e) metrics are no longer needed to meet external or regulatory requirements that have changed;

f) organization is unable to focus on what is important due to having too many metrics to track.

9.3.3 Revising metrics

Top management can decide to revise either metrics or their targets, or both, due to one or more of the following situations:

— the need to improve alignment with the organization's existing purpose and objectives;

— organizational priorities have changed;

— the need to either re-prioritize or rebalance, or both, and reduce bias in outcomes or performance;

— revise the frequency of tracking depending upon volatility/stability of data;

— change targets when consistently achieving goals;

— automation in data acquisition needs adjustment as a better alternative to dropping metrics.

9.3.4 Adding metrics

Top management can add new metrics due to one or more of the following conditions:

— new strategy, new risk, and/or new uncertainty that calls for new metrics;

— new requirements by third parties, for example, regulators, customers, or partners;

— data used for decision making is not contained in the current set of metrics;

— ability to meet all targets with ease, indicating that a competing metric may be missing.

— desired people behaviour is not evident in the culture being sought.

Annex A
(informative)

Selection considerations and examples of indicators and metrics for innovation operation measurements

A.1 Considerations in measuring activities

The planning, selection and usage of innovation operation measurements should reflect the organization's innovation portfolio and the stage of each product lifecycle (e.g. new, rapidly growing, mature or declining) and its structural complexity (e.g. conglomerate, operations unit or department). Different stages of lifecycle require different metrics, as do different types of organizational structures.

As innovation operation measurements will likely drive behaviour, enable alignment with strategies and ensure achievement of objectives provided the metrics and the process of measurement have been well chosen, the following can be avoided:

— metrics that do not contribute to the evaluation of the organization's innovation objectives or impact negatively other aspects of innovation;

— too few metrics that can overlook important aspects of innovation;

— excess of metrics that can overload the innovation management capacity of the organization;

— replication of metrics that produce similar effort or information;

— lack of alignment between innovation measurements and HR evaluation process, which would likely discourage people from innovation;

— lack of measurement consistency across the organization, which can be a problem for large organizations;

— innovation metrics that are difficult to measure and discuss and not useful for defining corrective actions.

A.2 Examples of indicators and associated metrics

Table A.1 provides several examples of important indicators and associated metrics.

Table A.1 — Examples of indicators and associated qualitative and quantitative metrics

Focus	Example of indicators	Qualitative metrics examples	Quantitative metrics examples
Preparation (Input)	External impacts	Can we understand external impacts on this activity?	Probability of social and regulatory developments affecting this activity
	Strategic alignment	Is activity aligned with the organization's vision and objectives?	% alignment with strategic objectives
	People capabilities	Is the team sufficiently prepared and knowledgeable for this activity?	% of activity team having necessary resources
	Budget availability	Is the budget required properly estimated?	% of necessary budget fully allocated from beginning
	Leadership and culture	Is this activity a leadership priority and are there incentives for participating in it?	% of people with proven collaboration experience

Table A.1 *(continued)*

Focus	Example of indicators	Qualitative metrics examples	Quantitative metrics examples
Activity (Progress)	Leadership	How involved is the leadership in this activity?	% of executive time dedicated to this activity
	Timeliness	Is activity progressing on time?	Time delays vis-à-vis initial plan at designated instances
	Efficiency	Is activity efficiently managed?	% expenditures over budget at specific instance
	Risk managing	How uncertain and how hazardous is this activity?	Number of measurements dedicated to detecting risks
	Learning and feedback	Are we learning and providing appropriate feedback?	Number of lessons of success or failure learned and communicated
Outputs and outcomes (Results)	Financial results	Are we getting a good financial return on investments (ROI)?	ROI after X years
	Non-financial results	How are we affecting the environment?	Customer satisfaction with the social and environmental impacts
	Management results	How well did we plan our innovation activity?	% of projects abandoned
	Learning results	Did we learn about better partnering?	% partnerships that succeeded as negotiated
	People and culture results	Are our people better prepared for the next challenges?	% of people with new innovative ideas

A simpler at-a-glance review of the situation may be provided using composite (layered) metrics as exemplified below:

— example for composite Innovation Leadership Metric = suitably weighted sum of:
  — leadership time spent on innovation,
  — percentage of people with innovation goals, and
  — percentage of high-return at high-risk innovation projects;
— example for composite Culture of Innovation Metric = suitably weighted sum of:
  — percentage of people submitting valuable ideas,
  — percentage of collaborations without complaints,
  — percentage of communicated lessons drawn from failure, and
  — percentage of people rewarded for innovation;
— example for composite Valuable Solutions Metric = suitably weighted sum of:
  — market value of innovation pipeline,
  — percentage process time savings,
  — percentage of early closing of innovation initiatives,
  — percentage growth in customers, and
  — percentage growth in value per customer.

Annex B
(informative)

Examples of measurements for establishing innovation initiatives

B.1 Examples of context measurements

The organization can undertake measurements enabling it to understand the impact of external context changes, from the past experiences, current situation and potential future evolution on the innovation activities. These context measurements assist to evaluate opportunities and threats and in capturing trends that are likely to affect the existing or future priorities of an organization and determining its innovation initiatives. Table B.1 provides examples of questions of particular interest concerning the organization's external context, areas of indicators, and examples of potential metrics that could be employed.

Table B.1 — Examples of key questions, important indicators and potential metrics for measuring external context

Examples of key questions	Areas of potential indicators	Metric examples
Do we understand the economic context changes affecting us, and what/how could we innovate to respond to them ?	**Economic context**	1) % change in value of our solution and costs of having them adopted 2) % change in financial sources available and % change in cost of investments
Do we understand the social changes in our context, and what/how could we innovate to enhance our societal value?	**Social context**	1) Which social trends affect the acceptance and values of our solutions? 2) % innovation initiatives aiming for enhanced social value solutions
Do we understand political context implications, and do we need to innovate for mastering them?	**Political context**	1) Localization and gravity of political changes affecting us 2) Number and location of politically-opened opportunities
Are we considering most important environmental context changes to enhance value of our innovations?	**Environmental context**	1) % our solutions negatively affecting the environment and our customers 2) % of innovation initiatives serving the environment
Do we understand the ethical requirements affecting us and their implications for our innovation?	**Ethical context**	1) % of innovation initiatives ethically oriented 2) % of past innovation outcomes not complying to ethical culture

Table B.1 *(continued)*

Examples of key questions	Areas of potential indicators	Metric examples
Do we understand the regulatory and standardization changes affecting us and their implications for our innovation?	**Regulatory context**	1) Number of new regulations impacting us significantly 2) % of innovation initiatives aimed at better regulatory compliance
Do we understand science and technology advances sufficiently to take advantage of, or defend against, them ?	**Technical context**	1) Which technology developments are top three threats for us? 2) Which technology developments and platforms are top opportunities for us?
Have we identified and suitably characterized the most relevant organizations impeding achievement of our vision and objectives?	**Competitive impacts**	1) Number and strengths of relevant organizations seriously impeding achievement of our objectives 2) Market share dynamics 3) Ratio of the number of positive media stories about competitors vs. the number of negative media stories about us 4) Multi-dimensional targeted competitive analysis of 3 toughest competitors 5) Change in patent map of the organization in its competitive landscape to assist in the decision-making concerning protection strategy

The organization can undertake measurements enabling it to understand the impact of internal context changes from the past experiences, current situation, and potential future evolution on innovation activities for determining innovation initiatives to exploit the organizational strengths and mitigate risks related to its weaknesses.

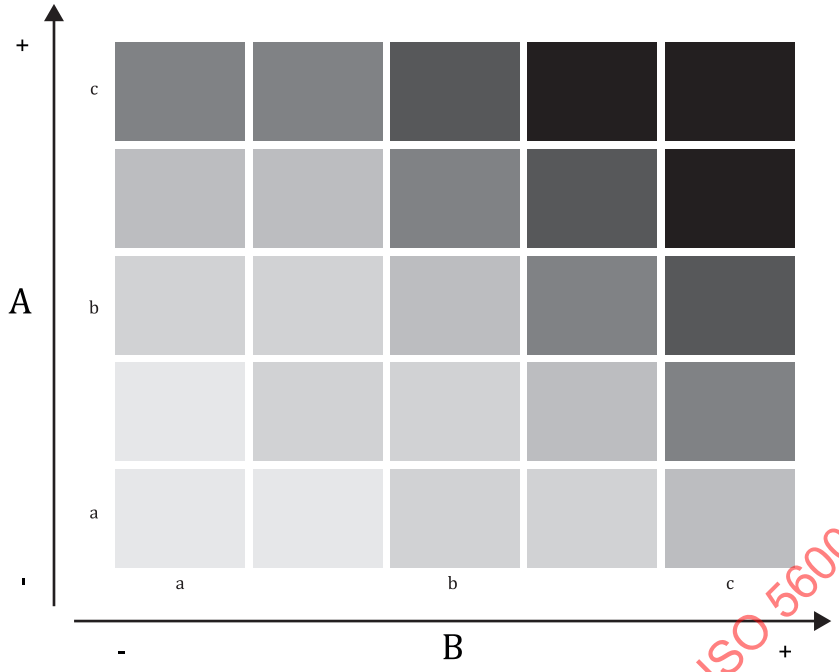
Table B.2 provides examples of key questions concerning the organization's internal context, areas of indicators, and examples of potential metrics that can be employed. It excludes those areas of internal context that are described later as part of the measurements for leadership and culture in 5.3.

Table B.2 — Examples of internal context key questions, areas of interest and some potential metrics

Examples of key questions	Areas of potential indicators	Metric examples
How agile and efficient is our organization for the world of today and that of tomorrow?	**Organization**	1) Number of structural aspects that have been changed and number still requiring change 2) Average life span of organizational changes
Are our people resources capable to succeed at innovating for sustainability and value enhancement?	**People and competencies**	1) % of HR turnover 2) % of people trained for enhanced competencies in last year 3) % of people using knowledge repositories, knowledge sharing platforms, etc.
Are our processes efficient enough for sustained success in context of external context changes?	**Processes**	1) Number of processes requiring change 2) % of innovation initiatives centered on process changes and enhancements
Do we need to make changes in our tools and infrastructure for enabling future successes?	**Infrastructure and tools**	1) % of effectiveness of our tools and infrastructure, including digital platforms 2) % of innovation initiatives aimed at tools/ infrastructure/platforms upgrades
Can we improve our financials and the effectiveness of our investments?	**Financials**	1) ROI and return on innovation investment (ROII) 2) +/- changes in internal investment decisions
Are we taking full advantage of our intellectual assets?	**Intellectual assets**	1) % of growth in numbers of protected IPs 2) Revenues (losses) due to IP protection (litigation)
Do leaders have a clear vision, formalize their strategy, and communicate it throughout the organization?	**Leadership**	1) Number of annual meetings or initiatives focusing on innovation vision and strategy. 2) % of innovation activities fully aligned with strategy
Are we reacting fast and decisive enough?	**Decision effectiveness**	1) Frequency of discussions on context change impacts on our organization 2) Average time delay from detection of threats to appropriate innovation action

The organization can undertake measurements to understand the role, needs and expectations as well as potential influence of its interested parties (internal and external).

An organization's interested parties can be characterized in matrices considering their potential influence and importance vis-à-vis the organization's innovation objectives, as shown in Figure B.1.



Key

A importance

B potential influence

[a] Low.

[b] Medium.

[c] High.

Figure B.1 — Matrix for characterizing interested parties according to their influence and importance

Examples of key questions concerning the need and expectation of an organization's interested parties, areas of indicators and potential metrics are shown in Table B.3.

Table B.3 — Examples of indicators concerning interested parties, key questions and potential metrics

Examples of key questions	Areas of potential indicators	Metric examples
Do we know who are the most impacting interested parties?	**Identification of interested parties**	1) Updated influence-importance characterization of interested parties 2) Number of customer journeys fully developed
Do we understand the needs and expectation of interested parties and how they translate into risks or value potentials for us?	**Value expectations**	1) Number of value potentials detected 2) % of business model innovation initiatives 3) % of innovation initiatives aimed at expanding the classes of addressed customers 4) % of disruptive innovation initiatives
Do we understand the dynamics of our ecosystem and are we interacting properly with its members?	**Ecosystem / value chain interactions**	1) Changes in priority ecosystem (value chain) players 2) Number of innovation requests passed to suppliers and ecosystem partners
Do we understand the impact of regulations and ethical considerations on our innovation activities?	**Regulatory ethical compliance**	1) % of innovation initiatives aimed at better regulatory compliance 2) % of innovation initiatives grappling with ethical issues
Are our communication channels with customers and other interested parties functioning properly?	**Communication channels**	1) Fidelity of communication channels with customers and stakeholders 2) Speed of communication channels with customers and stakeholders
Do we respond effectively, efficiently and timely to changes in interested parties that affect our innovation activities?	**Effectiveness of response**	1) Time lag between value potential detection and validation of relevant innovation concept 2) % of innovation initiatives with Triple Value Objectives (economic-social-environmental)

B.2 Examples of leadership and culture measurements for establishing innovation initiatives

Leadership establishes what the organization should focus on (e.g. values, objectives), how to approach innovation (e.g. beliefs, perspectives) and how to execute it (e.g. behaviours, organization). It has the responsibility to encourage and enable people to innovate effectively, to think about problems in creative ways and build an organizational culture that supports successful innovations. Innovation leaders should

— practice good innovation governance directly and in support of innovation activities,

— involve people, measure participation, have the ability to motivate, be open-minded,

— capture knowledge from employees, and

— dedicate time in communication and define how they encourage sharing new ideas from within and from outside the organization.

Determining the key indicators of leadership and culture in an organization can be based on asking questions probing their impact on the effectiveness and efficiency of the organization's innovation.

Table B.4 captures examples of key questions and metrics that can be used to measure some of the indicators associated with leadership commitment and actions.

Table B.4 — Examples of key questions, associated indicators and potential metrics for measuring leadership commitment towards innovation

Examples of key questions	Areas of potential indicators	Metric examples
How committed and accountable for innovation is the leadership?	**Accountability for innovation**	1) % of executive time dedicated to innovation 2) % of executives accountable for innovation initiatives (projects) 3) % of budget assigned for innovation
How focused are the executives on future realization of value?	**Focus on value**	1) % of long-horizon (> 3 years) innovation projects 2) % of high-risk projects / % of budget of high-risk projects 3) % of innovation projects with risk management
How committed are executives to metrics-based management?	**Evidence-based management**	1) Number of organization-level innovation metrics 2) Frequency of innovation portfolio evaluations 3) % of executives participating in metrics selection
How misaligned is the leadership on innovation priorities?	**Alignment**	1) % of unanimous agreements on setting-up innovation initiatives 2) % of approved innovation initiatives matching priority objectives 3) % of executives pushing for business model innovations
How appropriate and timely are innovation management roles and responsibilities assigned?	**Assigning roles and responsibilities**	1) Average time to assign innovation management responsibilities 2) % of innovation initiatives changing leadership 3) Average life-span of innovation management responsibilities
Is the leadership actively nourishing a culture of innovation?	**Fostering culture**	1) % of executives with innovation training 2) % of promotions based on innovation success 3) % of innovation initiatives aiming for social and environmental value

Table B.5 captures examples of key questions and metrics that can be used to measure some of the indicators associated with innovation strategy and awareness.

Table B.5 — Examples of key questions, associated indicators and metrics for innovation strategy and awareness

Examples of key questions	Areas of potential indicators	Metric examples
How committed is the leadership to achieving the organization's vision?	**Future focus**	1) % of long-horizon innovation initiatives 2) % of innovation budget dedicated to long-term initiatives 3) % of budget dedicated to enhancing innovation capabilities
How often is the innovation strategy updated to reflect context dynamics and changes in stakeholders' needs ?	**Adaptability**	1) % of innovation initiatives that have changed due to updated understanding of context and/or stakeholder needs 2) Decision time from context updating to setting-up new innovation initiatives 3) % of innovation initiatives aimed at updating the organization structure, tools and processes
Are innovation initiatives well aligned with the innovation strategy?	**Strategic direction**	1) % of innovation initiatives not-aligned with latest innovation strategy and objectives 2) % of innovation initiatives having executive sponsors/ champions 3) % of innovation initiatives with combined economic, social and/or environmental objectives
Are employees visibly motivated by the innovation strategy?	**Awareness**	1) Number of leadership-employees discussions concerning innovation latest strategy 2) % of employees participating in innovation initiatives 3) % of split between top-down and bottom-up originated innovation initiatives

Table B.6 captures examples of key metrics that can be used to measure some of the indicators associated with the culture of the organization and its impact on innovation success.

Table B.6 — Examples of key questions, associated indicators and potential metrics for measurements of culture

Examples of key questions	Areas of potential indicators	Metric examples
How open is the organization to new ideas and ways for its evolution?	**Openness**	1) Number of debates challenging organization orthodoxy 2) % of innovation ideas originating from outside the organization 3) % of innovations oriented to processes and organization upgrades
How effective are the collaborations in the organization?	**Collaboration**	1) % of employee time spent in innovation collaborations 2) % of executives championing/managing innovation partnerships 3) % of innovation initiatives based on external collaborations
How well are innovators supported and rewarded by the organization?	**Innovation support and incentives**	1) % of budget assigned for innovation incentives 2) % of people rewarded for their innovation efforts 3) % of promotions due to innovation efforts
Is the organization and its innovation initiatives diverse enough to achieve its objectives?	**Diversity**	1) % of innovation initiatives requiring multi-disciplinary involvement 2) % of first-time innovation leaders 3) Age/gender/background diversity of innovation teams
Does the organization have a working environment good enough for effective innovation?	**Working environment**	1) Number of complaints concerning working environment 2) Number of projects aimed at enhancing working environment 3) % of innovation people working from home
How well does the organization learn from its innovation success and failures?	**Learning and feedback**	1) Number of communicated lessons derived from failed innovations 2) % of innovation initiatives derived from failed innovations 3) % of innovation initiatives with predetermined feedback loops

B.3 Examples of measurement indicators and metrics on planning for innovation initiatives

Table B.7 captures examples of key questions and metrics that can be used to measure some of the indicators associated with the organization's planning activities for innovation operations.

Table B.7 — Examples of key questions, associated indicators and potential metrics for measurements of planning innovation initiatives

Examples of key questions	Areas of potential indicators	Metric examples
Is our organization sensing and seizing opportunities?	**Opportunities**	1) % of opportunities detected generating new activities or transformation of organizational capabilities
Does the organization use risks assessment tools or methods to evaluate innovation initiatives?	**Risks**	1) % of project risk assessment evaluations in the total number of on-going projects 2) % of innovation projects where value at risk exceeds specified threshold 3) % of risk response planning measures (e.g. mitigation) contributing to project success
Does the organization have a plan to define, review and implement innovation objectives?	**Innovation objectives**	1) % of people involved in the definition of objectives 2) Number of plan review meetings
Does organization apply project management practices?	**Management practices or processes**	1) % of innovation activities managed according to project management guidelines 2) % of project managers having international certification

B.4 Examples of measurement indicators and metrics on support for innovation initiatives

The organization can undertake measurements that evaluate needs, capabilities and limitations of support for innovation.

Table B.8 captures examples of key questions and metrics that can be used to measure some of the indicators associated with the organization's support for innovation operations.

Table B.8 — Some examples of indicators and potential metrics for measuring support for innovation initiatives

Examples of key questions	Areas of potential indicators	Metric examples
Is the organization attracting and retain people motivated to its innovation activities?	**People**	1) % of job ads or recruitment policies targeting innovation skills 2) % of people allocated to innovation activities
Does the organization provide time to stimulate innovation?	**Time**	1) % of weekly free time for unplanned activities (slack) per employee 2) Average % of working time spent on innovation initiatives versus routine operations
Are our facilities and tools sufficiently advanced to carry us forward?	**Infrastructure and tools**	1) % of innovation projects using technology platforms 2) % of internal users of tools and methods for innovation 3) # of facilities and tools used compared with competitors
Is our innovation budget (including R&D) compatible with planned activities?	**Financials and funding**	1) % of Business R&D expenditures in total turnover 2) % of Business Innovation expenditures in total turnover 3) % of deviation to the benchmark or relevant competitor
Does the organization use internal and external knowledge and information sources	**Knowledge**	1) % of people using knowledge repositories 2) Number of Knowledge Repositories 3) Number of knowledge experts (identified through citations or membership of scientific or technological organizations)

The organization can undertake measurements that contribute to identifying individual and organizational competencies, including those from external parties for present and future needs to achieve innovation objectives and to develop innovation operations.

Table B.9 exemplifies some indicators and associated metrics concerning the organization's innovation competencies.

Table B.9 — Examples of key questions, indicators and potential metrics for measurements of competencies

Examples of key questions	Areas of potential indicators	Metric examples
People are used to identify and review individual competences?	**Individual**	1) % of skills available vs. the skills considered necessary 2) Skills and competences concentration / dispersion (% each skill represents in the skill pool)
Does our organization have an inventory of collective competences?	**Collective**	1) Skill pool size (number of each skill represented in the skill pool
How our organization evaluates the need of external competences?	**External**	1) Number of competitors used in core skill assessment 2) % of external competences used in project or portfolio during year / project duration

Table B.10 captures examples of key indicators and metrics that can be used to measure the organization's IP capabilities and actions in support of its innovation operations.

Table B.10 — Examples of key questions, associated indicators and potential metrics for IP support

Examples of key questions	Areas of potential indicators	Metric examples
Does the organization have a competitive Technology Cycle Time?	**Speed of invention**	1) Median age, in years, of the references cited on the front page of patent and utility models. 2) % of people indicated as IP creators (internally and/or in collaborative activities)
How relevant is the technology or solutions protected?	**Technology relevance**	1) Average number of science papers referenced on the front page of the patent or utility model 2) Score of Impact Index (calculated through weighting technology relevance, market coverage, …)
Are solutions developed and deployed protected?	**Intellectual Property Rights (IPR) portfolio**	1) % of trademarks registered in the total number of solutions developed and deployed by the organization 2) Level of IP protection for solutions developed and deployed (poor, fair, good or strong).
Does the organization use IPR evaluation tools or methods?	**Intellectual Property Rights (IPR) Management**	1) Number of managers trained in the use of IPR evaluation tools or methods 2) % of innovation initiatives, including R&D projects, which have developed Freedom to Operate (FTO) analysis

Table B.11 shows some examples of key questions and metrics that can be used to measure some of the indicators associated with the organization's awareness and communication supporting innovation operations.

Table B.11 — Examples of indicators and potential metrics for measurements of awareness and communication

Examples of key questions	Areas of potential indicators	Metric examples
Does the organization know and understand its vision and strategy in the innovation context?	**Orientation to innovation**	1) Level of understanding of core messages in the vision (low/medium/high) 2) Level of understanding of each innovation objective (low/medium/high)
How people evaluate internal communication?	**Internal communication**	1) % people very satisfied with the quality of internal communication 2) Number of of internal communication tools (e.g. Intranet) 3) Number of communication events/initiatives
Is the organization recognized externally as being innovative?	**External communication**	1) % of project or activities known by collaborators from other departments (by department) 2) Number of awards and distinctions targeting innovation received from external parties 3) % of attendance in socialization spaces or events.

Annex C
(informative)

Examples of innovation process measurements

C.1 Examples of indicators and metrics for identifying innovation opportunity processes

Tables C.1, C.2, and C.3 show examples of key questions and metrics that can be used to enable evidence-based decisions in the management of the identifying opportunities process.

Table C.1 — Examples of key questions, indicators and metrics for identifying innovation opportunities preparation

Examples of key questions	Areas of potential indicators	Metric examples
Do we have enough knowledge of the external context?	**External context knowledge**	1) Degree of understanding of political context and trends 2) Degree of understanding of economic context and trends 3) Degree of understanding of social context and trends 4) Degree of understanding of technological context and trends 5) Degree of understanding of legal/regulatory context and trends 6) Degree of understanding of environmental context and trends 7) Degree of understanding of needs and expectations of interested parties
Do we have enough knowledge of the internal context, including organization's strengths, weaknesses and assets?	**Internal context knowledge**	1) Availability of organization vision and mission with specific time horizons 2) Degree of understanding of organization's strengths 3) Degree of understanding of organizations' weaknesses 4) Degree of awareness of organization's innovation strategy
Do we have the right culture and working environment for people to participate in the identification of opportunities?	**Culture and environment for opportunity identification**	1) Degree of openness to orthodoxy challenges and debates 2) Number of complaints concerning working environment 3) Degree of collaborations within the organization 4) Number of external collaborations 5) % of innovation initiatives aiming for social and environmental value
Do we have the right people participating in the identification of opportunities?	**Resources for opportunity identification**	1) Number of executive-employee sessions on innovation strategy and objectives 2) Number of employees available for opportunity identification
Do we have the process and tools for identifying opportunities?	**Process and tools for opportunity identification**	1) Availability of market research reports and on-line data bases 2) Number of issues identified concerning process of opportunity identification

Table C.2 — Examples of key questions, indicators and metrics for measuring the identification of opportunities activities

Examples of key questions	Areas of potential indicators	Metric examples
Do we have good and sufficiently well-spread participation in identifying opportunities?	**Participation in opportunity identification**	1) Average executive time spent on identifying opportunities 2) % of employees participating in identifying opportunities
Is our process for identifying innovation opportunities comprehensive and effective enough?	**Opportunity identification approach and progress**	1) Quality of process for identifying and documenting innovation opportunities 2) % of opportunities concerning requirements of interested parties 3) % of social and/or environmental oriented innovation opportunities 4) % of opportunities with fully defined risk assessment
Are we identifying opportunities early enough to enable timely response to context changes and new stakeholder requirements?	**Speed (timeliness) of opportunity identification**	1) Average number of sessions debating innovation opportunities 2) Average time spent per identified opportunity 3) % of long-horizon opportunities identified

Table C.3 — Examples of key questions, indicators and metrics for measuring the identification of innovation opportunities outputs and outcomes

Examples of key questions	Areas of potential indicators	Metric examples
How future-focused and vision-aligned are our identified opportunities?	**Focus of identified opportunities**	1) % identified opportunities not aligned with organization strategy 2) % of identified opportunities that led to a change in business strategy and innovation objectives 3) % of identified opportunities resulting from existing innovation partnerships
How many competitive opportunities have we missed and how many of those that we identified were not pursued?	**Waste in identified opportunities**	1) Number of competitors' innovations that were not identified as opportunities for our organization 2) Number of past identified opportunities that were never pursued
Are we addressing innovation opportunities across the entire spectrum of potential user and influencer targets?	**Opportunity spectrum and balance**	1) % of identified innovation opportunities addressing new types of external customers and users 2) % of opportunities targeting internal processes, platforms and organizational needs 3) % of incremental innovation opportunities identified 4) Distribution of innovation opportunities by types of innovation 5) % of identified opportunities addressing risks deriving from organization weaknesses
Are we learning from other innovation processes to identify new innovation opportunities?	**Learning from other innovation processes**	1) Number of opportunities identified thanks to learning from concept validation 2) Number of opportunities identified thanks to learning from solution development 3) Number of opportunities identified thanks to learning from solution deployment

C.2 Examples of measurements of preparation for the creation of innovation concepts

Tables C.4, C.5 and C.6 provide typical examples of key questions, indicators and metrics concerning the concept creation process.

Table C.4 — Examples of key questions, indicators and metrics for concept creation preparations

Examples of key questions	Areas of potential indicators	Metric examples
Are identified opportunities realistic and aligned with strategic goals?	**Concept-opportunity alignment**	1) % of incremental opportunities 2) % of opportunities deemed unrealistic for the moment
Is there enough leadership commitment to energize the organization and direct innovation concept creation?	**Concept leadership commitment**	1) % of executives participating in opportunity assessments 2) % of budget (employee time) allocated for idea generation and concept creation
Do we have a sufficiently well-developed entrepreneurial culture allowing for meaningful innovation concept generation?	**Concept innovation culture**	1) Number of open debates on opportunity and idea merits 2) % of people recognized and rewarded for generating ideas
Is Is the work environment and the infrastructure good enough for effective and efficient concept generation?	**Concept work environment**	1) Availability of research data, tools and infrastructure for idea generation 2) Incentives and infrastructure for collaboration
Do we have the competences and skills necessary for effective concept generation?	**Concept competences and skills**	1) % of employees trained in creativity 2) % of employees with customer understanding skills and experience 3) Availability of technical skills
Do we have the necessary criteria filtering concepts and deciding on external participation in concept creation?	**Concept criteria and hypothesis**	1) Availability of criteria for filtering opportunities by potential value 2) Availability of criteria for collaborative concept creation

Table C.5 — Examples of key questions, indicators and metrics for measuring concept creation process

Examples of key questions	Areas of potential indicators	Metric examples
Do we have an effective systematic process for generating innovation concepts?	**Systematic concept process**	1) Well engineered and communicated process of idea generation and concept creation 2) Average # of idea generation-analysis-synthesis stages to create full concept
Do we have good and sufficiently well-spread participation in concept generation?	**Concept creation participation**	1) % of employees participating 2) Number of external participants 3) Average executive time spent on concept creation
Are we balancing risks and opportunities when generating concepts?	**Concept risk-opportunity balance**	1) % of strawman concepts with associated risk assessment 2) % of concepts with potential new IP opportunities
Do we have a comprehensive multi0-disciplinary approach to generating concepts?	**Concept comprehensive approach**	1) % of concepts developed through comprehensive approaches (e.g. Design Thinking methodology) 2) Average number of disciplines applied per concept
Do we have the competences and skills necessary for effective concept generation?	**Concept intrapreneurial timeliness**	1) % of pursued concepts with dedicated leaders and executive sponsors 2) Average time to decide on abandoning potential concepts
Are we applying well the feedback and learning learning from other innovation processes?	**Concept learning from other processes**	1) % of ideas generated as feedback from other processes 2) % of ideas generated from outside the organization
Do we understand our potential customers?	**Concepts' addressable customers**	1) Number of new classes of customers and/or territories considered 2) % of concepts addressing established customers

Table C.6 — Examples of key questions, indicators and metrics for measuring concept creation outputs and outcomes

Examples of key questions	Areas of potential indicators	Metric examples
How aligned are our innovation concepts with executive strategies?	**Concepts' strategic alignment**	1) % of concepts not fully aligned with strategic goals 2) % socially responsible concepts (with mixed economic, social and environmental values)
How efficient and timely are the creativity processes and resources ?	**Concept creation efficiency**	1) Ratio of defined concepts to ideas generated within unit of time 2) Average time from initial idea to fully defined concept 3) Average total employee time spent per created concept 4) # of concepts generated per employee
How well do innovation concepts cover the spectrum of time-horizons and innovation impacts?	**Concept creation balance**	1) % of concepts with long time-horizon 2) % concepts focused on incremental vs extension vs disruptive innovation concepts
How well do we understand the targeted customers?	**Concepts' targeted customers**	1) % of concepts focused on internal customers 2) % concepts with full customer and end-user segmentation and characterization
Have we defined adequate value propositions for our innovation concepts?	**Concepts' value propositions**	1) % of concepts with acceptable value proposition (including value models, cost models and risk assessments) 2) Number of potential new IP Rights vs. cost of acquiring necessary IP
How much learning have we derived?	**Concept creation learning (eed-back)**	1) Number of communicated lessons for improved creativity process and competencies 2) Number of communicated lessons to other innovation processes
Are our concepts ready to be validated?	**Concept validation readiness**	1) % of ideas not-translated into concepts 2) % of completion of resource (people, partners and infrastructure) requirements and plan for validation

C.3 Examples of measurements for the concept validation process

Tables C.7, C.8 and C.9 provide examples of key questions, indicators and metrics associated with the concept validation process.

Table C.7 — Examples of key questions, indicators and metrics for concept validation preparations

Examples of key questions	Areas of potential indicators	Metric examples
Do we have an adequate decision making structure to validate concepts?	**Validation governance**	1) Number of concepts entering validation, in validation and exiting validation 2) Type of criteria for making Go/No-go/Re-evaluate decisions
Are the concepts developed enough to be validated?	**Concept development quality (completeness)**	1) Number of concepts with preliminary value realization model (i.e. primary customer, potential value, probability of success, required human/financial/ infrastructure resources to implement, scale concept, sales channels) 2) Number of concepts sent back for further completion
Do we have an adequate number of concepts coming into the validation pipeline?	**Concept development volume**	1) Number of concepts entering validation phase 2) Number of concepts entering validation phase which are aligned with each organizational strategic outcome
Do we have adequate resources to conduct concept validation?	**Validation resourcing**	1) Number of HR involved in prototyping, testing and validation 2) Skills inventory of HR involved in validation and governance concept 3) Amount of budget associated with concept validation
Do we have a good enough process and adequate tools and methods to validate concepts?	**Validation methods**	1) Number of validation tools by type 2) Number of personnel skilled in validation tools by type 3) Number of training hours per resource to develop skills
Do we have list of hypothesis and assumptions as an input to start the validation process?	**Validation readiness**	1) List of critical uncertainties and assumptions 2) Quality and completeness of initial hypotheses created

Table C.8 — Examples of key questions, indicators and metrics for measuring concept validation process

Examples of key questions	Areas of potential indicators	Metric examples
Do we understand how to create effective hypotheses and criteria for for an efficient validation process?	**Quality of validation**	1) List of critical uncertainties and assumptions 2) Number of concepts needing re-evaluation 3) Number of concepts returned from solution development process 4) Number of concepts adequately validated, by method or tool 5) Quality and completeness of initial hypotheses created 6) Number of times critical uncertainties were correctly identified and addressed first in validation
Is our validation process well-balanced between speed to deployment (market) and accuracy of validation?	**Validation process effectiveness**	1) Time per concept spent in validation 2) Speed of decision making for validated concepts 3) Diversity and number of validation methods (e.g. early feedback, wireframe, lean product development sprints) 4) Number of of validated concepts which were ultimately market winners
How are we creating, sharing and managing new knowledge?	**Learning (new knowledge creation and sharing)**	1) Number of lessons learned and documented 2) Number of stakeholders engaged 3) Number of feedback sessions for concept creation and solution development teams

Table C.9 — Examples of key questions, indicators and metrics for measuring concept validation outputs and outcomes

Examples of key questions	Areas of potential indicators	Metric examples
Do we get good quality concepts resulting from validation?	**Concept validation results**	1) Number of concepts with risks and uncertainties adequately addressed 2) Number of concepts accepted by solution development for action 3) % of concepts leaving validation process vs. number of concepts entering validation 4) Number of concepts leaving validation process which are aligned with each organizational strategic outcome 5) The degree of feasibility improvement as a result of the validation process 6) The degree of uncertainties decreased as a result of the validation process
Is Concept Validation speed aligned with rate of change in Context and requirements from interested parties?	**Concept validation speed**	1) Average time to validate concepts 2) % of concepts needing re-evaluation
Do we broadly share and incorporate new knowledge within the organization?	**Learning and feedback**	1) Number of stories shared 2) Number of innovation process enhancements resulting from new knowledge 3) Number of new relationships developed through concept validation

C.4 Examples of measurements for the solutions development process

Tables C.10, C.11, and C.12 show examples of key questions, indicators and associated qualitative and/or quantitative metrics for measuring the solution development process.

Table C.10 — Examples of key questions, indicators and metrics for development preparations

Examples of key questions	Areas of potential indicators	Metric examples
Have the concepts been fully validated?	**Validated concepts**	1) % of fully validated concepts 2) % of disruptive innovation concepts 3) Number of customers involved in validation
Are the business cases fully defined?	**Business case**	1) % of business cases with fully defined development requirements 2) % of concepts that are strategically aligned with organizational innovation objectives
Do we adequately budget and plan (responsibilities, milestones, etc.) for solution development?	**Development plans and budgets**	1) Amount of budget available, mapped to approved projects 2) Flexibility of assigned development budgets 3) % of programs with fully assigned responsibilities, schedules and progress metrics with pre-defined targets
Do we have the required resources available to develop solutions?	**Development resources**	1) % of multi-disciplinary innovation development projects 2) % of development programs requiring external experts
Do we have adequate infrastructure and tools to develop solutions?	**Infrastructure and tools**	1) Adequate infrastructure is in place to support solution development 2) % of tools (including software) that have yet to be acquired
Are we set up to manage risk effectively?	**Risk management**	1) % of development programs with associated risk management plans 2) Number of potential IP rights infringements

Table C.11 — Examples of key questions, indicators and metrics for measuring development activities

Examples of key questions	Areas of potential indicators	Metric examples
How efficient is the development?	**Decision efficiency**	1) Number of management levels required for decision on program changes 2) Average time to take corrective action
Are solutions/prototypes being completed?	**Development progress**	1) Number of new issues in meeting concept specs 2) % of development program not meeting planned schedule 3) % of solutions that are delayed vis-à-vis plan 4) Average delay times
Do we have adequate development resources?	**Development resources**	1) % of development programs requiring change in leadership 2) % of development programs requiring additional resources 3) % of resources not available on time
Do we have adequate collaborative partnerships to assist with solution development?	**Development partnerships**	1) Number of collaborative partnerships involved in developing solutions 2) Average time for partnership agreements
Do we have an effective processes to address failure rate or putting projects on hold	**Failure management**	1) Effective failure management process 2) % of programs failed and documented 3) Number of success/failure lessons communicated
Do we have adequate collaborative partnerships to assist with solution development?	**IP management**	1) % of solutions with new protectable IP rights 2) % of solutions requiring acquisition/licensing of external IP rights

Table C.12 — Examples of key questions, indicators and metrics for measuring development outputs and outcomes

Examples of key questions	Areas of potential indicators	Metric examples
How much do our developed solution's achieve stated intent (objectives)?	**Solution development results**	1) % of solutions with fully achieved objectives 2) % of solutions with intellectual assets ready for protection 3) % of solutions with social and/or environmental innovation value
How long does it take to develop innovation solutions?	**Solution development speed**	1) Average time required to develop solutions 2) % solutions suffering from delayed development
Does solution development take place within planned budget?	**Solution development cost**	1) % total innovation budget assigned for solution development 2) % of solutions developed within budget 3) % of solutions requiring budget adjustments
Do we have the required expertise (internal or external) to develop solutions?	**Solution development resources**	1) Number of disciplines required for development 2) % of developed solutions requiring external partnerships
Do we have the appropriate development team leadership?	**Solution development learning and feedback**	1) Number of communicated lessons on development process, leadership and resources 2) Number of new opportunities and ideas generated 3) % of innovation development people promoted to other functions

C.5 Examples of measurements for the solutions deployment process

Tables C.13, C.14, and C.15 provide examples of the key questions, the indicators and associated metrics for measuring the solution deployment process.

Table C.13 — Examples of key questions, indicators and metrics for the deployment of solutions preparations

Examples of key questions	Areas of potential indicators	Metric examples
Does the developed solution meet performance and quality expectations?	**Solution performance and quality**	1) % fulfilment of solution specs 2) Assessment of quality impacts on deployment
Is the solution replicable and scalable for intense and large-scale deployment and do we have the plans and resources for meeting demand?	**Solution scalability**	1) Ease of replicability (cost and time per unit) 2) % of budget, infrastructure and resources in place for scalability
Do we understand the customers and end users sufficiently well?	**Customer understanding**	1) % of completion of customer and end-user segmentation and characterization 2) # lead customers involved in development and fully satisfied
Do we meet regulatory and cultural requirements in targeted territories?	**Territorial understanding**	1) % of formal regulatory and statutory acceptance 2) Number of cultural requirements requiring further treatments
Do we have appropriate strategy, plans and resources (including partners) for marketing the solutions?	**Marketing readiness**	1) % of marketing budget, plans and materials available 2) % of necessary marketing partners fully committed with sign agreements and plans
Do we have appropriate strategy, plans and resources (including partners) for deployment and customer support?	**Deployment readiness**	1) % of deployment (sales) budget, plans and resources available 2) % of necessary channel (sales) partners fully committed with sign agreements and plans
Do we have appropriate plans and resources for handling deployment risks and opportunities (including IP)?	**Risk/Opportunity management**	1) % of solutions with deployment risk management plans in place 2) % of new IP protected 3) Number of potential 3rd party IP rights infringements