Chapter

# Innovation Management System Assessment and Benchmarking

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## Abstract

TIMS (Training in Innovation Management System for Sustainable SMEs) is an EU Erasmus+ project which analyzed the ISO (International Standardisation Organisation) 56000 innovation management system norm parts and configured in 2022 an ISO 56000-based innovation assessment portal. This system allows self-assessment, independent expert assessment, and benchmarking for innovation management. In 2023, a competence matrix and related training materials to support the implementation of ISO 56000 is developed. The ISO 56000-based assessment tool applied ISO 33020 for process capability assessment for ISO 56000 and this allows us to determine the capability of ISO 56000 processes. This paper gives an overview of which processes have been derived from ISO 56000 and how the PAM (Innovation Process Assessment Model) is structured. Since ISO 33020 provides a standard method to determine process attributes and capability level profiles of innovation management system processes, the method also allows a Europe (and worldwide) benchmarking of the capability of innovation management systems. The objective of TIMS is to establish an assessment system and training to roll out ISO 56000 to the European industry. The tools and training materials will be used by universities in lecturing programs and by innovation agents in the industry.

**Keywords:** innovation management system, ISO 56000, process assessment, ISO 33020, benchmarking, improvement

## 1. Introduction

TIMS (Training in Innovation Management System for Sustainable SMEs) represents an Erasmus+ EU project (2022–2023), which bases on the recently published ISO 56000 innovation management system norm and elaborates materials to efficiently apply this norm in European industry. This includes the development of an innovation assessment method and tool, the design of a European innovation agent competence matrix, and the development of training materials to support the rollout of this new innovation-related norm.

This work bases on previous innovation-related activities in the EuroSPI (European Systems, Software, Services Process and Product Improvement and Innovation, www.eurospi.net) community which organizes an annual international innovation workshop since 2012 and which was partner in the EU Blueprint project

DRIVES (2018–2022) in which a role of an innovation agent [1–28] has been developed for the automotive industry in Europe. Also, the EuroSPI community provides an infrastructure for managing assessment systems [29–32] and TIMS reused this infrastructure and configured it for innovation assessments based on the PAM (Process Assessment Model) for innovation management developed in TIMS.

This paper provides a short overview of the ISO 56000 norm series, explains the innovation assessment model developed in TIMS, gives an introduction to the setup of the innovation assessment system, and provides an interface to participate in a European innovation benchmarking system for innovation.

At the end, it will give an outlook for further developments and how to access the training materials in future to implement this new innovation-related norm in the industry.

## 2. A short introduction to the ISO 56000 series

The innovation management norm (ISO 56000) contains different parts that are related and some of the parts are still draft, most of them have been recently published in the years 2021 and 2022. This new norm substitutes the older norm CEN/TS 16555- Parts 1 to 7.

ISO 56000 - Innovation management—Fundamentals and vocabulary, 2020 [33]: This includes definitions.

ISO 56001 - Innovation management—Innovation management system—Requirements, Draft, 2022 [34]: ISO 56001 and ISO 56002 are 1:1 related and while 56,001 defines requirements and the part 56002 provides guidelines about how to implement the requirements.

ISO 56002 - Innovation management—Innovation management system—Guidance, 2019 [35]: This includes guidelines about how to establish an innovation management system, how to build innovation leadership, how to plan innovation projects, how to adapt organizational structures and processes to support innovation, how to establish and implement innovation processes and how to monitor and track innovation, and finally how to create a continuous improvement cycle.

ISO 56003 - Innovation management—Tools and methods for innovation partnership—Guidance, 2019 [36]: This includes guidelines about how to build innovation partnerships and networks, how to select partners for innovation projects and initiatives, how to arrange partner alignments and agreements, and how to communicate and interact in innovation partnerships.

ISO TR 56004 - Innovation Management Assessment—Guidance, 2019 [37]: This includes guidelines about how to choose an innovation assessment method, and how to prepare, plan, and perform an assessment. It also includes various metrics examples about how to measure innovation.

ISO 56005 - Innovation management—Tools and methods for intellectual property management—Guidance, 2020 [38]: This includes guidelines about how to establish an IP (Intellectual Property) management and framework, explains why IP is required, and defines why and how to manage IP in different phases of the innovation process.

ISO 56006 - Innovation management—Tools and methods for strategic intelligence management—Guidance, 2021 [39]: This includes guidelines about how to establish strategic intelligence (fundamentals, how to collect data, analyze data, etc.) and how to use and communicate the data analysis as a result of strategic intelligence.

ISO DIS 56007—Innovation management—Tools and methods for idea management—Guidance, 2022 [40]: This includes guidelines about how to prepare idea management, how to establish idea management processes, and how to structure the organization to support idea management.

ISO 56008—Innovation management—Tools and methods for innovation operation measurements—Guidance, Draft [41]: This includes guidelines about how to use innovation indicators and metrics for innovation operation management.

ISO DTS 56010—Innovation management—Illustrative examples of ISO 56000, under development, 2022 [42]: This includes examples of how to successfully implement the guidelines of the norm.

TIMS analyzed the available ISO 56000 parts and elaborated an integrated version 1 of an innovation process assessment model, which is explained in the next chapter.

## 3. The ISO 56000-based process assessment model

### 3.1 ISO 56000 and ISO/TR 33020

The TIMS project goal is to provide an assessment system that allows industry from different European regions to use the assessment system and also to benchmark the assessment with other regions or with, for example, the average, min, and max of a certain sector. The tool can also be used just for internal assessment and not sharing the data for European benchmarking. The ISO 56004 part of the norm talks about the assessment of the innovation process and in fact there is an existing process assessment norm [43–45] (ISO 330xx series). This led to the conclusion that TIMS decided to implement the innovation assessment portal system using an ISO 56000-based PAM (Process Assessment Model) consistent with the requirements in ISO/IEC 33002 (Information technology—Process assessment—Requirements for performing process assessment) and ISO/TR 33020 [43–45] (Information technology—Process assessment—Process measurement framework for assessment of process capability).

This assumption was also supported by looking at one of the proposed metrics in ISO 56004 (**Figure 1**) and the measurement framework of capability levels from ISO/TR 33020 (**Figure 2**), where both illustrate a scale from 0 to 5.

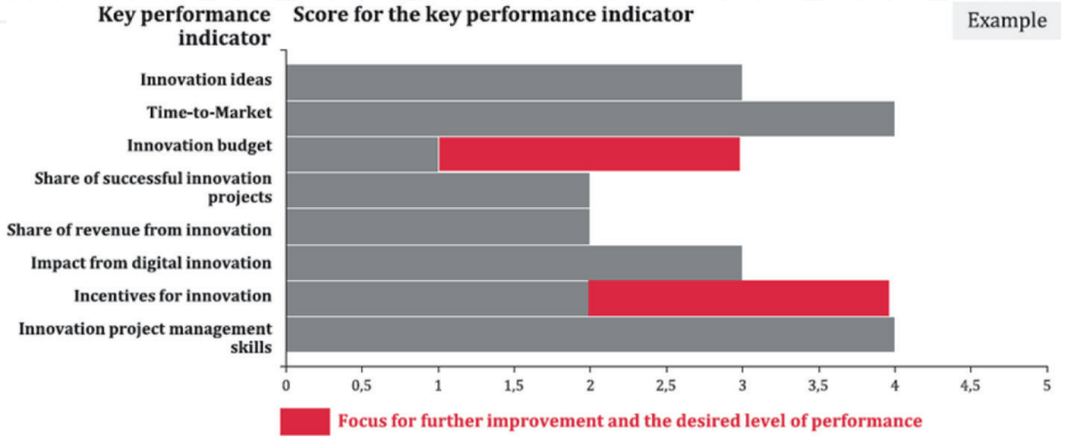


**Figure 1.**
*Example metric from ISO 56004.*

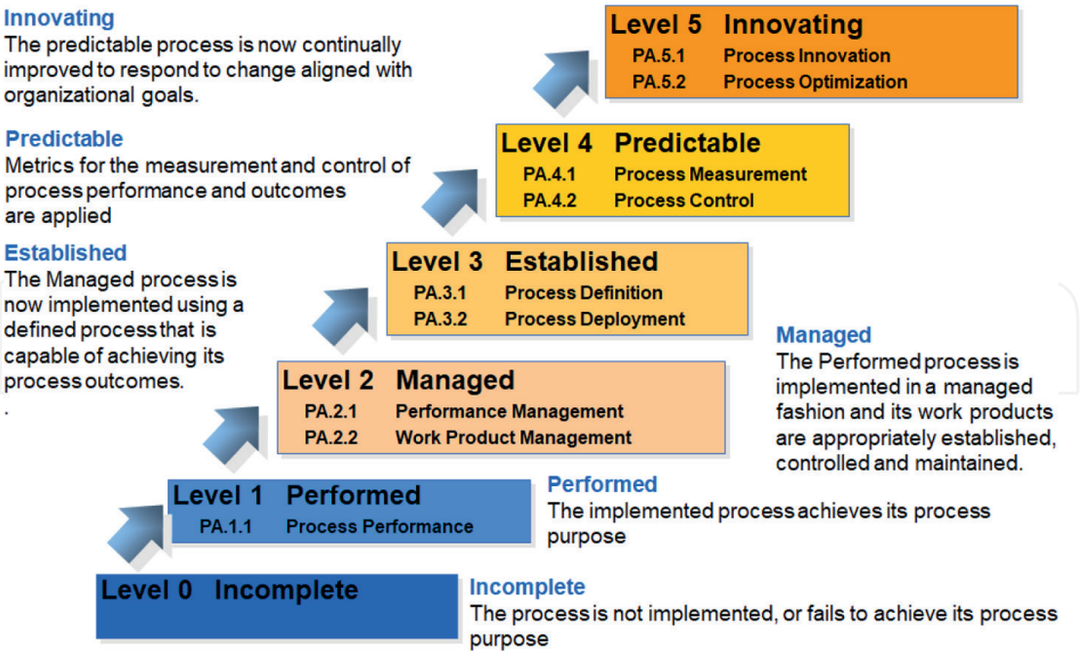


**Figure 2.**
*Capability levels from ISO/TR 33020.*

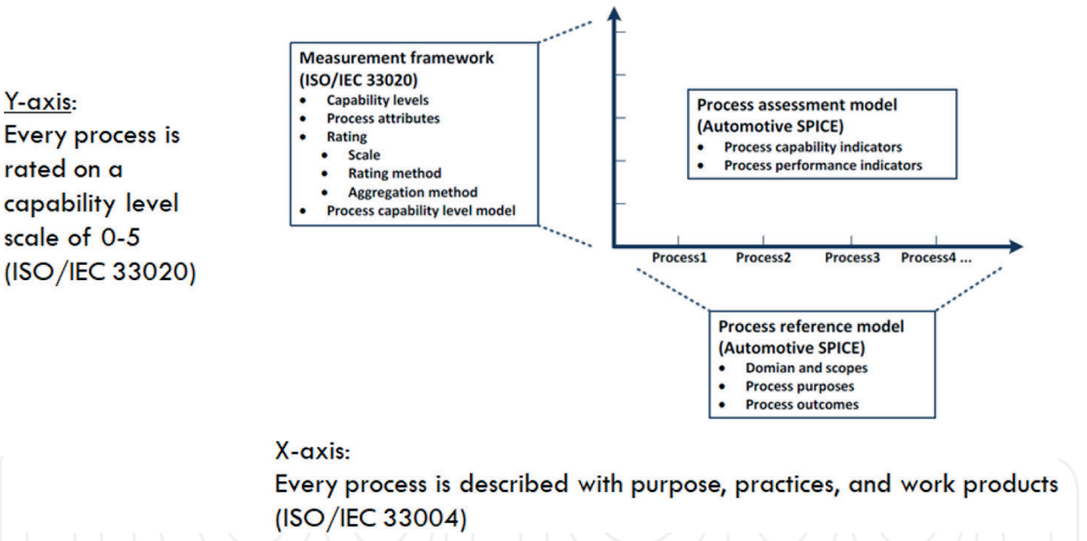


**Figure 3.**
*Process capability-based measurement framework.*

As shown in **Figure 3**, the application of the ISO 330xx series on the ISO 56000 series requires to define processes (X-axis) with purpose, practices, and work products and applying the measurement framework from ISO/TR 33020 on the Y-axis. This leads to a measurement of a capability level per innovation process and an innovation capability profile. A major task of TIMS therefore was to split ISO 56000 into single processes that can be included in this measurement framework [7, 29–32, 43–45].

For the project TIMS an important benefit of using the ISO / TR 33020 measurement framework was that a comparable and consistent approach of assessments must be used across European industry which allows benchmarking. And the use of ISO 33030 leads to capability-level profiles that can be compared and benchmarked.

### 3.2 Innovation process assessment model development

In TIMS, the available norm parts have been analyzed. The analysis also included the draft (and not published) norm parts since one of the partners is a member of the ISO 56000 group and the developed assessment model should in future support also the work of this group.

Each norm part was analyzed and requirements and guidelines in the norm parts have been grouped into process areas and processes of the PAM (Process Assessment Model). A number of review meetings were necessary since norm parts were overlapping and a 1:1 mapping of chapters of the norm parts to processes did not solve the overlapping issues. The ISO 330xx series requires that each process has separate base practices and separate outcomes.

Also, the Swedish national norming institute published an innovation assessment norm [46], which obviously also used the ISO 33020 measurement framework as a concept and provided a lean set of questions as practices to check. In TIMS, we decided to elaborate a comprehensive set of practices to check and develop a complete set of base practices and outcomes.

This then resulted in an assessment model with processes and outcomes. The description of a PAM (Process Assessment Model), and the configuration of an assessment portal system Capability Adviser [7, 29, 30–32] with that assessment model.

This resulted in an integrated version 1 of the process assessment model and below **Table 1** shows the list of process areas and processes with purpose statements that have been configured in the assessment systems in 2022.

Each process has been described with a purpose statement, process outcomes, base practices (BPs), and mapping of base practices onto the process outcomes. Below you find the process *SIM.1 Strategic Intelligence Management Setup* as an example elaboration. The entire model can be accessed *via* a benchmarking portal, which is described in a later section of this paper.

Example:

Process Group: SIM (Strategic Intelligence Management)

Process ID: SIM.1

Process Name: Strategic Intelligence Management Setup

Process Purpose: The purpose of this process is to establish and define the key items of Strategic Intelligence Management.

Outcome List:

1. The usage of tools for data collection and analysis for strategic intelligence analysis concerning market prediction.

2. The usage of tools for data collection and analysis for strategic intelligence analysis concerning innovation project objective achievement.

3. The usage of tools for data collection and analysis as proof of collaboration with other parties (emails, project results, social media posts, etc.).

4. The usage of tools for data collection and analysis for strategic intelligence analysis concerning external interested parties (customers, suppliers, etc.) involvement.

| | |
|---|---|
| IMS | Innovation Management System |
| IMS.1 | Leadership Purpose: The purpose of the leadership process by top management as described in ISO56002 is to demonstrate proper leadership while also implementing an innovation management system. |
| IMS.2 | Planning Purpose: The purpose of the planning process is to define the innovation opportunities to be planned for exploitation, to plan activities to implement the innovation, and track the innovation objectives, and by planning and implementing the innovation creating an innovation portfolio for the organization. |
| IMS.3 | Resources Management Purpose: The purpose of the resource management process is to plan, provide and maintain resources for innovation management considering people, time, budgets/ financing, and tools and infrastructure. |
| IMS.4 | Competence Management Purpose: The purpose of the competence management process is to analyze the skills gaps required for the innovation and to establish a competence matrix illustrating who contributes which skills to the innovation project. The stakeholders and teams are involved based on a communication plan, defined authorities and responsibilities, and a set of meetings. |
| IMS.5 | IMS Implementation and Operation Purpose: The purpose of the IMS implementation and operation process is to establish an infrastructure with tools and documentation management in which innovation projects and initiatives can be planned, tracked, and implemented. This also includes strategic intelligence analysis tools and methods, IPR procedures, and the tailoring options of plans and processes to fit with different types of innovation. |
| IMS.6 | Performance Evaluation Purpose: The purpose of the performance evaluation process is to set up a number of measurable innovation indicators, to report the indicators, and to track a successful implementation. The improvement opportunities and corrective actions derived from the analysis of the indicators, internal or external audits, and management reviews of the IMS system are tracked to continuously update and improve the IMS. |
| TAM | Tools and methods for innovation partnerships |
| TAM.1 | Innovation Partnership Framework: The purpose of the TAM (Tools and Methods for Innovation) Innovation Partnership Framework process is to establish a framework to identify and enter innovation partnerships. |
| TAM.2 | Entering an Innovation Partnership Purpose: The purpose of the TAM (Tools and Methods for Innovation) Entering an Innovation Partnership process is to perform a gap analysis to identify the competency, capability, and asset gaps and enter partnerships to fill the gaps. |
| TAM.3 | Partner Selection Purpose: The purpose of the TAM (Tools and Methods for Innovation) Partner Selection process is to identify, evaluate, and select innovation partner(s). |
| TAM.4 | Partner Alignment Purpose: The purpose of the TAM (Tools and Methods for Innovation) Partner Alignment process is to create a shared understanding of the partnership in terms of the proposed opportunity for innovation. |
| TAM.5 | Interaction between Partners Purpose: The purpose of the TAM (Tools and Methods for Innovation) Interaction between Partners process is to create a formal innovation partnership agreement. |
| ASM | Innovation Assessment |
| ASM.1 | Assessment Process Purpose: The purpose of this process is to establish and define a continuous innovation management assessment and improvement cycle. |
| ASM.2 | Perform Assessments Purpose: The purpose of this process is to assess the innovation projects by applying the innovation process based on an ISO 56000 capability assessment (norm ISO 33020 based). This is based on interviews, assessment checklists or tool, and a resulting capability profile with strengths and weaknesses. Weaknesses are used to define action plans. |
| ASM.3 | Benchmark and Improve Purpose: The purpose of this process is to benchmark the assessment results (capability profiles) internally and externally and conclude the assessment and improvement strategy of the organization. |

| | |
|---|---|
| IPM | Intellectual Property Management |
| IPM.1 | IPM Framework Purpose: The purpose of this process is to establish an organizational framework in which IP Management can be implemented. |
| IPM.2 | IP Strategy Purpose: The purpose of this process is to develop and implement an IP management strategy. |
| IPM.3 | IP Management in Innovation Process Purpose: The purpose of this process is to deploy the IP management process. |
| SIM | Strategic Intelligence Management |
| SIM.1 | Strategic Intelligence Management Setup Purpose: The purpose of this process is to establish and define the key items of Strategic Intelligence Management. |
| SIM.2 | Strategic Intelligence Cycle Purpose: The purpose of this process is to create awareness for all steps that need to be taken to control and manage the strategic intelligence cycle successfully in order to implement it. |
| SIM.3 | Intelligence Communication Purpose: The purpose of this process is to determine the necessary steps to ensure that strategic intelligence is improved continuously. |
| TIM | Tools & Methods for Innovation |
| TIM.1 | Preparing for Idea Management Purpose: The purpose of the TIM (Tools and Methods for Idea Management) Preparing for Idea Management process is to prepare and support a holistic idea management, including a schema, to categorize and rate ideas to make go/no-go decisions about ideas. |
| TIM.2 | People and Organization Purpose: The purpose of the TIM (Tools and Methods for Idea Management) People and Organization process is to consider the roles and skills required for the innovation, assign staff to the roles, and receiving top management support and decision-maker support for creating an environment for open innovation. |
| TIM.3 | Idea Management Process and Activities Purpose: The purpose of the TIM (Tools and Methods for Idea Management) Idea Management Process and Activities process is to assure the definition and deployment of an effective process model for idea management. |

**Table 1.**
*Process areas and processes for an ISO 56000 PAM (TIMS).*

5. The usage of tools for data collection and analysis for strategic intelligence concerning the identification of key success criteria (essentials).

Base Practices:

**SIM.1.BP1 Define strategic intelligence needs.** Identification of all factors internally and externally to define the intelligence needs.

[Outcome 1]

**SIM.1.BP2 Define the core of the strategic intelligence process.** Provide models for mapping data, information, knowledge, and intelligence.

[Outcomes 1, 2, 3, 4, 5]

**SIM.1.BP3 Define the expected strategic intelligence outcome.**

[Outcomes 1, 2]

**SIM.BP4 Provides strategic intelligence essentials.**

[Outcome 5]

Applying the same definition template as illustrated in the example above all processes have been elaborated. To provide further support in understanding the practices and the norm in 2023, the training is being developed in addition to TIMS.

### 3.3 Assessment system

The innovation PAM (Process Assessment Model) was imported to the Capability Adviser assessment system [7, 29–32] supporting process capability assessment of ISO 56000 processes using the ISO 33020 process measurement framework. The Capability Adviser assessment tool is already used by major automotive and electronics industry for Automotive SPICE, ISO26262 (functional safety), and Automotive SPICE for Cybersecurity (ISO 21434) assessments. This infrastructure was reused for the innovation process capability assessment in the TIMS project.

The TIMS project lead is a national representative of the ISO 56000 working group, which allows an interchange of ideas. TIMS objectives include the establishment of a European innovation assessment and benchmarking system. To support this concept, the assessment portal includes a registration for the self-assessment function.

One of the TIMS project partners is the coordinator of the EuroSPI initiative [47–64], which provides a platform to run the ISO 56000 assessment services. The system is available at https://iso56000.eurospi.net.

Innovation agents can register in the system (see **Figure 4**) for self-assessment. The system supports both self-assessment and an independent expert assessment. In case of an expert assessment, an extra account for an external assessor is required. After the registration, users have a user id and a password and can login later again with the LOGIN-Assessor function as an assessor. **Figure 5** shows the tree of processes and that level 1 to level 5 practices are configured. **Figure 6** shows that once the level 1 practices are selected the practices can be rated according to ISO 33020 with Not/Partially/Largely/Fully.

The capability levels of processes and related practices are based on the ISO 33020 process measurement framework (see **Figures 5** and **6**). And capability level 1 represents the base practices that were configured with the PAM (Process Assessment Model) for innovation management. Per process at level 1, the base

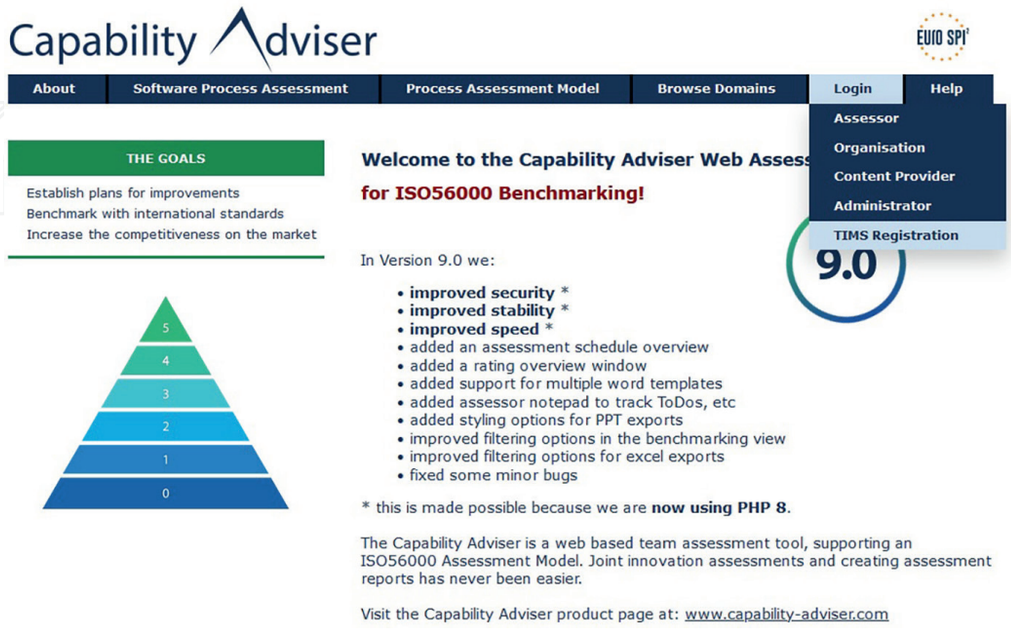


**Figure 4.**
*Registration at the TIMS assessment portal (ISO 56000).*

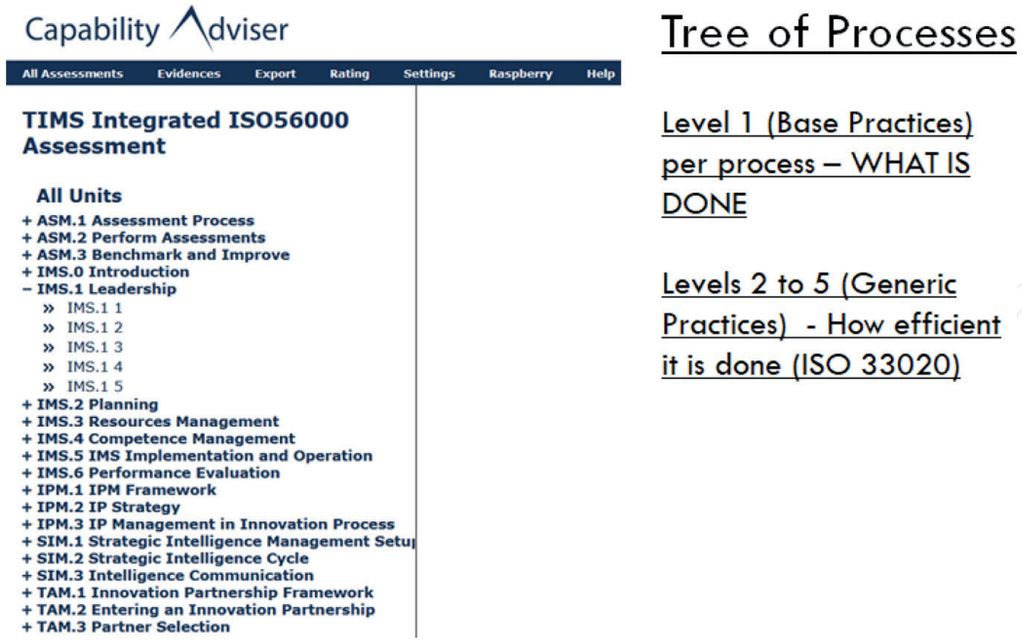


**Figure 5.**
*The tree of ISO 56000 processes with level 1–5 practices.*

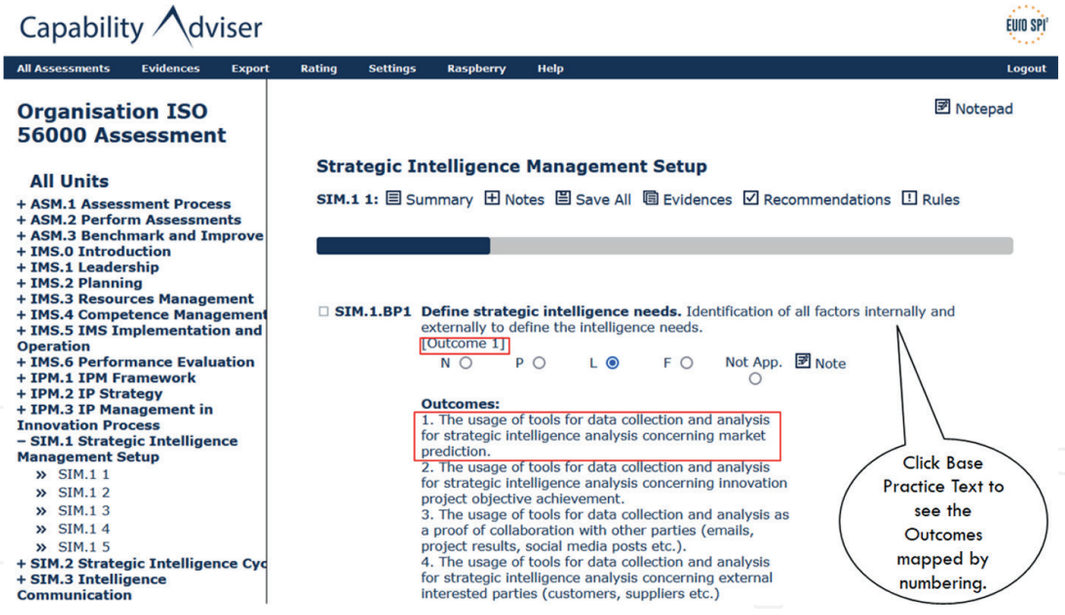


**Figure 6.**
*Not/partially/largely/fully rating based on ISO 33020.*

practices, the outcomes, and also the relationship to the ISO 56000 norm are shown in the tool (see **Figure** 7).

Since the system is built on the basis of the ISO 33020 process measurement framework, the system allows to generate process capability level profiles (**Figure 8**) and process attribute profiles (**Figure 9**).

The methods and algorithms for calculating process attribute ratings are specified in ISO 33020. In industry, currently, an average algorithm is used to aggregate single ratings to an average percentage and then map the average onto the scale published

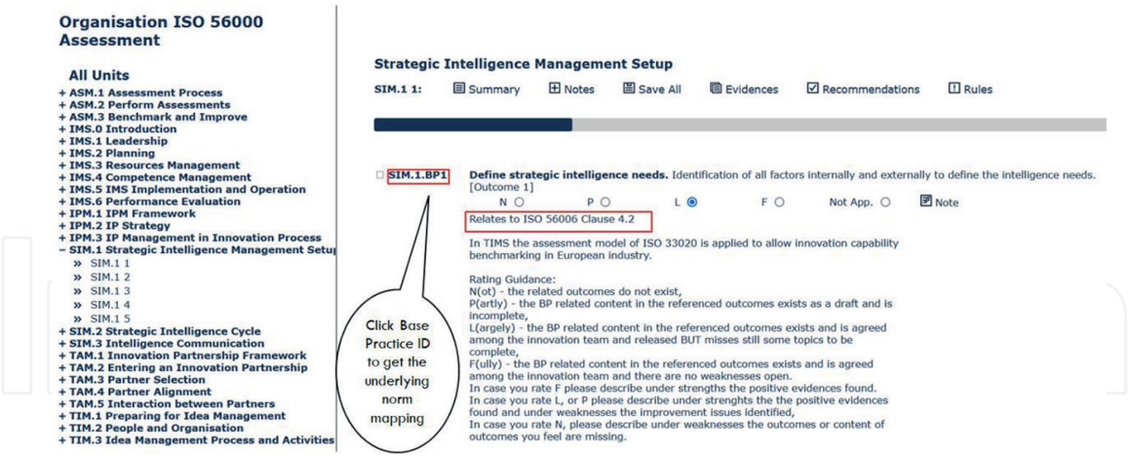


**Figure 7.**
*Showing related ISO 56000 clauses per base practice.*

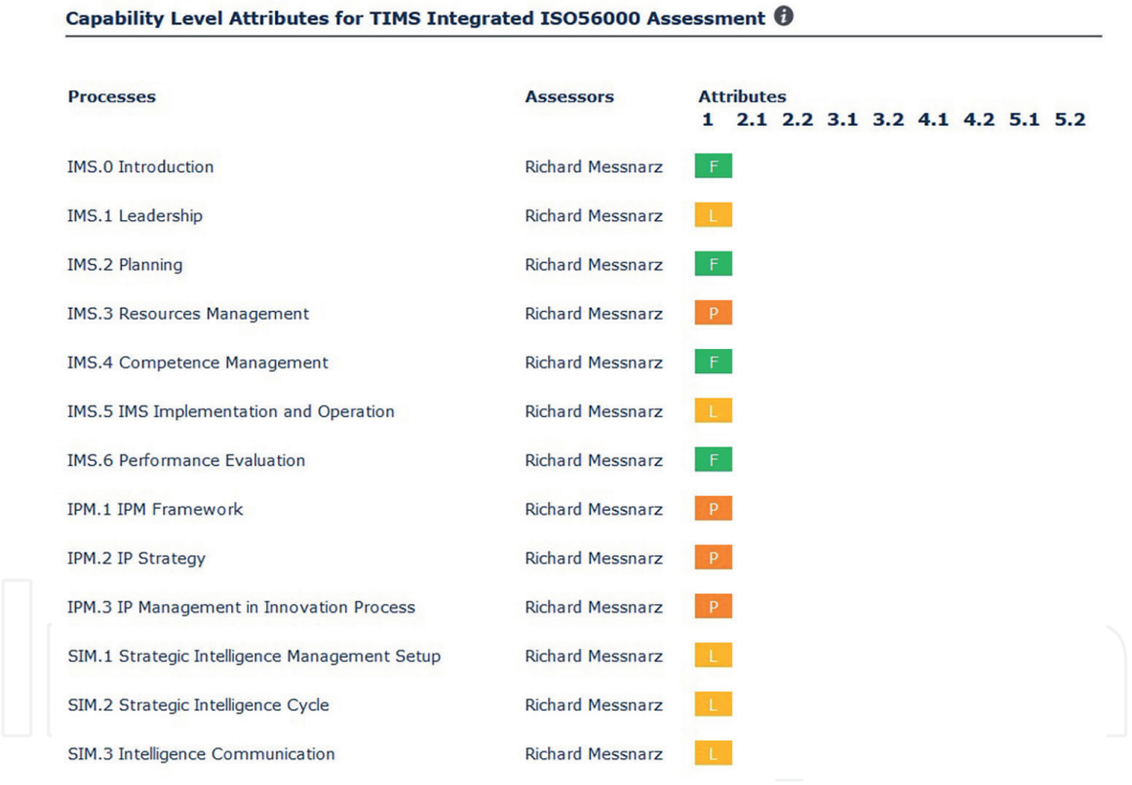


**Figure 8.**
*Capability level profile for innovation processes based on ISO 33020.*

in ISO 33020, with N between 0 and 15%, P greater than 15 and up to 50%, L greater than 50 and up to 85%, and F greater than 85%. However, an assessor can overrule this average algorithm.

Based on that assessment system each organization can analyze and generate its own (private) innovation capability profile. After more than a sufficient number of assessments so that single assessment results cannot be extracted (to keep the single organizations anonymous) an average benchmarking profile is generated. This is done with a filter per country.


**Figure 9.**
*Process attribute profile for innovation processes based on ISO 33020.*

## 4. Conclusions, experiences, and outlook

The project TIMS further developed the ISO 56000 innovation management norm parts into a PAM (Process Assessment Model) for innovation. This included the definition of processes, outcomes, and practices and to specify them according to ISO 33002. And by using the ISO 33020 process measurement framework and the Capability Adviser assessment system a process capability assessment system for innovation management has been established.

This system is now used for innovation assessment and benchmarking and TIMS develops in 2023 training materials for the rollout of the new norm. TIMS also had its first experiences using that approach which is shared below.

In TIMS, we were confronted with organizations that have no training in ISO 33002 or ISO 33020. This means that most organizations understood the base practices (capability level 1) but the rating on capability level 2 to 5 (efficiency questions for PA2.1 performance management, PA 2.2 work product management, PA 3.1 Process Definition, etc.) [65] (see **Figure 2**) needs an assessor training explaining the ISO 33020 process measurement framework.

To support this the TIMS partners developed a short training video. Still, the feedback showed that we need to separate 2 cases in future.

Case 1 Self-Assessment: Self-assessments should require a minimum amount of time to understand the model and the rating so that self-assessments will only ask capability level 1 base practices.

Case 2 Coaching expert assessments. Coaching experts shall have an assessor training and can rate also the practices on capability levels 2 to 5.

Another feedback was that every region in Europe has its own development stage and focus in industry and therefore it was accepted that in the assessment system regions might select a subset of processes. This means that it is possible to not rate all processes and only get a capability level profile for selected processes.

A further lesson learned was that the ISO 56000 norm series missed concretely expected outcomes and rather provides a best practices checklist and examples. Therefore, to make the processes assessable, the TIMS team had to develop a list of expected outcomes per process. The experiences from assessments will in future lead to an update of the outcomes per process.

The assessment system will also be used in future by sectoral networks and EU blueprint projects [66].

And the results are important for establishing a European process improvement program supporting the SPI manifesto [1, 2, 23, 67, 68] supported by EuroSPI [47–64].

The objective of TIMS is to establish an assessment system and training to roll out ISO 56000 to the European industry. The tools and training materials will be used by universities in lecturing programs and by innovation agents in the industry. For each of the processes in 2023, training materials are developed, including a collection of best practices and recommendations. This then will form a complete training package with an assessment tool, training materials per innovation process (see **Table 1**), and best practices and recommendations to provide guidance for the ISO 56000 implementation. The training will also be made available online with self-assessment functions by the end of 2023 to the public.

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