Technology Transfer Training Needs Assessment

Manual and Toolkit

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List of acronyms

ATTP	Alliance of Technology Transfer Professionals
AUTM	Association of University Technology Managers
CADRI	Capacity for Disaster Reduction Initiative
CIPD	Chartered Institute of Personnel and Development (UK)
EPO	European Patent Office
EU	European Union
HR	human resources
IP	intellectual property
ICT	information and communications technologies
JICA	Japan International Cooperation Agency
KCA	Knowledge Commercialisation Australasia
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
SME	small and medium enterprises
SMMEs	small, medium and micro enterprises
TISC	Technology and Innovation Support Center
TOR	terms of reference
UN	United Nations
UNDG	United Nations Development Group
UNDP	United Nations Development Programme
UN-Habitat	United Nations Human Settlement Programme
UNHCR	United Nations High Commissioner for Refugees
WIPO	World Intellectual Property Organization

Glossary

Note: The following glossary provides definitions for terminology according to their applicable meanings for this manual; alternative definitions may apply in different contexts.

Capability is a group's or system's (within an organization or unit) collective ability to do something either inside or outside the system.[1]

Capacity assessment identifies capacity on three levels: individual, organizational and national (enabling environment). It is a more comprehensive approach than a training needs assessment because a capacity assessment also looks at the interrelation between each level of capacity.

Capacity development is the process through which individuals, organizations and societies obtain, strengthen and maintain their capabilities to set and achieve their own development objectives over time.[2]

Commercialization is a process, referring to when the owner of a relevant technology's intellectual property rights realizes a financial profit over time. Often commercialization of technology is part of the technology transfer process.

Competency means possessing the skills, knowledge, behaviors and values required to perform the activities within an occupation, function, position or role to the standard expected in employment.

Evaluation is the systematic and objective assessment of an ongoing or completed training course or program and can include its design, implementation and results. Evaluations determine the relevance and fulfilment of the objectives, efficiency, effectiveness, impact and sustainability. An evaluation provides credible and useful information, enabling organizations to incorporate lessons learned into future planning. This term is synonymous with "monitoring."

Impact is the effect that a training produces, both immediately and over the long term. Impacts can be positive or negative, direct or indirect, and intended or unintended.

Indicators are measurable variables that show what a situation is like. They can be quantitative or qualitative and based on facts, opinions, numbers and narrative. They provide a source to measure achievements, performance or changes connected to the assessment and training intervention and are used for monitoring and evaluation purposes. The survey uses a combination of quantitative and qualitative indicators.

The **innovation value chain** presents innovation as a sequential, three-phase process that involves idea generation, idea development and the diffusion of developed concepts. Across all the phases, managers must perform six critical tasks: internal sourcing, cross-unit sourcing, external sourcing, selection, development and companywide spread of the idea. Each task is a link in the chain.

Intellectual property (IP) refers to creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce. IP is legally protected through patents, copyrights and trademarks, which enable people to earn recognition or financial benefit from what they invent or create.

Intellectual property management encompasses the set of practices that protect and manage intellectual property.

Knowledge transfer seeks to organize, create, capture or distribute knowledge and ensure its availability for future users. The term is more complex than "communication," because knowledge resides in organizational members, tools, tasks and their subnetworks. Additionally, much of an organization's knowledge is tacit or hard to articulate.

Learning is directly related to increased knowledge and understanding; improved technical, mental or social skills; or changes in attitudes or values.

Monitoring is the systematic process of collecting, analyzing and using information to track a project's progress toward its objectives and to guide management decisions. Monitoring usually focuses on processes and activities.

Non-commercialization refers to technology transfer efforts conducted to benefit a community non-financially, for the public good. At times they may eventually indirectly result in diffused financial benefits.

Outcomes describe the changes in organizational capability and improvements in the national innovation value chain as a result of a training program's outputs.

Outputs are specific deliverables produced by a training needs assessment or training program. Outputs also include the changes in individuals' skills, abilities or competencies as a result of completing activities within a training intervention. Outputs are relevant toward achieving outcomes.

Stakeholder organizations include institutions, bodies, entities, firms, ministries and departments that have an active interest in or commitment to the technology transfer process within a nation.

Technology transfer is the process of transferring scientific findings from one organization to another to for the purpose of further development and commercialization.

Technology transfer offices are responsible for technology transfer and other aspects of commercializing research in universities. Technology transfer offices engage in commercial activities to bring research developments to market, acting as a channel between academia and industry.

Technology transfer professional refers to professionals and specialists who have an active role in technology transfer. The term encompasses a wide range of professional roles and their associated competencies.

Training is a precise, short-term learning approach (spread over days, weeks or months) specific to the knowledge and skills that employees need for their current roles.

A **training needs assessment** measures the skills, knowledge, abilities and attitudes for a target group. In the case of technology transfer, the target group is those who work for organizations involved in technology transfer. Training needs assessments determine the employees' competency gaps and, thus, the training needs within the organization to ensure that the training aims match the training needs. The training needs assessment informs the subsequent training intervention.

Training aims define training intervention's (such as a course or program) goals – what the trainees should learn from the training and be able to achieve afterward.

A training evaluation measures if a training's objectives have been met and how the training process can be improved. Results can be measured on four levels: the participants' immediate reactions, the participants' learning, the participants' job performance and the organizational performance.

Transfer of learning is applying learning from the training room to the workplace. Transfer of learning relates to impact.

Part I.
Manual

1. Introduction

1.1 Purpose of the manual and toolkit

This manual and toolkit aim to enable the assessment of training needs for organizations involved with **intellectual property management**, **technology transfer** and commercialization/utilization. The resulting **training needs assessment** informs the design of an effective training program to address the identified gaps in skills and competencies.

The manual and toolkit target readers with limited knowledge of training needs assessments, allowing them to perform training needs assessments to establish training plans for the different organizations and people within the national innovation value chain (for example, funders, developers, managers and users of **intellectual property [IP]** and associated support institutions).

The manual describes the steps required to make a training needs assessment so that effective training can be selected for the key given group of stakeholders within the **innovation value chain**. The manual introduces the training cycle, training and training needs assessment theory and process and shows how the assessment data are collected, collated, analyzed and reported on to inform which training method and design are most beneficial. The toolkit provides a practical guide for applying the training needs assessment process using helpful tools and typical examples.

The scope of the manual and toolkit is to assess training needs for the non-specialist assessor and to inform the selection and design of training courses. Although we introduce and explain the training cycle's key concepts (for example, training design, implementation and evaluation), a detailed guide on conducting these areas is outside the scope of this training needs assessment manual and toolkit; however, we have provided references for further reading in Appendix A.

1.2 How to use the manual

The manual comprises three distinct parts (see **Figure 1**):

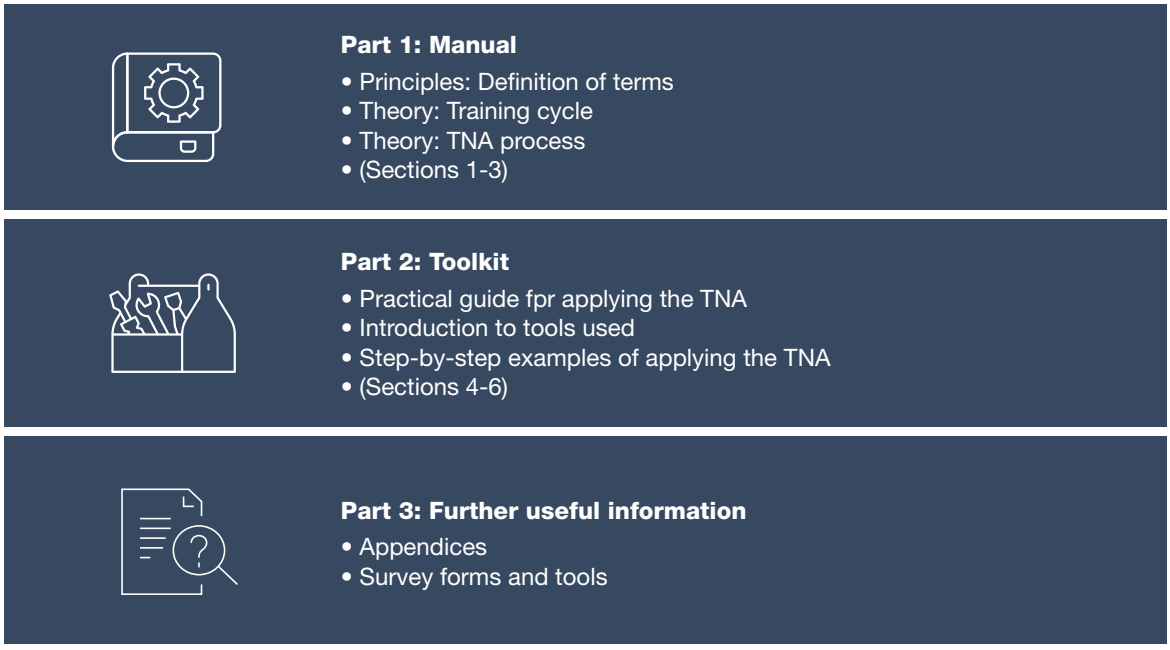
Part 1: Manual (Sections 1–3)

– Section 1 introduces the manual and toolkit.

– Section 2 introduces the principles of training theory and capacity development.

– Section 3 progresses the theory into the training needs assessment process for technology transfer.

Figure 1: Structure of the manual



Part 2: Toolkit (Sections 4–6)

- Section 4 is a practical guide that shows how to apply the training needs assessment process and introduces the supporting tools.
- Section 5 provides a step-by-step example case study that demonstrates how to apply the training needs assessment process.
- Section 6 provides a step-by-step example case study that illustrates how the training needs assessment recommendations are deduced and represented in the training needs assessment report.

Part 3: Further useful information

The appendices provide literature references, further information about concepts introduced in the manual and lists of training courses. The survey tools and forms are also found here.

The manual and toolkit adopt green text for **Links to other sections** and blue text for **Notes, tips and resources**.

2. Principles: Main terms and training theory

2.1 Definition of terms

Training and capacity development

Training is passing knowledge, skills and attributes from one party to another. It is a planned learning process that aims to improve trainees' competency, to positively change their behaviors and to benefit their organizations and other stakeholders.

To illustrate the difference between capacity development and training, we will use the example of a national public procurement reform program that aims to significantly improve public procurement across all national institutions. The concerned government initiated a comprehensive program that addressed governance, legislation, policy and capacity building. The capacity building targeted all organizations that had direct or indirect links to public procurement through a series of training courses at different levels. These ranged from orientation courses, which advocate for the importance of public procurement in the nation's growth, for target groups, such as journalists, parliament officials, judiciary officials and businesses; short technical training courses for the civil service officials that deal directly with public procurement in many different ministries and bodies; and a series of professional level training courses for specialists in public procurement to raise their professional abilities and introduce them to a professional certification scheme. The capacity development is the wider program, and the training is the targeted courses.

Training is an important element for developing organizational and national capacity by identifying (through a training needs assessment) and improving (through a training program) the individual competencies that contribute to an organization's capacity to provide its services within a national context.

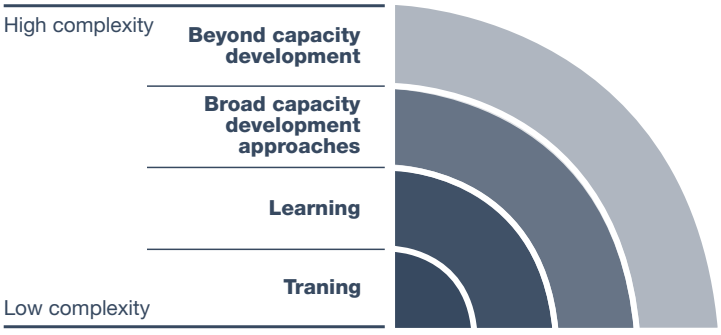
Because training is focused on individual competencies, other factors (such as funding, strategy, leadership and human resources [HR]) may have more influence on an organization's overall capacity to function optimally. These may be addressed through capacity development programs, which work to improve an entire organization's functional ability, of which training plays merely one part.

Figure 2 shows how the terms **training**, **learning** and **capacity development** are interrelated. We refer to this figure later in the manual because it shows how training (at an individual level) is one form of learning that is informed by and contributes to capacity development (at the organizational level), thereby enhancing the capacity at the national level (beyond capacity development). As the area of scope increases, so does the contextual complexity.

The United Nations Development Programme (UNDP) defines **capacity** as "the ability to perform functions, solve problems, and achieve objectives" at three levels: individual, institutional and societal.

Capacity development is defined as "The process whereby people, organizations and society as a whole unleash, strengthen, create, adapt and maintain capacity over time."[3] Alternatively, capacity development may also be defined as "The process through which

Figure 2: Situating training in the capacity development context



individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time."

Learning is the process of gaining knowledge and expertise.[4] Learning methods range widely, from formal educational programs (for example, higher-education courses) to work-based learning (for example, apprenticeships, mentoring and coaching) to training.

Training is an organized method of learning that aims to improve the skills and knowledge of trainees with specific goals that strengthen their capabilities, competencies and performance in relation to a job function. A training process ensures that the training effectively meets these goals. Training supports capacity development.

Professional development is learning to gain or maintain professional credentials and is often defined and ratified by a professional body or institution.

2.2 Training cycle

The training cycle (**Figure 3**) is the process to achieve a successful training outcome.

Assessment, design, delivery, follow-up and **evaluation** are the five basic steps of the training cycle that are all crucial to ensure positive outcomes.

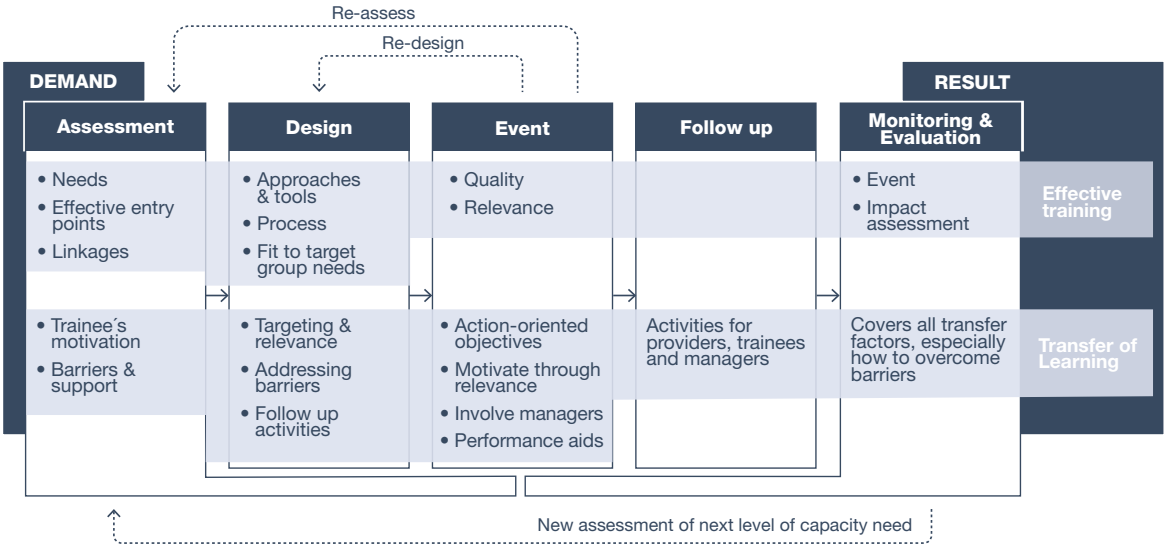
Although this manual mainly covers the training needs assessment, understanding how it is linked to the other steps in the training cycle is important.

Training is a way to address the gap between the participants' desired capabilities and their current capabilities in their job functions within an organization. The training needs assessment determines this gap by providing the relevant data to define the training need, so the best training solution to address that need can be chosen.

During the **assessment**, trainees' and their organization's needs are studied within their current context and the training's objectives are set according to what the organization wishes to achieve.

The **design** of the training builds on what the assessment found and defines the training (or learning) aims and objectives. The overall aims (to address the gaps in competencies) are broken further down into separate objectives, and a training plan is devised to achieve the objectives through the training intervention (or training solution) using appropriate learning techniques.

Figure 3: The training cycle



Source: UN-Habitat (2012). Training Needs Assessment and Training Outcome Evaluation in an Urban Context. Nairobi: UN-Habitat.

The choice of methodology, session timing and level of knowledge need to be carefully chosen so trainees can understand and learn the subject to achieve the training goals. Training can be conducted in many ways, such as on-site training or online training (e-learning).

Adults learn in different ways, so the trainer chooses different training methods, known as **delivery methodologies**, to ensure that all people's learning styles are taken into account. Different methods, which maximize learning, include simulations, case studies, quizzes, group work, debates, individual reading and presentations.

Follow-up monitors how well trainees and managers received a training and determines if the trainees have been able to apply what they learned in the workplace.

Evaluation measures if a training's objectives have been met and how the training process can be improved, including any recommendations to address wider capacity development issues.

2.3 Effective training

Effective training benefits the trainees' organization. If individuals' capacities have been developed but their organization's capacities have not, the organization's (or the country's) capacities remain underdeveloped.

Training programs are often too narrowly focused on the trainee; this type of program may not look at trainees' roles within their organization. Training programs and trainees should therefore have the full support of their organization, ensuring that the trainees can implement their new skills. The main goal of training is to improve organizational performance in the services that the organization provides for its clients and partners.

Many outside factors affect a program's performance, so it is difficult to ascertain the level of influence that a training has had. However, through informed planning, as outlined in this manual, you can plan the most effective program possible as well as evaluate not only if the training was effective but also how it has influenced organizational best practices.

Essentially, training works toward a larger goal of capacity development. But for it to be truly effective, its design and delivery need to take into account wider organizational issues that affect the sector at a national level.

Key factors for success include establishing a good relationship with the stakeholder organizations through focal points, building consensus on the training goals and activities and championing the training within the organizations. Across the national innovation value chain, engagement with different key organizations is important to gain the broader national picture.

2.4 Training needs assessment

What is a training needs assessment, and why should you use one?

A **training needs assessment** is the method that determines if an individual has a training need and, if so, which type of training is appropriate.

The training needs assessment establishes a baseline of existing competencies and compares them with an organization's future desired competencies. The assessment seeks to accurately identify people's levels of competency (or skills) through various methods, such as target surveys, interviews, observations, secondary data and workshops. The gap between the current state and desired state indicates a shortfall in the individuals' competencies and, thus, in the organization's capability to perform its services. These competency gaps can then be translated into training needs (see **Figure 4**), which are then addressed by defining specific learning objectives and designing or selecting a training solution to improve the ability in the competency and, thus, reduce the gap.

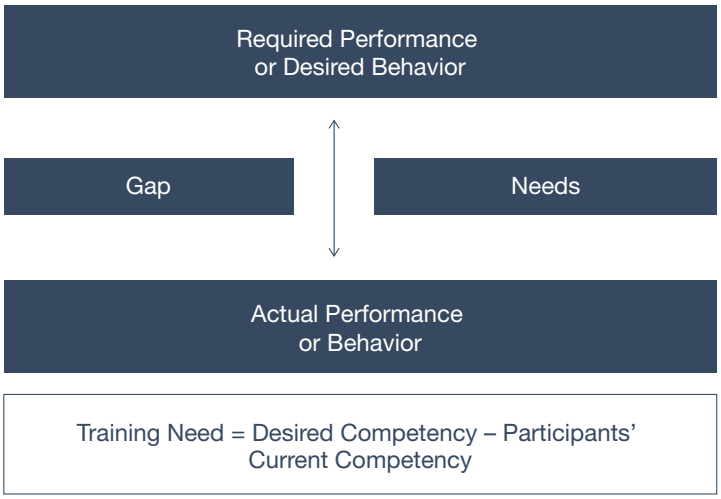
The training needs assessment identifies these competency gaps to define the training need, to develop training aims and objectives and to recommend appropriate training solutions.

Training can reduce, if not eliminate, the gap by equipping participants with knowledge and skills and encouraging them to build and enhance their capabilities. The data on participants' current status provide baseline data for the evaluation stage.

Figure 5 illustrates that if there is a poor (or no) assessment, then the training will not be targeted and may not succeed in providing an appropriate learning mechanism, meaning a lessened impact in the organization and less impact in the sector.

For this reason, carrying out an adequate training needs assessment is essential.

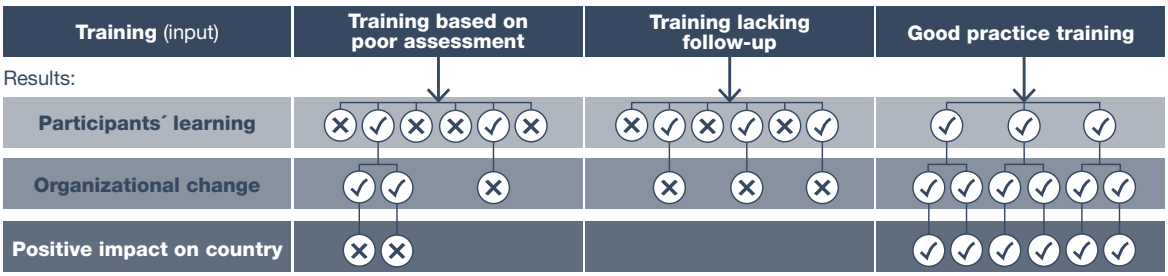
Figure 4: Training needs assessment assesses the participants' performance gaps



Note that a training needs assessment's scope is purely to define training solutions. The training needs assessment achieves this by providing information about the competency levels within organizations and insights into the background context. Training needs assessments are not intended to give a comprehensive HR management analysis or a broader capacity development solution; they focus solely on the competency improvement level. However, the training needs assessment takes the wider issues into account and contributes, in part, to solving these challenges.

We introduce the elements that comprise the training needs assessment process in Section 3.

Figure 5: Poor assessments and lack of follow-up lead to poor training results



If the assessment is poor there is a great risk that the training will be irrelevant to most of the participants and their organization, and not support the national level.

Without follow-up, the participants' learning is unsupported, and they will have difficulties applying what they learned for their organization.

By focusing on quality, rather than quantity, it is possible to do more with less and ultimately to have a greater impact on enhancing the innovation value chain.

Adapted from: UN-Habitat (2012). Training for Better Cities. Nairobi: UN-Habitat.

2.5 National level, organizational level and individual level

We use the term "organization" in this manual for simplicity and clarity. Organization is inclusive of, for example, institutions; government ministries; commercial firms; trade institutes; national entities; representative bodies; universities and units therein, such as Technology and Innovation Support Centers (TISCs) and technology transfer offices. For more details on the types of organizations involved in the innovation value chain, see Appendix D.

For the innovation value chain,[5] priorities are defined at the national level and then advanced by key organizations. This process relies on the capacities of an organization, which is in turn dependent on the skills, competencies and knowledge of the individuals who work there.

Figure 6 shows this relationship; the national priorities and needs inform the organizational priorities and services offered, which require individuals to have particular skills and knowledge (meaning the process is top down, shown by the downward pointing arrow labeled "Priorities, Needs").

However, the training response is a bottom-up process. The training solutions improve individuals' skills and knowledge, in turn enhancing their organization's capacity to participate in technology transfer services within the national innovation value chain, thus, successfully meeting the capacity need at the national level (shown by the upward pointing arrow labeled "Training" in **Figure 6**).

The training needs assessment assesses the skills and competencies of individuals working within the key organizations and maps out the pattern of individual skills that inform the organizational capacity. This then informs the national picture of capability. Thus, the national picture of capability is built from the assessment results at the individual and organizational levels.

The United Nations Development Group's (UNDG's) capacity assessment methodology informs country-level program planning and recognizes that a country's capacity resides at three different levels:

- individual
- organizational
- enabling environment.

The methodology consists of a framework, process and supporting tool for assessing capacity assets and needs.

Capacity development occurs at all three levels, building from the training at the individual level through the organizations the individuals work for and ultimately contributing to the overall national need.

We take the following approach in this manual:

- The **national level** is the equivalent of the UNDG's enabling environment, which corresponds to the high complexity layer in **Figure 2**.
- The **organizational level** addresses those organizations that are key actors in the innovation value chain.
- The **individual level** comprises staff, personnel and consultants who work in the technology transfer process directly or indirectly for the organizations.

Figure 6: Training needs assessment at national, organizational and individual levels

3. Training needs assessment process guide

This section introduces the training needs assessment's parameters – the stakeholders involved and how they relate to the training cycle. Next we explain a training needs assessment's standard steps and provide more information on the available assessment methods.

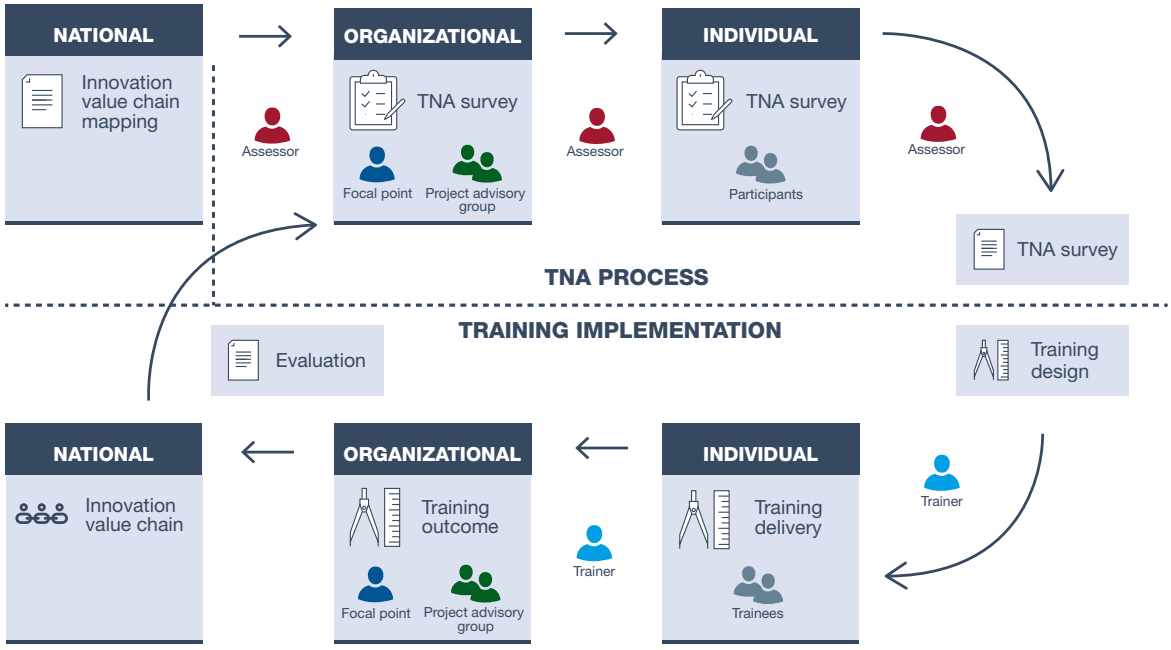
Then, with the knowledge of how a training needs assessment works and who is involved, we introduce and use a process model termed the "staircase framework," which extends the standard training needs assessment process to the context of organizations that work in technology transfer as part of a national innovation value chain. This framework forms the training needs assessment's structure.

The toolkit expands on the information from the manual with a practical guide and step-by-step examples for carrying out a competency-based assessment. For examples, see **Section 4: Training needs assessment toolkit: Tools for the training needs assessment process** and **Section 5: The training needs assessment in practice: Step-by-step toolkit example.**

3.1 Stakeholders in the training needs assessment and training implementation process

The training cycle can be split into two parts: a training needs assessment process and a training implementation process. These are shown in **Figure 7**. There is engagement (primarily the assessor and the organization responsible for the program) with the targeted organizations[6] at every stage to ensure that all parties' views on training needs are taken into account. It is important for those responsible for the training needs assessment to understand the different roles involved, find out what their interest in the training is and understand the reasons they need to be actively engaged in both the assessment and evaluation.

Figure 7: Stakeholders involved in the training needs assessment process and training implementation



The key stakeholders include the following roles.

Assessor

Training needs assessment assessor: An assessor or assessment team begins the training needs assessment using this manual. The assessor produces the training needs assessment report, which informs the training implementation process that the training provider carries out.

In the context of the WIPO project, the assessor is the assigned country expert, who may or may not have an assessment team. It is advantageous if the lead assessor is a senior person from a relevant industry and/or academia with access to senior staff in the government, universities or commercial organizations. This can keep an organization's staff interested in engaging with the assessment process. The assessment team may also benefit from officers who can conduct the legwork of surveys, interviews, data input and processing.

The assessor may also be involved in an update to the training needs assessment after the planned activities are evaluated.

Targeted organization: These select organizations work in the innovation value chain. Organizations include government departments, universities, business incubators, the private sector, law firms, technology transfer offices and IP offices. These organizations may have been identified during a country-level innovation value chain mapping exercise by the country expert.

The targeted organizations will be assessed at organizational, unit/department and individual levels. The training needs assessment assesses the organizations' roles in technology transfer and homes in on the skills and competencies of the personnel who carry out these activities. These personnel are the **participants** in the training needs assessment, and as **trainees**, the potential recipients of the training program.

Focal Point

Focal point: The assessor selects this person from a targeted organization to champion the training process from within the organization, liaising with and influencing key staff to enable the training needs assessment process (and the subsequent training implementation process). The role is voluntary and crucial to making a project a success, because the focal point effectively unlocks the organization for the assessor, providing valuable insights and information, setting up target and project advisory groups (if required), arranging interviews and so on.

Note that the focal point needs to have the influence to enable the training needs assessment and training process within an organization. This may mean someone who holds a position of authority; someone with an influencing personality; or, ideally, someone with both qualities.

Project Advisory Group

Project advisory group (optional): Depending on the size and complexity of a targeted organization, the assessor may benefit from working with an advisory group.

Advisory groups support the training needs assessment process by authorizing, mobilizing (via people and resources), monitoring and approving the scope and implementation of the training needs assessment process. This group is temporary and exists only for the training needs assessment's duration.

Although the addition of this group may seem to add a bureaucratic layer to a project, the group is important for making sure the training needs assessment process happens. Therefore the selected group members and their terms of engagement need to be carefully considered and may require the organization's authorization. The project advisory group may also provide continuity when the subsequent training starts. In capacity development programs, a technical committee may perform this function on behalf of the government.

Participants

Training participants (trainees): Participants are the ones who directly benefit from a training program. This participant target group is identified during the training needs assessment stage, and potential participants take part in the individual assessment to determine their training needs.

Because the participants are directly involved in the training, they are core stakeholders. They understand the need for training, can assist in defining training

objectives and can provide feedback to the training provider and their own unit or organization on training delivery methods. Trainees are also an important source of information when they evaluate the training's long-term results.

Training Provider

Training provider: The training provider (either an individual or organization) is responsible for delivering effective training to the target organizations under the technology transfer program.

Beneficiaries: The direct beneficiaries are the individuals and organizations that benefit from the training program's outputs. The indirect beneficiaries benefit from the training program's outcomes (or, put simply, the improved organizational performance). At the national level, this could be the leading government agency responsible for fostering and supporting innovation and, ultimately, the citizens themselves who benefit from the improved functioning of the innovation value chain.

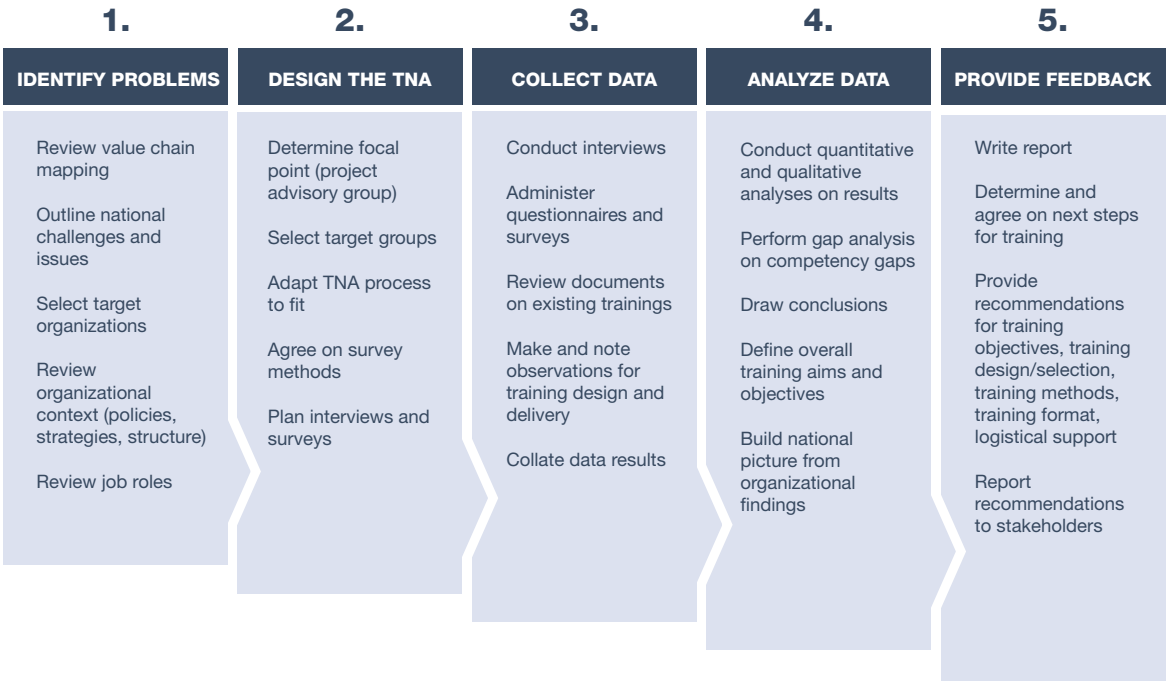
The relationships among the different stakeholders within the overall program is shown in **Figure 13: Relationships among stakeholders.**

Note: The assessment is not intended to be data gathering simply for the sake of doing so. Prioritize the most relevant areas that influence technology transfer and the issues that cause blockages in the system that can benefit from improvement through training. The data gathered are intended to support an evidence-based rationale for the proposed training solutions. The final recommendations should be derived from the gathered assessment data.

3.2 The five training needs assessment steps

Think of the training needs assessment process as a project and the training implementation (design, delivery and evaluation) as a subsequent project within the overall training cycle. The training needs assessment project can be broken down into a series of five steps, as shown in **Figure 8**.

Figure 8: The five steps of a training needs assessment



Adapted from: Barbazette, J. (2006). *TNA: Methods, Tools and Techniques.*

The survey forms provided in the manual and toolkit are resources that can be tailored to fit different needs, because each country context is different. The assessor can choose which forms and questions are relevant for a particular situation.

Many situations warrant using fewer forms or modifying the survey questions.

Interviewees have limited time, and the assessor should adapt the forms and questions to fit each situation.

For example, if an interviewee is the sole staff member dealing with technology transfer and is effectively self-managing, then conducting a dual set of interviews and completing both sets of forms for managers and individuals would be duplicate work; in this case, the assessor could choose one set of forms.

Another example is if the strategy for technology transfer in universities is set nationally, then asking all organizations questions about their overall strategic approaches may be repetitive, and referring to the national strategy makes more sense.

We cover the training needs assessment's design more thoroughly starting in **Section 3.3: Assessment methods**, with the practicalities discussed in **Section 4: Training needs assessment toolkit: Tools for the training needs assessment process**, which provides the survey tools and forms used in the assessment process. We also expand on how to select a focal point and project advisory team (if needed) in **Section 3.2: Stakeholders in the training needs assessment and training implementation process**.

Step 1: Identify problems

The assessor first builds a picture of the innovation value chain in the country to determine how it works; which organizations are involved; which policies, strategies and operational aspects exist; and how the future will unfold (for example, are there drivers for change in new technology?). This process identifies the problems and challenges that must be addressed. The training will subsequently target these problems and challenges by building necessary skills and knowledge.

A country-level innovation value chain mapping exercise is a useful resource to determine which organizations can be targeted for the training needs assessment.

The assessor uses survey tools to investigate how innovation and technology transfer work within a targeted organization – what is the structure? Which units are involved? Who contributes, how do they contribute and in which subject areas?

Training is designed to improve individuals' competencies who work for organizations in the national innovation value chain. Therefore the assessor identifies the main job roles and responsibilities for those professionals involved in the technology transfer process. These individuals become the possible participants for the assessment survey and, later, the potential trainees for the training program.

An initial overview allows the assessor to choose and refine the training needs assessment tools to match the outstanding issues; these areas could become relevant later on. For example, the assessor could identify areas of concern to include in the survey (such as policies, strategies, funding, units/departments, job roles and individual competencies).

Step 2: Determine the training needs assessment's design

The assessor now adapts the training needs assessment process to fit the organization's circumstances. Working alongside an organizational focal point, and possibly a project advisory group, the assessor selects the most appropriate assessment methods and chooses the target group that will participate, as well as which job roles and how many people (sample size) should take part.

The assessor schedules interviews and surveys and decides how to disseminate and collate questionnaires.

Step 3: Collect data

This step focuses on gathering pertinent data by interviewing organizational representatives, administering the questionnaires and surveys, collecting and collating all the survey results and summarizing notes about observations.

The assessor, with help from the focal point and/or project advisory group, will gather other relevant documents as part of a literature review that relate to the technology transfer process within the organization and in the national innovation value chain.

Note that many training solutions already exist. Rather than design a new training course, there may well be accessible training courses that an existing organization offers. Therefore the assessor should also gather information at this stage on which existing training courses in technology transfer are available. This will aid the recommendations in the report.

Step 4: Analyze data

In this step, the data gathered in step 3 is studied, analyzed and used to draw conclusions that inform the best training solution to address the issues identified in step 1.

Step 4 focuses on conducting quantitative and qualitative analysis as well as performing a competency gap analysis.

The collected data measure the individuals' competency levels. The difference between the current and required competencies is the gap analysis, which informs the training need. The training aims and objectives are the response to the need.

Step 5: Provide feedback

The assessor writes a summary report about the assessment's conclusions and makes recommendations for the proposed training program. Typical reports cover the organizational context, the issues faced in technology transfer and the innovation value chain, the collation of competency results and the gap analysis. The report identifies the training needs and proposes training aims and objectives that will satisfy these identified needs. The report concludes with training solutions to improve the desired competencies.

The conclusions are evidence based, so the assessor must provide assessment data and analysis to support the recommendations.

Reports are structured in a logical sequence to show how the recommendations were derived from the assessment. This structure helps readers follow the reasoning for why certain areas (subjects, competencies, skills and abilities) were chosen, how the training target group was selected and what the preferred course of action is for the subsequent training solution.

The assessor will then report their recommendations to stakeholders and together determine and agree on the next steps.

Because the training program may be designed at a later date, the assessor should leave sufficient information in the report to enable the program to be implemented (design, deliver and evaluate). Such information includes advice on training format, training design, training methodology, logistics (administrative support) and available alternative courses.

Thus, the process of assessment, implementation and reassessment is iterative and repeats as necessary.

The report may also highlight the challenges and issues that the organization faces in carrying out its current and future role in the technology transfer process that cannot be met though a training program (that is, any risks and opportunities beyond capacity development).

The risks are introduced in **Section 3.10: Risks** (and outlined in **Figure 2**). More details on the report's format are covered in **Table 3**.

Stakeholder forum. Capacity development programs typically present the training needs assessment's results at a stakeholder forum. Key stakeholders in the sector gather to discuss the training needs assessment's conclusions and recommendations. This allows everyone to debate high-level issues and can garner support for the training solutions and professional development measures.

Reassessment. The training needs assessment provides a snapshot in time of the learning needs. If there are changes in the underlying institutional or national landscape, they may be cascaded to the subsequent plans and programs, and the original training plans and activities may no longer be relevant. Therefore it is a good idea to revisit the assessment. Another reason to reassess would be to update the learning needs and revise the training plans if the post-implementation evaluation calls for it (see **Figure 13: Relationships among stakeholders**).

3.3 Assessment methods

This manual is written for the non-specialist to undertake training needs assessments in an organizational setting – therefore we've selected straightforward methods for the toolkit (detailed in **Section 5**).

People's opinions and perspectives form the assessment information; to minimize bias and gain valuable insights into the organization's strengths and weaknesses, use our recommended methodology. If you are interested in learning more about assessment methods, feel free to peruse the literature references in **Appendix A**.

We use the following methods in this manual and toolkit.

Structured interviews
Conducted with a prescribed list of questions, the advantage to structured interviews is a consistent set of questions that make data easy to compare. The disadvantage is that static questions may prevent crucial issues from being explored. Questions should be carefully constructed to avoid ambiguity yet retain the intended meaning.

Semi-structured interviews
These interviews are also conducted with a set of questions, however, during the discussion, the assessor is free to focus in more detail on any topic or explore other crucial areas of concern that were not identified in the original questions. Here the assessor may use both open-ended and more specific questions to encourage the interviewee response.

This method is best suited for the organizational assessment.

Observations
This informal method is conducted during the course of the assessor's work, in which they note any items of relevance. The notations can be as simple as recording the capacity of a training room to capturing more complex discussions on strategy that may have relevance to the assessment.

Observations provide information on the context and issues that affect the training needs and logistics. Making observations is useful to confirm trends that the gap analysis provides and to assess if few people responded to the surveys (see **Section 3.7: Risks**).

Questionnaire surveys
A series of prewritten questions are disseminated to the target group. In an individual survey, they cover basic information about the participant's job roles and responsibilities and ask about the participant's views on the competencies required in the work and how the participant would rank their importance.

The organizational survey asks similar questions but from a management perspective.

Organizational questionnaires also investigate the organization's ability to function in the technology transfer process and ask wider questions about the challenges that management faces in the innovation value chain.

Questions can be qualitative (written opinions), quantitative (scored or ranked), closed (yes or no answers) or open (elaborative, descriptive answers). Take care when drafting questions to avoid ambiguity, to cover the relevant areas and to maintain clarity, so the responses are easily interpreted at the analysis stage. Also, using the right balance in the number and style of questions keeps responses focused and relevant.

We recommend using questionnaire surveys for the individual assessment in combination with the semi-structured interview for the organizational assessment.

Focus group discussions (workshops)
Often used in the development sector, focus group discussions involve a facilitated meeting with communities of practice to explore issues in the technology transfer sector. Group work and discussions help all parties arrive at a consensus on the problems.

When managed well, these meetings can explore an issue in depth and peer consensus can propose realistic solutions. However, if the assessor is unfamiliar with hosting such discussions, they can be a bit daunting, because the assessor also needs to manage expectations and have reasonable facilitation skills.

Literature review
Part of the assessor's job is to carry out research on the organization. Having existing documentation about the innovation value chain context, the organization's structure and HR management can greatly assist an assessment's design and setup.

Include recent documents on the organization's approach to the innovation value chain and on its capabilities and competencies in technology transfer. Also include information on training, learning and professional development activities that the organization offers or has undertaken.

Previous assessments
With the pilot phase complete, the assessor can look to the previous country mapping exercises, training needs assessments, training plans and evaluations for guidance. By using their experience and knowledge, the country experts can draw reasonable recommendations for the learning gaps, even if the survey results are incomplete.

Job analysis
Analyzing the job descriptions and organizational organogram is useful to see whether the current job roles match the organization's desired state. The project advisory group (see **Section 4.5**) could assist in this task.

Before conducting the assessment, select the appropriate forms and adapt the set of questions from the toolkit. Participants may have limited time to respond, and the different forms (organizational and individual) sometimes cover the same ground.

Note: Many different assessment methods exist. Some require previous experience in the methodology or have more of a community-based approach.

For example, in the humanitarian context, the United Nations High Commissioner for Refugees (UNHCR) has a tool for participatory assessment to engage with community refugee groups.

3.4 Stakeholder engagement

The training needs assessment's success relies on engaging the participating organizations' managers and staff. The assessor should clearly explain the training needs assessment's purpose, how they will perform the assessment and the time commitment for participating staff (for interviewing, filling out forms and managing staff expectations).

The assessor designs the survey to minimize the time it takes the responders to contribute and reduce the number of visits to the most effective level.

A strong assessment provides information on staff members' capability to perform their expected daily duties in pursuit of technology transfer in the innovation value chain and, hence, defines the training needs.

Although the assessment stage is an unwise time to promise that a specific training course will be offered, the assessor can mention that the training needs assessment will inform a comprehensive training program to address the identified skills shortage of the staff concerned and that an evidence-based report will define the training plan. Then the training providers will use these findings to select the most appropriate training courses and modules to improve the concerned staff's abilities and skills, thereby improving the organization's and national sector's performance in the sector.

Give participating staff a sense of the timeline involved, for example, that the training could start within a calendar year.

This organized approach will also make time to receive funding approval for the training program.

The assessment aims to gather useful information that informs the training need and provides consistent data that justify the conclusions and can be used for comparative purposes.

If the assessor receives vague responses, the assessor needs to investigate further to find specifics.

Match the competency gaps to a training course or training module.

For example, if many employees mention "negotiation" as one of their required skills, the assessor should find out which kind of negotiation is most appropriate (such as negotiation for preparing commercial contracts).

The training needs assessment will produce credible evidence of the training needs, meaning the training courses should address the fundamental issues and improve trainees' performance, the organization's performance and performance at the national sector level.

The assessor must maintain good communication with the focal points throughout the process by consistently informing them of progress and sharing the resulting reports.

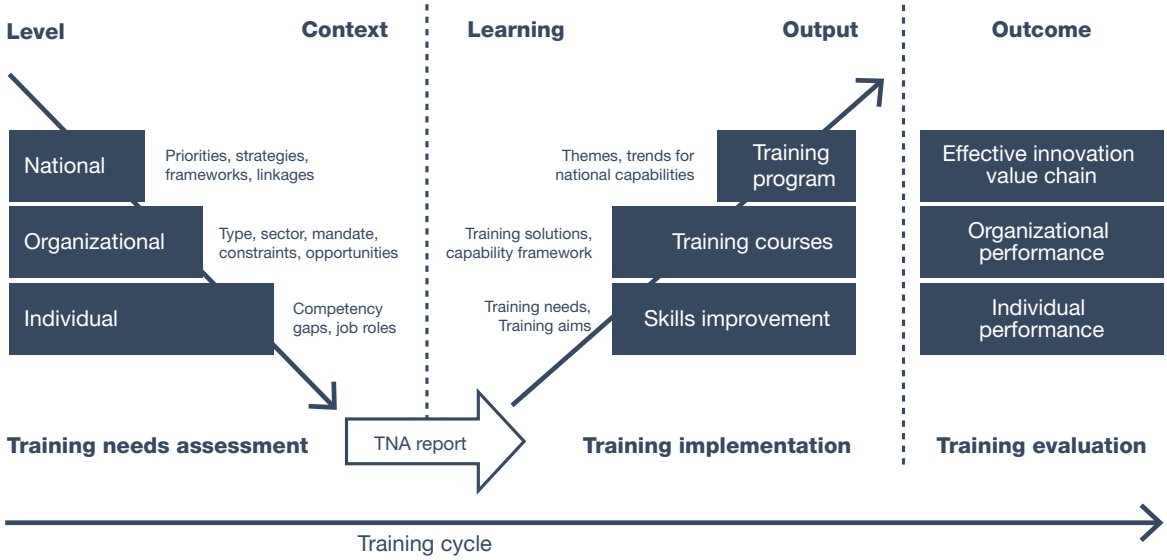
Although we covered different assessment methods in the preceding section, simply speaking, the assessor needs to:

1. Make initial contact with the organizational chief to explain the training needs assessment's purpose and approach.
2. Conduct an interview with key managerial staff for the organizational perspective.
3. Carry out a survey with operational staff to gain data (through the selected toolkit forms) on the participants' competence.
4. Collect the fundamental information about what all employees do or need to do daily in their jobs. What do they need to be better at?
5. Refine this approach with the methods described in this manual or with an assessment team that assists in carrying out the assessment.

3.5 The training needs assessment process within the overall program: Staircase framework

Figure 9 shows the training needs assessment framework that we use in this manual and toolkit, how the training needs assessment process gathers information through the different levels and which contextual issues are addressed at each level. The figure illustrates the entire structure; each section expands in more detail about how these processes and activities are carried out.

Figure 9: How the training needs assessment fits within the overall program ("staircase framework")



The left-hand side of the "descending staircase" is the training needs assessment process (gathering information) for the training needs assessment report and where data are collated, analyzed and made into recommendations.

The right-hand side of the "ascending staircase" is the subsequent training implementation process that the training needs assessment report defines. Here the training programs are put in place and courses are run.

Once the assessor produces the training needs assessment report, the figure shows how the recommendations are then put in place ascending through the same levels; which learning takes place; and which type of training output is produced, leading to the intervention's ultimate outcome.

The training needs assessment manual and toolkit show how to select and plan these interventions, however, their practical implementation is a separate, subsequent process.

The national level provides the context of the innovation value chain's priorities, strategies, frameworks and linkages. Organizations working in the innovation value chain are selected by the assessor, and the training needs assessment takes place at the organizational level, focusing on the competencies of individuals who work for the organizations' technology transfer process. The training needs assessment uses techniques from the toolkit to understand the competency gaps in individuals' skills and abilities. These gaps are analyzed by the assessor and define the training need. The training aims and objectives are subsequently written in response to the training needs. The aims are the goal of the training, to improve individual performance in job roles. The training aims materialize through appropriate training solutions, which means selecting or designing effective training courses that match the training aims and objectives. This, in turn, contributes to improved performance in the technology transfer services that the organization carries out. The training solutions also indirectly positively affect the innovation value chain among organizations.

The assessor carries out the training needs assessment for several organizations across the innovation value chain. The trends and themes that appear provide the national-level picture. This overall multiorganizational training need can be used to create a wider encompassing national training program across the innovation value chain.

The training needs assessment is an iterative process

Put simply, the training needs assessment process follows the stages shown in **Figure 10**.

Assess is the stage when the assessor maps the outputs from the main institutions and organizations involved in technology transfer and intellectual property management.

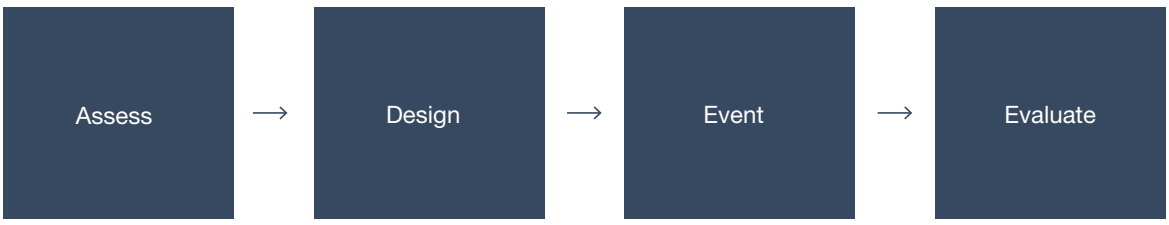
Design is the stage when the overall training plan and training course programs are formed.

Event is when the training solution or courses (activities) are delivered or implemented.

Evaluate is the stage when participants and organizations reflect on a training's efficacy.

However, this linear, one-time approach does not work well for complex contexts in which many actors are involved, such as industry, government and academia. A more effective approach in this scenario, after completing the process, is to revisit the initial assumptions and use the lessons learned from the training cycle in a further round to revise the assessment, replan, adapt the training events and reevaluate.

Figure 10: Traditional training cycle



Source: WIPO (2018). *Project on Intellectual Property Management and Transfer of Technology: Promoting the Effective Use of Intellectual Property in Developing Countries, Least Developed Countries and Countries with Economies in Transition* (see Appendix C).

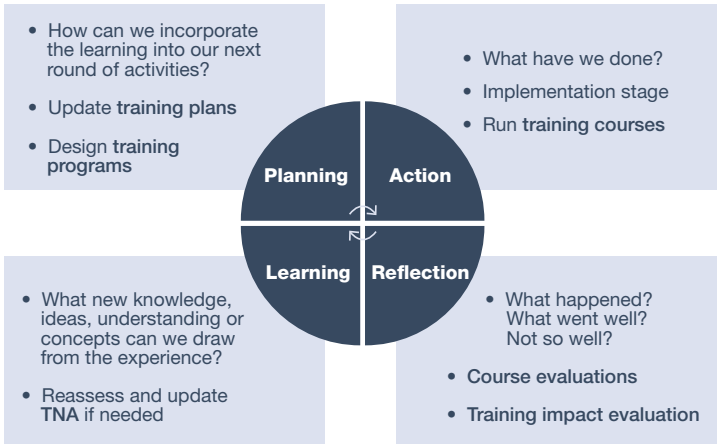
In practice, the training plan and programs are updated regularly (often annually), following the training cycle.

If the evaluations show the training has not met the need, or if the institutional landscape of intellectual property management has changed (because of new policies, new governance, change of strategy, etc.), then the assessment may need to be revisited, following the iterative action learning cycle.

Evaluation does not have to be confined to an end-of-cycle phase. If, for example, a national policy change is introduced that has a fundamental effect on responsibility for intellectual property management and organizations' approach to technology transfer, then it may be wise to review the training needs assessment's conclusions to see if they are still valid. If not, revisit the affected areas.

Note: Conducting a full training needs assessment again may not be necessary. The goal for each evaluation cycle is to review if the report's conclusions are still valid and, if not, which areas of the training needs assessment should be revisited.

Figure 11: Action learning cycle



Source: WIPO (2018). *Project on Intellectual Property Management and Transfer of Technology: Promoting the Effective Use of Intellectual Property in Developing Countries, Least Developed Countries and Countries with Economies in Transition* (see Appendix C).

This second approach is called the **action learning cycle** and is similar to the project cycle process (plan, do, check and act), as shown in **Figure 11**.

Thus, building a better picture of learning needs and how to best respond to the institutional landscape for the intellectual property management and technology transfer sector is an iterative approach.

Figure 12 shows that the training cycle and action learning cycle do not cease after one iteration. Rather, the evaluation informs the

Figure 12: The training cycle is iterative

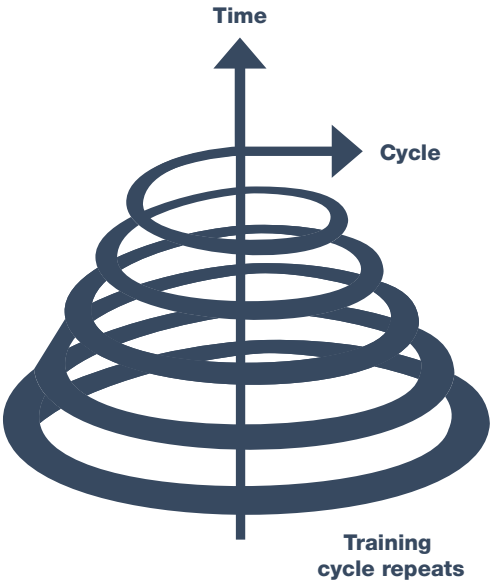
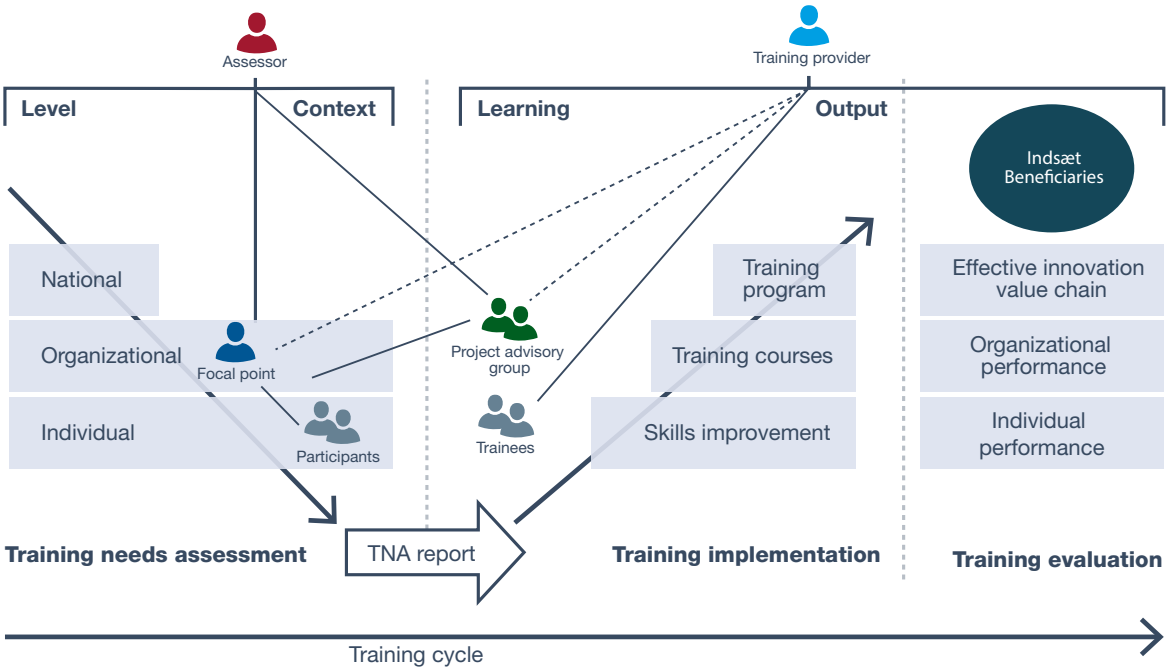


Figure 13: Relationships among stakeholders



next round of assessment, design, implementation and so on, and the cycle continues and is refined each time (indicated by the straight arrow).

Figure 13 shows the relationships among stakeholders. The assessor runs the training needs assessment while working closely with the organization's focal point (and potentially project advisory group) at the individual level with the training needs assessment participants. The assessor's report informs the training provider (who is responsible for the training implementation) about the trainees and about potentially working with the same focal point and project advisory group. The beneficiaries are at the end of the chain.

Organizational selection and sample size

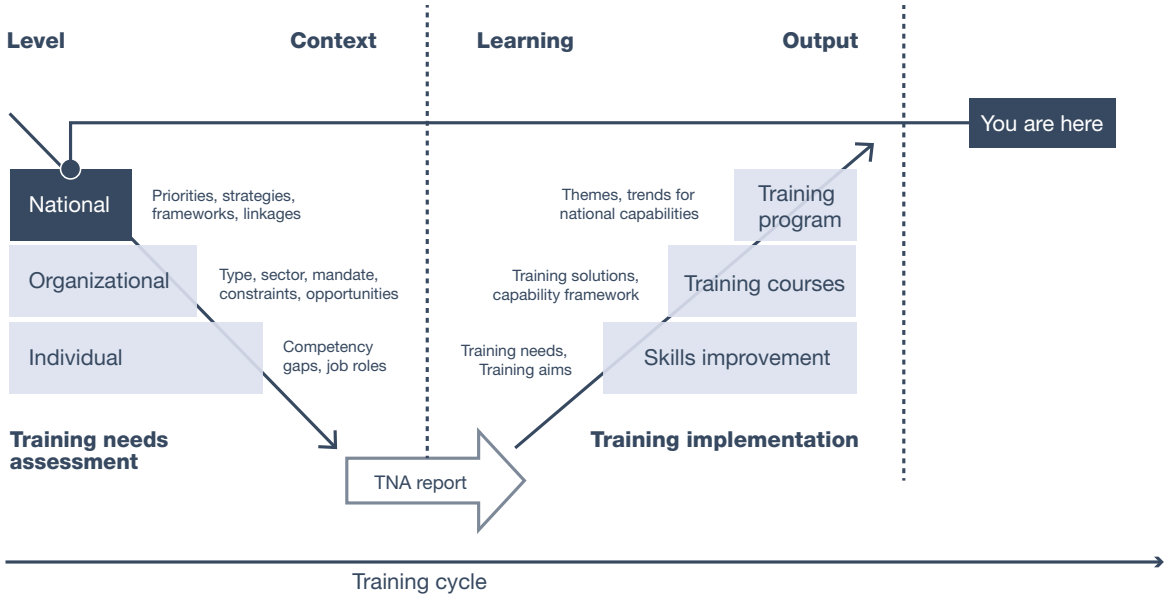
To start, the assessor has to find out which organizations to survey (that is, a representation of those that play key roles in the national innovation value chain).[7]

A mapping exercise provides a picture of how these key organizations function to support the innovation value chain, how they interact and the constraints and opportunities that exist. The policies, frameworks, linkages and activities are the context that the organizations operate in, and mapping shows the overall structure, whether by cluster groups, sectors, roles or other means.

Thus the mapping exercise and the training needs assessment counterpoint each other; one provides a framework of organizations' roles and interactions within the innovation value chain, and the other details the organizations' training needs to improve individual

The stakeholder groups were introduced in **Section 3.1: Stakeholders in the training needs assessment and training implementation process**.

Note: Many types of organizations are involved in a country's innovation value chain, such as funders; developers; managers; users of IP; and associated support institutions, including universities, research centers, government agencies, enterprises. Also engineering faculties, finance departments, legal divisions that function as specific units, technology and innovation support centers and technology transfer offices as organizations or specific units. They can encompass many industries and perform many roles within the value chain, such as a teaching institution or an office that brokers innovative products to markets. They are also often linked with one another. Some examples of different types of organizations are listed in **Appendix D.**



Selecting the organization is within step 1 of the training needs assessment, shown in **Figure 8**.

competencies. The goal is to enable the individuals to carry out their roles, and the organizations' their functions, within the national innovation value chain (and potentially at the international level).

Sample size

Organizational selection and sample size involve two parts. The first is the number and type of representative organizations to target for the assessment, and the second is the number of participants who will form the survey target groups.

Organizational sample size

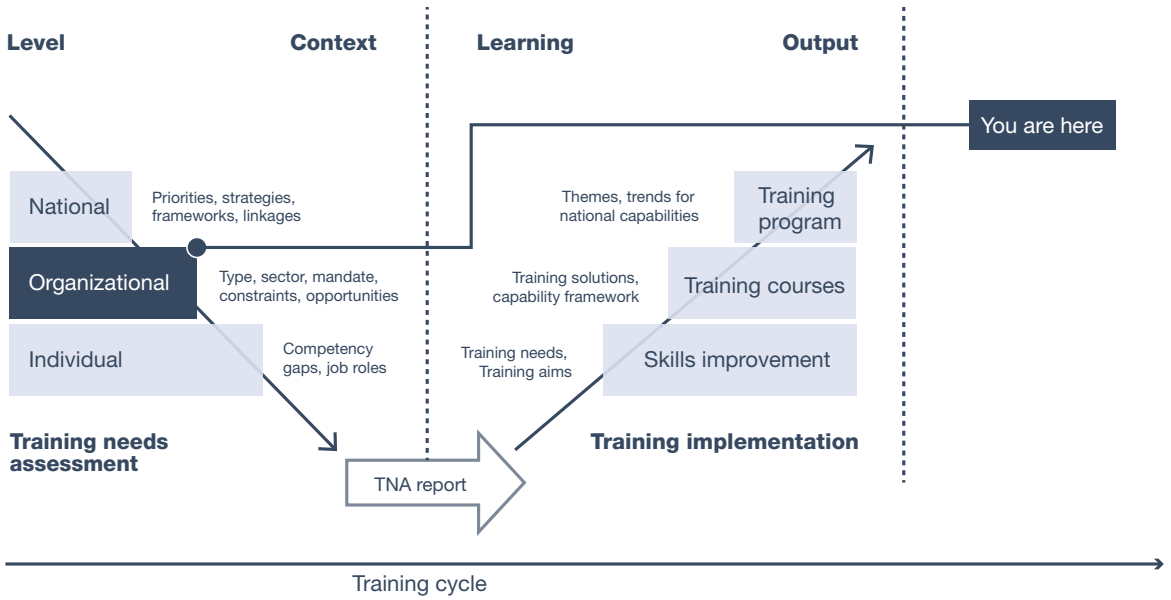
Not every organization needs to be assessed – if the training needs assessment's intent is to determine the training need for a particular organization, then, of course, this organization would be selected. If the training needs assessment's intent is to inform the overall national training need, then the assessor should cover a broad cross-section of different organizations to ensure that the survey results provide a realistic capability framework and training need across the value chain. Key institutions and organizations should be assessed.

Individual survey sample size

Within an organization, the selected sample size should represent the training target group.

For an example of what this numerically means in practice, review **Section 4.1: Organizational selection and sample size.**

There are different sampling methods to choose from (for example, random, systematic or stratified). In this case, the assessor's background research and focal point interviews should direct the assessment to likely units and areas for survey. Not everyone needs to take the survey, and some will likely not be available during the limited survey time. In small units (for example, five people), surveying everyone is possible. In larger organizations (for example, 1,000 or more personnel), a representative sample is necessary.



Organizational focal point

As a reminder, the assessor establishes a focal person within the organization and/or technology transfer unit, this a key stakeholder, who has:

- Influence and contacts within the organization.
- Interest in championing the survey and project.
- Knowledge of the management of technology transfer.
- Knowledge of the organization's training department.

Both assessor and focal point decide whether a project advisory group is beneficial and, if so, how the group should be composed. Then the two (as well as the project advisory group, if relevant) carry out the following activities:

- Agree on the assessment's scope.
- Tailor the methodology to fit and set up the target groups for the interview/questionnaire.

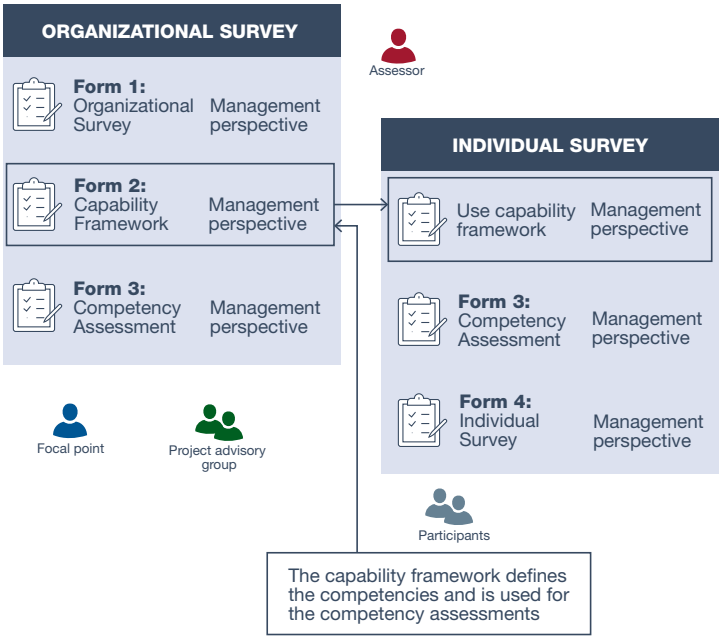
This step (design of the training needs assessment) relates to step 2 of the training needs assessment (refer to **Figure 8**) and **Section 3.1: Stakeholders in the training needs assessment and training implementation process**.

The steps for surveying an organization are outlined in **Section 3.4: Stakeholder engagement**.

3.6 Sequence of the survey

Figure 14 shows the sequence of the survey. The assessment proceeds from organizational to individual assessment, which the survey forms reflect. The capability framework defines the competencies relevant to the organization and is used as the template for the following competency assessments, which are conducted at both the organizational (management perspective) and individual (job holder) levels.

Figure 14: Sequence of the survey



In the circumstances of a small unit with a sole staff member, the assessor may decide not to have both organizational and individual surveys and would combine the two to avoid repetition.

Remember: The assessor should select the appropriate forms and questions, as mentioned in **Section 3.2: Five steps of the training needs assessment** and **Section 3.3: Assessment methods**.

The survey forms logically progress to obtain results that define the training need:

- The organizational survey provides the overall organizational picture.
- The competency assessment ranks the importance of a competency to a job function and the job holder's ability in that competency.

Hence the results will produce the most relevant competency gaps according to organizational priority and individual ability so that the assessor can choose the right training solution and the appropriate training group.

3.7 Organizational survey

At this stage, the assessor has adapted the assessment approach to fit the organization; has reviewed the organization's purpose, approach and structure as part of the innovation value chain; and has established the links within the organization to carry out the survey, which is the mainstay of the overall training needs assessment.

The survey conducted with the group that represents the organization's point of view and the data are gathered from semi-structured interviews supplemented by questionnaires on capability and competency.

To organize the survey, the assessor and focal point set up and brief the target group (after profiling and selecting it).

The outputs (after analysis) will be a profile of the organization's current capabilities and gaps in desired competencies that inform the training need. A direct output is the revised capability framework, which is used in the individual assessment.

Following the sequence in **Figure 14**, the assessor carries out the organizational survey to gain a management perspective on the capabilities required to fulfill the organizational capability need in carrying out its technology transfer function.

The survey narrows down the necessary job competencies by first asking which jobs contribute to technology transfer. Then the survey focuses on specific job descriptions and if they are valid or need updating. Job roles are looked at in a general sense rather than specific to the individuals who hold them (for example, one role might be "contract lawyers" rather than "contract lawyer John Doe" [specific people will be referenced in the individual-level survey]).

This exercise is advantageous, because when the subsequent competency assessments are given at an individual level, the terminology is already commonplace in the organization and participants are familiar with the competency definition. Initially, using generic competencies may not be familiar to the participants, which could lead to errors in response.

However, the assessor will need to combine the definitions from the organizational capability framework survey to produce one master framework for use in the subsequent surveys. To avoid having many different versions of the framework, a working group or the project advisory group could create a common organizational capability framework.

Armed with the list of defined competencies from the capability framework, the survey participants can then determine which competencies and abilities are relevant for the prescribed job roles.

The organizational survey group uses the framework to prioritize the competencies (skills) according to the importance in the job roles and to rank according to the staff members' current abilities. This establishes the gap in performance, which will, in turn, directly inform the training need.

Current and future states

The organizational assessment addresses both the current situation and future situation. There may be a different training need to address the competencies to fulfill the organization's current obligations with new competencies required for future strategies. For example, if an organization needs to expand its workforce to meet demand in a new policy area that, presently, it doesn't have the skilled workforce for.

The survey covers other important areas, sources of existing training, available professional development routes and best choices for training design and delivery.

The assessor should not be daunted by the survey's scale; whichever assessment methods, survey forms and questions are used, the assessment is simply showing how the organization approaches the technology transfer sector. At an individual level, the assessment is finding out what the people involved must do in their jobs in terms of competencies and where they can improve.

In practice, during the pilot assessments, the assessors found that even if they obtained limited data, they could still derive conclusions and make recommendations that inform the training approach.

This step (collect data) relates to step 3 of the training needs assessment (refer to **Figure 8**) and **Section 4.4: Organizational survey**.

If the organizational assessment process sounds complicated, put simply, it aims to find areas where there is a gap between individuals' levels of competency and their expected levels (specific areas that they need to improve in to carry out their daily work).

The future state brings in areas that individuals will need to cover in the future, such as due to change of job description, change of organizational strategy and so on.

Note: The assessor could conduct the survey as a distributed questionnaire online in a spreadsheet format or in a workshop format, if feasible (if participant numbers are low), by gathering participants in one location and coaching them through the process.

Online surveys are easy to use and common. They can aggregate the data and produce reports automatically.

To introduce the process, the assessor and focal point should explain the assessment's purpose and how the survey forms work. The notes in **Tool 3: Introduction of training needs assessment to individual respondent** assist in this introduction.

This step (collect data), relates to step 3 of the training needs assessment (refer to **Figure 8**) and **Section 4.5: Individual-level survey**.

The organizational survey examines which training sources are already available. Often the training need could be met by an existing training provider or training course, so it is important to have this information available.

The external relationship with other technology transfer actors is also a factor, because there may be a training need to assist with this interaction. The survey additionally explores other barriers to competency improvement outside of training solutions.

The survey inquires about available and applicable professional development for the current and future states, as well as if there are routes for professional development and if participants feel that professional development is important for themselves.

Individual survey

The assessment surveys individuals because their opinions are important. A training needs assessment looks at both the management and individual perspectives (individuals could be personnel, staff, consultants, advisers and partners or managers, but as individuals in their own job roles). This avoids a mismatch in the training design, where a management committee drafts a training that bears little relation to what is needed by the people who perform the actual tasks. By taking in both viewpoints, the assessor can avoid a mismatch and the training is better targeted.

With the focal point, the assessor selects a target group of participants for the individual survey (see **Section 4.2.2: Organizational sample size**).

The updated capability framework (from the organizational survey) is used as a template for the individual assessment. In a similar manner, participants complete the competency assessment for their own job roles and rate and rank their abilities and priorities. The data from these forms are used in the same way as the organizational surveys to build a picture of competency gaps.

Then the individual survey participants use the framework to prioritize the competencies (skills) according to the importance in the job roles and to rank according to their current abilities. This measures the gap in performance, which will, in turn, directly inform the training need.

The competency assessment

The training needs assessment uses a competency-based assessment, which is the typical approach to establishing training needs. This means the assessor may have to introduce the concept of competency and ranking and lead the organization through the process or, for a mature organization, the assessor can tap into the existing frameworks.

The approach of defining and measuring individual competencies within an organization enables the assessor to identify gaps in competency that then can be used to define the training aims.

The toolkit uses a capability framework to summarize the different competencies and match them to job functions. Then, during the surveys, the framework acts as a tool to prioritize and rank the importance of an ability in the competencies.

This exercise is carried out at both the **organizational** and **individual** levels.

3.8 The capability framework

The capability framework is a table of typical competency best practices that professionals who engage in technology transfer use for the industry.

Previous related assessments have produced capability frameworks (or equivalent; the exact terminology varies). These frameworks list the competencies required for the professional roles. Because there is a wide variety of professionals with different skillsets engaged in technology transfer, the list covers many eventualities for job roles. This comprehensive list is simply a template that can be tailored to fit an organization's specific approach.

The capability framework guides how competencies are assessed and is a useful method to gather information on the competency gaps and to directly inform the training need. (Because training provides a forum for improving individual skills, awareness and knowledge.) In the competency assessment, the participants rank and prioritize their competencies by importance and performance ability.

The capability framework can also introduce the concept of competencies to the survey participants, who, by being actively involved in selecting the definitions, will gain interest and understanding of the approach and be able to transfer it to their staff.

The capability framework defines (and analyzes) the most important skills that those involved in technology transfer require. These skills (or detailed competencies) are grouped in themes (known as the core competencies). The template is then applied to the organization under assessment. The individuals assessed likely require some, but not all, of these skills. For example, a specialized IP lawyer may need additional contract law training but not the entirety of skills listed in the framework. Many different professional roles are involved in the technology transfer sector, each with its own set of prioritized competencies, which may be particular to the way an organization works.

The survey group reviews the capability framework to see if it fits their view of technology transfer and adds or adapts competencies (bearing in mind that most capability frameworks for technology transfer identify similar competencies, perhaps using different terminology).

The assessor may need to refine the competency definitions to match the terms commonly used in the national context. Ideally, the detailed competencies match training modules or courses available, so they can be easily addressed.

For more information, see the note in **Section 3.4: Stakeholder engagement**.

The competencies are grouped by theme and skill. For example, the detailed competency (or skill) "strategic thinking" sits within the core competency (or theme) "strategy and business acumen."

The assessor can gain insight into an organization's workings by examining the framework and tailoring it to meet the unique approach of the organization in the technology transfer process. For example, if one unit within the organization emphasizes defining many legal skills, this could indicate their importance, which may not have been obvious from reviewing the unit's structure and job functions.

The capability framework can be represented by a matrix (**Table 8: Comparison of capability frameworks**), a spreadsheet (**Form 2** in the toolkit) or a graphic (Figure 19). Regardless, the competencies are partitioned into labeled groups, so the framework is readily comprehensible and usable.

Management (represented by participants in the organizational survey) adjusts or adds terms to the template, depending on the best fit to the organization's function and the standard terminology used.

Then, with a tailored capability framework, each job role can be broken down into the component competencies. Survey participants score the competency list in two ways:

1. First, they rank the importance (prioritization) of each competency as it contributes to a job role.

2. Second, they rate the abilities of the personnel who work in these roles.

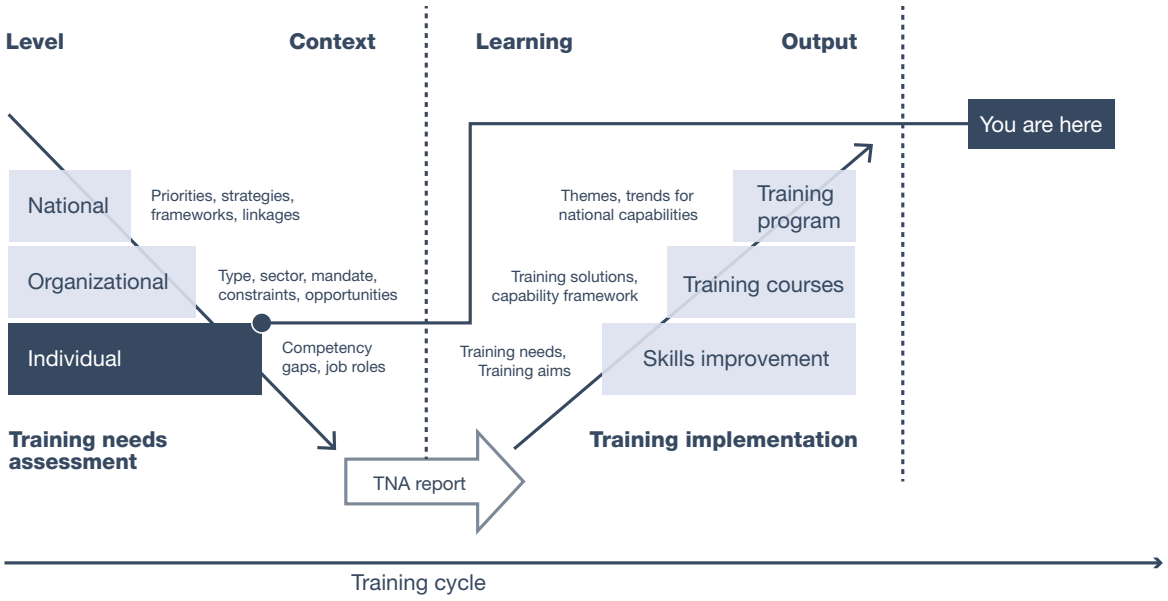
The rankings and ratings are simple scoring mechanisms that allow all survey forms to be compiled and compared using straightforward analysis of the results (covered in the toolkit). This part of the process is termed the "competency assessment," because it directly assesses the competencies.

Note that the survey rates the competency priorities and abilities from two points of view. During the organizational survey, management staff members give their perspectives on the generic job roles, and during the individual survey, individual staff members share their perspectives on the individual staff in each role.

For specific examples, refer to the toolkit.

Professionals working in technology transfer

Technology transfer, which covers many different sectors,[8] involves frequent interactions. Several professional roles play a part in the technology transfer process, and there is no singular role, organization or unit model.



Depending on an organization's size and maturity, a professional involved in technology transfer could have a specific role or a multifaceted role. Generalist roles may benefit from a wide range of trainings in different competencies, whereas specialist roles may require higher-level training in only a few areas. Specialist roles may also already have a clearly defined professional development route, whereas others may have no formal routes.

The organization (or professional body) may have a clear guide to the competencies necessary in each role, or perhaps this hasn't been defined, and there is a more reactive approach in each job function. Professionals can be internal or external to a targeted organization and be involved in various technology-related activities (for example, spinoffs, new business development, licensing, IP protection and so on).

Many individuals have their own professional bodies and networks (for example, lawyers and engineers), and many may be specialists in a narrow field with specific training needs. It is sufficient to note this in the assessment. Other roles (particularly in small, developing organizations) may require general multitasking duties, and a professional body may not be relevant. However, if such professional bodies and schemes do exist, they are a useful source of capacity development support.

Note: The term "technology transfer professional" is a specific role for those who support the technology transfer process, and they often work in technology transfer offices. Technology transfer professionals range widely in specialties. However, the training needs assessment also applies to a wider range of professionals involved in technology transfer, for example, directors, managers, administrators, engineering and technology experts, and so on.

Professional development schemes often provide accredited learning paths that improve professional skills and competencies, ready-made structured training programs and wider recognition of professional abilities within an industry. These bodies also offer other forms of support, such as professional networking, which drive policies and standards and provide forums for debating future challenges. However, the necessary support for career routes is a wider topic than training and depends on an organization's HR policies and practices.

Professional experience

The assessor should also consider experience and seniority in the framework. For example, the following terms are used for different levels of experience:

These definitions are for registration purposes. Most professional development bodies examine professionals' experience and continuing education under a peer-review system. Similarly, registered technology transfer professionals (registered technology transfer professionals) have three routes of registration that depend on experience, seniority and continuing education points: early career, midcareer and very experienced.

- An **early career technology transfer professional** generally has less than three years of technology transfer experience. Qualities include having responsibility for one's self, being part of a team (not leading a team) and working within guidelines and policies that others have developed.
- A **midcareer technology transfer professional** is responsible for a team, such as a project team; leads projects; and has scope for a project's discretion, judgment and decision-making.
- A **senior technology transfer professional (very experienced)** is responsible for leading a technology transfer unit and/or interacting directly with an organization's senior leadership and has responsibility for a unit's overall policy, budget, resourcing and staffing decisions.

We provide more information on professional classifications in **Appendix C**, including an example of the four levels of seniority for a training needs assessment in the procurement sector.

We also mention the factors influencing training dynamics from mixing or separating experience levels in **Section 3.7.2: Training solution**.

Knowing participants' levels of experience is useful, because training is designed or selected to improve their current ability levels. Learning is also affected by the group dynamics in training courses, so the training designer must decide whether to mix or separate trainees by experience level.

3.9 Results

Collation of results

The collated results directly show how well the participants meet the competency requirements and which competencies are most important in the job roles to both the organization and for its staff.

The assessment reviews whether participants have gaps in their individual knowledge, skills and abilities (competencies) to carry out their job functions. As a result, their training need emerges and the target group type becomes clear (for example, patent lawyers). At this stage, the assessor may identify potential individuals who could benefit from training.

The resulting information tells the assessor where competencies fall short and, therefore, where training is most beneficial.

The toolkit shows how the competency gaps can be easily derived and how they can be justified from the other assessment tools, such as the interviews, observations and literature reviews. The assessor must check the information from the competency gap analysis against any relevant contextual information.

Analysis of results

Using their professional judgment, the assessor interprets their findings to select the competency areas that have gaps and to recommend a plan to address the gaps. The assessor must have sufficient information to plot a direction for the training program and define its aims. Additional information and reflections on the best format, learning styles and logistics for the training program enhance the recommendations because they provide practical information.

Based on other background information that the assessor has gained, they can then suggest suitable training solutions.

We included radar charts as a useful way to visually present the results of the competency analysis. As with all the tools in the toolkit, the assessor may choose alternative ways to survey, analyze and present the information from the assessment.

For example, if the assessor could not conduct the survey, then they could instead give a summary of the interviews or of the stakeholder workshop.

Radar chart

We have included in the toolkit a radar chart (or spider graph), which is a useful tool that graphically illustrates competency gaps. These graphs are easily generated from a standard spreadsheet.

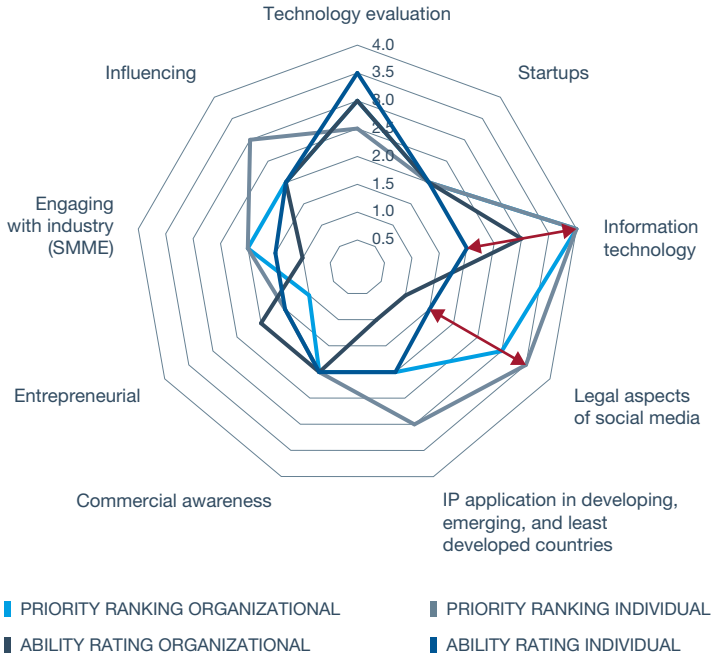
The collated competency data are represented by an image. The chart can be tailored to suit different information.

The charts need to be interpreted carefully, and the assessor should check any conclusions on training needs with the wider survey results.

These charts should confirm the previously expressed and observed trends in training needs; they may also identify an area that has not been noticed before.

Figure 15 uses the radar chart for the job role "technology transfer officer." The hexagonal axis shows the scoring, so high abilities and high priorities are toward the shape's outside. Each selected competency (for example, information technology) is on an angled line from the center. Thus, in the figure, the organizational survey prioritized information technology highest (rank 4, light blue line), and the organizational view on the staff's ability in this competency was ranked 3 (black line). The individual technology transfer offices rated their own abilities in information technology as only 2 (dark blue line), thus, they have a clear gap between ability and expectation in IT, which is a competency that the organization considers a high-priority area for technology transfer offices.

Figure 15: Radar chart for competency gap analysis

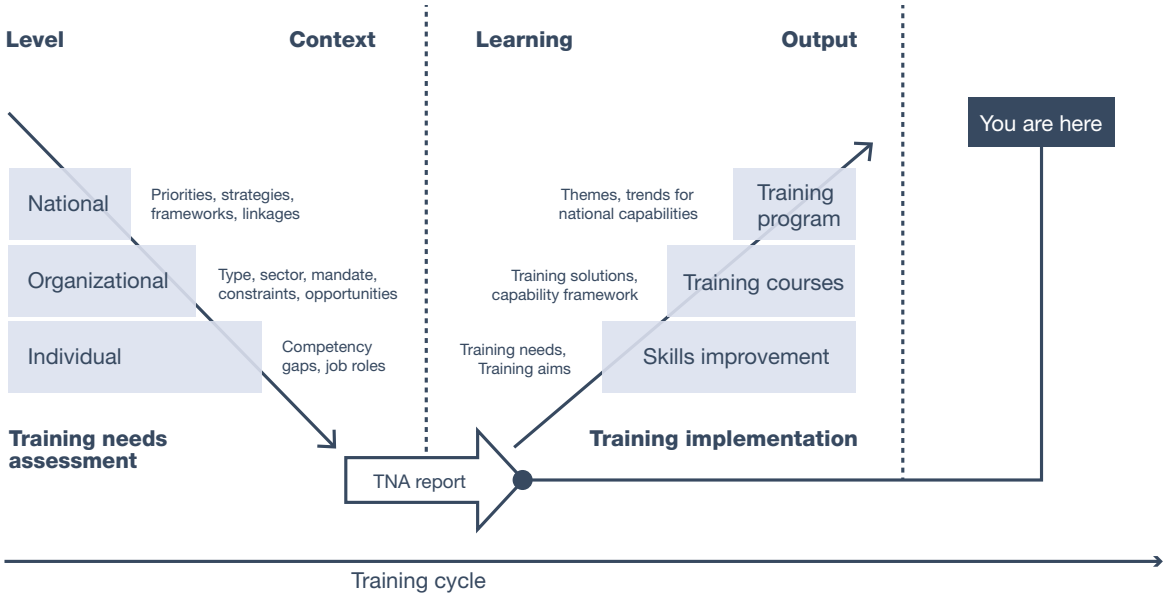


GAPS

- For the TTOs the organization priority is IT, legal aspects and technology evaluation.
- The individual prioritization is higher for influencing and IP application in developing countries.
- On abilities, there is a shortfall between IT skills and those expected so there is likely a training need here.
- There is a large gap on legal aspects, which has been continuously noticed in the surveys as a new priority area.

Appendix F presents a series of charts that show how information can be chosen to provide valuable insights into the competency gaps and trends.

These charts were used to produce the gap analysis and recommendations in **Section 6: The training needs assessment in practice: Step-by-step training needs assessment reporting example**.



The report relates to steps 4 and 5 of the training needs assessment, shown in **Figure 8: The five training needs assessment steps**. The toolkit provides more details on how to compile the report in **Section 4.8: Training needs assessment report**.

Training selection, design and delivery are subjects in and of themselves, with many manuals and textbooks dedicated to them. See **Appendix A: Further reading** for more information.

The training needs assessment's goal is to provide evidence-based information that informs the section of effective training courses; the next step is to develop the training plan. The training plan can provide an overview of the training courses on an annual basis. This plan can then be evaluated at the end of the year to review its success and relevance, and it may be further refined for subsequent years (see **Section 3.5.1: Training needs assessment is an iterative process**).

Thus, a good training plan can be a milestone to providing successful future training courses and also a benchmark that can be continuously evaluated.

These charts are shown sequentially to show building information on the organization's expectations compared to the actual abilities in the range of competencies within the capability framework.

Gaps are easily identifiable and provide insight on training needs. The radar charts can be simply adapted to highlight different areas.

Reporting results and recommendations

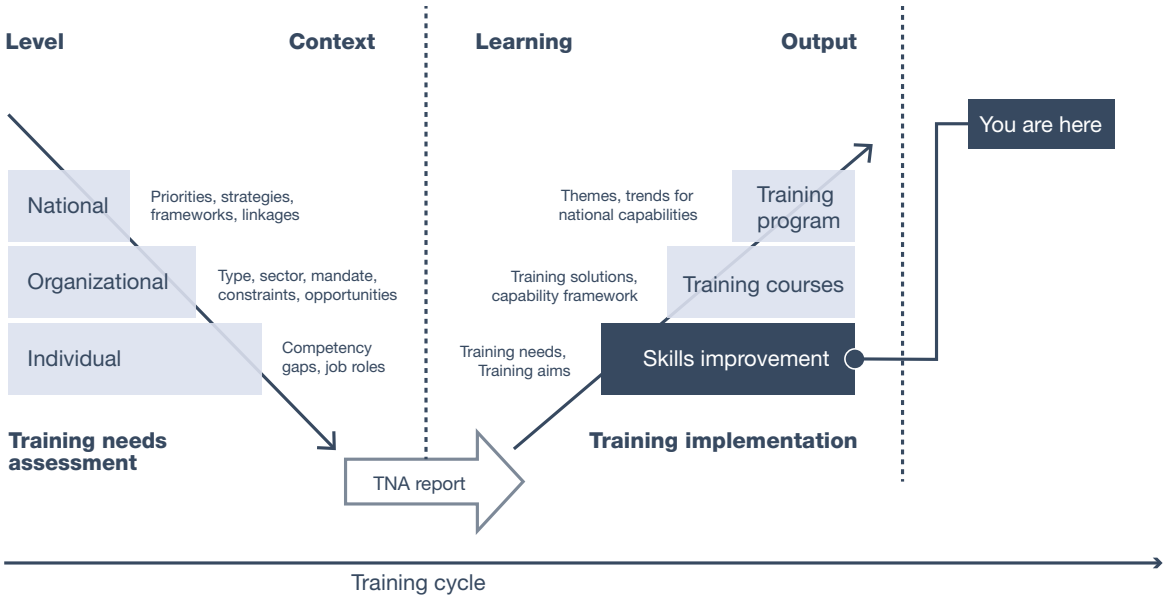
The training needs assessment report concludes the assessment. The report is where the data are represented, the analysis takes place and the training plans are recommended, pointing the way forward for the training implementation.

Thus, the collected data logically progress through to analyzed data to competency gaps, leading to prioritizing the training need and, eventually, offering training solutions. Training solutions may vary from unique internal training courses to a national program, depending on the trends that the assessor observes from the assessment and the organization's willingness to fund and implement such interventions.

The deduced training solutions are, therefore, evidence based and justifiable. The recommendations are produced and discussed in collaboration with stakeholders. The toolkit elaborates on how to carry out these activities and provides a recommended report structure in **Section 5.9.1**, followed by a chapter-by-chapter example.

3.10 Deriving training plans

The training needs assessment recommends which type of training could best fulfill the training need. Although the training



implementation process is separate and follows on from the assessment, the assessor needs to point the training provider in the right direction. This section provides guidance for the assessor to determine the training aims and objectives and how to arrive at an effective training solution.

Defining training goals: Aims, objectives and learning outcomes

A cornerstone output from the training needs assessment are the training aims (the course's overall objectives). The training need explains what is required to meet the aims.

Although definitions and uses vary, for this manual, we have used the following terms.

Aims are overall statements about the goal that the training will achieve.[9] For example:

– "The aim of this training is to introduce patents, copyrights and trademarks."

Objectives are more specific statements about what will be presented to the trainees, for example:

– "One objective is to present patent filing strategies."

Learning outcomes are a set of statements about what the trainees should be able to do or understand by the end of the training. For example:

– "By the end of this course, you will be able to manage a patent application using the *Handbook on Industrial Property Information and Documentation*."

Objectives can be subdivided into session objectives that define what participants will achieve in each training session. For example, a one-hour session on the history of patent filing could have the session objective to "introduce the chronology of patent filing to put into context the current approaches."

Normally, each training session has an objective and learning outcome. The objective is a statement about what will be provided. The learning outcome is a statement about what is expected to be achieved by the trainees, which relates directly to their competency improvement.

The objectives for specific sessions are levels of detail not expected from the training needs assessment report – the training provider should provide these.

However, the assessor **should** provide overall training aims and objectives in the training needs assessment report.

If trainees achieve the learning outcomes, then the training's objectives have been met, as have the training's aims, and the original training need has been fulfilled.

This structure also allows a training provider to build an evaluation system around the aims and objectives that is easy to monitor to measure if the training has met its purpose.

The training need must be carefully phrased so it reflects the causes behind the symptoms. For example, there may be a competency gap in patent filing strategies, however, if the cause was new technology that the patent filing officers were unfamiliar with, then the training need is primarily about helping them understand and use the new patent filing technology.

Note: Not all scenarios will have a solution based on training. Other reasons for competency gaps could be wider HR issues, such as staff recruitment, retention and funding.

The toolkit shows how training aims are derived from the competency assessments. For more, see **Section 6.2: Example of training needs assessment report**.

Read more on the target group in **Section 4: Training needs assessment toolkit: Tools for the training needs assessment process**.

The training program should list the course objectives and a short description of the chosen target group. This ensures that subsequent evaluation results can be linked clearly to the training's purpose.

Deriving training aims

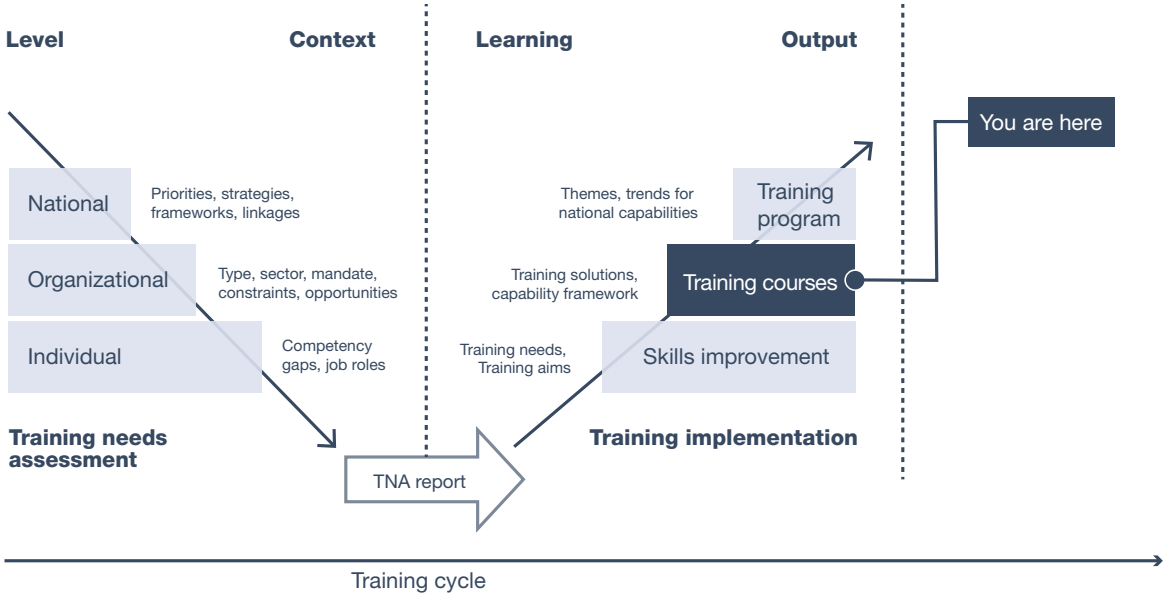
If trainees have ability gaps in areas important to their organization, then the assessment will identify these as competency gaps. If the gaps can be solved with training, then the assessor will define training needs to improve the abilities in the competencies and reduce the competency gap.

The training needs directly lead to the training aims and objectives. The assessor phrases a training aim as the training's goal or purpose. This aim is the response to the training need that was identified during the training needs assessment's analysis stage. The assessor also gives an overall objective, which is a short, pragmatic statement about what trainees will receive to achieve the aim(s).

Target group

The training needs assessment identifies the potential people who require training, because the training provider needs to know which type of trainees to design the training for. Defining the target group at an abstract level (for example, senior managers, contract lawyers or technology transfer offices) and including the group's experience level (because the design depends on their level of existing knowledge) is useful.

The training need, aims and objectives, and target group go hand in hand, because the target group is made up of the people who have inadequate competencies. They are also the individuals who the training is designed for. For the training to be successful, the target group must achieve the outcomes relating to the aims and objectives.



3.11 Training solution

The term "training solution" recognizes that many possible approaches can satisfy training needs. This section introduces some of the most relevant topics to assist the assessor in this choice.

First the assessor outlines the training modules required to address the need (as derived from the competency gap analysis). The outline can be transformed into a training course by combining similar subjects or coalescing the target groups. To further refine the training, the assessor can research which training solutions are currently available from existing training providers to see if there is a match with the required training. The final recommendation is the training solution.

For example, a training solution could be a one-day introductory classroom training on product licensing for entry-level staff.

Another could be an online course on IPM offered by a known training provider, chosen because it matches the training need.

Some courses are more applicable in certain formats. For example, online courses make access easy. The assessor can search available training providers (including WIPO).

Once the assessor selects the training subject, they have many choices for format, location, level, participants and so on. The information to inform these choices was gathered during the training needs assessment.

It is important to capture as much relevant information as possible in the training needs assessment to make the training a success, especially prior knowledge of the organization's culture, issues and needs.

The training solutions we mention are by no means an exhaustive list but more of an introduction for the assessor to suggest to the training provider the most appropriate training routes. The training provider's role is to take forward the detailed training design, planning and implementation based on the assessment recommendations. Read more on this topic in **Appendix A**.

Many training solutions exist, and the assessor needs to judge which is most appropriate for the training need. The assessor is likely not a training expert, so we have provided some rules of thumb to aid these decisions.

These solutions indicate what the training's purpose is, who it is for and why the participants have been chosen. The intent is to guide the training provider through the training selection and design process. The aims and solutions are merely suggestions; the training provider may prefer an alternative solution based on their expertise.

Because the assessment gathers information on existing training solutions, it can be used as a mapping exercise for future assessments. Linking future training needs to existing training providers could prove a valuable resource.

The assessor should include other recommendations borne from the interviews and observations in addition to the competency gap conclusions.

Training selection: Existing or custom?

A course can be an existing product ("off the shelf") or designed specifically for a required training need ("tailored" or "customized" training, which adapt a course to fit a certain situation).

The choice of which to use depends on a number of factors: Do the course's aims and objectives match the required ones from the training needs assessment report? Does the format and methodology

meet the training needs assessment recommendations for effective training and other considerations, such as previous evaluations of existing courses' quality? Are the course logistics suitable for trainees? What is the training provider's reputation and cost?

Newly designed courses are often appropriate if the subject area is new (such as a newly introduced technology).

If the training needs to address internal processes particular to the organization, a **tailored training** may be best.

Training design
The training aim is broken down into specific sessions during the design, with goals and learning outcomes for each session. The phrasing is crucial because it relates to the evaluation methodology that checks what trainees have achieved during the training compared to the training's intent (defined by the aims and objectives).[10]

The training needs assessment report is not meant to go into great detail, but it should provide enough information to point to the best solution and enable the best training choice.

Consider the following factors to ensure that the training solution is the most effective choice.

Format
Training comes in many formats, such as online courses and classroom learning. Some training solutions are based on coaching or mentoring individuals rather than formal training practice. Coaching techniques are also sometimes used within training courses.

Delivery methodology
The way training is delivered affects how well trainees learn. Workshops work well for experienced trainees, because they can discuss from experience and explore new approaches. Participatory training approaches empower trainees to share and contribute, increasing the synergy in the training room. Lectures are useful for disseminating technical information and theory.

Consider briefly explaining why you chose a particular methodology so the assessment links to the training program, which can then be evaluated at the end of the training cycle.

The method should be thoughtfully chosen and be part of the training design; this is outside the training needs assessment's scope. However, the assessor may gain insights into appropriate solutions during the assessment and provide suggestions to approaches that could work well. Part of the consideration is which techniques work well in the culture of both the organization and country (for example, some participatory training techniques may not be culturally appropriate).

Some of the most important training options include the following.

Table 1: Online/classroom training comparison

	Face-to-face/classroom		Online/distance learning	
Options	Trainer-led, presentations, case studies, group work, discussion		Webinar (audio), virtual conferencing (video and audio), Moodle, self-learning, breakout groups, redesign may be needed, online design specialists	
Area	**Advantages**	**Disadvantages**	**Advantages**	**Disadvantages**
Logistics	Training centers can organize easily	Expensive (travel and accommodation), time consuming	Availability of software apps, global access	Internet and computer skills needed
Methodology	Participatory interaction, informal learning	Facilitation needed	Learning software and learning management systems available	Concentration; shorter sessions needed spaced out over days
Health measures	Access to first aid and to office fire and safety measures	The need for social distancing and health measures in times of pandemic	Home health risks	More Isolated

Online courses

The principles for designing a training solution remain the same for online courses and classroom (or "face-to-face") training, however, the training provider can choose from several different methodologies.

Classroom trainings and online trainings each have their advantages and disadvantages. The following table compares these.

Online courses are easily accessible, can include many participants at once, are relatively inexpensive because they have few logistical costs and are easy to administer (often through a learning management system). These distance-learning systems can vary in type, from live courses with tutors and other participants to predetermined downloadable content for self-study.

Good examples of online courses incorporate different learning styles, intermediate tests and quizzes and online certification.

However, sometimes the dynamic interaction of an in-person workshop or participatory training is lost.

Classroom courses

This well-known format, also known as face-to-face courses, involves the trainer and participants in the same room. The course design should incorporate different learning styles (blended learning) to maximize impact. Participatory training uses techniques for group interaction to increase motivation and allows for participants to learn from one another. Workshops are formatted as facilitated sessions, where the instructor draws on participants' expertise to form the solutions. This option works best with more experienced participants and trainers.

During the COVID-19 pandemic, online courses have become the norm to maintain participants' safety.

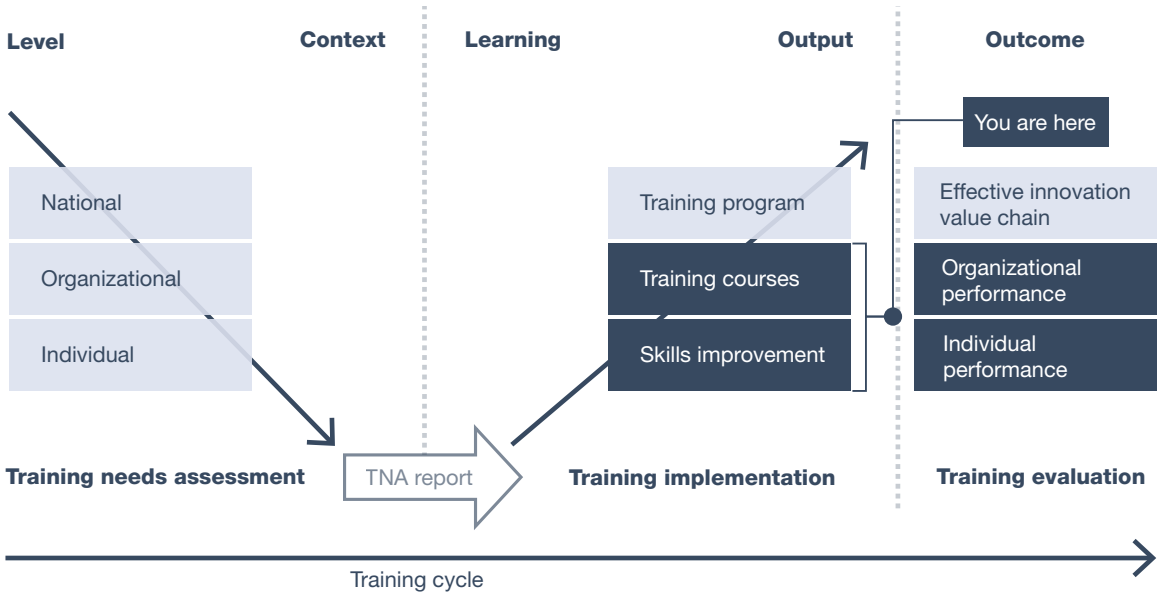
We recommend that the assessor further research online courses as an option.

For more information about designing an online course, see **Appendix A**.

Note: High-level workshops should include senior participants only, because they will bring their experience to the discussions. For training in fundamental principles, a mixed group in terms of experience can encourage learning through informal coaching.

Many guides cover classroom training design and include details such as seating layout arrangements to maximize the learning.

For more information on delivery methodology, see **Appendix A: Further reading**.



3.12 Training evaluation

Training evaluation involves gathering information to make decisions about training activities. It also establishes training activities' merit to determine if a training should continue, change or be discarded. Evaluation provides decision-makers with useful information that can cover improvement in trainees' abilities as a result of the training or the training's effectiveness in achieving organizational change.

The training provider should have an evaluation system in place for courses. However, for an overall program (at the national level, for example), training providers may use different systems, and the program as a whole might benefit more from a different evaluation system. For example, one that evaluates how the overall training intervention enhances the innovation value chain.

The evaluation system's design goes hand in hand with the training's design and can include feedback systems that measure how effective the training delivery has been (which is especially relevant for pilot courses) as well as evaluations on the organizational change that the training intervention seeks to achieve.

The assessor needs to be aware of this important process when working on the training needs assessment, but the detailed evaluation design will probably be undertaken in the training design stage.

3.13 National picture

So far, the training needs assessment's results indicate the competency gaps and capabilities for a particular organization,

For more information on specific texts to evaluate training, see **Appendix A: Further reading**.

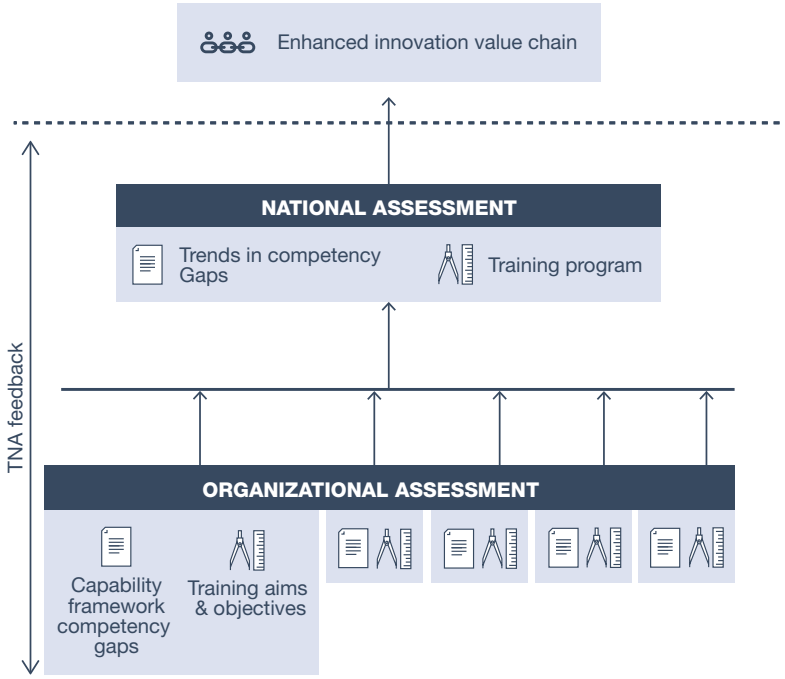
Note: The evaluation of this manual and toolkit is covered separately in **Section 3.9.1: Improvements to the training needs assessment manual and toolkit**.

If the evaluator is the same person involved in the assessment, planning and delivery stages, then they can maintain continuity throughout the process and incorporate the lessons learned in the next iteration of the program. See **Section 3.1: Stakeholders in the training needs assessment and training implementation process**.

The data gathered in the evaluation should record the number of trainees and the number of evaluation responses.

We recommend mentioning the evaluation during the training course so participants can expect to respond.

Figure 16: Deriving the national picture



but its likely overall purpose is to produce a national picture. **Figure 16** shows how this national picture is built from the different organizational assessments' results.

Once the training needs assessment has been conducted for multiple organizations, the results can be scaled up to provide a national-level recommendation. The combined results indicate national trends in competency needs and where common training themes and areas of weakness appear across organizations. The decision maker can then recommend a comprehensive training or capacity-building program with multiorganizational participation.

Senior managers must make many strategic, high-level choices (especially at the national level), such as whether to target the training to the majority of employees or target those with the weakest skillsets. The assessor should present these various options and recommendations in the training needs assessment report.

3.14 Risks

Use a risk-management process[11] in your programs and projects for maximum effectiveness.

Step 1: Identify the risk
Uncover, recognize and describe risks that might affect the project or its outcomes.

Step 2: Analyze the risk
Determine each risk's likelihood and consequence. Develop an understanding of the nature of the risk and its potential to affect project goals and objectives.

Step 3: Evaluate the risk
Determine the risk's magnitude, which is the combination of likelihood and consequence. Decide whether the risk is acceptable or if it is serious enough to warrant treatment.

Step 4: Treat the risk
Assess the highest-ranked risks and make a plan to treat or modify them to achieve acceptable risk levels. How can you minimize the probability of the negative risks as well as enhance the opportunities? Create risk mitigation strategies, preventive plans and contingency plans.

Step 5: Monitor and review the risk
Use the project risk register[12] to monitor, track and review risks.

Risk is about uncertainty. If you put a framework around that uncertainty, then a project is effectively de-risked.

Many potential risks could affect the training cycle, especially in the implementation stage.

For the training needs assessment process, which heavily relies on the assessor's engagement with people in the targeted organizations, the following risks could occur.

Table 2: Training needs assessment risks

Risk	Likely scenario	Mitigation
Lack of data	Participants did not complete the survey forms	Assessor uses other sources of information, such as interviews and observations
Quantitative results do not match qualitative	Management suggested training needs that vary from the gap analysis	Discuss results with the management focal point/group
Limited knowledge of terms	Participants don't understand terminology and process	Introduce both the process and the different terms to all parties many times
No training implementation occurs	The training needs assessment raised expectations that a training program will occur	Clarify the next steps

Part II. The training needs assessment in practice

4. Training needs assessment toolkit: Tools for the training needs assessment process

Now we can combine how the training needs assessment works (the five training needs assessment process steps, the stakeholders involved and assessment methods) within the overall program "staircase" framework.

4.1 Applying the training needs assessment process in a targeted organization

When the training needs assessment process is applied to a targeted organization, the order of assessment activities is as shown in **Figure 17**.

The organizational survey provides the data from a management perspective, and the individual survey shows the personnel perspective; both are necessary to map competence. The assessor oversees the entire process by managing the survey, results, analysis and conclusions.

The organizational focal point and project advisory group (if applicable) enable the process, with the survey participants carrying it out.

The final report provides recommendations for training solutions, which the training provider will implement. The assessment's core is the capability framework, which measures competency gaps. However, other important information is also gathered on the organization and individuals to inform the training need.

4.2 Toolkit list: Survey forms and tools

List of tools and forms

Gathering information

Tool 1: Assessor's training needs assessment checklist

– Introduction: setting up the survey (a reminder list of activities that the assessor needs to organize with stakeholders).

Figure 17: Training needs assessment process: Assessment within the targeted organization

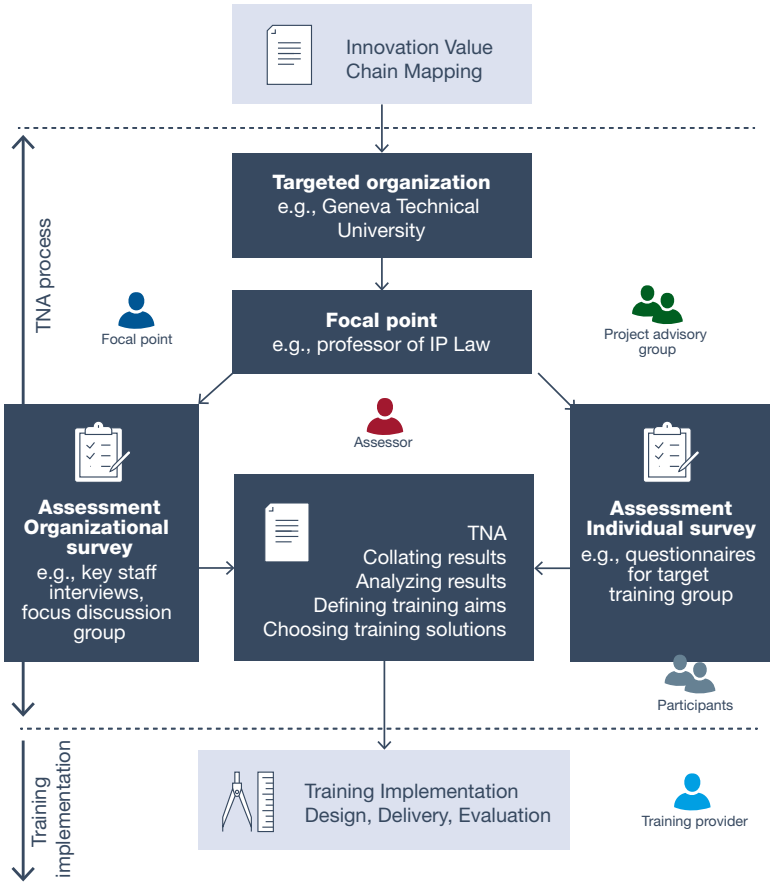
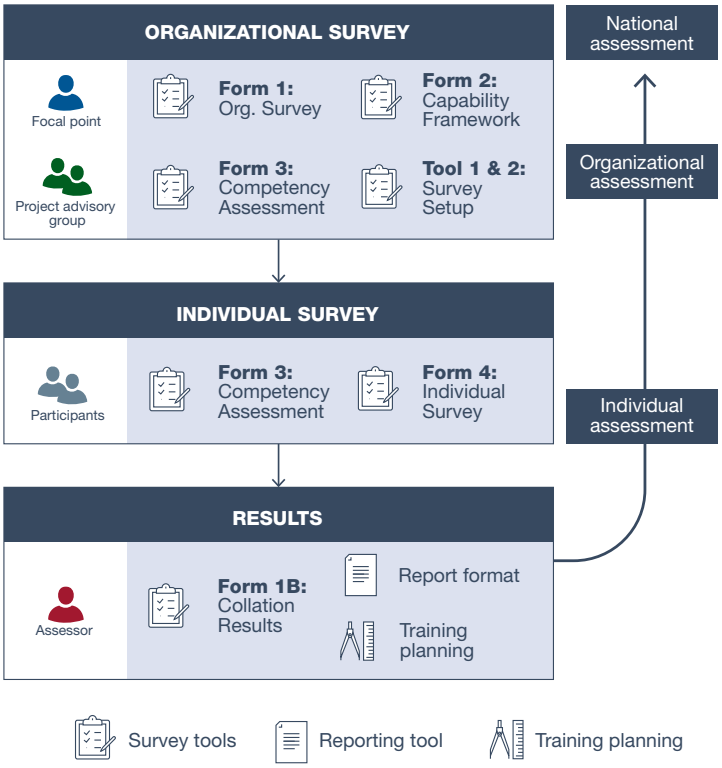


Figure 18: Training needs assessment toolkit



Forms suffixed "A" are examples of completed forms.

Forms suffixed "B" are used to collate the completed forms' results into one master sheet.

We highly recommend introducing and distributing the organizational survey forms to the participants prior to their interviews. If the assessor needs to clarify the results, they can arrange follow-up interviews or discussion groups.

The tools and forms fit the training needs assessment process outlined in **Section 3: Training needs assessment process guide**.

If the forms confuse the assessor, they can reference examples of completed forms in **Section 5: The training needs assessment in practice: Step-by-step toolkit example** and **Section 6: The training needs assessment in practice: Step-by-step training needs assessment reporting example**.

This manual provides a comprehensive list of tools and recommended processes to carry out the training needs assessment. The assessor should select and adapt the tools and processes to fit an organization's actual context. To make an effective training needs assessment, bear in mind the respondents' availability and commitment.

Tool 2: Briefing note – introduction of the training needs assessment to the focal point
- Prepares the assessor for the initial conversations with the focal point.

Tool 3: Briefing note – introduction of the training needs assessment to individual respondents
- Prepares the assessor to introduce the surveys to the individual participants.

Form 1: Organizational survey
- Background information on interviewee (participant).
- Organizational role in technology transfer.
- Job roles and target groups – who needs training?
- Existing sources of training.
- Professional development – what exists and what is needed?
- Training design – which methods work best?
- Last questions.

Form 2: Capability framework
- Defining the competencies needed.

Form 3: Competency assessment
- Prioritizing the importance of the competencies.
- Ranking the ability in the competencies.

Note: For ease of use, we've included the assessment survey forms on the accompanying Excel spreadsheet.

All tools are available in **Appendix E: Survey tools and forms**.

We suggest sending the questionnaire forms via an online survey (or email) for ease of access and collation. (Printouts could be used if there are email issues).

How the organizational survey fits within the training needs assessment process was described in **Section 3.5: Organizational survey**.

Forms 1A, 2A, 3A and 4A are the examples used in **Section 5: The training needs assessment in practice: Step-by-step toolkit example**. We explain the radar chart in **Section 3.9.2: Analysis of results**.

The tables for analyzing data and for the training needs assessment recommendations appear as examples in **Section 6.2: Example of a training needs assessment report**.

Organization sample size: An estimate could be to select four organizations from each of the four groups (IP funders, developers, managers and users) for the training needs assessment.

Literature review: The assessor starts the background research while identifying the key organizations and continues the research after selecting an organization. This does not link to a specific tool, but the areas to cover are detailed in **Section 3.3: Assessment methods**.

Form 4: Individual survey
- Participant's role and experience.
- Competency assessment reminder.
- Constraints, professional development and future needs.
- Training needs and training design.
- Last questions.

Collating data
Form 1B: Organizational survey
Form 2B: Capability framework
Form 3B: Competency assessment
Form 4B: Individual survey

Analyzing data
Radar charts
Table 4: Competency gap analysis

Training needs assessment report
Figure 19: Reporting sequence
Table 5: Deriving training aims and objectives
Table 6: National-level training needs
Table 7: Example risk report

4.3 Tools for each assessment level

The assessment interacts with the national, organizational and individual levels (as shown in the staircase framework and **Figure 18: Training needs assessment toolkit**). The assessment is typically a survey for the organizational and individual levels. The national-level assessment is then deduced from these earlier results; however, interviews at the national level can form part of the assessment.

Using standard forms is advantageous because they provide for consistent data collection and analysis and remain relevant, given that the organization tailored them.

Using the training needs assessment process described earlier, this section details how the specific tools work and provides examples for each.

National assessment
Consider using informal interviews based on the organizational surveys with national-level stakeholders. This way you have informed opinions supplementing the results from the individual and organizational surveys (for example, interviews with technology journalists, ministers for science and so on).

The country expert or assessor typically identifies potential organizations during the national-level innovation value chain mapping exercise. Additionally, the organizational survey forms include questions about organizations' roles within the value chain.

Organizational assessment
For organizational performance, the assessor, working through the focal point (with approval from the project group, if required), interviews the manager(s), who represents the organizational viewpoint.

Organizational survey
To organize the survey, the assessor and focal point set up and brief the target person or group to schedule the one-on-one interviews using a suitable quiet office (or virtual connection). The questionnaires should be distributed to interviewees beforehand so they know what to expect and to ensure that they complete and submit the questionnaires on time.

As a reminder, both the assessor and focal point decide whether a project advisory group is beneficial and, if so, how it would be composed (in most cases, such a group is not necessary, unless the organization's scale warrants it). The assessor and focal point/ project advisory group then complete the following activities:

– Agree on the assessment's scope.

– Tailor the methodology to fit and set up the target groups for interview/questionnaire response.

Survey checklist: Tool 1
This serves as a reminder list of the activities that the assessor needs to organize with the focal point when setting up the surveys.

Briefing note to focal point: Tool 2
This narrative tool assists with the assessor's introduction and explanation to the focal point about the training needs assessment process and how the survey will work.

Organization survey: Form 1
An interview questionnaire serves as the basis for the semi-structured interview. This questionnaire is tailored for the technology transfer sector, and the assessor can adjust it to meet the assessment's needs.

Capability framework: Form 2
The capability framework form complements the interview questionnaire. This form lists the themes and detailed competencies associated with the technology transfer process and is derived from best practice examples.[13] The survey respondents provide their interpretations of the capability framework that fit their organization's function.

Competency assessment: Form 3
The tailored capability framework is then used with the participants both for the organizational survey group and later in the individual survey. This competency assessment asks the participants to rank the importance of the provided competencies and to rate their own competency levels. For the organizational survey, the representative group would take a management perspective in rating the employees in the training target groups (that is, rate them generally rather than specific to individuals).

For both the organizational and individual surveys, the questions on competency boil down to the following:

– What does this person need to do in their daily work? Both now and in the future?

– What are these competencies? How well does the person have these required competencies?

– Which improvements would help this person perform their duties?

These are the training needs assessment fundamentals that inform the basis of the training selection.

Within the organization, the assessor must select a sample size that represents the training target group.

Use the Raosoft sample size calculator to determine an appropriate sample size.

Note: The survey target group (training needs assessment participants) could become the target group for the training program (trainees), depending on the conclusions reached during the results analysis and report recommendations.

If the assessor knows specific names of trainees, it will benefit the training operationalization, but in practice, the names are normally added at a later stage.

Individual assessment
For individual performance, the assessor determines with the focal point which people are most relevant to survey. This could cover a wide range of job functions in the technology transfer process. The training needs assessment participants then answer a similar set of questions as those for the organizational survey but more focused on their roles and viewpoints of fulfilling the roles.

Briefing note to participants: Tool 3
This narrative tool assists the assessor in introducing and explaining how the survey will work to the individual participants.

Individual survey assessment: Form 4
The individual survey group receives this prepared set of questions. The assessor and the focal point determine the most effective way to manage the forms' engagement, distribution and collection. This may be supplemented by sample interviews with participants.

Competency assessment: Form 3
Using the organization's competency framework established in the previous survey (which now has an updated, tailored list of relevant competencies), the participants rank the importance of each competency to their own job roles as well as rate their own competency level. This is crucial information, because the training needs assessment's point is to establish the gaps in competency to inform the training solution.

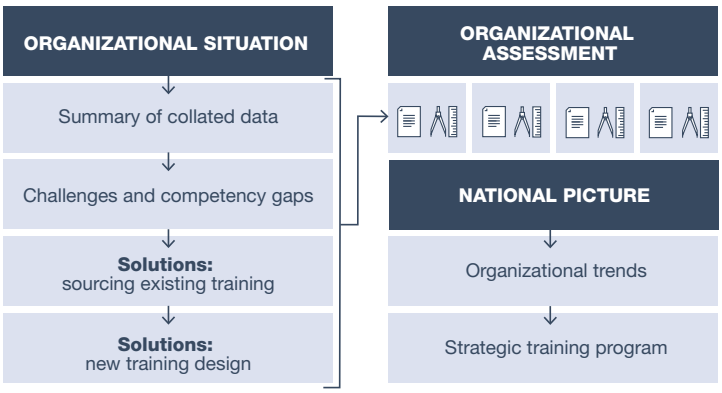
4.4 Training needs assessment report

Scaling up to the national training program was shown in **Figure 16: Deriving the national picture.**

The reporting structure follows the assessment process in that it builds from the assessments to give an organizational picture. The assessments from multiple organizations scale up to provide the national outlook.

Collating results
After the interviews are conducted, the completed individual questionnaires received and the assessor's observations noted, then the results can be collated. Although the assessor may include all

Figure 19: Reporting sequence



the received forms for records in the final report's annex, a summary sheet must inform the trends and conclusions.

Collation of results: Forms 1B, 2B, 3B and 4B
Collation forms help the assessor compile the data. These forms are modified from the original survey forms for easy compilation. The assessor reads through the collected forms and summarizes the results in the report. In the original form format, the collation forms show the common trends in responses.

We've provided an adapted version of the survey forms as the collation summary sheet in a prefilled format that can easily be adapted. As we see from these collation forms, at this stage, the assessor is summarizing and paraphrasing the raw data to make the results briefer and clearer.

Include the raw data (received forms) in the report annex.

Note: The capability framework Form 2B is then used as the template for the competency assessment.

This step (analyze data), relates to step 4 of the training needs assessment (refer to **Figure 8: The five steps of a training needs assessment**) and was introduced in **Section 3.9.1: Collation of results**.

Analysis of results
Competency assessment: Form 3B
This form collates all the results for the competency assessment. The radar charts for competency gap analysis can be generated directly from this form.

The example in **Section 6: The training needs assessment in practice: Step-by-step training needs assessment reporting example** uses **Table 4: Competency gap analysis** to assist in the analysis of results.

Recommendations
The training needs assessment reporting format detailed in the toolkit section leads the assessor through the reporting process outlined in **Section 3.7.3**. **Figure 19** shows the report sequence. The report summarizes the training needs assessment (the collated data, the situation, challenges and competency gaps). The assessor makes recommendations for the next steps in the training cycle (that is, the training needs, training aims and objectives). Tables within the report demonstrate how to derive the training aims and objectives, recommend the training solutions and indicate how the national recommendations can be construed.

The report concludes with proposed solutions, which courses can be sourced from existing providers and where new training designs are necessary.

These steps (analyze data and provide feedback), relate to steps 4 and 5 of the training needs assessment (refer to **Figure 8: The five steps of a training needs assessment**). The report structure is shown in **Figure 19: Reporting sequence**.

Within the report example, **Table 5: Training aims and objectives** shows how to derive the training aims and objectives as well as the ultimate training solutions. **Table 6: National-level training needs** shows how to construe the national-level training program. **Table 7: Example risk report** shows an example of the risk report.

5. The training needs assessment in practice: Step-by-step toolkit example

The example forms are suffixed A (for example, Form 1A, 2A, 3A and 4A).

Figure 16: Deriving the national picture shows the survey's running order, and the collation and reporting tools applied to the assessment order are shown in **Figure 14: Sequence of the survey**.

These tools are provided in **Appendix E: Survey**.

The training needs assessment now proceeds in a practical manner. This section covers setting up and carrying out the surveys.

The participants receive four survey forms. The prefilled examples are used in this section to demonstrate the training needs assessment in action.

We explain how to gather information using these tools and forms in sequential order.

5.1 Tools for setting up the survey

Introduction: Setting up the survey
Tool 1: Assessor's checklist for the training needs assessment
This is a reminder checklist for the assessor and focal point that covers who is involved in the survey and what has to be set up.

Tool 2: Introduction of the training needs assessment to the focal point
This narrative assists the assessor in introducing the assessment to the focal point.

Tool 3: Introduction of the training needs assessment to the individual respondents
This narrative assists the assessor in introducing the assessment to the individual survey participants.

5.2 Organizational survey: Form 1

Background information on the interviewee (participant) (questions 1–6)
This form covers basic information about who is being interviewed – their name, role, qualifications and experience are useful to source the collected information and may be referred back to if necessary. There may be trends in the answers, depending on unit and the participants' professional capacity.

FORM 1: ORGANIZATIONAL SURVEY	**Read preamble in Section 5; refer to figure 14**
Structured discussion **Background data**	
1 Name of organization/unit	
2 Date of discussion	
3 Name of interviewee	
4 Job title	
5 Qualifications	
6 Summary of work experience	*(Expand on a separate sheet if necessary.)*

Organizational role in technology transfer (questions 7–15)

Questions 7–9 are a snapshot of the organization's role in technology transfer. Knowing if capabilities, gaps and training needs vary with organization type and/or the industrial sector that they support is useful. This information can then be highlighted in the training needs assessment recommendations (for example, the information technology center sector may have more need for their employees to understand the patent process than other sectors).

Organizational role in technology transfer

7	Purpose of organization	Funders ☐	Developers ☐	Managers ☐	Users ☐
	Description	*Other*			
8	Type of organization	*(e.g., university, TTO)*			
9	Sector	Agriculture/ food ☐	Biotech ☐	Consultancy ☐	Electrical & semiconductor ☐
		Health care ☐	ICT ☐	Research ☐	Education ☐
		Other			

Questions 10–15 further investigate technology transfer within the unit or organization. Here the assessor uses the standard questions as a starting point for discussions, expanding as needed to understand this role. As we mentioned earlier, this information may already be available in more detail if the assessor has conducted an innovation value chain mapping exercise.

	Interview questions	Current state		Future needs (F)	
10	Which technology transfer services does your organization provide?	*(Expand on a separate sheet if necessary.)*	10 F	Which technology transfer services does your organization need to provide in the future? When?	*(Expand on a separate sheet if necessary.)*
11	Which units are directly involved in the innovation value chain?	*(Expand on a separate sheet if necessary.)*	11 F	What would the new organizational structure look like to meet this need?	*(Expand on a separate sheet if necessary.)*
12	Describe the process of technology transfer within your organization.	*(Expand on a separate sheet if necessary.)*	12 F	Any changes planned to the technology transfer process?	*(Expand on a separate sheet if necessary.)*
	External interactions				
13	Which external organizations does your organization interact with in technology transfer?	*(Expand on a separate sheet if necessary.)*	13 F	And in the future?	*(Expand on a separate sheet if necessary.)*
14	What is the nature of this interaction?	*(Expand on a separate sheet if necessary.)*	14 F	Any change from the current interaction?	*(Expand on a separate sheet if necessary.)*
15	What current challenges does technology transfer face?	Policy ☐ Compliance ☐ Skill shortage ☐ Funding ☐ *(Expand on a separate sheet if necessary.)*	15 F	What are the future opportunities?	*(Expand on a separate sheet if necessary.)*

Note: This section separates the current situation and future situation to differentiate between training needs that address the competencies that would fulfill the organization's current obligations with new competencies required for future strategies.

Job roles and target groups – who needs training? (questions 16–22)

Here we again see the questions split into the current needs and future needs (that is, equivalent question numbers with suffix F for future). Form 2 defines the capability framework, and Form 3 carries out the competency assessment. This set of questions focuses on the job roles, gathers job descriptions and takes an early look at the target groups to determine whether trainees' experience should be differentiated in the target group.

Existing sources of training – what is available? (questions 23–26)

Section 2.1: definition of terms introduced the concept that many barriers prevent capacity development outside of providing a good training program. Here questions investigate which barriers prevent effective training, such as funding, work pressure, management buy-in and accessibility.

Interview questions	Current state		Future needs (F)	
Job roles				
16 List the key positions involved in the innovation value chain.	*Obtain job titles*		16 F List which positions will be needed	*Obtain job titles*
17 Provide job descriptions (TOR).	*Obtain job descriptions*		17 F Provide new job descriptions, if available	*Obtain job descriptions*
18 Do the job descriptions reflect the duties required? Elaborate.	*Comment*			
19 Does the competency framework reflect technology transfer in your organization? Fill in Form 2.	*Adapt competency framework*		19 F Additional skills for future needs	*List skills*
20 Prioritize the competencies and abilities. Fill in Form 3.	*Rank the skills by priority and ability to perform*		20 F Rerank for future	*Suggest future trends*
Target groups	*Follow the identified prioritized skill gaps*			
21 Which target groups require skills improvement, and which skills?	*List target groups and skills (opinion to compare results)*		21 F Future target groups?	*As a result of strategy*
22 Should the target group differentiate experience/seniority?	*Refer to the three seniority levels in Section 4.6 and Q11 on Form 4*			

Training needs				
23 How do TTPs gain the skills they need?	*List professional development, learning and training routes*			
24 What training or learning does your organization offer?	*Indicate company-offered trainings, formats and subjects*		24 F Plans to offer training	*To align skill improvement with strategy*
25 Describe any restrictions on uptake of training.	*(e.g., funding and support from line managers)*		25 F What else needs to be put in place?	*Funding, support from management*
26 Are there other readily accessible training sources?	*(e.g., a partner university; which format and subject?)*		26 F Future training that is needed	*Internal or in other institutions*

Professional development – what exists and what is needed (questions 27–32)

The assessment explores the possible routes for professional development and whether the participants feel that a professional development route is important for those working in technology transfer. The assessment may also support career routes, which is a wider category for professionals and the organization's HR policy.

Training design – which methods work best? (questions 33–38)

Once a training solution is selected (the training needs assessment's whole purpose), we can focus on other considerations to make the training successful.

Although the training lies beyond the training needs assessment and forms, in the next part of the training cycle process (training design and delivery), the training needs assessment needs to pick up relevant information to inform the planning stage (**see Section 3.6** for more on how to deliver training plans).

Last questions (questions 39–42)

The last questions recap the training needs assessment's overall purpose and give the participant a chance to add anything else as well as reflect on their priority area that the training should address. This is included as a check so the most important subject areas, skills and people are not missed somehow in the detail of the competency-based approach. Both areas should match but are included for thoroughness.

5.3 Capability framework: Form 2

Defining the competencies needed

The capability framework's purpose is to define which competencies the personnel have and need to carry out their duties (job functions). The participants can then rank and prioritize the competencies in terms of importance and performance ability. This occurs in the next step, when the competency assessment (Form 3) uses the results of Form 2 (the defined framework) to home in on this information.

Professional development

27	Is training certified or accredited?	*(Expand as necessary)*
28	Is there a professional development route for TTPs?	*(Expand as necessary)*
29	Are there sources for CPD (continuing professional development)?	*(Expand as necessary)*
30	Do staff follow formal higher-education courses in TT-related subjects?	*(Expand as necessary)*
31	Do staff follow any WIPO Academy courses?	*See Appendix B*
32	If so, what is the feedback?	*(Expand as necessary)*

27 F	Does it need to be?	*(Expand as necessary)*
28 F	Is it important to have a professional development route?	*(Expand as necessary)*

Training design

What type of training would be most effective?

33	Format	Classroo	Online	Distance learning	Mentoring
		☐	☐	☐	☐
		Other (70:20:10, shadowing)			
34	Language				
35	Location				
36	Learning style	*Participatory, discussions, simulations, case*			
37	Logistics/administration Factors	*Training rooms, resource persons*			
38	Other				

Last questions

39	Is there anything you would like to add?	*(Expand on a separate sheet if necessary.)*
40	What is the **most** important thing to improve in the innovation value chain?	*(Expand as necessary)*
41	What are the **most** relevant groups to benefit from a training program?	*(Expand as necessary)*
42	How large is the target group for training?	*Number of potential trainees*

In the following example (Form 2A), the organizational focal point is the participant, and they agree with many of the provided competency definitions. However, they note some variances to the core competencies; in the university environment, the theme "organizational administration" and "university governance and ethics" are commonly used instead of "governance and project management," and there is a cross-cutting area, "appropriate technology for developing partners" that is a better fit than "culture and relationships."

FORM 2: CAPABILITY FRAMEWORK **Read preamble in Section 5; refer figure 14**

Fill in for organizational survey; use results for individual survey

Organization name	
Number of employees	

Capability framework

Core competency (theme) Template	**Organization version** *Fill in here*	**Detailed competency (skill)** Template	**Organization version** *Fill in here*
Strategy and business acumen		Strategic thinking	
		Business skills	
		Commercial awareness	
		Marketing and promotion	
Entrepreneurial leadership		Entrepreneurial	
		Fundraising	
		Negotiation	
		Developing new ventures	
Effective engagement		Communication	
		Collaboration	
		Influencing	
		Applying social media	
		Engaging with industry (SMMEs)	
Legal and technical knowhow		Legal	
		IP protection	
		IP management	
		IP tools (define)	
		Licensing	
		Domain knowledge	
		Compliance	
		Infringement monitoring	
		Information technology	
		Contract writing	
Technology commercialization		Technology evaluation	
		Knowledge of technology types	
		Start up, set up and spin out	
Governance and project management		Project management	
		Knowledge management	
		Governance	
		Administration	
		Knowledge transfer	
Culture and relationships		Customs and beliefs	
		Indigenous knowledge	
		Teamwork	
		Relationship building	
		IP application in developing, emerging and least-developed countries	

This list is compiled from previous frameworks (RTTP, ATTP, KCA, PraxisAuril FTT course, WIPO Project Doc and Stellenbosch University)

In the detailed competency definitions, "financial management" is better known than "business skills." The professor thought that "leadership" was a crucial skill missing from the list and that the area "legal aspects of social media" was a vital skill in the unit's work.

5.4 Competency assessment: Form 3

Prioritizing and ranking the competencies

Form 3's format is to classify the competency skills (defined by the capability framework) according to job function (job title) under the departmental (or unit) heading.

The task for the participant is twofold.

The first task is to prioritize how important the competency (skill) is in relation to the job function. The second task is to rank the job holder's current abilities performing that skill (ability in the competency). Note: Participants can add new competencies to the list if they feel that they are important.

As an example, a professor of IP law, as head of their unit (and the participant in this survey), is filling out Form 3 (the competency assessment). The professor has identified all the staff in their unit (the IP Contract Law Department). This includes two technology transfer offices (more information on their roles is available in the organizational survey).

The professor lists the key skills (obtained from the capability framework) that the technology transfer offices need. This a shorter set of skills than the original framework lists (37 in total), because the technology transfer offices do not use all the skills.

However, the remaining list of nine skills may not all be equally important for the technology transfer office job function, and the technology transfer offices as individuals have varying abilities in these competencies (for example, they might be IT specialists who do not need any further training in this area).

So, the professor ranks the skills by importance to the job role (the ranking is according to the organizational need, not personal need). The scoring system is as follows.

Here the professor places IT as the most essential skill (level 4) for the technology transfer office. Next the professor ranks the technology transfer office's abilities overall in that skill (keep in mind that this is a personal perception rather than a tested reality, however, its purpose is to make a best estimate). The skill level is also ranked on a five-point scale.

Here the professor classifies the technology transfer offices as capable and effective performers (level 3) in IT. Therefore, although the skill is the most important one, the staff members' abilities are already competent in this area.

Thus, the training needs assessment could conclude that there is no training need for IT.

However, the technology transfer offices have unsatisfactory skill levels in "legal aspects of social media," and although this skill is required, the weakness shown could reflect a need for training.

The following image of Form 3A is a simplified example of using the competency assessment. In practice, all the skills are analyzed and training

Prioritize how important the skill is for the job role	
Level 4	Essential
Level 3	Required
Level 2	Nice to have
Level 1	Not important
Level 0	Irrelevant

Rank how good the person is at the skill	
Level 4	Expert; clear strength demonstrated
Level 3	Capable and effective performer in this area
Level 2	Intermediate; could benefit from some development
Level 1	Unsatisfactory; needs significant development
Level 0	Irrelevant

FORM 3: COMPETENCY ASSESSMENT

Fill in for both organizational survey and individual survey

Competency assessment

Prioritize how important the skill is for the job role		**Rank how good the person is at the skill**	
Level 4	Essential	Level 4	Expert; clear strength demonstrated
Level 3	Required	Level 3	Capable and effective performer in this area
Level 2	Nice to have	Level 2	Intermediate; could benefit from some development
Level 1	Not important	Level 1	Unsatisfactory; needs significant development
Level 0	Irrelevant	Level 0	Irrelevant

						Used in individual survey	
Department/unit	Number of staff in this role *(org question only)*	Job role/name of person	Key skills required in this role (see competency framework)	Priority ranking organizational	Ability rating Organizational	Priority ranking individual	Ability rating individual

recommendations would depend on the target group as well as other factors. For example, if IT was a training need, the assessor would further investigate which aspects of IT should be measured.

The form is necessary because competency gaps are specific for job roles and some competencies are more important for a job role than others. If the assessor did not use this approach, then the conclusions would be too generic to create an effective training program (for example, the training needs assessment would identify that IT training was needed, but for whom, and do they already know the subject?).

5.5 Individual survey: Form 4

Form 4 is used for the individual assessment survey.

***Participant's* role and experience (questions 1–11)**
The form includes basic information on the participant and their job role but also covers more on career experience using the classification introduced in the manual in **Section 3.8.2: Professional experience**, because training design is normally tailored according to experience level.

Competency assessment reminder (question 12)
We also remind the participant to complete the competency assessment Form 3, which is the main tool for identifying competency gaps.

FORM 4: INDIVIDUAL

Individual assessment **Read preamble in Section 5.1**
Questionnaire to TNA target g **Read preamble in Section 5; refer to Figure 14**
Background data

1	Name of organization/unit/ department/office	
2	Date of completion	
3	Name of participant	
4	Job title	
5	Job role/function	
6	Please include a copy of your job description.	*Job description included*
7	Do the job descriptions reflect the duties required? Elaborate.	*Comment*
8	How many people work in your department/ office/unit?	
	Your Experience	
9	How many years have you worked in technology transfer?	
10	What is your specialization?	
11	How would you classify your career level as a TT professional?	Early career ☐ / Midcareer ☐ / Senior career ☐ / *See right*

Early career technology transfer professional

Generally, has less than three years of TT experience. Being responsible for one's self; being part of a team but not leading a team; and working within guidelines and policies developed by others.

Midcareer technology transfer professional

Being responsible for a team, such as a project team; leading a project; and using scope for project discretion, judgment and decision-making.

Senior technology transfer professional (very experienced)
Responsible for leading the TTO unit and/or interacting directly with the organization's senior leadership, and being responsible for the overall policy, budget, resourcing and staffing decisions of the unit.

12	Referring to Form 2: Competency Framework, fill in Form 3: Competency Assessment, by ranking the importance of each skill in your role (prioritization). Also rank your own abilities in the skill, based on your own perceptions. Note: This informs training needs rather than a performance evaluation. Add other competencies that you feel are necessary for success in your role.

	Constraints	
13	In your current position, which constraints exist that affect your ability to contribute to the innovation value chain?	*(Expand as necessary)*
	Professional development	
14	Which professional qualifications do you have?	*(Expand as necessary)*
15	Is an accredited (certified) route available for your profession?	*(Expand as necessary)*
16	Do you think it is important to have an accredited professional route?	*(Expand as necessary)*
	Future needs	
17	Is your role changing to meet future needs?	*If so, how?*
18	Which training would match your needs for this?	*List any needed training courses, subjects, formats or lo*
19	Are there any plans to put new training, learning or professional development in place?	*List planned events.*

	Training needs				
20	How do you gain the skills you need?	*List professional development, learning and training routes.*			
21	Which training or learning have you undertaken for your job?	*Indicate training and the year taken, location, format and subject.*			
22	Describe any restrictions on uptake of training.	*(e.g., funding, support from line managers)*			
23	Are there other readily accessible training sources?	*If so, which have you followed?*			
24	Are you aware of WIPO's portfolio of courses?	*(e.g., a partner university; which format and subject?)*			
25	Looking at the competency framework, what is the most important area that would benefit from training?	*(Expand as necessary)*			
	Training design				
	Which type of training would be most effective?				
26	Format	Classroom ☐	Online ☐	Distance learnin ☐	Mentoring ☐
		Other (70:20:10, shadowing)			
27	Language				
28	Location				
29	Learning style	*Participatory, discussions, simulations, case studies,*			
30	Logistics/administration factors	*Training rooms, resource persons*			
31	Other	*(Expand on a separate sheet if necessary)*			
32	How should the training be adapted for different career levels?	*(Expand on a separate sheet if necessary)*			

	Last questions	
33	Is there anything you would like to add?	*(Expand on a separate sheet if necessary)*
34	What is the **most** important thing to improve in your role?	*(Expand as necessary)*
35	What is the **most** relevant group to benefit from a training program?	*(Expand as necessary)*
	Thank you for completing the interview/ questionnaire.	

Constraints, professional development and future needs (questions 13–19)

Questions 13–19 provide participants with the opportunity to share their thoughts about wider issues outside competency mapping. First an open question asks about constraints affecting their work. As we previously mentioned, training solutions may not be available for these constraints; however, they're useful to know about.

The next few questions ask about professional development. These are tailored for individual responses, unlike the organizational questions.

The future needs questions complement the organizational strategic future needs questions and provide individual insight into future training needs.

Training needs and training design (questions 20–32)

These questions explore how training could improve the participant's job performance and which training methods are available. Question 22 may reveal blockages for training, and question 25 repeats a question from the competency assessment, so the most important area is not lost in the survey.

Similarly, the participant may have recommendations for how to best approach training delivery that can be reflected in the training design.

Last questions (questions 33–35)

Last there is space for participants to answer general questions (often in poignant closing remarks). This, in a way, is an entire assessment in three open-ended questions:

- What is important to you?
- If there was a singular training, what should it be on?
- Who should participate in the above-mentioned singular training?

Once the questionnaires are collated, this set of last questions may produce a strong recurring theme, indicating the outstanding training need and relevant target group.

6. The training needs assessment in practice: Step-by-step training needs assessment reporting example[14]

Section 6 continues the examples used in **Section 5**. Using the survey data from **Section 5**, the assessor produces a final report on the training needs assessment process.

The report summarizes the survey results, analyzes the results to identify the competency gaps, defines the training need and recommends training aims and objectives to meet these needs. The report also proposes training solutions and provides useful information to inform the training implementation.

For the report at the national level, the common themes between organizational reports are also made at this time, and national training programs are suggested.

The specific reporting methodology is described in **section 4.4: Training needs assessment report**.

The reporting structure follows the assessment process (see **Figure 19: Reporting sequence**), because it builds on the assessments to give a larger organizational picture.

6.1 Reporting structure

Table 3: Reporting structure

Chapter heading		Information sources	
		Organizational survey	Individual survey
1	**Executive summary**		
2	**Results of the survey**	Form 1B	Form 4B
2.1	Organization selection	Form 1B, part 1 and 2	
2.2	Organization's role in technology transfer	Form 1B, part 3	
2.3	Job roles and target groups	Form 1B, part 4	Form 4B, part 11
2.4	Existing sources of training	Form 1B, part 5	Form 4B, part 14
2.5	Professional development	Form 1B, part 6	Form 4B, part 13
2.6	Training design	Form 1B, part 7	Form 4B, part 14
2.7	Challenges and future needs	Form 1B, part 8	Form 4B, part 13 and 15
3	**Capability framework**	Form 2B, part 9	Form 4B, part 12
4	**Competency gaps**		
4.1	Competency gaps: radar charts	Form 3B, part 10	Form 3B
5	**Training solutions**		
5.1	Competency gap to training need	Form 1B, 2B and 3B	Form 3B and 4B
5.2	Training aims and type of training		
5.3	Training design and delivery		
6	**National picture**		
7	**Risks**		
8	**Annexes**		
8.1	Survey forms	Blank, completed and collated forms	
8.2	Organizational contact details	For the training implementation	

6.2 Example of a training needs assessment report

Here we provide an example of a training needs assessment report following the format given in **Table 3: Reporting structure** for a fictitious case.

Executive summary

The unit is a dedicated support office for technology transfer within the university that has an active role in researching and developing new information and communications technology applications.

The unit's purpose is to support innovation in new information and communications technology applications between the research departments at the technical university and commercial partners within the country.

The unit focuses on providing legal advice and includes legal contract specialists supported by administrative personnel, communications personnel, general management and technology transfer offices. The unit is relatively small (10 staff members). The unit head primarily provides legal advice.

The training needs assessment focused on staff competencies for the unit's current and future needs within the organization's strategy and the national innovation value chain.

The unit has an informal structure and relies on the staff's existing competencies, which primarily lie in contract law. Increase in workload, outdated job definitions and unclear strategy must be considered when choosing training solutions.

The university intends to adopt a more strategic approach to HR in the future; at present, there is little funding or support for training and even less awareness of available professional development opportunities.

Therefore the training needs assessment is timely, and the recommendations aim to address the gaps in skills.

Because new EU legislation will affect the data protection rights of app users within a few months, implementing training in social media law is crucial.

The most important competency gaps identified have been classified according to role seniority within the unit. Some of the training solutions can extend to partners, and at a wider national level could be served by a joint training program.

When only a handful of staff would benefit from a training solution, we recommend using existing training courses (outsourcing). When the whole team would benefit or a new course is necessary (for example, legal aspects of social media), then an in-house tailor-made course is recommended.

We recommend taking the following approaches to training:

- an executive management course for the senior head of unit – partners reinforce the management skills in leading a small business unit;
- a tailored in-house teamwork course for all staff;
- a due diligence course for the department managers and partners to improve compliance;
- an introductory knowledge management course for department managers;
- contract-writing courses for contract lawyers;
- a new legal aspects of social media course for the technical and legal staff, including partners;
- an introductory course in strategic IT for the technology transfer offices; and
- a report-writing course for the communications officer.

These subjects could be combined as sessions in the same course when the target group is the same.

We've provided more details and justifications for the preceding conclusions in the example report.

The national-level conclusions would combine the findings from each of the organizational assessments, taking into account the studies of context, polices, strategies, frameworks and linkages that have been made throughout the assessments and during the preceding innovation value chain mapping exercise.

Results of the organizational survey

Organization selection

The research unit at the Geneva Technical University (GTU) plays a leading role in linking technology transfer in ICT between University researchers and commercial entities in the region.

GTU provides IP management services, enabling commercialization of the latest IT research in the

University's information technology center department by bridging to commercial companies in the region. GTU was surveyed recently as part of an innovation value chain mapping exercise.

Organization role in technology transfer
The University caters to 1,000 full-time undergraduate students, 100 postgraduate students and up to 300 part-time students attending adult education short courses. There are four main departments (Engineering, information technology center, Business Management and Life Sciences) and two support departments (Operations and Finance and Administration). The six department directors form the senior management team and report to the chief operating officer (COO) and executive director (ED). The ED has a small support team. The University also has an external governance board of trustees from both industry and academia.

Job roles, experience and target groups
The research unit is led by the head of the unit, with a manager of operations running the unit, two contract lawyers and two technology transfer offices. The unit is supported by a communications officer, who provides reporting and marketing, and three administrative assistants. Program strategy and budgets are set by the head of the unit with the senior management team and authorized by the COO.

The initial target group is anticipated to be the unit's staff (10 people), as well as key staff in the partner commercial organizations that the unit regularly interacts with in technology transfer (approximately 10 people).

The unit has a broad range of experience – 30% are early career, 40% are midcareer and 30% are senior professionals.

Job descriptions are available for each role, but participants note that the descriptions are two years outdated and no performance management system is in place.

Existing sources of training
The unit does not offer formal training opportunities, although some staff have taken courses on their own initiative. The University may restructure its HR department in the future.

The assessor has researched other available training courses and included them in the recommendations (under training solutions, reporting, part 7).

Professional development
Professional development routes are not widely known. Certain professions have their own professional bodies. Lawyers, for example, are qualified through the European Law Society. The operations manager is qualified by the Project Management Institute.

Training design
The survey notes that training must be job related, that there is an existing training room for 20 people (the target group size) and that the partners should be included. Soft-skills training (for example, teamwork and negotiation) is needed by all staff, but specialist courses are only necessary for the few professionals who work in those subjects. The most important area that participants noted on the assessment is shared knowledge of how each stakeholder works within the innovation value chain, and technology transfer offices are mentioned as the most relevant target group.

The survey participants requested learning support in soft, technical and management skills. This can be tailored to fit their existing and required skillsets; the number of staff is small, so access to existing courses is a good match and an affordable solution. A larger target group could be the technical staff in the information technology center department for awareness or introduction courses on intellectual property management technology transfer.

Challenges and future needs
Participants are interested in professional development; however, the organization's culture does not currently highlight skills that could be improved through training, and receiving funding for training courses may not be likely. Therefore professional development may not be sustainable in both the short and long term.

The University may choose to take a more strategic approach and make its research unit an innovation hub for industry that supports the University's goal to be proactive in business innovation. If it does take this approach, then training would need to play a stronger role.

Capability framework
The definitions in the capability framework reflect the organizational setup and culture. The changes from the standard template are as follows:

– In the core competency definitions, "organizational administration" and "university governance and ethics" are commonly used instead of "governance and project management," and there is a cross-cutting area called "appropriate technology for developing partners" that is a better fit than "culture and relationships."

We have included examples of using the collated data to produce radar charts in **Appendix F: Analysis tools**. The charts are sequenced to show how layers of information can be built up and to clearly illustrate the competency gaps.

The radar charts are made from the collated data in Form 3B and inform the results in the following tables (**Table 4: Competency gap analysis** and **Table 5: Training aims and objectives**).

– In the detailed competency definitions, "financial management" is better known than "business skills." "Leadership" and "legal aspects of social media" were added by the management as vital skills in the unit's work.

Competencies for other future roles depend on the decision to make a new structure in the unit. At the time of the survey, these roles were unknown.

Competency gaps

Competency gap analysis

See the radar charts that pair with **Table 4** in **Appendix F: Analysis tools**.

FORM 2: CAPABILITY FRAMEWORK **Read preamble in Section 5; refer figure 14**

Fill in for organizational survey; use results for individual survey

Organization name	
Number of employees	

Capability framework

Core competency (theme) Template	**Organization version** *Fill in here*	**Detailed competency (skill)** Template	**Organization version** *Fill in here*
Strategy and business acumen		Strategic thinking	
		Business skills	
		Commercial awareness	
		Marketing and promotion	
Entrepreneurial leadership		Entrepreneurial	
		Fundraising	
		Negotiation	
		Developing new ventures	
Effective engagement		Communication	
		Collaboration	
		Influencing	
		Applying social media	
		Engaging with industry (SMMEs)	
Legal and technical knowhow		Legal	
		IP protection	
		IP management	
		IP tools (define)	
		Licensing	
		Domain knowledge	
		Compliance	
		Infringement monitoring	
		Information technology	
		Contract writing	
Technology commercialization		Technology evaluation	
		Knowledge of technology types	
		Start up, set up and spin out	
Governance and project management		Project management	
		Knowledge management	
		Governance	
		Administration	
		Knowledge transfer	
Culture and relationships		Customs and beliefs	
		Indigenous knowledge	
		Teamwork	
		Relationship building	
		IP application in developing, emerging and least-developed countries	

This list is compiled from previous frameworks (RTTP, ATTP, KCA, PraxisAuril FTT course, WIPO Project Doc and Stellenbosch University)

Table 4: Competency gap analysis

Figure	Job role/chart subject	Gap analysis
22	Head of unit: Management perspective	The highest management priorities are leadership, negotiation and contract law. The graph shows that the largest gap between priorities and abilities is for leadership, negotiation and strategic thinking. Strategic thinking is less of a priority for management, and the ability in contract management meets the level required. Therefore this graph indicates that leadership and negotiation are the most important areas to cover. Note: The sample size is only one person, hence, the management and individual results are the same. Be cautious with small sample sizes.
24	Contract lawyers: Individual competencies	Individuals identify a bigger gap in contract writing compared to the organization's view, so there is likely a training need for contract writing. Individuals also identify that they have low ability in legal aspects of social media, although they rate their ability higher than the organization perceives it. Individuals also rate their licensing ability higher than management does. This confirms the management's view that training in contract writing is relevant and needed, as is training for legal aspects of social media.
25	Contract lawyers: Priorities	The organization puts a slightly higher priority on contract writing than the contract lawyers do. The lawyers put a higher priority on licensing and IT, meaning that IT could be a future need, given that the lawyers identified it early on. Contract writing and licensing are both viewed as very important. Because of the varying perceptions, a closer look at the required ability levels may be beneficial.
27	Communications officer: Combined picture	From the communications officer's view, staff has a large gap in reporting ability. In social media, marketing/promotion and communication, management and the communications officer disagree about the ability levels. Perhaps the officer has less confidence in their own ability than the officer demonstrates. Further investigation could be helpful.
28	Administrator: Combined picture	The administrators meet their ability expectations, apart from teamwork, where they have a large gap. To determine the training need, the assessor must investigate what the issue is with teamwork, why it occurs within the administration only and if the issue is strictly internal to the unit or also affects partners. The training need is in teamwork, which is probably applicable to all staff (the graph alone cannot answer this). Further information from the surveys will provide clues about the teamwork training need.

Training solutions

Competency gap to training need

After the assessor collects the survey data, they sort and present the data to highlight competency gaps and areas where staff needs training.

The assessor can combine this task with the interpretations from the rest of the survey information (collated on forms suffixed "B").

If the assessor finds that participants are having difficulty completing forms, then the analysis will be more narrative and based on the discussions and interviews.

Training aims and types

The training aims are phrased to specifically address the competency gaps identified during the assessment analysis.

We recommend using an off-the-shelf training product when available and relevant. For small groups, inventing a new training solution is uneconomic, so existing external courses or distance-learning solutions, if relevant, are a good idea.

Table 5 shows the logical progression from competency gap to training aims to training solution.

The organizational assessment identified a large competency gap in contract writing for contract lawyers. This competency is also an organizational priority, so it needs to be addressed. The training need is written in terms of objectives.

As we can see, a training aim is suggested (the purpose of the course) and a training solution is proposed (an outsourced short course, because contract writing is a commonly known subject).

The **target group** is also given (in this example, two contract lawyers who have midcareer experience).

Training design and delivery

For the example of the contract-writing course, the **training aim** is "writing effective legal documents

Table 5: Training aims and objectives

Role/experience level	Competency gaps	Training aims and objectives	Proposed solution	Target group
Head of unit Senior professional	Leadership, negotiation, strategic thinking	– To reinforce management skills, particularly in weak areas (fundraising, new business ventures, strategy, relationship building)	Outsourced executive management course (3–6 months, either online or in a classroom)	1 unit staff, 4 external partners (total 5 senior managers)
Manager Senior professional	Compliance	– To understand and apply compliance policy and application in the technology transfer commercialization, as run by GTU and its partners	Tailored due diligence short course for in-house delivery	1 unit staff, 5 organizational staff, 9 partners (total 15 managers)
	Knowledge management	– To introduce knowledge management	Outsourced knowledge management short course	1 unit staff, 5 organizational staff (total 6 staff)
Contract lawyers Midcareer professionals	Contract writing	– To write effective legal documents and commercial contracts – To use appropriate legal language – To identify risks in contract clauses – To draft concisely, without ambiguity – To structure and create a logical flow	Outsourced contract writing short course	2 unit staff
	Legal aspects of social media	– To understand new EU directives on social media and how these apply to intellectual property management for social media applications	Newly tailored in-house short course: Legal Aspects of Social Media	6 unit staff, 9 from external partners (total 15 staff)
Technology transfer officers Midcareer professionals	Legal aspects of social media	– To understand new EU directives on social media and how these apply to intellectual property management for social media applications	Newly tailored in-house short course: Legal Aspects of Social Media	6 unit staff, 9 from external partners (total 15 staff)
	IT	– To use ICT at a strategic, tactical and operational level in the value chain	Technology transfer for IT innovation	2 unit staff
Communications officer Early career professionals	Reporting	– To understand the different types of report formats and when, why and how they should be used – To produce clear, hierarchical and logical structures	Outsourced short course on report writing	1 unit staff, 9 organizational staff
Administration officer and assistant Early career professionals	Teamwork	– To manage the behavioral roles that employees take within a team and learn ways to improve team dynamics – To establish personal actions that build and maintain a high-performing team – To communicate the team's vision in an engaging way that encourages buy-in	Custom in-house course on teamwork (two days per month)	(total 10 unit staff)

and commercial contracts" for the **target group** of contract lawyers at the experience level of midcareer professionals. The training provider will need more detail than this, so the main training objectives are as follows. The trainee needs to be able to:

– practice effective legal writing in drafting their contract documents;

– use appropriate legal language in drafting their contract documents;

– describe how to identify risks in contract clauses;

– demonstrate how to draft contacts more concisely and without ambiguity; and

– structure contracts using a logical flow.

Because these are fairly standard aims and objectives for a contract-writing course, the recommended **training solution** is an outsourced short course, (that is, using an existing course from an external training provider). There are only two contract lawyers, which does not justify a dedicated internal course (although, when the national picture is built, this quantity may change).

The best **format** may be unknown at this stage, but the trainees wish to have their writing work assessed, so an element of tutoring or coaching is advisable.

National-level recommendations

The preceding example had so far been used for one organization only. If many organizations are assessed across the innovation value chain, then the national picture becomes clearer. The previous assessment identified that the new directives for social media law are a pressing need, not only for the unit but also its partners. If many organizations also expressed this need, it would indicate a trend, and using a more universal training program would be beneficial. **Table 6** shows an example of extrapolation up to the national level.

Note: The compilation table is merely an aid. Drawing conclusions at the national level also requires studying context, polices, strategies, frameworks and linkages that the assessor has made throughout the assessment and during the preceding innovation value chain mapping exercise.

Table 6: National-level training needs

Organization	Type of organization	Role in innovation value chain	Main training need	Training group	Training solution	Applicable to wider audience?
GTU technology transfer office	University IT research	IT innovation and commercialization Managers of research and development	Executive management	Executive management	Executive course	Yes
			Due diligence	Senior management in compliance	Newly designed course	No
			Knowledge management	Communications manager	Short course	Yes
			Contract writing	Contract lawyers	Short course	Yes
			Legal aspects of social media	Lawyers and technology transfer offices	Newly designed course	Yes
			Reporting	Media and communications officers	Short course	Yes
Swiss Chamber of Commerce	Government	Funders of research and development		*Identified during the organizational assessment*		
Centre for Business Innovation	Private sector	TISC supporting research and development		*Identified during the organizational assessment*		
Science Technology Transfer Network	Nonprofit networking society	Networking for IP and research and development		*Identified during the organizational assessment*		
Amalgamate Ltd.	Private-sector licensing technology	IP management	Technology for licensing	Technology transfer professionals	Offers courses in own software licensing applications	Yes

Risks

Table 7: Example risk report

Risk	Scenario	Mitigation
Small sample size	The unit is small, and the management perspective is smaller	Divide assessment results to check competency gaps
Small trainee group	Only a few trainees require training	Offer training for small groups (an existing course)
Partner perspective is important to verify organizational services and to provide what is required	Training addresses internal needs only	Include partners in the survey, and weigh their opinions accordingly
No training implementation takes place	No funding or little funding inputs for follow-up implementation	Make strategic and funding discussions with a project stakeholder group; maintain focal point and group

Annexes

To build the annex for the training needs assessment results, include all the completed and collated survey forms in the report.

To build the annex for the analysis, include the capability framework, competency table and radar charts.

To build the annex for the contextual review, include the organizational organograms, job descriptions, lists of policies and strategies.

To build the annex for the training solutions, include information on available training courses and professional development institutions.

To build the annex for the training implementation, include the organizational contact details and information on training design, logistics and training providers.

Appendix

Appendix A: Further reading

Capacity development

- *UNDG Capacity Assessment Methodology User Guide* by UNDG
- *Capacity Assessment Methodology User Guide* by UNDP
- *A Collective Approach to Supporting Capacity Development* by UNDG
- *Training Needs Assessment and Training Outcome Evaluation in an Urban Context* by the United Nations Human Settlement Programme (UN-Habitat)
- *Training for Better Cities* by UN-Habitat
- *Training and Beyond: Seeking Better Practices for Capacity Development* by OECD Publishing

Training needs assessment

- *Training Needs Assessment: Methods, Tools, and Techniques* by Jean Barbazette
- *The UNCHR Tool for Participatory Assessment in Operations* by UNHCR
- *Project on Improvement of Local Administration in Cambodia: Manual on Training Needs Assessment* by JICA
- *A Practical Guide to Needs Assessment* by Catherine M. Sleezer, Darlene F. Russ-Eft and Kavita Gupta

Training cycle

- *Training and Development for Dummies* by Elaine Biech
- *The Adult Learner* by Malcolm Knowles
- *Evaluating Training* by Peter Bramley
- *Facilitation Skills* by Frances and Roland Bee

Relevant online resources

- Professional development by CIPD
- Training Journal
- *E-Learning Methodologies: A Guide for Designing and Developing E-Learning Courses* by FAO

Technology transfer

- *Enhancing Implementation of Technology Needs Assessments: Guidance for Preparing a Technology Action Plan* by UNEP DTU
- *Transfer of Technology and Knowledge Sharing for Development: Science, Technology and Innovation Issues for Developing Countries* by UNCTAD
- *Global Perspectives on Technology Transfer and Commercialization* by John Sibley Butler and David V. Gibson
- *A Macro Perspective on Technology Transfer* by Allan C. Reddy

WIPO references

- *Project on Intellectual Property Management and Transfer of Technology: Promoting the Effective Use of Intellectual Property in Developing Countries, Least Developed Countries and Countries with Economies in Transition Proposed by South Africa*

Appendix B: Existing training courses in technology transfer

This section should be expanded after the training needs assessment reports gather information on existing training courses. Use this resource to show which training courses are available in each country and then match them with identified training needs.

WIPO Academy

The WIPO Academy is WIPO's core entity for training and human capacity-building activities, particularly for developing countries, least developed countries and countries in transition.

The Academy publishes an Education and Training Programs Portfolio with details of its professional development program, distance-learning program, academic institutions program and summer schools program.

Learn more about the portfolio.

Appendix C: Capability frameworks and competencies

This section provides more information on using the capability frameworks and competencies introduced in **Section 3.4.3**.

The Chartered Institute of Personnel and Development UK

Approach to integrating organizational capability within a training needs assessment

Many training needs assessment approaches are based on identifying capability (current and anticipated) at individual (team) and organizational levels. Some have more emphasis on checklists, while others focus on models of organizational behavior. Most approaches caution about having a "training solution" in mind before identifying an organizational issue. The Chartered Institute of Personnel and Development UK (CIPD) provides insight into recommended approaches:

Identifying learning and development (L&D) needs involves the assessment of employee capabilities alongside an understanding of current or anticipated gaps in knowledge or skills. This analysis can be conducted at the individual, team or organizational level. In any case, the outcomes can identify the appropriate learning provisions required to enable sustained business performance and should be closely aligned to the overall organization strategy.

The clear and systematic identification of learning and development needs is a key aspect of ensuring effective learning provision across an organization. However, the process can be seen as a rigid, box-ticking exercise unless it is aligned with organizational requirements. The need for organizational agility means people professionals must act quickly to deliver a learning needs analysis when required. The process demands an appropriate mapping of organizational needs linking the learning to the desired business outcomes.

Identifying learning and development needs may be done through an assessment of prevailing levels of skills, attitudes and knowledge, as well as through any current or anticipated gaps. This assessment can use formal or informal methods. Such an analysis enables decisions about which learning provisions are needed at individual, team or organizational levels. These gaps should be interpreted and prioritized in connection with the wider organizational strategy.

Implementing a formal training needs assessment may be seen as a current or future health check on the skills, talent and capabilities of an organization (or part of an organization). Training needs assessments are based on the systematic gathering of data about employees' capabilities and organizational demands for skills, alongside an analysis of the implications of new and changed roles for changes in capability.

Such a process needs to flow from business strategy, and its aim is to produce a plan for the organization to make sure it can sufficiently sustain current and future business performance. The process must also consider statutory requirements, for example, certain positions require specified levels of health and safety expertise.

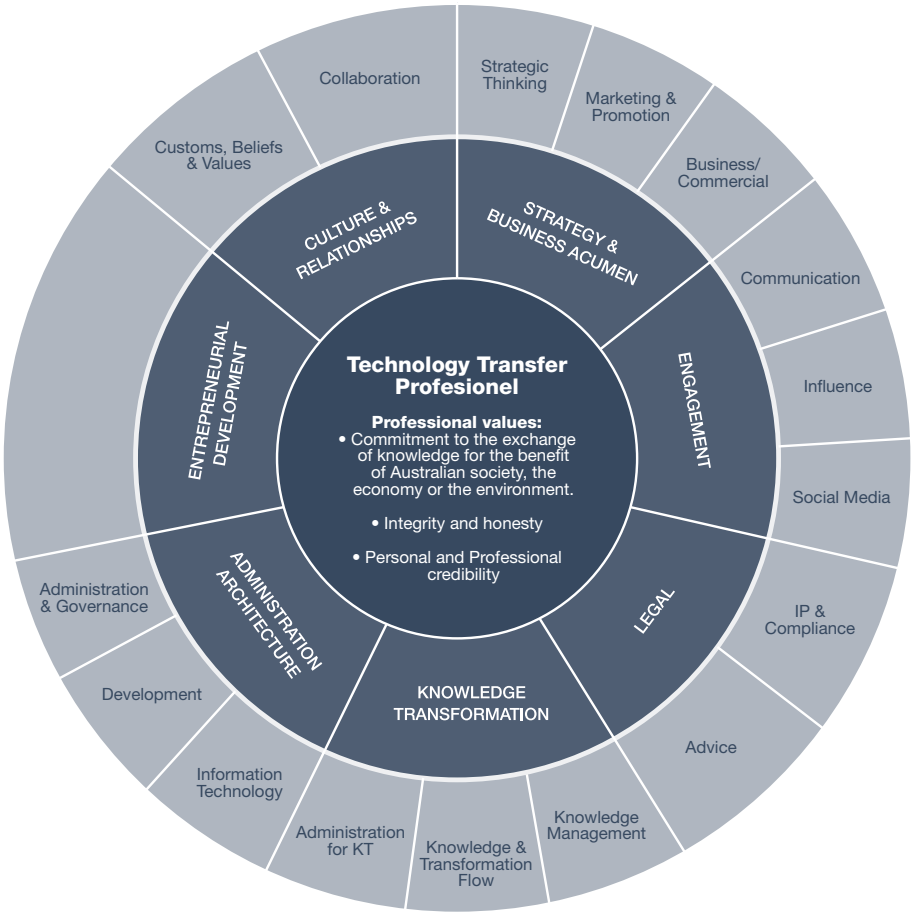
The training needs assessment should inform the organization's learning and development strategy and align with business needs. This, in turn, informs:

- Organizational performance, which depends on having the right people in the right place with the right skills at the right time.
- Learning opportunities, which can help build organizational effectiveness as well as enable staff to achieve personal and career goals that then increase employee engagement.
- A clear idea of what participants need to learn and which outcomes are likely provides a foundation for learning and development professionals to evaluate effectiveness and demonstrate the impact of learning and development to the organization.
- Well-planned learning, which is an effective retention strategy, particularly when linked to talent strategies. It is also useful in times of high attrition, providing it is designed to capture in-house knowledge well, therefore stopping knowledge from "walking out of the door."

Capability framework for Knowledge Commercialisation Australasia (KCA)

Figure 20 shows an example of a technology transfer capability framework undertaken to provide a professional benchmark and analysis of technology

Figure 20: Example capability framework for technology transfer professionals



Source: Prib, A., J. Simpson, G. Brown, S. Brown and K. Crane (2016). *Knowledge Transfer in Australia: Is There a Route to Professionalism?*

transfer professionals in Australia. The project surveyed who carries out technology transfer, what their roles are, which competencies are involved and how individuals (participants) and stakeholders (organizations) perceive the prioritized competencies and the gaps in current abilities.

Alliance of Technology Transfer Professionals (ATTP) use of competencies

The ATTP provides a detailed description of core competencies, skills and experiences for a registered technology transfer professional.[15]

Strategy and business insight

This category includes strategic thinking; market-led, entrepreneurial approach; and business and commercial skills.

Relevant skills/experiences may include:

- Identifying/sourcing opportunities/initiatives.
- Translating market knowledge into commercial opportunities.
- Assessing risks and undertaking due diligence.
- Formulating the vision, setting the direction and securing buy-in.
- Developing the strategy and design of projects/ initiatives.
- Defining the market and business strategy and/or the marketing cycle.
- Matching skills, experience, capacity and resources to opportunities.

Entrepreneurial leadership
This category includes active engagement in securing funding, leading negotiations and developing new ventures.

Relevant skills/experiences may include:

- Aligning funding opportunities with strategic aims and priorities.
- Identifying and securing new funding to support knowledge exchange (knowledge exchange)/ technology transfer projects and/or initiatives.
- Leading, structuring and realizing complex negotiation, and reconciling different perspectives to achieve resolution (for example, conflicts with lawyers or accountants).
- Overcoming institutional issues or partner barriers through flexible, creative solutions.
- Supporting new business formation, structures, legal frameworks and shareholder agreements, as well as accessing investment funding.
- Developing and managing community-based or charitable projects.
- Nurturing new ventures/projects until they are financially independent.

Effective engagement
This category includes communication, collaboration and influencing skills.

Relevant skills/experiences may include:

- Building new networks for university/business collaboration.
- Researching and creatively planning to identify potential partners.
- Applying the marketing mix to relevant markets/ segments.
- Finding partners, investors and collaborators.
- Informing and persuading potential partners.
- Managing effective relationships with stakeholders of different cultures or backgrounds (for example, contracts, milestones, deliverables, and disputes or problems).

Legal and technical knowhow
This category involves understanding the key legal, technical and domain-related issues required to effectively transfer knowledge.

Relevant skills/experiences may include:

- Assessing the attributes and commercial potential of IP.
- Developing an IP exploitation strategy to meet commercial needs.
- Applying different licensing and business models.
- Protecting, packaging and enforcing any IP needed for projects.
- Drafting, negotiating and reviewing relevant IP licenses and agreements.
- Understanding and demonstrating expertise in commercial law and finance frameworks.
- Interpreting, advising on and managing risk.
- Complying with relevant external terms and regulations, such as national/international legislation and jurisdictions.

Governance and project management
This category involves managing projects, knowledge and information flow, as well as developing and managing systems and processes for knowledge exchange.

Relevant skills/experiences may include:

- Establishing governance frameworks for multi-stakeholder projects.
- Developing, setting up and managing complex projects (including management of contracts, finances, milestones, deliverables and information, as well as reporting on outputs and outcomes).
- Developing, setting up and managing customer experiences/delivering or facilitating outputs.
- Developing, setting up and managing systems (including ICT systems) to handle knowledge from its creation or capture through to objective completion, ensuring that information flows efficiently to achieve knowledge exchange, knowledge transfer and technology transfer objectives.

Table 8: Comparison of capability frameworks

Registered technology transfer professional		KCA	
Core competency	**Definition**	**Capability cluster**	**Definition**
Strategy and business insight	Strategic thinking; market-led, entrepreneurial approach; and business and commercial skills	**Strategy and business acumen**	Strategic thinking; marketing and promotion; and business/commercial
Entrepreneurial leadership	Active engagement in securing funding, leading negotiations and developing new ventures	**Entrepreneurial development**	Promotes and supports the development of entrepreneurial capability in researchers, administrators and students
Effective engagement	Communication, collaboration and influencing skills	**Engagement**	Communication, influence and social media
N/A		**Culture & relationships**	Shares customs, beliefs and values; collaborates
Legal and technical knowhow	Understanding the key legal, technical and domain-related issues required to effectively transfer knowledge	**Legal**	IP and compliance; advice
Governance and project management	Managing projects, knowledge and information flow, and developing and managing systems and processes for knowledge exchange	**Knowledge transformation**	Administration for knowledge transformation; knowledge and information flow; and knowledge management
N/A		**Administration architecture**	Admin and governance; development; and information technology

Comparison of technology transfer capability frameworks

Different frameworks from the KCA and the registered technology transfer professional are closely correlated. Although they may use different terminology, they essentially describe the same skills.

Table 8 shows a comparison between the KCA and registered technology transfer professional frameworks with the higher theme level and the competency skill level from each framework.

Example: Competencies in technology transfer defined by WIPO

The WIPO project document[16] lists the possible organizations involved in the innovation value chain and provides a description of required essential competencies.

Many players along the innovation value chain must take a product (including process) or service to market, and these players include:

- funders of research commercialization/utilization (including employees within government funding agencies);
- IP developers (including researchers);
- IP managers (including individuals within research offices and technology transfer offices based at higher-education institutions or public research organizations); and
- IP users (including small, medium and micro enterprises [SMMEs] and industry/private sector players).

These various players all require a clear understanding of:

- IP and associated IP protection strategies relevant for different technology types;
- effective active IP management, including infringement monitoring, with a particular emphasis to empower developing, emerging and least developed countries to ensure that no third party abuses their IP;
- IP tools' use, including flexibilities to access technologies relevant to a particular country's technological needs;
- IP marketing and how to engage with industry partners (including SMMEs and industry players);
- the conclusion of transactions for commercialization/utilization, including negotiation strategies and pitfalls to avoid, as well as how to launch a start-up and, ultimately, spin it out; and
- commercialization in the global market.

Appendix D: Innovation value chain

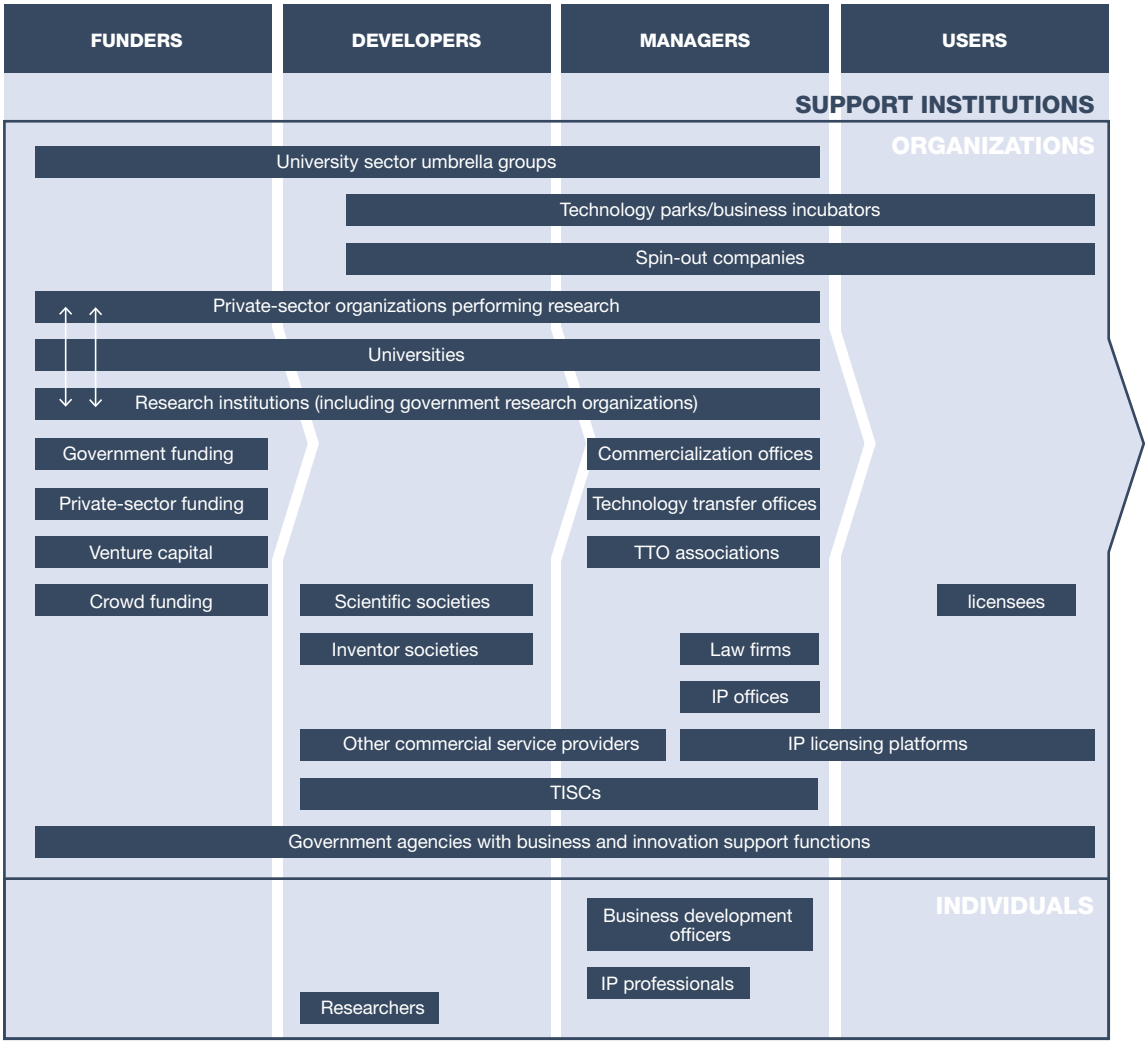
Types of organizations involved in the innovation value chain

Various lists detail the typical types of organizations involved in the innovation value chain. The following list gives the assessor an idea of where to identify organizations for the training needs assessment. Ideally a country-level innovation value chain mapping exercise will identify the relevant organizations, which include:

- government agencies doing research and development (R&D);
- government agencies funding R&D;
- government agencies supporting R&D;
- IP offices;
- universities;
- sector groups, such as university umbrella groups, scientific societies, inventor societies and technology transfer associations;
- technology transfer or commercialization offices within R&D organizations;
- private sector companies doing R&D;
- companies licensing technology, both as beneficiaries and benefactors;
- cooperative centers between different types of organizations doing R&D;
- TISCs;
- technology transfer offices;
- IP lawyers/attorneys; and
- other support institutions.

Example: Innovation value chain in Australia

Figure 21: Types of organizations involved in the Australian innovation value chain



Appendix E: Survey tools and forms

Tool 1: Assessor's training needs assessment checklist

- Review literature.
- Select organizations.

Within each organization
- Identify a focal point.
- Determine a sample size for surveying.
- Review the organization's purpose, approach and structure as part of the innovation value chain.

With the focal point
- Explain the training needs assessment's purpose.
- Explain how the survey will work.
- Decide if a project advisory group is required.
- Determine the composition of the project advisory group.

With the focal point/project advisory group
- Agree to the scope of the assessment.
- Tailor the methodology (if required).
- Set up the target groups for interview/questionnaire response.
- Select a person/group to survey for the organizational survey.

With the survey respondents
- Schedule interviews.
- Distribute questionnaires.
- Conduct interviews.

After the interview
- Revise the capability framework for the individual assessment.

For the individual assessment
- List the named participants.
- Conduct an introductory meeting (optional).
- Distribute the questionnaires.
- Collect the questionnaires.

For the data analysis
- Collate the results.
- Use gap analysis on competencies.
- Derive training needs.

For the report
- Define training aims.
- Suggest training solutions.
- Advise on training design.
- Provide source information for training delivery.

Tool 2: Briefing note – training needs assessment introduction to focal point

This tool aids the assessor's initial discussion with the focal point.

As an introduction, explain the following:

- the purpose of the project and survey (training needs assessment);
- how the focal point will gain interest and momentum within the organization; and
- how the organizational survey (through interviews) will be conducted alongside individual questionnaires.

Note: If the questions seem too numerous and prescriptive, remember that we are trying to find out:

- What the competency gaps are that can be addressed through training, according to those working in technology transfer
- If a training program were to address these gaps,
    - Who would it target (job roles, units, seniority, subject experts)?

- Which themes does it need to cover (subject areas, current themes)?
- Which levels (of professional experience) should the program cover?
- Which format (e-learning, classroom) should the program take?
- Which method (case studies, group work) should the program use?
- Are there any other insights to make the training successfully improve the competencies of those involved in technology transfer?

Adapt the questionnaires as you see fit; reduce or expand questions as needed.

Note: For ease of use, we've included the assessment surveys in the accompanying workbook.

If the amount of questions seem daunting, remember that their purpose is to:

– Obtain a baseline of information to provide a picture of the staff's current competency levels.

– Determine the improvements needed in competencies.

– Find out the organization's requirements for its future competency needs to match its future strategy.

– Determine the individual staff members' perspectives on their current and desired competency levels.

– Measure the results to produce a gap analysis of competencies that can be addressed through a training program (that is, the gap analysis informs the overall training aims).

– Gather enough concrete information to inform the detailed training design.

Keep records for the key contacts (including the focal point); these can be used later in the training process.

We recommend initiating the training needs assessment by sending a formal introductory letter explaining the survey's purpose and requirements to the target organization's senior directors. Ideally the letter will come from an authority within the assessment team or organization hosting the training needs assessment (for example, WIPO's national office). This will boost subsequent engagement.

Tool 3: Briefing note – training needs assessment introduction to the individual respondents

This tool aids the assessor in introducing the training needs assessment and how it works to the individual survey participants.

The training needs assessment's purpose is to determine the training needs to address the gaps in skills and competencies in the technology transfer sector at an individual, organizational and national level.

This survey targets professionals working in technology transfer and aims to build an organizational picture of which competencies are necessary for the various job roles and what ability the job holders have for their current roles and potential roles.

The training needs assessment is not intended to judge performance but rather to inform organizational training needs, so that training will improve participants' skills, knowledge and abilities.

As a professional working in this role, your opinions are invaluable, and we request your response to the survey.

Please answer as realistically as possible and include any suggestions you may have.

The capability framework (Form 2) is a template that shows the management perspectives of the competencies relevant to the technology transfer process within your organization.

Please complete two survey forms: the competency assessment (Form 3) and the individual survey (Form 4).

In the competency assessment, assign (and add, if you wish) competencies from the capability framework to your job role (that is, which competencies you need to perform your job both now and in the future).

Then prioritize the list, using the scale provided, to indicate which competencies are more important (or less) in your job role.

Using the numeric ranking scale provided, go on to provide your views of how well your abilities meet the competencies.

Last, complete the individual survey (Form 4), which further explores your perceptions of your role, your thoughts on professional development and how we can make an effective program.

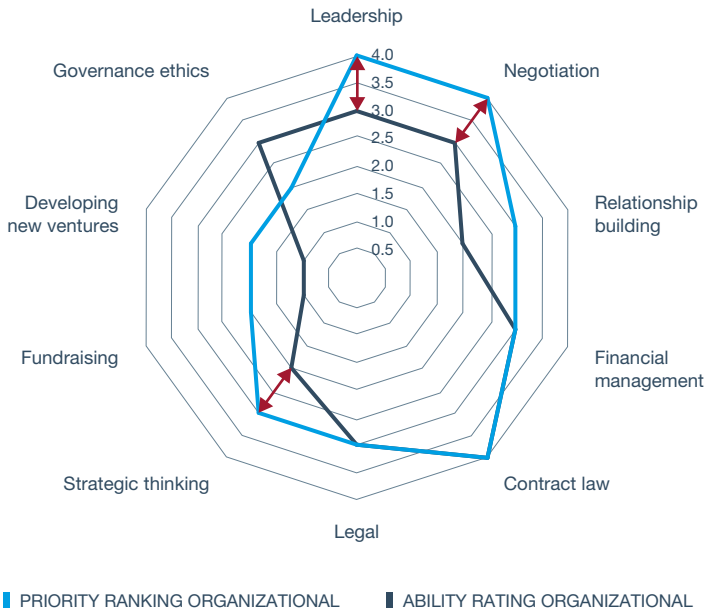
To set the scene for future trainings and development without falsely raising expectations, explain the training needs assessment's expectations for individuals and organizations, the time commitment necessary and the benefits of accomplishing a national picture of the technology transfer and IP sectors.

Appendix F: Analysis tools

The following examples are of the radar chart used for the example in **Section 6: The training needs assessment in practice: Step-by-step training needs assessment reporting example**. We used them directly to derive the competency gaps shown in **Table 4: Competency gap analysis** and **Table 5: Training aims and objectives**.

Competency gap analysis: Radar chart examples

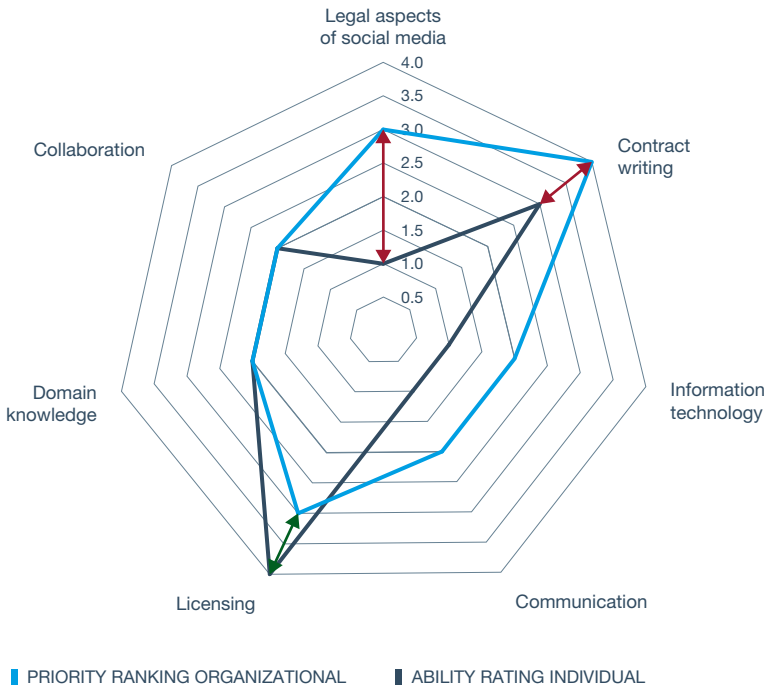
Figure 22: Head of unit: Management perspective



GAPS

- The highest priority are leadership, legotiation and contract law.
- Of these, the lowest ability is leadership and negotiation.
- There may be a training need here, also in strategic thinking, although this is a lower priority.
- Note the sample size is only 1 person, hence the management and individual results are the same.

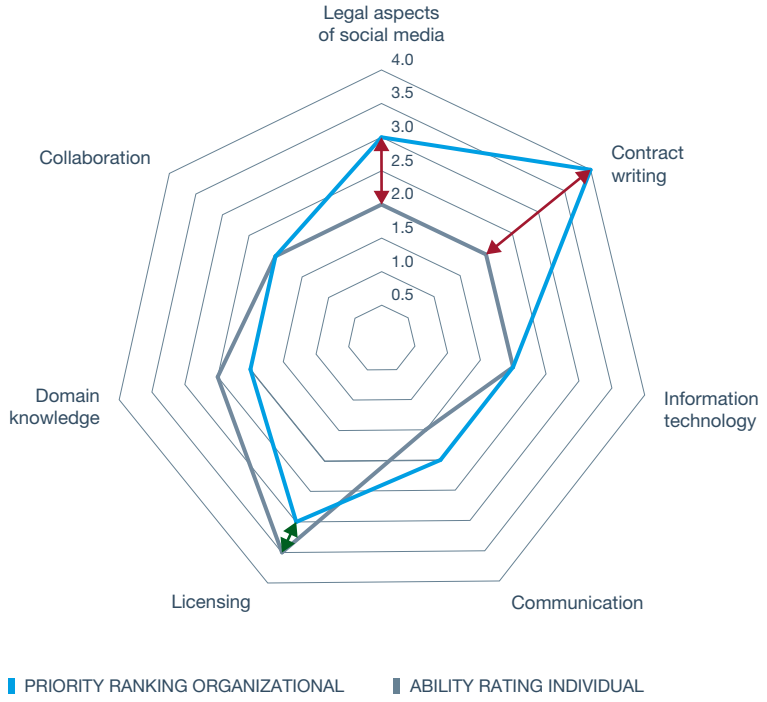
Figure 23: Contract lawyers: Management perspective



GAPS

- Contract writing is the highest priority with a gap to ability.
- Legal aspect of social media is important and the largest gap to ability.
- The lawyers own ranking of ability needs to be checked.
- Ability in licensing is higher than the priority, so no need for training here.

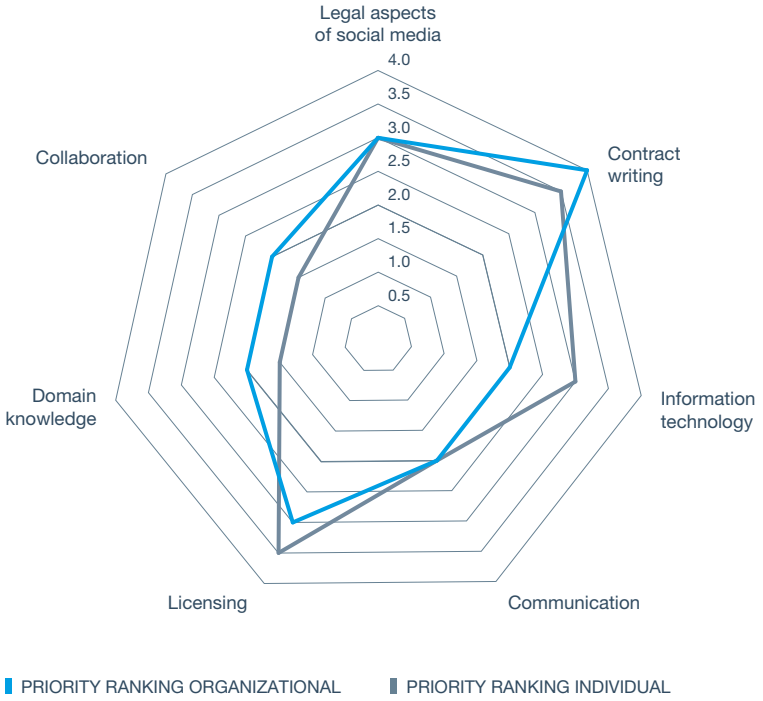
Figure 24: Contract lawyers: Individual competencies



GAPS

- Individuals have a bigger gap in contract writing compared to the organizational view, so there seems a training need in contract writing.
- They have low ability in legal aspects, although higher than the organizational view of their skills.
- Licensing ability is higher than management perceives.
- This confirms the management view; training is contract writing for the lawyers is relevant and needed, as is legal aspects of social media.

Figure 25: Contract lawyers: Priorities



DIFFERENCE IN PRIORITIES

The organization puts a higher priority on contract writing, than the contract lawyers.

The lawyers put a higher priority on licensing and IT.

IT could be a future need, that the lawyers have identified early.

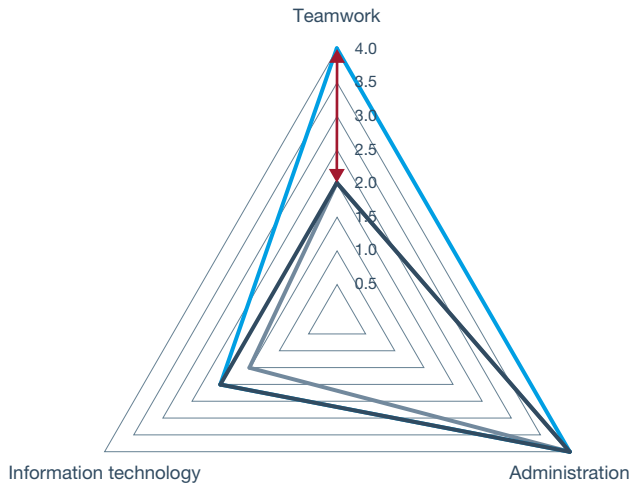
Contract writing and licensing are viewed as very important. A closer look at the required ability levels here, might be needed.

Figure 26: Communications officer: Combined picture

GAPS

- A huge gap in reporting ability, from the communications officer's view.
- But in social media, marketing and promotion and communication there is a discrepancy between the management view and the communications officer.
- Perhaps the officer has less confidence in ability than is demonstrated, worth to investigate further.
- Reporting skills is a clear training need though.

Figure 27: Administrator: Combined picture



GAPS

- The administrators meet expectations, apart from teamwork, where there is quite a gap.
- For training need, the assessor needs to investigate what is the issue with teamwork, within the admin part, internal to the unit or with partners, further information in the surveys will provide clues to this.
- The training need is in teamwork, which may be applicable to all the staff (the graph alone cannot give the answer).

Figure 28: Unit manager: Combined picture

GAPS

- The clear gap is between the manager's skill and organizational view is in KM. This is also an organizational priority, though not the highest.
- Compliance is also a gap and a priority, in this case the manager thinks his skills are better than the management thinks.
- For the highest priorities, in project and financial management the manager has adequate skills.

Endnotes

1 See De Lange, P. & Feddes, R. (2008). General Terms of References. Evaluation of Dutch support to capacity development. www.pdffiller.com/jsfiller-desk21/?requestHash=2d05343c9c8. Retrieved on March 10, 2018 from The Hague: IOB.

2 See CIDA definition of Capacity Development.

3 See UNDG (2008). Capacity Assessment User Guide.

4 See Knowles, M (2012). The Adult Learner. Oxford: Routledge.

5 "Innovation value chain" is defined in **the glossary.**

6 For an example of organizations in the Australian innovation value chain, see **Appendix D**.

7 As identified in WIPO's 2018 Project on Intellectual Property Management and Transfer of Technology: Promoting the Effective Use of Intellectual Property in Developing Countries, Least Developed Countries and Countries with Economies in Transition **(see Appendix C)**.

8 Technology transfer sectors include agriculture and food, biotechnology, electrical and semiconductors, health care, information technology centers, corrected research, education and consultancy. See Mom, T. J. M., I. Oshri and H. W. Volberda (2012). The skills base of technology transfer professionals. Technology Analysis & Strategic Management, 24(9): 871–891.

9 See International Council on Archives (2005). Training the trainer resource pack.

10 See Ogrady-Marshall, R. (2013). How to write aims and objectives for eLearning courses.

11 PRINCE2 (PRojects IN Controlled Environments) recommends that each project have its own Risk-Management Approach document. This document defines the project procedures for risk management in terms of how risk will be identified, assessed, controlled and communicated in the project; the risk-management approach describes the specific risk-management techniques and standards to be applied during the project, and the responsibilities provide a good and consistent risk-management procedure.

12 See Kloosterman, V. (2016). What are the 5 risk management steps in a sound risk process?

13 Compiled from previous frameworks of registered technology transfer professionals, ATTP, KCA, PraxisAuril FTT course, WIPO Project Doc and Stellenbosch University.

14 For the WIPO project, this is part of the country expert's TOR.

15 See ATTP: RTTP Criteria.

16 See WIPO CDIP (2017). Project on Intellectual Property Management and Transfer of Technology: Promoting the Effective Use of Intellectual Property in Developing Countries, Least Developed Countries and Countries with Economies in Transition Proposed by South Africa.

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