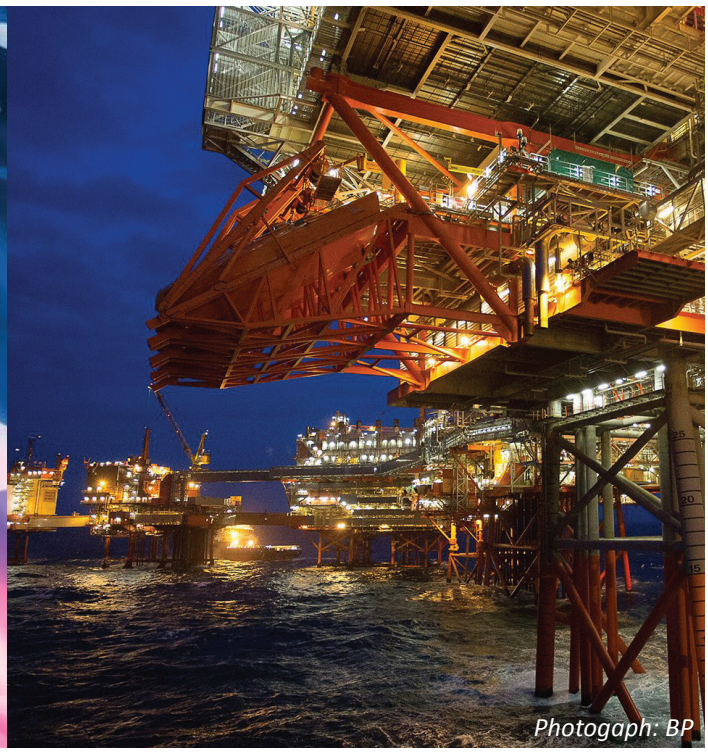
Center for
Integrated Operations
in the Petroleum Industry

HANDBOOK

The Capability Approach to Integrated Operations



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Abstract / Managerial summary

The Capability Approach to IO is an approach for systematically managing the increasing complexity of integrated operations (IO) projects through structured development of the key resources needed for realization of the value of IO opportunities. Through a top down approach, the Capability Approach identifies needed development of resources for value creation from use of IO across organizational units, disciplines and professions. In combination, it uses a bottom up approach to define potential IO solutions by actively involving key personnel and stakeholders in the process.

This handbook offers a guide to use the Capability Approach to IO projects. It is intended for two groups of users: the project managers of IO implementation projects within a business area (e.g. a new field or upgrading in a field); and corporate IO responsible (e.g. global IO in the company). The handbook provides the outline of the steps in the Capability Approach, and for each step highlighting the purpose, who should be involved, and how to perform the step including typical reflection points. In addition, a case example is provided to illustrate the performance of each of the steps, referring to our experiences with the method.

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Contents

Figures and tables

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Introduction

This handbook is meant as a guide to use the Capability Approach to IO projects. It provides the outline of the steps in the Capability Approach including typical reflection points for each of the steps, and some tips that can facilitate execution of IO projects. A case example is provided to illustrate the performance of each of the steps, referring to our experiences with the method. For this purpose, we have chosen to refer to an IO-typical capability enabler, namely collaboration. Because collaboration is crucial in enabling execution of several other processes at the core of the business objective, the case example is focused on a rather general collaboration capability enabler. For more detailed tips on collaboration in operations, please see the IO teamwork handbook (Nystad et al., 2014).

The handbook is intended for two groups of users: the project managers of IO implementation projects within a business area (e.g. a new field or upgrading in a field); and corporate IO responsible (e.g. global IO in the company).

The method presented in this handbook can be used in a variety of settings, and several of the reflection points will be useful independent of the project scope and setting. For the same reason, this handbook does not offer an exhaustive list of reflections and decision points, nor a detailed solution to specific capabilities.

Implementation of IO

Nowadays, Integrated Operations (IO), and similar concepts, are common operational concept for running fields given the opportunities that technological developments have provided (Edwards, Mydland & Henriquez, 2010; Fernandes et al., 2014). However, the implementation of IO has brought with it some challenges. These challenges partly relate to understanding how to operationalise the IO concept already during the concept and development phases of projects, and how to involve the right people at the right time to uphold the needed focus on IO throughout the projects. Collaboration and work across disciplines is needed for successful execution of IO projects (Drøivoldsmo, Reegård & Farbrot, 2014).

The Capability Approach to IO can be understood as a planning and implementation support tool that also addresses quality in the planning process.

A brief introduction to the concept of capabilities and the Capability Approach to IO

The Capability Approach to IO is a structured method for developing capabilities through an understanding of the elements that support innovation and development of new and more efficient IO practices that can be both sustained and scaled. The Capability Approach can be seen as a generic method to organizational development, partly through planning and building a platform of reusable capability resources that can be deployed throughout the companies' operations.

A capability is the synthesis of people, processes, governance/organization and technology which constitute the building blocks for delivering intended performance:

- **People:** Staffing, skills, training, competency development, leadership, IO mindset, operations culture, performance management, networking, communications etc.
- **Technology:** Facilities, plants, wells, pipelines, reservoir, working environments, infrastructure, automation, sensors, network, ICT architecture, software etc.
- **Process:** Work flows, roles, responsibilities, decision-making, collaboration, supporting processes etc.
- **Governance:** Business model, organizational structure, decision rights, contracts, agreements, policies, regulations, internal/external sourcing, investments, steering system etc.

Critical success factors to capability development that can greatly influence the success of an IO project (see e.g. Kotter, 1995; Abbott & Fisher, 2010):

- Sense of urgency
- Leadership (see handbook on *Leadership in IO* (Taylor, 2014)
- Dedicated internal champions
  - With a broad IO perspective
  - Local
- Quality in the planning process
- Planning and implementation support tools, including standards and processes for capability development
- Capacity in project execution
- Stamina, from the planning process throughout the implementation process

Hence, a capability is always performed to achieve a specified objective, e.g. optimization of production, and a designed combination of the four resources (people, processes, governance/organization and technology) is needed to do so. Furthermore, these resources must be configured in interaction with the company's environment which defines the boundaries of both opportunities and constraints for operation.

Scalability

The key challenge in IO has been to go from piloting and successful cases to more wide scale deployment of the solutions developed. The capability approach helps us to define the important elements of scalability; how we go from a working solution in one setting to adjusting the product and service to new areas and a larger deployment that maximizes its value of delivery. Scalability, then, is about managing variations in capacity and complexity depending on contexts, by transferring, adapting and/or acquiring resources and combining these to meet the contextual demands for operations. Thus, a capability is performed to achieve the same objective across fields, companies, services and/or industries, but its development and configuration of building blocks might be different due to differences in operational opportunities and constraints.

We distinguish between scalability and global capability; a global capability can be understood as developing and deploying a capability that consists of the same core qualities regardless of where it is deployed because it is considered to generate value by the company. This does not mean that the complete configuration of resources for delivering the capability is identical across locations, but that the core of the capability realization is. Scalability then, is requisite for achieving a global capability, while the opposite is not true. As such, the Capability Approach to IO can guide development of both scalable and global capabilities.

Succeeding with scaling is, in large, dependent on understanding the operational context(s) and the opportunities and constraints that lay therein, and seeing the potentials for scaling from the very beginning. This allows for a prioritization of capabilities that need to be developed for specific operations, as well as identification of existing resources and needs or potentials for acquiring or developing new ones that allow the company to take full advantage of the capabilities in the target setting(s).

For more (theoretical) details on the concept of capabilities and the Capability Approach, see the IO Center report *The Capability Approach to Integrated Operations* (Drøivoldsmo, Reegård and Farbrot, 2014), and the white papers *A capability approach to integrated operations* (Hepsø, Mydland and Henderson, 2012) and T*he Capability Approach to IO: Scaling from the North Sea to the Arctic* (Reegård, Hepsø, Rindahl, Drøivoldsmo and Fernandes, 2014).

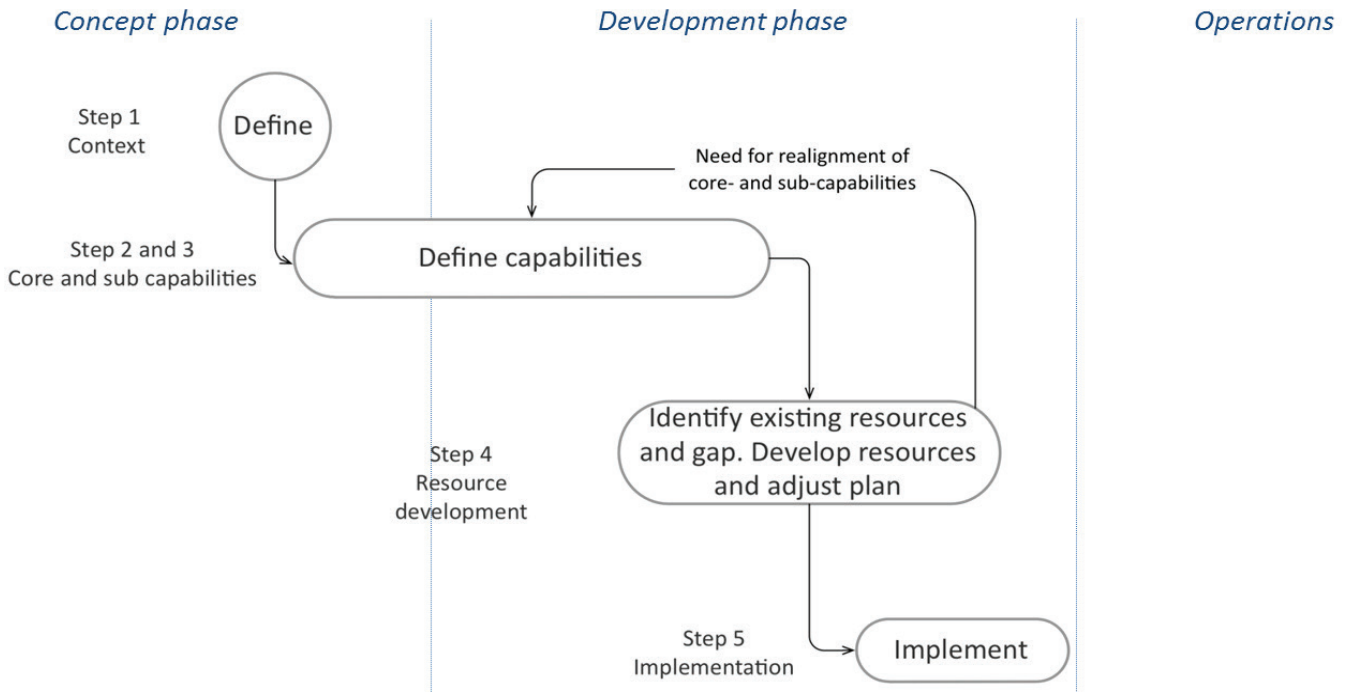

Figure 1. Overview of the Capability Approach to IO

The Capability Approach to IO

The Capability Approach consists of four main steps to be performed. These are, in short,

1. Understand your context of operation(s) and the opportunities and constraints therein
2. Based on your context analysis, identify the capabilities that are critical for operations
3. Perform a sub-layering of the critical capabilities to get the full picture
4. Design the combination of people, process, technology and governance/organization of the capabilities. The Capability Resource Matrix is proposed as a planning and structuring tool to help you develop these in a scalable and sustainable way.

Through performance of these four steps, you plan and prepare for implementation of the capability in the field(s). Implementation is a natural consequent step in the project, building on the outcome of the Capability Approach, but it is not part of the methodology itself. In addition, we propose that there is an initial step where the target and ambition of IO implementation is set.

In practice, there is most often a need for performing step 2, 3 and 4 in iterations, depending on for example, technology vendors' possible deliveries. In typical IO projects, the performance of the steps is done as shown in figure 1.

Set the target

Purpose: Set up the IO project.

How: Define the target of the project and decide on the project setup.

Main issues you need to have determined:

- Project scope:
  - Is the project of a global or local nature?
  - Are you considering green fields, brown fields or both?
  - IO ambitions (the extent to which new and untried operational concepts and technology are sought implemented)
- Project setup:
  - Project owner
  - Project team
  - Management commitment
  - Decision rights
  - Financing
  - Time frame

TIP

Considering the potentials for scaling and global capabilities from the start can be time and resource saving, in comparison to treating each field separately.

Case example

The case presented is focused on developing a green field organisation with operations in the Barents Sea. The ambitions were to fully utilize the concept of IO for the most efficient operations in this location. The case company had limited experience with operations of fields on the Norwegian Continental Shelf (NCS) before, but has extensive operator experience worldwide. The case company's strategy for this field was further to utilize its own and others' good practices for establishing new and improved ways of working. From central management's point of view, this was part of the company's strategy to excel worldwide.

Step 1: Operational context

Purpose: Identify the most influencing contextual aspects related to your business goals. A thorough understanding of your context(s) is crucial for identifying and prioritizing the critical capabilities in subsequent steps.

Who: Key roles that should be involved in performance of this step are the project manager, corporate IO responsible (especially if you are targeting scaling and/or global capabilities), central roles from the targeted fields such as operations manager, and strategy and business development representatives such as those holding responsibility for technology development and ICT coordination. These hold different expertise and will identify different opportunities and constraints from their perspectives that combined give you a thorough analysis.

How: Identify what is specific to the operational context in terms of both opportunities and constraints regarding capability development.

Key reflections:

- What is special about this operational context?
  - Climate/environment?
  - Field-specificities?
- Has the company operated in a similar context before?

- What is the existing infrastructure?
  - Data and telecommunications
  - Service
- Is there something special regarding local laws and regulations for operation?
- Are there any special political aspects to operation in this context?
  - Security
- Potentials/need for integration with operators, authorities and collaboration with other actors?
- What is the expected performance in this context?
- Are there any prospects of near-future changes to any of the contextual aspects, and how might that impact your opportunities and constraints?
- Operation philosophy

TIP
Asking all key roles involved in performing this step to do the context analysis themselves, and then get together to discuss and agree on a final analysis, can be a good way of creating a shared and thorough understanding of the context

Case example continued

The case company is the first to operate topside offshore installations in the context of the Barents Sea. The contextual analysis was performed by focusing on what was special regarding operations in this high North area, in comparison to how operations can (and are) usually carried out in the North Sea. This was done in order to understand whether any already existing solutions could be applied to this specific field, and what would need to be developed and/or improved.

In this first step of performing the Capability Approach, the following main constraints were rated most influencing:

- The first topside offshore installation in the Barents Sea
- Limited industry experience with operations in a similar context
- There is not sufficiently established local support industry in the area, meaning that the installation needs to be rather self-contained.
- The distance is long between the onshore operations centre and the headquarters that will deliver support functions for (amongst others) Reservoir, Wells and Technology. Exploration and Production main office is even further away.

The contextual analysis revealed constraints related to high geographic and organizational dispersion for operation. This calls for extensive use of collaboration between onshore sites to get hold of the necessary resources, in addition to following the principles of division of labour between onshore and offshore. Hence, these constraints also give rise to an opportunity to develop IO in the company to a greater extent than what is common on NCS today, referring to (amongst others) closer integration with support services and flexible solutions.

Step 2: Identifying key capabilities

Purpose: Identify and prioritize among your capabilities for achieving your business goals in the specified context, either using existing capabilities or developing new ones. The output is a description of the critical capabilities for operations and a proposal of principles for the execution of capabilities.

Who: If scaling and/or global capabilities are targeted, focus on involving and using the expertise of the corporate IO responsible. If the target is a specific field(s), on the other hand, involve the field responsible.

How: Identify the key goals to be delivered and the processes for reaching these goals, as well as interfaces between these. Then, use the contextual analysis to prioritise which capabilities you need to focus on the most that are central for execution.

Typically in Oil & Gas operations, there are three overarching purposes of your capabilities; running normal production, keeping your production in normal mode (proactive), and get back to normal mode (reactive). The purpose of the capabilities can impact your needed design and development of their constituting resources. The following key reflections can help you identify the needed capabilities for each of these purposes.

Key reflections:
- What goals are to be achieved?
- How may you assess the goal accomplishment later?
- What are the critical processes for achieving these goals?
- Which activities must be carried out to deliver the critical processes?
- Are these activities needed for running normal pro-

duction, keeping your production in normal mode (proactive), get back to normal mode (reactive), or several?
- Do these activities have something in common in the way they are performed?
- How do these activities relate to each other? Are there any dependencies?

The two latter reflection points concerns the interdependencies between the critical processes to ensure that you do not address any one of them without understanding how that affects others. In addition, the two latter reflection points address the universal building blocks that need to be in place in order to perform business processes in accordance with your IO ambitions. These are transversal for most processes for all three purposes of your capabilities.

Figure 2 gives a brief overview of a capability stack model. Such a stack model attempts to reduce complexity of the system, thereby allowing for strategic focus regarding capability development by introducing distinct, layered activities connected by standard interfaces. It assumes that capabilities at lower levels are required for delivering capabilities at a higher level. Henderson, Hepsø & Mydland (2013) provide a simplified model and description of the layering that figure 2 builds on:

- An operational layer: collaboration arenas, organization, networking, work process framework, leadership, mindset and training.
- Analytics and collaboration layer: Information and collaboration, knowledge sharing and analytics
- Foundational layer: all wells, pipelines, processing plants, and an intelligent infrastructure including data capture and communications.

Case example continued

Using the stack model as a guiding reference, it was concluded that the critical capabilities for the specific green field would be similar to the operational clusters in the model. Given the contextual analysis, it was evident that the collaboration capability would be crucial for efficient execution of the operational capabilities in accordance with the IO ambitions for this field. To overcome the constraints identified in the contextual analysis, a high degree of flexibility to their collaboration capability would be needed for efficient operations. This was also one of the opportunities identified for the case company; to develop and implement IO to a greater extent than current industry standard, moving towards a 2nd generation of IO with the following central features:

- Contractor, vendor and service company integration goes beyond the interface level. This means that they are integrated into the company way of working.
- Processes, roles and competences define teams and teamwork.
- Collaboration arenas are established where people perform their work; office desks, social areas and in the process areas.

Given that the principles for work sharing and collaboration over distance from the first generation IO were implemented, these features describing the way of working formed the basis for the scope of new requirements for how the company should support the flow of information in the work processes with technology, definitions of roles and responsibilities, and training programs to make it happen. In this context, the central IO features identified were used as guidance in the description and development of the capability enablers as well as identification of the necessary capability fundaments described in the subsequent steps.

The output from performing the first and second step was a high level description of the main capabilities for operations and proposed principles for collaboration supporting these capabilities.

Step 3: Sub-layering of capabilities

Purpose: To produce an applicable and concrete description of the capabilities and its elements to be used in the subsequent step of defining requirements for delivery of the capabilities.

Who: Involve the relevant process owners and stakeholders within the identified opportunity and challenge areas. For clarifications, involve technical domain expertise and management with relevant responsibility.

How: Use the principles for execution of the capabilities that you have produced from step 1 and 2 and verify their applicability, and identify the different nuances of the capabilities that give rise to requirements for design of the capabilities.

Key reflections:

- What are the key processes in execution of your needed capabilities?

Capabilities stack model

The stack model may help you get started and have an initial idea of the typically needed clusters of capabilities for IO O & G production and how they relate to one another.

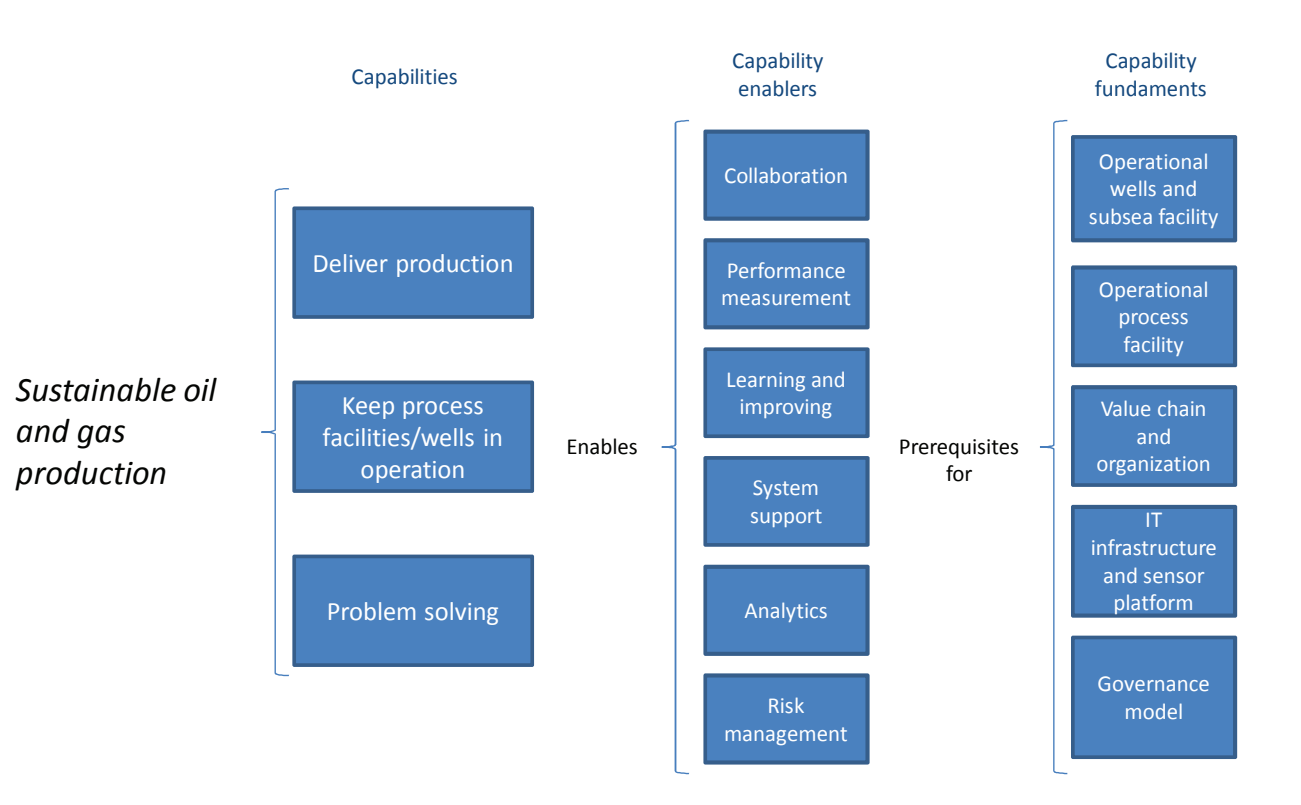

Figure 2. A Capability stack model for oil and gas operations

Starting from left, the overall business goal is to have sustainable oil and gas production. In order to achieve this (by use of IO), you need capabilities for delivering production, keep processes and wells in operation, as well as problem solving for managing unwanted and unforeseen events. Each of these is an overarching purpose of capabilities which can only be successfully managed through several related capabilities. For example, “deliver production” consist of daily production, production optimisation, production planning, etc.

The IO delivery of capabilities is dependent on a set of enablers. These are usually highly transversal across fields and contexts, although adaptations and development will be needed dependent on the nature of operations, the specific challenges and opportunities and so on.

The capability enablers, and consequently the execution of capabilities in accordance with the IO ambitions, are at the mercy of having an appropriate fundament for running such operations. The capability fundaments are the main issues that need to be addressed in this respect. These constitute the very foundations for running IO operations at all, such as having the necessary IT infrastructure in place for transfer of data.

Understanding the layering in this model is important; you are not able to execute the capabilities unless you have the needed enablers and fundaments in place. Hence, there is a high level of interdependency between the capabilities. Therefore, it is critical that you develop the necessary quality and functionality of the fundaments from the beginning, as these will impact (constrain and/or facilitate) your enablers and consequently the execution of your capabilities.

- Do these processes interact with other processes? Are there any dependencies?

For each process:

- What are the key decisions to be made and what are the decision situations (a typical example is process decision gates where several roles are involved)?
- Which are the key roles to be involved, and their responsibilities?
- What is the affiliation and location of each of the key roles?
- What are the key tasks to be performed?
- What is the key information needed to perform tasks and make decisions?
    - Who uses the information and for what purpose?
    - Who/what produces the information?
    - How may it best be shared/communicated?
- What are the key systems existing and required to deliver this information and enable interaction
- What type of technology is required to support the execution of the process?

This step is the first "test" of whether the identified capabilities can be developed. The principles that you have arrived at from performing the contextual analysis and identifying the core capabilities are used as a basis for talks with owners of the key processes. During the discussions with process owners, a number of major and minor challenges are usually identified. Solutions to these challenges must be clarified and you might find that the principles you have for operations are not applicable or possible to follow through. If so, redo the second step and readjust the principles. Figure 3 shows the iterative process of performing the second and third steps of the capability approach.

If you are considering global capabilities and have done so from the beginning, you need to "test" the principles with process owners in the relevant fields in the same manner. These principles should then be global (referring to beneficial and applicable in several contexts) in nature.

Output from this step is a description of the capability, as it ideally should be built for optimal performance. At the same time, you will have identified some critical issues that might hinder you from successful capability development. These will need to be managed and should be prioritized when moving forward in the project. Therefore, by performing this step, you are already starting to remove showstoppers to your capabilities. The description of the capability should be in such a state that you can deliver it to top management and get a final approval for development.

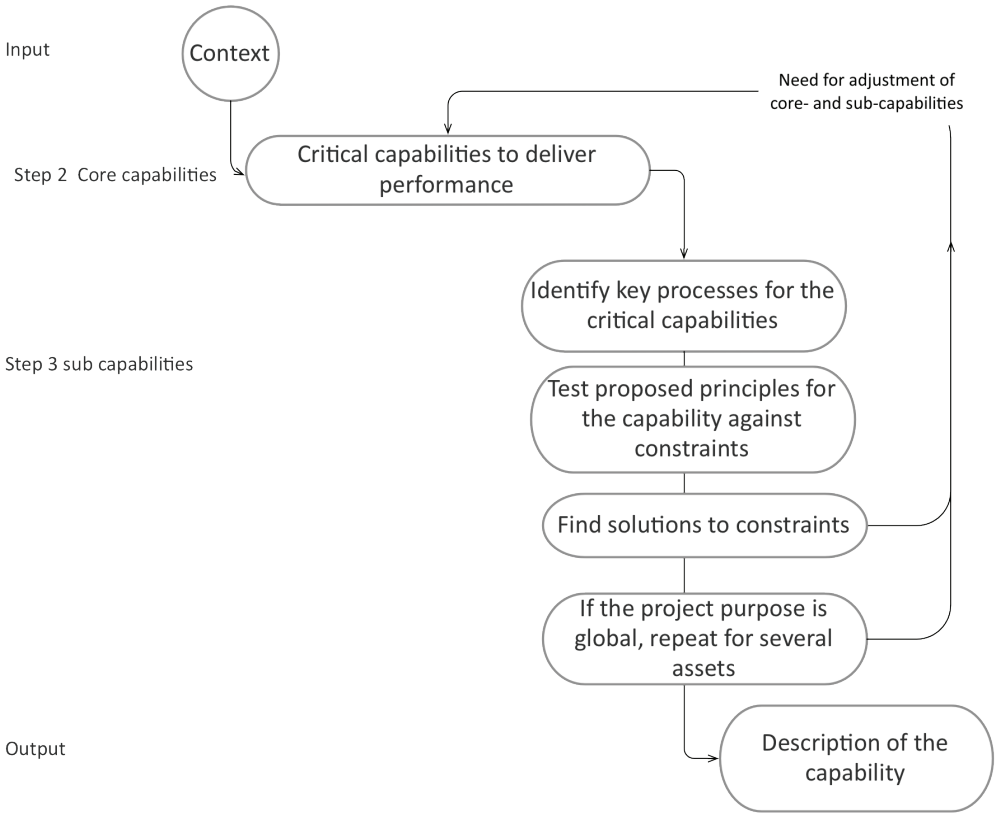

Figure 3. The iterative process of performing step 2 and 3 in the Capability Approach to IO

Table 1. Example of main and sub capabilities with identified key supporting processes for delivering production when all wells and production facilities are running normal. in "green status"

Capability	Sub-capability	Key processes
Stable production	Manage production targets and operation	Budget, plan and control
		Daily operation and prioritization
	Production reporting	Long term production plan and budgeting
Production optimization	Tuning the production within technical limit (short loop)	Steady state production optimization (short loop)
		De-bottle-necking, turnaround plan and preparations (long loop)
	Increase the technical limit (long loop)	Model management (long loop)

Case example continued

Given that collaboration is at the heart of executing the operational capabilities, the next step was to have a more detailed understanding of what the collaboration capability needed to look like. This was done by selecting the set of main processes that benefit the most from collaboration and identify the main collaboration interfaces. For instance, production optimization is an operational capability that is regarded as one of the keys for delivering value in production. Table 1 shows main processes identified for the stable production and production optimization capabilities.

The process owners and/or key stakeholders for the selected main processes were presented with the principles for operation and asked whether it was possible to perform work by following these principles. If the answer was "no", a follow-up question was "why not" which allowed for identification of showstoppers and constraints at a more detailed level. These issues were then attempted resolved. Further, through talking with the process owner, the interfaces involved in performing short loop production optimization were mapped in order to understand the elements necessary for good performance in the process, and to verify our understanding of the process.

Typically, planning for optimal performance in the identified processes supporting the production optimization capability raised requirements for tight cooperation between competences located in three different physical locations (see figure 4). Awareness of factors influencing steady state production was identified as a requirement for a number of positions both onshore and offshore. To increase this awareness, lowering of the threshold for interaction between locations was regarded as especially important in the key processes. The need for collaboration in the production optimization process situation refers to not only scheduled meetings, but also follow-up contact between competences during the day.

In the process of testing the capabilities against constraints, the project typically identified a number of practical issues with implementation; lack of standard technology, company policies for use of mobile devices, etc. This was typically solved by getting "yes" or "no" from the management. In the case of "no", it could end in longer loops with security clarifications and a need for deciding whether the use of a specific technology had to be rethought or the entire technology had to be changed, resulting in a readjustment of the core or sub capabilities.

However, more important was the lack of alignment between division and disciplines in their work process

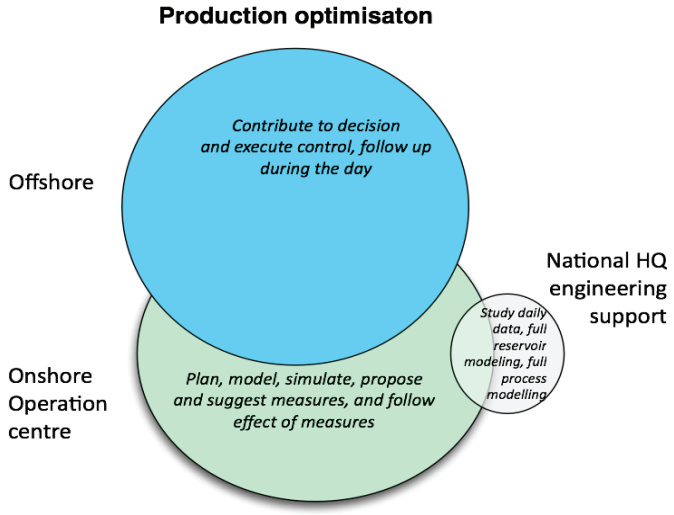

Figure 4. Venndiagram of needed collaboration between competencies in different locations

development and differences in their understanding of IO. Successful IO implementation is dependent on an understanding of new distributions in responsibilities in line with the work processes designed, including understanding for how and when to use the right competence. To clarify whether the organisation could be settled in a new way of working based on a set of work processes with clear roles and responsibilities requires a large effort as early as possible in the project definition phase and good communication of the principles the organization shall work after. Typically this calls for a number of iterations and cross discipline work to get the necessary decisions before starting the work with configuration of your capabilities.

TIP
Use the stakeholder input to evaluate the challenges according to whether they are in conflict with absolute requirements necessary for developing the proposed capabilities. The project should also develop an understanding of the level of disintegration of the proposed IO elements that the capabilities can withstand before value creation by means of IO is lost. E.g. where is the limit for reduction in collaboration technology quality, what is the effect of not having common formats/ resolutions for different types of data, etc.?

Step 4: Configuration of capabilities

Purpose: Aid you in appropriately configuring your capabilities for successfully achieving their objectives.

Who: Involve key operational personnel, internal ICT department and procurer, Human Resources department, management, and any other stakeholders you identify. In addition, involve relevant roles from interfacing organizations such as their upper management, ICT department and operational personnel, technology vendors, Human Resources department. You will need these roles to identify the different needs, showstoppers, and to find appropriate solutions. Having them all involved in the planning process also makes them more informed and committed to follow through in the implementation process.

How: Organize the details of your needed capabilities in terms of people, process, technology and governance, and align decisions and efforts across these four resources. Using the Capability Resource Matrix may help you structure the decisions and efforts in this planning process.

Key reflections and decisions:

- What are the minimum requirements (in terms of people, technology, process and governance) that need to be met for delivery of the capabilities?
- What existing resources can be used as building blocks for delivering the capabilities?
- What resources need to be developed and/or acquired for delivering the capabilities?
    - What is the time and cost of developing/acquiring the resources?
- What are the key requirements that need to be met for further developing the capabilities?
- To what extent are the capabilities relevant, appropriable and transferable to other target setting(s)?

The Capability Resource Matrix

The Capability Resource Matrix is a structuring tool to be used in the planning process that describes five maturity levels through which you manage and develop your capability resources in line with the intended capability delivery. Using the matrix as a tool can facilitate the planning process, and its output can easily be transformed to an implementation plan for the project.

Figure 5 shows the structure of the Capability Resource Matrix, as well as the generic definitions of the levels.

The staged process of development implies that the organization needs to steadily develop its resources level by level. This is to make sure that you are not attempting to conduct changes that your organization is not ready for. You are able to achieve a determined level of maturity if all the resources achieve that same level of maturity.

The highest level of capability maturity in this tool concerns continuously adjusting and improving internal processes and external partnerships in response to changing environments (referring to changes in opportunities and constraints, e.g. new technological developments), so that you maintain value from your capabilities. Although you may be excellent at continuous improvements in general, you are not able to conduct continuous improvements and innovations in a specific area (e.g. offshore healthcare services) unless you have control of how to execute these capabilities today and acquire experiences on what works well and what can be done better.

People	Technology	Process	Governance	Maturity level	Objective
Continuous improvements and innovations to the capabilities				*Adaptable*	
Predict and manage the future execution of the capabilities				*Predictable*	
Scaling up the proven capabilities				*Scaled*	
Managing and in control of execution of the capabilities				*Managed*	
	Delivery of the capabilities			*Initial*	

Figure 5. Structure of the Capability Resource Matrix

In the Initial level, the focus is on removing any obstacles that may keep you from repeating practices that prove to be successful. This refers to the minimum requirements for being able to successfully execute the capabilities at all.

The focus in the Managed level is to establish control of commitments and baselines for enabling your organization to repeat the successful practices of capability execution on a regular basis.

For these two first levels, the capability development is (recommended) to be piloted in one-two fields. This allows you to evaluate your capability set-up (what works well, what needs to be refined, goal achievement, cost-benefit), which is important for scaling initiatives.

In the Scaling level (if scaling is within the project scope), these successful practices are then scaled for delivery of a capability in line with your ambitions (e.g. implemented in multiple fields), contributing to the establishment of an organization-wide infrastructure that ties the capabilities to the business objectives. Scaling often makes you think of application in multiple fields, but it could also refer to other ways of increasing the complexity; for example adding to the capabilities' delivery, and/or broadening its partnerships.

It is important to note that when scaling, you need to transfer, adapt and/or acquire relevant resources for delivering the capability and combine these to meet the demands of specific operations. Thus, the successful practices can be transferred, but the building blocks necessary for achieving them may need to be different, referring to a need to perform an assessment of potential reconfigurations of resources for succeeding with the scaling initiative. Consequently, succeeding with scaling is dependent on your analysis of contextual opportunities and constraints from which you infer the demands for operations in the near-future.

In the Predictable level, the infrastructure you have built enables you to quantitatively manage the performance of your capabilities. By quantifying the outcome of the capabilities and the processes used in performing activities, you are able to predict your future performance. Note that quantifying performance can refer to quantifying goal achievement that is qualitative in nature, e.g. trend in measures of safety culture.

Finally, in the Adaptable level, use this quantitative knowledge to identify the processes that will benefit the most from improvement actions. The objective of continuous improvements is reached by empowering your employees to attempt such improvement actions where they see potentials by (for example) standardization of improvement methods and tools throughout the organization, establishing processes for assessing and prioritizing improvement proposals, etc.

When moving between the levels in the matrix, there is a continuous need for using learning capabilities so that you keep the practices that are successful, and either refine or discard practices that do not add value. Further, it is crucial to identify and systematically manage risks, referring to both risks to the project and implementation itself, and risks to operations (which tends to increase in times of changes). Your answers to the reflections (below) for the different levels are likely to show that several existing capabilities (e.g. change management, knowledge and learning management, risk management, competency management, training principles, improvement

and innovation methods and tools, evaluation methods and criteria, etc.) in your company can be reused for the purpose of developing the ones currently in focus, or you may find that your existing capabilities can be executed in an even smarter way.

TIP

Use Statoil's IO success criteria (see figure 6) to check whether you have covered the IO aspects necessary for successful execution of your targeted capability. The 7 success criteria can be used to verify the first level of the Capability Resource Matrix (the minimum requirements).

Key reflections when using the Capability Resource Matrix:

The Initial level in the matrix equals the minimum requirements that need to be met for delivery of the capabilities in question. Through the performance of step 3, you are likely to have identified many of the requirements already, either in the format of what needs to be in place, what needs to be changed, or issues that you have already taken care of. For the rest of the levels, the key reflections are structured according to their corresponding levels in the matrix:

Managed:

- What are the requirements that need to be met in order to be actively in control of your capabilities (meaning successful execution of the capabilities on a regular basis)?
- How can you evaluate the effect of the capabilities as well as assess any further refinement needs?
- How can you identify and retain successful practices?

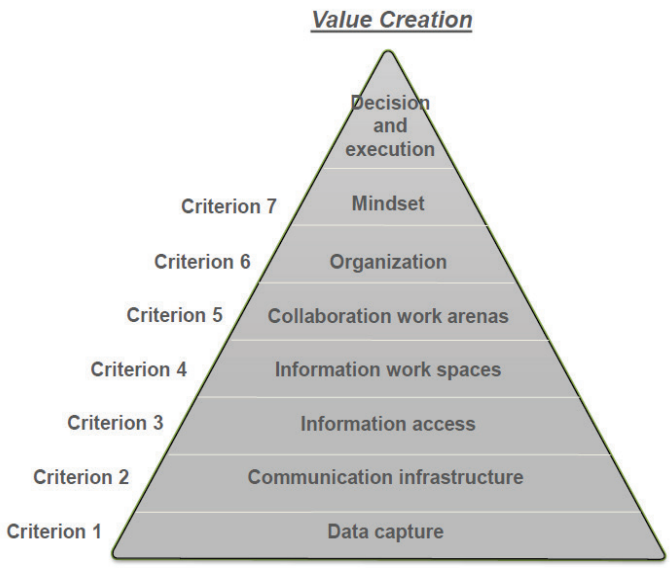

Figure 6. Statoil's IO success criteria (Lilleng & Sagatun, 2010)

Scaled:

- What are the new interfaces that need to be managed?
- What can and should be transversal across operations, and what needs to be adapted, developed or acquired?
    - What is the time and cost associated with developing or acquiring the needed resources vs. the value of the capabilities?
- What are the requirements that need to be met in order to be actively in control of your scaled capabilities?
- How are the scaling efforts to be financed?
- How can you evaluate the effect of the scaled capabilities as well as assess any further refinement needs?
- How can you identify and retain successful practices?

Predictable:

- How can you best manage performance of your (scaled) capabilities?
- What is needed for your personnel (both sharp and blunt end) to be able to contribute to continuous improvements and innovations?
- How can you best measure effects of continuous improvement and innovation efforts?
- How can knowledge be systematically spread in the organization?

Adaptable:

- What are the requirements that need to be met for achieving continuous improvements and innovations to your capabilities and the delivery of them?
- Which contact can be useful for identifying near-term changes in your opportunities and constraints (environment)?
- How can you assess potentials for improvements and innovations and prioritize amongst them?

The issue of scaling and global capabilities

Scaling is often challenging, and several IO projects have struggled with this particular issue (Hepsø, Mydland & Henderson, 2012). Scaling can mean more than implementing capabilities in several fields. It may also refer to adding to a capability's delivery, for instance using telemedicine for proactive healthcare delivery and not just event-based which is most common today. It might also imply new and extended partnerships, such as extending the onshore medical support team to include hospitals and dentists. However, most often, we think of implementation in several fields and contexts when we talk about scaling.

For scaling across locations, the context analysis you have performed for the different locations should have

identified the key differences between them that are likely to impact your configuration of capabilities and/or implementation of them in the different settings. Several resources needed are likely to be similar, but several aspects will be in need of tailoring. Some examples are technological devices depending on network quality, performance management, training needs, leadership, decision rights, internal/external sourcing, and contracts.

For global capabilities, you will need to focus on what should to be common across operational contexts as well. For instance, creating a meta-operational culture is necessary for successful collaboration across contexts and national cultures, basic training in using systems and applications can be more efficient (e.g. e-learning opportunities) etc.

Photograph: Naphoto

On a general note, it is wise to start off with 1-2 pilot fields; some level of success must often be proven before the company will agree to further investments in the projects. That is why it is important to have a way of evaluating the results and effect of capability implementation.

Note also that possibilities regarding scaling might change with time. For instance, you might want to establish partnerships with some services that are not ready for the IO way of working today, but are likely to be in three years. Also, possibilities regarding scaling might go hand in hand with locations for scaling. For example, in moving to the Arctic regions, environmental constraints also give rise to opportunities for new and closer partnerships for several aspects of running operations which allow for smarter use of resources across organizational boundaries.

Considering such changes in opportunities and constraints is important when configuring your capabilities so that you avoid closing future opportunities that you might want to take advantage of. The future perspective is crucial for timely developing the necessary resources that enable you to maximize value of the capability delivery.

Using the Capability Resource Matrix can help you plan the resource developments needed for taking full advantage of your future opportunities. It is important to note then, that the Capability Resource Matrix is not meant as a static tool. Whenever (larger) changes in your surroundings occur, readdress the matrix and assess whether alterations to the resource developments are beneficial or needed.

TIP

Consider specific aspects related to implementation in the different locations such as who you will need to involve and to what extent. Often, it will be advantageous to have local resources take ownership, but with a continuous feedback loop to the central organization (company HQ).

Case example continued

In this case, the collaboration capability was mainly focused on running operations in one specific field. Therefore, the requirements identified for collaboration does not relate to the third level of the capability resource matrix.

The requirements that were identified for collaboration are mainly based on the work performed in step 3 of the Capability Approach. Because collaboration is an enabler of all operational capabilities, these requirements are generic and need to be related to the different operational capabilities more specifically. For example, what is considered relevant data and to whom it needs to be accessible for (requirement: “relevant data are distributable and accessible for the relevant roles when they need it […]”) is dependent on which operational capabilities we are considering.

These requirements also relate to different organizational functions. To give some examples, typically, training of personnel is one of the responsibilities of the Human Resources, the definition of work processes is the responsibility of different process owners, while the ICT department works on ensuring that the relevant technology is in place and accessible for the right people at the right time. Hence, these requirements show that there is a great need for different departments and roles to align their work in fulfilling their responsibilities related to building the collaboration capability.

Further, some decisions and work is not possible to initiate unless other decisions have been made. One example is that it is not possible to start training personnel in use of the relevant collaboration technologies unless the organization has staffed the roles and positions, a decision has been made regarding which collaboration technologies to use, and the technologies have been procured.

The minimum requirements that need to be met for successful execution of the collaboration capability are (initial level) given in table 2.

For the managed level of the collaboration capability, the control and active use of collaboration in execution of processes happen with time, training and daily familiarisation. Through this familiarisation phase, the organisation will also need to have mechanisms and systems in place for identifying what works well and what needs to be re-adjusted. This is particularly relevant in terms of preparing for scaling, but also an important point in general for showcasing the effect of the capability and whether one achieved the goals that were sought after both for employees and top management.

Table 2. Minimum requirements for successful execution of collaboration capability (initial level)

People	Technology	Process	Governance
• Personnel are able to use the relevant technologies, including collaboration technologies • Personnel are trained in collaboration across disciplines, organizations and locations • Personnel understand and commit to the extended collaborative way of working • Personnel are thoroughly familiarized with relevant governing documents, procedures, work flows, roles, responsibilities and mandates • Leaders/managers are actively championing the collaboration capability	• The appropriate IT architecture is set up • The appropriate communications infrastructure is set up • Relevant data are of sufficient quality (e.g. consistent, accurate, complete) • Relevant data are distributable and accessible for the relevant roles when they need it, across locations and organizational boundaries • Dashboards for management reporting are set up • Back-up solutions are in place • Collaboration technologies have been tested and positively evaluated • The appropriate collaboration environment has been built	• Work processes are defined, including when which roles are involved, with which competences, mandates and decision authorities, along the value chain • Work processes are defined in accordance with the operations' guiding principles for IO • Work processes take into account the necessary time use across activities • Work processes are defined to manage interfaces between processes and activities • Processes are defined for ensuring training of personnel • Process are defined for facilitating organizational learning, improvement and innovation regarding collaboration • Processes are defined for maintenance and support of collaboration technologies • Change management processes are defined and initiated	• The appropriate collaboration arenas are established • An organizational structure that ensures that decisions are made at the appropriate level is established • Appropriate contracts with interfacing organizations are established, including the necessary specifications of requirements that need to be met for integration across organizational boundaries • Appropriate incentive structure is established, facilitating collaboration across boundaries • Governing documents are clearly defined and comply with current regulations • Necessary investments and actions to meet the requirements for collaboration are made • Measureable goals are established for work processes

Table 3. Requirements for successful execution of collaboration capability at the managed level

People	Technology	Process	Governance
• Competency analysis are performed to tailor competency development and training needed • Personnel give feedback to further training needs or other requirements to successfully execute collaboration in their relevant processes	• Any concerns regarding the technological solutions have been assessed and corrected. • Any additional needs in terms of technology have been assessed and incorporated	• Change management processes are continued • Evaluation and refinement of work processes and flows in terms of efficiency, quality, safety and flexibility • Support processes (e.g. training, feedback, communication) are evaluated and necessary follow-up changes are performed • Cost-benefit analysis and assessment of goal achievement of the collaboration capability are performed	• Evaluation and refinement of the organizational structure • Evaluation and refinement of procedures, policies and other governing documents • Evaluation and refinement of incentive structures • Evaluation and refinement of contracts and agreements with external partners • Evaluation and refinement of data policies and strategies • Evaluation efforts are aligned with interfacing organizations

The requirements from the initial level still apply and need to be continued, e.g. continuous training of personnel in collaboration, leaders/managers are actively advocating collaboration, etc. Thus, the main requirements to the generic collaboration capability for the managed level add to those of the previous level and are listed in table 3.

In the predictable level, focus is on predicting future performance so that you are able to proactively manage your performance and identify improvement and innovation potentials. Again, requirements from previous levels still apply as these are essential for execution of the collaboration capability itself. Main requirements for the generic collaboration capability with respect to the predictable level are given in table 4.

Table 4. Requirements for successful execution of collaboration capability at the predictable level

People	Technology	Process	Governance
• Personnel are thoroughly familiarized with processes for improvement and innovations • Training of personnel in improvement and innovation methods and tools	• Databases for acquiring and retaining performance data • Tools for reporting and facilitate the use of performance data • Databases and tools for learning initiatives and knowledge management	• Periodic measurement and evaluation of performance for each work process are established • Ensure use of performance data to manage future performance • Processes for identifying and assessing improvement and innovation potentials are established • Processes for knowledge management are established	• Establish a structure that empowers personnel and ensures that decisions regarding improvements and innovations are made at the appropriate level • Establish baselines for work processes and appropriate KPIs

Table 5. Requirements for successful execution of collaboration capability at the adaptable level

People	Technology	Process	Governance
• Competencies to assess and perform improvement and innovation initiatives • Continuous improvement and innovation mindset/culture • Continuous learning across process- and organizational boundaries	• Continuous integration of new/improved/ needed technology	• Continuous improvement of processes • Continuous adaptation to new requirements • Continuous evaluation of improvement and innovation initiatives to feed into organisational learning • Continuous updating of learning processes at the organisational level	• Empowerment of personnel and work groups • Continuous proactive adaptation to laws and regulations • Proactive strategy and policy development • Flexibility in organizational structure • Active use of contacts and networks to identify near-future changes in opportunities, constraints

Finally, in the Adaptable level, continuous improvements and innovations are achieved by building on the resources that you have developed in previous maturity levels. The requirements associated with this level are shown in table 5.

From this case example, it is easy to see how using the matrix can be beneficial for planning and preparing for implementation of the capability as well as further development of it. The requirements easily demonstrate the interdependence between them, the responsibility for fulfilling them can easily be placed, and they can be directly transferred to an implementation plan with a given timeline.

Photograph: Institute for Energy Technology

Summary

This handbook on using the Capability Approach to IO has presented and explained the steps in performing the method. It aims to facilitate performance of IO projects through supporting the planning process by introducing a holistic perspective; pinpointing some key reflections throughout the project process as well as identifying key stakeholders and roles to involve in different phases.

The Capability Approach to IO can aid in prioritizing capabilities to be developed, identifying requirements for successfully delivering the capabilities, and identification, prioritization and development of reusable resources.

However, performing the steps of the Capability Approach to IO alone is not enough to succeed. In addition, there are other factors that impact the project execution and the outcome of it, such as leadership and management commitment, having some dedicated internal champions, capacity in the project execution and stamina to follow through the project from early planning phases and throughout the implementation.

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