

TNO report**TNO 2021 R12569****Elaboration of the requirements for
Collaborative Business Modelling for Industry**

Subreport to the KIP CBM4IND 2021

Strategic Analysis & Policy

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1 Requirements specification for collaborative business modelling for industry

1.1 Introduction

The world around us is changing rapidly and is impacting society as we know it – factors such as climate change, depletion of natural resources, population growth and urbanization are increasingly affecting our current as well as our future way of living. Without intervention, we will irreversibly damage society as well as our surroundings. Structural, immediate change is needed with regards to our current business practices and beliefs in order to address such challenges – change that is directed at improving sustainability. This change however is not easy to realize – it requires a *transition* from our current systems and structures towards a new dominant, sustainable mode of living. This call for transition is often met with resistance, as organizations or stakeholders are generally rooted in contemporary, often short-term norms and beliefs which have proven to work or have demonstrated to be beneficial. Accordingly, new sustainable business practices will only be considered or adopted if it is evidently clear that such practices are worthwhile in the long run. However, given the complex and multi-faceted nature of sustainability initiatives, involving many concurrent parties, each with different motivations, such long-term benefits generally can only be attained if all relevant actors commit resources towards developing and adopting such initiatives. Only if sustainable innovations are able to be implemented and proliferate in the market, its long-term benefits can be achieved. There is thus a need for a collective approach, built upon value co-creation, that facilitates the alignment between stakeholders in terms of achieving both individual and collective goals and that is able to mobilize stakeholders to commit and participate to novel initiatives. Through such an approach, we are able to support the development and implementation of sustainable initiatives and are able to accelerate our transition towards a sustainable mode of living.

In response to this need, we aim to develop such an approach through connecting theory on collaborative business modelling to theory on transition management, enhancing the development and marketization of sustainability initiatives through collaborative business models. Collaborative business models focus on value co-creation, in which a business network of stakeholders collaboratively works towards a central value proposition whilst ensuring that each stakeholder is able to capture (sufficient) value in return. The viability of the business model consequently defines and motivates whether it is worthwhile to participate. Such a dynamic interplay between stakeholders is also clear for sustainability initiatives, but in contrast to more traditional business initiatives, many different motivations, values (social, ecological, economic) may exist. Enriching collaborative business models through characteristics or themes central in transition management can enable this application of collaborative business modelling for transitions and help in accelerating sustainability initiatives.

In this report, we elaborate on the themes and associated requirements that decision makers for any sustainability initiative should take into account to support the subsequent design of collaborative business models and to increase the survivability of new sustainability initiatives. These overarching themes or

categories have been derived from an extensive literature review on related work on transition management, project management and business modelling. The following themes have been identified: *impact logic*, *regime breakdown*, *scalability* and *financeability*. Through the analysis of related work, we have identified requirements per theme that should be taken into account, serving as an operationalization of how the themes can be incorporated for the development of sustainability initiatives.

In total we have identified 16 requirements (4 requirements per category). An overview of these requirements can be seen in

I: Impact logic
R: Regime breakdown
S: Scalability
F: Financeability

. Per requirement, we indicate what it means and what the implication of the requirement is if not considered. Per requirement, we also make explicit to what extent and in what way the requirement has been considered in practice, building upon a preliminary application of the requirements in three sustainability-oriented projects.

The set of requirements should be used by decision makers in sustainability-oriented projects to reflect on whether (the requirements for) the important themes have been addressed. In case requirements have not or only sparsely been applied, this implies that certain risks are incurred in terms of fostering the adoption of the solution, understanding the appropriate business structure or controlling the risks that underlie to proposed solution.

1.2 Reading guide

In the following chapters of this document, we will elaborate on each theme as well as the requirements that have been identified. Per theme, we will indicate when it should be considered for the collaborative business modelling process and highlight the requirements that are associated to it.

Table 1 gives an overview of the requirements per theme. The abbreviations are the following:

I: Impact logic
R: Regime breakdown
S: Scalability
F: Financeability

Table 1: Overview of the requirements for collaborative business modelling

I1	The impact goals for the project should be explicitly defined and quantified
I2	The impact goals should be specified per project as well as per stakeholder, for which the synergies and conflicts between project / stakeholder goals should be analyzed
I3	The causal logic (cause-effect) towards achieving the impact goals should be clear and sound, for which the assumptions and associated risks should be identified.

I4	The minimal prerequisites towards achieving the impact goals should be specified
R1	The legal, regulatory and fiscal barriers towards the execution or scaling of the project / sustainability initiative should be explicitly defined and analyzed
R2	The organizational barriers towards the execution or scaling of the project /sustainability initiative should be explicitly defined and analyzed
R3	The social barriers towards project execution should be explicitly defined and analyzed
R4	Engagement strategies regarding regime stakeholders (i.e. direct, indirect and market stakeholders) should be specified, detailing how such stakeholders are engaged for decision making to shift or phase out the regime
S1	The scaling of the internal project structure and environment to achieve the proposed impact should be explicated and quantified
S2	The roadmap towards internal project scaling , including scaling strategies, cost-time resources scenarios and mechanisms that are involved, should be defined
S3	The scaling intentions or goals after the project has been completed (post-project scaling) should be expressed and explicated
S4	The roadmap towards post-project scaling, including indications of what scaling strategies or mechanisms are used
F1	The investment structure and cost distribution should be explicated and analyzed temporally and per stakeholder and governed throughout the project
F2	Acquisition / engagement strategies to collaborate with investors , to increase investments, or to mitigate funding deficits for the project should be defined
F3	The commercial viability and feasibility of the proposed solution / intervention should be demonstrated to stimulate the acquisition of investments
F4	The business case analysis for the project should clarify key risks associated with the investment structure and the stakeholder network and should incorporate mitigation strategies to address these risks

2 Impact goals and logic

2.1 Introduction and context

Impact logic refers to the *logic* or *line of reasoning* through which a project or business initiative expects to achieve its impact goals. Such impact goals may take the form of economic wealth, may relate to improved social standards or welfare or may address and improve environmental challenges.

Logically, such goals should be clearly defined and explicated such that one can measure or monitor when a novel initiative or project can be considered successful. Generally speaking, this is typically included for any novel initiative, as it serves as the basis for communication, transparency and commitment amongst relevant stakeholders. However, we often see that novel projects do not explicate or even assess:

- how such impact goals should be achieved
- how project outputs (are expected to) lead to various desirable and undesirable outcomes, and how those outcomes lead to other outcomes and eventually to impact
- what resources are needed and when to achieve project outputs and subsequently impact goals
- how the progress towards achieving such impact goals is measured, validated and verified
- what the role of the collaboration is for achieving such impact goals
- what value in return each stakeholder is able to capture through participation in the business initiative and,
- why this is relevant for each individual stakeholder in the initiative

Achieving impact goals is often a **collaborative effort** – projects generally constitute of a wide variety of deliverables and outputs, collectively contributing towards impact. Such outputs and deliverables however are generally dispersed over the various stakeholders involved for the project, making it difficult for stakeholders to independently control the outcomes of the project. Here, the efforts of many concurrent stakeholders in close collaboration is required to ensure deliverables are aligned and thus to achieve impact goals. Given that achieving impact goals is an activity that may span several years, an explicit and temporal assessment is needed on how the efforts of each stakeholder contribute towards achieving the impact goals, and what assumptions are made regarding the cause-effect logic for achieving impact (if an intervention is made, why *does* this lead to a certain impact, and what risks or uncertainties may be associated?). Without a clear plan of action and a thorough assessment of how this will contribute towards achieving the intended impact, projects may fail to reach the intended impact, as implicit assumptions were not validated, risks were overlooked or the cause-effect logic followed was not cohesive or comprehensive.

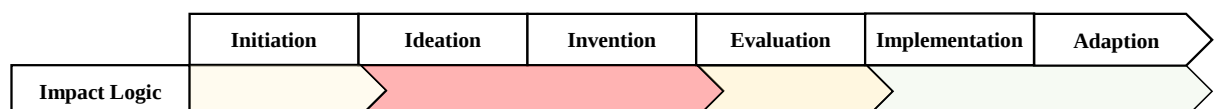
In addition to understand the **path to impact**, the impact to be generated itself should also be considered in light of the stakeholders that either contribute towards establishing this value or are considered as the main beneficiary of the proposed impact. Stakeholders may participate in novel initiatives for various reasons or motives. For example, private companies (such as investors, technology providers

or service providers) often pursue economic goals as the main driver for participating in novel business initiatives, whereas governments or non-profit organizations focus predominantly on achieving environmental or social (impact) goals. These objectives may play in different timeframes, e.g. sales related to innovation typically precedes the actual usage and deployment and eventual impact of that innovation. Such stakeholder concerns and motives influence whether the overall goals of a project can be achieved, as failing to meet individual stakeholder goals will result in stakeholders or partners dropping out or losing commitment, hindering or halting project execution.

Therefore, it is not only important to understand how the proposed impact will be achieved, but also to consider how achieving this impact can be beneficial for other stakeholders in the business network or ecosystem, and whether the overall impact goals align with or can exist next to the individual goals. For example, it could be the case that even though all stakeholders in the business network are satisfied as their individual economic goals are achieved, these individual economic goals are actually at the expense of the overall environmental goals set for the project. Similarly, achieving overall social impact goals may put significant pressure on individual stakeholders to achieve their economic goals, making it difficult for such individual stakeholders to continue their participation. Impact logic therefore calls for an explicit consideration of *what* is to be achieved, *how* and *when* this is achieved through the collaboration of stakeholders, and *why* this is relevant for the stakeholders in the business network or ecosystem.

1. When should impact logic be considered for the collaborative business modelling process?

Impact logic is essential to explicate goals and understand how the goals through collaborative business efforts will be achieved. It serves as the strategic foundation for further concretization of the project or initiative. Accordingly, impact logic should be considered at the early stages of the collaborative business modelling process, already being considered for the *initiation stage* (what is the current stakeholder landscape and what challenges are present, and how can impact logic contribute in explaining this) and feature prominently for the *ideation and invention stage* of the CBM process. For the ideation stage, the business collaboration focuses on finding solutions towards achieving the identified impact goals (why would a certain solution result in the expected impact), which are further concretized for the invention stage. Here, it becomes apparent how the impact goals can actually be realized in terms of the business model structure ("if we conduct these activities, we will achieve impact X"). In the *evaluation stage* also the impact logic should be evaluated – does it still hold or should the business model design be altered? Once the overall business model design is agreed upon (implementation), the impact logic becomes less important, although should still be considered in light of how activities are implemented or resources are deployed.



2. Tools that can be used to support impact logic

Theory of change, benefits-realization mapping, value creation canvas, dialogic design, value network analysis

❖ **I.1. The impact goals for the project should be explicitly defined**

Description

Requirement I.1. concerns the definition and specification of the impact goals that are set for a business initiative or project validates that such impact goals are *explicitly* defined. The impact goals should be captured in the form of a textual description or through a graphical representation to support the establishment of a shared vision for the collaboration, and to stimulate the transparency and subsequent communication of these goals both internally (business network) as well as externally (ecosystem).

Practical implication

Without *explicit and quantified* impact goals, stakeholders may form inconsistent or even incorrect perceptions regarding the goals and intentions of the project. This may even hold for *implicit* impact goals (for example, *spoken*), as such goals are heavily subjected to practices of interpretation and sense making. As a result, misalignment between stakeholders in the business network may occur, which in return may result in resources being ineffectively or inefficiently used. In the case of sustainability-oriented projects, such resources may correspond to public resources (subsidies, taxes) which is even more troublesome. In addition, the lack of *explicit* goals may decrease commitment amongst business network stakeholders, as without explicit goals it is difficult to determine concrete steps towards achieving such goals. Consequently, stakeholders may only act passively or even refrain from acting towards project progression.

❖ **I.2. The impact goals should be specified *per project* as well as *per stakeholder* and critically compared**

Description

Requirement I.2. addresses the need for business initiatives or projects to define goals on both the *stakeholder* as well as *ecosystem* level. As mentioned, both *project level impact* goals as well as *stakeholder* impact goals can be distinguished. Logically, stakeholders have individual goals that they desire to achieve through project realization, which should be mapped and assessed with regards to the overall goals of the project, as such goals may be conflicting. Stakeholders may have goals which are solely economically oriented, for which it should be assessed whether these can be satisfied and whether these conflict with social or environmental goals which other stakeholders (or the project as a whole) may pursue. Additionally, for the proposed impact goals, it should be evaluated whether the main beneficiaries of the goals actually deem the proposed impact to be valuable. The goal of the requirement therefore is to understand the *overall goals*, the *individual goals* (per stakeholder), and to assess how these goals fit or compare to each other, understanding where potential conflicts may lie or where synergies between goals can be established (and how this should be mitigated or facilitated).

Practical implication

If individual goals for stakeholders in the ecosystem are not met, particularly for those stakeholders that actively contribute towards project execution or realization, such stakeholders may be inclined to put less effort towards the completion of the project, or may even withdraw their participation. In turn, this may negatively impact

project execution or even project success. In addition, a lack of explicating goals on a stakeholder perspective makes it difficult to understand how each stakeholder intends to benefit through participation. As result, it is difficult for other stakeholders in the ecosystem to support mutual stakeholders in achieving such goals. In addition, goals may even conflict, resulting in stakeholders working against the goals of the overall project, negatively impacting the execution or success of the project. Therefore, both individual goals and their relationship to overall goals should be mapped and assessed / compared.

- ❖ **I.3. The causal logic (cause-effect) towards achieving the impact goals should be clear and sound, for which the assumptions and associated risks should be identified.**

Description

Requirement I.3. addresses the need for sound and clear reasoning with regards to how impact goals are achieved. The **realization** of goals calls for a structured consideration of how the goals are achieved, detailing the process, stages or steps towards achieving the goals, as well as at what point in time each step is undertaken. In addition, the role of the business network or ecosystem should be considered here. For example, it should be clear how activities conducted in the business network are dependent on each other (highlighting the *critical path* of the project), how these activities serve as input for future activities, and what partial impact is established through each activity (and how does this partial impact contribute to the overall goals of the project?). In close connection to requirement I.2., this should also make explicit why the impact generated is actually relevant for a specific stakeholder as well as the project as a whole. Logically, as this involves significant uncertainty (as the exact effect of steps taken may be difficult to predict), each of the steps should be accommodated by a structured analysis of the (critical) assumptions made and the associated risks

Practical implication

Without **realization management** of goals, offering a clear plan of action towards achieving the goals set, it becomes difficult to understand when resources and competencies are needed, and to what purpose resources are applied to achieve partial or overall impact goals. Consequently, resources may not be used efficiently or may even be wasted, as the intended deadline for application of such resources is not met. As a result, project costs may increase significantly, or the project may not achieve its intended goals as tasks specified within the project were not completed in time.

- ❖ **I.4. The minimal prerequisites towards achieving the impact goals should be specified**

Description

Requirement I.4. is used to validate whether the minimal prerequisites towards achieving the impact goals are specified. This covers the *minimal* resources, competencies and capabilities that are needed to achieve the impact goals as well as *what activities should at a minimum* be conducted to still be able to achieve the impact goals. Consequently, what impact does this have for the stakeholders that are responsible for executing these activities. Do they currently have or will they have at the time of occurrence the resources needed to conduct their activities? In

what way do activities of stakeholders relate to other stakeholders in the business network? What are the dependencies between stakeholders to execute or conduct the planned activities? This requirement aims to verify what the *critical path* is for the project (e.g. deviations cause delays regarding the execution of the project) and to identify the minimal prerequisites (resources, competencies and capabilities, which can reside at different stakeholders) that are needed to still be able to execute the project and to achieve the impact goals. Having an understanding on the minimal prerequisites can help the collaboration in identifying severe risks regarding project execution, but also enables the collaboration to set-up mitigation plans (for example additional partners that can be acquired to support activities) to reduce the impact of the associated risks.

Practical implication

Without a clear indication of the minimal prerequisites needed to achieve the impact goals, it decreases the transparency on how impact goals are achieved, whereas it becomes difficult to respond to changes in the available resources or competencies for the project, as it is not explicit how these resources relate to achieving certain project tasks or steps towards achieving the impact goals. As a result, internal or external project deadlines may not be met (as resources are lacking which are needed to advance the project), or new resources are acquired which are not really used for the remainder of the project.

2.2 Practical consideration of impact logic in the set of case studies

In terms of NSE and Porthos, we see that both projects are quite explicit on the goals to be achieved (corresponding with I.1.), considering this both on a project level as well as a stakeholder level. With regards to the project level impact, the Paris climate agreements pose that to preserve our current way of living as much as possible, taking into account both social as well as environmental aspects, we as a world should reduce our CO₂ emissions significantly in order to limit the global rise to temperature to *at most* 2 degrees Celsius. Considering the current governmental (Dutch) agreements, a reduction of 45 megaton CO₂ has to be achieved in 2030 for the agreements to be satisfied with regards to the Netherlands. Both projects, even if instigated from different perspectives (NSE focusing on EU wide collaboration with Porthos focusing on reducing the impact of the Harbor of Rotterdam), acknowledge that the North Sea can serve as a valuable asset in achieving the climate agreement goals, as the already empty or soon to be empty oil reserves in the North Sea can serve as reservoirs for the storage of CO₂, thus reducing the emissions of CO₂ and its effects on global warming. In addition, the generation of wind energy can replace traditional, CO₂ heavy sources of energy, further contributing towards decreasing the emissions of CO₂. In light of project goals, NSE aims to realize a reduction of 7 megaton CO₂ per year, whereas Porthos aims to store 37.5 megaton CO₂, reaching a yearly storage of 2,5 megaton CO₂ based on the current actors that are involved. However, what could be improved is to make explicit in what way this contributes to the reduction in temperature, and under what conditions the project can be considered successful.

This explication of goals is also largely considered for stakeholders participating in the project (I.2.). For example, a thorough analysis is conducted of the perceptions of the public, knowledge stakeholders, North Sea users and Oil and Gas companies on the expected value of the intervention in light of the proposed impact goals, as

well as what concerns and motives exist for these stakeholders regarding assumptions made to achieve the impact goals. In addition, the general motives to support or participate in the project were assessed (what benefits do fishers see with regards off-shore CO₂ storage and wind farms, or are solely negative effects in play?). Conflicts between stakeholder groups are assessed and served as input for how to engage the partners or stakeholders for the remainder of the project. For Porthos, this investigation was less thorough, focusing more predominantly on the companies or institutions required to support the proposed intervention, rather than the ecosystem (and what value participation could bring these parties – for example, Shell benefiting from the storage of CO₂, working towards *green production*).

In contrast, the ***path towards*** achieving the impact goals (e.g. preliminary activities that are conducted to each partial impact goals or the steps taken towards achieving the goals) is not explicit (I.3.). Whilst this can be attributed to the fact that both projects are still in exploratory phases of development (e.g. focusing on understanding the technical implications of the proposed intervention or identifying the business landscape in terms of attracting investors or oil companies to provide CO₂), even a generic or high level roadmap could help in shedding light on how activities are interlinked and how they contribute towards achieving the impact goals. When are what activities required to happen, how much CO₂ do we expect to receive in order to achieve the partial impact goals? Such cause-effect relationships are not really explicated – both projects focus predominantly on specifying scenarios (2030 and 2050) and *what* should be achieved (often taking an economic viewpoint, for example under set conditions a positive business case can still be obtained), but not on *how* this is to be achieved.

This lack of clarity also translates to how activities relate to each other, and what interdependencies exist between activities and thus what resources are needed when (I.4.). For NSE, this is somewhat expected as the project largely concerns *researching* the effects of CO₂ storage and wind farming on decreasing the impact on global warming. Again, both NSE and Porthos indicate scenarios for which the business case is acceptable, but do not provide an indication of the roadmap towards achieving this, clarifying in detail what resources *at a minimum* are needed and their respective timing within the project. Accordingly it becomes difficult to assess where potential risks lie for the projects and how these should be mitigated.

3 Regime breakdown

3.1 Introduction and context

Regime breakdown or transformation of the regime concerns (breaking down, shifting) the dominant socio-technical, institutional and legal mode of thinking or paradigm as a result of the execution of the project and achieving the impact goals. A novel sustainability-oriented business initiative or project is driven by a form of innovation (either incremental or radical) that emerges because of opportunities or challenges posed by the current status quo, but as a result also challenges the status quo. When transitioning to a new status quo, we observe that such innovations (for example novel technologies) increasingly replace existing solutions and form the novel regime. For example, energy providers increasingly investigate *green sources* of energy to generate less emissions of CO₂. Traditionally, central heating of households would be conducted via gas boilers, which are effective to control the temperature within a house(hold) but generate significant amounts of CO₂ in the process. Driven by the pursuit for *green sources* of energy to reduce climate effects, and fostered by the new emergent technologies such as the use of heat pumps, we observe that the current regime is increasingly acknowledging the value of heat pumps, moving towards the adoption of heat pumps as the status quo for providing heating / energy. This adoption represents a gradual process in which stakeholders shift their current way of thinking and standardized practices (installing households with gas boilers versus ensuring isolated households equipped with heat pumps) to accommodate this phase out / phasing in and to facilitate heat pumps to become part of the status quo. Such adoption can only be facilitated if one truly understands what the current regime is, i.e., what are the current policies, perceptions, standards and norms that exist for the regime or ecosystem of stakeholders, and in what way does the proposed solution central to a sustainability project go against these norms or standards? Consequently, how can we facilitate that these norms, standards and policies to change to accommodate the adoption of the innovation? How can we involve governments, institutions or businesses to foster this change? How can we facilitate the widespread adoption or diffusion of the innovation to become part of the new status quo? Without understanding the current regime and consequently challenging and breaking the regime, novel innovations remain innovations without clear implementation or impact for the market. Particularly in sustainability projects, interventions generally demand significant changes for the current mode of thinking or go against the current standards and norms dominant for the regime. To generate impact through sustainability projects, such norms and standards have to be altered or adapted to facilitate a sustainability intervention to become a success or to generate an impact. Accordingly, this calls for adoption of the intervention amongst stakeholders in the ecosystem / regime, and the subsequent diffusion of the intervention over the regime to become the new dominant mode of thinking.

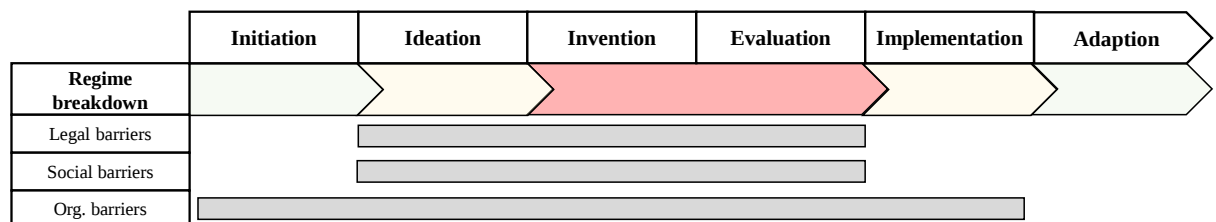
1. Timing for collaborative business modelling process

Regime breakdown becomes important as soon as the intervention or solution central to a sustainability project or initiative becomes clear, as at that moment it becomes key to understand the current regime in which the intervention or solution is to be positioned and what forces or barriers exist to prevent the intervention / solution to become part of the status quo. Without paving the way for adoption and

responsibly shifting or phasing out the regime where needed, it will become significantly difficult or even impossible to generate adoption of the novel solution, as stakeholders for the regime will in such cases opt for existing (certain proven, favorable, easy to understand) solutions, failing to capture the intended impact.

For example, we observe that coal-fired power stations have gradually but responsibly been phased out for the current energy landscape as wind-based energy generation started to emerge. Understanding the traditional regime in terms of the current stakeholders and their needs helped in support this change (subsidizing coal-fired power stations to close down). Accordingly, analyzing the regime and identifying what regime changes are necessary can take place already from the start of the sustainability initiative or project (to *mitigate* or *breakdown* organizational barriers), and intensifies once the business model design, e.g., the concrete logic of how the intervention will create and capture value, is established and evaluated (as part of the *invention* and *evaluation stage*).

A differentiation can be made between the types of barriers that can be considered for regime breakdown and their timing for the collaborative business modelling process. Organizational barriers (the current beliefs, standards and logic of the organizations in the regime) are relevant throughout the process, requiring a collaboration to understand early on what stakeholders are present and what their motivations are, up until the actual implementation of a concrete business model design to stimulate its adoption. Social and legal barriers become relevant as soon as the intervention / novel solution is clear and should be considered actively up until the evaluation of the business model design (after which these barriers should not pose issues regarding the implementation of the business model design). Here, legal barriers may refer to both barriers related to regulatory concerns (laws in place that potentially inhibit the success or impact achieved through new solutions) or fiscal concerns (barriers that relate to whether the project actually can be executed, having a strong link with the financeability of the project as a whole).



2. Tools to support regime breakdown

- Stakeholder analysis, Multi-level perspective, use case scenarios

❖ **R.1. The legal barriers towards the execution or scaling of the project / sustainability initiative should be explicitly defined and analyzed**

Description

Requirement R.1. validates that legal, regulatory and fiscal barriers towards the execution or scaling of the sustainability initiative or project are explicitly defined and analyzed. Current regulations and laws, as well as future plans towards changing these regulations or laws may significantly affect whether a novel intervention is likely to be adopted as part of the regime, and may thus affect whether the project or sustainability initiative can be executed or scaled. Current or

established laws are not necessarily catered to novel sustainability solutions or interventions, and thus may either limit or halt the implementation of the proposed intervention (in cases where the law actually prohibits a novel solution), or may disfavor the attractiveness or adoption of the proposed intervention (current laws make it more attractive to stick with existing solutions as these are more favorable in terms of expected economic returns or simply because it is less of a hassle to build or leverage existing solutions). Therefore, current laws, policies and regulations should be assessed with regards to the expected impact of the proposed intervention in comparison to existing solutions, whereas potential conflicts should be analyzed and mitigated to support the adoption of the solution by the regime. This may involve either *coping* with the legal boundaries posed or to plan activities (e.g. lobbying or involvement of local governments) to set steps to adjust policies for the long run. On the other hand, fiscal barriers should be analyzed to understand whether the project offers a financial incentive to even conduct. Without clear incentive structures, relevant stakeholders may refrain from participation or from conducting initial investments to kickstart the project. As a result, it may significantly inhibit (or even stop) the development of the project.

Practical implication

If the legal and regulatory barriers towards the proposed intervention (in comparison to existing solutions) or towards project execution are not mapped and assessed, the necessary adoption of the proposed intervention to become part of the established regime may not be reached, resulting in limited project success and impact, or even project failure. For example, if laws and policies are in place that disfavor the adoption of the proposed intervention (as the laws make it more attractive, in an economic or legal sense, to opt for existing solutions or standards), and these laws and policies are not mitigated in any way, then logically the regime will opt to leverage existing solutions rather than to adopt the novel proposed intervention or solution. It could even be the case here that laws will gradually change over time in favor of the proposed intervention, but as currently the laws favor existing solutions, the regime will stick with the status quo. Considering that novel interventions generally take time to become established and accepted for the regime, and that the impact generated through the intervention depends on its timely adoption, the intervention likely may not generate the impact as intended or planned, resulting in limited project success or impact. Accordingly, failing to identify legal barriers early on may have significant risks for meeting internal and external project deadlines, for ensuring that resources are efficiently and effectively used and even for fostering project success. Similarly, without addressing fiscal barriers towards project execution, stakeholders may lack explicit commitment or reason to participate.

❖ **R.2. The organizational barriers towards the execution or scaling of the project /sustainability initiative should be explicitly defined and analyzed**

Description

Requirement R.2. verifies whether the organizational barriers towards project execution have been explicitly defined, analyzed, and (in case of conflict) how these are handled or addressed. With organizational barriers, we refer to organizations, institutions that exist for the current regime, and thus are accustomed (but also are bounded) to existing norms, standards and beliefs which may impact to what extent the novel intervention or solution is adopted. In a regime, organizations have

adopted standardized ways of working that have developed over the course of years or even decades of optimization and improvement, creating *inertia* or *lock-in* with regards to what technologies, solutions or competencies are used (organizations are prone to leverage current knowledge, competencies and experience to solve emergent problems or challenges). Novel solutions or interventions (particularly those that are radical in nature, built upon innovative technologies or entirely novel ways of thinking) consequently are met with skepticism or are significantly challenged or questioned, as these interventions do not comply with the current status quo. Such interventions may even go against or contrast to the current status quo (for example an intervention renders a technology currently adopted to be invaluable), affecting all stakeholders that build upon the status quo.

As an example, Take the introduction of 'vegetarian burgers or meat', which was met with heavy resistance of regime stakeholders as the traditional business logic was built selling meat-based products. Here, existing stakeholders were against such vegetarian products to adopt names such as 'sausage' or 'burger', as these traditionally were connotated to meat-based offerings (thus losing the opportunity the differentiate such offerings in terms of their name). Such conflicts can make it significantly difficult for a new intervention or solution to be adopted, especially if stakeholders in the regime have significant power for the market – either through possessing a large customer base or through possessing significant equity to counteract changes in the market.

To facilitate the adoption of novel interventions therefore, such organizational barriers (e.g. understanding the market players) should be mapped and analyzed, for which conflicts should be managed or mitigated.

Practical implication

Without an explicit consideration of organizational barriers and a concrete plan on how conflicting barriers should be addressed, novel interventions or solutions may fail to be adopted, as the regime will opt for existing solutions or standards (as the barriers towards the novel solutions are still in place, rendering the novel solution to be impossible select or make the novel solutions less favorable). As a consequence, the project may not or only partially reach its intended impact goals, as the intervention is not adopted for the regime and has not become part of the state-of-the-art. In addition, organizations present for the regime may even actively work against the proposed solution, further reducing the proposed impact the project is aiming to generate. This results in the risk of failing to generate the proposed impact, failing to reach internal or external deadlines for the project and the risk of waste or inefficient use of resources.

❖ **R.3. The social barriers towards project execution should be explicitly defined and analyzed**

Description

Requirement R.3. verifies whether the social barriers towards project execution have been explicitly defined, analyzed, and (in case of conflict) how these are handled or addressed. Here, social barriers refer to the perceptions of the public, impacting how the project is executed or whether the intended impact goals are actually relevant and needed. For example, reaching the impact goals may require

a collaboration to conduct activities which generate significant negative externalities for the public that lives close to where the project is executed. This in turn may generate public dissatisfaction with the project, which could affect the overall success of the project. Accordingly, these perceptions should be carefully considered and mapped. Again, if such social barriers create conflict, an explicit analysis should be given on how the project collaboration to mitigate these conflicts (either *breaking down* the regime or *coping* with the social boundaries posed). Alternatively, social barriers or perceptions can also stimulate the execution or conception of a sustainability project, as the current social landscape calls for changing the current regime as this in the long run could benefit the landscape (think about the increasing activism towards reducing climate change). In such cases, it is also valuable to understand and define the social barriers or perceptions such that these can be leveraged to further stimulate project execution.

Practical implication

If the perceptions of the public are not taken into account and adequately addressed (e.g. conflicts preferably being resolved or mitigated), public outrage or dissatisfaction is likely to be generated. If this dissatisfaction is escalated (e.g. involving government bodies or non-profit social institutions), this may significantly affect the execution and continuation of the sustainability project or initiative, resulting in deadlines not being met or in general the project not reaching its intended goals.

- ❖ **R.4. Engagement strategies regarding regime stakeholders (i.e. *direct*, *indirect* and *market stakeholders*) should be specified, detailing how such stakeholders are engaged for decision making to shift or phase out the regime**

Description

Requirement R.4. verifies whether, in light of the highlighted barriers towards regime breakdown (i.e. legal, organizational and social), engagement strategies are specified for the regime stakeholders to foster regime breakdown, either by including relevant stakeholders for the decision making and development process in the project or by involving stakeholders early-on to create transparency, to highlight the importance of the to be generated impact and the role of the respective stakeholder. Both strategies are aimed at stimulating the adoption of the proposed solution and enabling the novel solution to gradually become part of the new status quo. Regime stakeholders can be differentiated between *direct stakeholders* (those that are essential to the project, but are not actively part of the collaborative business model design, such as investors or governments), *indirect stakeholders* (that are present in the regime but do not necessarily have an active role for the intervention, but should be managed as they are affected by the solution, such as the public) and *market stakeholders* (stakeholders that will use the intervention after the project, but are not involved for its execution, e.g. private or public end-users and customers). Depending on the stakeholders present for the regime, engagement strategies per stakeholder group should be specified either to actively take such stakeholders in account for the decision making process or to establish transparency for the project such that stakeholders are not dissatisfied or generate resistance with respect to project execution.

For *direct stakeholders*, one may think of banks and governments which are often already passively involved for the sustainability project (approving project execution or facilitating the deployment of interventions), but their role can be further enhanced or extended depending on to what extent they are included for the decision making. Involving such actors early can avoid running into legal, financial or operational issues regarding project execution.

For *indirect stakeholders*, for example, consider how to inform fishery stakeholders on the efforts to be conducted for the underground storage of CO₂, which can already help in ensuring that such stakeholders at the very least are not dissatisfied and as a result do not generate resistance for the project.

Lastly, for *market stakeholders*, plans regarding the involvement of end-users can be drafted to ensure that the solution after project execution is continuously used.

Practical implication

Without a clear consideration of how stakeholders will be engaged to participate for the project or will be involved for decision making, it will be difficult to create transparency in terms of what is asked from each of the stakeholders, and to motivate stakeholders to contribute to the business modelling initiative or to stimulate their acceptance of the project. As a result, stakeholders may not be inclined to support project execution, may be dissatisfied and consequently generate resistance or may not consider to adopt the solution and accept it as part of the new status quo. This in turn may impact the timing and execution of the project, as well as severely affect the impact that can be generated through the project. Furthermore, without concrete engagement plans (particularly for *direct stakeholders*), the business collaboration more or less will have to react in an ad-hoc fashion to changes for the business structure, as it takes time for such stakeholders to be involved for the project if need be.

3.2 Practical consideration of regime breakdown in the set of case studies

Regime breakdown is only partially considered for both NSE and Porthos. Both NSE and Porthos conduct a thorough assessment of the laws and policies that are currently in place with regards to the execution of the project and the implementation of the proposed intervention (I.1.) (storage of CO₂ in empty reservoirs, as well as the generation of wind energy and green hydrogen production, as well as how related laws are bound to change over time), how these laws and policies may affect the expected impact generated through the intervention or may conflict with project execution. This generally concerns how laws and policies impact the technical feasibility of the solution and its resulting effect on the business case underlying the proposed intervention (is it still a good idea to conduct this project?).

For example, laws are considered related to how the European Union aims to preserve and protect the marine environment as well as how marine space is used, which logically may be affected in case off-shore oil platforms are used to store CO₂ (generating negative externalities such as vibrations or noise). Similarly, national laws and policies related to how electricity that is generated offshore can be used are considered and challenge. For example, laws exist that dictate that the electricity network in place for the North Sea is solely to be used to transport off

shore generated electricity on shore. This would go against the intervention foreseen, for which electricity is used to produce green hydrogen offshore. To use the electricity network for the production of green hydrogen offshore, such policies thus should be challenged. In addition to Porthos, NSE also clarifies mitigation plans to address any conflicts generated (for example, to lobby and involve the government early on to establish more favorable policies supporting the adoption of the novel intervention).

Similarly, in regards to R.3., particularly NSE dedicates significant effort towards understanding the perceptions of the public, and how the proposed intervention may affect or conflict with the (perceptions of the) public. This involved understanding whether the public negatively or positively responded to a set of claims made regarding the need for and expected impact of the proposed intervention, in order to make explicit what characteristics of the intervention may generate resistance of the public (and thus limit its potential for adoption by the regime). Consequently, in a more general sense, NSE defined action steps towards engaging or informing the public regarding the value and impact of the project / proposed solution.

However, we see that both NSE and Porthos remain rather limited in terms of their analysis of existing organizational barriers (I.2.), analyzing the current regime and what barriers may exist towards the adoption of the proposed intervention / solution. Whilst the perceptions of relevant stakeholders in the regime are taken into account, there is little consideration for whether the solution can become part of the status quo, and importantly what conflicts it may have as opposed to existing solutions or organizations for the regime. Both projects essentially consider the solution to be 'valuable', hence not further investigating how it may destroy the value of existing solutions that represent the current status quo. As a consequence, it could very well occur that the solution is not adopted as it significantly goes against the standardized or traditional business practices of the existing regime stakeholders, or even though the solution is considered 'nice to have' would require significant startup or investments costs which current solutions do not require. Through participation in NSE, organizations can thus 'act' as if they are moving towards green or sustainable solutions, without actually changing their current practices.

This is also reflected in the engagement strategies that are presented for each of the regime aspects (R.4.): Whilst communication interfaces have been established to engage governments and the public for the project, reducing the barriers that may exist towards implementation of the solution, we see that engagement strategies to stimulate the adoption of the solution are somewhat lacking (further reducing the organizational barriers towards reaching the intended goals). Whilst it is explicitly clear what organizations in a financial sense may be able to benefit from the solution (organizations such as Shell being able to offload CO₂ and thus being able to achieve a 'greener' production), it is not apparent what stakeholders will maintain the solution after completion of the project. Who will be responsible for the day to day activities and to what extent has this been upfront already discussed and communicated. Both projects are still in early phases of development, but such questions can already generally be highlighted and answered to stimulate stakeholders to think about it.

4 Scalability

4.1 Introduction and context

Scalability refers to the embedded capability for a project or sustainability initiative to either enhance, extend or increase the efforts conducted for the project to increase the expected impact that is generated. Scalability is often key to achieve large-scale impact: projects generally start on a small scale or in test-bed environments, allowing stakeholders to maintain more control over the project and allowing activities, technologies and practices within projects to mature. Novel technologies are often uncertain and untested. Applying such technologies in smaller settings can help in understand how these technologies can be improved and help in accelerating such developments. Consequently, when the technologies or solutions have demonstrated their prowess, the projects can be scaled further (but building on a more validated and robust basis).

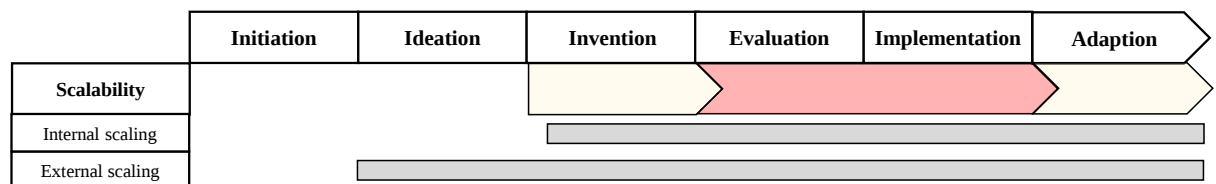
Scalability can relate to many aspects of collaborative business models, whereas scaling intentions may be specified for the *current project* (e.g. *internal project scaling*) or after the project has been completed (*post-project scaling*). For the latter, one can consider the scalability of the expected solution or intervention post completion, and thus the resulting additional impact that can be generated. For example, the implementation of a solution or intervention can be confined to a bounded environment, offering limited opportunities for scalability (take the example of an intervention that builds upon natural resources only available in a specific set of locations), or can be robust and generic in such a way that the solution can be expanded over many locations or areas (a solution being deployed globally rather than locally), or can be adapted easily to accommodate different end-users. For the former, scalability however can also relate to *inter project* scalability, being able to benefit from economies of scale to improve activities conducted or processes executed as part of the project, as well as the degree to which it is more or less easy for actors in the business network to scale.

For collaborative business models, it is key to understand in what way scalability impacts the *business network* that supports the novel intervention or solution. Collaborative business models built upon the contributions of and exchanges between individual stakeholders, creating significant dependencies between stakeholders to create value for a project or initiative. Accordingly, if one has the intention to scale an intervention or solution (to generate increased impact), one has to carefully understand what this means for the stakeholders that are involved for the collaborative business model, and what this means for their current way of working / business. For example, scaling an energy trading platform means that the infrastructure on which the platform is built should be able to support this. Accordingly, the intent to scale the platform has significant implications for the stakeholders that are responsible for maintaining or expanding the platform, as well as for stakeholders on which the infrastructure providers may depend (think of software developers that may support the proposed solution). Additionally, here, one should question whether this infrastructure provider is even able to scale at all, or whether the current mode of operation serves as the limit? Furthermore, would scaling actually be beneficial for the incorporated stakeholder(s)? Would their current business model even be appropriate for scaling? In line with impact logic,

would these stakeholders actually be able to capture value as a result of the scaling intentions, or would the imposed need for scaling generate difficulties to still be able to capture value? Such motivations, dependencies and challenges towards scaling for the business network should be clarified before any scaling intention (either for the current project or post-project) can be made explicit. Next, one should specify what strategies can be adopted to achieve these scaling intentions. Can, for example, scaling be achieved through differentiation? Can organizations engage in joint-ventures to achieve scaling? Such mechanisms of scaling should be clarified to reach the scalability intentions. Failing to do so may significantly burden the business network or individual stakeholders in the network, committing resources towards scaling intentions which ultimately are not used (as it turns out that other stakeholders in the network are not able to scale) or resulting in stakeholders that are not able to capture value as a result of scaling (as their business model currently in place does not accommodate the scaling intentions).

1. Timing for the collaborative business modelling process

Embedding scalability for novel sustainability projects or initiatives becomes important as soon as the proposed intervention or solution central to the initiative becomes clear, related to the *ideation stage* of the collaborative business modelling process. At this stage, the collaboration should consider, in addition to understanding what impact to achieve and how this should be achieved (impact logic), what future goals (outside of the boundaries of the project) it desires to achieve. To be able to manage a project more adequately, collaborations can decide to set the boundaries of the project deliberately narrow. However, this does not mean one cannot or even should not expand on the goals achieved on a smaller scale. Such intentions however should be taken into account early on for the business modelling process to ensure that the capability to scale is embedded for the project strategy and structure. Once the associated collaborative business model is designed and concretized (*invention stage*), the focus on scaling intensifies, calling for both *external* as well as *internal scaling* (how can activities, processes and exchanges within the business model design be further optimized and improved). These scaling perspectives remain relevant up until the paths towards business model implementation have been defined. After the *implementation stage*, scaling intentions should be monitored, whereas the collaboration should decide on whether the initially proposed scaling intentions should be pursued.



2. Tools to support scalability

Work breakdown structures, Cause effect diagrams, Strategy roadmapping, backcasting, multi-criteria mapping, technology road mapping

- ❖ **S.1. The scaling of the internal project structure and environment to achieve the proposed impact should be explicated and assessed.**

Description

Requirement S.1. verifies whether it is explicated how the project should be scaled throughout the project lifetime, and how this impacts the business network stakeholders to be involved for the deployment of the solution. It requires an analysis of what the current status of the project is, what challenges are ahead for the roadmap in terms of scaling and what consequences this has for the business network and its individual stakeholders.

For example, if the goal of a project is to achieve a customer base of 5000 customers in order to generate the proposed impact, the project should identify its current position and explicate the differential as opposed to the desired position. Again, identification of the critical path is key here or the paths towards achieving the scaling intentions, understanding what resources are needed when, and how stakeholders within the business network may depend on resources that are available or to be acquired elsewhere. Additionally, it should be assessed whether individual stakeholders for the network possess (or can possess) the means to achieve this scaling intention, and whether it makes sense for these stakeholders to do so (in terms of value they can capture in return). Through requirement S.1., such concerns are verified.

Practical implication

Without making explicit what intentions are specified regarding internal scaling and what impact this has for the (stakeholders in the) business network, the sustainability project may fail to identify that critical resources are missing for the project, that stakeholders are unable to scale their current activities or that internal deadlines set cannot be reached. As a result, conflict may be generated for the business collaboration, whereas the intended project impact goals may not be reached at all (as the project is not able to scale internally).

❖ **S.2. The roadmap towards *internal project scaling*, including scaling strategies or mechanisms that are involved, should be defined**

Description

Requirement S.2. verifies whether roadmap towards achieving these intentions is specified and defined, such that it becomes apparent when stakeholders in the business network should scale and what is required from each stakeholder (in terms of input, output and dependencies). This *roadmap* should be significantly concrete as it should be directly linked to the impact goals specified for the sustainability initiative. The roadmap should make explicit the stages that are undertaken towards achieving the impact goals, what per stage the scaling intentions are and how consequently these intentions are addressed through the business network. This should be detailed to the level of individual stakeholders, clarifying per stage what each stakeholder is expected to do, what it needs in terms of resources and where these resources currently are available (highlighting dependencies between stakeholders where applicable). Here, it should also become apparent how the scaling challenges for the stakeholders (as well as the project) are resolved, by clarifying what scaling mechanisms are considered. For example, are economies of scale established for the project through the integration of cross-organizational processes? Will organizations in the business network collaborate through different legal forms (for example to establish joint venture agreements) to achieve the scaling intentions? Based on the roadmap and scaling

mechanisms, the project collaboration accordingly can monitor the scaling of the project through use of the roadmap, and can support stakeholders where needed to achieve the scaling intentions.

Practical implication

Without the definition of a roadmap towards *internal scaling*, it is significantly more difficult for the project collaboration to monitor, manage and steer the project into the right direction. Without a roadmap, the timing of when what resources are needed becomes obscured, even more so if this is not related to the individual stakeholders for the business network. Accordingly, timely identifying if current activities are on-track or being able to timely react to challenges or problems faced becomes a strenuous and complex task, as resources may be dependent on other partners in the project. In addition, without a roadmap, prioritization of what activities or resources or needed remains implicit, potentially resulting in resources being used inefficiently or being wasted. In turn, this could lead to stakeholders in the network not achieving their individual impact goals (either leading to dropout for the business network or reducing the commitment for stakeholders to participate).

❖ **S.3. The scaling intentions or goals after the project has been completed (*post-project scaling*) should be expressed and explicated.**

Description

Requirement S.3. verifies whether the scaling intentions regarding the diffusion of the intervention or solution, and thus the related expected impact to be generated or increased, are explicitly defined. Diffusion of the intervention refers to whether the intervention can be scaled over different application domains or locations (for example, application of an intervention in different countries). In case the intention is to scale the solution or intervention, it should become apparent what targets or objectives should be achieved (e.g. what is the increase in scale for the solution, where will it be deployed). Additionally, it should be explicit *what* this intent for post-project scaling implies for the collaboration as a whole (in terms of capabilities, competencies and resources needed) as well as for each individual stakeholder in the collaboration. For example, what are the current resources or what is the current capacity available at each of the stakeholders that are involved, and what is needed to achieve the intended scaling goals? Is the availability of resources at stakeholders dependent on other stakeholders in the business network? If so, what critical path can be identified, and what resources are key to maintain this critical path (and thus require increased care or management)? Through req. S.3., the collaboration makes explicit what its intentions are regarding *post-project scaling* (e.g. after the project has been finished, how will the solution further be proliferated in different markets, addressing different segments?), and what consequently is demanded from the business network as well as from individual stakeholders – who will take charge or responsibility to do so?.

Practical implication

Although the *post-project scaling intentions* exceed the boundaries posed by the initial impact goals (and thus is less related with the current execution of a project or initiative), lacking scaling opportunities post project can be troublesome, as it means that within the context of the current project one can never expand on the impact generated. In case the impact should be increased, this would imply that a novel project or initiative should be instigated, resulting in a waste or inefficient use

of resources, as the *wheel has to be, at least partially, reinvented*. Similarly, if through the current plan of action the expected impact turns out to be lower than expected, then being able to scale enables a collaboration to still reach the desired impact goals. Embedding this flexibility and robustness thus can help in saving significant waste or inefficient use of resources. In addition, without an explicit analysis of how the scaling intentions may impact the business network and individual stakeholders for the network, pursuing post-project scaling may overburden or negatively impact (stakeholders within) the business network. This may create conflict in the business network as such challenges (for example understanding what resources are needed to maintain the critical path) were not identified. Similarly, the post-project scaling intentions may not at all comply with the individual business models of the business network actors, creating resistance or conflict as such intentions then require actors to adapt or entirely shift their business model.

❖ **S.4. The roadmap towards *post-project scaling*, including indications of what scaling strategies or mechanisms are used**

Description

Requirement S.4. verifies whether, based on the *post-project scaling intentions* specified for S.3., a roadmap towards achieving these intentions is specified and defined. Such a roadmap would make explicit how the challenges identified for S.3. are mitigated, the related scaling strategies that exist to do so and what strategies ultimately are selected to achieve the intentions. Accordingly, the roadmap concretizes the 'next steps' post project, dividing responsibilities over the business network and its individual stakeholders and clarifying what high-level capabilities and resources are needed to achieve the post-project scaling intentions.

Practical implication

Without an explicit consideration of such a roadmap, intentions may remain vague and may lack commitment – the role of individual stakeholders in the business network for future scaling is not explicated, whereas stakeholders likely are not aware of what future resources or capabilities are needed to scale the interventions or solutions, making it difficult to plan ahead.

4.2 Practical consideration of scalability within the set of case studies

Internal scaling (e.g. scaling within the current boundaries of the project) (S.1. and S.2.) is explicated for both Porthos and NSE, although it generally resides on a higher level of abstraction (i.e. detail on the project level rather than stakeholder level). For example, NSE specifies in a general sense how activities on the platforms can be expanded upon and what is needed to do so (e.g. the amount of energy generated through wind farms needed to support the electrification of the platforms and to support CCS on the platforms). Porthos provides a general timeline with respect to how impact should be achieved, but includes tasks such as *build infrastructure* which present limited information on what is actually required, more so in terms of what this demands from stakeholders in the project, and whether these stakeholders are able to achieve this scaling. A similar case can be made for NSE, that offers detail on what has to be implemented to support the proposed solution, but remains implicit on what this implies for the stakeholders involved and what potential scaling strategies can be leveraged to do so.

In contrast, the intentions regarding *post-project scaling* (e.g. what commitment is expressed towards scalability after the project and who will take this commitment, S.3. and S.4.) is rather implicitly specified for NSE and Porthos. Both projects consider a large time dimension for project execution and achieving impact goals (up until 2050), but do not really consider what should happen *post project*, and what consequences this would have for the current business collaboration. Porthos hints that at some post-project plans (for example, indicating that the current pipeline infrastructure would be sufficient to accommodate additional customers / stakeholders as opposed to Air Liquide, Air Products, Shell and Exxon, but does not make explicit what concrete intentions currently will be followed. As a result, it is unclear what happens once the project is completed, how the generated results can be expanded upon and who will take charge here. This is also reflected by the lack of an explicit roadmap to clarify these post project scaling intentions.

5 Financeability

5.1 Introduction and context

Financeability addresses the *bottom-line* of any novel business initiative or project, concerning the financial structure and related investments needed to support the execution of the project or the deployment of the intervention or solution. For collaborative business models or initiatives, this financial structure is generally more complex as opposed to traditional, organization-centric business models, as in contrast to such traditional business models (for which the responsibility lies with a single organization), collaborative business models depend on the concurrent investments and contributions of a multitude of stakeholders.

Generally, collaborative business models (central to establishing large-scale sustainability solutions or interventions) may require significant investments at the start of the project in order to stimulate the deployment and adoption of an intervention, after which the value captured in return by each individual stakeholders gradually starts to increase (either through economic wealth and / or through environmental and social benefits that are generated). To be able to understand, monitor and control this need for investment, the investment landscape should be made explicit. Additionally, explicating the investment landscape can help in understanding what sources of finance in general are available, what concrete stakeholders can be leveraged to support the project and what potential lock-ins (as stakeholders may partake in different or even conflicting projects or services) regarding these sources of finance. Through explicating the investment landscape, it should become apparent what investments are demanded from which stakeholders in the collaborative business model, and when these investments are required. These up-front or mid-term investments should be contrasted to how the involved stakeholders are able to capture value in return, and whether this is actually feasible or viable or even whether this is acceptable (potentially an investment may conflict with investments for other already running projects). For example, if through a sustainability intervention only after three years value is captured, whereas each year after starting the project financial investments are needed to advance the project, one should investigate whether the stakeholders responsible for these investments are actually able to carry this burden. Logically, one should also examine whether in the end each stakeholder in the business network is able to capture more benefits than costs incurred through participation.

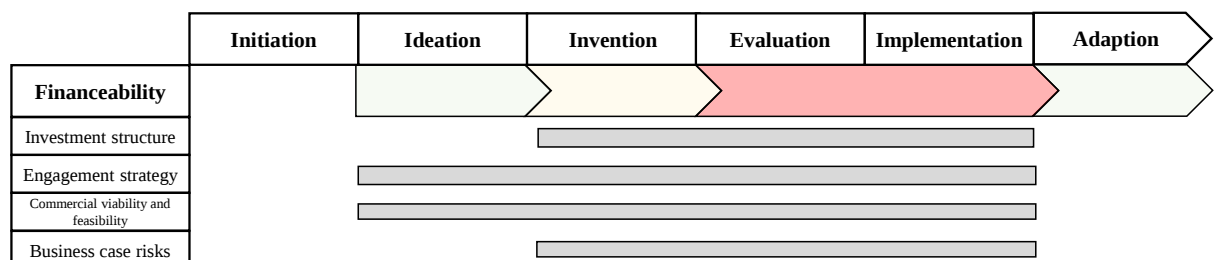
In case stakeholders are not able to carry the investment load required for the project, the collaboration should actively investigate how this issue can be resolved. For example, can new investors (such as banks) be acquired to support the financeability of the project? If so, how are such investors engaged, and at what timing for the sustainability project are these investors needed? Alternatively, can the investments required be balanced over the business network, spreading the initial load for a single individual stakeholder to a multitude of stakeholders? If so, what implications does this have for the viability of the collaborative business model for each involved stakeholder?

Without a consideration of the investment landscape as well as how this affects those stakeholders that are responsible for these investments, the project may run

the risk of not possessing the necessary amount of equity to support the deployment of the intervention and the execution of the project. Here, the project may either not have enough funds to conduct activities planned for the project (as the cost of conducting these activities was poorly analyzed), or stakeholders responsible for the investments to be made were unable to carry the load, as either value is captured late or not even captured at all. Additionally, as the investment landscape was not explicated, the project may fail to be able to react to changes in the costs of the project, not being able to acquire investors to support the financeability of the project. As a consequence, the project may grind to a halt or be significantly delayed, resulting in internal or external deadlines being missed and the proposed impact of the project to not be reached. This in turn would affect involved stakeholders, creating conflict or decreased commitment within the business network.

1. Timing for the collaborative business modelling process

Financeability becomes relevant for the collaborative business modelling process already when the intervention or proposed solution central to the sustainability project is defined (e.g. should be considered already for the *ideation stage*), increasingly becomes important throughout the *invention stage* and is of utmost importance to consider for the *evaluation and implementation stage* of the CBM process. At these stages, the business model design (e.g. the plan towards the deployment and commercialization of an intervention or solution, explaining how value will be achieved) is significantly concretized and ready to be evaluated. Here, questions regarding the financeability of the business model design become essential, as it makes explicit what value stakeholders for the CBM actually will be able to capture and whether this can be deemed acceptable. As the activities conducted for the business model design are defined, concrete, quantified investments can be associated to these activities, clarifying the investment landscape and facilitating decision makers to analyze whether the current and future investment landscape is adequate to support the business model design. Even after the *evaluation stage*, when stakeholders define the *path towards* implementation of the agreed upon business model design, financeability remains important, as stakeholders now define how they individually will support the execution of the business model design, further reflecting on the investments to be made (and whether in a general sense this is still valid and viable). Once the *path towards* implementation is defined and positively evaluated (e.g. the investments pose no concern for the viability of the stakeholders involved), financeability becomes less important (although logically any changes in the investment landscape should be reflected upon).



2. Tools to support requirement

Risk/reward analysis, cause-effect analysis, life cycle assessment, Stakeholder analysis, Techno-economic analysis, life cycle assessment, business case analysis

❖ **F.1. The investment structure and cost distribution should be explicated and analyzed *temporally* and *per stakeholder* and governed throughout the project**

Description

Requirement F.1. verifies whether the investment structure for the sustainability initiative or project is explicated and analyzed. This analysis should cover the temporal dimension of the investments made for the project (when for the project lifetime are what investments needed and what is the magnitude of these investments) as well as the stakeholder dimension of who is responsible or tasked with which investments (and what impact do these investments have for the viability of the project for the involved stakeholders). Accordingly, it should become apparent what investments are needed to support the activities conducted for the project and the deployment of the intervention, what investments each individual stakeholder for the business network needs to make and how these are interconnected, and at what timing these investments should be made to ensure that critical deadlines are reached. This enables stakeholders to understand and judge whether their respective investments can actually be realized (taking into account the financial, social or environmental value that is captured in return), or whether different investors should be included or the investment structure should be changed. Note that this investment structure and cost distribution should be governed throughout the project to stimulate trust and commitment amongst stakeholders - it should be apparent how cost structures will change over time, why this occurs (clear motivation) and what stakeholders are affected.

Practical implication

Failure to explicate and analysis of the investment structure may result in not detecting issues towards the financeability of the project, either that stakeholders are unable to support or make the required investments, or activities demanding significantly more investments than initially expected without the project possessing contingency plans to mitigate these issues. As a consequence, stakeholders may drop-out or lose commitment (as the business model design does not prove to be viable), whereas activities planned for achieving the impact goals lack funding and thus are grinded to a halt (potentially affecting the critical path of other planned activities). Logically, this can have severe negative implications for the proposed impact to be generated through the project.

❖ **F.2. Acquisition / engagement strategies to collaborate with current investors, to increase investments, or to mitigate funding deficits for the project should be defined**

Description

Requirement F.2. assesses whether acquisition / engagement strategies have been specified to support current investments or increase the financial investments for the project. Logically, if the analysis conducted for F.1. demonstrates that stakeholders are not able to support or make investments needed to advance the project, additional sources of investments or funding should be considered. Finding additional funding or attracting investors however is not a trivial task, for which acquisition or engagement strategies may help to attract or develop new sources of funding. Many strategies can be considered here. First, funding can be explored

within the project collaboration, balancing the load of the investment over multiple stakeholders in the business network. Additionally, funding may be sourced externally. Here, banks or investors can be motivated to join the project if such stakeholders are able to capture sufficient value (at a later stage) in return. Similarly, government bodies or European institutions may be motivated to subsidize or invest to stimulate the execution of the project, or the contents of the project can be connected to other projects that run in parallel, and which (partially) address similar challenges (balancing the financing load). Depending on the strategy selected, it should be defined how such investors are attracted, acquired or engaged for the project. This is not only relevant when the investment structure proves to be inadequate beforehand, but also when changes occur during project execution which were not accounted for. Explicating the strategies enables the project collaboration to adequately and timely react to such funding challenges. In addition, it can help in further understanding what potential lock-ins may be present for those parties that are to be included – can these stakeholders actually be engaged, and how do these stakeholders position themselves? Do they operate from a collaboration of investors, or do they act independently? What implications does this have for the engagement strategy?

Practical implication

Without engagement or acquisition strategies, projects may fail to be able to react to changes or shifts for the investment structure or may only be able to react in an ad-hoc fashion. Because no acquisition or engagement strategies are defined, it can be difficult to attract novel or additional sources of funding to compensate deficits that have occurred for the project, or to understand what stakeholders should be taken into account or selected (depending on how they are organized) to truly benefit the project. As a result, activities for the project cannot be completed or executed as project funding is lacking, making it difficult for the project to achieve its impact objectives or to meet internal or external deadlines.

❖ **F.3. The commercial viability and feasibility of the proposed solution / intervention should be demonstrated to stimulate the acquisition of investments**

Description

Requirement F.3. validates whether the project has assessed and / or demonstrated the commercial viability and feasibility of the proposed solution, such that its 'value' or 'necessity' becomes apparent, stimulating the acquisition of investments for the execution of the project. This requires the business collaboration to understand both from a technical and market perspective whether the proposed intervention actually makes sense to pursue. For the technical perspective, this involves analyzing whether the intervention can actually function or work in practice, and whether this can actually be developed (in the case of CO₂ storage for underground oil reservoirs, is this actually possible to do and are we technically advanced enough to achieve this?). For the market perspective, this involves analyzing whether the intended customers or users for the solution actually would want to use it (and under what conditions), as well as gaining an understanding of the number of customers or users that potentially are available. In turn, the results generated for these analyses may contribute towards stimulating the acquisition of investments (investing in a promising or attractive project).

Practical implication

Without analyzing the commercial viability and feasibility of the proposed solution, it will be difficult or even impossible to understand whether it makes sense to pursue the proposed solution, potentially resulting in the business collaboration committing resources to an unsuccessful project, as the solution turned out to not be viability or feasible. Additionally, without actual, quantified results on whether the intervention actually makes sense, it will be impossible to communicate the attractiveness of the project to investors in the market, making it difficult to support the financeability of the project. Consequently, the project may fail to be executed at all or may fail to reach intended internal or external deadlines.

❖ **F.4. The business case analysis for the project should clarify and mitigate key risks associated with the investment structure, and how these are distributed over the business network**

Requirement F.4. validates whether the risks regarding investment structure have been incorporated as part of the business case analysis, whereas mitigation plans have been specified to cope with these risks. Additionally, it should become apparent where these risks reside for the business network (e.g. who will be responsible for mitigating these risks?). Whilst a business case analysis generally is conducted for sustainability projects (related to F.3.), such analyses generally consider the investment structure to be more or less given and stable, whereas this in fact can be dynamic in nature and subject to significant change (for example, stakeholders entering and leaving the business collaboration, influencing the financeability of the project). Similarly, business case analyses generally consider that the benefits expected for the project will be achieved, and thus build their calculations on this assumption, whereas this may actually entail significant uncertainty that should be accounted for. As per F.4., we verify whether a risk analysis is conducted regarding the investment landscape for the project, and how this influences the business case analysis. What happens if a stakeholder drops out and how are we able to mitigate this as a collaboration? How would this affect other stakeholders for the project and what risks accordingly per stakeholder are present? What happens if the adoption of the intervention of the solution does not reach its intended impact, and how does this affect the viability of the business model design? In relation to F.2., how can subsequently new sources of financing be attained and how uncertain is this? Critical risks should be identified here and analyzed. Such an analysis can be complemented through scenario analysis, generating hypothetical scenarios to understand where key risks regarding the investment structure or financeability of the project may reside.

Practical implication

Without an understanding of the key risks related to the investment structure of the project, it will be difficult to proactively react to changes for the investment landscape. If mitigation plans are absent to replace stakeholders in the business network, the collaboration will have to ad-hoc react if such a scenario occurs, potentially resulting in internal or external deadlines not being met or the execution of the project to be halted, failing to reach the intended impact goals. Similarly, if risks regarding the investment structure and the investments to be made are not explicated, in pessimistic scenarios stakeholders may have to invest far more than initially planned, affecting their respective business case. This in turn could lead to stakeholders being less committed to support the sustainability initiative.

5.2 Practical consideration of financeability for the set of case studies

Regarding F.1. we see that whilst both NSE and Porthos detail the investments needed to support the modification of pipelines, the installation of wind farms and the adaptation of the platforms to accommodate CCS and hydrogen production, both projects generally take a project perspective of the investment structure, explaining in a general sense what investments are needed to support the storage of CO₂ in the North Sea in oil reservoirs. It is not explained how these investments are distributed over the relevant partners and stakeholders for the project. Subsidies generated through the EU / local governments are highlighted, but this represents only a single perspective of the entire investment landscape. This lack of stakeholder perspective is also visible for the business case analysis (F.4.): NSE includes scenario analysis to identify where potential risks lie regarding the viability and financing of the sustainability initiative, although their analysis remains on the ecosystem level rather than indicating how this may affect individual stakeholders, and does not address risks regarding the investment structure. Their analysis focuses predominantly on the roll-out / efficiency of the proposed intervention as well as to what extent the trade in CO₂ emissions (selling CO₂ rights) may affect the viability of the business case. Limited consideration is given regarding what would happen if shifts in the business network occur or investments should be increased to continue the project (and how this affects the business case).

For F.2., Porthos explicates how it aims to attract new investors or banks, setting up both preliminary as well as concrete *joint development agreements* (JDA and JDA2) with interested parties to support or finance the sustainability project. Through these agreements, Porthos aims to generate commitment, and subsequently support from such parties, in turn contributing to the investment structure for the project. Similarly, it details how it aims to acquire additional subsidies or funding from the European commission, aiming to connect the output generated for the project to challenges or strategic areas posed by the European Union.

With regards to clarifying and analyzing the feasibility / viability of the solution (F.3.) both Porthos and NSE conduct a techno-economic analysis for the underground storage of CO₂ in the North Sea, with particularly NSE addressing significant attention towards understanding the technical aspects of the proposed solution and its implications for the resulting business case. Porthos on the other hand dedicates more effort towards clarifying the commercial viability of the solution, focusing on attracting customers and understand the potential customers for the market (companies in the Port of Rotterdam that aim to reduce CO₂ emissions) to ensure that the solution can be deployed and is commercially viable.

6 Conclusion

In this report, we have introduced a set of key themes – *impact logic*, *regime breakdown*, *scalability* and *financeability* – that should be considered to support the development of collaborative business models for new sustainability-oriented initiatives. These themes have been the result of an extensive literature analysis in the domains of transition management, project management and business modelling. To support the practical use of these themes by decision makers in project contexts, we have identified and defined a set of requirements per key theme, making explicit how each theme should be addressed or considered. In total, four requirements per theme were defined, resulting in a set of 16 requirements to be considered when developing (collaborative business models for) new sustainability-oriented initiatives.

To get an understanding of the practical validity of the themes and the proposed set of requirements, we applied the set of requirements to two real-life sustainability-oriented case studies: North Sea Energy and Porthos. Here, we consulted and built upon available documentation regarding (current) project execution of these projects and validated whether the identified themes are acknowledged and to what extent they have been acknowledged. The results show that the themes are generally acknowledged: they provide initial evidence that the themes are practically relevant. We also observe that not all requirements have been fully addressed for both cases – we highlight how this could potentially affect the further development and execution of the project.

Even though the case studies provide initial support towards the defined themes and their practical relevance in light of developing and supporting sustainability initiatives, additional case studies are needed to draw conclusive results. Therefore, as future work, we aim to further validate the set of themes and requirements in practice by means of additional sustainability-oriented case studies. In addition to assessing the completeness and validity of the set of requirements, we also aim to develop and provide practical, methodological support towards the design of collaborative business models for sustainability-oriented initiatives. Here, we will further build upon the set of requirements indicated for this document, serving as pillars to support the design of such business models. In turn, we hope this may contribute towards the development and success of sustainability-oriented initiatives and consequently towards accelerating our move towards sustainable business practices.

7 Signature

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