Transforming our work:
Getting ready for transformational projects

Guidance

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Abbreviations

BMU .... German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

BMZ .... German Federal Ministry for Economic Cooperation and Development

CIF .... Climate Investment Funds

GCF .... Green Climate Fund

GEF .... Global Environment Facility

GIZ .... Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH

IKI .... International Climate Initiative

ODA .... Official Development Assistance

SDG .... Sustainable Development Goal

WBGU ...... German Advisory Council on Global Change

Preface
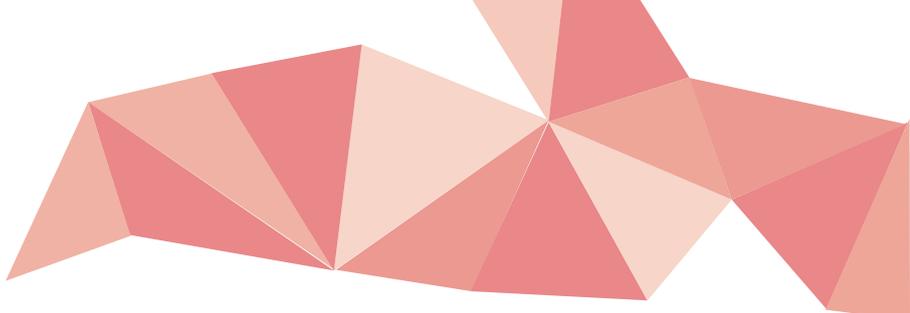
The 2030 Agenda and the climate change agenda call for no less than 'transforming our world'. Transformational change leads to something fundamentally different from the previous. You may think of the caterpillar who grows in size (more of the same) and may change its color and number of legs (reform) but finally transforms into a butterfly. In this context transformation refers to large scale goals like carbon neutral societies and economies for the common good.[1]

Within GIZ, facilitating change for sustainable development is our profession. For a number of development goals, we have the necessary knowledge and well-developed tools from years of experience. However, if we aim at stimulating transformational change on societal levels, we need to think and act outside established structures. Transformation processes are on the way, with or without facilitation from our side, like digital transformation, urbanization and industrialization in many partner countries. In the case of digitalization, the world changes very fast and yet our facilitation will be needed in order shape this transformation in a desirable way. For other challenges, like addressing anthropogenic climate change, progress has been too slow. At the same time, complexity and speed of our everyday life are constantly increasing – all in all not an easy situation for 'change agents'. For this type of change ambition, we need to emancipate from the current mode of working in which we like to believe that we can control and steer development towards predefined goals. Evidence about 'the best way' is usually scarce while norms and values are highly contested. As an international cooperation agency we aim at enabling and accelerating anticipated transformations that are wanted and needed to address global development challenges. At the same time, we need to make efforts to influence ongoing transformations ensuring they develop in a generally acceptable way.

This work sheds light on various perspectives on transformation and suggest a holistic way of designing transformative interventions. The design principles are quality criteria and a measure of our transformAbilty. We thank all our colleagues involved for taking this challenge and for joining forces across organizational boundaries. The guidance is a next step to further differentiating our understanding, our approaches and individual skills for being ready for transformation.

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[1]   Compare e.g. the social movement 'Economy for the Common Good'.

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Summary

A number of global development challenges do not seem to be solved by gradually changing or reforming current ways of production, consumption, transport or other systems. For years, actors in academia, policy and practice have been calling for more action on 'transformational change', meaning a change that is profound enough to shift societies, up to 'the' global one onto fundamentally different development pathways. The term 'transformation' is not only fashionable in describing new types of change interventions and new ways of intervening. It has also become a prerequisite for international funding.

In the first chapters, we shed light on transformation from a range of literature and disciplinary perspectives. We then deduct design principles for transformative change interventions (chapter 3).

In short, transformative change converts a current (ecological, social, political, economic, scientific, or technological) system or all systems together into a fundamentally new one that, from there on, forms the new mainstream.

Definitions of transformation are offered from diverse fields of knowledge and normative perspectives. For us, more important than having one scientific and one socially desirable direction is the ability to facilitate transformative processes and assisting partners and target groups in their own transformAbility, i.e. the ability to transform.

Transformative interventions…

1. …need to question current systems in general in demanding paradigm or regime shifts (paradigmshiftAbility), a new identity and narratives or similar disruptive changes. Anticipated transformations are e.g. carbon neutral societies and related to this energy transitions, mobility transformation, food transformation, urban transitions, inclusive green or welfare economies etc.

2. They can involve incremental change and reforms (two other types of change) to support transformations in provoking respective tipping points. Nevertheless, these other forms of change may also prevent transformations by cementing current systems (unwanted path dependency).

3. Transformative interventions need to strive for scaling (scalAbility) up their innovation (tech-
nology, political, social or economic norm and narrative etc.) to a mainstream that would form the new regime, paradigm or overall narrative. Transformations can happen on various nested system levels from individuals to global regimes and narratives.

4. They need to strengthen the resilience (resilienceAbility) of the new system(s) so that they can adapt further and be sustained (sustainAbility) while weakening the resilience of current systems.

5. Depending on ambition and resources, they should address as many 'dimensions of transformation' (multidimensionAbility) as possible in which changes could take place, such as environment, society, science, technology, policy and markets. The more dimensions involved, the better the chances for a 'great transformation' (like industrialization).

6. Transformative interventions should be able deal with the fact that transformations cannot be controlled or steered in a 'classical' management fashion. This kind of change involves the highest levels of complexity (complexAbility) and hence deals with systems characterized by emergence, non-linear behavior and unpredictability. Interventions should be able to navigate complexity and permanently adapt (adaptAbility) to and work with unforeseen changes.

7. They should finally, yet importantly, facilitate deliberation about which transformations to aim at and how to shape the new systems. The concept of sustainable development and the 2030 Agenda should generally guide such deliberation around transformations. However, transformations are usually subject to extensive debates and high uncertainties of knowledge about system behavior, implications of various options and how to get there. They are 'wicked problems' for which knowledge needs to be co-created and values and norms need to be debated based on reciprocal relationships (reciprocAbility). Otherwise, innovations and new systems are prone to be 'technically' and socially instable. Acceptance, ownership and 'just transitions' are less likely if relationships are less reciprocal.

Since transformations require changing social values, norms and behavior, transformative interventions need to be very deliberate about their approach towards social change (social-changeAbility).

We believe that these principles are 'ingredients', which enhance the chances of successful facilitation of such change. They further allow a differentiation regarding the transformative quality of interventions and their evaluation. We offer a number of generic sub-questions and indicators towards the end of chapter 3 (3.2.8).

Applying this to the concrete design of interventions, we continue with typical elements of our development projects and offer first ideas for shaping them. Better understanding the complex contexts in which we work may e.g. be advanced by approaches for systems- and actor network analysis. Our understanding of the types of transformation problems may be advanced by tools derived from science-society-policy studies. Our impact models may benefit e.g. from causal loop exercises and new indicators and rationales of measuring might be needed. Navigating 'super complex (transformation) systems' is less controllable and predictable than 'business as usual management' environments. The methods used in this context should get much more attention and it makes sense to evaluate the quality of a transformative project rather based on its 'facilitation power'. Impact

predictions may be important for various reasons but they are subject to high uncertainty by nature. We see much more room to advance the 'method promise' compared to the 'impact promise'. Ironically, we will need to shift the balance from a high outcome orientation towards a higher process orientation in order to be more effective with outcomes.

At the end of chapter 4, we do a rough assessment of current requirements of different funding organizations for transformative project design.

Finally, current modes of development that still are to a substantial part embedded in 'conventional change thinking' will probably not deliver sufficient innovation, scale and societal robustness at time. "The significant problems we face cannot be solved at the same level of thinking we were at when we created them." (Albert Einstein). Throughout this guidance, we argue for questioning our modes of working, how we approach interventions, design and implement projects. For a number of aspects, we will need to transform our work before transforming our world.

SUSTAINABLE
DEVELOPMENT
GOALS

1. Introduction

International diplomacy achieved two milestones for sustainable development with the conclusion of the Paris agreement and the 2030 Agenda that aspires to no less than "transforming our world" (UN 2015). The anticipated "bold and transformative steps" should "shift the world onto a sustainable and resilient path" (ibid). While the 2030 Agenda aims at transformational change for development issues at a whole, the climate agenda has adopted the transformation narrative for pursuing low carbon and climate-resilient societies. Patricia Espinosa, Executive Secretary of the UN Framework Convention on Climate Change further claims in 2017 that "we need to get from international agreements to a thorough, complete transformation of societies (Espinosa 2017).

A strong argument for the urge of transformative change emerges from discussions around 'transformative environmental policy' (Jacob, Graaf, and Bär 2015) and the 'planetary boundaries' (Leach et al. 2012; Rockström et al. 2009; Steffen et al. 2015; Stuart 1992; WGBU 2011). A compelling narrative here are the planet's absolute and finite boundaries (including the climate system and the 1.5°C goal). Beyond the so-called 'safe operating space', tipping points can lead to different environmental regimes that are hostile to current life on earth. Due to the high complexity of these systems, change can be non-linear and tipping-points unforeseeable (ibid and Steffen et al. 2018). For the climate system, the recent IPCC global report suggests that such tipping-points are closer than formerly believed (IPCC 2018).

We have become the major determining factor for the current and future conditions for life on earth and seem to be running out of time (Kepper, Hoff, and Kahlenborn 2017). "In 50 years, we tipped from 10,000 years Holocene to the Anthropocene. What we will do in the next 50 years will determine the next 10,000 years" deems professor Rockström, Executive Director of the Stockholm Resilience Centre (Rockström 2017).

For years, actors in academia, policy and practice (private sector initiatives included) have been calling for more action on 'transformational change', meaning a change that is profound enough to shift societies, up to 'the' global one onto fundamentally different development pathways. These should follow different socio-economic paradigms. Particular innovative processes and investments should e.g. tip economies from carbon-based to carbon neutral econ-

omies, from linear, waste and pollution-based economies to circular, 'cradle to cradle'[2] and pollution free ones, from neoliberal capitalist to common welfare economies. Past, current or anticipated transformation subjects can be of a more ecological, social or economic nature or combine all dimensions. The following chapters will add more examples.

Even though or because the narratives of transformation became more and more widespread, their different goals are not necessarily compatible, nor can we find a coherent understanding of transformative change. As a policy document, the 2030 Agenda does not define or operationalize 'transformation' any further. Some institutions have started to do so (compare chapter 4.5) but we will need further layers and levels of detail. Not least because, on the part of science, a great diversity of perspectives and insight into transformative change is already available that has not yet been fully put into value in practice.

Some policy perspectives might even claim to be but are in fact hardly transformative and rather revitalize old strategies like 'scaling up'. Furthermore, according to a number of authors, transformation is not just about having different goals but also about doing things differently in very complex settings (Burns and Worsley 2015; Kuenkel 2019; Ramalingam 2013; Ravetz 2006; Reyers et al. 2015; Richardson and Cilliers 2001; Waddell 2016, 2018). In this line of thinking, there is a demand for a more consequent paradigm shift from linear thinking towards appreciating complexity within the development industry itself in order to meet the ambitions of transformation (see chapters 2.5 and 3.6).

The term 'transformation' is not only fashionable in describing new types of change interventions and new ways of intervening. It has also become a prerequisite for international funding from a series of sources such as the GCF and the NAMA Facility under the climate change agenda, requiring proof of how their funding leads to transformational change. The various funding organizations face the same challenge of defining and operationalizing transformative change.

Hence there is a number of reasons for taking the discourse on transformation further, within and beyond GIZ. In the following chapters, we aim at creating a holistic, integrated and applicable understanding of transformational change and taking next steps of adapting our work to these bold ambitions.

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[2] Products that can be disassembled completely in a way, which allows the creation of new products, using all of the components again. This technological goal is often linked to a mind-shift from owning to using and respective business models (e.g. leasing).
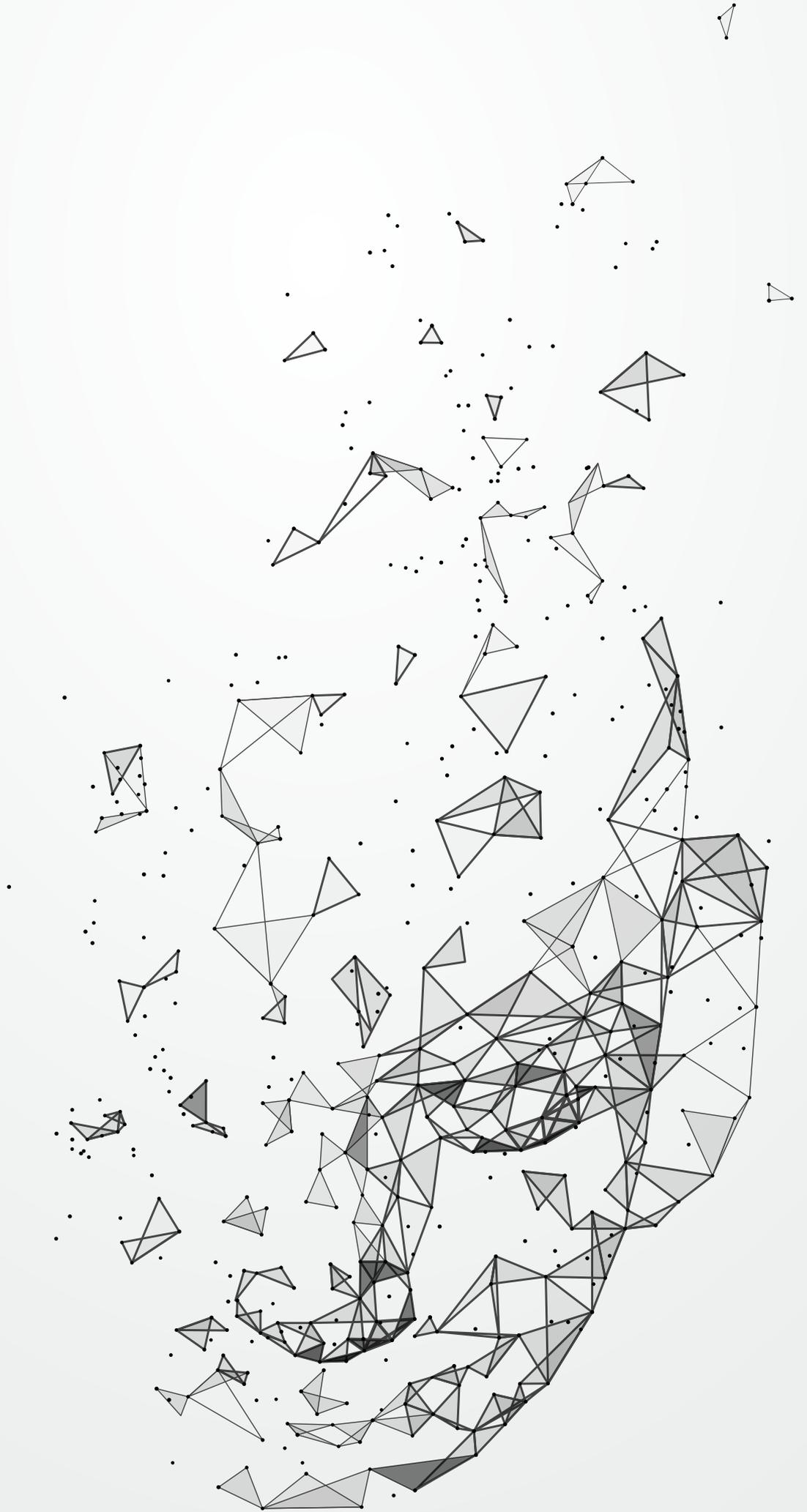
2. Transformation: One term, many perspectives

The first one to shape the term 'transformation' in this context was the Hungarian-American political economist Karl Polanyi. In his book "The Great Transformation" (Polanyi 1944) he describes how England as a formerly agrarian society transformed into an industrialized society. He found that the emerging market economy/society was closely connected with the formation of modern states. The resulting formalized capitalist institutions and new economic and political relationships fundamentally changed societies as a whole. Polanyi described a kind of 'naturally' occurring transformation that was driven by significant technological innovations in the first place and the possibilities they opened up. These innovations had such a huge potential that they soon became the new benchmark and caused societal tipping points leaving no way back and shaping not only Western societies but also geopolitics in the centuries to come. Starting in Western countries the compelling narrative of industrialization still prevails in developing countries.

Example of Industrialization

Similarly, the current digital transformation has and will have far-reaching implications that change societies fundamentally. Other examples from the SDG Transformation Forum further illustrate the broad range of levels and dimensions in which transformation could happen:

  # "From carbon-based to carbon neutral energy systems – change of core logic in technology and understanding of socio-ecological relationships.

  # From [suppression] (or worse) to marriage equality – change in core values, social norms and understanding of gays and lesbians.

  # From apartheid to [racial equality] – change in core values, social norms and political system rules.

  # From war to peace in Northern Ireland – change in core values and social norms.

  # From centralized to decentralized – change in power structures and governance mechanisms.

  # From the world is flat to the world is round – change in ways of thinking about the world." (SDG Transformation Forum 2017).

Over the past years, the term transformation has appeared more frequently in research, reports and policies on sustainable development. Research on transformation has different objectives and subjects since there are different schools of thought involved. Scholars describe transformational processes e.g. by power structures involved, historical diffusion of technological innovations or they prescribe possible solutions on how to save the planet. Some of the relevant research fields are:

  # Transition / Transformation Science,

  # Innovation Theory,

  # Complexity Science,

  # Resilience Theory / Adaptive Management,

  # Science Technology & Society Studies / Sociology of Knowledge

  # Co-Production of Knowledge, Transdisciplinarity, Post-Normal Science, Mode 2 Research,

  # Evidence-Based Policy-Making

  # Sustainability Science,

  # Social Ecological Systems Science,

  # Behavioral Theory/Economics,

  # (Communication for) Social Change Theory.

On the (local to global) societal and political side 'transforming our world' also becomes a stronger narrative, no less diverse in the perspectives than in the academic field. Perceptions and application can even provoke contradictions such as advocating for a carbon-neutral society on one side and for economic transformation towards an industrialized society on the other.

Even though the term transformation appears in many academic and policy publications, there is no universally accepted definition. In his literature review of transformation concepts Feola (2015) found that almost fifty percent of publications in social sciences using the terms 'transform*' and 'climate change' or 'environmental change' do not even provide a concept or definition of transformation. Similarly to the term 'sustainable development' the diverse or absent definitions of transformation might have created a new buzzword that could be used for everything and could lose any useful identity (compare Bahadur & Tanner 2013: 34). On the other side, one success factor for the broad acceptance of the term 'sustainable development' and some related narratives might have been its openness towards diverse perspectives and not being completely arbitrary at the same time (compare 'boundary concepts', e.g. Mollinga, 2008).

The interpretations of transformation might further remain diverse and this should not be a problem of demotivation after all. In any multi-stakeholder development planning exercise a reasonable question is: 'Which sustainable development do you mean?' The same applies to transformative change. A standardized definition might not be able to describe a universally accepted version, neither from a knowledge perspective nor regarding the associated values and norms. We will need to construct, deconstruct and reconstruct our understanding of transformation over and over again with diverse actors. For us, it will be more important to assist others in finding their own definition and pathway than imposing our own. This guidance cannot sketch the way to the next great transformation but it can point at some questions that might be important along the way.

TAKEAWAY:

Definitions of transformation are offered from diverse fields of knowledge and normative perspectives. At least for GIZ, more important than having one scientific and one socially desirable direction is the **ability to facilitate transformative processes** and assisting partners and target groups in their own **transformAbility,** i.e. the ability to transform (compare Folke et al., 2010).

'Great Transformation' usually refers to fundamental changes of whole societies, including new technological, economic, political and cultural paradigms. They can reach out to a global trend – in a globalized world even more so. **'Natural Transformations'**[3] may be unforeseen and may occur without political pressure but rather be driven by game changing innovations.

2.1. Types of change

Development projects have always been about change. So what is the new thing about transformative change? What is the difference between transformative change and other types of change?

A useful answer is offered by Steve Waddell (2016) who differentiates between incremental change, reform and transformation. Transformation describes a process explicitly leading to a new system, paradigm, socio-technological regime and mindset or overall narrative while questioning the old ones (see Figure 1 and Figure 2).

A majority of our development projects mainly seem to follow the first two types of change, which would not be

much of an issue if we did not have such fundamental development problems and so little time. However, incremental change and reforms do not seem to solve a number of development challenges that are e.g. caused by current ways (paradigms, regimes, narratives…) of production and consumption.

Whether or not to promote transformative change depends on our evaluation of underlying 'deep' causes of system failures (Waddell 2016). For that, we do not look at direct causes in the first place (like greenhouse

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[3]   Nelson et al. (2007) also suggest 'inadvertent' vs. 'deliberate' transformations.

Figure 1: Types of change and related core questions

	Types of Change		
	Incremental	**Reform**	**Transformation**
Core Question	How can we do more of the same? Are we doing things right?	What rules shall we create? What structures and processes do we need?	How do I make sense of this? What is the purpose? How do we know what is best?
Purpose	To improve performance	To understand and change the system and its parts	To innovate and create previously unimagined possibilities
Power and relationships	Confirms existing rules.	Opens rules to revision.	Opens issue to creation of new ways of thinking about power.
Action Logic	Project implementation	Piloting	Experimenting
Archetypical Actions	Copying, duplicating, mimicking	Changing policy, adjusting, adapting	Visioning, experimenting, inventing
Tools Logic	Negotiation logic	Mediation logic	Envisioning logic

From Waddell (2016, own illustration)

Figure 2: Examples for the different types of change

	Types of Change		
Examples	**Incremental**	**Reform**	**Transformation**
Waste	Less waste (waste regime)	Waste recycling (waste regime)	Cradle to Cradle (no waste regime)
Racism	Reduction of discrimination (racial segregation regime)	More rights for the discriminated (racial segregation regime)	Same rights for all (no racial segregation regime)
Mitigation of Climate Change	Increasing energy efficiency (lower carbon regime)	Promoting renewable energies (low carbon regime)	Abandoning fossil energy, using 100% renewables (carbon neutral regime)

Own illustration

gas emissions) but e.g. finance rationales, reward and incentive structures, dominant narratives or rationales of evidence creation.

In general, there seems to be no mutual exclusion between these three types of change. On the contrary: incremental change and reforms could contribute to reaching tipping points for transformative change (Waddell 2016).

Nevertheless, following a goal frame of incremental change or reform only might even prevent transfor-

mational change. If e.g. a project introduces energy efficient technology based on fossil fuel combustion and infrastructure, this could create or strengthen a fossil fuel based path dependency (carbon lock-in). Such investments would maintain the fossil fuel regime while investments into renewables might remain not competitive. On the other side, if used as a short-term fix in a larger transformative process (for example to enhance grid stability) fossil fuels can be a bridge-technology and contribute to a carbon neutral energy regime in the long run. Energy efficiency based on renewable energies might further be one key aspect for realizing energy transitions.

To complicate matters further: the attribute 'transformative' is neither objective nor absolute. On high system levels such as industrialization or digitalization of whole societies the attribute might reach broad consensus. On lower levels like e.g. the waste regime, it depends much more on the relative point of view. Looking at the waste management sector only, we might call a change towards 100% recycling 'transformation' because it changes the socio-technical regime of the waste sector. Looking at the entire product cycles and material flows, we might call the current recycling practice a 'reform' because it still produces waste and does not necessarily close the material cycles (downcycling) like a cradle-to-cradle regime (upcycling, no waste regime). Similarly, changing towards renewable energies for power generation transforms the electricity system but it takes more (e.g. mobility transformation) to realize a full energy transition. All of this might not yet be called a transformation towards a low carbon society without e.g. an agricultural transformation. In short: a change that might be a transformation on one system level, might be called 'incremental change', 'reform' or 'milestone' for a higher system level transformation.

Example of German energy transition

The German energy transition may be an example involving all sorts of change. The first calls for fundamental changes of the energy system in Germany may be dated to the 1970s during the first oil crisis. For more than 50 years there have been incremental changes in social and legal norms as well as in technologies. We might think of the environmental movements against nuclear power, the founding of the green party, increasing environmental awareness and improvements in energy efficiency.

The Chernobyl disaster of 1986 was an influential event that further increased the social and political acceptance of a nuclear phase-out strategy. There have also been legal and fiscal reforms in support of a 'lower carbon' system, such as the energy and fuel tax system, the Electricity Feed Act and the series of renewable energy laws.

The Fukushima disaster in 2011, however, caused a political and legal tipping point in Germany in favor of such an exit strategy. This without a clear answer to the question of whether there was a high level of acceptance in German society. However, this would probably not have been possible without the earlier developments, including the strengthening of renewable energy technologies and markets, which have the potential to replace nuclear energy.

The increasingly dominant narratives around climate change and corresponding resonance in politics and society contribute to further questioning the energy system based on fossil fuels.

Nevertheless, it is not yet clear to what extent all this could lead to a climate-neutral society based on renewable energies and to what extent there could be great acceptance for this narrative. In 2018, a Commission for Growth, Structural Change and Employment was to propose a plan for an exit strategy for coal.

Thus, a number of incremental changes and reforms have led to a transformation, at least for nuclear energy - and partly also for renewable energy - at least at the political and legal level so far. The energy market, consumers' behavior and the overall narrative of what energy regime would be desirable have not yet reached a turning point and might still be subject to incremental and reform changes for a while.

A closer look into this case from a transformational perspective is provided e.g. by Olsen and Fenhann (2015) and Waddell (2018).

Not all sources clearly distinguish between different types of change. For some scholars, for example those emphasizing a transition management perspective, it may be sufficient for a new idea to reach a certain scale and mainstream that can be maintained over time (compare chapters 2.2 and 2.3). This is a rather quantitative perspective. Gillard et al. (2016, 256) even describe 'transitions' as incremental change while 'transformation' would call into question the 'structures of development' and overall regimes.

However, using 'transformation' as a new way of describing scaling-up strategies would ignore major parts of the transformation literature. The paradigm or regime shift would be missing – the quality of change. Every innovation may be scaled but this must not lead to a transformation on the desired level. A new energy efficiency technology may get the new standard but probably not suffice for an energy transition. Similarly, a strategy for the reduction of discrimination may be scaled up but the resulting change will probably remain incremental until discrimination is questioned in general.

Probably the most important characteristic of a project or intervention to be transformative could be the goal frame, which envisions a new paradigm, regime, identity or way of thinking. To be described as 'transformative', it would be less important how far the intervention progresses on the path to the new paradigm but essential to promote it. Its potential reach is another question discussed in the next chapters.

> ## TAKEAWAY:
>
> Perhaps the most distinctive feature of transformative change is the **questioning of systems, paradigms, regimes, identities or major narratives** that eventually lead to new ones with fundamental differences that could not be part of the old ones. Without such a quality of the expected change, transformation would be no different from incremental change, reform or scaling-up strategies. These different forms of change, however, *can* support each other but also influence each other. Not every project needs to be transformative if incremental change and/or reforms are sufficient to achieve the objectives.

2.2. The time and scale dimensions: diffusion of game changing innovation

How can transformative change happen over time? Following transition theory and diffusion of innovation research (Loorbach and Rotmans 2006; Rogers 1983, 2010), transformation processes – like any successful innovation – are usually described as an s-curve (see Figure 3). This presentation accounts for the observation that successful innovations usually do not diffuse into society in a linear process but most of the times with a very slow beginning (over decades) that may accelerate fast during 'windows of opportunity'. Actors develop (technical, political, economic and social) innovations in a niche during the predevelopment stage, and maybe cause first changes to the regime (dominant structures) during the take-off stage. In the case of a breakthrough, these changes accumulate or cause a tipping point towards a structural change of the regime (paradigm or regime shift) which can either be sustained over time or relapse again.

Figure 3: Levels and dynamics of transformation including the types of support needed
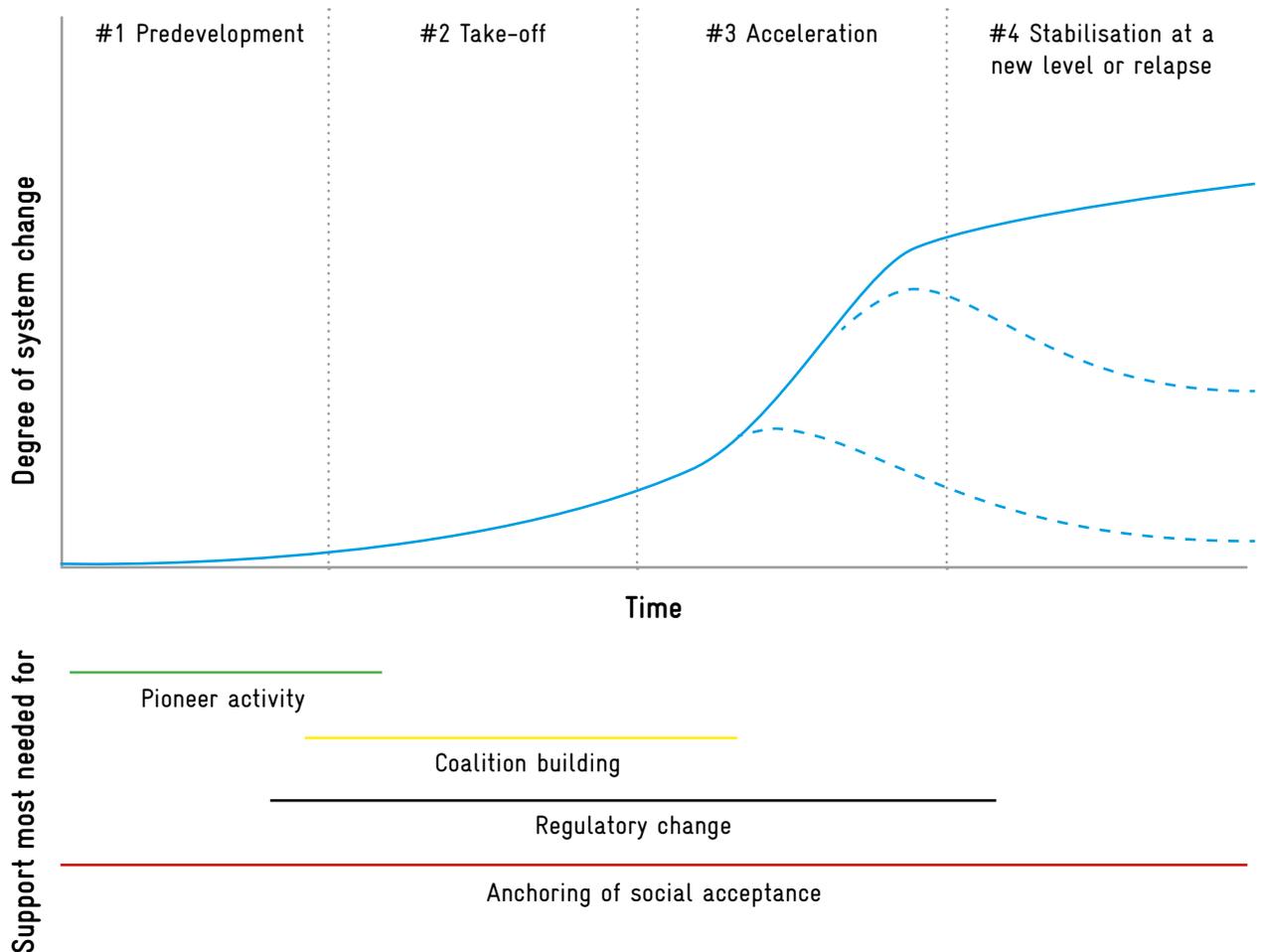
From Mersmann, Olsen, Wehnert, & Boodoo, 2014, own illustration

The different (idealized) phases require different types of support. It is thus important to analyze the state of any innovation. It could e.g. be hopeless to invest in mainstreaming (or acceleration or scaling-up) activities, if the innovation is not yet ready to take off. For the same question, we might also find different dimensions (compare chapter 2.4) of transformation like technology, legal and social norms at different stages of transformation. The German energy transition for example does have a relatively stable and reliable legal and regulatory framework (although elements, such as feed in tariffs are being adapted over the years due to technological development)

and political support. Technological development might still need acceleration while respective societal norms and behavior may still need to take off towards the mainstream. ICAD (2018, part III, Chapter 7) offer helpful suggestions to further operationalize this step of assessing the starting situation.

Whether a certain idea can become the new mainstream is influenced by multiple factors that may be pushed from the bottom (niche) and/or be pulled by the top ('socio-technical landscape') up to a global level (see Figure 4).

Figure 4: Multilevel perspective on transformation

Socio-technical landscape (exogenous context)

Landscape developments put pressure on existing regime, which opens up, creating windows of opportunity for novelties

New regime influences landscape

Increasing structuration of activities in local practices

Markets, user preferences

Policy

Culture

Industry

Science

Technology

Socio-technical regime

Socio-technical regime is 'dynamically stabile'. On different dimensions there are ongoing processes

New configuration breadks through, taking advantage of 'windows of opportunity'. Adjustments occur in socio-technical regime.

External influences on niches (via expectations and networks)

Elements become aligned, and stabilise in a dominant design, internal momentum increases.

Niche-innovations

Small networks of actors support novelities on the basis of expectations and visions. Learning processes take place on multiple dimensions (co-construction). Efforts to link different elemnts in a seamless web.

Time

From Göpel (2016), original from Geels & Schot (2010), own illustration

Yet, it is one thing to observe such processes happening 'naturally' over time or to try and deliberately influence them with certain ideas and eventually accelerate and stabilize them so that e.g. planetary boundaries could be maintained.

TAKEAWAY:

Besides the quality of change (paradigm or regime shift, chapter 2.1), transformations involve a quantitative and time dimension. Without **large-scale change** towards a new mainstream that can be **stabilized over time** there will be no transformation. Such change usually happens in different **non-linear phases**. For designing transformative interventions, it is important to know, in which phase a certain innovation actually is as a whole or for a certain dimension, like policy, technology or societal norms. For this, we may look at market shares, do social media analyses or use similar indicators and tools for assessing the diffusion of innovation.

2.3. The system level: Between small innovation and great transformation

How big should a transformation be or which 'mainstream' (new paradigm or regime) do we mean?

In the previous chapter, we have already seen that there are various nested system levels involved if we follow disruptive innovations to a mainstream. It may range from individual level via a 'niche', 'regime', 'landscape' to overall narratives (see Figure 5) or in geographical categories from individual level via local groups, cities, regions, nations to the global level (compare Figure 8). Both perspectives, the more abstract socio-technological one below and geographical or social levels (Figure 8) are not the same but are both relevant for the system level question.

Figure 5: Multilevel perspective and dimensions of transformation
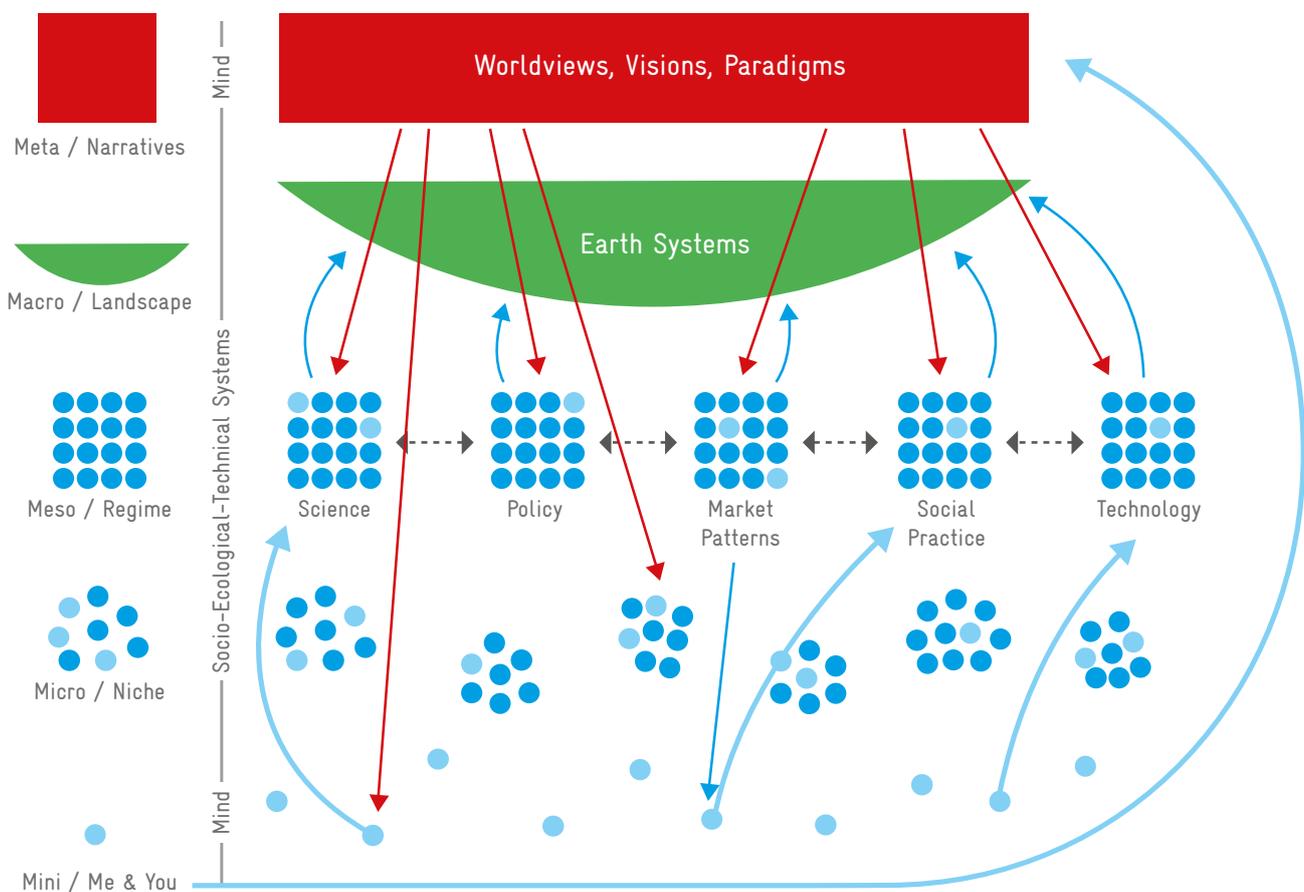
From Göpel (2016), own illustration

Individual technical and socio-economic innovations such as car sharing and autonomous driving of taxi services may change the economic and cultural paradigm of private transport from owning to using but they might not yet be called 'mobility transformation'. Neither might an innovation like natural refrigerants in air-cooling be called 'transformation towards a low carbon society', even if it becomes a (local or national) mainstream. On the other hand, some may argue that this could be a transformation of the individual transport and air-cooling sectors. Nevertheless, both follow a transformative idea in questioning a current (technological and socio-economic) paradigm and in aiming at eventually becoming mainstream. Together with other processes under the 'sharing economy', 'circular economy' and 'carbon neutral society' narratives they may add up to bigger transformations. The WGBU (2011) e.g. suggest 'medium-range transformations' like the green revolution in the 1960s as a level somewhere between a very narrow disruptive idea and a great transformation.

Hence, there is a difference between calling a project 'transformative' and the (qualitative and quantitative) level of 'how transformative' it actually is or in how far it can really change the dominant regimes and narratives. For any meaningful approach to transformation, depending on ambition and resources, it could be neither imperative nor realistic to affect the highest levels of the system (e.g. society as a whole or global society) and bring about a 'great

transformation'. 'Small transformations' can make a big contribution to great or medium transformations, sometimes even more efficiently and effectively than focusing on anything with limited resources.

Regardless of the respective level or scope, it is useful to be aware of lower and higher system levels, nested or related systems that interact with each other. Transformative interventions with their disruptive character can favor one technology or societal value over another, which could lead to compromises at higher system levels and create resistance. Conversely, the more parallel (but coherent) investments are made at different system levels into 'likeminded' technologies, social or economic innovation the better the chances of creating path dependencies that are difficult to reverse.

TAKEAWAY:

Transformations happen on **various nested system levels** from individuals to overall (global) regimes and narratives. It could be sufficient to facilitate the diffusion of a transformative idea in a single sector (such as cooling technology) into society in order to be **'transformative'** and contribute to a wider vision (horizontal scope). Changing the individual transport system of an entire city from owning cars to using shared cars could be called the 'transformation of individual transport' for this city. It might be scaled-up and contribute again to a bigger transformative vision (vertical scope). Most of the currently anticipated major transformations (compare chapter 2.7) have a medium-range horizontal (or sectoral) scope and aim at national and/or global levels. Some of them combined eventually cause the next 'great transformation'. In addition to the previous points, the **system level and scope of ambition** is thus another important criterion for transformative interventions.

2.4. Dimensions of transformation

Figure 5 already suggests that besides the multiple levels, there are some major dimensions or societal areas involved, such as science, policy and markets, in which changes are supposed to take place. Similar to the multilevel perspective above, the more dimensions that can be addressed, the more powerful interventions can become. Figure 6 summarizes the most common 'dimensions of

transformation' from the literature (e.g. Elzen, Geels, and Green 2004; Gillard et al. 2016; Göpel 2016; ICAD 2018; Mersmann, Wehnert, et al. 2014; Pereira et al. 2015; UNRISD 2017). They do not always occur or with the same framing or clustering, but we try to provide an adequate representation of a number of sources.

Figure 6: Dimensions of transformation

Environment

Social spheere from individual to (global) society, involving:
calues, cultures, social norms, attitudes, memes, beliefs, knowledge, behaviors, practices

Economy, financial market, production and consumption petterns

Politics, legal norms, incentives, institutions

Most of our interventions are here

Science, technology, infrastructure
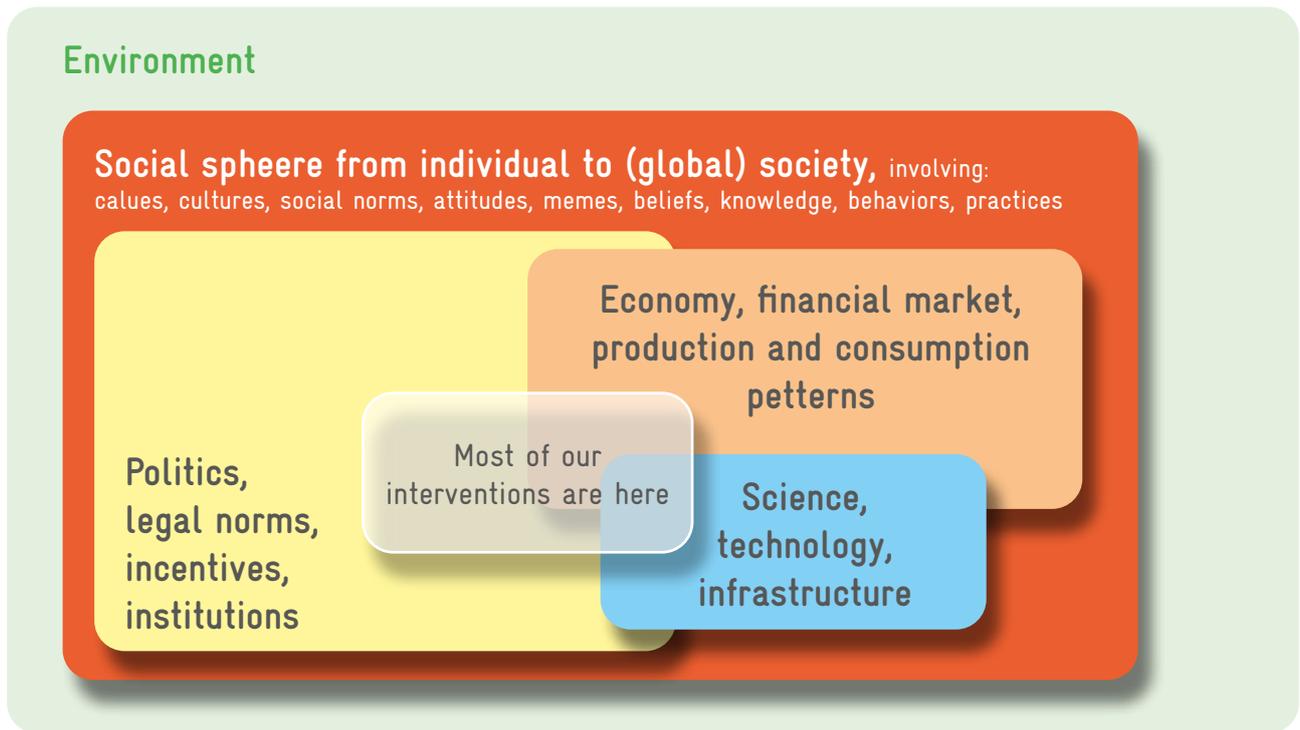
Own graphic

Most or our interventions address the three dimensions in the middle and have less explicit strategies of how to deal with the underlying social dimension. Given the importance of social change in this context, this is a considerable gap. Social factors such as values, social norms and mental or religious beliefs can enable or inhibit transformations and they can also (be) develop(ed) (see chapter 2.4.2). Similarly, the environmental dimension can transform into a desirable or undesirable state and an explicit transformative vision for this dimension would help most transformative interventions, even if they do not address the environment in the first place. This is one overlap, where transformation corresponds with the integrated approach of the 2030 Agenda and the three-dimensional approach of sustainable development, respectively (compare chapter 3.3).

Example of Industrialization

Taking the earlier example of the industrialization, a major change or innovation happened in the blue field of science and technology in figure 6. According to Polanyi (1944) the new technology co-evolved with a new economic system (purple field) as well as the (further) development of the modern state and its political institutions (yellow field) and even changed the 'underlying' societies as a whole (brown field) from individual to collective values, social norms[4], (religious and epistemic) beliefs and behavior. Finally, the environment in which all of these are embedded again (green field) has fundamentally changed up to the point where a new geological period has been proclaimed: the Anthropocene (Steffen et al. 2015). After passing a number of local and regional environmental tipping points and transforming ecosystems into new states, even global environmental tipping points can be reached. As a result, we might see the climate change beyond the limits of a livable planet. Of course, this linear description is oversimplified but serves the purpose for the time being.

....

[4]   A social norm is what people in a group believe to be normal in the group, that is believed to be a typical and/or an appropriate action (Paluck and Ball 2010).

Other transformational processes or goals might take different routes or have different starting points. Many 'green economy' measures, for example, aim to promote legal norms that would implement and catalyze green technology innovations that finally restore 'the environment' back to a healthy state and create inclusive and resilient societies that produce and consume in sustainable ways.

TAKEAWAY:

In addition to the system levels, there are various 'dimensions of transformation' in which changes could take place, such as science, policy and markets, and similar to the dimensions of sustainable development. We could call a paradigm shift in each of the dimensions (medium-range) transformation. The more dimensions involved and the broader the scope, the better the chances for a 'great (major) transformation'. One transformation can take place at different times in the different dimensions.

2.4.1. The case for deliberately organizing science-society-policy interfaces

The dimensions of transformation (Figure 6) imply that transformations (should deliberately) involve science & technology, society (overall social sphere, religion, civil society, economies) as well as the administrative, legal and political sphere. This is not a general difference to other forms of change, but for conscious transformative interventions, proactive engagement with these interfaces is a must when aiming at medium-range or great transformations.

Transformations in these dimensions usually do not take place in isolation and, on the contrary, are dependent on exchange, pushing and pulling between them. An energy transition for example progresses neither without innovative technology, supportive political, legal and economic framework conditions nor without societal acceptance and ownership (at least in democracies). The more dimensions are included and consciously addressed, the higher the chances of reaching tipping points.

The dimensions involve very different ways of thinking and acting and have large blurry overlaps at the same time. Yet, experiences with consciously organizing and learning from these interfaces are still limited and little known.

Major relevant fields of knowledge are:

the Sociology of Knowledge in general,

Science Technology & Society Studies (STS, amongst others a historical, sociological, political science school of thought),

Co-Production of Knowledge (sociological and STS school of thought),

Co-Creation (economic and management school of thought),

Transdisciplinarity, Post-Normal Science, Mode 2 Research (philosophical, sociological and other schools of thought)

Evidence-Based Policy-Making (natural sciences / medical school of thought).

Evidence from these fields suggests **three success criteria** that actors usually apply to science, society policy interfaces, i.e. their perception of the

credibility,

salience (or relevance)

and legitimacy

of respective processes and outcomes. The subjective perception of the level of fulfillment of these criteria seems to be the base for the overall acceptance amongst actors.

A number of **design principles** or **success conditions** contribute to the creation of acceptance, ownership and eventually sustainability of such multi-actor processes.

Facilitating interfaces, roles and tasks in this context (boundary work) helps to identify and characterize (structure) the types of problems and to design and implement adequate processes which maintain or expand comfort zones[5] on all sides (science, politics, civil society, private sector). This is important for protecting the credibility of actors and results, to ensure

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5   E.g. technical, disciplinary comfort zones or regarding expected roles of politicians, experts, scientists, entrepreneurs and civil society.

salience or relevance of the issues at stake and to increase legitimacy in involving the relevant actors. All in all facilitation and boundary work play a crucial role in increasing acceptance and ensuring robust results (e. g. Gieryn 1983; Guston 2001; Jacobs et al. 2016; Leith et al. 2016). This work requires significant resources e.g. in terms of physical places and organization, the use of facilitation expertise, 'boundary objects' as well as time. Boundary objects can e.g. be concepts or tools that are generic enough to be compatible with very diverse actors and disciplines and may get specific enough to advance concrete development questions. The concept of sustainable development may be seen as a boundary object (or boundary concept), since it works for a very broad range of actors and can be differentiated and adapted to specific contexts at the same time. Despite potential contradictions between specific interpretations, the different actors can refer to the same concept. Maps, graphical illustrations or simulation tools may be other examples as long as they are applicable across different disciplines, sectors and cultures.

Many multi-actor processes involving science, society and policy interfaces are less well informed about possible traps, success factors and tools for managing them. They often have less adequate or no institutions (boundary organizations) or even professional facilitators on a constant base. Projects in international cooperation almost by default play a role in/for science-society-policy interfaces, involving a challenging mix of roles between international and/or bilateral interests, expert identity (compare role of experts below), facilitation role and administrator or manager. Dedicated resources, appropriate expertise and facilitation at societal interfaces could have great potential to enhance many projects' impacts.

Such facilitation and especially transparency about the **role of technology/knowledge/experts** can help to avoid role conflicts, politicization of knowledge and 'scientization' of politics (technocracy). There are various possible roles for scientists and experts from 'pure scientists' via '(stealth) issue advocates' to 'honest brokers' (Pielke 2007). On the other hand, politicians or interest groups can also assume a similar range of roles from being or pretending to be very knowledge driven to an obviously strong politicization and value orientation. Knowledge itself remains socially constructed and attached to values and norms, whether it consists of harder or softer facts (Hegger et al. 2012; Latour 1988). Uncertainties usually increase with complexity and competing interests (Funtowicz and Ravetz 2003; Ravetz 2006; Sarewitz 2004). There are hence good reasons for being transparent about the roles and boundaries of expert knowledge. The notion of 'speaking truth to power' and its connotation of objectivity is highly controversial in the context of complex (transformation) problems (Jasanoff 2003; Van Pelt et al. 2015; Umans 2016). These types of problems usually are 'wicked problems' for

which uncertainty of knowledge is high and associated values are highly contested. There is no such thing as one objective truth (at least) for transformation problems that in itself will solve decision-making. Hence, transparent and democratic ways of incorporating science into politics are required.

This is a challenge for many development agencies having an interest in being perceived as competent neutral experts 'speaking truth to partners' and many partners have an explicit demand for 'knowledge transfer' and 'evidence-based' policies and economies. Since the layers and sources of uncertainty associated with such evidence increase with increasing complexity (Van der Sluijs et al. 2008), in some cases the same facts are used for several, even contradictory purposes, so that the 'aura of objectivity' aggravates rather than resolves controversies. On the other hand, many developing partners have a high interest in self-determination and the creation of their own agendas and can be very sensitive to scientization of their political affairs. At least for the relations, this must not be a problem as long as all sides have a strong belief in the 'objectivity of the knowledge' involved (Jasanoff 2011) and that it is detached from value judgements. However, credibility, relevance and legitimacy can be questioned suddenly or at the 'backstage' if this perception changes for instance because too many roles are combined by the same experts (Rayner 2003; Spruijt et al. 2013; Turnhout et al. 2013; Wilson 2006).

Another frequent demand in this context is involving **different forms of knowledge** equally, such as scientific, legal, political, traditional, local and tacit knowledge. This can be crucial for grounding any (transformative) development intervention in its respective context and for making new ideas work at all. It may further play an important role for increasing not only 'system knowledge' but also 'goal knowledge' and 'transformation knowledge'. Finally, acceptance and social robustness or resilience depend to a large part on a synthesis of various forms of knowledge (Hornidge 2014; van der Molen, van der Windt, and Swart 2016; Qadeer 1996; Wilson 2006). These aspects illustrate some of the limitations of top-down approaches and a one-sided belief in abstracted centrally collected knowledge (e.g. framed by 'best practice') is one expression of a top-down approach. There is a great number of participation methods available and applied in many projects but scientific/expert knowledge in many cases still seems to be preferred to other forms of knowledge. This can lead to explicit or implicit resistance in many ways.

Transparently and explicitly involving **different perspectives** at 'eye level' with knowledge & technological imperatives further creates a base for acceptance and socially as well as technically robust decisions (Cash et al. 2002; Hadorn et al. 2008; Hegger et al. 2012; Schauppenlehner-Kloyber and Penker 2015). ‚Perspectives' in this context includes social values, norms, religious and epistemic beliefs, cultures, 'local' (e.g. disciplinary or cultural) practices and routines (how things are done).

A focus on rather abstract knowledge (internal validity) and on technology tends to underestimate the role of values, norms and practices in defining worldviews, narratives and paradigms (including scientific ones). While emphasizing the importance of hard facts and as many facts as possible (knowledge society, big data) for decision-making, a weakness of these perspectives can therefore be the underestimation of other relevant factors for making sustainable and accepted decisions. This to the point where democratic principles are ignored for the sake of 'speaking truth to power'. This may be the case, if a classical cost-benefit analysis gets the only rationale of decision-making. There seems to be still much room for finding effective ways of discovering, facilitating between and accounting for different values, norms, beliefs and practices in such processes.

Shaping processes iteratively, adaptively, in a non-linear and result-open way accounts for the complex and hence unpredictable nature of science-society-policy interfaces. This will strengthen triple-loop learning, adaptive capacities and resilience as well as ownership and capacities for action (e. g. Flitcroft et al. 2011; Huggel et al. 2015; Steyaert et al. 2007).

A major development critique observe a relatively top-down, rigid and output-oriented (vs. process oriented) way of designing and implementing projects (Burns and Worsley 2015; Probst and Bassi 2014; Ramalingam 2013; Reyers et al. 2015). This rigid way would best be suited for complicated problems but less for the complex ones we are dealing with. The next chapter 2.5 further elaborates on this

Ensuring genuine reciprocal relationships between countries, actors, sectors and hierarchies will enable effective exchange, using the best knowledge from all 'worlds', integrate different perspectives, ensure ownership and shared responsibilities on all relevant sides. Different stages of participation should be used carefully, like being informed via consultation (being asked), co-production of results (contributing equally on a technical level) up to participating in decision-making. Different types of problems and different actor types require different stages of participation. The challenge is to differentiate between them; to be able to implement the findings. For complex problems many scholars call at least for a co-productive process mode (Callo-Concha et al. 2016; Hornidge

2014; Roux et al. 2006; Weible, Sabatier, and Lubell 2004; Wilson 2006).

Unidirectional relationships resulting from top-down, rigid and output oriented development work in which commissioning parties and implementing agencies define the terms and conditions seem to be less effective. The 2030 Agenda principle of 'universality' (see chapter 3.3) acknowledges this. However, as long as e.g. accountability is mainly demanded in one direction, while the other one is regularly 'consulted', reciprocity remains a challenge. If expected results are defined from the beginning and expert knowledge provides the 'best practice' solutions, there might be little need for truly iterative processes and genuinely reciprocal relationships. The WBGU (2011, chap. 5.3.5.2) advising the German government identifies "structural problems and democracy deficits of global governance and international organizations" at the costs of local legitimacy, relevance and ownership. The same could be true for developing partner systems. As difficult it may be to shape the multi- and bilateral systems in a genuinely reciprocal way, as sensitive it could be to question power structures and hierarchical cultures on the partner side. There are many ways in which participative approaches may ignore local cultures or even make global inequalities permanent (Wilson 2006). Nevertheless, on all sides there might still be much leeway for evolving unidirectional patterns towards more reciprocity.

Finally, integrating the largest possible actor coalitions within manageable boundaries contributes to all success criteria above and helps sustainability innovations on their way to the mainstream or new paradigm (e.g. Hage, Leroy, and Petersen 2010; Hegger et al. 2012; Maat and Waldman 2007; Meadow et al. 2015).

It seems like most of these 'conditions for success' for the organization of science-society-policy interfaces still pose significant challenges for international cooperation. Some scholars demand systemic changes in the bi- and multilateral systems (Easterly 2014; Ramalingam 2013; Wilson 2006) as well as institutional and methodological innovations (compare chapter 4.4) in order to make boundary work at these interfaces more effective. This may be even more so for transformative interventions, which heavily depend on addressing multiple parts (dimensions) of societies.

Figure 7: Causal model for interventions at science-society-policy interfaces
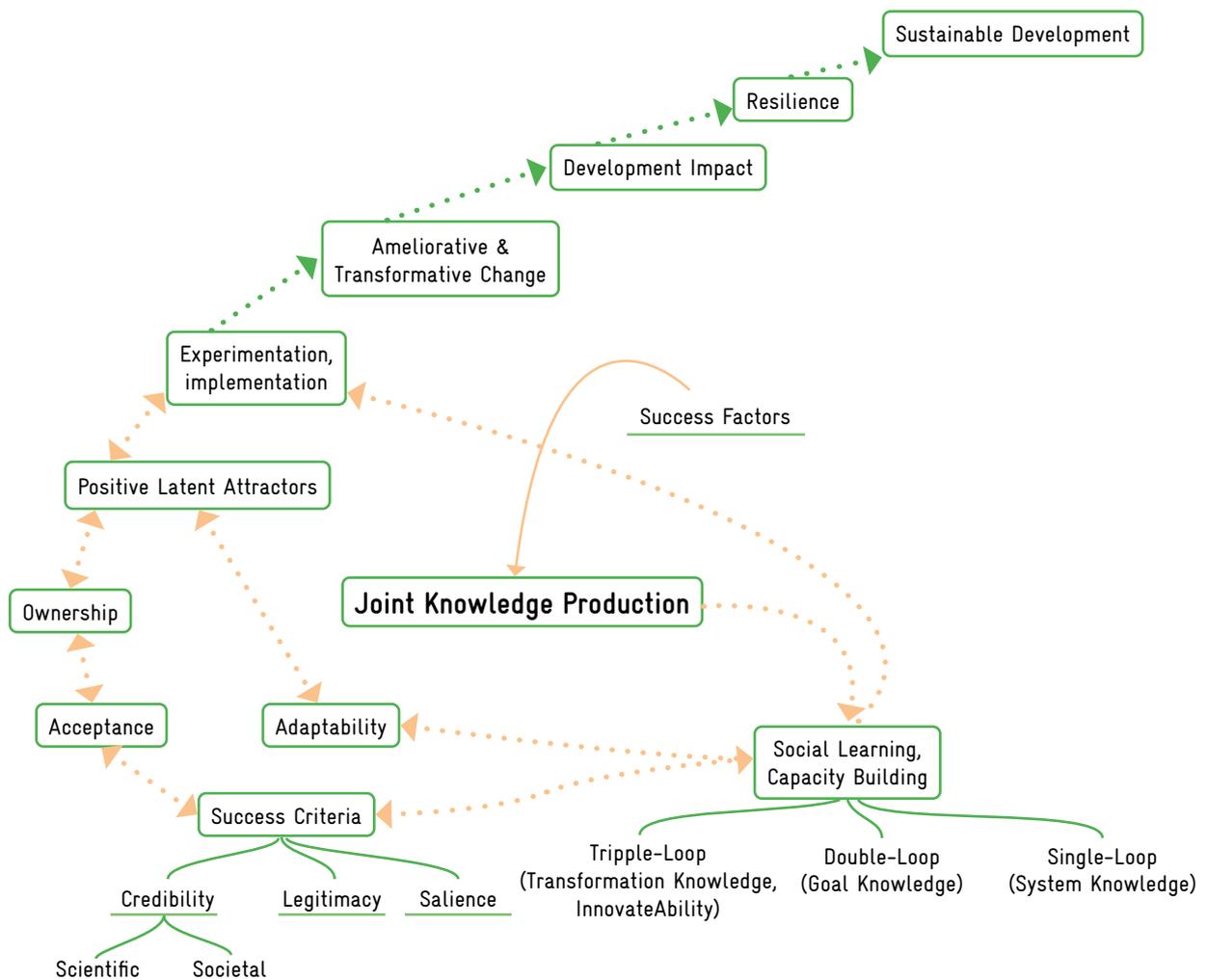
It has been combined from a range of sources (Burns and Worsley 2015; Hegger et al. 2012; Medema, Wals, and Adamowski 2014; Perovic 2014; Sellberg, Wilkinson, and Peterson 2015; Waddell 2016, amongst others in an own graphic).

Figure 7 offers a basic causal model for interventions at science, society policy interfaces with the aim of creating different forms of change (including transformative change) towards sustainable development. The success factors or conditions described above can be understood as important ingredients for the model, creating ongoing cycles of social learning, innovation and action (yellow arrows) that eventually lead to more sustainable development (green arrows).

TAKEAWAY:

The ability to **address multiple dimensions** such as policy, technology, markets or societal norms is crucial, especially for transformative interventions that want to change societies as a whole or at the level of large system scales. They should therefore be able to deliberately organize and facilitate science-society-policy interfaces in following **success criteria** such as the perceived legitimacy, salience and credibility of processes and outcomes. There are again a number of **'design principles'** that influence these criteria, like iterative and adaptive process design, genuinely reciprocal relationships and participation or transparent deliberation on values, roles and interests.

2.4.2. The case for social change

Most of our interventions seem to focus on economic development, technological innovation and probably still with the biggest share of policy advice (Figure 6). However, most of the transformation scholars assume that all of the dimensions will be important with different emphasis on technological, political, economic or social drivers. We believe that if we are to support societal change as a prerequisite for transformation, much more attention should be paid to the social dimension and its multiple aspects.

The debate on transformation is strongly influenced by transition management and diffusion of innovation research. These strands take a rather technical lens and often use the socio-technical systems framework (see Figure 4) in order to understand transformational changes (e.g. Haxeltine and Seyfang 2009; Olsen and Fenhann 2015; WGBU 2011). Therefore, many of the current examples of transformation include technology as the main driver or solution e.g. in the German energy system transition, mobility and digital transformation.

However, the early and general ideas about the diffusion of innovations look at social systems in general (Rogers 1983, 2010) with potentially all of its aspects and subsystems (see Figure 4 and Figure 6).

Similarly, other authors argue that, according to pure systems logic, sociopolitical processes, including power relations, could be underestimated, and therefore suggest adding a different perspective on transformational change, asking for "who and why instead of how and when" (Gillard et al. 2016, 258).

There seems to be a significant gap in attention, competences and dedicated support for addressing the broad social dimension or social change, respectively. The higher the ambition to influence transformations, and the higher the ambition for the level of transformation up to a 'great transformation', the more important the social dimension will become for driving and drawing new paradigms. Another example could strengthen this point:

On December 1, 1955, in the city of Montgomery, a bus driver demanded from (told) Rosa Parks, tired from work, to give up her seat for white passengers. Rosa Parks stayed on her seat. Therefore, she was arrested by the police, charged and fined for disorderly conduct and for violating Montgomery's ordinance to segregate bus passengers by race. Rosa Parks' husband was engaged in civil rights movements but she has not been active so far.

Martin Luther King, at that time still a rather unknown Baptist priest, organized together with his 'Montgomery Improvement Association' the 'Montgomery Bus Boycott', partly as a response to the events involving Rosa Parks. She herself became an icon of the civil rights movement.

As a result, the authorities were obliged to stop the segregation of bus and train passengers by race. This again inspired many more protests of the human rights movement in the US, which ultimately led to the abandonment of all racial segregation laws.

In this case, social values, norms and practices were questioned up to the (tipping) point of establishing fundamentally new values, which were accordingly reflected in new legal norms. However, this did not mean that racism was no longer a problem at the time. So far, most American citizens may not have dared to state that societal transformation for this problem is complete.

Example of Rosa Parks

It is therefore not sufficient to establish new laws or financial incentive mechanisms that only create extrinsic motivations, or to flood markets with new technologies and products. Societal acceptance (values, norms, attitudes) and the transformability (knowledge, learning, skills) play a major role in allowing transformations to happen. Societal discourse and social learning also play a role when it comes to leading transformations in desirable directions (compare chapter 2.7). Facilitating social transformation will be crucial when hoping to influence transformations directly or indirectly. At the same time, the academic debate as well as practical guidelines are strongly influenced by the fields of knowledge that focus on technological, political or economic innovation. The obvious gap in social change should be closed and reflected in our competences and portfolio.

There are again many perspectives on social change. Relevant theories and practical approaches can be found in psychological, behavioral, sociological, communication or economic theory, among others. On a very general level, social change plays a role in different ways across transformative change processes. First, all 'layers of social change' are relevant, i.e. the development of values,

cultures, social norms, attitudes, beliefs, knowledge, behavior and practices. Many approaches may focus on knowledge, some on behavior but if the underlying values are not addressed, transformations will be less sustainable. Secondly, all 'levels of the social sphere' are relevant, from individuals to (global) societies or, from individual values to collective values, respectively. Thirdly, social change is relevant for all phases of transformations, from pioneers to sustaining a new paradigm within the mainstream (compare Figure 3).

Learning and communicating for social change interventions can therefore be manifold in the context of transformation. They can e.g. address individual change agents in pioneering phases, they can address multi-stakeholder settings to enable social learning and joint decision-making in the take-off phase (compare Figure 3) or they can address societal milieus in communicating certain values, new social norms and behaviors in the acceleration phase.

Figure 8 illustrates the numerous possibilities of addressing social change in a three-dimensional room of social layers, social levels and transformation phases.

Figure 8: Coordinates of social and transformational change.
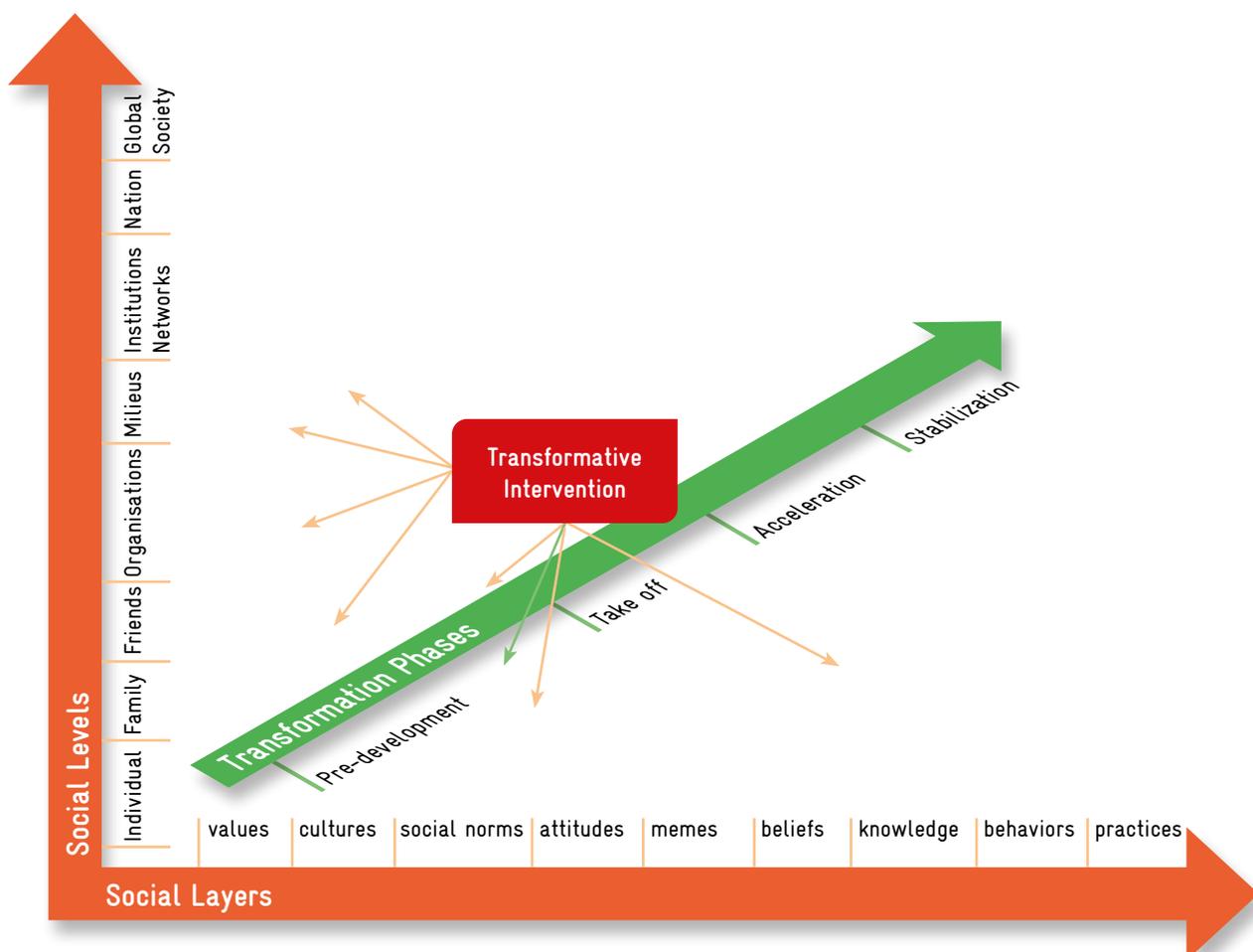
Own graphic

Learning (formal or informal) seems to be closely related to social change (O'Brien et al. 2013). In fact, an abundant (common) assumption in many development interventions is still that the exchange or dissemination of information will **transfer knowledge** and the knowledge subsequently changes attitudes, behavior and practices (Shove 2010). There are at least **three highly contested assumptions** here.

One of them is the assumption that knowledge tends to be objective in such complex environments, if sufficiently 'evidence based' and therefore indicates the best choices and the best path. This implies that there is little need for joint reflections on different perspectives, different forms of knowledge, different experiences and different values that may be attached to different scientific narratives. Critics of this perspective call it technocratic, rationalistic or anti-democratic and ignorant of the finding that the uncertainty of knowledge tends to be high for complex problems and values tend to be highly controversial (Behague et al. 2009; Clark et al. 2011; Hantrais, Lenihan, and MacGregor 2015; Hegger, Zeijl-Rozema, and Dieperink 2012; Hornidge 2014; Jasanoff 2005, 2011; Ramalingam 2013; Rayner 2003; Reynolds 2008; Rietig 2014; Wilson 2006).

The use of empirical evidence without further consultation might work for a more or less simple challenge like finding the fastest way to a travel destination. Evidence alone is much less likely to work for collectively acceptable solutions such as a suitable site for radioactive waste (compare Sarewitz 2004). One of the effects of the 'knowledge focus' would be that values, social norms and attitudes are underestimated in their importance for people. For experts on system knowledge it can be hard to understand the resistance stemming from deeper social layers (left side on x-axis of Figure 8). This resistance can be reinforced if experts continue to insist on certain interpretations of knowledge so that they are perceived as 'just another interest group' and they can lose their credibility. If experts (or politicians using the same narrative) suggest that certain tools, information or knowledge alone could lead the way (e.g. using a cost-benefit analysis) they may even be perceived to be anti-democratic because participation becomes obsolete and choices prescribed (Juntti, Russel, and Turnpenny 2009; Sarewitz 2004; Spruijt et al. 2016; Tudela, Akiki, and Cisternas 2006). This can also lead to a loss of relevance and legitimacy and thus the desired effects (change of practice).

The second conflict with the knowledge-to-action rationale is the assumption that knowledge can be transferred at all in the case of complex problems and lead to reasonable and sustainable practice. It might work for a manual on constructing a wardrobe (not always) but certainly not for larger scale environmental issues such as choosing between a nuclear or renewable energy development path for a country (Åkerman and Peltola

2012; Sarewitz 2004). Even if there were already a high level of acceptance and demand, e.g. for paving the way for renewable energies, the path would most likely look very different in the individual countries and involve an extensive social learning process that can hardly be replaced by knowledge transfer. Many scholars e.g. from the sociology of knowledge, sustainability science and transdisciplinary studies suggest that existing knowledge must somehow be deconstructed and reconstructed again by the actors, analyzed for uncertainties, the associated values and norms and supplemented by local and tacit knowledge (Beers, Mierlo, and Hoes 2016; Bos, Brown, and Farrelly 2013; Colvin et al. 2014; Cundill 2010; Ensor and Harvey 2015; Herrera-Reyes, Méndez, and Carmenado 2015; Kristjanson et al. 2014; Leys and Vanclay 2011; Luks and Siebenhüner 2007; Medema, Wals, and Adamowski 2014; A. Shaw and Kristjanson 2014; Siebenhüner, Rodela, and Ecker 2016; Wals and Rodela 2014). For larger groups of actors it would be important to participate in joint sense-making and co-production of knowledge in order to be able to contextualize it profoundly, adapt it, create acceptance and ownership and be able to use it for decisions or practice. For particular groups of actors, social learning opportunities will be crucial and for these as well as wider target groups, all other learning and communication formats addressing values, norms, attitudes and step by step learning could be relevant.

The third challenge is the frequent finding in development interventions that the knowledge-to-action rationale does not actually work for many problems in which behavior change is desired and communicated, because it ignores a large part of the complexity involved (Bouman, Lubjuhn, and Hollemans 2017; Shove 2010). Our lay perspective may suggest that people can change if they really want to and have sufficient knowledge. And both motivation and knowledge do play a role, but as such they are not enough.

Knowledge for action might work for a travel guide who instructs to drive on the left-hand side (not every time) but certainly not if he informs an average citizen on how to save carbon dioxide, buy less and eat less meat. Experience with addictive behavior has shown that there are different levels of awareness, attitudes and practices that should not be ignored and addressed in the same way. This has inspired the model of the 'stages of change' (ibid, see Figure 9).

Figure 9: The stages of behavior change

Open for **cognitive communication**

Open for **affective communication**

Maintenance
Works to sustain
the behavior
change

Relapse
Fall back to
old patterns of
behavior

Action
Practices the
desired behavior

Preparation
Intends to take action

Contemplation
Aware of the problem and of
the desired behavior change

Precontemplation
Unaware of the problem
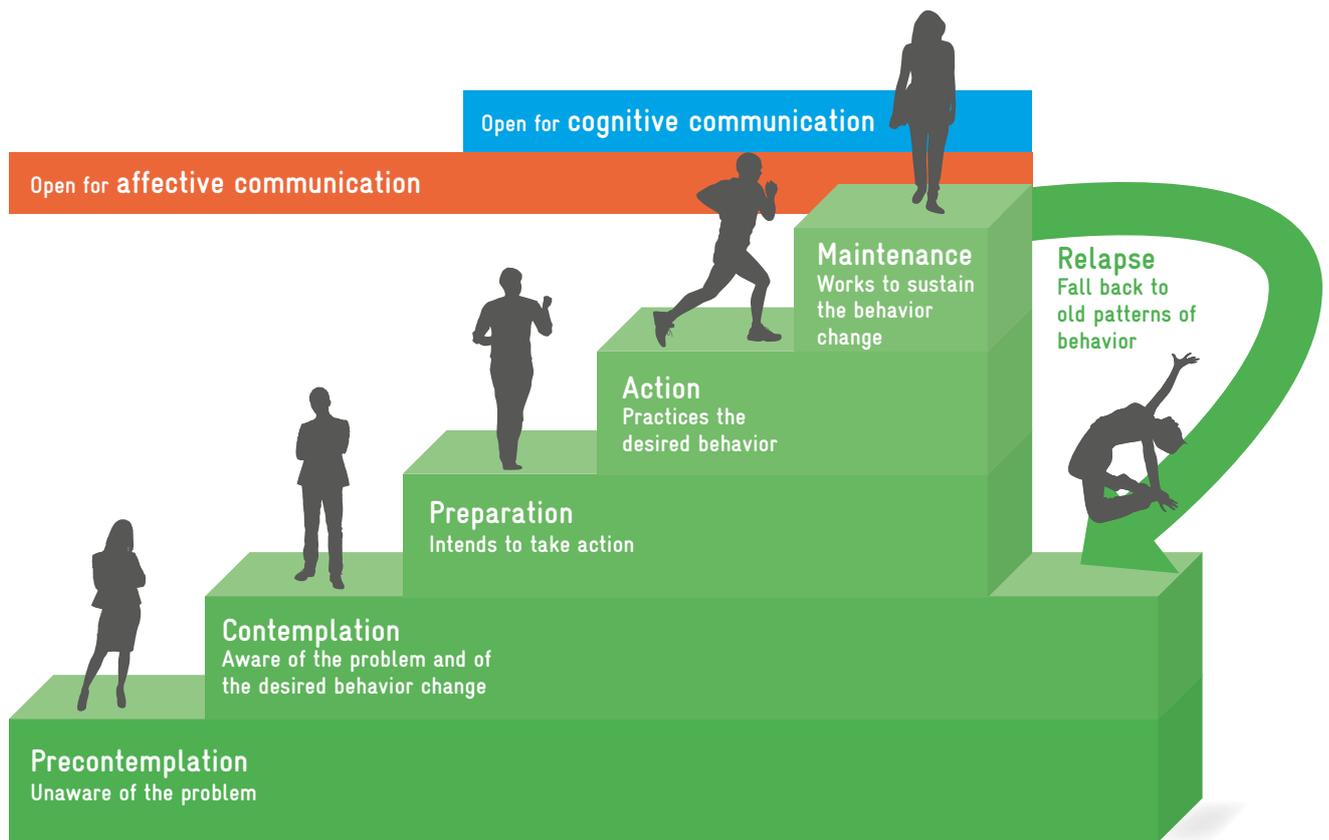
Based on Prochaska & DiClemente (1986, own visualization)

Experiences from entertainment-education interventions have shown that, regarding a certain topic, broader target groups on the lower stages of change tend to be more open for affective communication such as fictional stories or infotainment, appealing to values, norms and attitudes and less to knowledge and rational arguments in the first place (Bouman, Lubjuhn, and Hollemans 2017; Reinermann et al. 2014; Singhal et al. 2003; H. Wang and Singhal 2018). People on higher levels of change therefore also tend to be more open to cognitive forms of communication (e.g. nonfiction media, reports etc.). Of course, this is a gross simplification, because such a receptiveness depends very much e.g. on the educational and socioeconomic background people already have. For example, people with higher education might be more receptive to

cognitive communication even if they are not aware of the problem. However, whether this can already change behavior is strongly questioned by many experiences, which indicate that the different stages should be taken one step at a time. People would have to be addressed with different learning and communication formats and contents at different stages and the leap to the second level would be unrealistic for most of the education and/or communication interventions.

Nevertheless, this is a rather linear conception of social change and would be incomplete without a multidimensional view of factors that can influence values, norms and behavior. Some more dimensions according to Grenny et al. (2013) are illustrated in Figure 10.

Figure 10: 'Six sources of influence'

	Motivation		Ability	
Personal	**Personal motivation:** Do people actually want to act differently? *Make undesired things desirable*	1	**Personal skills:** Do people have the ability and strength to act differently? *Help others to learn*	2
Social	**Social motivation:** Are there other people close who motivate or inhibit certain behavior? *Use group dynamics*	3	**Social skills:** Do other people offer support, information, etc. that is needed at times? *Involve social support*	4
Structural	**Structural motivation:** Do structures enable desired behavior or do they discourage? *Develop systemic measures*	5	**Structural skills:** Which things, structures etc. empower people to act in certain ways? *Use or develop respective structures*	6

Model for social change according to Grenny et al. (2013, own illustration).

Contextual factors such as "social, organizational, and physical environments" (Glanz and Bishop 2010) gain in importance in social change interventions. These are not merely tangible environmental factors but also people's perceptions and ideas of these – both have the potential to either facilitate or constrain change of behaviour. Structural issues for instance could consist of financial considerations, lack of safety or access to public transport and legal certainty. Grenny et al. (2013) suggest that at least 6 'sources of influence' (Figure 10) should enhance the chances of behaviour change[6].

Such stages of differentiation of change, target groups as well as conditions of behavior change are still rare in development cooperation, especially in fields with a greater affinity for natural, economic, or political science. The target groups in many of the development interventions may be placed on the lower stages of change for many of our topics and associated with lower educational and socio-economic backgrounds. Most development cooperation interventions aimed at social change still tend to use cognitive, knowledge-based formats of learning and communication with a high probability of not changing much about behavior.

After all, social change in the context of transformation seems to require social learning at various levels in various forms (educational, social, institutional and governance level learning) as well as communication interventions that reach people by different media. In this broad landscape of learning and communication, numerous approaches, formats and methods can be found. Figure 11 highlights only some of them, including the blurred notions of capacity development and capacity building.

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6   The training provider VitalSmarts e.g. has published an illustrative film about the influencer concept.

Figure 11: Map of learning and social change
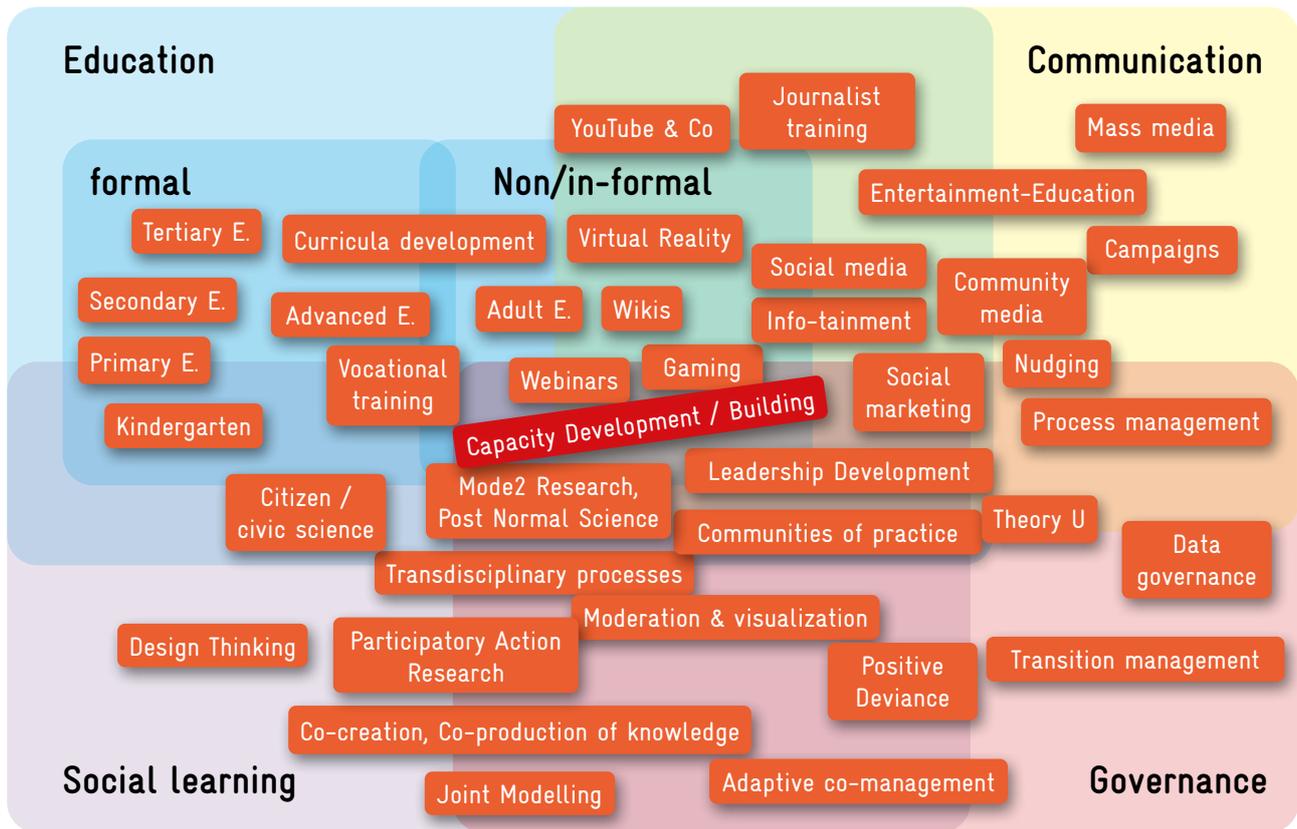
It assembles a wide range of categories for the sake of displaying diverse (non-exhaustive) options and interfaces in the field of social change. The various categories like modes of education, approaches, methods and different media are roughly allocated on the map and do not follow any order (own graphic).

At the end of this chapter, two complementary strategies are highlighted that are still underrepresented in some development work communities (e.g. communication on climate change) but have shown tremendous impact on behavior.

Entertainment education strategies use existing or new affective fictional (often transmedia) formats like soaps combined with social media to communicate desired social norms and information by using the effects of storytelling and role models. Examples such as 'East Los High' or 'I, A Woman, Can Achieve Anything'[7] reach millions of people in developed and developing countries with great success in terms of desired changes in discourses and behavior. (Bouman, Lubjuhn, and Hollemans 2017; Reinermann et al. 2014; Singhal et al. 2003; H. Wang and Singhal 2018). Such interventions require significant resources but have much greater chances of (transformative) success than many 'knowledge products' that are

factually correct but fail in doing their intended job of changing behavior. If we want large-scale transformative change, we need to invest much more and dare to make the 'bite' a bit more attractive to fish than to fishermen.

A bottom-up strategy for social change that works with people directly emerges under the name **'Positive Deviance'** (Anino, Were, and Khamasi 2016; Bradley et al. 2009; Marsh et al. 2004; Pascale, Sternin, and Sternin 2010; Rose and McCullough 2016; Singhal, Shirley, and Frost 2010; Sternin 2007; Walker et al. 2007). The diffusion of innovation theory is largely based on the idea of 'knowledge to action', i.e. solutions that can be abstracted to knowledge and technology and transferred to the mainstream. (Singhal, Shirley, and Frost 2010). Despite the image of a niche that eventually becomes mainstream, deliberate transformative approaches often use a top down approach when imposing certain norms and technology on society. The positive deviance approach

reverses the rationale of 'knowledge to action' by screening single and hidden behavioral innovations that work in daily routines and analyzing them for why and how they work. Such innovations (or 'positive deviants' and their 'micro behaviors') are identified through a combination of empirical data and discovery and action dialogues in respective communities. Once such interventions have found out what positive deviants actually do differently from others ('micro behaviors'), the local solutions are further socialized, communicated and made a norm in the broader or comparable communities who have not been exposed to the intervention. This can be supported by entertainment education interventions to increase the communication outreach. The positive deviance strategy uses the recognition that it can be easier

to "act your way into new ways of thinking, than think your way into a new way of acting" (Pascale, Sternin, and Sternin 2010) and therewith offers a paradigm shift for a persistent mainstream approach to social change.

> **TAKEAWAY:**
>
> For societal transformations, the establishment of new laws or financial incentive mechanisms will hardly be sufficient, since in the best case they create extrinsic motivations. The political, technological and economic dimensions are embedded in the wider social sphere. Societal acceptance or **intrinsic motivations** and the **transformAbility** (knowledge, learning, skills) therefore play a huge role in allowing transformations to happen. Nevertheless, there is a number of misconceptions about social change such as the 'knowledge to action' rationale that need to be overcome in order to have an impact in this dimension. At the same time, there are diverse experiences with learning and communication approaches from which we can learn how to shift social values, norms and behavior towards new paradigms.

2.5. Complexity or the types of problems we have

If change is the bold ambition at all levels and in all dimensions of transformation, a closer look at the nature of the transformation challenges is helpful.

Their general nature can best be described as complex as opposed to simple, complicated or chaotic systems (see

Figure 12). The different dimensions of transformation as such (Chapter 2.4) and their subsystems can already be very complex. Hence, the holistic consideration of all of these aspects could therefore be described as 'super complex'.

Figure 12: Different Strategies for different types of problems according to complexity theory
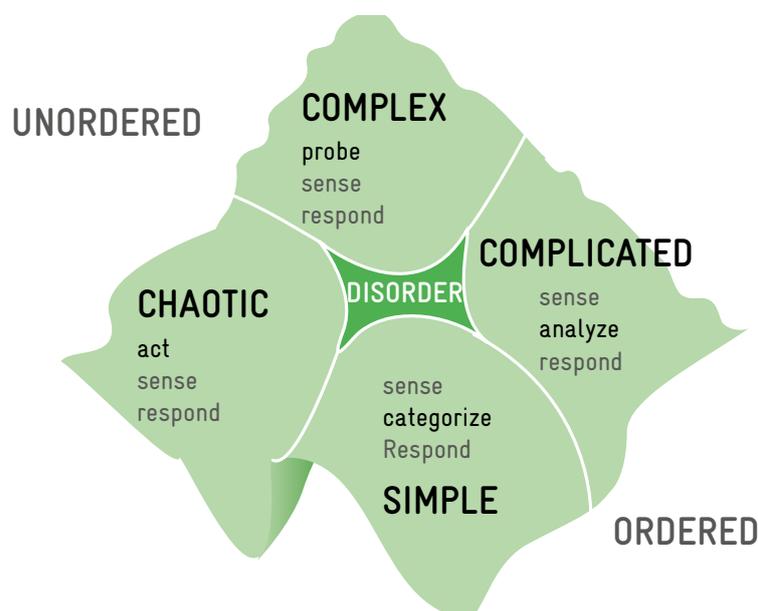
It can be assumed that transformation fields as a whole are best described as 'super complex' systems (from Snowden & Boone, 2007, own illustration).

The notion of complexity does not sound surprising in this context and many practitioners might 'suffer' from the extensive daily use of the term, which characterizes almost everything in the 'development world'. It seems therefore all the more surprising that the idea of controlling our interventions is so persistent and still growing, especially in relations between implementing agencies and commissioning parties. One signal towards a new direction might be the notion of 'smart implementation' and a number of lessons learnt from governance projects around the world that have been implemented by GIZ (Kirsch, Siehl, and Stockmayer 2017). Amongst others, the authors argue for moving away from 'best practice' blueprints towards iterative and adaptive management for local solutions on a base of mutual trust and eye-level between parties around development interventions. However, the growing ambitions for transformation do not seem to change much in the self-reinforcing linear cycles of output orientation, impact promises and desired control.

One reason for this might be a vicious circle in which 'business as usual' management practice tries to stick with predefined goals and indicators, ignores complexity, does not get further or produces results other than expected which triggers the impulse to steer and control even more and differentiated the achievement of rigid goals and indicators. One challenge here can be a mistaken assumption of why things may go wrong. It is the assumption that rules, routines, M&E methods and formats are not firm and differentiated enough to ensure desired outcomes. Ironically, these assumptions are part of the problem. More and more rigid structures can lead interventions to work in 'shadow systems' (High, Pelling, and Rengasamy 2004; P. Shaw 1997) which are more adapted to the complex reality and ignore some of the formal structures. Interventions in this case have to deliver in and bridge at least two realities, the very formalized one in which outcomes are clear and a very uncertain one (shadow system). The existence of shadow systems makes it further difficult to detect what may go wrong because, as the name implies, they happen back-

stage and deliver at least some results that might compensate for bigger failures. That way, incremental changes to the system of how we develop and implement projects may often seem to be sufficient and 'the system' as such or its paradigms are not questioned.

Another barrier for adapting better to complexity conditions might be the fact that relationships and communication rules between actors in 'business as usual' management practice (simple or complicated world) are very formalized too and dependent on hierarchies, unidirectional financial, accountability or other dependencies. In such a system, result open mutual learning that may cause fundamental changes remains a challenge.

Some of the basic insights into complexity, however, are the ideas of emergence (the system is more than its parts), non-linear behavior and unpredictability (Burns and Worsley 2015; Ramalingam 2013). We keep analyzing and steering systems as if there were dependent and independent variables that could be influenced in a more or less controlled linear environment of a project – a complicated world (ibid, Kuenkel 2019, chaps. 1.4, 3.4). Only, the elements in complex systems can best be described as interdependent, creating punctuated equilibria and short unpredictable bursts of change – the complex world. Slightly influencing one small element can trigger a tipping point and change the nature of the whole system. Strongly influencing many elements at the same time can lead to self-reinforcing feedback loops that maintain the nature of the system (Cairney 2012; Derbyshire 2016; Fiksel 2006; Johnson 2009; Lissack 1999; Loorbach 2010; Richardson and Cilliers 2001).

Figure 13 shows some of the differences between living in a 'complicated world' that can be managed with conventional management approaches and some expectation of control and living in a 'complex world' that can be managed adaptively with trust in self-organization.

Figure 13: Comparison of the 'complicated world' change paradigm with the 'complex world' change paradigm

	Conventional aid thinking (complicated world)	New perspectives (complex world)
Systems and problems	System and problems are closed, static, linear systems; reductionist (parts would reveal the whole)	Systems are open, dynamic, non-linear systems far from equilibrium. Macro patterns emerge from micro behaviors and interactions
Human agency	Individuals use rational deduction; behavior and action can be specified from top-down; perfect knowledge of future outcomes is possible	Heterogeneous agents that mix deductive/inductive decisions, are subject to errors and biases, and which learn, adapt, self-organize and co-evolve over time
Social structures	Formal relations between actors are most important; relationships are ahistorical and can be designed; actors can be treated as independent and atomized	Interpersonal relationships and interactions matter in form of culture, ties, values, beliefs, peers. Informal matters, relationships are path dependent and historical
The nature of change	Change is direct result of actions; proportional, additive and predictable; can hold things constant; simple cause and effect	Change is non-linear, unpredictable, with phases of transitions

Adapted from Beinhocker 2006 and Ramalingam 2013, Figure 7.1; own illustration.

The case of Rosa Parks can again serve to illustrate some of the dynamics.

…Eleven years earlier Irene Morgan had done the same as Rosa Parks did in 1955 (p. 29) and some others as well. 2) Irene Morgan had initiated with her 'bus protest' that bus lines and trains between federal states were liberated from racial segregation. She had therefore contributed to incremental change but not caused a tipping point like Rosa Parks.

So why did not the same action cause the same reaction? Certainly, at the time of Irene Morgan's individual protest there was obviously no 'window of opportunity', no suitable societal framework conditions, the time was not ripe. However, no one would have expected Irene Morgan to cause the abandoning of all racist discriminatory legislation, nor could anyone have imagined that of all actions Rosa Parks would have caused just that.

Example of Rosa Parks

Who will be the next Rosa Parks? Which activity (and hopefully not a disaster) will cause the next tipping point? We cannot know and we cannot steer our projects to the next tipping point and transformation. The narratives of (top down) steering and control might even broaden the gap between complicated concepts, reports and indicators on one hand and the complex reality on the other (Burns and Worsley 2015; Ramalingam 2013). Nevertheless, we may be able to continuously influence transformations in a mode of probing, sensing and adapting our activities (ibid). This implies letting go some amount of the control for things that cannot be controlled and strengthening our adaptive capacities (and possibilities) and hence our 'TransformAbility' (Brown and Williams 2015; Folke et al. 2010; Garmestani and Benson 2013; Göpel 2016; Kirsch, Siehl, and Stockmayer 2017).

Complexity science, amongst others, is making noticeable progress in exploring complex systems. A growing number of examples are provided, e.g. for social networks, knowledge and influence webs and interdependencies between different goals such as the SDGs (Caniato

et al. 2014; Heeks and Stanforth 2014; Moeliono et al. 2014; Muñoz-Erickson and Cutts 2016; Rates, Mulvey, and Feldon 2016). Insights are for example gained into how these systems look beyond (sometimes misleading) abstractions such as organigrams and simple actor maps or into the question of what makes certain systems more or less stable and resilient (see next chapter). Conversely, this may strengthen our capacity to influence systems in ways that make new configurations or regime shifts more likely.

However, we might never be able to get full control of the complexity and uncertainties involved in super complex systems. In this area, our emphasis on evidence-based interventions (positivism) gets less useful rationale compared to the appreciation of co-creation and adaptability (constructivism, see Figure 14). There will

probably always be limits regarding the knowledge we can create and the best possible knowledge should not replace a democratic deliberation on subjective values and desirable goals (compare chapters 2.4.1 and 2.7).

> ## TAKEAWAY:
>
> Transformation deals with **'super complex' systems. Non-linear behavior** and **unpredictability** are 'normal' in this field. Here, informal social values, norms, beliefs and relationships matter more than formalized and abstracted ones. **Adaptive co-evolving processes** work better than output oriented linear steering. Joint sense-making of reality works better than the purely evidence-based implementation. Despite some appreciation for complex systems, major parts of development agency and transformative interventions are still subject to systemic conditions that favor formalized linear design and steering (complicated world paradigm). Transformative interventions therefore have to do both, work as much as possible in a 'complexity mode' in a 'complicated world environment' and, in this context, advocate for 'transforming our work'.

Figure 14: Aggregate complexity
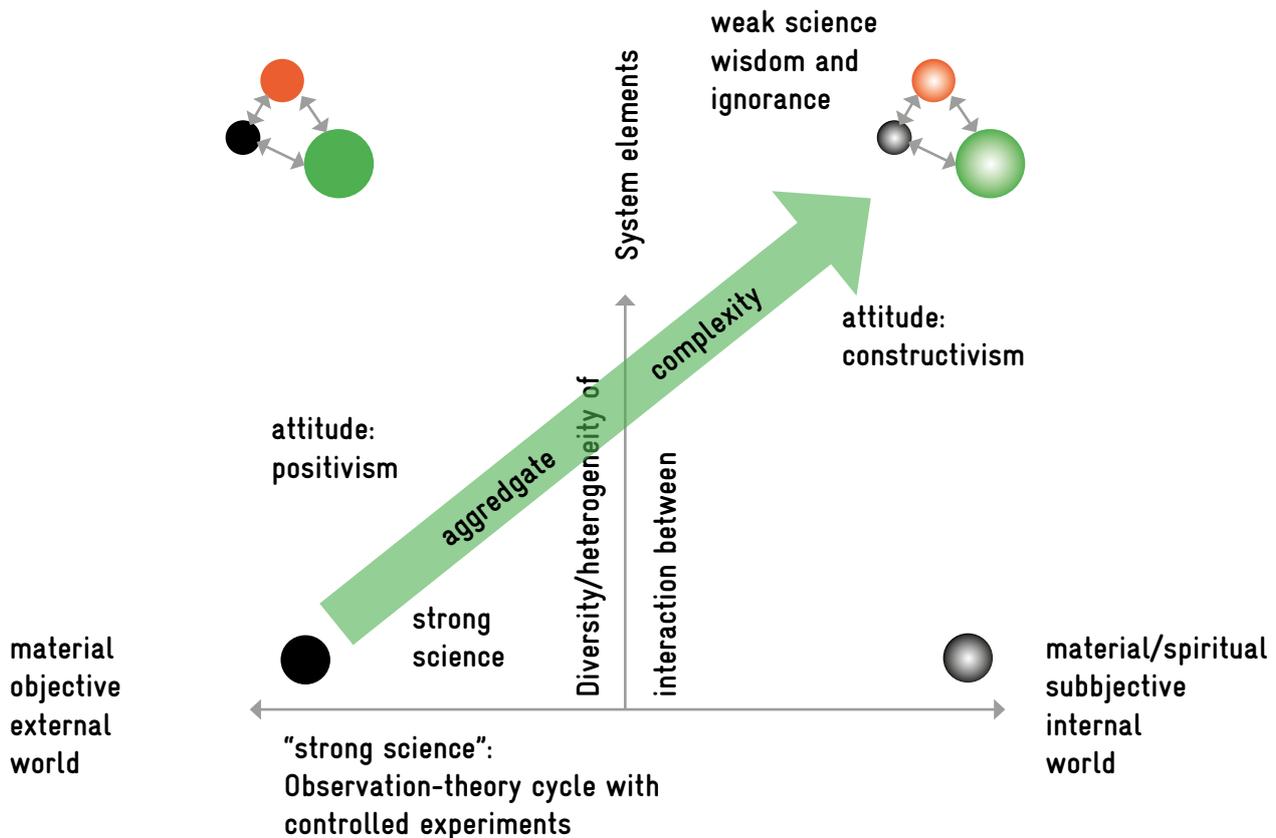
… as an increase of interaction between system elements and an increase of the importance of subjective mental worlds (taken from de Vries and Petersen, 2009, own illustration). In a 'super complex' system, of uncounted interactions and uncounted subjective mental models the science and the evidence base gets weak and adaptive, co-creative management a way to navigate.

2.6. The resilience perspective

How can complex systems change to an extent that establishes fundamentally new system properties or a new regime?

The complex systems we look at tend to have a higher resilience against change than simple or complicated systems. The latter two tend to react in a linear and predictable way to disturbances or intended change. A few modifications or signals can lead to a chain reaction at any time, leading to a fundamental change or failure of the simple or complicated system.

Resilience can be described as the ability of a system to maintain central (desired) characteristics and parameters while adapting to a changing environment that can cause system disruption. In short: the ability of a system to change while remaining the same. The 'super complex' societal systems tend to have numerous feedback mechanisms that serve the purpose of resilience in compensating or adapting to disturbances while maintaining central functions. For transformative interventions,

it is therefore important to understand such feedback mechanisms or the dynamics of resilience in general. In socio-technical and political systems these may consist of established narratives, social and political norms, operational routines, rationales of calculation (calculation bases), power structures etc.

For desired systems or desired system properties (such as human and ecological health), resilience is usually associated with a positive goal of maintaining it. When aiming at transformation, the opposite is the case with a current regime and some of the sub-systems (levels and dimensions, chapters 2.3 and 2.4). Transformative capacity (transformability) from this point of view would be the ability "to create new stability domains for development" (Folke et al. 2010, compare Figure 14).

Finally, when a new regime or paradigm is established, deliberate transformative interventions will again aim at strengthening the resilience of these new systems (Figure 15).

Figure 15: Transformation as a reaction to disturbances
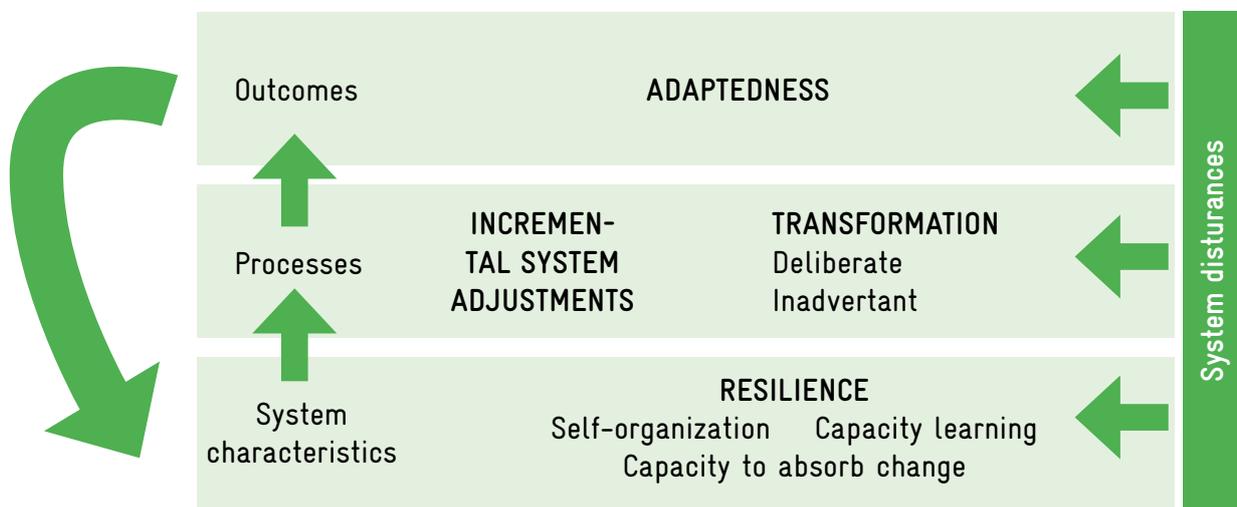
... disrupting a system and leading to a new adaptability and resilience (from Nelson, Adger, and Brown 2007, own illustration).

This could imply the deliberate weaving of actor networks, facilitating societal acceptance and creating political and technical path dependencies etc. Change agents or 'institutional entrepreneurs' may play an important role for creating new 'valleys of attraction' up to the point where innovation becomes the new main-

stream (Figure 16) (Ottaway 1983; Westley et al. 2011). Westley et al. (2011) describe their role as "questioning the institutional context, designing it for those who work on a smaller scale, identifying those inventions with potential to tip systems and sell them to institutional decision makers".

Figure 16: Transformation from a resilience perspective

TIME 1 – Innovation regime (left) is shallow and unstable dominant regime (right) is deep and stable

Institutional entrepreneurs can open up new regimes

TIME 2 – Innovation regime's basin of attraction is deeper and more stable, dominant regime's basin becoming shallower and less stable

Institutional entrepreneurs can lower the threshold between regimes

Institutional entrepreneurs can make the dominant regimes shallower

TIME 3 – Innovation regime's basin of attraction is deep stable; resources of previous dominant regime now drawn into innovation regime to create a transformed system

... emphasizing the role of institutional entrepreneurs (from Westley et al. 2011, own illustration).

Environmental systems or 'nature' and its interaction with social systems are an important consideration in the resilience discussion, which is partly motivated by the notion of strong sustainability and the assumption that society is largely dependent on healthy eco-systems. The framework for social-ecological systems (SES) may complement the idea of socio-technical systems and is used for analyzing transformational change in the context of to a radical change in the interactions between humans and the environment (Cote and Nightingale 2012; Folke et al. 2010; Olsson, Galaz, and Boonstra 2014; Ostrom 2009).

This may include goals on regime shifts in ecosystems that have been massively changed by human development and are now desired to move 'back' to a more natural state with a higher ecosystem service capacity. It may also include a strengthening of the resilience of natural systems, including cultivated landscapes.

Figure 17: Examples of cultivated landscapes

Laos (Huaphan)

Indonesia (Kutai Barat)

China (Xishuangbanna)

Vietnam (Nghe An)

Legend:
- Current an past state
- Land-system regime
- Shift to alternative land system
- Socioeconomic/ environmental shock
- Drivers influencing resilience
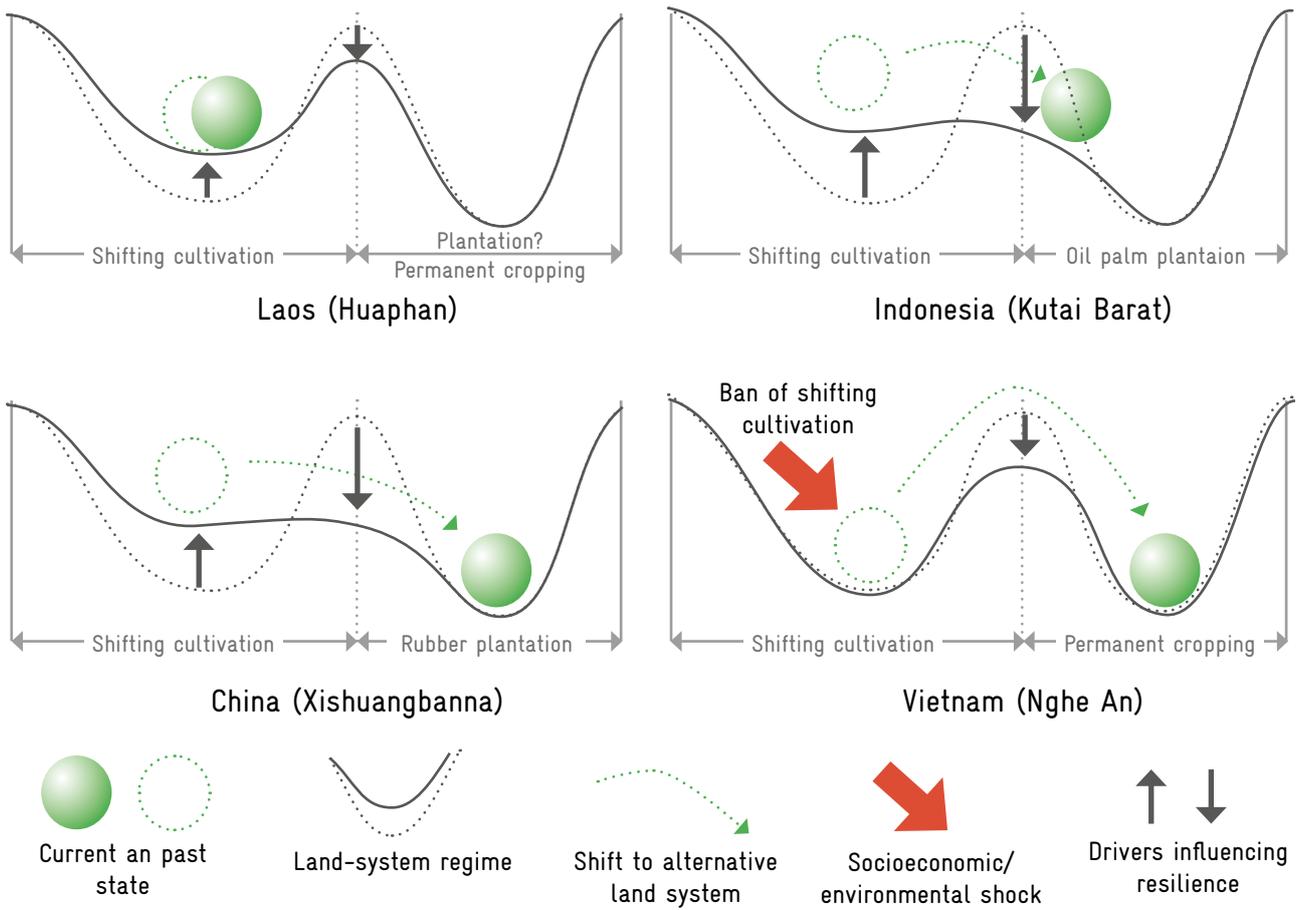
... and their past, their actual or possible shift to alternative land-system regimes that might be less resilient and desirable from an ecological point of view (from Müller et al. 2014, own illustration). Transformative interventions dealing with social-ecological systems could question on or the other regime (usually the more artificial one) and try to facilitate the societal discourse around them and eventually catalyze a change of the land-system regime.

TAKEAWAY:

The **'super complex' systems** we are looking at tend to have a higher resilience to change compared to simple or complicated systems. Resilience can be described as the ability of a system to change (adapt) while remaining the same (maintaining central properties and identity).

On the one hand, a task of transformative interventions is hence to **destabilize the resilience of a current system** or paradigm and to **build resilience for the alternative narrative** on the other. This could imply the weaving of actor networks, facilitating societal acceptance and creating political and technical path dependencies etc. Ecosystems can also be subject to transformation (regime shifts); in unintended (degrading) directions or intended (restoring or evolving) directions. **Ecosystem should** hence **be part of a holistic transformative vision.**

2.7. Which transformation? The normative question

If we aim for new narratives, paradigms and regimes, that eventually become more and more mainstream and resilient, who actually decides which narratives are desirable and how they are framed? The same applies to inadvertent or 'natural' transformations: How can we shape them with the highest levels of legitimacy and justice?

At the moment there are a number of ongoing or anticipated transformations (Schneidewind 2018; The World in 2050 2018):

Digital Transformation (ongoing)

Energy Transitions (ongoing in some countries)

Transformation of **resource use: Production** (circular economy) and **Consumption** (behavior) Patterns + **pollution** free planet (anticipated) e.g. for

   •   Critical and carbon intensive raw materials

   •   Technical products / goods

   •   Infrastructure

   •   Food

   •   Energy intensive services

Mobility Transformation (ongoing in some 'centers of innovation')

Urban Transitions - sustainable and smart cities (ongoing in a number of urban areas)

Human capacity & demography (education, health, ageing, labor markets, gender, inequalities)

For many countries with lower to upper-middle incomes, **industrialization** (industrial transformation) continues to be a very important and dominant overall political narrative. Interdependencies with all or some of the other transformations mentioned above are frequently combined with arguments about global justice or 'just transition'.

This makes it all the more important for the development industry not to ignore the normative and democratic aspects of transformation. The discourses on absolute planetary boundaries, universal SDGs and evidence-based policy-making tend to imply that there are already objective indicators and goals for transformations. In chapters 2.4.1 and 2.4.2 we have introduced some fundamental problems with the notion of objectivity in this context as well as the expectation that societies will change because of certain evidence. It will be neither sufficient nor desirable to change attitudes and learn how to transform when there is little agreement on the overall direction and possibly high trade-offs.

There are numerous international and national assumptions and normative assessments as to what the solutions to climate change are and who should benefit from them. Several authors have already pointed out the danger of overlooking unintended consequences and adverse effects for the already marginalized, poor and powerless in transformation discourses and the necessity not to overlook issues of power and politics (e.g. Gillard et al. 2016; Manuel-Navarrete 2010; Meadowcroft 2007; Smith and Stirling 2010; Swyngedouw 2013). With regard to the focus on transformational change towards low carbon development in international climate finance Winkler and Dubash (2016) even warn against a new 'carbon colonialism'. Together with the notion of societal winners and losers, however, such critique has contributed not only to finding democratically legitimate goals and ways of transformation but also to ensuring 'just transitions' (Newell and Mulvaney 2013; UNRISD 2017). In this discussion, the notion of justice usually involves dimensions such as international, inter-generational, historical and intra-societal or national justice. The term 'justice', again, is far from being objective or distinct. It involves many eventually contradicting general perspectives and countless concrete interpretations (Sen 2009). A just transition can therefore hardly be calculated and prescribed as a perfect system on paper (ibid).

Even for 'great transformations' such as industrialization and digitalization, many normative questions about their implications are open to societal discourse and participatory inclusion for the ways we want to treat earth, how we live together and how we want to shape or be shaped in an industrial and digital world. Even though these transformations may be inevitable, many of their manifestations and implications such as high environmental and social costs can well be influenced. There is considerable leeway to deliberate and to decide how the new overall paradigms should be shaped or which paradigm should be chosen at lower system levels. For example, does industrialization mean a neoliberal paradigm in which free markets and competition, economic productivity and growth are the highest values and goals

or would it be more desirable to have somewhat lower priorities for these functions and place welfare, cooperation and sustainable use of resources on top of the value pyramid? The same applies to digitalization: Do we want to become functions and products of a digital world because such a 'nature' of digitalization (like the 'nature' of the free markets) is inevitable in the use of its amenities or do we want to make an effort and actively shape digitaliz

2.7.1. The example of climate change and 'just transitions'

The Paris Agreement, which was ratified in record time, has partially overcome the division of the climate world into two camps, industrialized and developing countries, for the first time in the history of climate negotiations. However, the issue of climate justice ('equity' within the meaning of 'common but differentiated responsibilities'[8]) is far from being resolved (WGBU 2011, 2016).

Climate change continues to affect mainly those who have contributed least to the crisis, jeopardizing development objectives already achieved and hampering the fight against poverty. Therefore, priority should be given not only to reducing greenhouse gas emissions but also to adapting to the impacts of climate change, and the international community is increasingly recognizing this. Adaptation and mitigation are less framed today as a trade-off with regard to limited financial resources but increasingly perceived as two sides of the same coin. A growing number of national and international policymakers have begun planning and implementing strategies that try to do both at the same time: reducing emissions, building resilience and delivering sustainable development, dubbed as 'low-carbon resilient development' transitions.

Especially Least Developed Countries (LDCs) have communities that are both highly vulnerable to the impacts of climate change and poor. Enhancing resilience to climate change is a prerequisite for development and overcoming the poverty cycle in this context. Nevertheless, they must continue to play a key role in a low-emission future. They might even offer potential synergies with national development priorities such as energy access or green economy, thus providing a 'triple win' approach for LDCs.

Such opportunities, of course, do not only apply to the least developed countries. Triple wins are beneficial for other countries, including emerging economies, in which large sums are invested into infrastructure. E.g., organi-

zations such as the Center for Clean Air Policy (CCAP) are promoting a shift towards 'Green Resilience', arguing that infrastructure finance should take both adaptation and mitigation into account to make sure that money that is spent is spent wisely.[9]

International funding and its conditionality is subject to ongoing questions posed by LDCs to higher middle-income counties who want to know (e.g. during the UNFCCC negotiations) what kind of transformation is meant and how they will benefit from it. Will they have to take over Western narratives, norms and expensive technologies and pay for the impacts of past emissions or will there be 'just transitions' that take sufficient account of their questions about global justice?

In recent years, climate finance institutions have increasingly linked the term transformation to the availability of funding. A further critical discussion of the respective understanding of transformation and its assumptions will benefit the intended climate change mitigation and adaptation outcomes and may avoid a further deepening of existing inequalities.

In the context of international climate financing, the concept of 'transformational change' first appeared in the Green Climate Fund (GCF), which aims to achieve more impact than conventional projects. This was reflected in the highly political discussions about the establishment of the GCF, when the initiators of the GCF stressed the importance of the concept of transformative change (the Transitional Committee) and the UNFCCC Executive Secretary in 2011 (Winkler and Dubash 2016). Later, other finance institutions incorporated transformation narratives into their funding criteria (see chapter 4.5).

With a rough assessment, most of these definitions have their origins in socio-technical systems thinking and transition research, including the possible limitations we have shown in the previous chapters.

....

[8] The principle of common but differentiated responsibilities is one of the principles of the United Nations Framework Convention on Climate Change stated in Article 3 of the Convention: https://unfccc.int/resource/docs/convkp/conveng.pdf

[9] UNEP CTC-N webinar.

The definitions therefore tend to be less explicit about their normative and prescriptive (climate centric) implications and may rather follow a positivist perspective in assuming that there are more or less objective definitions and goals about transformation that now need to be implemented. Winkler and Dubash (2016, 5) observe that "actions originally defined as 'nationally appropriate' have been redefined by donors as requiring transformational change, measured first in GHG emission terms. Without a clear agreement on what is essentially transformational change, and who decides how this concept is implemented, the door is open to concerns of externally imposed agendas that have a long and troubled history in development assistance, and that have also been echoed in the climate debate".

As long as transformation concepts, especially in the context of environmental and climate policy, are perceived as unilaterally defined and as imposing a vague set of undefined pressures on developing countries, their ownership will be limited. In order to avoid the conditionality of climate change transformation being perceived as 'carbon colonialism', we might need, among other things, systemic change in the development assistance processes, more genuine capacity building as well as truly reciprocal local and global facilitation (compare chapters 2.4.1 and 2.5). Here again, in order to facilitate transformation, we must be open to transforming ourselves.

TAKEAWAY:

A number of transformations are already on their way or anticipated in many of our partner countries, such as digital, energy and food transitions but also industrialization. These may come with different goals that can cause **trade-offs** but also **synergies**. Although there is a lot of evidence for absolute planetary boundaries and for how synergies can be created between different transformative goals, the corresponding decisions are far from being purely rational and objective. **Purely evidence-based arguments tend to constrain the deliberation** about the different needs, values and notions of justice and at the same time provoke significant resistance against transformational agendas. Transformational visions have a disruptive character and can provoke **winners and losers** in countries and worldwide. The support of **'just transitions'** is therefore a responsibility of the change agency. **Justice itself cannot be prescribed** in this context but should be subject to constant joint sense-making.

Finding answers to these questions case by case and day to day will greatly improve **acceptance, ownership and the social resilience** of emerging societal, political and technical paradigms.

2.8. It depends on who is talking

We have seen that as much as there seems to be agreement on the need for transformation(s) as different are the interpretations of what it actually is. In the previous chapters, we have tried to look from different angles and paint a more or less holistic picture. As a last step of this part, we would like to summarize some of the diversity and emphasize again that each perspective might have strengths and weaknesses. Even if some perspectives might be mutually excluding, a holistic and differentiated view will be more instrumental in facilitating the further debate as a more or less conscious limitation to one school of thought.

Below we list key statements on transformation and highlight some different perspectives around them.

Despite the burgeoning literature on and interpretations of 'transformation', we believe that it is still possible and necessary to continue working on our own narrative. This is an opportunity for co-evolving discourse on how to make transformation work for us.

Figure 18: Summary of different perspectives on transformation according to key statements.

Statement	Perspectives
Transformation is different from incremental change	Some scholars, often with a socio-technical perspective, do not make very clear statements about the difference. Similarly, some sources assume that reaching all SDGs would 'transform the world' while many goals might rather refer or lead to incremental change.
Transformation is different from reform	Socio-technical and social-ecological systems thinking continues to be criticized because it might favor reforms, in which course underlying layers of power that conserve current paradigms may not change. An example are 'green economy' or 'green growth' interventions, which do not necessarily question and rethink social and economic arrangements (Bina and La Camera 2011; Brand 2012; Ehresman and Okereke 2015; Netzer and Althaus 2012).
Transformation is different from transition	The term 'transition' is still tied to the socio-technical systems perspective and the radical system change at this interface. In this context, transition is often used as a synonym for transformation. This can be questioned if the socio-technical systems perspective is perceived as incomplete. However, the different perspectives begin to merge as well, not only in this work (Waddell 2016, 10).
Transformation is different from paradigm shift	A number of scholars and institutions such as the GCF use the term paradigm shift synonymously with transformation. Others, following the philosopher Thomas Kuhn, differentiate the paradigm shift as an important part of transformational change that refers to the cognitive dimension of fundamental common concepts, beliefs and practices but no changes, e.g., in technology as such.
Transformation must happen on overall societal level, not just in a sector (Great Transformation)	Some scholars associate transformation with what others call 'great transformation'. In this perspective, single sectors or technologies would not sufficiently qualify such a framing.
Transformation can be controlled or steered	For some institutions and scholars, 'transition management' implies that transitions can be managed more or less like complicated linear systems, while others emphasize the complex nature and its implications of unpredictable behavior, e.g. regarding desired tipping points.
Transformation is not positive as such or imperative because of certain evidence (evidence does not replace democratic deliberation)	Some advocates of certain transformations refer to evidence that objectively would require such a fundamental change, which in turn would lead to sustainability as a positive vision. Others emphasize that evidence and all notions of sustainability are social constructions that should not ignore different perspectives, values and democratic principles. Transformation as a concept is neutral and may have positive as well as negative implications or perceptions (compare industrialization, digitalization and the notion of 'just transition').

Own graphic

3. A concept and design principles for transformative change

Following our holistic vision we now suggest a possible approach including several criteria that combine all perspectives. Such an approach should be able to differentiate between less and more transformative interventions and help design interventions that are as transformative as possible under the current systemic conditions of international cooperation (compare chapters 2.4, 2.5 and 2.7).

3.1. Definition of transformative change

In short:
Transformative change converts a current (ecological, social, political, economic, scientific, or technological) system or all systems together into a fundamentally new system that, from there on, forms the new mainstream.

Transformative interventions…

1. …need to question current systems in general in demanding **paradigm or regime shifts**, a new identity and narratives or similar disruptive changes. Anticipated transformations are e.g. carbon neutral societies and related to this energy transitions, mobility transformation, food transformation, urban transitions, inclusive green or welfare economies etc.

2. They can involve **incremental change and reforms** (two other types of change) to support transformations in provoking respective tipping points. Nevertheless, these other forms of change may also prevent transformations by making existing systems permanent (unwanted path dependency).

3. Transformative interventions need to strive for **scaling** up their innovation (technology, political, social or economic norm and narrative etc.) to a mainstream that would form the new regime, paradigm or mainstream narrative. Transformations can happen on various (nested) system levels from individuals to overall (global) regimes and narratives.

4. They need to strengthen the **resilience** of the new system(s) so that they can adapt further and be **sustained** while weakening the resilience of current systems.

5. Depending on ambition and resources, they should address as many **'dimensions of transformation'** as possible in which changes could take place, such as environment, society, science, technology, policy and markets. We can call a paradigm shift in each of the dimensions (medium-range) transformation. The more dimensions involved, the higher the system level, the larger the chances for a 'great transformation'.

6. Transformative interventions should be able to deal with the fact that transformations cannot be controlled or steered in a managerial fashion. Transformational change deals with high levels of **complexity** and hence with systems characterized by emergence, non-linear behavior and unpredictability. Interventions should be able to navigate complexity and permanently **adapt** to and work with unforeseen changes.

7. They should finally, yet importantly, **facilitate deliberation** about which transformations to aim at and how to shape the new systems. The concept of sustainable development and the 2030 Agenda should generally guide such deliberation around transformations (compare chapter 3.3). However, transformations are usually subject to extensive

debates and high uncertainties of knowledge about system behavior, implications of various options and the best ways of achieving them. They are 'wicked problems' for which knowledge needs to be co-created and values and norms need to be debated based on **reciprocal relationships**. Other-wise, innovations and new systems are prone to be technically and socially instable and may become artefacts again very fast. Acceptance, ownership and 'just transitions' are less likely if relationships are not reciprocal.

3.2. Design principles: TransformAbilities

All in all, the criteria below are indicators **for our trans-formAbility.** We suggest that some are **mandatory criteria.** Without them, interventions could hardly be called 'transformative'. Others may be **essential criteria** and less distinctive from other forms of change but particularly important for transformative success.

The criteria follow our (still) subjective assessment of what others and we deem important factors and how they could be sorted. We use the framing '…Ability' (e.g. following Folke et al. 2004, 2010) to imply that individuals, projects, organizations etc. may acquire skills and other resources that help to influence transfor-mations. This should, however, not tempt us to believe that we could learn a set of skills etc. that would allow us to reliably trigger and manage transformations if only we could acquire 100% of what is needed. On the contrary, such abilities could mean "risking complexity, chaos, and vulnerability" (Kuenkel 2019, 76).

Figure 19: Design principles for transformative change
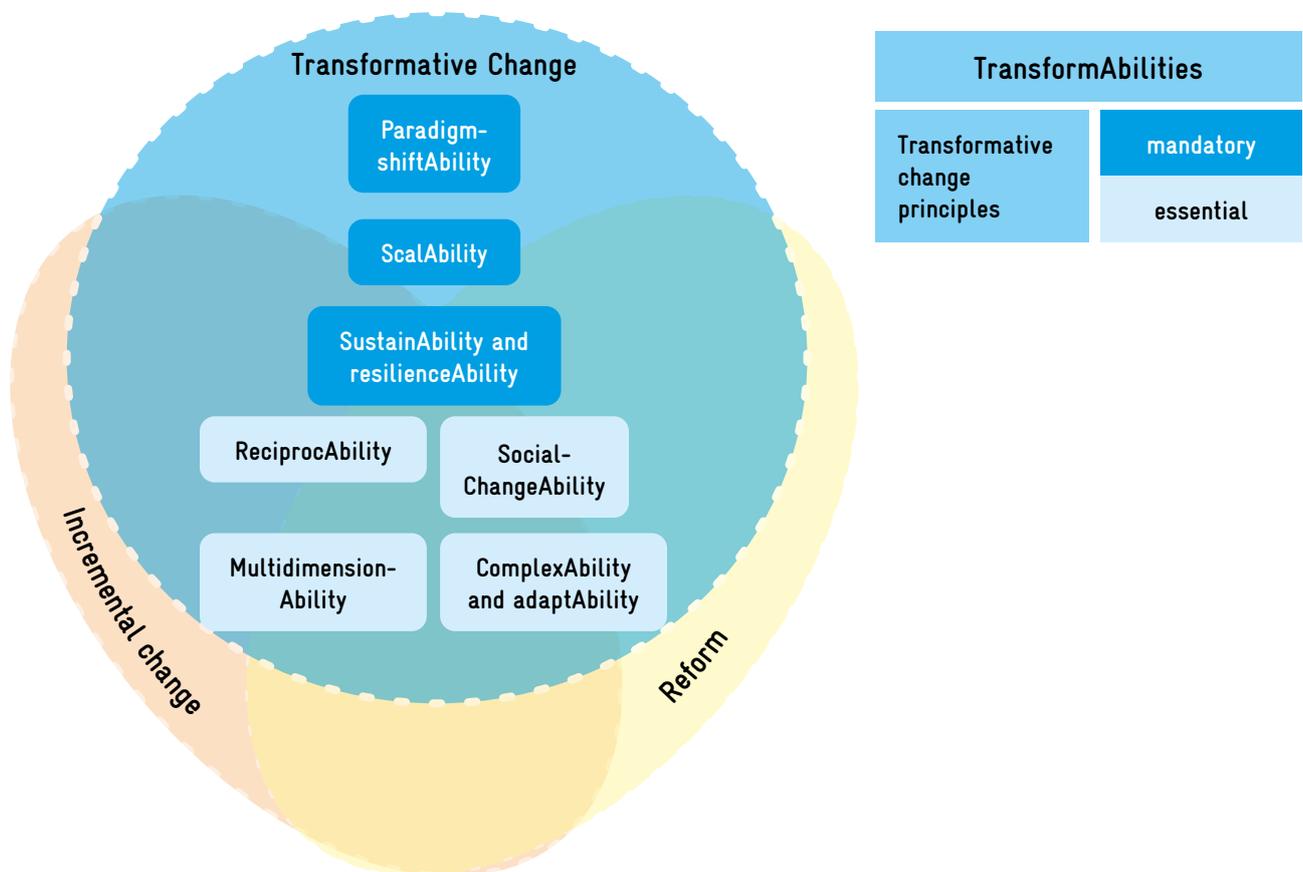
TransformAbilities; own graphic. Except paradigm-shiftAbility, they are relevant for all forms of change, i.e. incremental change and reform. However, in this context they are especially important. Some are even mandatory in order to reach and sustain transformations and some are essential.

3.2.1. Paradigm-shiftAbility

Maybe the most distinctive characteristic and hardest criterion of transformational change is the **questioning and changing of recent systems, paradigms, socio-technological regimes or major narratives.** Such change leads to new systems with fundamental differences that could not be included in the old ones. This criterion differentiates interventions by the qualitative question: "What kind of change do we envisage?" (chapter 2.1). Without such a quality of the anticipated (deliberate) or 'naturally' occurring (inadvertent) change, transformation would be no different from incremental change, reform or scaling-up strategies.

Therefore, aiming at this quality of change is a must-have for every transformative intervention. Interventions may include all kinds of changes, e.g. the promotion of energy efficiency while questioning the fossil fuel based energy regime. However, if these interventions only promote energy efficiency based on fossil fuels, they would be called incremental change interventions and not transformative for the energy regime. To be transformative, the goal framework of interventions must meet this criterion of the paradigm-shiftAbility, regardless of how far it gets to a new regime, paradigm or overall narrative.

Weaving the biggest possible actor coalitions for innovation on the way to the mainstream serves not only for this but all transformAbilities as a measure.

3.2.2. ScalAbility

Transformation also consists of a mandatory quantitative criterion, i.e. the question of 'how much should change?' As the first criterion suggests, without **larger-scale change** up to a new mainstream, paradigm or narrative there would be no transformation. Again, interventions do not need to reach such scale alone and during their existence but they should actively try to catalyze a scaling towards a mainstream (chapter 2.3).

Depending on time, financial and other resources, interventions should be realistic and focused. It might be sufficient for an intervention to facilitate the diffusion of a single technology (such as cooling technology) or social norm (such as gender equality). However, if ambition is high, 'sustainable scaling' and higher system levels should be a goal. It may be reached by a combination of numerous interventions. The conversion of the individual transport system of an entire city from owning cars to using shared cars could be described as the 'transformation of individual transport for this city'. This can be scaled-up and, together with many other transformations, contribute to the highest possible level of a global 'great transformation'. In addition to the mandatory criterion of the ability and actual activity of an intervention to facilitate scaling or mainstreaming, the envisaged system level and scope of the sector indicate the level of the transformative ambition.

There may be many indicators and methods to assess the diffusion of technological, social, political and economic innovations into the mainstream. We might think of market shares, levels of application and acceptance, social norms etc. (compare chapter 4.3).

3.2.3. SustainAbility and resilienceAbility

As a final mandatory criterion, we propose the ability of an intervention to facilitate **stabilization and resilience** of a new regime, paradigm or narrative so as to increase its chances of remaining **sustained over time.** Without this dimension of time, innovations could well enter the mainstream, but after a short time could become unstable, obsolete and artifacts and thus not bring about transformation. Transformative interventions, however, can do both, weakening the resilience of established regimes and creating the conditions for- and strengthening an alternative one. This could e.g. mean to shift subsidies and to change societal norms.

The resilience of a developing new system might be anticipated by proxies such as the growing number of reinforcing cycles, growing number and quality of interdependencies or similar stability indicators (compare chapter 4.1).

3.2.4. MultidimensionAbility

Transformations may occur in one or more dimensions (chapter 2.4). The ability of an intervention to **address multiple dimensions** such as policy, technology, markets or societal norms is therefore an essential criterion. However, there will hardly be any interventions that are successful with transformative changes, by e.g. merely addressing markets. The more dimensions can be addressed at the same time, the better the chances for tipping points in favor of a new regime that is embedded in society as a whole.

We can understand multidimensionAbility as a criterion for the ability of an intervention to deliberately organize and facilitate interfaces between science, society and politics. (chapter 2.4.1). Success subcriteria are the actors' perceptions of the **credibility, salience** (or relevance) and **legitimacy** of the respective processes and outcomes (compare Figure 7). Again, these criteria are important for many interventions beyond transformation, but they become crucial if we aim at disruptive change in multiple overlapping dimensions.

Thus, beyond the number of dimensions and subsectors involved, reaching high scores on the three success criteria of credibility, salience and legitimacy will significantly increase the transformative performance.

Other related indicators for the ability to address multiple dimensions are the degree to which various forms of **knowledge** can be integrated and **balanced with** different social **values** and norms (combining positivist and constructivist perspectives). Knowledge driven scientization and technocracy on the one hand tends to ignore democratic and participatory principles, while purely value-based politicization on the other hand would ignore different types of knowledge. Both extremes are less multidimensional because they are less interested in integrating various perspectives. Both, technocracy and politicization usually lead to the mainstreaming of certain rationales and narratives regardless of other perspectives.

The integration of these different dimensions and their perspectives requires significant **facilitating capacity**, from individual level (change agents, boundary workers, facilitators…) to the institutional level and beyond (boundary organizations). The degrees to which this is in place and the diversity of actors involved may serve as well as a measure for the multidimensionAbility.

3.2.5. Social-changeAbility

Because of the fundamental importance of anchoring new regimes, paradigms or narratives within the broader society (scale, resilience), a deliberate approach towards social change (as one of the dimensions) is crucial (chapter 2.4.2). The various social layers and levels can show tremendous resistance (or resilience) to transformative change and force innovations back to their niche or turn them into artifacts. Societal acceptance of knowledge, world views, technology, legal and social norms, etc. hence needs to be created for a transformation to be sustainable. At the same time, our ability to address social change is usually very limited and one-dimensional, e.g. in following a knowledge-to-action rationale.

The more holistic we can address social change through transformative interventions, the better the chances of success. This may comprise addressing as many social levels and layers (Figure 8) as possible by using diverse strategies for individual and social learning (education, co-production, positive deviance…Figure 11) as well as communication strategies that reach people through different media (campaigns, infotainment, entertainment education…Figure 11). The more deliberately and differentiated they deal with the various target groups, again the better the chances of success.

3.2.6. ComplexAbility and adaptAbility

Transformations deal with 'super complex' system levels (chapter 2.5). A transformative intervention should therefore be able to **address some of the basic characteristics and dynamics of complexity.** These are the ideas of emergence (the system is more than its parts), nonlinear behavior and unpredictability. There is hence no single truth or best practice here and little control: for the same challenge, the same approach may work in one context but not in the other while different approaches may work for one context.

The mode of designing and implementing an intervention can be adjusted to simple, complicated or complex problems. A (not unusual) mismatch can significantly reduce the chances of a transformation to succeed. Many parts of our project cycle are still optimized for complicated systems (e.g. linear steering, outcome promise etc.). Interventions that are planned and implemented with high expectations (accountability) of control, predefined goals, indicators and means (output orientation) and little flexibility at all times to change and adapt to emerging and non-linear developments (process orientation) may be very limited in terms of transformative impact.

This is why we need to transform our work, using new ways of working and project management, in order to deal with transformations.

As far as the established processes of the project cycle allow, interventions should therefore be designed and implemented in an iterative and non-linear way that aims at **understanding** the complexity involved, is open to unforeseen goals and solutions (emergence) as well as unpredictable behavior of the entire system and able to **adapt** continuously (adaptive management). As a more proactive element, this comprises an interventions' ability to 'weave' new emerging systems and actor networks towards higher levels of complexity, resilience etc. (compare other transformAbilities). Similarly, existing formal structures might need to be converted to more fluid and holacratic[10] networks in order to cope with complexity.

The 'integrated approach' of the 2030 Agenda, which looks at the interrelationships between all goals (SDGs), has benefitted a number of interventions by pushing the use of tools for exploring complexity (compare chapter 4.1 and following ones).

3.2.7. ReciprocAbility

Reciprocal relationships (vertical and horizontal) are crucial for the success of development interventions and even more so if they want to be transformative (chapter 2.4.1). The criterion is central because it addresses many of the other criteria as well as the challenges they pose.

Complex systems, including socio-political ones, consist of uncounted interdependencies, mutual influence and power structures. Nevertheless, interventions may ignore them in establishing mainly unidirectional linear dependencies and relationships in parallel (simple or complicated world, chapter 2.5), expecting control over defined outcomes. Integration of multiple forms of knowledge as well as diverse social values and norms are key for the resilience of a new system.

If, e.g., in development projects, the major accountability is expected from the donor side, strong unidirectional dependencies are the result. Partner countries may be consulted but involving them in co-production and joint

decision-making on the details of interventions would be a secondary priority throughout the project cycle.

In a purely complicated and positivistic environment, expert knowledge also provides the solutions at the costs of local legitimacy, relevance and ownership. Unidirectional knowledge transfer usually favors certain types of scientific, centralized and abstract knowledge over contextualized local and tacit knowledge, thus limiting case based and local transformation skills and -knowledge (chapters 2.4.1 and 2.4.2).

These counterproductive dynamics are even more likely if the more powerful side not only defines the necessary reforms but also expects entire (partner) systems to transform into something fundamentally different. 'Just transitions' are less likely if the relationships are less reciprocal than expected from one side and required due to complexity.

....

[10] Holacracy is a form of decentralized and self-organized management by flexible teams, having more joint decision-making authority compared to strong hierarchies.

The same applies to the science society policy interfaces within partner countries and their ability to question unidirectional power structures, hierarchical cultures and linear top down processes. Less reciprocal interventions are limited in the creation of legitimacy, acceptance and ownership and are therefore limited in shifting narratives, the attainment of scales and in ensuring resilience. At the same time, formal and informal power relationships, hierarchies and different levels of influence can be crucial for the basic functionality of culture, social interactions, institutions, politics etc. They are a typical characteristic of complex systems and do not have to contradict reciprocity. There may well be reciprocal relationships between hierarchies and power structures. Transformational interventions only call into question certain power structures and relationships that are related to the current regime and linear top-down practices by default. For establishing a resilient new regime or narrative, various centers of influence will be important that are highly connected among each other and with smaller actors (compare Figure 22). The co-creation of such diverse and reciprocal structures allows a new system to adapt continuously while maintaining its identity (resilience). It can develop self-reinforcing positive and negative feedback loops (compare Figure 21) in a way that unidirectional linear relationships are not able to.

The degree of reciprocity of the relationships can be indicated e.g. by information flows, the direction of accountability, the level of participation up to joint decision-making as well as power or influence, which in turn can be subdivided into i) influence in the definition and framing of world views, ii) goals, iii) indicators, iv) means, v) metrics and vi) processes. Another indicator would be the relation between knowledge and values again (positivist vs. constructivist perspective, see under multidimensionAbility).

3.2.8 Summary: Design and evaluation grid for projects

Criterion	Questions / Indicator	Verification
Mandatory criteria	**Legend**	
Essential criteria		
Paradigm-shiftAbility	Does the project question current systems, paradigms, regimes or major narratives through its goal frame, indicators and activities, offering fundamentally different ones?	yes/no + description
ScalAbility	# Will the intervention be able to contribute to reaching a certain mainstream (piloting vs. scaling)? # How broad is the scope (e.g. single technology / local social norm up to technological regime / sets of societal norms)? # What would be the highest system level that can be addressed (niche to global paradigm / narrative)? # In how far can the biggest possible actor coalition be involved? # In how far does the intervention link up with other similar or complementary interventions on various system levels?	# yes/no + description # Levels of scope # System levels e.g. according to Figure 5 # e.g. X of the relevant actors etc. # e.g. number, quality and system levels of connected interventions

Criterion	Questions / Indicator	Verification
Mandatory criteria	**Legend**	
Essential criteria		
SustainAbility and resilienceAbility	# Does the intervention have measures to weaken the resilience of established regimes, paradigms and narratives (e.g. abandoning of subsidies) and to strengthen the resilience of alternative ones (e.g. investments and policies creating new path dependencies or improving societal acceptance)?	# yes/no + description (including expected tipping points)
	# Are measures in place to strengthen social resilience of the new system by addressing various forms of justice, like between social milieus, local to global, intergenerational, historical, mutual agreement, subordinate value (utilitarism), distributive justice…?	# yes/no + description + number of different forms of justice
	# Are there measures in place to facilitate deliberation and agreement about which forms of justice to address?	# yes/no + description
Multidimension-Ability	# How many of the dimensions (Figure 6) are deliberately addressed and how many actor groups / societal milieus within them?	# Listing and explanation of various forms of diversity like richness, proportional abundance… (compare diversity indices)
	# How do actors perceive the credibility, salience (or relevance) and legitimacy of processes and their outcomes at the multidimensional interfaces?	# Regular assessments of these criteria
	# To what extent can various forms of knowledge (e.g. scientific, local, traditional, tacit, regulatory knowledge or goal, transformation and system knowledge) be integrated?	# Description
	# To what extent can knowledge be balanced with various values and norms (positivist vs. constructivist perspective, scientization and technocracy vs. politicization)?	# Description
	# How strong is the ability to facilitate the integration of different dimensions (e.g. using change agents, boundary workers, facilitators, boundary organizations…)?	# Description including the amount of competences and resources invested

Criterion	Questions / Indicator	Verification
Mandatory criteria	Legend	
Essential criteria		
Social-changeAbility	# How deliberate and complete is the approach of social change to anchoring innovations in society?, i.e.	# See below
	# How many social strata and levels of social change (Figure 8) are addressed?	# Number and-description
	# How many target groups are addressed?	# Same
	# How differentiated and adequate are target groups addressed (using diverse strategies such as formal and informal education, co-production, positive deviance, campaigns, infotainment, entertainment education…) and are the strategies based on thorough target group research?	# Description, target group analysis (qualitative and quantitative, including citations of world-views etc.)
	# Does the intervention go beyond the 'knowledge to ac-tion' paradigm and e.g. uses the transtheoretical model (stages of change) and addresses various conditions of social change: 1. Knowing (awareness, information, knowledge…) 2. Capacity / ability (skills, action knowledge, experience…) 3. Motivation (values, social norms, beliefs, attitude, routines…) 4. Enabling environment / structural conditions (legal and societal norms, physical/geographical struc-tures, incentives…)?	# Description, number of conditions ad-dressed…
ComplexAbility and adaptAbility	In how far is the intervention adjusted to dealing with (super) complex problems?	
	# How strong will the understanding of the associ-ated complexity be (e.g. using tools for analyzing complexity / interlinkages)?	# Description of methods and tools
	# To what extent is the intervention designed and imple-mented in an iterative and adaptive way (process vs. output orientation, i.e. to what extent are processes and methods emphasized while goals and indicators are tentative)?	# Assessment of impor-tance of processes vs. goals and indicators
	# How flexible and open to unforeseen goals and solu-tions as well as unpredictable behavior of the entire system is the intervention and its design (expectation of control and classical vs. adaptive management)?	# Description of flexibility for changes of goals, indicators and means

Criterion	Questions / Indicator	Verification
Mandatory criteria	Legend	
Essential criteria		
ReciprocAbility	To what extent does the intervention build on and promote reciprocal relationships vertically and horizontally between actors from different dimensions of transformation within and between countries (interdependencies vs. unidirectional dependencies and relationships)? i.e.	
	# To what extent do these actors share and expect accountability and responsibility from each other (e.g. between funding source, implementer and beneficiary)?	# E.g. direction of reporting obligations…
	# To what extent are these actors able to learn with and from each other within and between countries (co-productive mode vs. knowledge transfer)?	# E.g. mode of project design and regular iterative exchange
	# To what extent do these different actors benefit in a just and fair way ('just transition')?	# E.g. explicit deliberation on justice
	# To what extent is the intervention able to question power structures, hierarchical cultures and top down processes?	# E.g. mode of exchange across hierarchies
	# What levels of participation are reached between these actors from being informed up to joint decision-making? # To what extent can different types actors / target groups choose a transformation and its nature?	# E.g. participation level, existence and quality of participation strategy, democratic quality…
	# How much equal capacity and influence do these actors have in defining and framing world views, goals, indicators, means, metrics and processes?	# Capacity building, co-productive modes…
	# To what extent does information flow freely between these actors?	# E.g. use of shared platforms…
	# …there might be many more	

3.3. Transformation, sustainable development and the 2030 Agenda

Like other forms of change, transformations should be guided by the normative goals around sustainable development. 'Sustainable development' prescribes the balancing of environmental, economic, and social dimensions over time for the benefit of recent and future generations. Different forms of change are relevant for this at all times. Transformative change as the most radical and disruptive form of change is in high demand if current (sub)systems or all dimensions of sustainable development at once are likely to not deliver sustainable development anymore.

The 2030 Agenda for sustainable development forms the global framework for sustainable development. Four years after the adoption of the 2030 Agenda for sustainable development there is an alarming lack of progress in achieving the SDGs. According to the Global Sustainable Development Report 2019, we will not achieve the SDGs with our current "business as usual" approach. It is required to focus on specific entry points and levers in order to accelerate the implementation of the 2030 Agenda. We need new transformative approaches if we want to achieve the ambitious SDGs. Depending on the national context, some SDGs are achievable using approaches of incremental changes, while other areas such as for example climate change, biodiversity and inequality require transformative change.

In the case of climate change the impacts of economic and social development on the environment are so severe that they will transform the entire earth system and uncounted sub(eco)systems at the costs of future generations. Incremental change and reforms in relevant socio-technical and economic systems, consumption patterns or policy are unlikely to deliver the amount of emission reductions in time for a sustained 'safe operating space' for humanity or carbon neutrality, respectively. Therefore, an increasing number of actors demand radical system change (transformation) for a number of the relevant systems like energy, traffic, agriculture and food consumption. The recent systems are to be replaced by new ones (e.g. renewable energy system) for the sake of carbon neutral societies while trying to create as many social co-benefits as possible.

Given the link between sustainable development and transformative change, it will be crucial that transformations consider the broader development principles of the 2030 Agenda. It implies 5 principles that have been framed in this way by the German Federal Ministry for Economic Cooperation and Development (BMZ) and GIZ (see Figure 20). Transformative projects should hence take into account the universality (1) of the sus-

tainable development goals applying to all countries: developing, emerging and industrialized countries. Approaches to transformation should foster synergies and prevent trade-offs between the Sustainable Development Goals or on a broader level the three dimensions of sustainability – social, economic, environmental – in which change could take place. This is called the **integrated approach** (2) and will at the same time broaden transformative success (compare multidimensionAbility). In a similar vein, development should further be driven by multi-stakeholder approaches and **joint responsibility** (3) and **accountability** (4) of all Actors and Sectors working together to promote change in line with the 2030 Agenda. **Leaving no one behind** (5) and reducing inequality is not just crucial for development in general but will also contribute to 'Just Transitions'.

Regarding the difference between the 2030 Agenda principles above and transformative change design principles we conceptualize the following:

Relevant agendas, including the 2030 Agenda, do not further define transformation; instead they relate it to goals like 'resilience', 'carbon neutrality', 'no poverty', etc.

Achieving the 2030 agenda as a whole might correspond to a great transformation (without further defining a paradigm shift but potentially including medium range transformations like no poverty, carbon neutral societies, circular economies, …)

Not all sub-goals and indicators are or need to be transformative by nature but in sum they should contribute to 'transforming the world'. Still, potential contradictions may come along between SDG (sub-)goals and with anticipated transformations. The integrated approach of the Agenda 2030, however, calls for creating as much synergies as possible and for avoiding trade-offs.

The five 2030 Agenda principles are necessary for implementing the agenda as a whole and increasingly form key design principles for development projects in general. They may hence be called: **Implementation principles for all development interventions** (all forms of change).

The transformAbilites – at least the 'mandatory ones – are specific design principles for transformative interventions. They may hence be called: **Transformative change principles**

If an intervention explicitly pursues transformative change, it not only needs to prove how it integrates the implementation principles of the 2030 Agenda but how it follows the 'mandatory' transformative principles. It further should follow the 'optional' principles.

Figure 20: The 2030 Agenda and transformative change
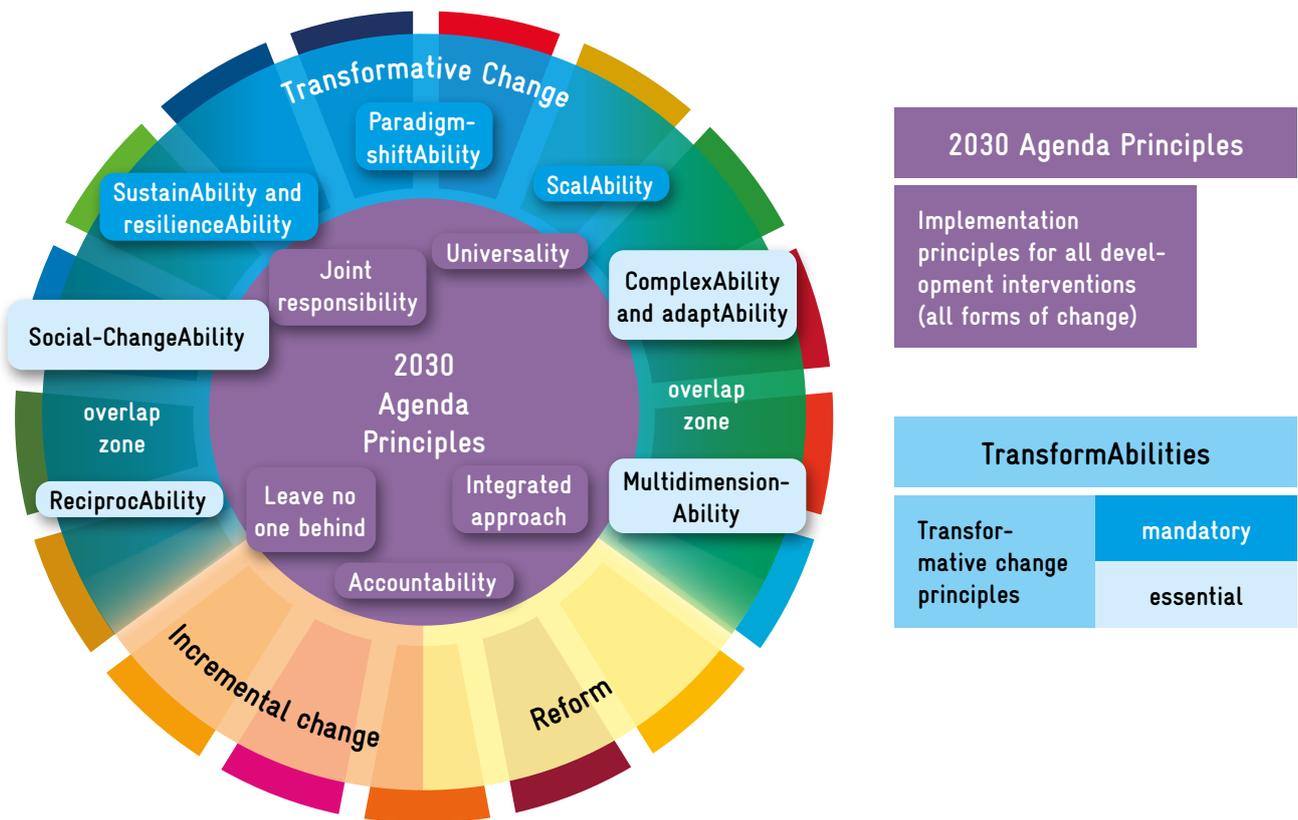
Own graphic. In order to reach the goals of the 2030 Agenda, all forms of change are relevant. The agenda itself builds on 5 overall development principles that have been framed in this way by BMZ and GIZ. The transformAbilties are design principles especially important for the parts of the agenda referring to transformative change. Except paradigmShiftability, they are relevant for other forms of change too (compare Figure 19).

4. Transformative project design

4.1. Context, system, actor networks

After having defined a number of criteria for the evaluation and design of transformative interventions, we would like to provide some more guidance on the application of these criteria in development projects.

Research into the complex context, actor networks and the assumptions about causal interlinkages within the system(s) can be particularly useful for initial design but can also be used any time later when diving deeper and observing changes.

One early exercise for transformative interventions is to know in which **phase of transformation** their envisaged innovation, sector, dimension etc. currently is. ICAD (2018, 38 ff.) offer a range of questions and criteria to assess such system states.

There are multiple ways of modelling and mapping complex systems on walls or computer-based, in a data collection or participatory mode. **Participatory sys-**temic inquiry (Burns and Worsley 2015) does have the advantage of enabling social learning, joint sense-making and deliberation about beliefs about reality, dominant narratives and goals etc. As a way of co-producing and displaying complex interdependencies, **causal loop diagrams** (Figure 21) have proven instrumental (ibid; Hadorn et al. 2008; Hanspach et al. 2014; Hjorth and Bagheri 2006; Mersmann, Wehnert, et al. 2014; Probst and Bassi 2014; Voinov et al. 2016; Voinov and Bousquet 2010). The joint collection of respective narratives and problem perceptions may be supported by a **'systemic story analysis'** (Burns and Worsley 2015) using a story telling approach that can be easily related to by different kinds of actors.

## Figure 21: Example of a causal loop diagram
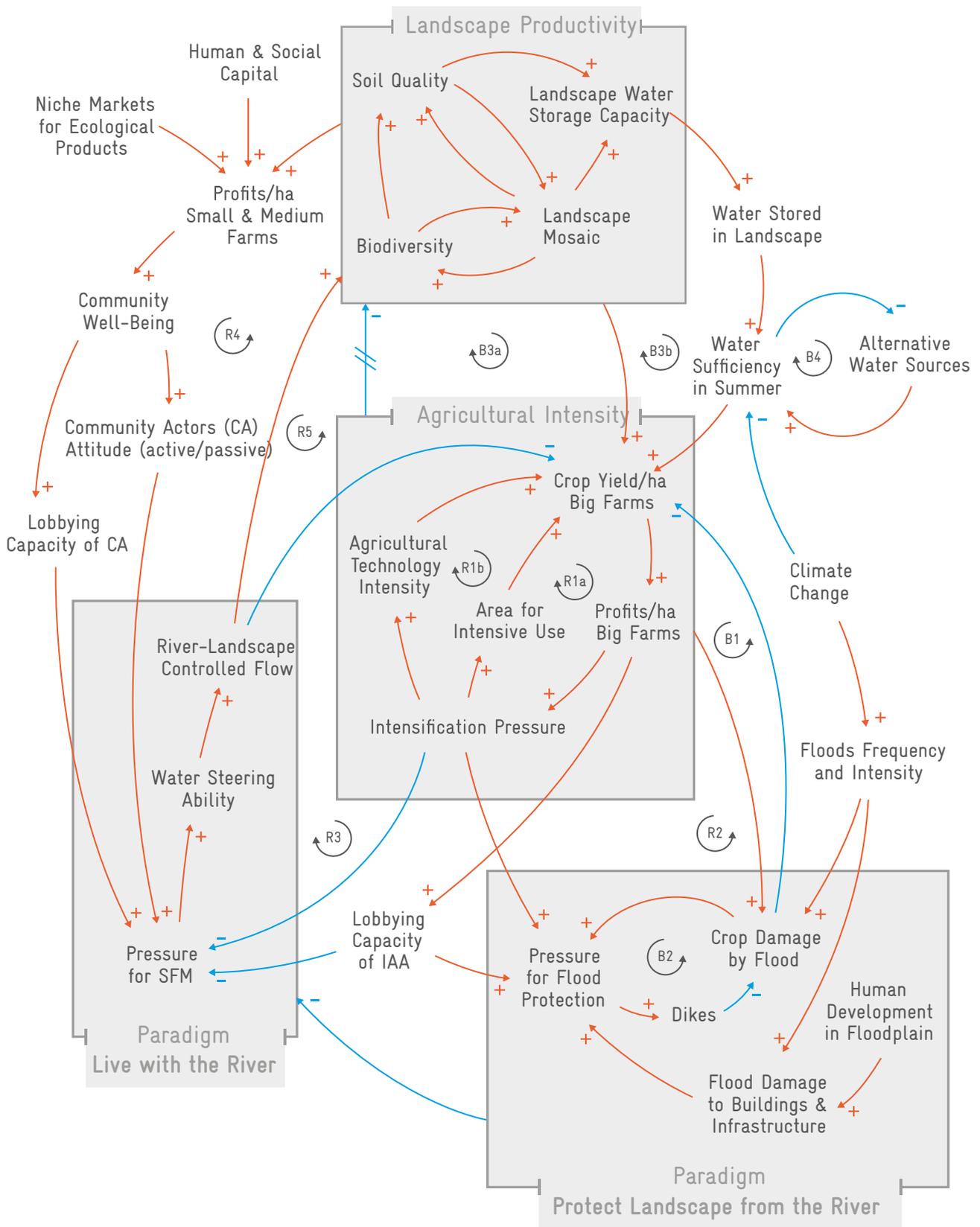
... of river management in the Tisza River Basin (taken from Mersmann, Wehnert, et al. 2014 and Sendzimir et al. 2008, own illustration).

Another range of approaches and tools focuses on **social/ actor networks** and various criteria that characterize interactions such as information flow, power and influence structures, 'real world' decision-making etc. (Blanchet and James 2012; Caniato et al. 2014; Heeks and Stanforth 2014; Moeliono et al. 2014; Muñoz-Erickson and Cutts 2016; Sendzimir et al. 2008; Wonodi et al. 2012)

There are many more approaches and tools for exploring complex systems. An overview on various modelling approaches such as group-, mediated-, companion modelling, participatory simulation and different planning, joint learning, gaming and decision-making tools e.g. provide, (Voinov et al. 2016; Voinov and Bousquet 2010). Probst and Bassi (2014) e.g. offer systemic approaches to problem identification, system analysis with influence tables, creating strategies and making decisions with scenarios and simulations.

Figure 22: Actor network analysis
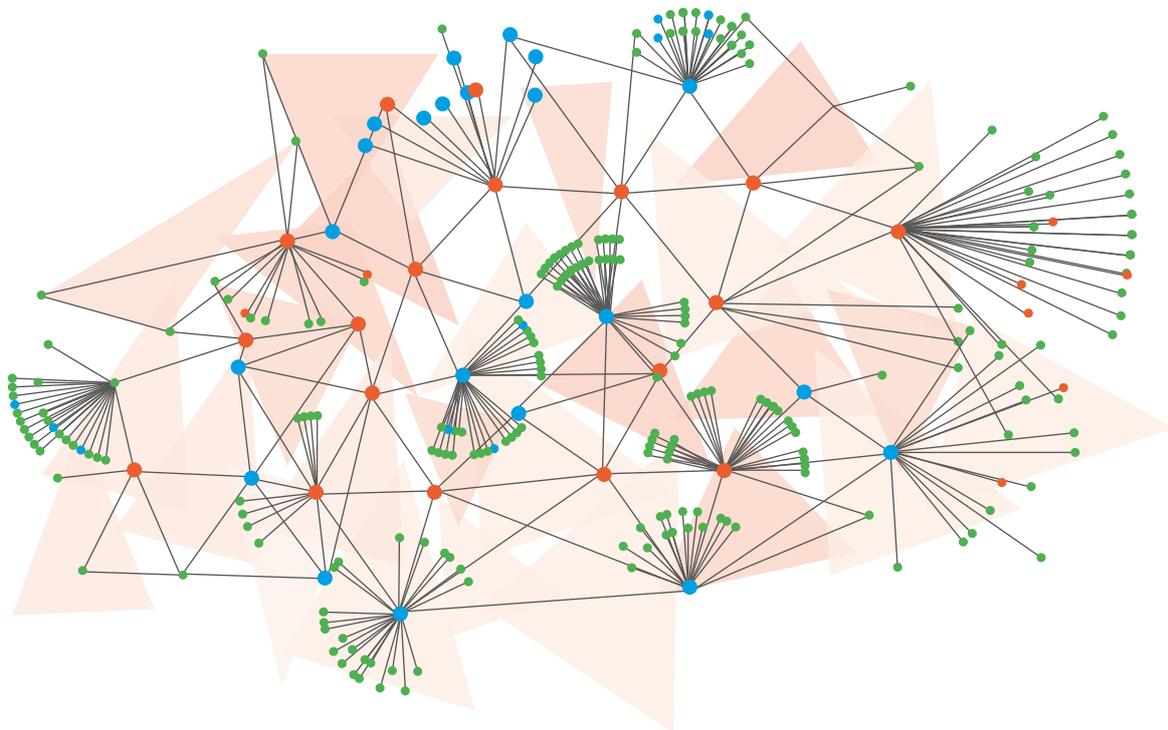
4.2. Problems, goals and means

In defining goals for transformative interventions, the most central feature would be a framing around their quality and ambition to replace existing social, technical, political, economic regimes, paradigms and overall narratives. We described such framings in chapter 2.1 and related ambitions by the first three criteria in chapter 3.

With regard to scalability, the overall goal and impact level goals beyond the interventions system boundaries should be explicit on the extent of how broad the scope is (e.g. single technology / local social norm up to technological regime / sets of societal norms) and what the highest system level would be that can be addressed (niche to global paradigm / narrative).

The perception of what the problems, appropriate goals and the appropriate means them, is of course very different, especially for super complex systems, and depends on values, norms, worldviews and established practices, amongst others. Defining goals and means is therefore not a matter of finding the 'truth' but a matter of intensive and ongoing (multidimensional, chapter 2.4) deliberation on factual level but even more so on the levels of values and norms. Inclusiveness and reciprocity play major roles.

There are multiple approaches for **participatory inquiry, action research**, planning etc. that have much to offer for ensuring credibility, relevance and legitimacy of goals and means (Blumenthal and Jannink 2000; Brinkmann

et al. 2015; Edelenbos 1999; Heron and Reason 2006; Mayer, van Daalen, and Bots 2004; Schulz and Parker 2005; Zandee and Cooperrider 2008).

One of the basic exercises for exploring problems and for balancing the integration of knowledge and values at the interfaces to science society policy are approaches to **'problem structuring'** (Van Enst, Driessen, and Runhaar 2014; Hage, Leroy, and Petersen 2008; Hegger and Dieperink 2014; Hisschemöller and Hoppe 1995). It describes various ways to analyze the (un)certainty of knowledge and the (dis)agreement about values around a particular problem (Figure 23).

The results provide an idea of the complexity and 'wickedness' of a problem and potentially appropriate

rough strategies for process design. If e.g. there is more agreement about values but less certainty about knowledge, more investment needs to be made in generating and integrating various forms of knowledge to understand the system and how it can be transformed (single and double loop learning). If there is a high diversity of conflicting values, more investments need to be made into deliberation on and integration of the various perspectives.

The matrix could be extended to multiple dimensions, e.g. including different forms of knowledge and problem acceptance (compare Kleindorfer, Kunreuther, and Schoemaker 1993) as further dimensions for structuring the problem (Figure 24).

Figure 23: Problem types, differentiating knowledge and values

Agreement on values	Uncertainly of knowledge	
	low	high
high	Structured problem	Semi-structured problem
low	Semi-structured problem	Unstructured / wicked problem

Own graphic, taken from science-policy studies. Transformation challenges tend to be unstructured or wicked, involving contested values and knowledge.

Figure 24: One option for problem structuring

System knowledge uncertainly (system)

Transformation knowledge uncertainly (means)

Value Plurality (goals)

Problem acceptance (salience)

Example
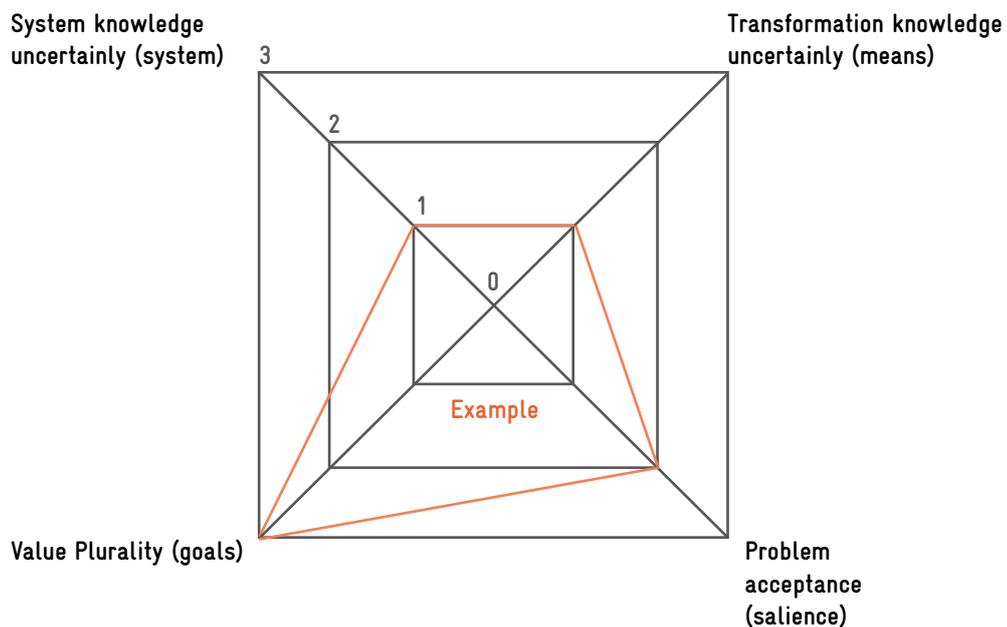
… and derivation of a corresponding strategy (own graphic).

The ways of generating such information are diverse. It could be document analysis and review as well as expert interviews for the knowledge part, focus groups, workshops etc.

Methods explicitly exploring values and norms are still rare in development work, even though they are so influential in defining beliefs, narratives, perceptions of what is desirable, behavior and practices. There are some conceptions for understanding and (jointly) analyzing **values and norms** but very little guidance on how to effectively facilitate such endeavors (Caracciolo et al. 2015; Kinzig et al. 2013; Lapinski and Rimal 2005; McAdams 1997; Ooms 2015; Schwartz 2012; Schwartz and Bardi 2001; Spini 2003).

Similarly to causal loop and influence diagrams (Boulanger and Bréchet 2005; Todorov and Marinova 2011), value trees displaying values according to their perceived importance can be created jointly. It may as well be in-

strumental already to offer a range of generic (partly contrary) values like self-determination, solidarity, progress, tradition, control, self-organization, reciprocity, authority, competition, cooperation etc. and to jointly relate them to different problems, goals and means.

A range of approaches and tools for jointly defining what is important offer **(social) multi-criteria analysis** (Butler et al. 2016; Cantarella and Vitetta 2006; Estévez and Gelcich 2015; Huang, Keisler, and Linkov 2011; Koschke et al. 2012; Mendoza and Martins 2006; Munda 2004, 2006; Tudela, Akiki, and Cisternas 2006; J.-J. Wang et al. 2009). Such analysis can be done based on values as well as more concrete goals and criteria. There are mathematical and computer-based versions and variants, which put more emphasis on facilitation and joint sense-making. The latter might be more relevant in terms of complexity, reciprocity and ownership when defining goals and means of transformative itnerventions.

4.3. Impact model and M&E

Transformative interventions need impact models and evaluation methods that are fit for super complex systems. Due to the need for adaptive management, such systems fulfill more functions than being an evidence base for periodical reporting and steering. They need to (more or less) permanently deliver information about progress indicators as well as on the changing environment in which interventions take place. Based on these data or unforeseen changes, respectively, an intervention should be prepared to change its assumptions, models, goals, means, indicators etc. at all times. In contrast to recent practice, such monitoring systems hence do not primarily exist to confirm or not confirm whether interventions are on track towards predefined goals and indicators. They are used to navigate complexity while constantly adapting and changing themselves. The question "Are we on track?" needs to be complemented and if necessary overruled by the questions: "Is this the right track?" and "Do we have the right shoes?". M&E systems for transformative change hence need to shift the balance from mere output and outcome orientation towards a stronger focus on processes. This might be true for all forms of change but especially in this context and e.g. van den Berg, Magro, and Salinas Mulder (2019) argue for a paradigm shift in M&E practice.

A usual critique asks whether this will suffice for accountability and legitimization demands. How can we credibly state that we are doing the right things? Shifting the focus on processes (not without irony) promises more impact than sticking with outcome promises, because

it does more justice to the complex reality. The quality of a project proposal can be very well judged according to its quality regarding process design, methodological approaches and facilitation capacity (e.g. quality and frequency of use of facilitators). Much resources are usually spent upfront to design a very coherent (internal validity) impact model and smart outcome indicators while process design, methodological approaches and facilitation capacity often remains superficial. We argue that for assessing the quality of a project proposal for its transformative change potential it should be other way round: goals, impact model and indicators should be tentative by default, whereas high standards should be applied to process design, methods and facilitation.

Impact models and M&E systems still play important roles on the way and will even get more sophisticated and challenging if they are to get closer to complex systems and (very data intensive) adaptive management.

Impact models may e.g. be further inspired by causal loop approaches or more sophisticated modeling (compare chapter 4.1). Maybe more import than abstract modeling might be regular joint deliberative sense making of impact hypotheses (Burns and Worsley 2015). Comparing and integrating different perspectives on how the world works will not only improve the quality of knowledge but also advance acceptance and transformative capacities amongst actors.

A broad range of indicators remains crucial for adaptive management and measuring progress. The shift of focus towards processes is not just required because of the complex nature of transformative change.

Transformations take time. The energy transition in Germany took about 50 years from niche development up to now and it is still not completed. This should not be a benchmark for future transformations. We do not have the time. Yet, acceleration ambitions will have to deal with limited control and requirements around social resilience. Even strongly facilitated medium to great transformations will take significantly longer than usual project cycles. Most of the rather ambitious interventions will need to use a number of process design and milestone indicators to evaluate whether the intervention is on track and whether it is the right track.

The design principles in chapter 3 already provide some guidance on what could be important to assess during transformative interventions. Indicators for process design focus on whether interventions adhere to the

above discussed design principles or success factors such as questioning a system, working on scale and resilience, addressing complexity and multiple societal dimensions including social change and acceptance.

Outcome-oriented milestone indicators can e.g. measure how far a new idea, technology, social norm etc. actually is on its way to the mainstream or getting a dominant regime, narrative etc. ICAD (2018, 81 ff.) provide a number of examples of mainly quantitative outcome and process indicators for energy transitions that may be inspiring for other sectors.

The identification, further definition and use of indicators are far from being a technical exercise, even more so for super complex systems. The choice of certain indicators, qualitative properties and methods of measuring them can be strongly influenced by certain disciplinary narratives, goal frameworks and normative routines. Probst and Bassi (2014) as well as van den Berg, Magro, and Salinas Mulder (2019) offer systemic, complexity-based approaches and examples for further guidance.

4.4. Methodological approach

Most efforts during project design are still being invested in formulating coherent output-oriented milestones, goals and indicators whereas the methodological parts tend to remain superficial. The "use of participative formats" as such might not sound convincing enough when having bold transformative ambitions.

If navigating complexity is such a challenge compared to managing complicated systems and if transformative change is less predictable, the methods used by transformative interventions should get more attention compared to their impact promises. It makes much more sense to evaluate the quality of a transformative project based on its 'facilitation power' than based on impact predictions that must be unrealistic by nature. How good do we think is an intervention's capacity to design and adapt transformative processes? Which facilitation expertise can it mobilize? Which methods and tools will it apply? What about the transformAbilities? These are

the questions that should rather guide our assessment of how promising interventions are.

Following the rationale of adaptive management and ongoing iterations, all of the methods mentioned before may be used throughout the project cycles. The TransformAbilities provide further hints. ReciprocAbility and complexAbility e.g. are enhanced with holacratic working modes in which flexibility and informal relationships matter more than top-down control and hierarchies. Together with all sorts of co-creative approaches (like design thinking, agile methodology, liberating structures etc.) the chances of creating transformative innovation increase.

Depending on the context, the dimensions and system levels, which we address, the stage of transformation, the recent acceptance etc., the **basic change strategies** could differ (Figure 25).

Figure 25: Four strategies of change

	Doing change	Forcing change	Directing change	Cocreating change
Components	# Creation # Confrontation	# Destruction # Confrontation	# Destruction # Collaboration	# Creation # Collaboration
Archetypical Role	Entrepreneur	Warrior	Missionary	Lover
Dynamic	# Inventing # Growing	# Mobilizing # Challenging	# Reinventing # Breaking	# Collaborating # Coevolving
Necessary Conditions	Willingness to start small and face naysayers	Willingness to risk incurring harm	Willingness to take on tradition and power structure	Willingness of every-one to change
Danger	Irrelevance	Marginalization	Suppression	Co-optation
Relationship to Traditional Power	Outsider	Outsider	Insider	Insider
Question	What does living the new look like?	How do we press the old to become the new?	How can the old change itself into the new?	How can we work with the old to develop the new?
Archetypical Tactics	# Startups # Intentional com-munities	# Community organizing # State force # Strikes (capital, labor) # Demonstrations # Media campaigns	# Policy changes # Organization breakups # Rights legislation # Legal cases	# Multistakeholder forums # Public engage-ment # Social labs

Taken from Waddell, 2018, own illustration.

Interventions may focus on creating innovation in new niches, hoping to bring them into the mainstream ('doing change'). They could try to mobilize (state or societal) power (forcing change), they could change legal norms and institutions (directing change) or focus on broad participation and joint ownership (co-creating change). All strategies could be pursued simultaneously and more or less intensely. Waddell (2018) emphasizes that a single organization is not likely to have competences in all strategies, but usually only in one. This seems a good argument to continue investing in collaboration with organizations with complementary competencies.

4.5. Recent transformation requirements of funding organizations

Funding requirements are already becoming more ambitious and are being elaborated as transformation discourses progress. We hope that they will follow a holistic approach that has good chances of successfully influencing transformations rather than reiterating the management mode of the 'complicated world'.

Development cooperation itself currently undergoes a transformational process leading from a 'donor-beneficia-ry paradigm' to a paradigm of' 'reciprocal international cooperation'. This might also further change the funding institutions.

In the following, we provide some assessment of the status quo, which requires continuous updating as institutions progress.

4.5.1. German Federal Ministry for Economic Cooperation and Development (BMZ)

The BMZ refers to transformation e.g. in the context of the German sustainability strategy and the implementation of the SDGs[11]. The level of detail regarding transformative change seems to be similar to the 2030 Agenda itself.

The 2030 Agenda Transformation Fund is an instrument of the 2030 Implementation Initiative, which is intended to support the implementation of the 2030 Agenda in partner countries of German development cooperation.

It supports innovative approaches for aligning national policies, financial and statistical systems to the requirements of the 2030 Agenda with short-term and small-scale projects and activities (EUR 50,000 – EUR 125,000, 4 – 12 months) providing transformative impulses that are embedded in a larger political and/or social process in the country.

Funding criteria are (inter alia): Relevance to the country's priorities, contribution to the implementation of the 2030 Agenda in the country, cooperation with other organizations, methodological approach, expected output, possible follow-up activities etc.

The fund refers more generally to the implementation of the 2030 Agenda and does not require more specific transformational criteria. However, it also stresses the five 2030 Agenda principles used by GIZ: Universality, integrated approach, leave no one behind, shared responsibility and accountability (see website for details). These general development principles constitute quality criteria for transformative interventions and overlap in part with the suggestions in this document.

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[11] See BMZ report 'Entwicklungspolitik ist Zukunftspolitik', 2018.

4.5.2. German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety / International Climate Initiative (BMU/IKI)

We found a distinct notion of transformative environmental policy in the BMU overall strategy (BMUB 2016) and with the environmental agency (UBA)[12]. Here, 'ecological transformation' aims at a "wide-ranging transformation of our economy and society" (BMUB 2016, 5), a "social-ecological market economy" (ibid) in order to stay within the planetary boundaries and to get close to carbon neutral societies. The notion of transformation within these documents seems to combine a transition theory lens of socio-technical systems with the provisions of the 2030 Agenda and has a number of overlaps with this work too.

For the International Climate Initiative (IKI) as a major fund under the BMU, transformation refers to the development of low carbon societies that are resilient against climate change (see info 2018). The quality of change and the potential of shifting paradigms in creating tipping points seems to include a broader range of framings around 'low carbon'. It includes energy efficiency measures that not necessarily catalyze transitions towards renewable energies only.

The prescriptions about the nature of transformative change seem to imply a broad and large-scale innovative change. Transformative impact is hence anticipated as a combination of the level of ambition and the potential for innovation in the areas of technology, economy, institutions and regarding the applied methods (ibid).

4.5.3. NAMA Facility

The NAMA Facility is a multi-donor fund launched by the UK and Germany in 2013 to provide financial support to developing countries and emerging economies that show leadership on tackling climate change and that want to implement transformational country-led NAMAs within the global mitigation architecture (NAMA Facility GID 6th Call[13]). In its funding decisions, the potential for transformational change of any proposed project receives the highest weight in its evaluation scheme.

In its framework, the potential for transformational change implies to sustainably redirect the flow of public and private funds towards GHG mitigation actions (low carbon goal frame). The focus is on the regulatory and financial dimensions of transformation. Any funding proposal for a NAMA Support Project must demonstrate its impact as long-term direct and indirect effects that reflect the ambition criteria: potential for transformational change including sustainable development co-benefits, financial ambitions and mitigation ambitions.

The facilities' concept of transformational change further requires a combination of scaling ambition and regime shift potential with socio-political factors such as local ownership, political will, a multisectoral approach and systematic learning.

In May 2016, the NAMA Facility presented the lessons learned from three previous calls for proposals and attempted a definition of transformational change. According to this webinar, some central characteristics of transformational change, guiding the assessment of NAMAs are:

Transformational change is 'permanent'. That means that it establishes a new situation, which does not fall back onto its point of departure once the dedicated NAMA implementation phase ends. In the NAMA Facility terminology, this is referred to as 'a sustainable phase-out concept'. The interpretation of the NAMA Facility requires the gradual development of an additional source of finance after the expiry of the financing, since lasting change usually requires a permanent financial structure to prevent things from falling back to where they came from. This result relates to the sustainAbility and resilienceAbility criteria in this work.

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[12] See also BMU transformation of German industry.
[13] See also lessons of the 6th call.

Transformational change is 'radical'. That means that it deviates significantly from an already expected path of change and development (compare Paradigm-shiftAbility I this work). In financing decisions, the NAMA Facility translates 'radical' into 'scale'. Since the financial resources of the NAMA Facility are limited and rare enough to institute a transformation on its own they use 'scale up' and 'replicability' to signal this.

Transformational change is 'abrupt' (compare chapter 2.5 on complexity and non-linear behavior). This observation might be true for a number of dimensions of transformative change in which tipping points may occur. However, it might not necessarily imply that transformational processes are sufficiently realized and sustained in all dimensions. In particular, broad social adoption may take significantly longer after such tipping points and cannot guarantee that systems will fall back or continue to change (compare energy transition or Rosa Parks cases).

4.5.4. Green Climate Fund (GCF)

The Green Climate Fund (GCF) together with the Global Environment Facility constitutes the financial mechanism of the UNFCCC and was established with the main objective of supporting developing countries in their efforts to implement climate action with focus on both mitigation and adaptation. While the NAMA Facility only provides funding for mitigation, the Green Climate Fund aims to balance adaptation and mitigation throughout its portfolio[14], with a particular focus on the most vulnerable populations and countries such as LDCs and SIDs.

The 'paradigm shift' potential is one of the GCF's mandatory investment criteria that all projects must meet, a key concept for both, mitigation and adaptation finance.

More precisely, the major investment criteria are[15]:

impact potential

paradigm shift potential

- Potential for scaling up and replication

- Potential for knowledge sharing and learning

- Contribution to the creation of an enabling environment

- Contribution to the regulatory framework and policies

- Overall contribution to climate-resilient development pathways consistent with relevant national climate change adaptation strategies and plans

sustainable development potential

needs of the recipient

country ownership

efficiency and effectiveness

The GCF investment framework further operationalizes these criteria. The approach towards transformative change seems to be quite similar to the NAMA facility with a large emphasis on scaling economic and technological innovations in favor of low carbon and climate-resilient societies.

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[14] Introduction to GCF, Concept Note User's Guide
[15] See Funding Proposal Template at the funding section of the GCF website.

4.5.5. Climate Investment Funds (CIF)

The Climate Investment Funds were founded in 2008. The Funds aim at advancing climate change related transformations in developing and middle-income countries. The World Bank serves as a host for the funds while multilateral development banks serve as implementing agencies.

Based on work by the World Banks Independent Evaluation Unit and the Independent Evaluation Office of the Global Environment Facility (GEF), the CIFs define transformation as follows:

"Strategic changes in targeted markets and other systems, with large-scale, sustainable impacts that shift and/or accelerate the trajectory toward low-carbon and climate-resilient development"[16].

They further use four dimensions, which further operationalize transformative Change (same brochure):

   # Relevance: The strategic focus of CIF investments to support advancement towards CIF's transformative goals

   # Scale: Contextually large-scale transformational processes and impacts

   # Systemic: Fundamental shifts in system structures and functions

   # Sustainability: The robustness and resilience of transformational change

The four dimensions, except 'relevance', seem to have large overlaps with the first three transformAbilities.

In 2017, the CIF Transformational Change Learning Partnership was founded in order to further co-create a deeper understanding of transformative change in general and more specifically in the context of climate change. The partnership is open to and involves a broad range of interested actors and regularly organizes webinars and similar exchange.

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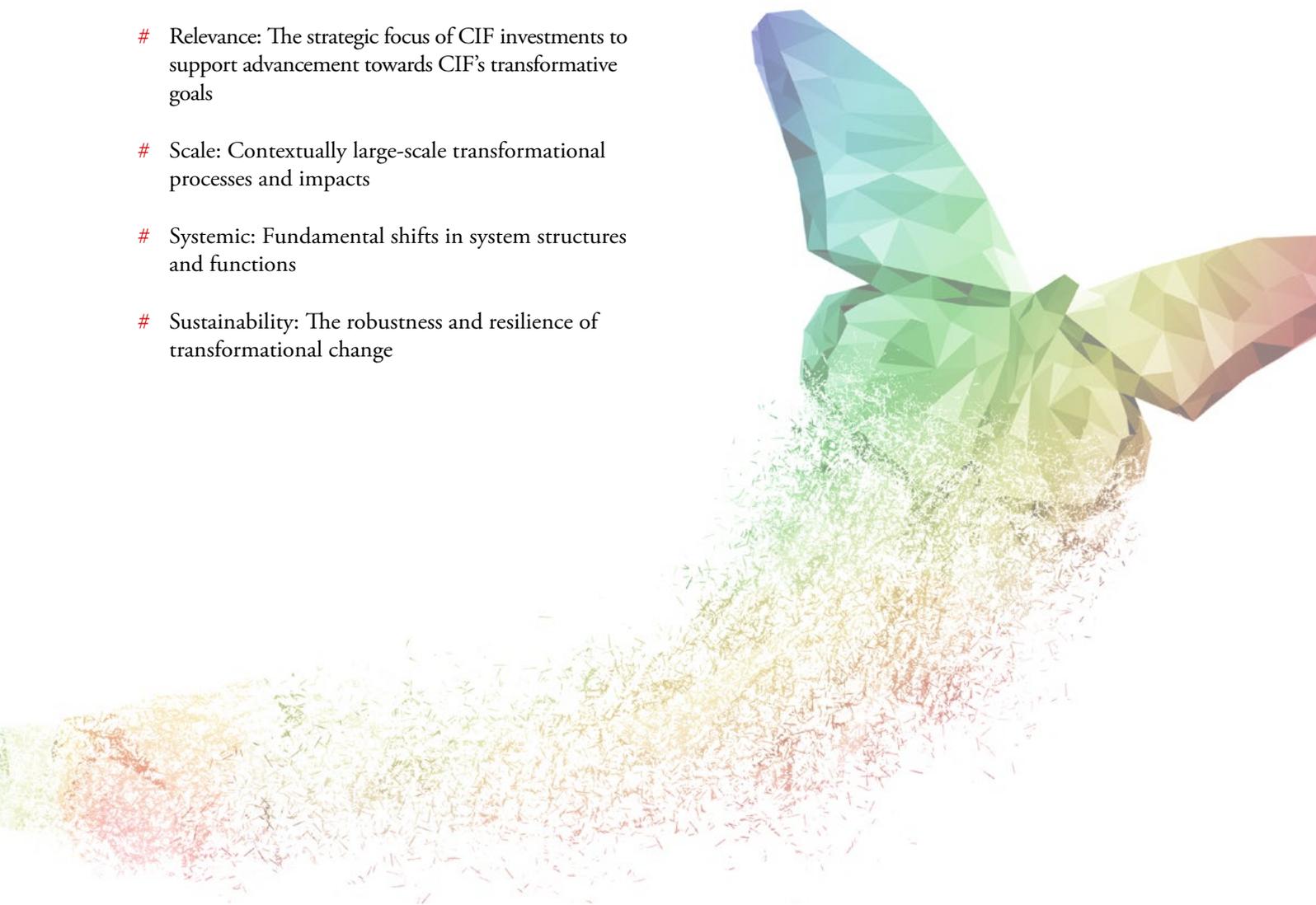
16 See brochure 'Learning about Transformational Change from CIF's Experience'.

5. Conclusion

The social and ecological pressures further increase while our current modes of development are to a large part embedded in 'conventional change thinking' and thus not able to deliver sufficient innovation, scale and societal robustness in time. Despite a high diversity of political interests and goal frames around the global challenges, international donor organizations will most likely further tighten their requirements related to transformative change ambitions. Development organizations need to intensify their efforts to develop transformative interventions.

We define transformative change as a process that converts a current (ecological, social, political, economic, scientific, or technological) system or all systems together into a fundamentally new system that, from there on, forms the new mainstream.

Hereby, transformative interventions i) question existing systems, demanding paradigm or regime shifts, ii) might involve incremental change and reforms to support transformations, iii) strive for scaling up their innovation (technology, political, social or economic norm and narrative etc.), iv) strengthen the resilience of the new system(s) while weakening the resilience of current systems, v) address several 'dimensions of transformation' such as environment, society, science, technology, policy and markets, vi) navigate complexity in adaptive cycles, and finally vii) facilitate deliberation about which transformations to aim at and how to shape the new systems. For this process knowledge needs to be co-created and values and norms need to be debated based on reciprocal relationships. Otherwise, innovations and new systems

are prone to be technically and socially instable and may become artefacts again very fast. Acceptance, ownership and 'just transitions' are less likely if relationships are not reciprocal.

As a next step, we tried to create a holistic picture of what transformation can mean and suggest a possible approach including several criteria that combine the various perspectives. These criteria are indicators for our transformAbility. The criteria are paradigm-shiftAbility, scalAbility, sustainAbility and resilienceAbility, multi-dimensionAbility, social-changeAbility, complexAbility and adaptAbility as well as reciprocAbility. We call some of them mandatory criteria. Without them, interventions could hardly be called 'transformative'. Others may be essential criteria and less distinctive from other forms of change but particularly important for successful transformation.

The approach presented in this paper should be able to differentiate between less and more transformative interventions and help design interventions that are as transformative as possible under the current systemic conditions of international cooperation.

This work is just another way to contribute to this debate and above all to become more operational with transformative change interventions. We look forward to the further discourse and mutual learning within GIZ and between the development organizations. We hope this learning process will contribute to further transforming our work and finally the world.

6. Literature

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