

Strategy for Sustainability using Participatory Backcasting from Principles

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1 Introduction

Backcasting, as opposed to forecasting methods of predicting the future, is about working backwards: setting the desired future state and working to define which steps are needed to attain it. The main difference between the two is that the first focuses on designing how desirable futures can be attained and the latter works on figuring out futures that are likely to happen [Robinson 1990].

In the field of sustainability is not particularly helpful to know scenarios of the future that are most likely to happen. In order to strategically plan, decision makers are after, given multiple possible futures, the most desirable rather than the most likely one [Robinson 1988].

While backcasting, the process of choosing a scenario of what would be the most desirable future can be a hard task for a complex theme such as sustainability. To create a detailed picture of the future in those circumstances would be like attempting to solve a difficult puzzle in a room with five hundred people and limited time.

For that matter, instead of finding the one desired scenario, better would be to have a set of principles working as boundary conditions that, if complied, the scenario in question would be considered desirable. Backcasting from basic principles allow creativity on the course of the development of your strategy and actions towards your goal because you have general rules to guide you to the right direction instead of a solidified detailed vision of the future [Holmberg and Robèrt 2000].

To define strategies for sustainability, both science and social participation are needed. The approach where the decision is typically science-centered and lies on the hands of experts often puts as secondary matters the social and cultural structure of the system [Street 1997]. For that matter, a participatory approach also needs to be in place.

2 Approaches for scenario-based planning

While traditional forecasts were increasingly failing to create good anticipations by the late 60's and early 70's, a new approach on strategic planning by using scenarios started at Royal Dutch/Shell. Two main things at Shell show a development on planning using scenarios: it shifted from "less on predicting outcomes and more on understanding the forces that would eventually compel an outcome"; and the shift to design scenarios aiming to support decision-makers by questioning their mental models [Wack 1985a; Wack 1985b].

This evolution shakes the paradigm of traditional scenarios from based on a probabilistic assessment to causal analysis. Different cause-effect relations were creating possible futures to happen, not the most likely one. Scenario analysis then broke with the pure rationalistic paradigm [van der Heijden 2005: p. 23-31] and moved to become explorative rather than predictive. According to the typologies defined by Carlson-Kanyama et al. [Carlsson-Kanyama, Dreborg, Moll, and Padovan 2008], Shell moved from (1) to (2):

1. Probable: predictive scenarios. Answering the question: What will happen? Methodologies such as forecasting models or trend extrapolations.
2. Possible: explorative scenarios. Answering the question: What could happen? Methods are based on 'push' driving forces: causal analysis.
3. Preferable: normative scenarios. Answering the question: How a solution to a particular problem might look? Methods based on 'pull' driving forces: a teleological¹ analysis.

Among these typologies, the issue is to decide which questions should be asked when facing a specific situation. For our weather forecast, (1) would be chosen; for scenario-planning at Shell, (2) was more adequate. When talking about strategy for sustainability, (1) will not serve us since the most probable scenario is only useful for mitigation pur-

¹ the explanation of phenomena by the purpose they serve rather than by postulated causes.

poses. We will then look at (2) and (3) by analyzing both what is possible and preferable.

Backcasting approaches already work with those typologies by acknowledging that causality (2) has a role to play, but a *total causal model* [Dreborg 1996], as used in forecasting studies, needs to be complemented by a normative approach (3).

Backcasting is an approach that differs from forecasting by points described by Dreborg [Dreborg 1996], among them:

- Backcasting works in a context of discovery rather than a context of justification;
- Backcasting, when working with social issues, carries the principle of teleology (purposefulness) rather than simple causality.

This normative approach in backcasting underlines the assumption that human intentions today influence the shape of the future, while forecasting usually only offers extrapolations of the past drawn by causal derivations. Backcasting is an approach that facilitates the creation of scenarios less bounded by the present, ones that are mental images of a “totally other” reality [Polak 1961].

Backcasting is a normative and goal-oriented process, intuitively the process we use to plan: “we do not so much predict the most likely future as articulate and intention, or set a goal, and then act to realize it” [Robinson 2003]. By being goal-oriented, the process of developing scenarios does not come with an effort to justify the choice, but rather an effort of collective discovery, since in this case what matters are the ideas that can solve the question and not the pursuing of scientific validity [Dreborg 1996].

The development of society towards sustainability is influenced by many actors’ actions and perceptions. If intention plays an important role on human behavior [Dreborg 1996], a shared intention is essential in organizations [Senge 1990; Collins and Porras 1994] or a society [Boulding 1988].

On these groups, the importance is not entirely on setting the goal, but also in the social learning process that allows the goal to be perceived as collective and instigate collective engagement. Backcasting together with using participatory processes can both contribute with the social learning and to access this shared intention.

3 Participatory Backcasting

When planning in complex systems, backcasting can be used in a way Robinson defines as a “second generation” form [Robinson 2003]. The desired future is not determined in advance by experts and brought to the dialogue, but the analysis is an emergent property as the stakeholders engage in the process.

Society within the biosphere is the complex system in which sustainability is addressed. To that complexity, a paradigm of optimizing the most efficient way of achieving a goal shifts for a paradigm of learning [Bagheri and Hjorth 2007; Checkland 1981: p. 258] where collective learning is fundamental for the evolution of the system.

Focusing on systems that learn implies adopting a processual theory of strategy [van der Heijden 2005: p. 34-50], a theory that focuses on acting while continuously learning from the feedback of our actions [Argyris and Shon 1978] and from the future as it emerges [Scharmer 2007].

The use of the method of science in planning in complex systems has its limitations when the complexity of the system increases [Checkland 1981: p. 60]. Social sciences, as opposed to natural sciences, has to consider more undefined variables and relationships since a component of the study “is the individual human being, and even if we depersonalize him as an ‘actor’ in a ‘role’ he will be an active participant in the phenomena investigated, attributing meanings and modifying the situation in a potentially unique way” [Checkland 1981: p. 69].

No laws - as they are understood in natural sciences - can apply to social sciences. The simple fact that the agent observed re-creates his relationship to a situation by giving a different meaning *ad hoc*, an observer will never be able to have a detailed map of his state of mind in advance to predict his behaviour. “This kind of argument suggests that at best social systems will reveal ‘trends’ rather than ‘laws’ [Checkland 1981]. Those maps are cognitive creations of human beings, always changing as behaviors within it changes [Banathy 1998]. The exploration of social systems are therefore more related to creating a process rather than trying to come up with crystallised laws.

Acknowledging the importance of a participatory process rather than a think-tank of experts, the focus shifts from scenarios (sustainability goals) determined in advance to become an emergent property of the consultation process [Carlsson-Kanyama, Dreborg, Moll, and Padovan 2008].

4 Natural science and boundary conditions

The fact that a system is too complex for a pure scientific analysis does not mean that natural sciences does not apply to them. What is the role of natural sciences when we plan towards sustainable development?

Natural sciences values the predictive approach. A law in science is something that models an event in a way that experience always confirm, until a better model takes its place [Kuhn 1962; Checkland 1981: p. 248-249]. Gravity is a law because it predicts the behaviour of an object when we hold it a meter off the ground and drop it. A kid in high-school, provided with some data, can give us a good prediction of the velocity of this object based on a Newtonian model.

Analog to this, principles of sustainability are based on the laws of thermodynamics. These laws are models that predict the future of thermodynamic behavior and can be considered the boundary conditions of how systems behave thermodynamically. Scientific studies have been made that defined the natural principles of sustainability [Holmberg 1998; Holmberg and Robèrt 2000; Robèrt 2000]:

In a sustainable society, nature is not subject to systematically increasing

- I. concentrations of substances extracted from the Earth's crust;
- II. concentration of substances produced by society;
- III. degradation by physical means.

If not contradicting any law, i.e. within those boundaries, space is open to any development and creation. When creating scenarios and processes of a future state that is at least sustainable, it is important to acknowledge this boundaries to be able to create within them.

This is the basis of what Robèrt et al. [Robèrt, Broman, Waldron, Ny, Byggeth, Cook, Johansson, Oldmark, Basile, Haraldsson, and MacDonald 2004] call “creativity within constrains”. Being creative within constrains means, for example, that one knows the laws of nature well enough to be able to engineer a machine heavier than air and put it to fly.

To have the overall description of the system set into principles does not aim to be a platform for solutions in complex systems such as sustainability [Holmberg and Robèrt 2000]. Definition of principles is rather a strategy to help make the process of planning simpler, but without reductionism [Broman, Holmberg, and Robèrt 2000].

5 Participatory backcasting from principles

Besides the conditions proposed by natural sciences, there is a need to define social principles - and therefore the boundaries - that the collective representing the system wants to set for themselves. This approach integrates science-based and value-based principles as assets to support the process of backcasting from principles.

Dreborg [Dreborg 1996] suggests that backcasting should include a view on the role of values. Street [Street 1997] says that “economic, environmental and social goals are value laden, and thus local values and knowledges need to be integrated into strategies for sustainability”.

As discussed above, the nature of complexity between the two sets of principles differs, suggesting a more tailored-made approach when defining social principles. The time frame for re-accessing social principles and apply recent learnings is also different. Social principles can be seen as a social contract over common ground starting points. Robèrt represents this in a story of a family setting principles to help them move from one city to another [Holmberg and Robèrt 2000; Robèrt, Broman, Waldron, Ny, Byggeth, Cook, Johansson, Oldmark, Basile, Haraldsson, and MacDonald 2004: p. 34]. As a learning system, the same family would, five years later when moving again, re-access those principles.

This approach to backcasting can be seen as predictive as it limits the possible scenarios in the future, but it actually only displays the boundaries within which many scenarios are possible and creativity is allowed. This sets up a common-ground for the development of scenarios. Backcasting from principles can be considered non-predictive as the general purpose of the analysis is not to predict, but to assess feasibility of desired outcomes [Robinson 2003], even if the outcomes are conditioned to principle boundaries.

At the end, we are using both science-based laws and a stakeholder-defined social principles. The first is defined by the laws of thermodynamics and the latter by consensus on desired system social laws. Details of possible future states are not set, so there is enough flexibility to allow creativity in planning and mid-course corrections in acting.

Not trying to start agreeing on details of a desired future state prevents the group of getting in a infinite jig-saw puzzle-solving exercise [Street 1997; Robèrt, Broman, Waldron, Ny, Byggeth, Cook, Johansson, Oldmark, Basile, Haraldsson, and MacDonald 2004: p. 34]. This approach has no strategy and low value. On the contrary, understand the system in terms of both science and the role of people within it enhances the emergence of a collective desired scenario [Street 1997].

At this point, scenarios can be created and used for backcasting once they are scrutinized by the natural principles and the social principles designed by stakeholder engagement. Any method can be chosen to support shape those scenarios. With principles defined by a participatory backcasting, a more decentralized process can take place: it is possible to create multiple scenarios as a group or even have one or more focus groups to define scenarios and offer them to the whole group.

6 Conclusion

The process of planning in a complex system such as sustainability has to take into account both natural and social aspects. Both aspects are considered by creating principles, or boundary conditions, within which a backcasting approach is possible.

Approaches that only rely on natural sciences fail to acknowledge the emergence of social systems as learning organisms and usually consider social issues generically or secondary compared to expert top-down determinations.

On the other hand, approaches that focus on complete unbounded scenarios do not recognize the inherent natural laws that encompasses sustainability and fails to define and understand the system in place: in the case of sustainability, our society within the biosphere.

Natural principles are taken from scientific-based studies rooted on the law of thermodynamics while social principles are based on stakeholder engagement and a social consensus on common ground for the envisioned future. Scenarios, when within those boundaries, can be creatively designed by the whole system or smaller focus groups and allows flexibility for decision-makers to take mid-course correction actions without constant consultation.

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