Backcasting

A Systematic Method for Creating a Picture of the Future and How to Get There

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Introduction

A challenge we face in envisioning a goal is the difficulty of imagining the conditions that have to be true in the future if our goal is to be achieved. If we posit a goal, say, “Our revenues are 50% higher,” it is apparent that many other conditions must also be true, e.g., “Our workforce is bigger,” or, “Our product appeals to customers who have never before purchased this kind of product.” But how can we envision fully the texture of such a future state? What are the conditions that need to be in place in order for us to have accomplished our goal?

This is not a theoretical question, since without a relatively complete picture of the future state, we will not be able to map out an implementation plan for achieving our goal. For example, if we believe that revenues can grow 50% only if we attract customers who have never before purchased the kind of product we sell, then our conception of the actions we have to take now to achieve our goal must include steps for attracting new customers to our product category. Our understanding of our desired future state and our plan for getting there are inextricably intertwined.

Goldratt’s Methodology: The Thinking Process

How can we identify the network of future conditions surrounding a goal? When we do so, how do we use this knowledge to implement a change within an organization?

To answer these questions we draw directly on, while also modifying, the rich and creative methodology developed by Eli Goldratt and his colleagues, called “the thinking process” (Goldratt, 1994). They developed a four-step thinking process for identifying how to improve a situation or setting. First, organization actors link identified symptoms to a root cause; second, they describe how an intervention, by overturning the root cause, can transform the symptoms into desired conditions; third, they specify the prerequisites that must be in place to implement the intervention; and fourth, they delineate the tactics to put these prerequisites into place.

The Backcasting Approach

As rich as Goldratt’s method is, it is also time consuming and difficult. Many clients are reluctant to engage with it. I and my colleagues at CFAR developed our backcasting method to overcome resistance to this way of thinking. Our method short-circuits the first two steps and substitutes an interviewing process for the client’s work of rigorously thinking in cause and effect terms. Instead of beginning with symptoms, we posit a goal, e.g., “We have a suitable incentive scheme” and then employ our structured interviewing process to help an organizational actor identify rigorously the prerequisites. We call this interviewing method and the tree of prerequisites it helps us produce, “backcasting.”

Our approach consists of four steps.
Interview Protocol Sample

INTERVIEWER: Let's take as the goal; “Nursing turnover is reduced to a minimum.” What are some obstacles?
CLIENT: People don't feel comfortable working outside of their specialty areas. It would be good to have them spend most of their time in their specialty areas.
INTERVIEWER: What are obstacles to achieving that?
CLIENT: We don't have a staffing model that supports staying in your specialty areas.
INTERVIEWER: If you had the staffing model what would be the obstacle to that?
CLIENT: We can't build the teams we need on evening and weekends.
INTERVIEWER: If you had the staffing model what would be the obstacles to building the teams?
CLIENT: Right now we have people with seniority in the operating room on days. The newest people are doing the weekends and evenings, which is stressful for them.
INTERVIEWER: How could you overcome this problem?
CLIENT: We should look at a dedicated pool of senior nurses for the evenings and weekends and pay a premium rate. A lot of interest has been piqued in that. They could proctor the new nurses who work nights.
INTERVIEWER: Are there obstacles to paying a premium?
CLIENT: I also have to pay the OR tech a premium, but one way to do this is to offer more school benefits. I think the culture would support this. People should get paid for their inconvenience.
INTERVIEWER: Is there another obstacle to getting the dedicated pool?
CLIENT: Maybe too many experienced nurses will want to shift to evenings and weekends. You have to protect the day shifts. We should try to attract some new employees back who already know our systems. They will like the premium pay. We could also increase the number of senior people on call.
INTERVIEWER: Are there any other obstacles to reducing turnover?
(Cliente turns to issues of proctoring and educational support for new nurses)

Figure 1: Interview Map

The sidebar (at right) demonstrates an example of such an interview protocol conducted with a nurse manager.

The interview in effect, replicates the diagram in Figure 1 where the goal and the accomplishments are shaded in

1. Specifying the goal.
2. Interviewing the organizational actor(s).
3. Creating a draft backcast and its corresponding accomplishments map.
4. Developing a project plan based on the backcast.

Let us describe each step.

Specifying the Goal

Ask the organizational actor or client to specify a desired end state, for example, “Our incentive scheme rewards collaboration.” The only rule in specifying the end state is that it not be stated as an action, e.g., “We replace our incentive scheme with one that rewards collaboration,” since the latter describes a process for reaching our goal, rather than the goal itself.

The goal can be stated in somewhat general terms, because the interviewing process itself will elicit the specific meaning or import of the goal to the organizational actor(s). If we ask for too much specificity in defining the goal we are in essence anticipating the backcasting work itself.

Interviewing the Organizational Actors

Interview the actor(s) using an iterative process based on the following two questions
1. What obstacles would you have to overcome to achieve this result?
2. What accomplishments represent the overcoming of these obstacles?
   a. What obstacles you would have to have overcome to achieve these accomplishments?
   b. What accomplishments represent the overcoming of these obstacles?

The sidebar (at right) demonstrates an example of such an interview protocol conducted with a nurse manager.
rectangles, the obstacles in “squashed” rectangles.

The map is read in the following way. Looking at Accomplishment 1 it says, “If we want to achieve Accomplishment 1 we will have to overcome Obstacles 1.1 and 1.2. Achieving Accomplishment 1.1 is a way to overcome Obstacle 1.1, and achieving Accomplishment 1.2 is a way to overcome Obstacle 1.2. While the map is read “downwards,” the arrows point upwards to indicate that an accomplishment at a level below, e.g., Accomplishment 1.1, is a precondition for achieving an accomplishment at a level above, e.g., Accomplishment 1.

The Interview

One important question is how to conduct the interview. There is a tension between a “vertical” and “horizontal” approach. In the horizontal approach we would ask the client or actors to first list all the high level obstacles, then to list all the accompanying accomplishments, then to list all their obstacles to these accomplishments etc. Alternatively we could follow one line of causation all the way down to the “bottom” of the backcast tree much as the protocol above reads. Our own experience is that people more naturally follow the second path. Once they start with one obstacle they are comfortable working their way down through the resulting cascade of accomplishments and obstacles. This means that the interviewer has to periodically pull the client “back to the top” to start on a second obstacles.

We have found that it takes practice to master this kind of interviewing protocol. The challenge is to enable the organizational actor to follow his or her own lines of thought, while periodically asserting the logical structure of the protocol. This sometimes means allowing the actor to think horizontally as well as vertically, while keeping track of the implicit logic. It helps to have two interviewers present, one to facilitate the conversation and one to take notes and keep track of where the actor is in his or her thinking.

As the above protocol suggests, the structure of the interview helps people access their implicit theory of the causal structure of the setting in which they work. For example, the nurse manager believes that seniority interferes with good staffing practices on the evening shift because nurses on the evening shift, who are less experienced, work out of their specialty areas. Novice nurses experience this as stressful and as a result some fraction of them leave. If more senior nurses worked on the night shift, novice nurses, if still required to work out of their specialty areas, could get good informal supervision from the senior nurses. Our philosophical premise is that organizational actors have an intuitive understanding of the causal structure of the environments they are in,

Figure 2: Draft Backcast

Nursing turnover is reduced to a minimum
New nurses are confused by too many protocols
A dedicated pool of senior nurses works the night shift
Senior nurses do not want to take up the extra work of being primarily responsible for one or more new nurses
Each new nurse has a primary protector
Senior nurses do not know how to be primary protectors
All protectors are trained
We don't have a training program
We have a training program for protectors
Nurse executives believe that turnover costs are much higher than the costs of premium pay
Nurses who are protectors are rewarded with incentive pay
Nurse executives don't want to spend more money
Senior nurses who work nights get premium pay
A premium rate for nurses means paying a premium rate for Techs
Techs who work nights receive tuition support paid directly to the school
Ex-employees who know our system well are attracted to working for us
Currently employed nurses receive extra call pay for being on call at nights
We will put the day shift together
and that the interviewing protocol helps them access and verbalize this intuition.

The Challenge of Verbalizing Accolishments

What happens if this intuition fails them? What if they get stuck, that is, they cannot envision an accomplishment that represents the overcoming of an obstacle they have just named? In this case the interviewer simply reframes the obstacle as an accomplishment and follows the logic down the tree. So for example, if the organizational actor says, “The obstacle to more sales is that our service quality is low,” and then cannot think of any avenues for increasing service quality, the interviewer then posits the accomplishment, “Our service quality is high,” and then asks the interviewee to list obstacles to this accomplishment. In naming these obstacles the interviewee begins to describe what has to change to insure high quality. For example, one obstacle might be, “We don’t really understand what our customers will pay for.” An accomplishment might then be, “Customers regularly give us feedback on the quality of our service.” So now we have at least one accomplishment that contributes to overcoming the obstacle of low service quality. The capacity to envision an obstacle is the first step to envisioning a solution. Or, to reference a more general methodological point, the problem stated correctly is simply another way of describing the solution.

Creating a Draft Backcast

The interviewer then analyzes the text of the interview, and maps it onto structure shown in Figure 2. Let us return to our interview protocol with the nursing manager. We posited there the goal that, “Nursing turnover is at a minimum.” Using the interview protocol, we then create the following backcast.

This map is read in the following way, “If we want to achieve the goal, nursing turnover is reduced to a minimum,” then we have to overcome the obstacle that “Newer nurses work out of their specialty areas on the night shift.” To overcome that obstacle we need “A dedicated pool of senior nurses who work on the night shift.” However, senior nurses have no incentive to move to nights. Therefore we must, “offer senior nurses premium pay at nights.” But if we do this we might “raid the day shift.” So, “we should also have incentives to attract day-senior nurses to be on call for nights, and we should attract ex-employees back to work for us.” This backcast also shows the beginning of the second branch related to the mentoring of new nurses, a theme which first appears at the end of our protocol.

One question is how exhaustive in its logic must the map be. For example, the backcast assumes that it is more difficult to cover each area of surgery with nurses trained for that area, for example neurosurgery, on evenings and weekends. In the interview protocol this is a taken-for-granted assumption, it is a fact of life which any insider knows. The interviewer can of course ask for clarification about this, if the rationale for the taken-for-granted assumption is unclear. But the rule of thumb in building the backcast is to include as much detail about the underlying logic that helps the client scrutinize and then revise the backcast tree, and that serves as a good enough communication vehicle among all of the organizational actors.

The Accomplishments Map

As was noted in the introduction, to create an implementation plan we need to develop a textured picture of a future state that includes among many other conditions our original goal. To do this we create an accomplishments map (Figure 3) by eliminating all the obstacles.

We built our backcast by asking what accomplishments must be in place to overcome each obstacle. This means
in turn that each accomplishment must logically be a part of the future in which our goal is achieved. Taken together, we now have a richer picture of the future state we want to achieve. It entails at least ten different conditions. If we had not worked through this logical process we could never have intuited that our future state must include at least these conditions. This method of describing a future state is more exacting than simply asking people to imagine how the future might look. The latter is based on brainstorming, a process that offers no assurance that the picture of the future will be complete or even coherent. The backcast method provides a much higher level of assurance that such criteria can be met.

**Logical time versus historical time**

The reader can now see why it is important to phrase each accomplishment as a condition in the present tense, rather than as an action. If instead of using the phrasing, “Techs who work nights receive tuition support paid directly to the school,” we write instead, “We increase rewards to techs who work nights by giving them tuition benefits,” we would be describing an action that is on the way to accomplishing our objective rather than the accomplishment itself. We would have shifted from logical time to historical time. The thinking process we use in the interview is based on the logic of precedence, what must precede what, logically speaking, rather than in actual time. In this sense the backcast is just like a forecast that states how the future will look, e.g., “It will be a hot day tomorrow (Wednesday),” rather than how we get to a hot day. (“The cold air front will move out to the ocean pulling a warm air front in behind it.”) The only difference we add is that, to keep us focused on conditions rather than actions, we phrase everything in the present tense, e.g., “In the future, Wednesday, the temperature is hot.”

**Figure 4: Action Plan**

- We negotiate with human resource to get the incentive pay we need.
- We demonstrate the high costs of nurse turnover.
- We survey senior nurses to see what level of incentive would motivate them to work nights.
- We call ex-employees and offer them night shift with premium pay.
- We open up some premium pay night positions to senior nurses on the day shift.
- We have a training program for proctors.
- We launch a task force of senior nurses to design a training program.
- Nurse executives believe that turnover costs are much higher than the costs of premium pay.
- Senior nurses who work nights get premium pay.
- The nurse manager assigns new nurses to proctors.
- We compare historical turnover rates with current rates controlling for seasonal effects.
- A dedicated pool of senior nurses works the night shift.
- Nursing turnover is reduced to a minimum.
- Each new nurse has a primary proctor.
- All proctors are trained.
- We secure a training venue and provide the training at the beginning and end of each shift.
- We negotiate with research and evaluation for support.
The reader will also note that we have used what Goldratt calls the "logic of sufficiency" rather than the "logic of necessity." Every obstacle we name is sufficient to prevent an accomplishment, but it is not necessary to prevent it, since there may be other still un-verbalized obstacles that could also prevent the accomplishment. In other words, our method does not guarantee that we have an exhaustive list of obstacles for each accomplishment. Instead, we arrive at a good enough set of obstacles by asking organizational actors to scrutinize the tree and add obstacles that they believe are important in moving from the present to the desired future. We use an iterative process to get to a good enough set of obstacles.

Creating an Action Plan: Interpreting Logical Precedence

We can use the accomplishments map to create a project plan. The project plan is the picture of how we get from the present to the future. Consider the diagram in Figure 4. If we eliminate references to "on-call" nurses and to "giving techs tuition benefits" to simplify our diagram.

The illustrated action plan has five distinct features.
1. The action steps, in the "cut" rectangles, are all verb phrases. We are now in the realm of action.
2. We display the action steps horizontally to indicate decisions taken over time.
3. Each accomplishment is associated with one or more action steps. When the action plan is complete the action steps surround the backcast.
4. These actions steps are not descriptions of the future state but how we get to the future state. For example, once the task force designing the training program completes its work, it will disband.
5. The sequence of steps is determined partly by the logic of precedence but also by considering the amount of lead-time we will need to complete each action step. For example, we begin discussions with human resources even before we have completed the design of the training program because we know it will take some time to get their agreement.

The action plan demonstrates an important link between logical time and historical time, which guides the development of a project plan. The accomplishment "Nurse executives believe that turnover costs are much higher than the costs of premium pay" logically precedes "A dedicated pool of senior nurses works the night shift." This means that while I can start working on the latter by starting my discussions with human resources, I can't get my pool of dedicated nurses until I have demonstrated that the costs of nurse turnover are high. Lead-time can trump logical precedence in terms of when I begin an action step, but logical precedence determines when I reach my goal.

Creating a history of the Future

An added benefit of an action plan is that it provides the outline for writing a history of the future by enabling us to combine historical time steps into a coherent in the form of a story of how we reach our goal. Our history should reflect the story as if it were an interview with one or more of the organizational actors. The interview can be described as having been published in the organization's newsletter. So for example it might begin in the way it is in the following way.

We have found that the texture of the backcast and the action plan provides an excellent level of realistic detail to write readily, a plausible interview. Moreover, because the interview is framed as the telling of a story of success, when circulated to the project team it is motivating. People begin to see how they can get from the present to the future by facing and overcoming all the serious obstacles in their way.

In sum

A goal describes how we want our part of the world to look in the future. But a goal does not stand alone. It is part of a network of conditions, all of which also have to be true in the future if we are to realize our goal. It is difficult for people to imagine this network of conditions simply by brainstorming or playfully imagining the future, because this network depends on the causal structure of obstacles that stand in our way of accomplishing the goal. Backcasting helps us reveal this causal structure and gives us a relatively complete and coherent picture of the network of conditions we need to achieve if we are to overcome these obstacles. In addition, the backcast guides us in building a detailed action plan that combines our accomplishments and the steps to achieve them. The action plan helps us create a vivid and realistic "history of the future," which as a story of success can be very motivating.

Reference

Creating a history of the Future

An added benefit of an action plan is that it provides the outline for writing a “history of the future” by enabling us to combine historical time and logical time together in a believable story of how we reach our goal. Our practice is to write the story as if it were an interview that takes place in the future with one or more of the organizational actors. The interview can be described as having been published in the organization’s newsletter. So for example it might begin in the following way.

Reporter: I understand that you were able to significantly reduce nursing turnover. Our readers would be very interested in knowing how you did this.

Nurse Manager: Well we knew that the problem was with our newer nurses. They were being thrown into the night shift, and because we did not have as much coverage of all the specialties we wanted at nights, they were sometimes working outside their specialty without much supervision. It was too stressful for them and some left.

Reporter: How did you address this specific issue?

Nurse Manager: We knew that we needed more senior nurses working nights to provide the newer nurses with more supervision.

Reporter: I would think it would be hard to get the senior nurse to shift to nights. Working days in one perk of seniority. 

Nurse Manager: Well it was. But we did a survey of the senior nurses on days focusing on those we knew had no young children at home. We asked them what increment in pay it would take for them to switch to nights. It was not trivial, but when we ran the numbers we could see that we would still be saving money if turnover fell.

Reporter: How did you justify paying them more than the standard premium, and didn’t this mean that everyone on night got a boost in pay?

Nurse Manager: We worked with human resources on this. We realized that we could justify this pay if the senior nurses were proctors for the new nurses while on the night shift. This is what we wanted to do anyway. HR was accommodating once they saw that the job description was changing.

Reporter: Was it hard getting the nurse executives to sign off on this extra pay?

Nurse Manager: Well we had already calculated our cost of turnover and we could show to our executives that there was a good chance that the extra cost of turnover would outweigh significantly the extra cost associated with our proposal for the night shift. Of course we could not prove this for sure, but the executives were willing to take a risk, since high turnover of new nurses was such an obvious waste of money. We invest so much training in them.
Reporter. So once you got there buy-in it was a go?

Nurse Managers: Well not exactly. We had to promise the clinical director of nursing that we would put in place a good evaluation plan to see if in fact turnover really fell. This took some time to develop and held up our implementing the program. In retrospect I wished we had started this earlier.

Reporter: But when it was done you went ahead?

Nurse Managers. Yes, except that……

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