

Massachusetts Institute of Technology  
Sloan School of Management  
System Dynamics II: Applications of System Dynamics

Professor Jim Hines

**Guidelines for kickoff meeting and first breakout Group presentation: Definition of Concern and Momentum Policies<sup>1</sup>**

1. Overview of weekly activities. Each week for the first six weeks or so, we'll provide a handout that describes the activities for that week. And, each week each team will present what they did during the prior week. Each handout will have one or more examples of slides for such a presentation. Feel free to imitate the format of these slides. In fact there's no reason to depart from the example formats, unless you think you have a better way – in this case, there is no plagiarism. Copying with small improvements is the way that we make progress in our process.

The weekly handouts and presentations

- Help pace your projects.
- Help us keep up to date with the progress of your project.
- Give you practice in expressing system dynamics ideas.
- Provide you with helpful comments from the instructors and your fellow students.
- Let all students see what other teams are doing
- Gives all students the opportunity to help other teams.

Please provide a hardcopy of your presentation to the person leading your breakout group, and upload your presentation to the appropriate place on the course website.

2. Purpose of first presentation: Definition of concern and momentum policies. Your first presentation will report on the kickoff meeting with your client. The purpose of the kickoff meeting is to define the client's concern and to get a list of "momentum policies". Although concern definition and refinement will continue to some degree throughout your project, this meeting is designed to give an initial direction; and the resulting presentation will show the class where you are headed. The client's *concern* should be captured as one or more reference modes. The process of getting reference modes includes listing variables and selecting "important ones" to graph over time. *Momentum policies* are the solutions currently being considered (or perhaps currently implemented) by people in the company to address the concern.
3. List of variables. A good kick-off meeting might begin with a short description of the issue area from the client. Ask the lead client to spend "two or three minutes" just describing the concern, keeping it as general and fuzzy as possible.

Sometimes a client will want to start out by writing down "the problem statement". If this is what your client wants to do, explain that part of the project is getting clear on what the project is about and that trying to write down and/or explain a problem statement *now* would be time consuming and surprisingly unproductive. Explain to your client that experience shows that a very good way to *begin* to get a sense of the issue area is to simply list variables. You and your client will find that just listing variables – saying single words is a *very* efficient way to communicate. If two or more people from

---

<sup>1</sup> Prepared by Jim Hines 1998. Revised February, 1999. Revised October 2000. Revised February 2001. Revised February 2004.  
Copyright © 1998-2004 Jim Hines.

the client organization are present, they'll find that by listing variables, they're communicating rapidly with each other and with you. Putting things into complete sentences and paragraphs just isn't worth the

So, begin the real process simply by asking your client to list variables – all the variables that have a bearing on what he (or they) already *know* the issue to be. One person on your team can write down the variables as everyone (client and consultants) blurt out variables.

Tell your client that variables are things that can go up, can go down or can stay the same; they include anything anyone thinks is relevant whether a concern or a cause. Do not be restricted by departmental or organizational boundaries. Discourage discussion or debate about the variables. If a question of definition comes up, simply ask the person who suggested the variable what he or she meant. If someone wants to modify the definition, encourage her to offer a separate variable instead.

You will probably end up with between twenty-five and seventy variables. Try to get at least twenty. But the more variables, the better. Listing variables is very cheap, so if you're ever going to be comprehensive, this is the time. The more people from the client organization and the more familiar they are with the problem area, the more variables you will get. The most I've ever collected in a single meeting was about 200.

.Make sure that your client's concern is among the variables (this is oddly easy to overlook). For example, if the concern is the time it takes to get a product to market, make sure that "time to market" is one of the variables. For example:

- time to market
- product complexity
- customer sophistication
- workforce
- R&D budget
- etc.

The process of listing variables can take an hour or an hour and a half (or more, but probably not much more). When people first start to run out of variables, name a variable from a different part of the company. If the concern is the time it takes to get a product to market and people are listing variables in the R&D area, suggest one from manufacturing or sales (or even a variable having to do with a customer, a competitor, a complementary product, or a regulatory agency). Eventually, though, you'll find that people really will be running out of variables, that the variables being added are a bit of a stretch, and that you can't think of any organizational areas that have not been touched upon.

After listing the variables, have your client choose the "most important" (these will be the ones you will graph as reference modes, but you don't have to tell the client this right now). Usually half a dozen important variables will be more than sufficient, because all you're really interested in is the patterns of behavior. Usually there are only one or two (*maybe* three) different behavior patterns. So with six variables you'll probably get them all.

Picking *which* variables to graph should not take a long time. In fact, *any* six variables would probably be fine. One way of doing the picking is to call a break after listing the variables. During the break everyone marks, say, three of his or her favorite variables. The "winners" will be the variables with the most "votes". You can tell the client to pick variables that seem important to him or her with the following guidelines:

- Given a choice between a major concern and a major cause of the concern, choose the major concern.
- Given a choice between a variable that is different from other variables chosen and one that is similar, choose the one that is different. For example if the choice is between *unit sales* and *overtime*, and if *revenues* has already been chosen, the client should pick *overtime*. The

variables will give you and your client different “windows” onto the system, so it’s best if the windows look out over different views.

Remind the client that just because a variable is not chosen does not mean that it’s not a significant variable. Unselected variables are not discarded; an unselected may well go on to be a key part of the system. Also reassure your client that you’re not shutting the door on additional variables as the project moves along. New variables can emerge right up until the end of the project.

4. Reference modes. You and your client will produce hand-drawn, approximate graphs of the chosen variables. These graphs are your reference modes. They should be pictures of what is disturbing the client. In many cases they will extend from the past into the future, showing how the concern evolved to its current state and then what the client’s hopes and fears are going forward (i.e. the future will often have two (or more) lines). Although you do not need to have numbers on the vertical axis, **the horizontal axis should be labeled so that it shows the time horizon of the problem.**

For example:



The time axis should be long enough to capture the entire pattern of behavior. Do not be restricted by organizational planning horizons or by data availability. One good way of getting the numbers for the horizontal axis is to *first* draw the pattern of behavior and only later ask what year (or month) is at the left hand side, where is “now” and what is the time at the right hand edge of the diagram (or perhaps, what is the time at which the “hope” and “fear” curves are clearly different.

The process of drawing graphs can take two hours or more, depending on the number of variables selected to draw and the amount of knowledge agreement in your team. Don’t let anyone stall for data. You don’t want to know draw every bump and twiddle; you want just want the particular *pattern* of behavior that concerns the client. You’re after a cartoon or caricature of what the data would show, and the client should be able to draw it from memory. If the client doesn’t know what the pattern is, then the variable clearly is not the real concern and does not need to be graphed.

You do not need to force agreement on the reference modes; that is, people can draw different reference modes. In fact if people really think that a certain variable has behaved quite differently, that will usually be an insight (i.e. people won’t have realized before that they have different recollections of what happened). You don’t have to resolve now who is right – in fact it usually turns out that they each have piece of what happened. (Definitions here are in order, but again avoid debate. The person who suggested the variable can decide what the definition is. If someone “voted” for the variable because he thought it meant something else, get a variable for his idea and let him draw an additional reference mode for the *new* variable.

Graphing can be done during the kickoff meeting if the meeting takes place in person or using videoconference and if you have time. Otherwise, you might want to do this off-line. You can fax people graph axes on which to draw their beliefs. It is sometimes helpful if you give your client a “strawman”<sup>2</sup> sketch of each variable so that they have something to react against – they can then draw

<sup>2</sup> The term “strawman” means an initial, extremely tentative, and probably wrong attempt at something. The term comes from the process that led to the development of ADA, a computer programming language

on top of the strawman and fax back to you.

5. Verbal statement. After the client has drawn reference modes, you will be in a position to capture the concern verbally. The verbal statement is easily over-emphasized. It is not as important as you or the client probably think. ***The reference modes are the most important deliverable from this stage.***

To deemphasize the verbal statement, suggest that you NOT write it down. Instead just talk through one of the reference modes that seems to capture what the problem is. For example, while pointing to various parts of a curve, say, “The time it takes to get a product to market has been increasing, we hope it will decline but fear it will continue to increase. If our project is successful, our hope will become more likely and our fear less likely.”

Stay away from *explanations* of the pattern of behavior. Explanations that came up during the kick-off meeting should be listed under insights (see below). You would **not** want to say something like, “The problem is that products are becoming too complex”, or even “The time it takes to get a product to market has been increasing because of increasing product complexity”.

The “problem” should be a source of direct **concern** for the managers you are working with. In the poor example immediately above, increasing product complexity is offered as an explanation. While product complexity may be the most important causal factor, the pressing *concern* is time to market, *not* product complexity. One of the good things about the standard method is that it slows down the rush to judgment that is rather among managers. The standard method provides a time when the concern can be efficiently crystallized and a separate time when explanations can be efficiently described and created. The standard method provides a structure whereby these two very different activities will build on each other, rather than disrupt each other.<sup>3</sup>

6. Momentum Policies. The term *momentum policy* is borrowed from GM’s problem-solving process. A momentum policy is a solution that your client would implement now if he or she had to make a decision immediately. The term is a bit confusing in system dynamics where the term “policy” usually is used interchangeably with “decision rule”. A term such as “momentum *solution*” would be less confusing, but the term “momentum policy” is the one we have. The word “momentum” is intended to suggest that these are the solutions that would be implemented now given the current direction of thinking.

For example, say, your client’s concern involved time to market as in the reference mode of figure above. In this case you would ask your contacts what they currently think they should do about the problem. That is, “If it were decision time right now, what would be your solution?” For example momentum policies for the company with the above concern might be

- Put emphasis on the back-end of the R&D pipeline
- Get marketing involved in the R&D process
- Put a “can-do” guy in charge of R&D

Note, the company may already have implemented or be in the process of implementing a momentum policy. You are looking for what your client believes the solution policies to be right now; whether the policies are currently implemented or not is beside the point.

---

based on Pascal and developed for the U.S. Department of Defense. The team defining the language issued a series of increasingly well-thought out requirements for the language. The first one, issued in 1975, was called “strawman”. After strawman came “woodenman”, “tinman”, “ironman”, and finally “steelman”.

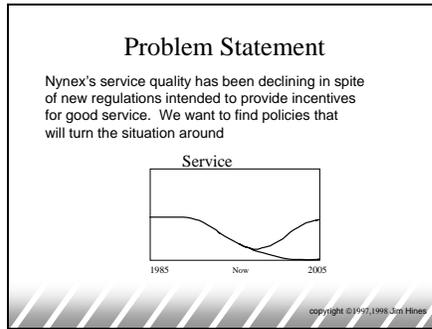
<sup>3</sup> Of course if an explanation does get expressed, put it under insights. The point here is that you don’t want to get bogged down with explanations now.

Recording momentum policies has a number of benefits. First momentum policies clarify for the client what solutions are currently implemented, being implemented or simply “in the air”. Second, you will learn more about the concern if you understand how people are thinking of solving it. Third the momentum policies may help you create dynamic hypotheses, because each momentum policy is implicitly based on a dynamic hypothesis. Fourth, you will be able to map the momentum policies onto your causal loop diagram a couple of weeks from now – doing so may provide an ‘aha’ for your client. Finally, and most importantly, recording momentum policies will provide you with a mile-marker for judging how far you and the client travel during the project. If, at project’s end, the *same* policies remain with no increase in confidence and no additions or subtractions, then the project has *not* been useful in terms of the client’s concern (although it could still be useful in other ways, such as providing greater clarity about what system dynamics can and cannot do) . More likely however, the level of confidence in certain momentum policies will have risen or fallen; some *new* policies will have been added, and some momentum policies will have been jettisoned. Almost certainly, you and your client will be much smarter about the concern by the end of the course, but you and your client may well have a tough time comparing *now* to *then*, unless you record the momentum policies at the beginning.

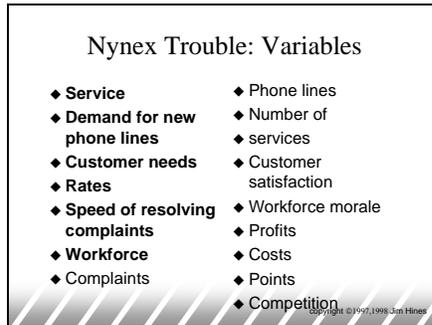
7. Insights. Insights always emerge from the reference modes and even from listing variables. During the kickoff meeting be sure to record all insights as publicly as possible. During an in-person meeting, recording on a flip chart page labeled “insights” or “ideas” will serve nicely. PLEASE prepare a slide or two of any insights for your presentation. Note: Identifying insights is a bit of a skill. When you are starting, go for quantity of insights, not quality. Write down everything and anything that seems even remotely interesting to you or your client and don’t worry if it’s been thought of before. All that’s required is that it’s somewhat new to someone, and that someone could be *you*.
8. Brevity. Make your presentation clean, clear and short.

## Example of a presentation

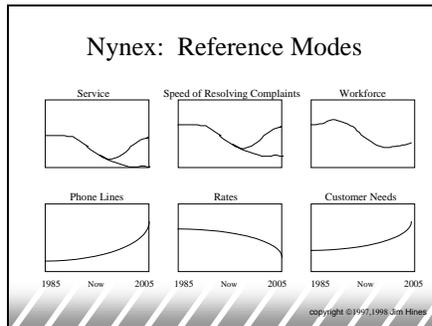
Slide 1



Slide 2



Slide 3



Slide 4

**Nynex: Momentum Policies**

- ◆ Don't lay people off (Nynex)
- ◆ Grow faster than the penalties (Nynex)
- ◆ Reduce rates even more if service stays low (Customers, regulators)

Copyright © 1997, 1998, 1999, Jim Hines