

LESSON PLAN #2

Subject: System Dynamics

Title: Identifying Leverage Points for Systems Change with Loops That Matter

Level: Undergraduate level and above

Duration: 105 minutes

Pre-Requisite Knowledge

Before the lesson, students should already be able to:

1. navigate Stella Architect software;
2. build and interpret simulation results of system dynamics models;
3. analyse the feedback loops of the system, including its interplay and shifts in dominance;
4. understand the concept of leverage points.

Learning Objectives

After the lesson, students should be able to:

1. use Loops That Matter tools to identify high-leverage loops in the system to intervene in;
2. use Loops That Matter tools to anticipate the system wide effects of intervening in the system;
3. understand the concept of leverage points;
4. provide high-leverage policy recommendations for systems change.

Pre-Lesson Activity

Prior to class, students are tasked to analyse the model of the week and fill the worksheet using the techniques they were taught in the previous workshop.

Lesson Activities

Activity	Instructions
Introduction to policy analysis (10 minutes)	<ol style="list-style-type: none">1. Recap previous taught approaches to leverage points and policy analysis.<ol style="list-style-type: none">a. Sensitivity analysis of parameters for behavioural sensitivity.b. Policy scenario analysis with different parameter values with real-world equivalent.2. Introduce high-leverage feedback loops, and not just highly sensitive model parameters.<ol style="list-style-type: none">a. Targeting feedback loops and changing the behaviour of that loop for systems change.b. Manipulating the strength of the loop directly and indirectly.c. When to intervene in the system for most impact?
LTM tool demonstration with a small model (20 minutes)	<ol style="list-style-type: none">1. Demonstrate identification of momentum policy options.<ol style="list-style-type: none">a. Open model from previous workshop for the demonstration. Run the model and click on the Create CLD button for CLD view.b. Recap the feedback structure and narrative of the system modelled.c. Based on the real-world problem, ask students to identify several momentum policy options (policies that have been implemented in the past and/or are obvious candidates for implementation).d. For each policy option, identify the part of the structure (feedback loop) that it will affect.

	<ol style="list-style-type: none"> 2. Demonstrate identification of high-leverage loops for intervention. <ol style="list-style-type: none"> a. Explain to students that before we experiment with policy options, we want to understand the main feedback loop(s) that are responsible for driving periods of high system change. This will give us insights into not just how to intervene, but also where and when. b. In the LTM panel, select the Systems Change graph (NOT contribution). c. Identify the first peak in the Systems Change graph and set the Time Range slider to encompass the period around the peak. d. Return to the Stacked Area graph to identify the feedback loops responsible for the behaviour during this period of system change. e. Use the previously documented progression of loop dominance to understand the shifts in dominance in this period (i.e., the strength of the loops and how they change). Based on the structural understanding, identify the high-leverage loop(s) ripe for intervention. 3. Demonstrate identification of high-leverage intervention points. <ol style="list-style-type: none"> a. Return to the SFD view of the model structure and highlight the high-leverage loop(s) responsible for behaviour during the first peak of system change. b. Revisit the identified policy options for directly impacting that loop. Consider how those policies might be implemented in the model – is it a matter of changing parameter, cutting a link in the loop, or creating new structure? c. Study the variables in the loop and ask students to consider if there are any other policy options that could directly impact the loop. d. Revisit the feedback loop structure of the system (CLD view if necessary) and identify how the high-leverage loop may be indirectly impacted by other loops in the system (e.g., weakening that loop by strengthening others that counteract it). e. Consider how the identified policy options of those auxiliary loops, as well as any other new policies, might be implemented in the model (parameters, cutting link, or new structure). f. For each of the policy options considered, implement it in the model by modifying parameter values or building additional structures. Use a comparative graph to observe the behaviour of KPIs. If the behaviour mode changes drastically and disrupts the original peaks in the system change graph, then a high point of leverage is found. 4. Demonstrate policy analysis. <ol style="list-style-type: none"> a. Describe the effects of identified high-leverage policies on the feedback narrative of the system. How did the system change, in turn, cause changes in the observed behaviour? b. Consider potential policy resistance (unintended consequences) and feasibility of the identified policies. c. Rank the policy options in terms of impact and feasibility. d. Consider a combination of feasible policies that could be implemented for systems change. e. Explain the policy insights for decision-makers in terms of when, where, and how to effectively intervene in the system. f. Further consider the momentum policies that were determined to be of low leverage in the system and explain the policy insights for decision-makers.
Group activity to analyse a larger model with LTM (45 minutes)	<ol style="list-style-type: none"> 1. Divide the class into small groups (2-4 students). 2. Instruct each group to open the model that they were tasked to analyse prior to the workshop and conduct a policy analysis using LTM.

	<ol style="list-style-type: none"> 3. Using a text box on the Stella file, students will document: <ol style="list-style-type: none"> a. Momentum policy options with a brief description of each (around 3 sentences each). b. High-leverage loops and how their strength may be changed directly and/or indirectly with potential policies (parameter, cutting link, or new structure). c. High-leverage policies list with description and their effect on the system. d. Policy insights for intervening in the system. 4. Walk around the classroom to provide assistance and ensure that students are on the right track.
Presentations (15 minutes)	<ol style="list-style-type: none"> 1. Bring the groups back together after the group activity. 2. Get volunteers to share their findings, with emphasis on their most important policy recommendations.
Conclusion (15 minutes)	<ol style="list-style-type: none"> 1. Summarise the key takeaways from the lesson: <ol style="list-style-type: none"> a. The importance of understanding not just how to intervene in the system, but also when to intervene. b. The importance of understanding the system-wide effect of policies given the feedback narrative of the system. 2. Have students reflect on their experience with and usefulness of LTM for policy analysis.

Instructor Reflections

What went right and what went wrong? Why do you think it turned out this way? What have you learnt from this? How would you do things differently in the future?

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