



System Dynamics and Complex Systems

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This is a partial preview. For full access to these teaching materials, please register and download.

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| Rationale | These lessons introduce some systems thinking/theory concepts that can be useful for analyzing future developments. Systems thinking is a way of looking at the world - that looks for patterns, regularities, and commonalities - that may help in understanding the complexities of how things work and dealing with inevitable uncertainties that we as (futures) researchers will encounter. It is very much in line with the complex and rich ways in which futurists look at the world - e.g. thinking in multiple causes and different layers, problematizing "simple" solutions. |
| Purpose, learning objectives, outcomes | <p>Introduce more nuance in division of expected, plausible, preferable future; prediction is not necessarily bad</p> <p>Introduce systems and system characteristics; Interdependence/control and layers/hierarchy</p> <p>Experience emergence and unpredictability in attacker-defender game</p> <p>Introduce models/modeling (system dynamics versus agent-based models) and a very nice tool to play with</p> <p>Demonstrate understanding by writing short essay (500 words) on the concepts introduced in relation to a system of student's own choice</p> |
| Foresight/Futures Studies Skills, Methods, Techniques | Modelling (and within this context scenarios), cause-effect diagrams |
| Type | Mainly group (classroom and game) – individual questions/essay task |
| Time | 2x1.5 hours + homework assignment |

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| Background/Preparation | http://arxiv.org/abs/0809.1698v1 Boulding, K. E. General systems theory: the skeleton of science <i>Management Science</i> , 1956 , 2, 197-208 Simon, H. A. The architecture of complexity <i>Proceedings of the American Philosophical Society</i> , 1962 , 106, 467-482 Ackoff, R. L. The systems revolution <i>Long range planning</i> , 1974 , 7, 2-20 Downloading and installing Netlogo (either students on their own computers or in computer lab) Multimedia/videos embedded in powerpoint |
| Learning Environment | Classroom, later: large open space (for attacker-defender game), computerlab / bring-your-own-laptop |
| Instructions | See notes section of powerpoint slide for contents. Start in classroom. LESSON 1 SLIDE 1 introduction and rationale SLIDE 2 positioning systems thinking and modeling SLIDE 3 discussion with class about what a system is/not SLIDE 4 some definitions of systems SLIDE 5 list of characteristics of systems SLIDE 6 youtube of narrow scope in problem analysis SLIDE 7 explanation of example in terms of cause-effect models and the characteristics of slide 5 SLIDE 8 cont'd + interdependence/communication concept SLIDE 9 layers/hierarchy concept SLIDE 10 explained by Herbert Simon SLIDE 11 mechanistic versus holistic and somewhere in the middle SLIDE 12 some systems are highly predictable > MOVE TO LARGE OPEN SPACE SLIDES 13/14 time to get out: attacked defender game > BACK TO CLASSROOM (OR WRAP-UP WITHOUT SLIDES) SLIDES 15/16 lessons learnt |