

Overview of system dynamics modelling

Nici Zimmermann

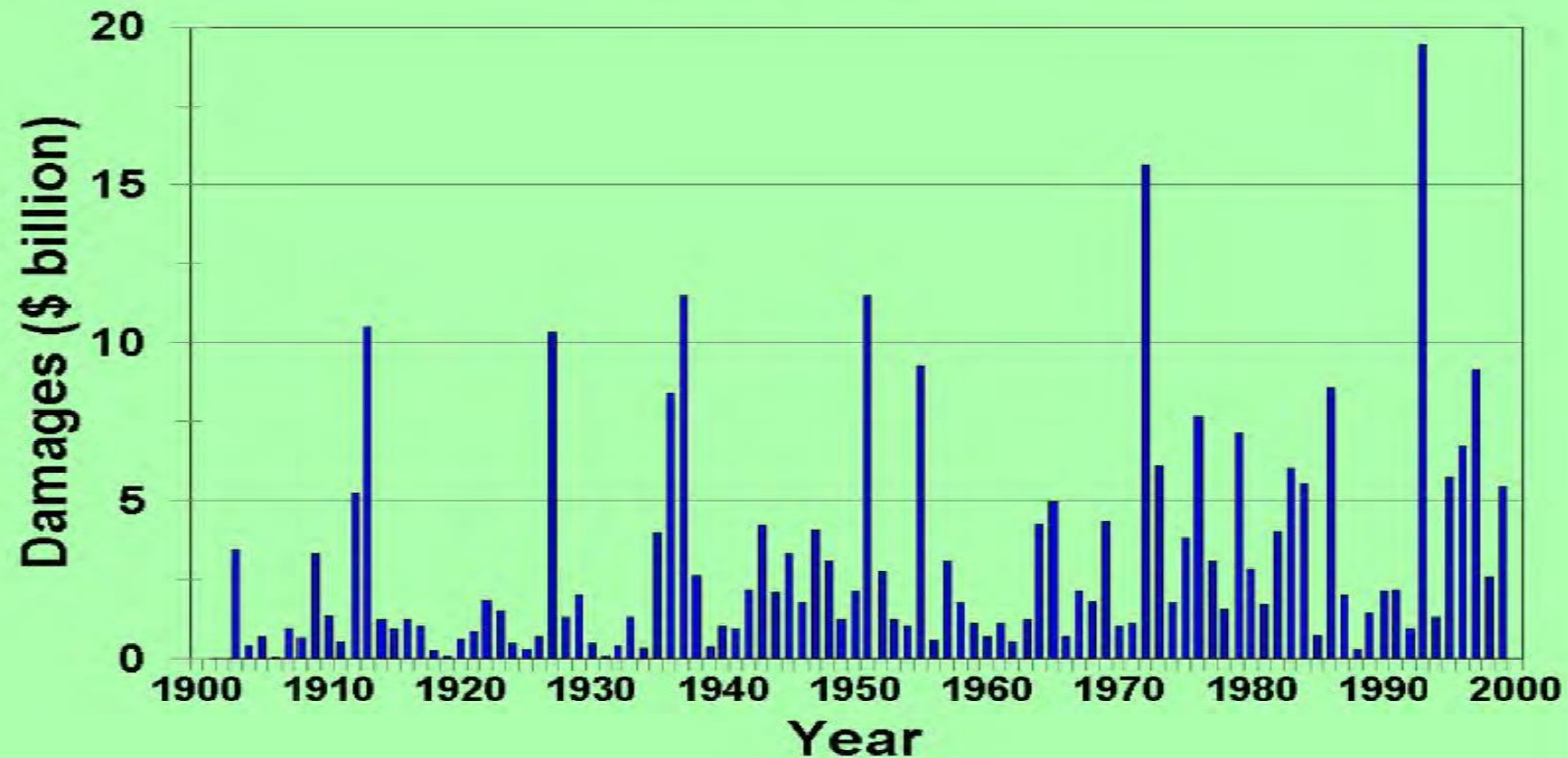
Monday, 11 January 2016



Managing the Mississippi



Flood Damages
(constant dollars)



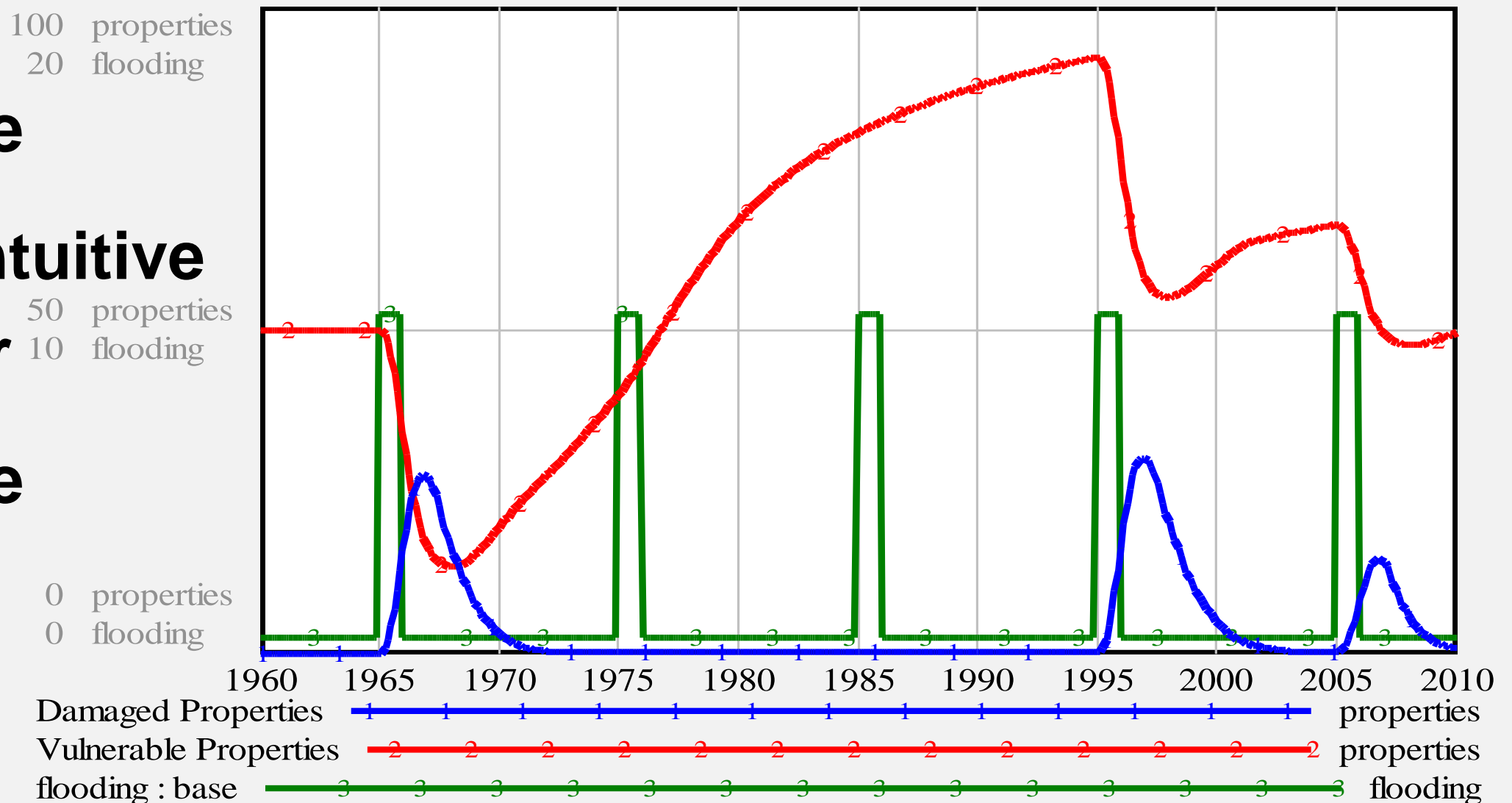
Flood years
 1718
 1724
 1725
 1735
 1740
 ...
 2011

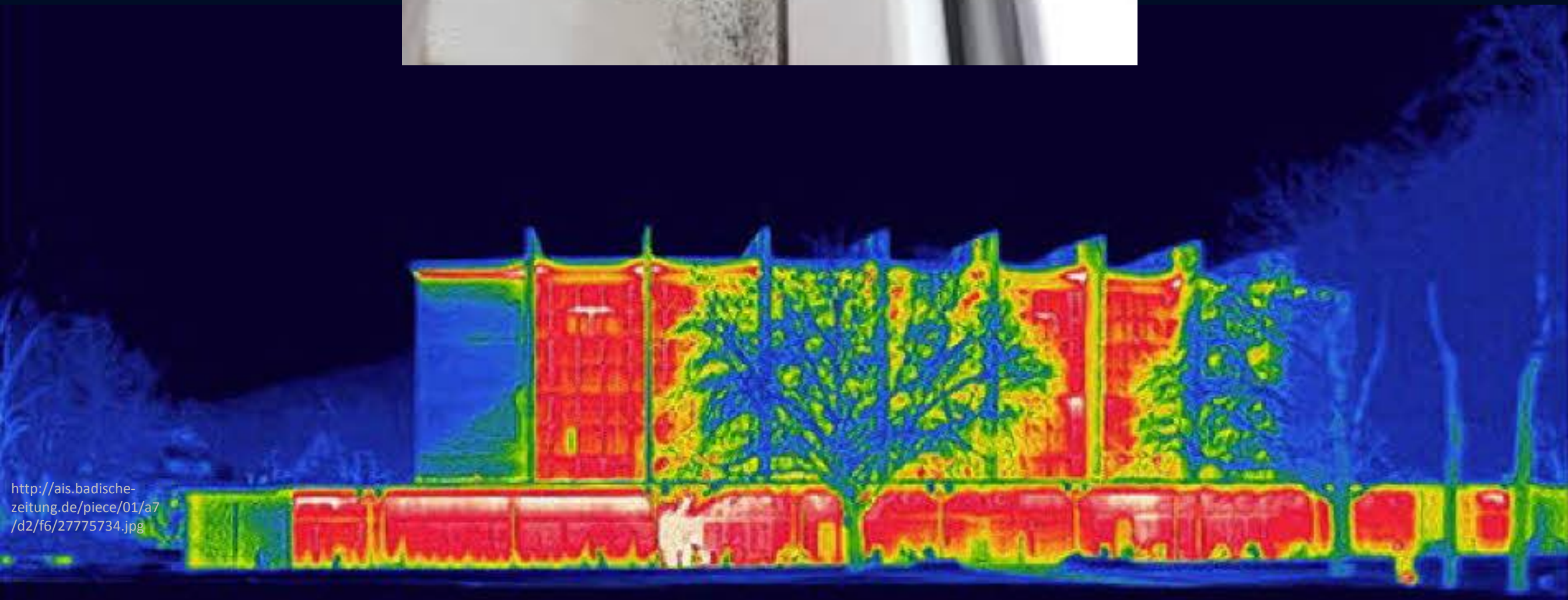
A system dynamics perspective of the issue

Why system dynamics?

- **Policy resistance**
- **Counterintuitive behaviour**
- **Man-made causes**

Flooding and Damage



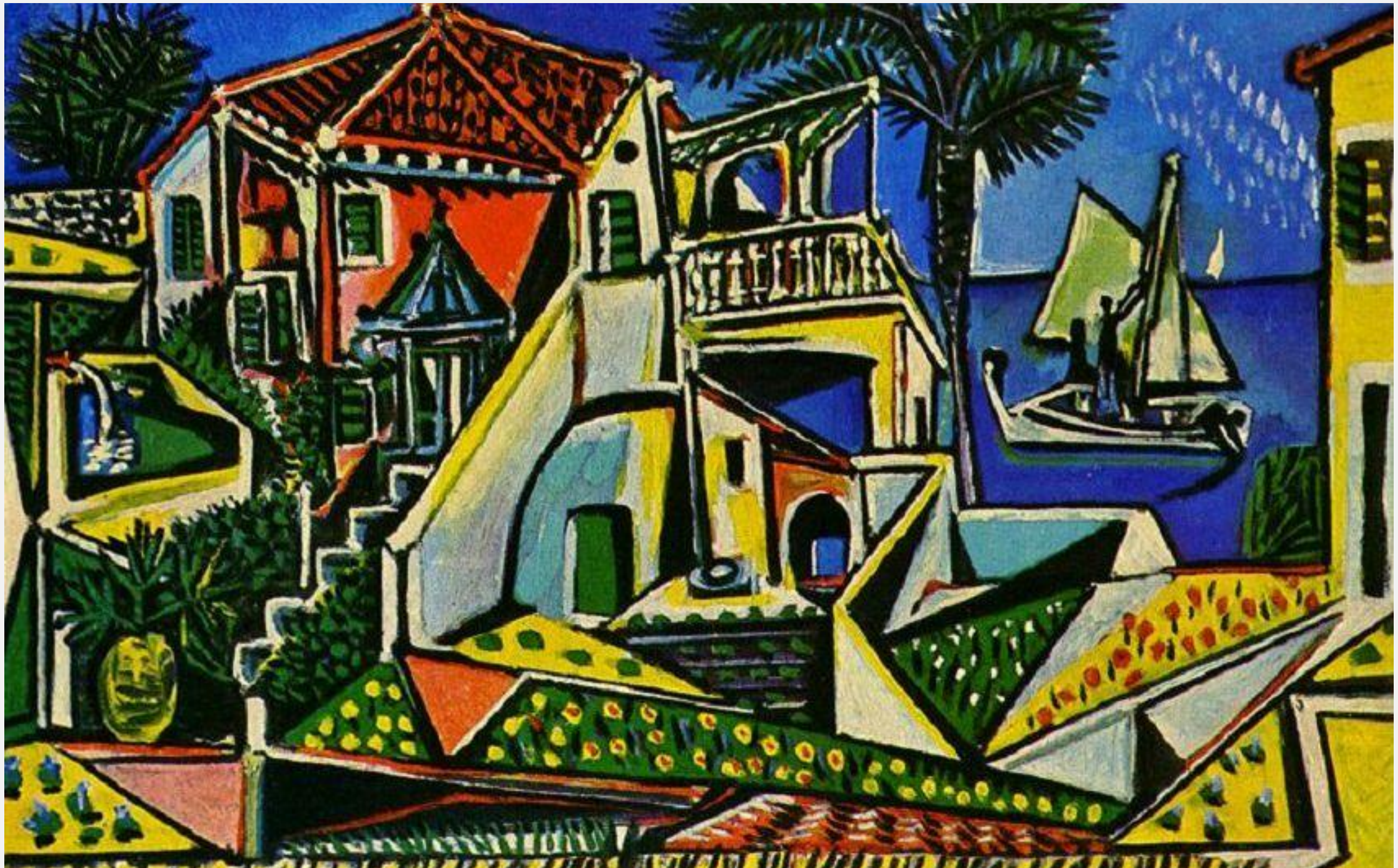


<http://ais.badische-zeitung.de/piece/01/a7/d2/f6/27775734.jpg>

Our starting point

- What will be the overall impact of policies aimed at energy efficiency and indoor environmental quality of dwellings?
- We know from history that single focus policies lead to 'unintended' effects

Participatory approach of collaborative learning



Pablo Picasso
<http://www.pablocicasso.org/picasso-paintings.jsp>

Theory of system dynamics



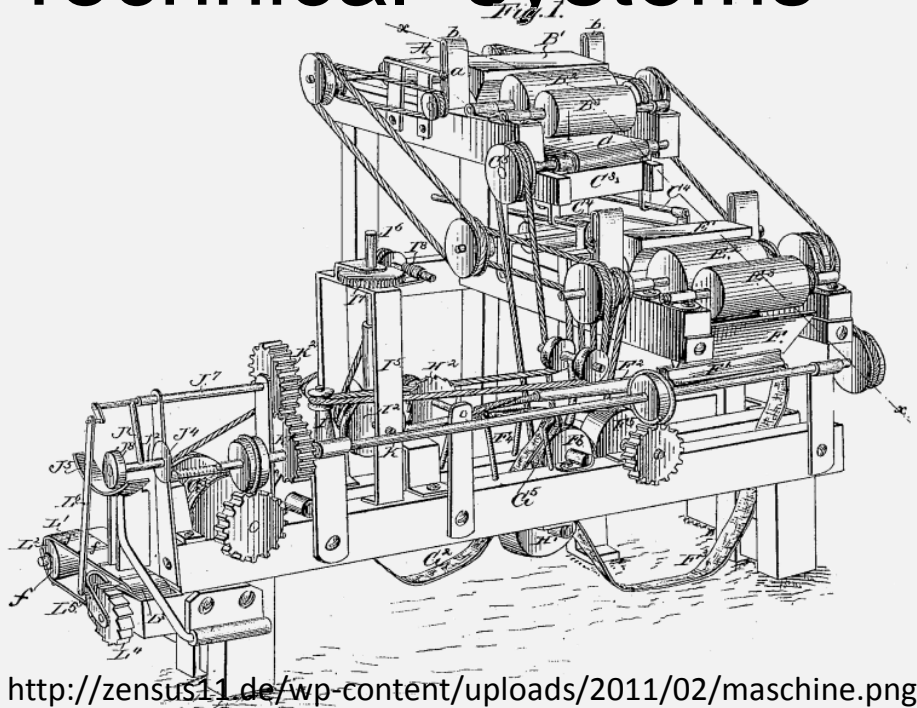
System dynamics elevator pitch

From George Richardson:

- *‘System dynamics is the use of computer **simulation** for **policy analysis in complex systems**. It's big contribution is helping people to build **progressively richer understandings of some dynamic problem, and anticipate weaknesses in policy initiatives that would develop over time. ...***
- *It gets a lot of its power from a **'feedback' perspective ... rather than simple one-way causal chains.***
- *Humans are good at thinking up all that interconnected complexity and weak at inferring its implications.’*

Systems

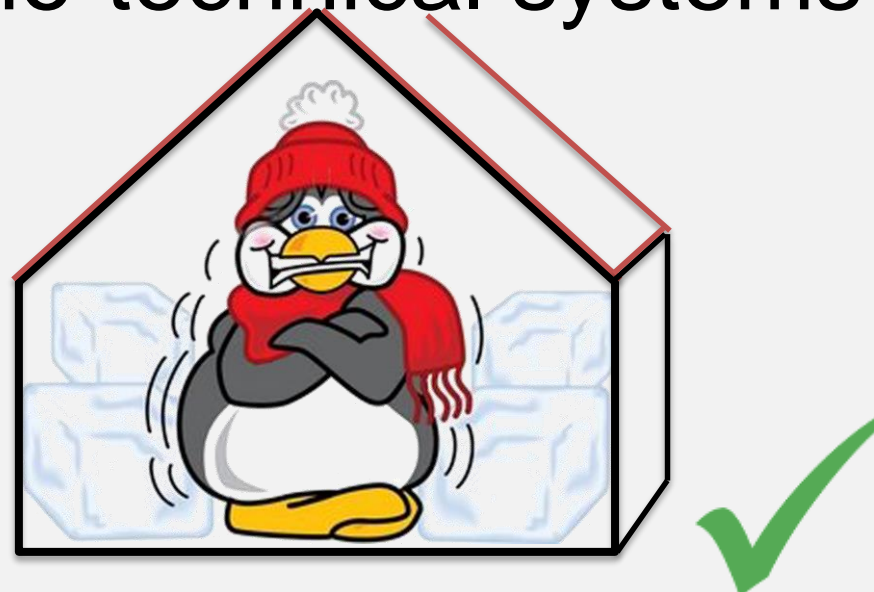
Technical systems



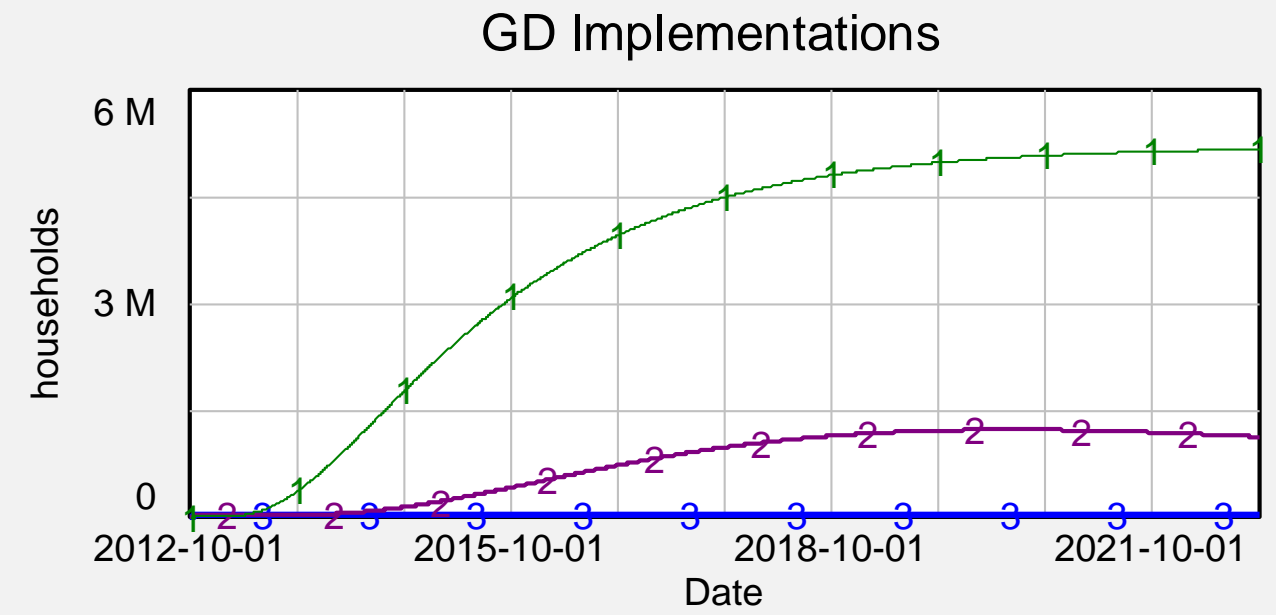
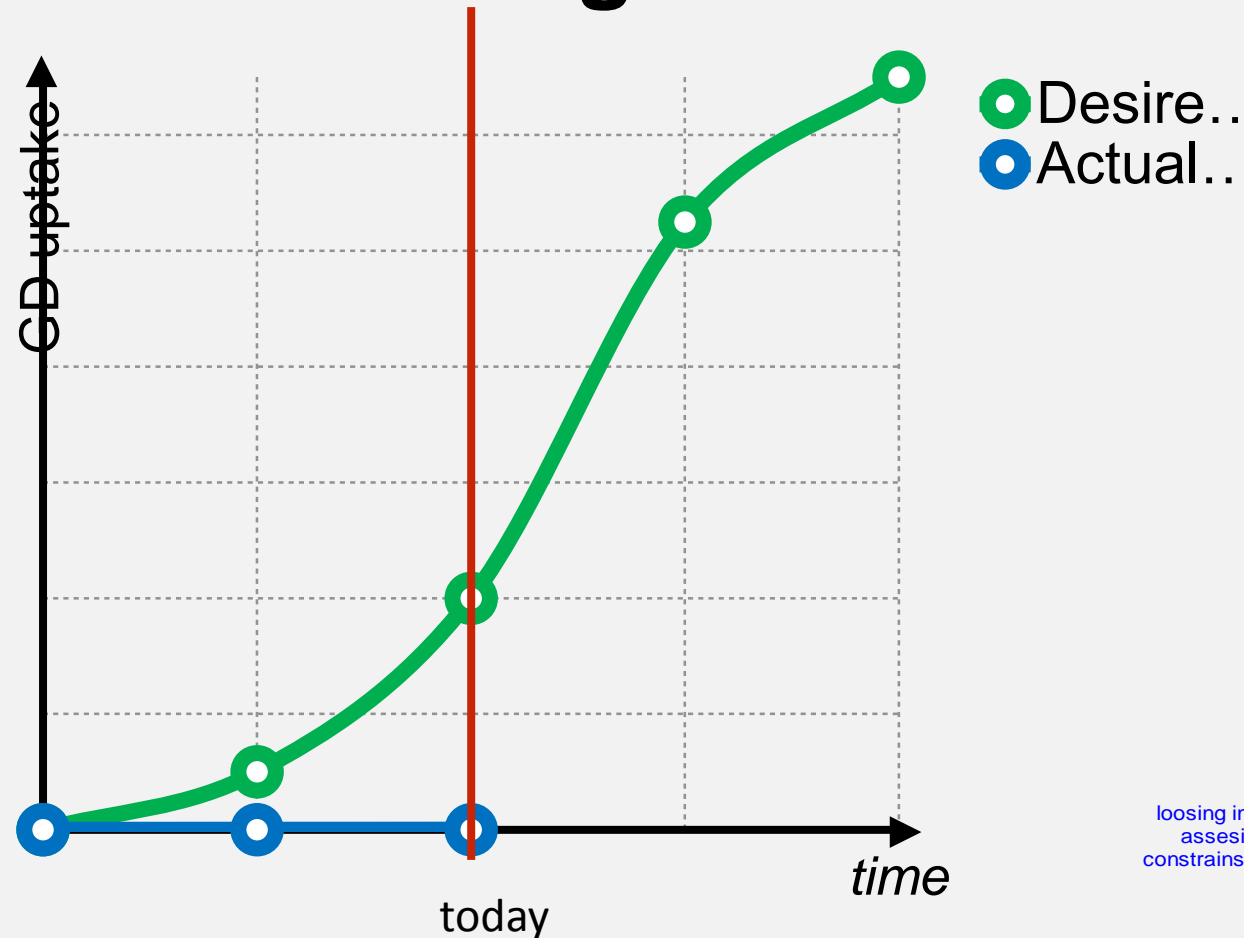
Social systems



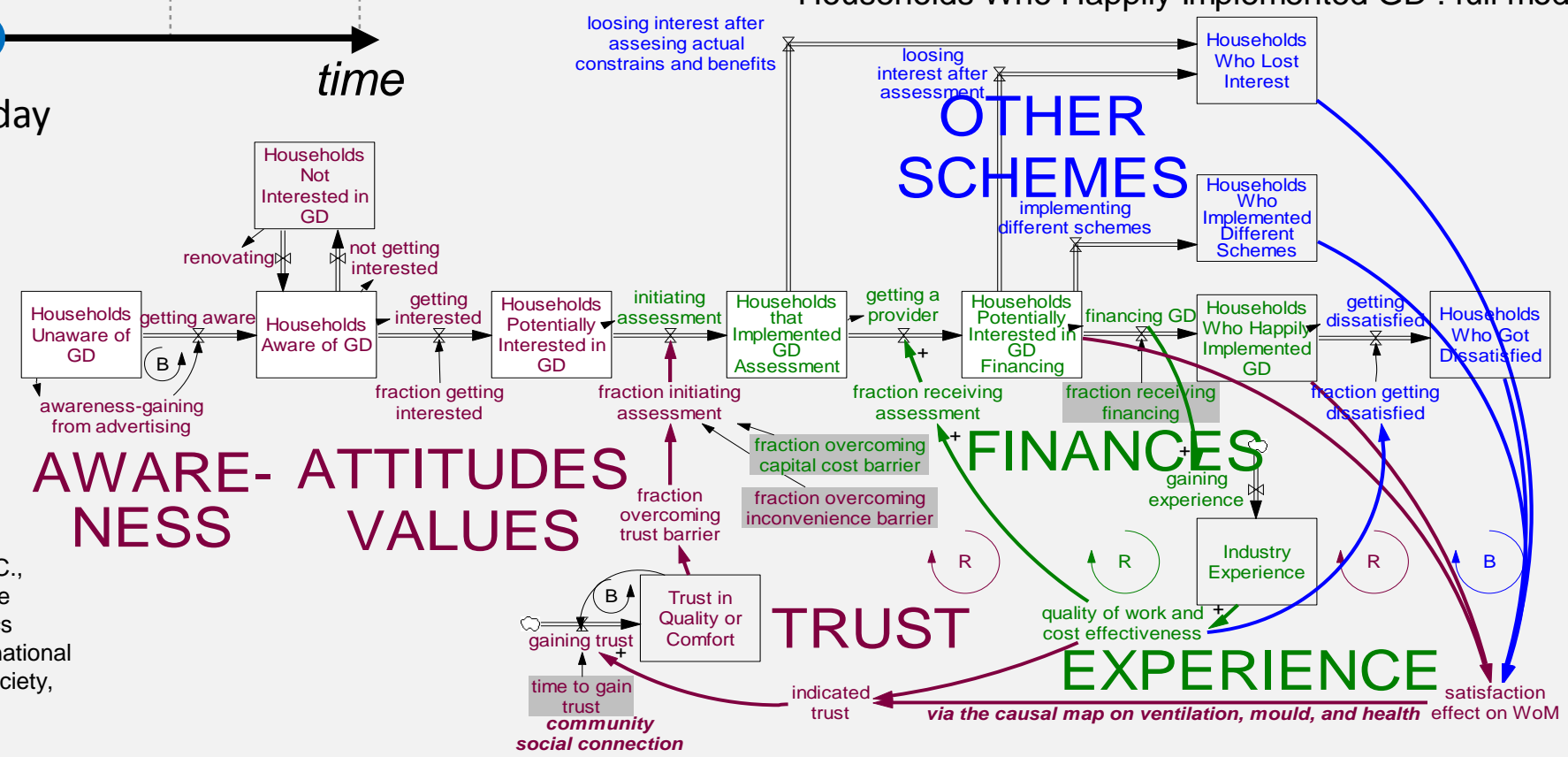
Socio-technical systems



Structure generates behaviour: Green Deal



Households Who Happily Implemented GD : financial-rational — 1 — 1
 Households Who Happily Implemented GD : user-driven — 2 — 2
 Households Who Happily Implemented GD : full model — 3 — 3



Zimmermann, N., Black, L., Shrubsole, C., Davies, M., 2015. Meaning-making in the process of participatory system dynamics research, Proceedings of the 33rd International Conference of the System Dynamics Society, Cambridge, MA, pp. 1–12.



Appendix

