How to handle emergent behaviour?

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Conventional observation-based analysis

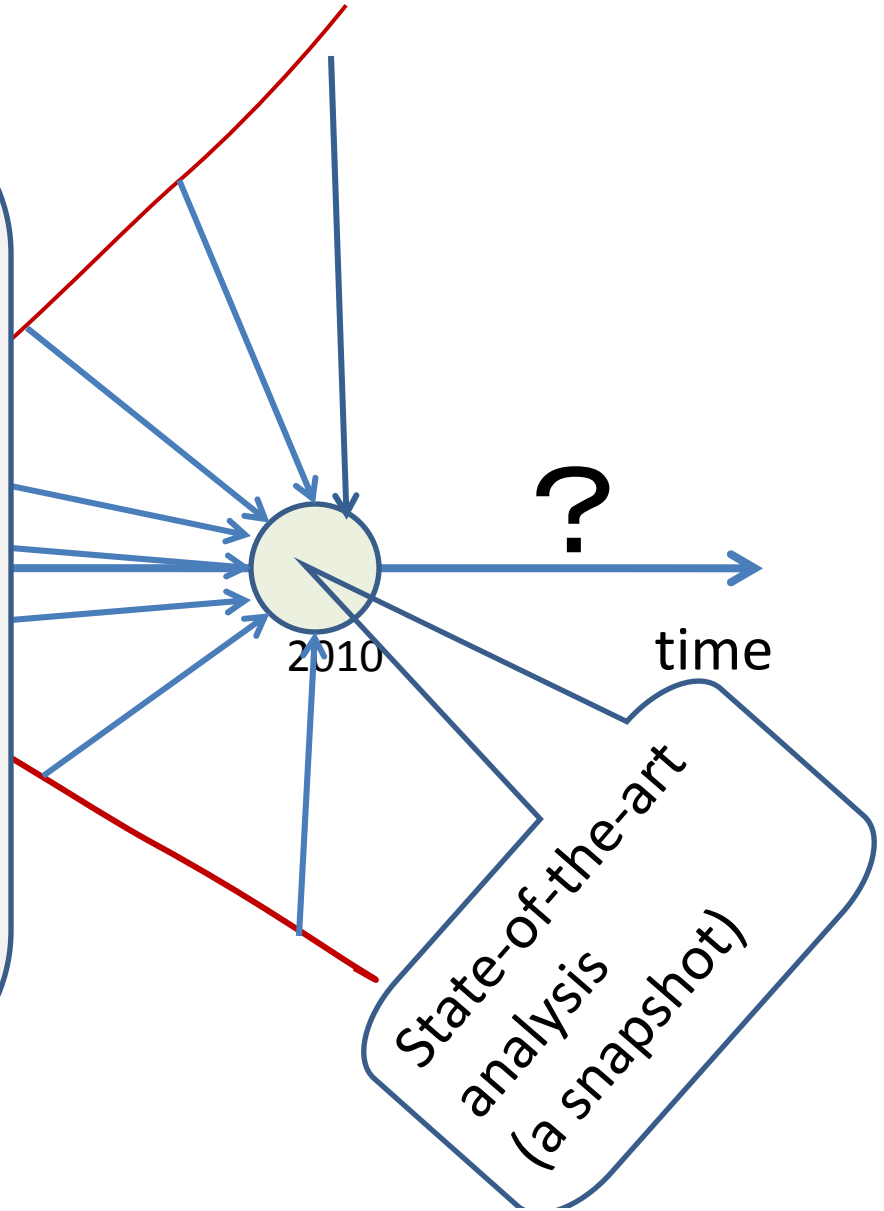
Questionable properties:

1.Quality of used data, e.g.
-coverage, validity, consistency

2.Validity of the applied data fusion process

3.Feasibility of reasoning process

4.etc.



Learning is not compulsory.

Neither is survival.

W. Edwards Deming

Self-organizing multi-agent system

- Instead of conventional snapshot analysis we construct a “mirror-universe” that serves as a synthetic environment for analysis and simulation:
  - every single object of interest is modelled as an agent (or multi-agent)
  - those models are tuned, based on available time series of data,
  - and are connected to smart middleware that organises interactions of agents
- The “mirror-universe” is fine-tuned and validated on the existing time series
- The potential future behaviour of the “mirror-universe” can be assessed by adjusting parameters and constraints appropriately

Concluding remarks

- The “mirror-universe” concept is a natural extension of the project “e-Estonia”, with its existing electronic information system, and plans to enhance it.
- A practical difficulty is to develop a (semi-)automatic data acquisition system, where the data is equipped with tags that enable validity checks and pre-fusion consistency checks.
- Building a “mirror-universe” invokes several challenging theoretical problems in complexity science and computer science – super-Turing computation, control of emergent behaviour, etc.
- A small group of enthusiasts in Estonia is dealing with enabling technologies for creating the “mirror-universe”