Cyberspace

Cyberbullying

Cybersecurity

Cybersex

Cybernetics

Kubernetes

Cyberwarfare

Cyberpunk

Cyborgs

Cybernetics

Science of communication and control of complex systems with changing environments.

Origin: first used in the context of "the study of self-governance" by Plato

Etymology: steersman, governor

Goals: Understand self-regulation. Encode complexity in self-regulating systems.

Areas of application: engineering, biology, psychology, social systems

Predecessor of: Reinforcement Learning, Machine Learning, Computer Science

History

- 1940s Transdisciplinary research of self-regulation, feedback-loops. E.g. Turing and von Neumann were involved.
- 1947/1948 Norbert Wiener officially starts Cybernetics
- 1950 Soviet Union: Cybernetics is "pseudoscience"
- 1953 Stalin's death
- 1956 AI split out of Cybernetics
- 1958 Soviet Union: Cybernetics is propagated and incorporates computer science
- 1959 Stafford Beer starts publications on organizational Cybernetics
- 1962 US is scared of "Soviet Cybernetics" and avoids the word
- 1969 ARPANET
- 1970-1973 Salvador Allende President of Chile, Project Cybersyn
- 1980s Cybernetics lost its cultural relevance, being replaced by 'informatics'

Chile 1970/71

Salvador Allende first democratically elected socialist leader
Marxist but not in favor of Soviet Union style top-down command and control

Revolutionary dynamics
- nationalized companies
- workers councils took over

Economic problems
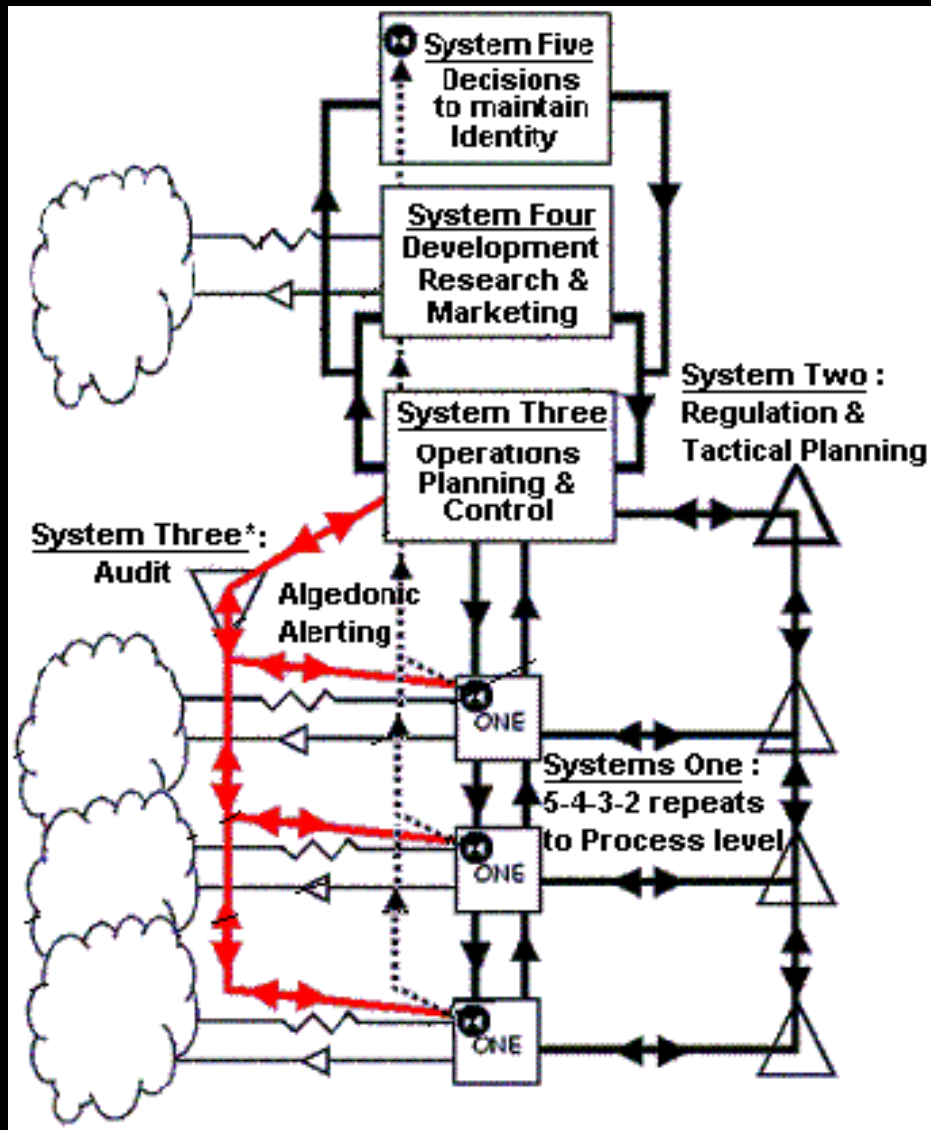Government staff contacts Stafford Beer….

Stafford Beer

Organizational Cybernetics

In complex systems, central control is not viable.
→ Decentralize as much as possible.

Viable System Model (VSM):
- S1: autonomous operational units, specific task, respond to changes in their environment. **Is in itself a VSM.**
- S2: communication between S1s
- S3: constraints for S1-2, interface to S4-5
- S4: strategy based on information from environment and S1
- S5: long-term strategic thinking

VSM is a diagnostic tool

Project Cybersyn

"Cybernetic Synthesis" – a distributed decision support system

1) Cybernet
2) Cyberstride
3) CHECO
4) Opsroom

Cybernet

500 Telex machines
1 IBM 360/50
"almost realtime"

CyberStride

Software suite containing multiple programs.

- CyberFilter: statistical tools for time series analysis
  - Check "real time" data (10 KPIs from each company) for deviations
- Generate algedonics: early alarm signals
- Bayesian Statistics for short time forecasting

CHECO

CHilean ECOnomic simulator

Simulation of the entire Chilean economy.

Long term forecasting is not possible → Experiment with multiple scenarios using simulations.

DYANAMO compiler (Dynamo language was made famous by its use for the Limits to Growth model)

Not really put into practice.

OpsRoom

Chile 1972/73

October 1972 CIA backed Trucker strike
→ Cybersyn breaks the strike

9/11 1973 CIA backed military coup
→ Allende is dead, Cybersyn destroyed

Summary

A group of enthusiastic people can build great projects – no matter the circumstances.

Use the VSM as a debugger for entities that need to handle complexity.