

**“The Disregarded Tools of Moderns Man”,
“A Liberty Machine In Prototype”,
“The Free man in a Cybernetic World”, in
Designing Freedom**

Stafford Beer

Massey Lectures, 1973

Reviewed by Anna Mytcul

Cybernetics

noun, plural in form but singular in construction

cy·ber·net·ics | \ ,sī-bər-'ne-tiks \

Definition of cybernetics

the science of communication and control theory that is concerned especially with the comparative study of automatic control systems (such as the nervous system and brain and mechanical-electrical communication systems) [1]

In subsequent years the computer and the areas of mathematics related to it (e.g., mathematical logic) had a great influence on the development of cybernetics—for the simple reason that computers can be used **not only for automatic calculation but also for all conversions of information**, including the various types of information processing used in control systems. This enhanced ability of computers has made possible **two different views of cybernetics**.

-Western countries, defines cybernetics as the **science of the control of complex systems of various types—technical, biological, or social**. In many Western countries particular emphasis is given to aspects of cybernetics used in the generation of control systems in technology and in living organisms.

-Russia and the other Soviet republics

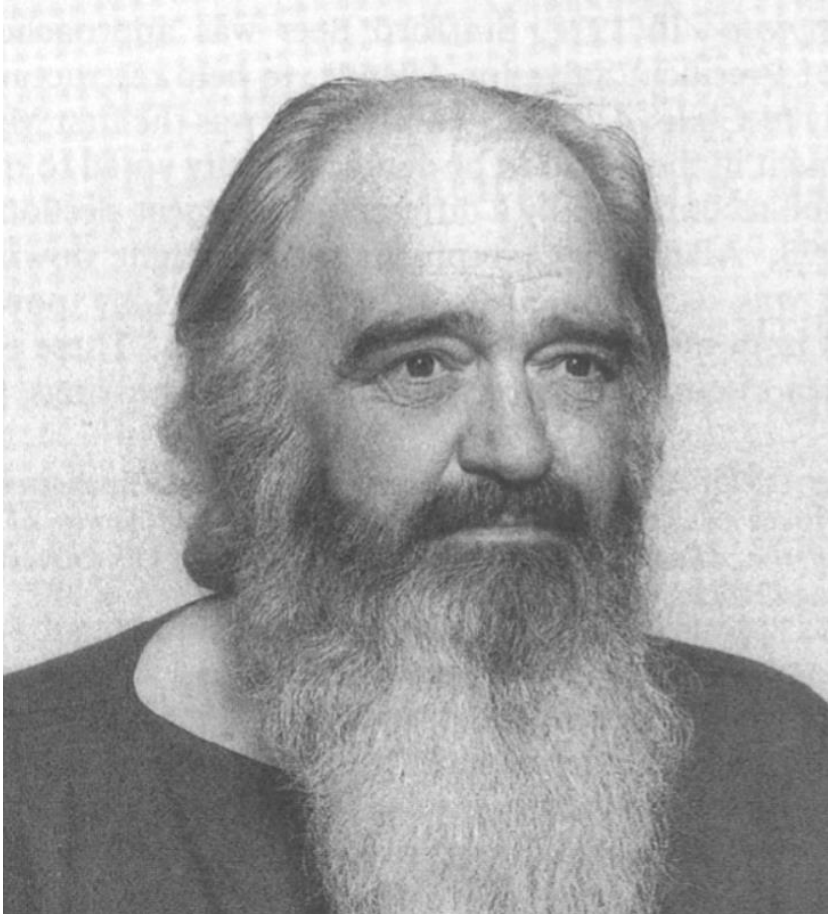
Cybernetics includes **not only the science of control but all forms of information processing as well**. In this way computer science, considered a separate discipline in the West, is included as one of the component parts of cybernetics. [2]

1. "Cybernetics." Merriam-Webster, Merriam-Webster, <https://www.merriam-webster.com/dictionary/cybernetics>.

2. Britannica, The Editors of Encyclopaedia. "Cybernetics." *Encyclopædia Britannica*, Encyclopædia Britannica, Inc., <https://www.britannica.com/science/cybernetics>.

Anthony Stafford Beer

(25 September 1926 – 23 August 2002)



- Consultant and professor at the Manchester Business School. Fields of operational research and management cybernetics.
- 1956 United Steel, headed the Department of Operations Research and Cybernetics.
- In 1961 started an operational research consultancy in partnership with Roger Eddison called SIGMA (Science in General Management)
- In mid-1971, Beer was approached by Fernando Flores, then a high-ranking member of the Chilean Production Development Corporation (CORFO), applied his cybernetic theories to the **management of the state-run sector of the Chilean economy.**
- Visiting professor at almost 30 universities. He was president of the World Organization of Systems and Cybernetics.

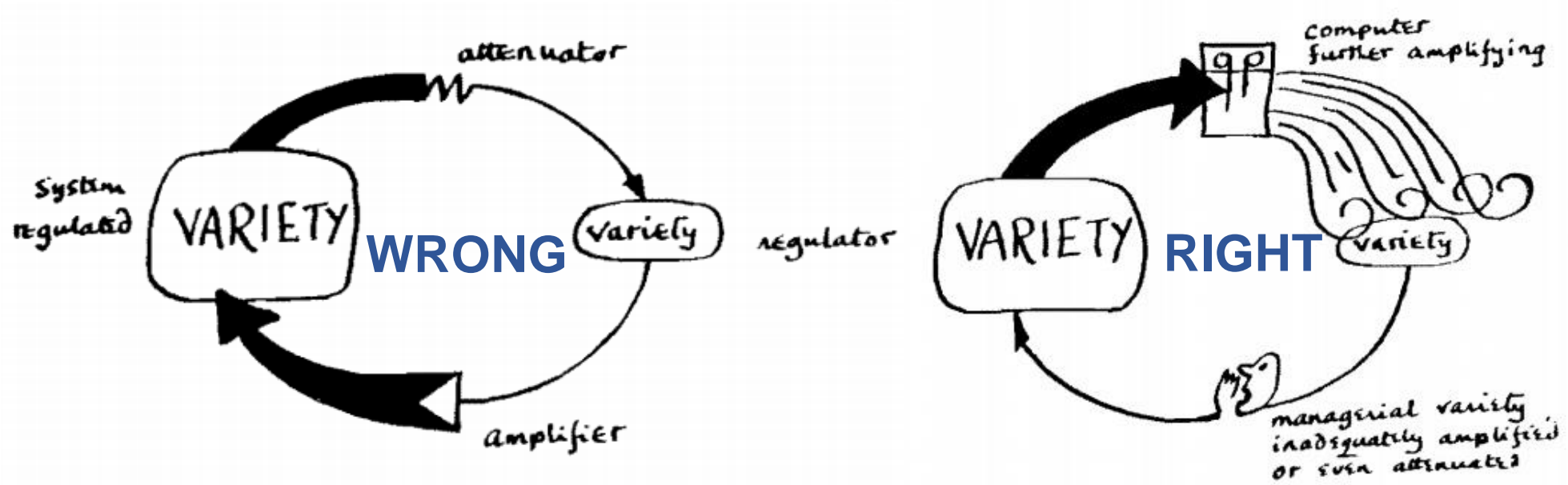
The disregarded tools of modern man

“... society should **use its tools to redesign its institutions**, and to operate those institutions quite differently. “ p. 20

“A social institution is not an entity, but a **dynamic system**...

Variety is the number of possible states of the system, and that number grows daily, for every institution, because of an ever-increasing range of possibilities afforded by education, by technology, by communications, by prosperity, and by the way these possibilities interact to generate yet more variety. “ p. 21

The Law of Requisite Variety (Ashby's Law): only variety can absorb variety.



! Assuming that the regulator has the smaller variety, there are only two ways of meeting the demand of Ashby's Law. One **is to attenuate variety in the system**, the other is to **amplify variety in the regulator**. These strategies can be mixed.

Three basic tools that are available for variety amplification:

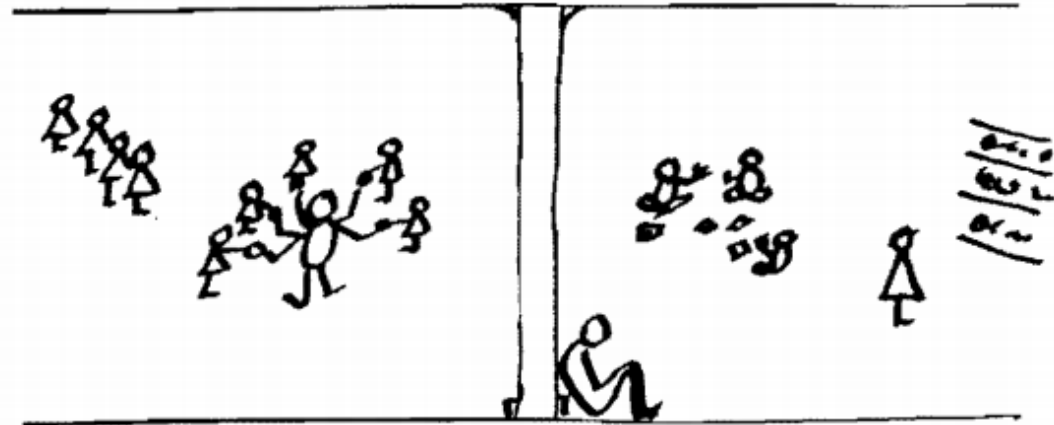
- computer
- teleprocessing
- techniques of the science of effective organization (cybernetics)

! ■ The trouble is that we are using them on the wrong side of the variety equation.

! ■ Computers do not make mistakes. People make mistakes.

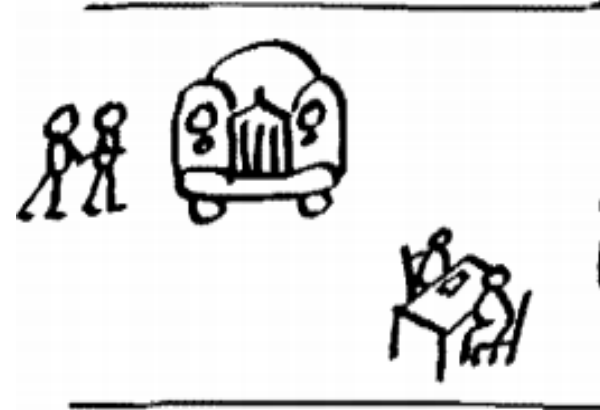
! ■ "...attach a salesman to each customer on arrival." → we cannot afford it → attenuation of variety → **generalizing a case**

Ashby's Law Operating in a Departmental Store

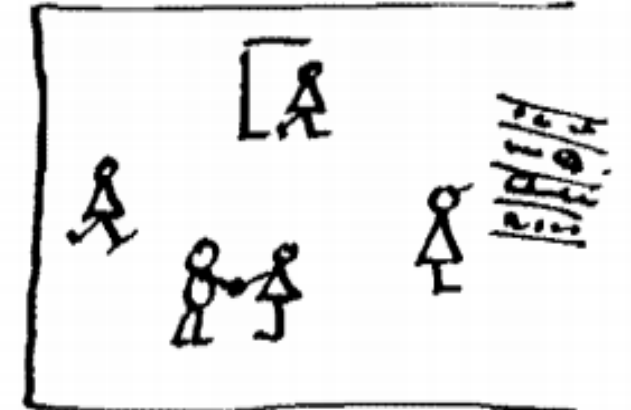


Unstable: variety of store less than that of custom = inadequate service

Unstable: variety of store more than that of custom = unprofitability



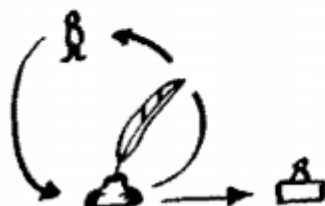
Stable: variety matched on a one-to-one basis



Stable: variety matched on a many-to-one times occupancy basis

How the Abused Computer Replaced the Quill Pen

Year 1873



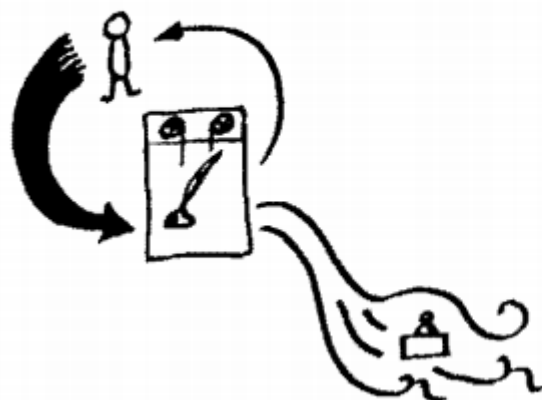
The public supplies minimal information to the institution and receives minimal information in return. The management receives minimal information too.

Year 1953



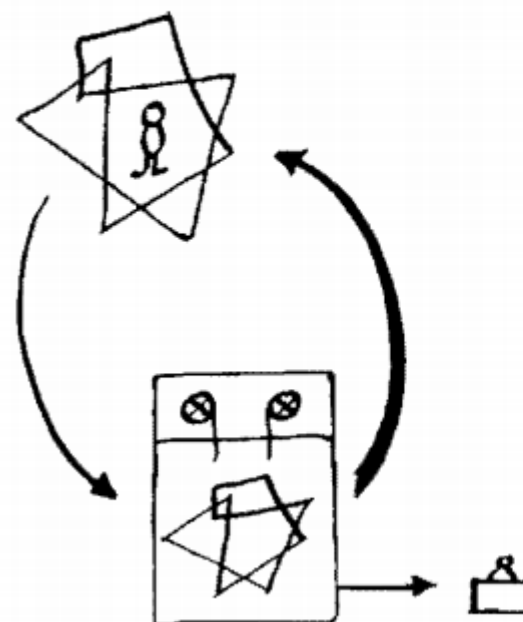
A larger public is asked for much more information, and receives much more in return. Quill pen administration continues, although the systems are mechanized. The management is threatened with an excess of information.

Year 1973

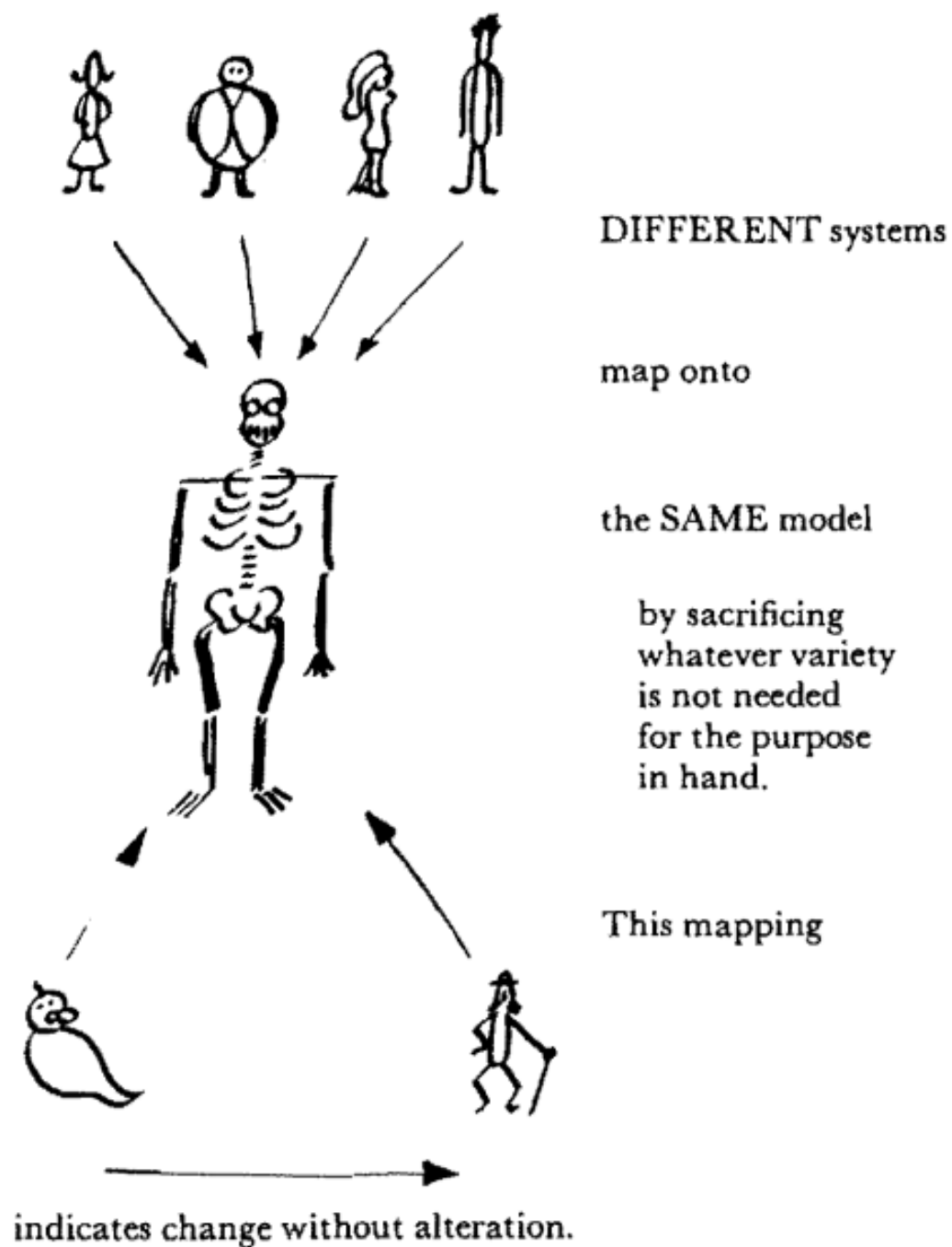


Inordinate demands for information are made on the public, which receives much less *useful* information than before. Quill pen administration continues, although the systems are computerized. The management is inundated with indigestible data.

How to Use the Computer According to Cybernetic Principles



The public is conceived as a system, a model of which is contained in the computer. The public supplies minimal information, which the computer then synthesizes in the model. This amplifies variety as required to help the public, and attenuates variety to help the manager—thereby meeting the requirement of the law of requisite variety for each of them.

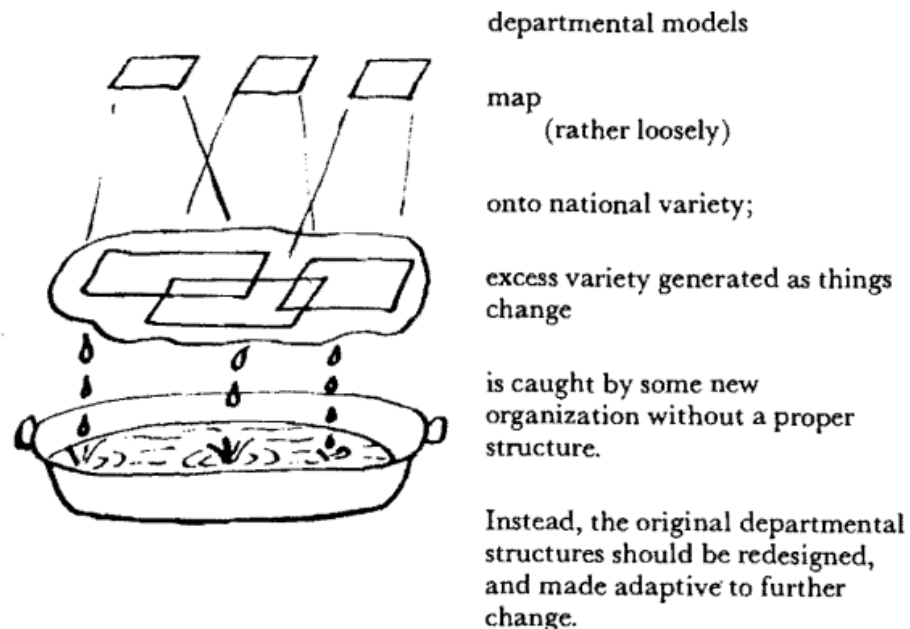


A liberty machine in prototype.

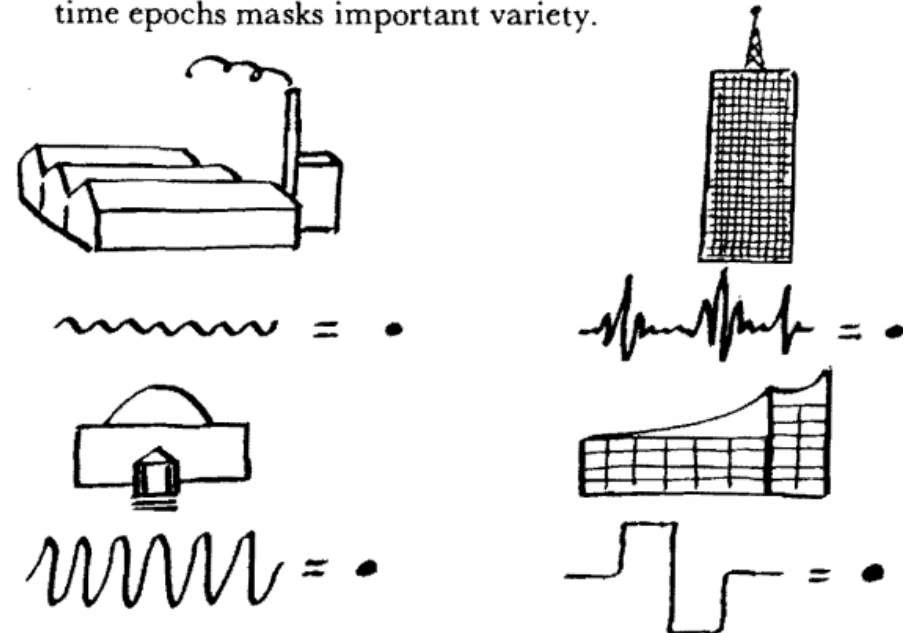
In government, variety is handled by attenuation in four main ways:

- First, **models are made of the country by every government department.**
- The second variety attenuator is the **model that each department has of the component enterprises for which it is accountable.** Consider the economy.

1. Models of Nation by Departments of Government:



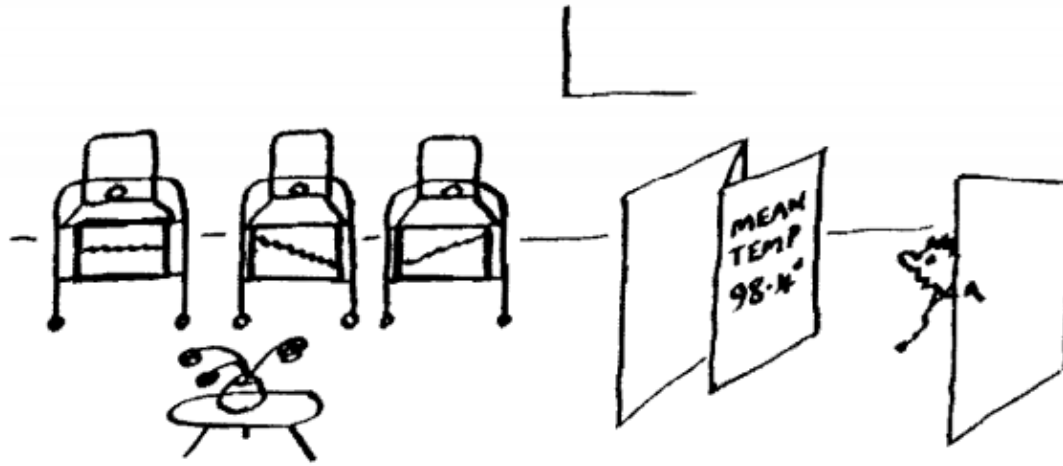
2. Models of Enterprises Within the Economy: the arbitrary choice of significant characteristics and of time epochs masks important variety.



- The third variety attenuator – **aggregation**.
- The fourth variety attenuator of government information is by far the most dangerous. It is the **delay** imposed by the methods of collection and variety attenuation.

! we need better models of the components of the economy, and they must be **dynamic** models

3. Aggregation of Statistical Information.



4. Time Lags in Registering Information:

perception (dotted line) of the movement of economic indicators is not only “too late”—it means that at the time of taking a decision the most relevant variety generated by the already inadequate model is suppressed. We may be led to do precisely the wrong thing.

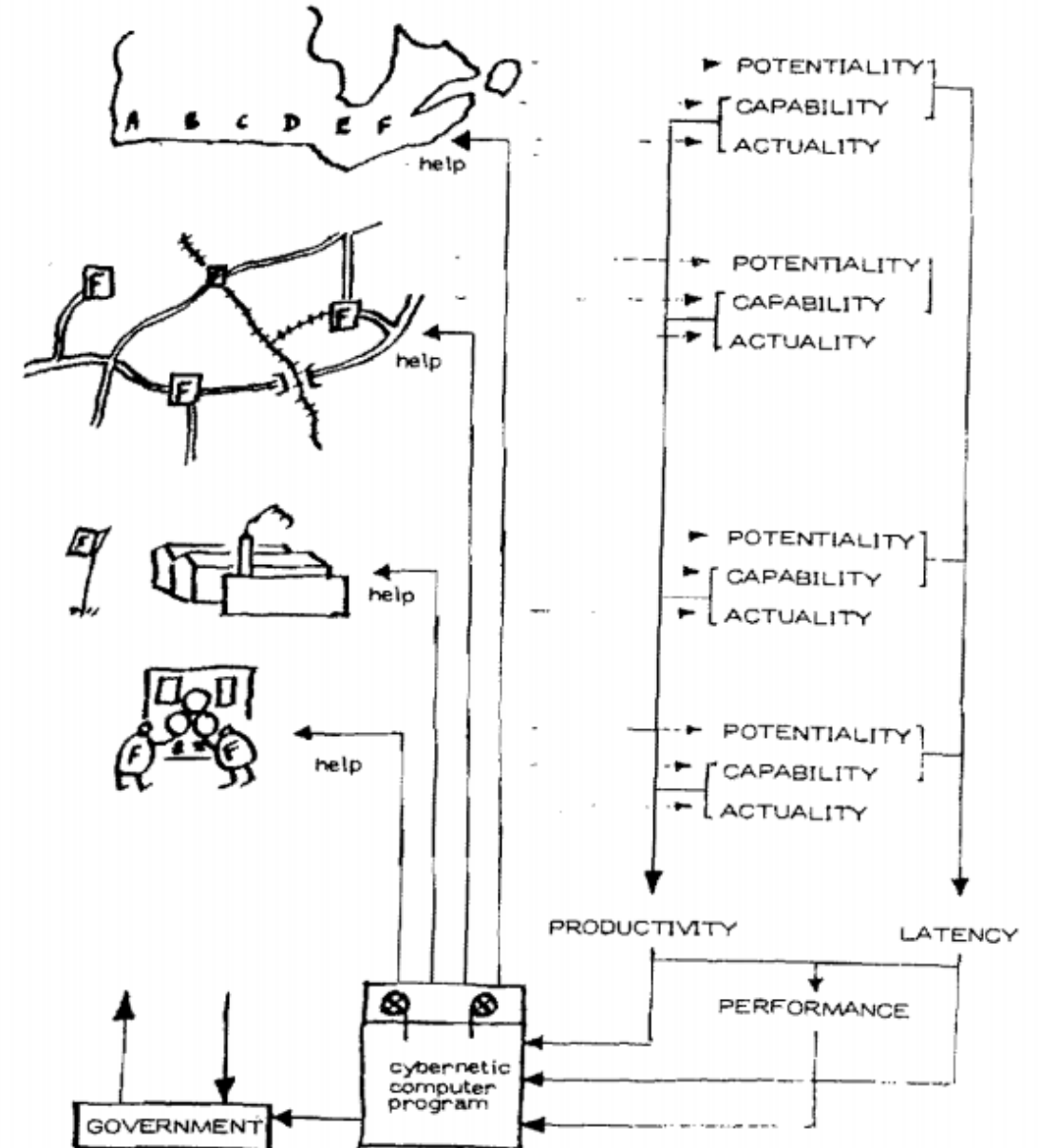


“As soon as you think of running the economy by computer, the culture promptly feeds you an image of acres of expensive equipment. It is not required. What is required is **an ordinary computer, with teleprocessing interfaces between itself and its inputs from the country and itself and the control room, plus an extraordinarily clever program.** The cost is in that software, and not in acres of hardware, its maintenance and staffing. But if the regulatory model is the same at every level of **recursion in the economy**, because the cybernetic models map onto each other, **only one set of software is required**”

“...if they really wish to get down to **serious decision taking**, they will **activate their dynamic systems models** with their **new data** and try out **alternative policies** by **simulating** them at **very fast speed.**”

p. 44

Four Levels of Recursion: One Model: One Computer Program



Criticism of a liberty machine in prototype:

- “...that instead of this being a Liberty Machine it means the death of individual freedom. “
- “...this whole approach to running a country presupposes a regime in which the state either owns industry or intervenes massively in its affairs. “ → “...misunderstanding; it confuses the machinery of government with government policy.” p.45
- “...it is all too simple.” → “...once you start to use systems thinking you need fewer data than before-because the data (are synthesized within the model of the system, “
- “...it is all too complicated-you could never do it, or it would take twenty years.” p.46

Chile as a real example

- “Firstly, it is actually possible to redesign the institutions of government according to the principles and practice of cybernetics.” p.47
- “Secondly, there is a long way to go in dismantling bureaucracy.” p.47
- “...the impact of such scientific advance as this on the status and freedom of the individual the impact of such scientific advance as this on the status and freedom of the individual” p. 48
- “Individual freedom has been lost, momentarily at least, in Chile.” p. 48

The free man in a cybernetic world

- “... freedom is not pure anarchy.” p.87
- “What we understand we can control. “→ “...that any system is "in control", I mean that it is ultrastable: capable of adapting smoothly to unpredicted change.” p.88

Two things wrong with the role of science in our society:

1. Usage of a **science** “...as a tool of power, wherever that is concentrated by economic forces.”
2. “Elite image of...” a **science**

“Civilization is being dragged down by its own **inefficiency**. We cannot feed the starving; we cannot stop war; we are in a terrible muddle with education, transportation, the care of the sick and the old; institutions are failing, and often we feel unsafe in the streets of our own cities. All this is inefficient. Then it cannot be correct to say **that the only way to preserve liberty is to be so damned inefficient that freedom is not even threatened. We have to become efficient in order to solve our problems;** and we have to accept the threat to freedom that this entails-and handle it. “ p.89

Conclusions:

- “...efficiency does not entail tyranny-if we can get the system right...”
- "unpredictive prophecy" → “ I do not believe that we can predict the future. I believe instead that we can describe the present with perspicuity, if we use the proper instruments, and that this same present constrains future variety.”
- “Planning should be continuous and adaptive. Societary plans should continuously abort, and be recast, before they give birth to a monster.
→ “...probabilities ...”