

Chile's Project Cybersyn (1970-1973)

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The context

- Chile, 1970
- Allende presidency
 - from November 4, 1970 to September 11, 1973
 - Stagnant economy, 35% inflation
 - “la vía chilena al socialismo”
 - nationalization of large-scale industries
 - government administration of:
health care system
educational system
 - expansion of the agrarian reform



The economic plan

- Pedro Vuskovic. Ministry of economy
- Keynesian economics:
 - massive redistribution of revenue by raising **salaries** and increasing **public expenditure**.
 - increase of buying power
 - activation of the large idle capacity of the monopolistic productive apparatus
 - political pay-off and consolidation

Strong opposition

- National
 - Monopolistic Industry
 - Land owners
 - etc
- International opposition
 - USA fears a communist “example” in South America.

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OPTIONS PAPER FOR NSC

CHILE

I. Assumptions

1. The Allende government will seek to establish in Chile as soon as feasible an authoritarian system following Marxist principles. To that end it will move (a) to bring all significant economic activity under state operation including nationalization of basic industries; (b) to gain control over the security and armed forces; and (c) to dominate public information media. Allende is a Marxist, and will be faithful to his Marxist goals, but in his tactics may be a pragmatist who, for as long as it suits his purposes, might tolerate less than radical solutions.

2. The Allende government will, at least in its first two years, encounter some political opposition from anti-Communist forces including the military, and will suffer from internal tensions, especially between Socialists and orthodox Communists, as well as between opportunists and ideologues within the UP. It will work deliberately but purposefully to eliminate that opposition and those tensions. Opposition within the military will act as both an incentive and a deterrent to Allende's attempting to establish absolute control over the military and security forces through key appointments, retirements, and other legal measures. The pace at which Allende will proceed to obtain this control will be dictated by opportunity and circumstances, but assuredly will be as rapid as possible without inciting a dangerous reaction from the military.

3. The Allende government will encounter serious economic problems which could exacerbate tensions within the governing coalition and increase

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Option D

Maintain an outwardly correct but adversary posture, make clear our opposition to the emergence of a Communist government in South America; adopt without delay economic, political and diplomatic measures designed to prevent Allende from consolidating his position; act positively to retain the initiative vis-a-vis the Allende government.

This option would be posited on the belief that a satisfactory modus vivendi is impossible; that confrontations are inevitable; that it is necessary to act without delay to deny the Communists/Socialists the chance to consolidate their power; that we must retain the initiative while leaving flexibility to Allende; that it is in the U.S. interest to make U.S. opposition to a Communist government in South America clear to Chile, the rest of Latin America, the USSR, and the world.

This option reflects the reported evaluation of the situation by ex-President Frei (Santiago 4637) that Chile is dead, without any future except as a fully Marxist state, and that the only miracle that might save it would be the incapacity of the government to handle the economic situation.

1. Courses of Action

a. Regarding the Allende Government

- (1) On the diplomatic level, deal with the Allende government in a manner consonant with established diplomatic practice.
- (2) At the beginning of the Allende administration, declare at a very high level that we would view with grave concern adoption of policies, alliances or courses of action by the Allende government that transformed

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1. ^{TRIP/TURN} POLICY, OBJECTIVES, AND ACTIONS WERE
REVIEWED AT HIGH USG LEVEL AFTERNOON 15 OCTOBER. CON-

CLUSIONS, WHICH ARE TO BE YOUR OPERATIONAL GUIDE, FOLLOW:

2. IT IS FIRM AND CONTINUING POLICY THAT ALLENDE
BE OVERTHROWN BY A COUP. IT WOULD BE MUCH PREFERABLE
TO HAVE THIS TRANSPIRE PRIOR TO 24 OCTOBER BUT EFFORTS IN
THIS REGARD WILL CONTINUE VIGOROUSLY BEYOND THIS DATE.
WE ARE TO CONTINUE TO GENERATE MAXIMUM PRESSURE TOWARD
THIS END UTILIZING EVERY APPROPRIATE RESOURCE. IT IS
IMPERATIVE THAT THESE ACTIONS BE IMPLEMENTED CLANDESTINELY
AND SECURELY SO THAT THE USG AND AMERICAN HAND BE WELL
HIDDEN, WHILE THIS IMPOSES UPON US A HIGH DEGREE OF
SELECTIVITY IN MAKING MILITARY CONTACTS AND DICTATES

COORDINATING OFFICERS

....CONTINUED....

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"CIA deputy director of plans, Thomas Karamessines, conveys Kissinger's orders to CIA station chief in Santiago, Henry Hecksher:"

The project

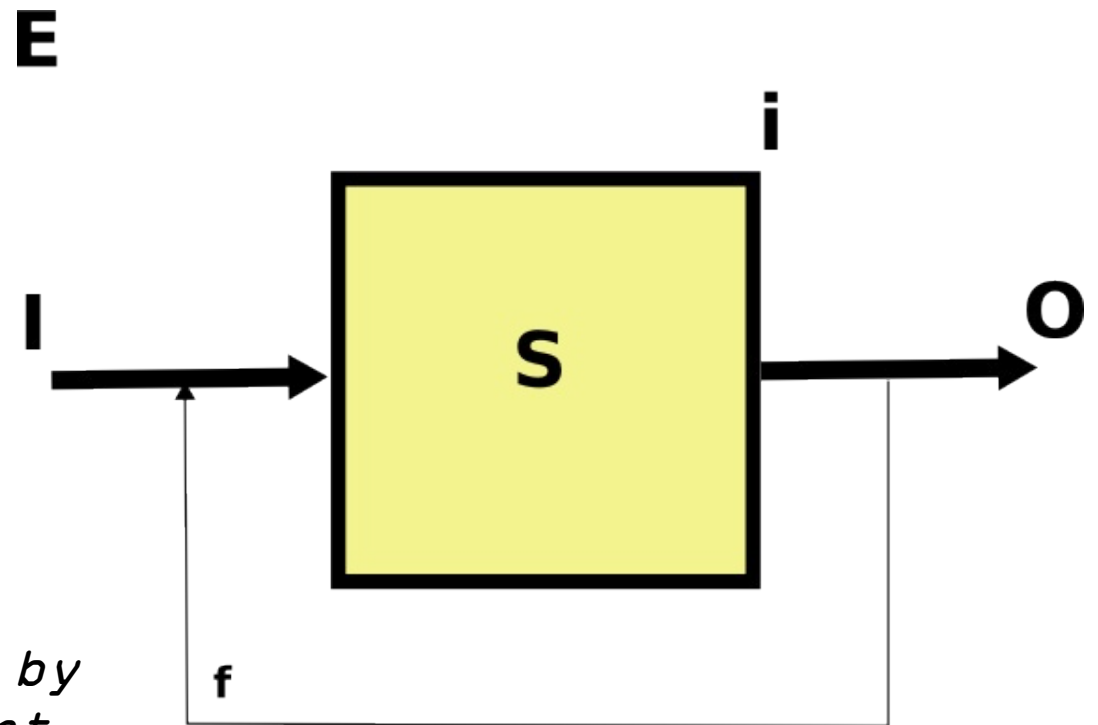
- Central economic planning by the state
 - quick massive nationalization
 - “a management nightmare” (Eden Medina)
- Fernando Flores, manager in charge, knew of british cybernetitian Stafford Beer, consultant with Sigma (who has working for Chile in '60)
 - asks Beer to organize the country's economy by applying *cybernetic* concepts.
 - CyberSyn: Cybernetic Sinergy project

Cybernetics?

- Interdisciplinary study of regulatory and communication systems
- complex, adaptive, self-regulating systems
- information, control, feedback, communication
- Systems theory:
 - Norbert Wiener
 - Ludwig von Bertalanffy
 - Ross Ashby
 - Heinz von Foerster
 - many others

Systems according to Wiener

Environment,
Input,
Output,
(throughput),
interface (boundary),
feedback



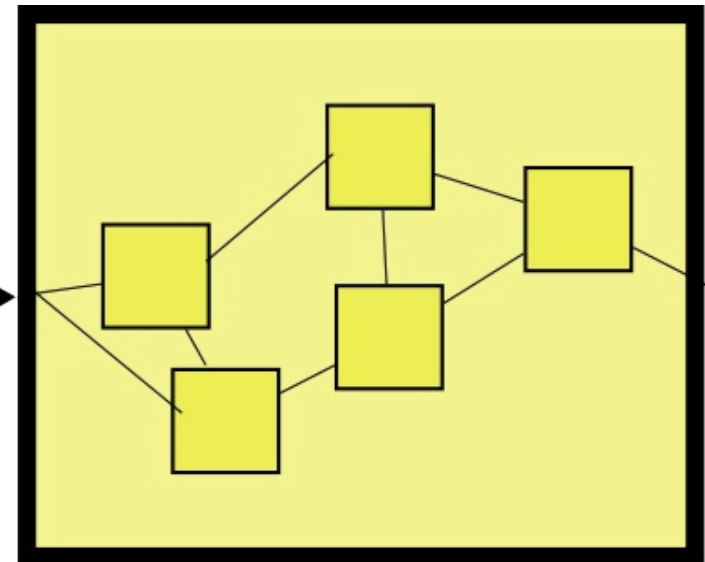
"our motion is regulated by some measure of the amount by which it has not yet been accomplished" (p.97)

Norbert Wiener, *Cybernetics or control and communication in the animal and the machine*, 1948

Systems according to von Bertalanffy

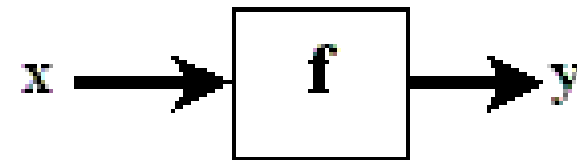
"a system can be defined as a complex of interacting elements"

"open system is defined as a system in exchange of matter with its environment, presenting import and export, building-up and breaking-down of its material components"



Systems according to von Foerster

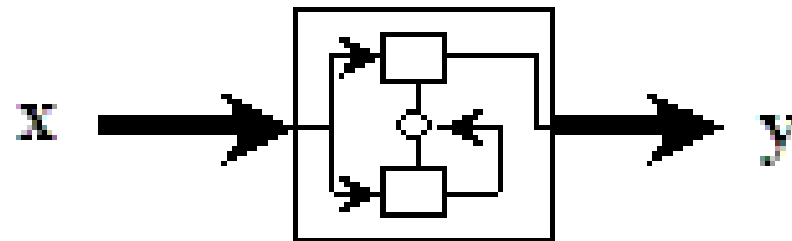
"The nervous system is organized (or it organizes itself) so as to compute a stable Reality"



f	
x	y
A	B
B	C
C	D
D	A

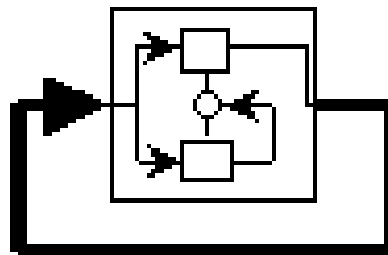
Trivial Machines

"Experience is the cause, the world is the consequence."



$$\begin{aligned}
 N^4 &= 4,294,967,296 \\
 N^{24} &= 6.3 \times 10^{57} \\
 N^{256} &= 5 \times 10^{616}
 \end{aligned}$$

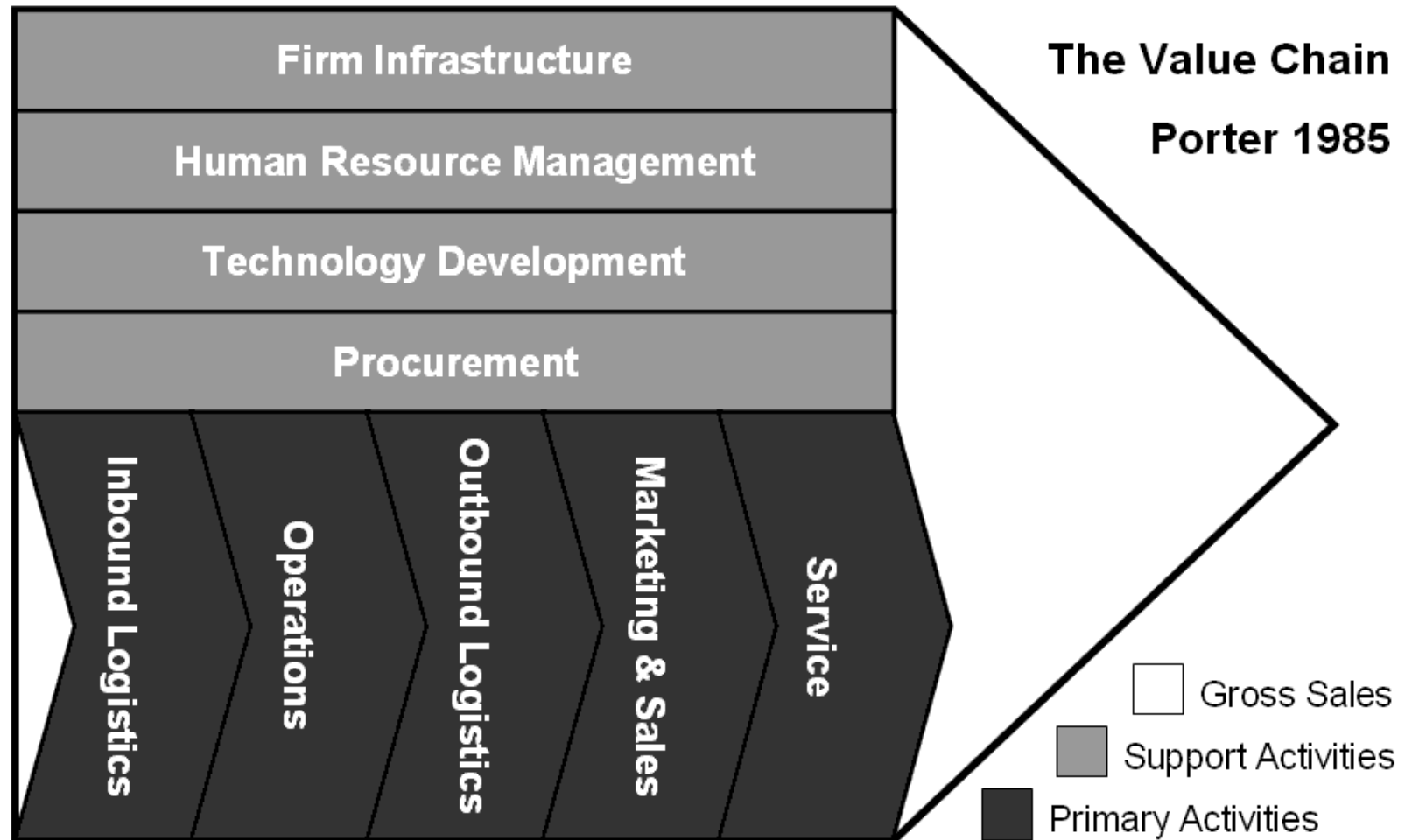
Non-Trivial Machines



A	B	C	A	D	A	D	C	A	D	A...
10	10	17	24	24	19	19	17	24	24	19
D	C	B	D	C	A	D	A			
24	17	19	17	24	24	19	19			

Recursively Operating Non-Trivial Machine

The firm as an I/O system



Economy as I/O modular system

Table 3-2 Input-output table of the U.S. economy for the year 1958 reduced to 8 from 57 producing sectors^a

Column row	Industry	Food and Drugs (1)	Housewares (2)	Machinery (3)	Trans. Equip. & Consum. Appl. (4)	Construction (5)	Metals (6)	Energy (7)	Chemicals (8)	Final Demand	Gross Domestic Output
1	Food and drugs	15,202 (12,468)	547 (96)	161 (11)	353 (49)	513 (17)	165 (53)	218 (62)	386 (288)	58,728 (55,320)	76,272
2	Textiles, clothing, and furnishings	347 (155)	12,815 (12,692)	92 (37)	821 (636)	761 (524)	171 (47)	63 (8)	61 (38)	21,369 (20,033)	36,500
3	Machinery	430 (28)	215 (105)	2,321 (2,186)	2,061 (1,644)	1,397 (748)	819 (545)	406 (141)	200 (150)	13,385 (11,293)	21,233
4	Transportation equipment and consumer appliances	363 (29)	158 (55)	816 (691)	11,791 (11,196)	1,372 (753)	485 (101)	183 (29)	53 (5)	38,691 (32,670)	53,912
5	Construction	1,158 (235)	218 (18)	115 (26)	308 (109)	48 (8)	284 (131)	1,541 (579)	70 (6)	65,117 (56,836)	69,291
6	Metals	1,033 (46)	475 (277)	3,073 (2,631)	6,038 (4,618)	6,468 (3,650)	7,959 (7,335)	388 (110)	479 (389)	2,244 (-45)	28,158
7	Energy	2,158 (783)	652 (293)	371 (226)	805 (404)	2,774 (1,536)	1,704 (1,391)	6,888 (6,236)	1,127 (1,007)	23,851 (17,702)	40,330
8	Chemicals	1,956 (1,056)	1,030 (218)	201 (117)	475 (115)	1,218 (437)	459 (283)	713 (576)	2,500 (2,351)	3,218 (1,510)	11,770
	Value added	53,625 (22,252)	20,390 (12,844)	14,083 (10,254)	31,260 (20,677)	54,308 (28,937)	16,112 (10,509)	29,930 (15,127)	6,894 (4,674)	178,912	405,515
Total		76,272	36,500	21,233	53,912	69,291	28,158	40,330	11,770	405,515	
	Labor	8,182 (2,202)	3,929 (2,808)	1,820 (1,307)	3,891 (2,467)	8,581 (4,847)	1,867 (1,155)	1,755 (1,003)	671 (403)	26,430	57,146

^aDerived from the 83-sector table published in "Transaction Table of the 1958 Input-Output Study and Revised Direct Requirements Data," *Survey of Current Business* 45 (9), September 1969. Each of the 8 sectors of the intermediate 57-sector table retained in this reduced table represents an aggregate of the following industries identified by the numbers they carry in the original 83-sector table:

(1) Food and drugs: 14, 15, 29; (2) textiles, clothing, furnishings: 16, 17, 18, 19, 34, 22, 23; (3) machinery (only final): 51, 44, 45, 46, 47, 48, 49, 50, 63; (4) transportation equipment and consumer appliances: 52, 54, 56, 59, 60, 61, 62; (5) construction: 11, 12; (6) metals: 37, 38; (7) energy: 31, 68; (8) chemicals: 27.

Corresponding entries in the unreduced 57-sector table appear in parentheses. The units are man-years in the labor row and millions of dollars in all other rows.

Managing model

- "I was very much against the Soviet model of centralisation," Raul Espejo, one of Flores's senior advisers
- Flores and Espejo realised that their ministry had acquired a **disorganised** empire of mines and factories, some occupied by their employees, others still controlled by their original managers, few of them operating with complete efficiency.
- Beckett, 2003

Viable System Model

- *"To be considered viable, a system has to be capable of adapting to its constantly changing environment. It has to be capable of preserving its identity and assimilating and making use of its experiences; it has to be capable of learning and of continuing to develop."* (Cwarel Isaf Institute)
- VSM and management cybernetics
 - Recursive
 - Decentralized control
 - Ranges, not exact values
 - Guidance, not command

VSM

System:

- 1: Operations
- 2: Coordination
- 3: Optimization
- 4: Development
- 5: Valuation

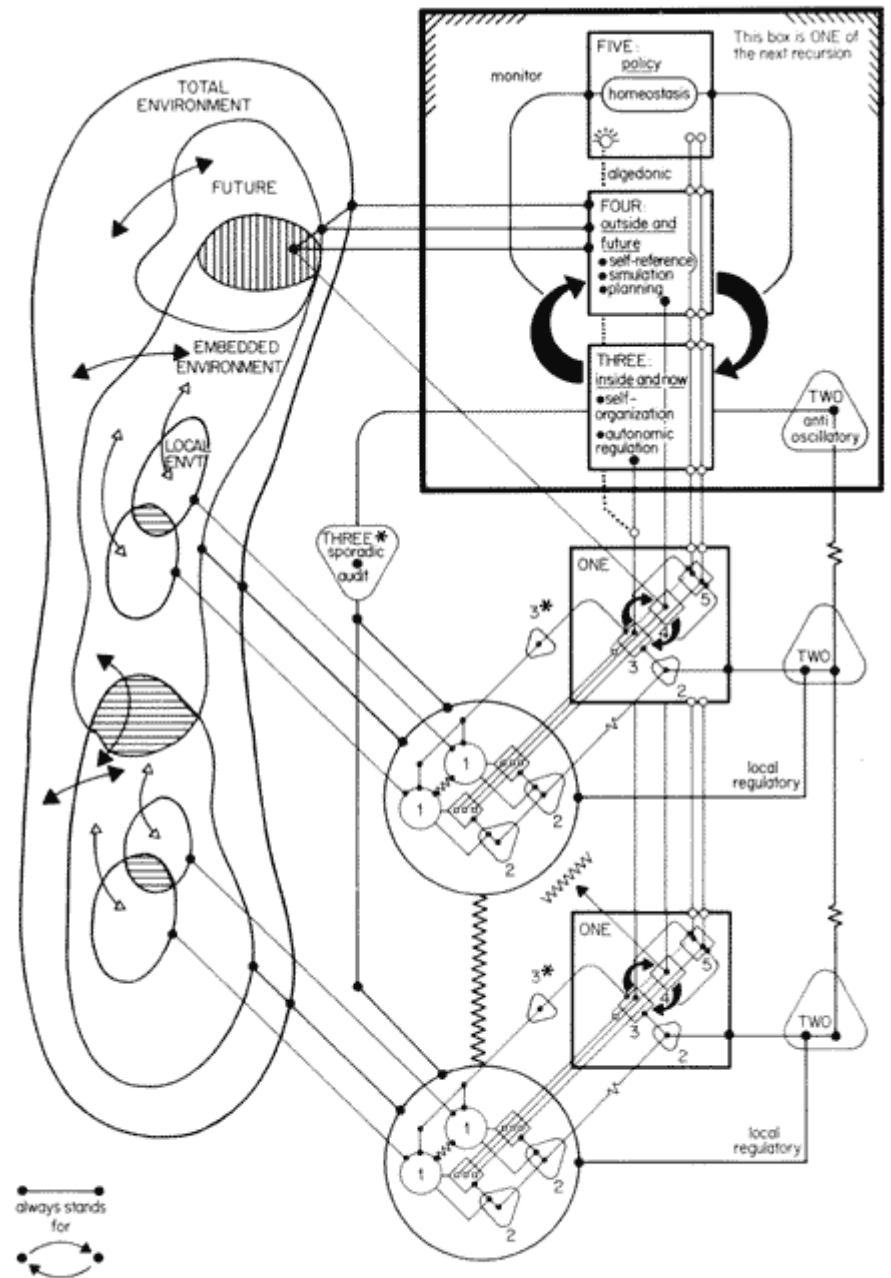
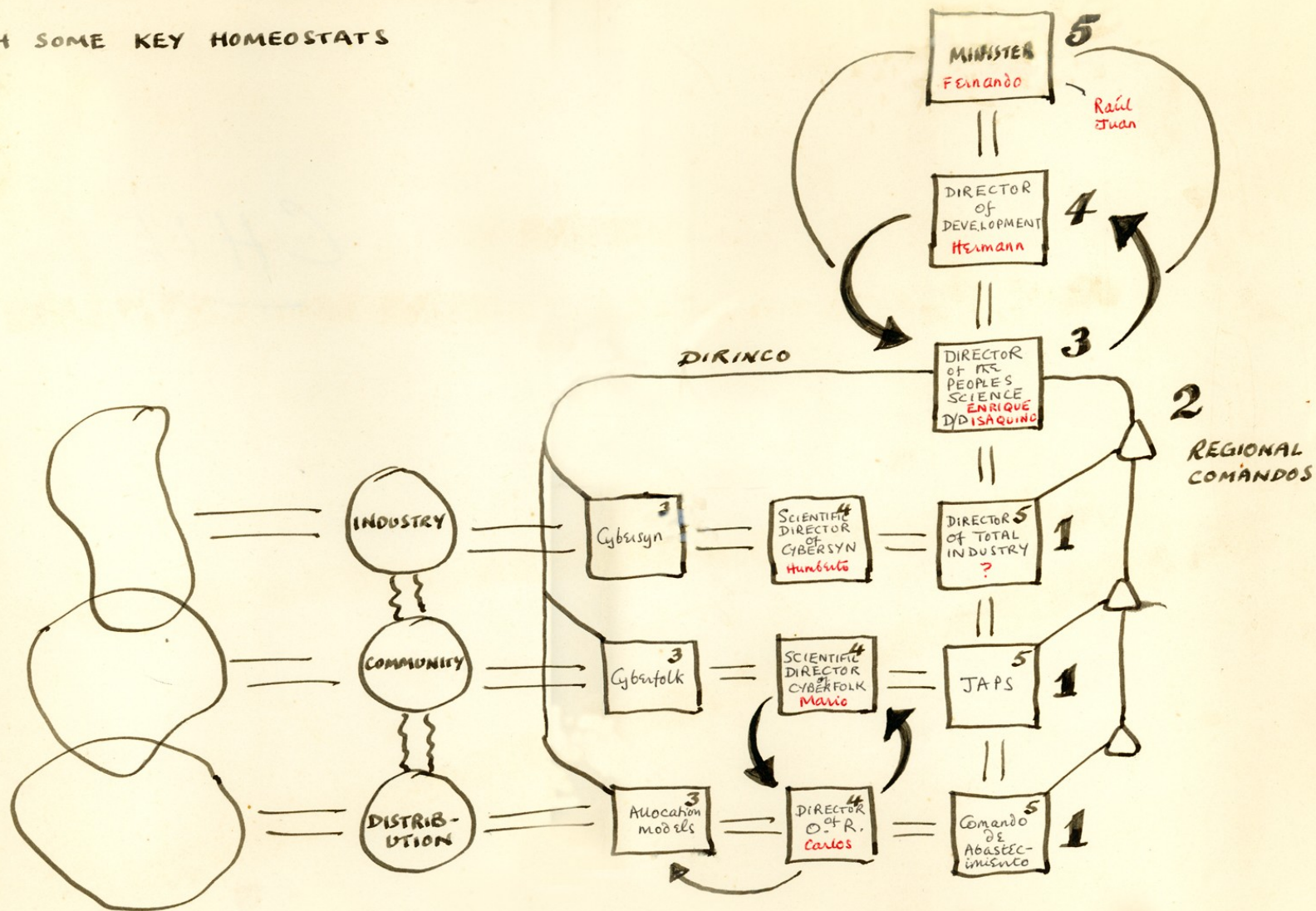


FIGURE 37

THE VIABLE SYSTEM
- Stafford Beer

TWO LEVELS OF RECURSION

WITH SOME KEY HOMEOSTATS



Architecture

- 500 telexes in factories: information, requests and complaints to the government, and vice versa
- An Operations Room
- One mainframe



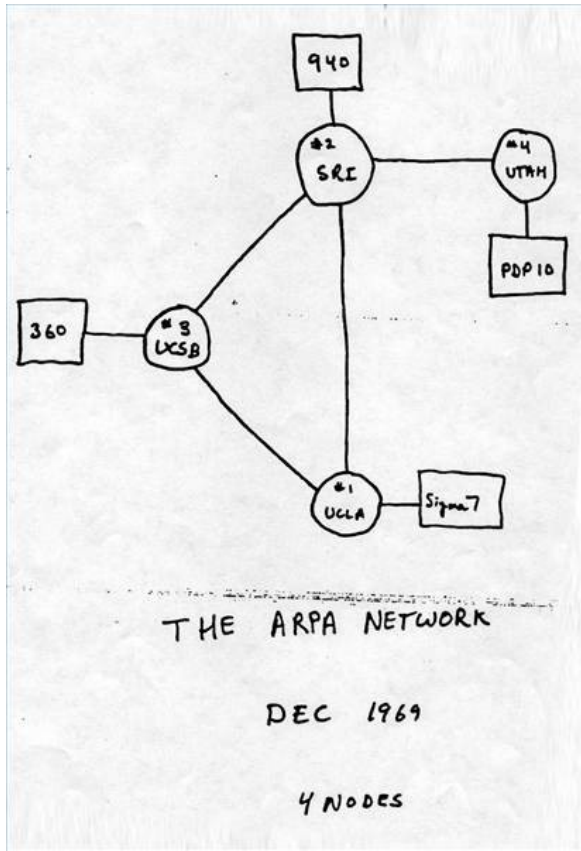
Structure

- **Cybernet**: telex machines network
- **Cyberstride**: software for IBM 360 mainframe
- **ChEco Program**: based on *system dynamics* model used by “Club of Rome”
- **Operations Room**
- **Cyberfolk**: real time connexion from people's homes with Government decision making groups

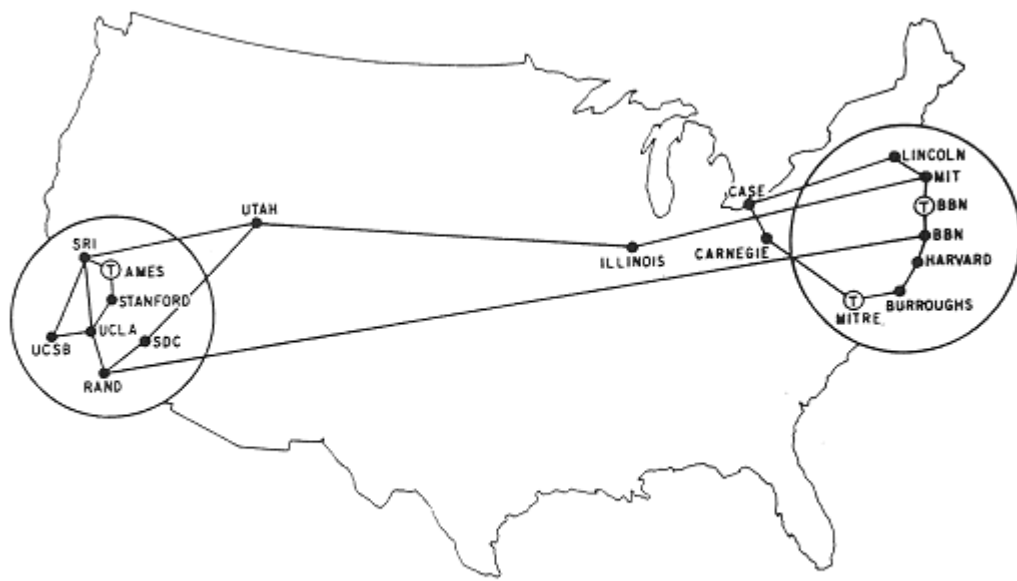
Requirements

- **Layered:** 11 levels of recursion from the State as such down to villages and enterprises
- **Real-time:** no management information could be more than 24 hours out of date at any level
- **Informative:** isolate incipient dangers on which management can instantly act. Information goes at the appropriate level.

(Beer, 2002)



Cybernet



Success

- a new communications system carrying daily information about
 - the output of individual factories,
 - the flow of important raw materials,
 - rates of absenteeism and other economic problems.
- During 1972 strike, food and fuel supplies threatened to run out. The telexes could be used to obtain intelligence about where scarcities were worst, and where people were still working.

Crisis

- Internal problems to Cybersyn *rather than transforming Chile's economy through the massive social restructuring Beer envisaged*, Cybersyn struggled merely to *regulate the day-to-day operations, a task that became increasingly difficult by 1973* (Medina, 2006)
- National and international: “big brother” criticism, inflation, foreign value shortage, black market, strikes, economic sanctions, ending with the military coup.



What happened next?

- Pinochet military dictatorship (1973-1988): kidnapping, torture, assassinations ...
- Economic reform by the “Chicago Boys”:
 - economic liberalization
 - privatization of state owned companies, deregulation
 - stabilization of inflation
 - locked dollar-peso change rate
- IMF, WB financing

Conclusions: environment matters

- Allende's Chile had trouble facing an powerful and hostile international environment having access to its internal systems
- Perhaps the innovators assumptions on successfully implementing radical changes quickly were optimistic
- Cybernetically improving communication and control was anyhow a success
- Technology has to be suitable to the managing needs, but and also scalable when needs change.
i.e. Has to be viable.

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