

Lecture 1: The Hard Reality of Requirements Engineering, A Business Sciences View

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Program

1. A systems approach: Control Design Regulation
2. $P \rightarrow B \rightarrow I$ approach to process redesign
3. Contingency
4. Complexity and Variety
5. Ashby's Law of Requisite Variety
6. Galbraith's theory on designing complex organizations
7. ITEC case

System Theory: Control Paradigm

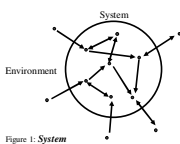


Figure 1: System

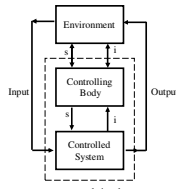
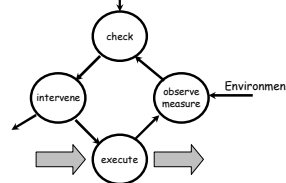


Figure 2: The Control Paradigm. (de Leeuw, 1974)

Systems Theory: Regulation

The regulation cycle

standards, objectives and set-points

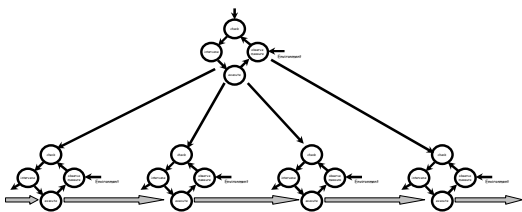


Regulation of the work process

1. Observing and measuring of the process, input, output and its environment
2. Comparing (checking) the actual situation (state) with the desired situation (state)
3. Intervening in the process and the environment to get the process on target

Source: Amelsvoort, P van and G. van Amelsvoort (2000), *Designing and developing self-directed work teams*

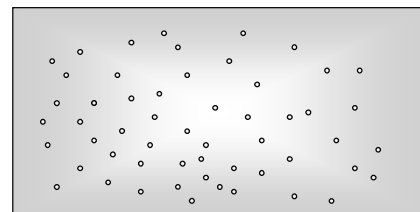
Systems Theory: Organization



Source: Amelsvoort, P van and G. van Amelsvoort (2000), *Designing and developing self-directed work teams*

Systems Theory:

Variety: number of states a system can be in.



iE Ashby's Law of Requisite Variety

"Thus the variety in the outcomes, if minimal, can be decreased further only by a corresponding increase in that of R. [...] This is the law of Requisite Variety. To put it more picturesquely: only variety in R can force down the variety due to D; only variety can destroy variety" (Ashby, 1958, p. 207).

The exact formulation of the Law of Requisite Variety :

IF $V(D)$ is given and fixed, and $V(E)$ before regulation is given and fixed, and $V(E)$ after regulation ($V(O)$) is minimal, but greater than one

THEN

$V(E)$ after regulation (= $V(O)$, the 'variety in the outcomes') can only be decreased by in-creasing $V(R)$.

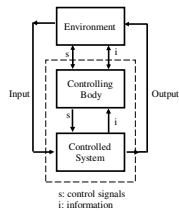


Figure 2. The Control Paradigm (de Lotz, 1954)

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iE Contingency models 1: Galbraith

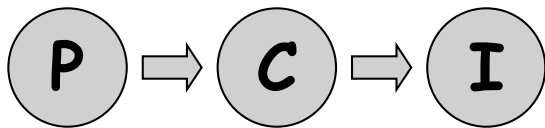
- Any way is not equally effective
- There is no "one best way" to organize your activities. So.....its always an experiment!
- Task uncertainty - knowledge - information
- Preplanning
- Variety in organization design stems from chosen design strategy
 - Increase ability to pre plan
 - Increase flexibility
 - Decrease level of required performance
 - Decrease need for coordination

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iE Production, Control and Information Structure

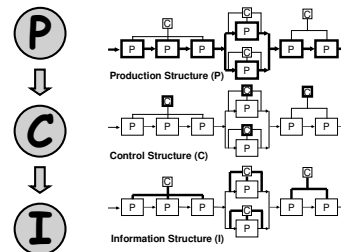


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iE De Sitter's PCI model



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iE Process Redesign

- Eliminate process steps
- Simplify process steps
- Integrate process steps
- Automate process steps

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iE Designing complex organizations J.R. Galbraith

Means for coordination:

- Hierarchy
- Programs
- Rules
- Objectives
- Lateral relations

Reduce the need for coordination:

- Slack resources
- Self contained tasks
- Physical process design (Not by Galbraith)

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iE Organization design strategies to cope with complexity (reader 4b)

create slack resources vertical information systems

create self-contained tasks create lateral relations

J.R. Galbraith, *Designing complex organizations*

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iE Link to Information Management

hierarchy, programs, rules, objectives, physical process design

create slack resources vertical information systems

create self-contained tasks create lateral relations

reduces the need for information processing increases the capacity for information processing

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iE ITEC Case

- Hardware services for printing companies
- Spare parts delivery slow-down service performance
- Solution: on site spare parts packages

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iE Complexity: Redon Tax dep.

Complexity = $4 * 4 * 4 * 4 = 256$ possible routings !!!
 120 employees: $30 * 30 * 30 * 30 = 810.000$

Valuation Levy Collection Remission

Parallelization or segmentation!

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iE Reduction of complexity by structure; possibilities of IS

$P \Rightarrow C \Rightarrow I$

Routings from 256 --> Sum of number of groups per 'service line' max. 120

	Valuation	Levy	Collection	Remission
Citizens	[Empty grid for routing possibilities]			
Medium/small companies				
Big companies				

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iE Rap up

- Control design regulation
- Complexity and variety
- Ashby's law of requisite variety
- Galbraith's theory on design

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