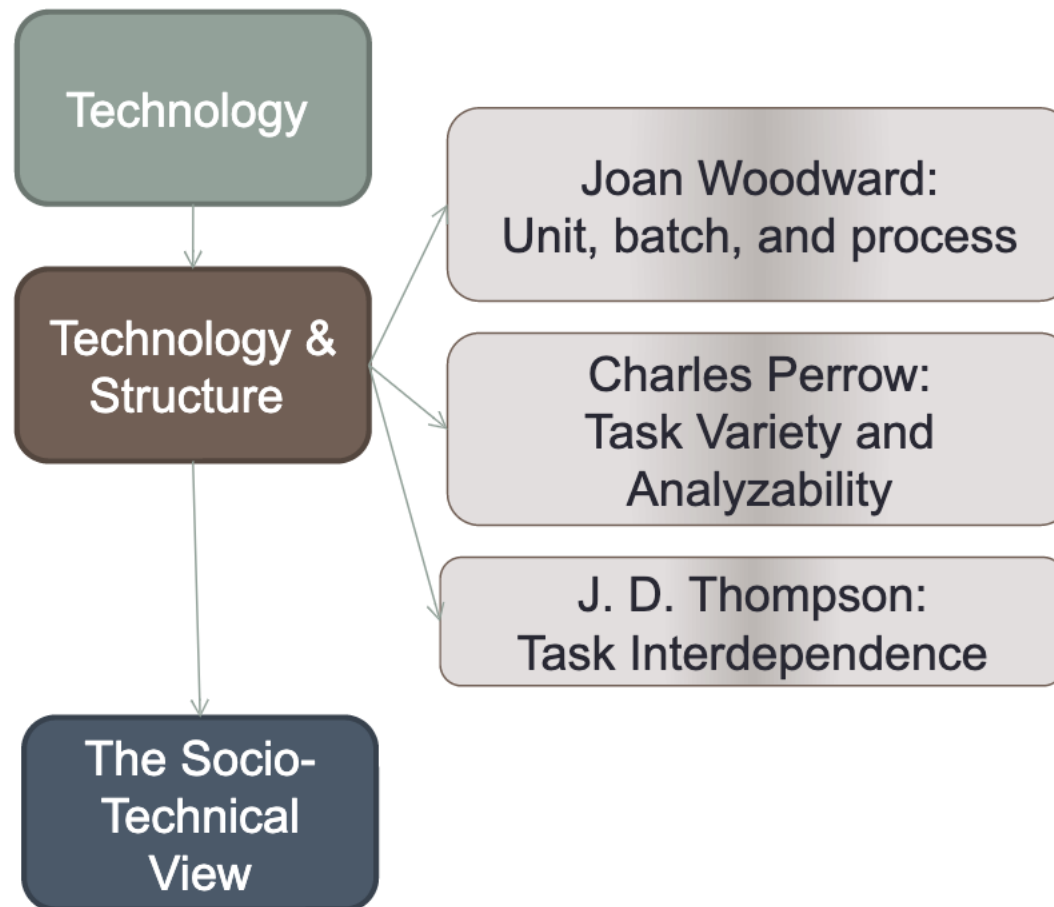


MODULE 5

TECHNOLOGY

(CHAPTER 4 IN THE TEXTBOOK)

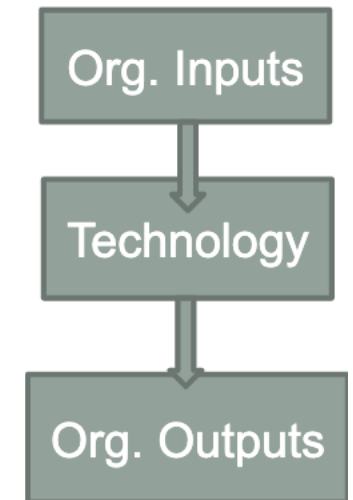
What's to come



Introduction

- Definition
 - Technology = “knowledge, tools, techniques, and behaviour used to transform org. inputs into org. outputs”
 - **Operations technology**: machines, equipment, instruments
 - **Information technology**: information that is received, generated, and analyzed

Q: Is this definition surprising?



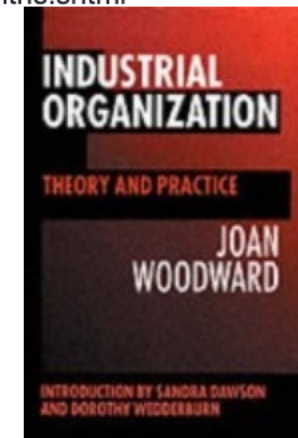
- Importance of technology
 - Tasks
 - Technology affects job design
 - Productivity
 - New technology to increase productivity
 - Organizational Design (to be discussed later in this module)

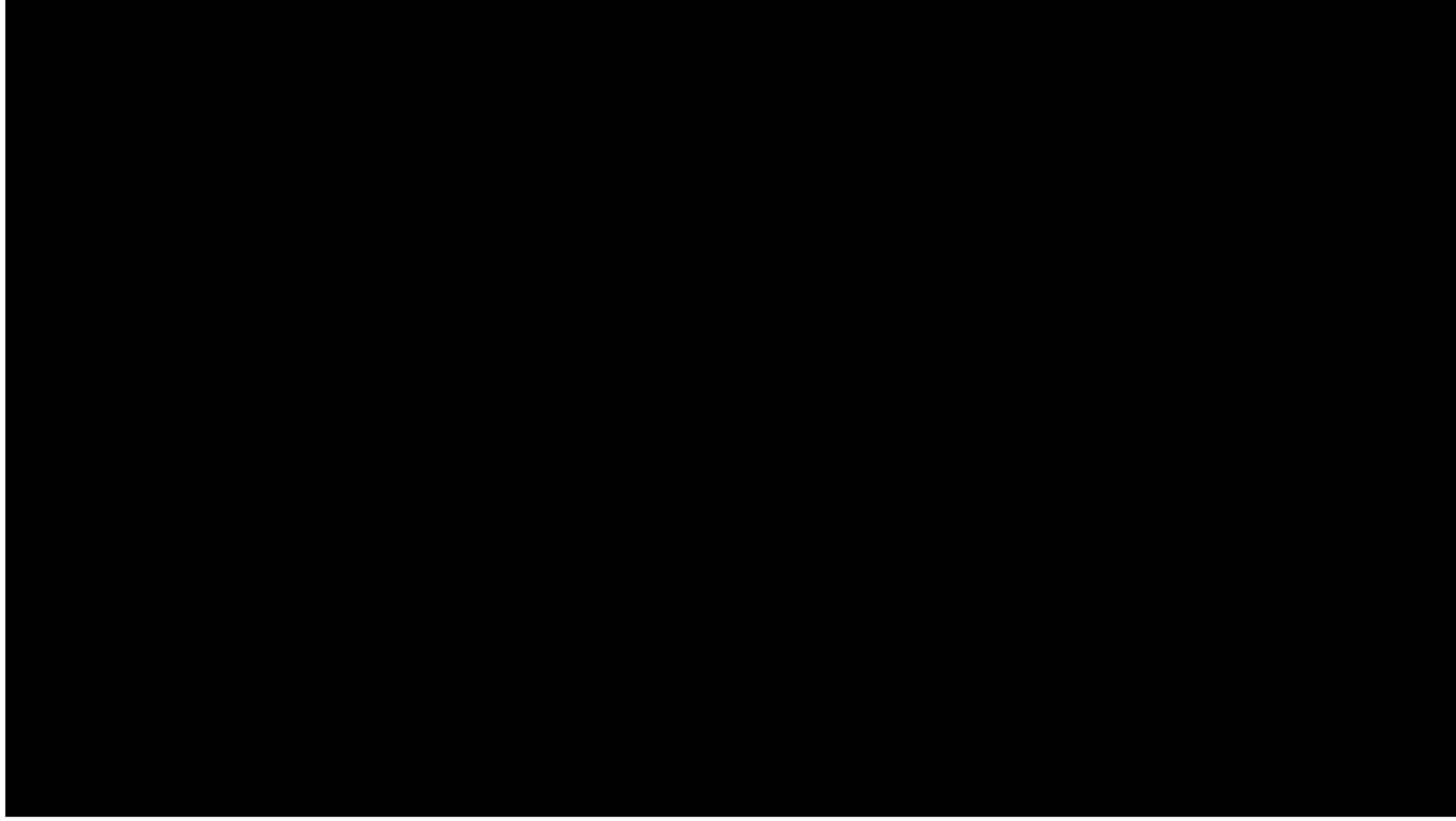
Technical Complexity (Woodward)

- Study (1950s) on many **manufacturing** firms
- Unit of analysis: core operating technology of the organization
- Complexity is measured through two factors:
 1. Extent to which manufacturing tasks are integrated, automated, and programmed
 2. Production volume



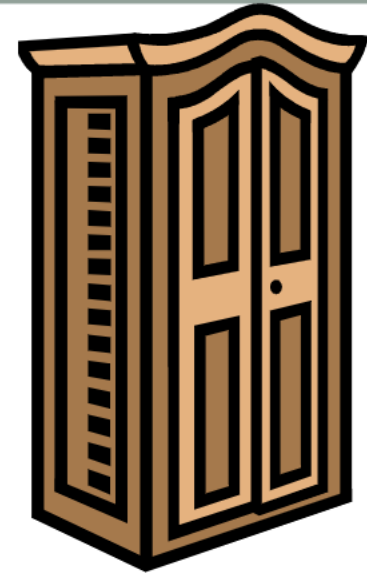
<http://www.imperial.ac.uk/centenary/memories/dotgriffiths.shtml>

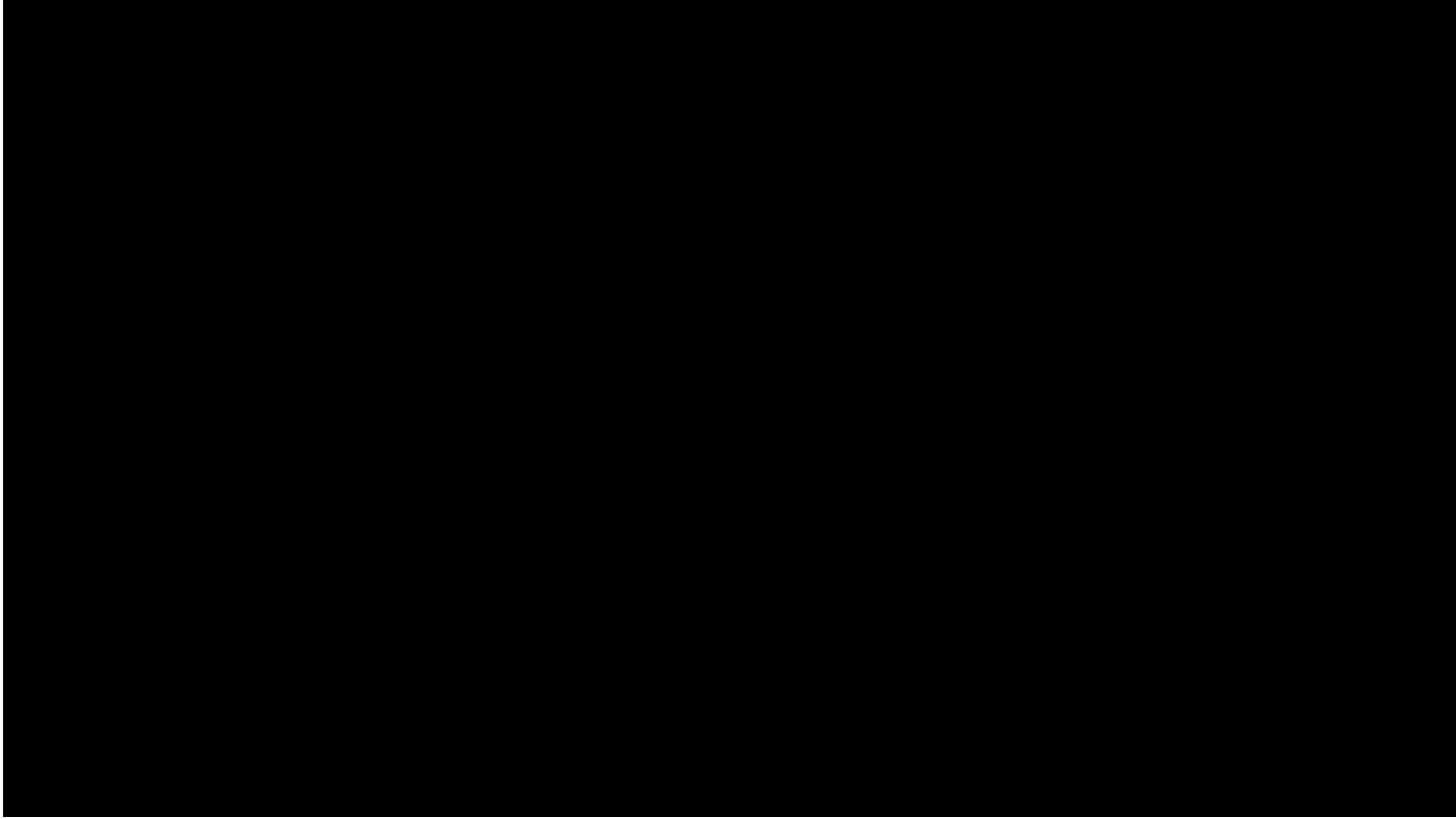




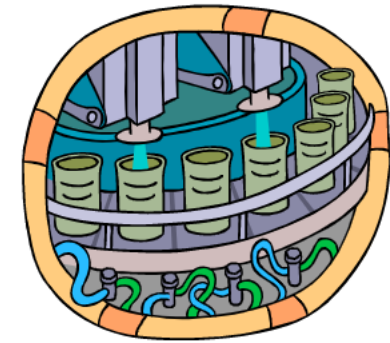
Technical Complexity (Woodward)

- Three groupings of technology
 1. Unit (and small batch) production
 - Small quantity, custom made products
 - Worker skill and knowledge important
 - Unpredictable, time-consuming process
 - E.g. custom furniture, prototypes

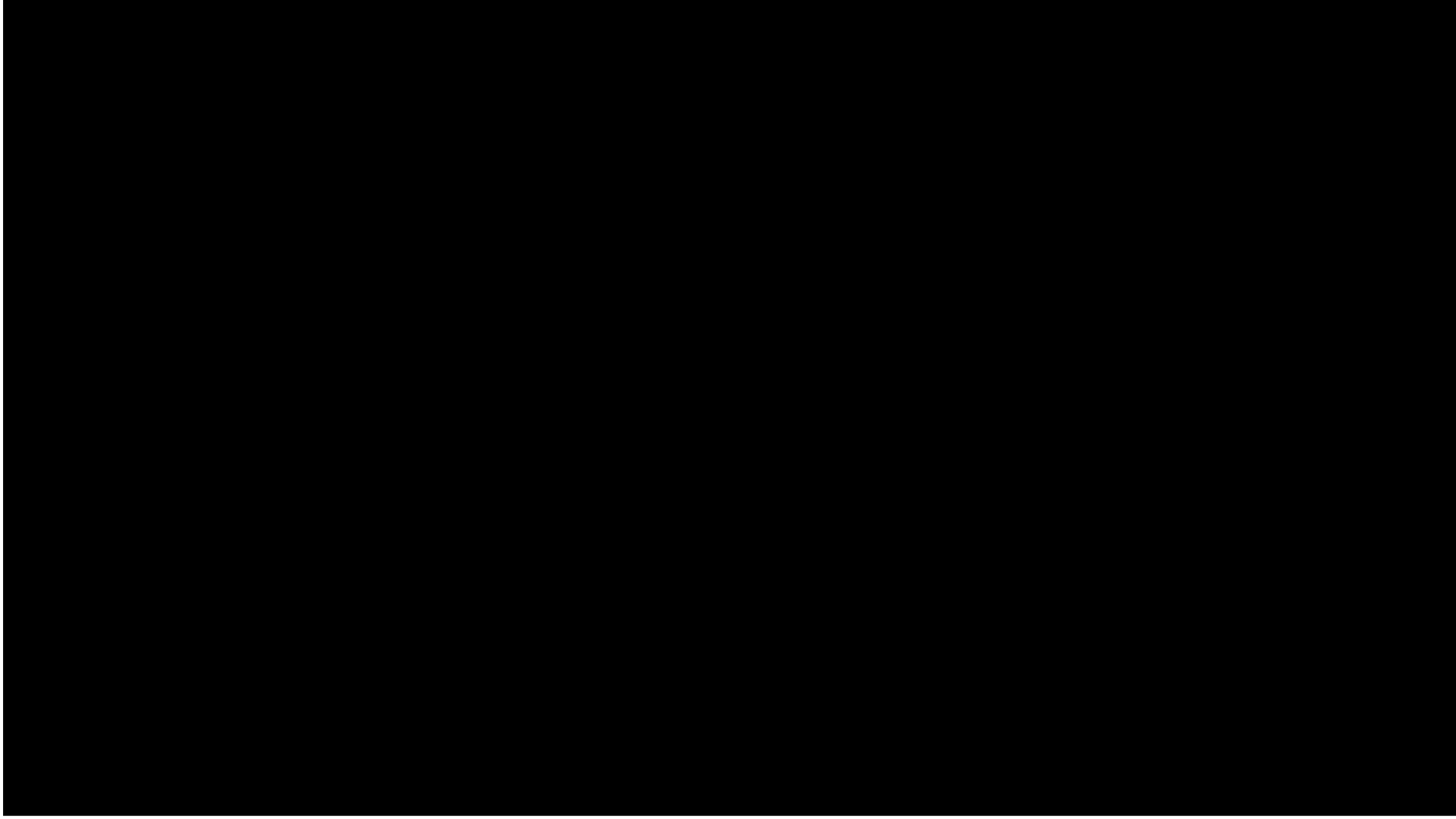




Technical Complexity (Woodward)



- Three groupings of technology
 2. Mass (and large batch) production
 - Standardized output, using assembly line
 - Processes are routine, repetitive, and predictable
 - Highly automated production, small impact of workers
 - Large, efficient production that lowers unit price
 - E.g. cars in an assembly line



Technical Complexity (Woodward)

- Three groupings of technology
 3. Continuous Process production
 - Highly mechanized/automated
 - Processes are continuous, repetitive, and endless
 - Highest degree of standardization
 - E.g. oil refinery



5.2 Technology and Structure

5.2.1 Technical Complexity (Woodward)

Complexity	Unit	Mass	Process
Technology	Craft	Production	Automation
Organizational Structure	Organic (Structure is built around the skills of the workers in the operating core. Output is non-standard; work can not be standardized or formalized)	Mechanistic (Structure is built around an obsession for maintaining control over unskilled operating core. Classic bureaucracy, standardized production leads to formalized behaviour)	Organic (Structure is built around skilled workers that maintain the automation. Intimate and informal relationship between operators and supervisors)
Span of Control of first line managers	Narrow (Managers work closely with operators)	Wide (Formalized, unskilled work requires little supervision)	Narrow (Specialists work in small groups)
Hierarchy	Weak	Strong	Weak
Coordinating Mechanisms	Mutual adjustment	Direct supervision	Mutual Adjustments

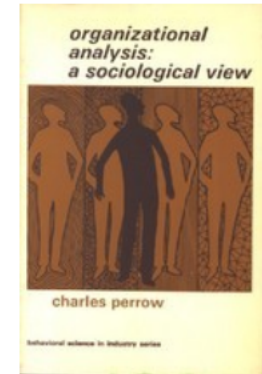
Class Discussion

“Automation puts the organization in a *post-bureaucratic* state”





Q: What does this mean?

Task Variety & Analyzability (Perrow)

- Extend concepts beyond manufacturing (e.g. services)
- Unit of analysis: work unit tasks
- Two dimensions of technology
 1. **Task Variety** = “The number of exceptions to the planned course of events”
 - Unstable inputs increase task variety
 - Task variety not consistently related to technological complexity
 2. **Task Analyzability** = “Extent to which task can be reduced to explicit steps, techniques, instructions, and programs”
 - E.g. catching a ball vs. typing a sentence



Task Variety, Analyzability (Perrow)

		Task Variety	
		Low	High
Task Analyzability	Low	Craft (e.g., pottery, fashion) <ul style="list-style-type: none"> •Moderate formalization & centralization •Mostly verbal, horizontal communication •Experience is critical •Moderate span of control  <p>Mostly organic structure</p>	Non-Routine (e.g. research, new product development) <ul style="list-style-type: none"> •New problems, that can't be dealt with in a standard way •Low formalization & centralization •Verbal, horizontal communication •Training & experience are critical •Small span of control  <p>Organic structure</p>
	High	Routine (e.g. auto assembly worker) <ul style="list-style-type: none"> •Few surprise problems •Standard procedures •High formalization & centralization •Written, vertical communication •Little training or experience •Large span of control  <p>Mechanistic structure</p>	Engineering (e.g. bridge design) <ul style="list-style-type: none"> •Moderate formalization & centralization •Both verbal and written, vertical and horizontal communication •Formal training is critical •Moderate span of control  <p>Mostly mechanistic structure</p>