Module 1:
Integrating Social and Technical Systems

Overview and Expected Outcomes – Module 1

- **Overview**
  - Welcome and overview
  - The “big picture”
  - Social and technical framework
  - Exercise: Focus on the Seven Wastes and the 5 S’s
  - Sample Socio-Tech Implementation
  - Exercise: Cellular Design Socio-Tech Analysis
  - Conclusion

- **Expected outcomes**
  - Awareness of shifts in social and technical systems over time
  - Understanding of the interdependency between social and technical systems
  - Identification of potential “guiding principles” for designing, implementing and sustaining change in social and technical aspects of new work systems

The "Big Picture"

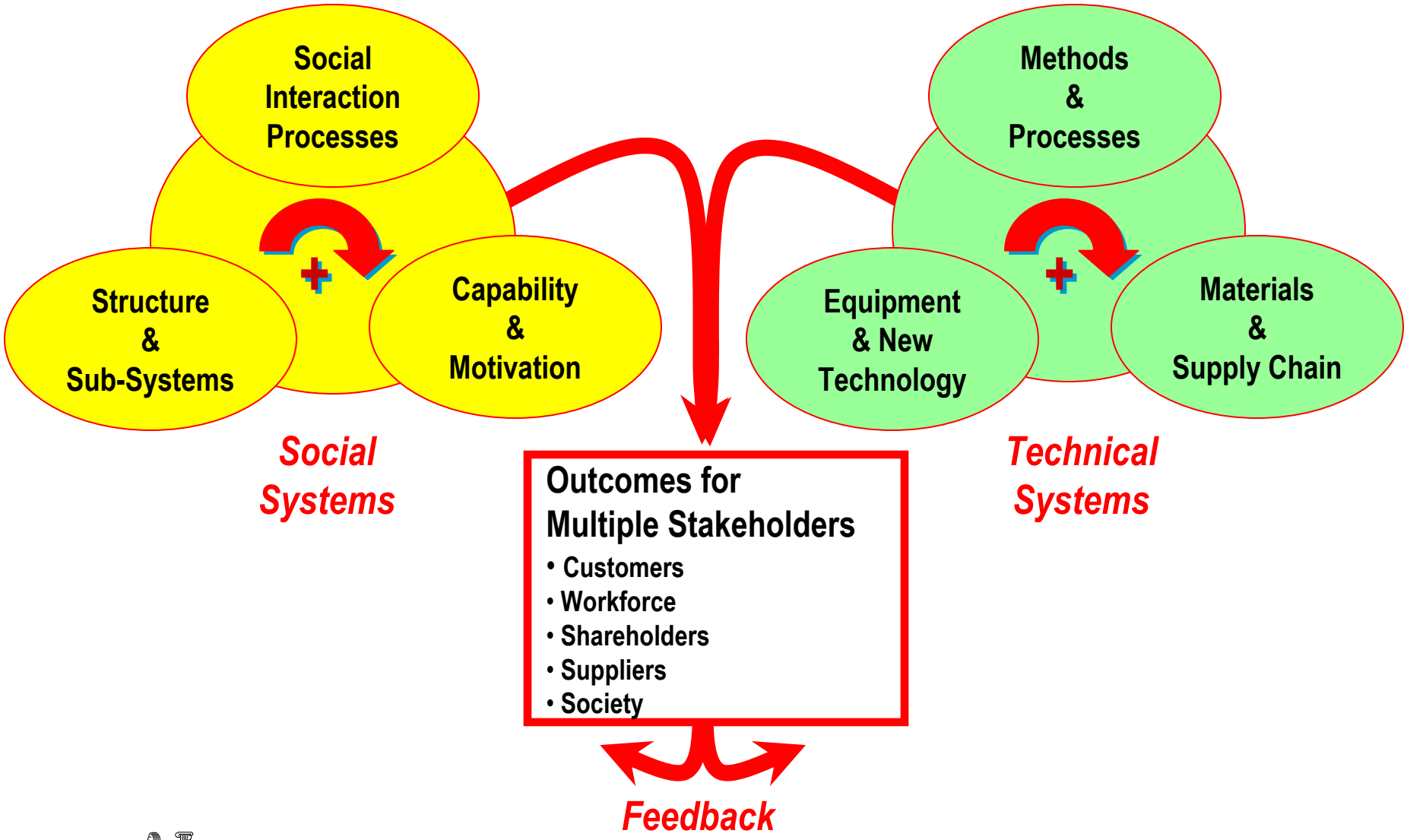
	Social Systems	Technical Systems
Craft Production	Decentralized Enterprises Mastery of Craft	Custom Manufacture Specialized Tools
Mass Production	Vertical Hierarchies Scientific management	Assembly Line Interchangable Parts
Knowledge-Driven Work	Network Alliances Team-Based Work Systems	Flexible Specialization Information Systems

Adapted from: "Knowledge-Driven Work: Unexpected Lessons from Japanese and United States Work Practices" (Oxford University Press, 1998)

Sample Social System Transformation Initiatives

- Socio-Technical Work Systems . . . . . Semi-autonomous teams
  - 1950s-1980s
- Employee Involvement/QWL. . . . . EI/QWL groups (off-line)
  - Late 1970s-1990s
- Total Quality Management . . . . . Quality circles (off-line)
  - Early 1980s-1990s
- Re-engineering . . . . . Work-out events (off-line)
  - 1990s
- Six Sigma . . . . . Black belt let project teams (off-line)
  - 1990s-present
- Lean Production/Enterprise Systems . . Lean production teams/Integrated product & Process teams
  - 1950s-present

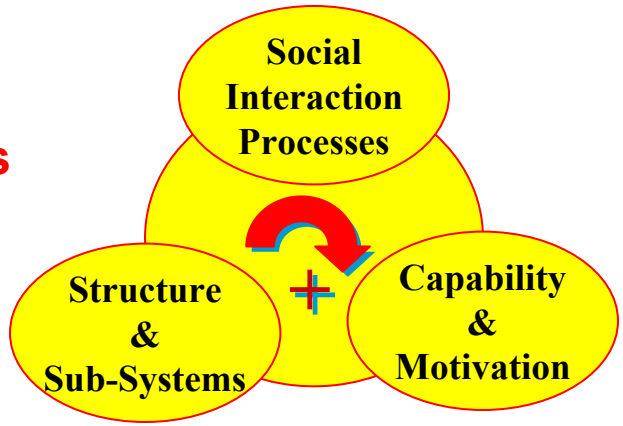
Social and Technical Systems Framework: Delivering Value to Multiple Stakeholders



Focus on Social Systems

Structure & Sub-Systems

- Structure
  - Groups
  - Organizations
  - Institutions
- Sub-Systems
  - Communications
  - Information
  - Rewards & reinforcement
  - Selection & retention
  - Learning and feedback
  - Conflict resolution



Social Interaction Processes

- Leadership
- Negotiations
- Problem-solving
- Decision-making
- Partnership

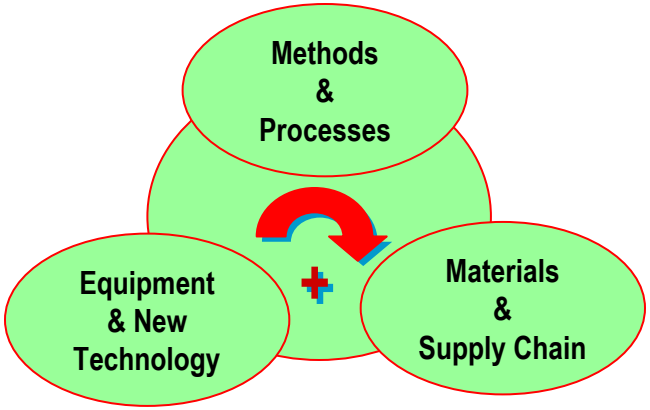
Capability & Motivation

- Individual knowledge, skills & ability
- Group stages of development
- Fear, satisfaction and commitment

Focus on Technical Systems

Equipment & New Technology

- Equipment and machinery
- Physical infrastructure
- Information technology
- Nano-technology, bio-technology, and other frontiers of science



Methods & Processes

- Job design/office design
- Work flow/process mapping methods
- Value stream mapping
- Constraint analysis
- Statistical Process Control (SPC)
- System optimization and decomposition methods

Materials & Supply Chain

- Interchangeable parts and mass production systems
- Just-In-Time delivery (JIT) systems
- Synchronous material flow systems
- e-commerce

Exercise: The Seven Wastes and the Five S's

The Seven Wastes

- Over Production
- Waiting
- Transportation
- Inventory
- Processing
- Motion
- Defects

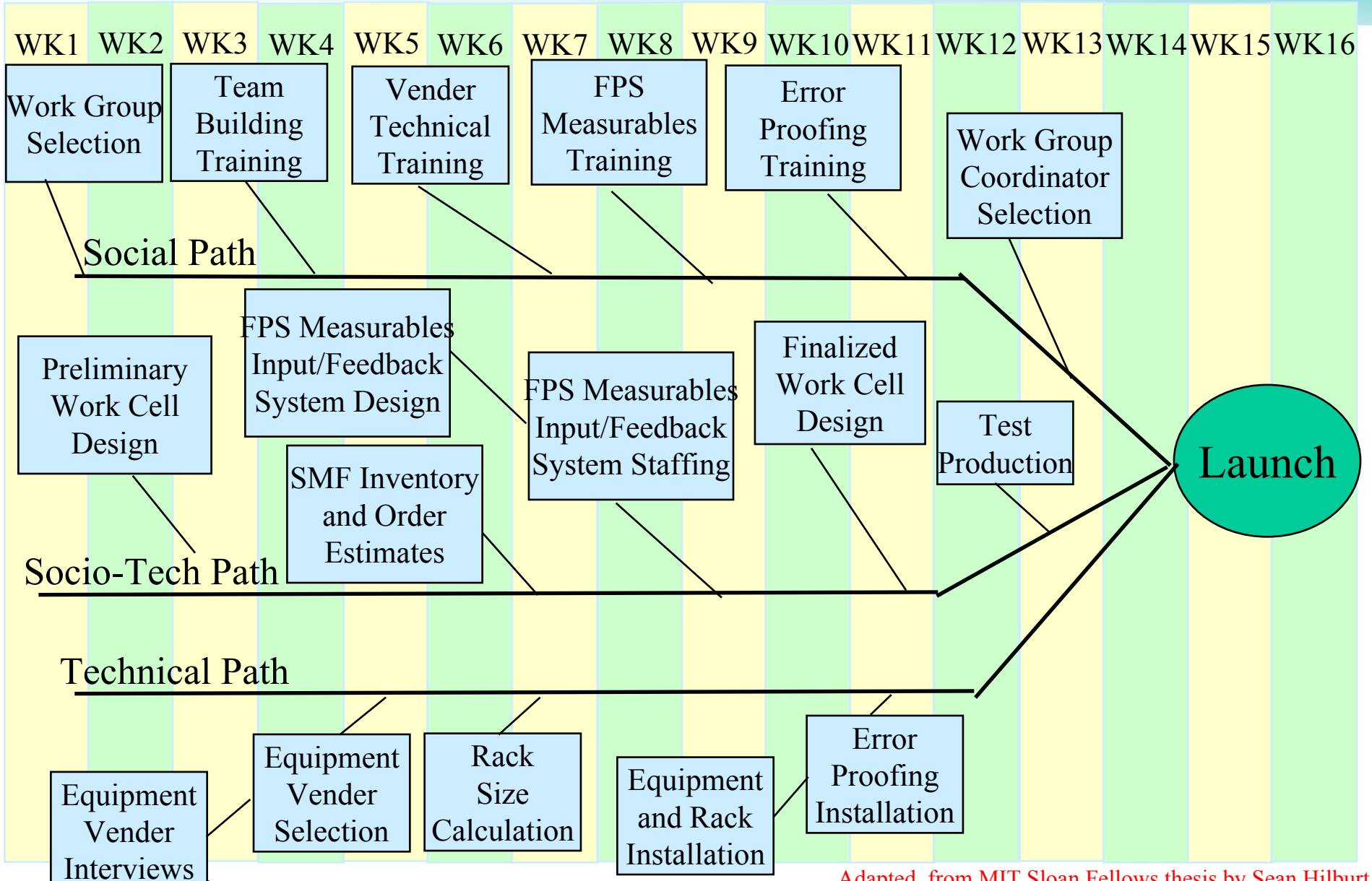
The Five S's

- Simplify or Sort
- Straighten or Simplify
- Scrub or Shine
- Stabilize or Standardize
- Sustain or Self-Discipline

How are social and technical systems interdependent when it comes to addressing the Seven Waste?

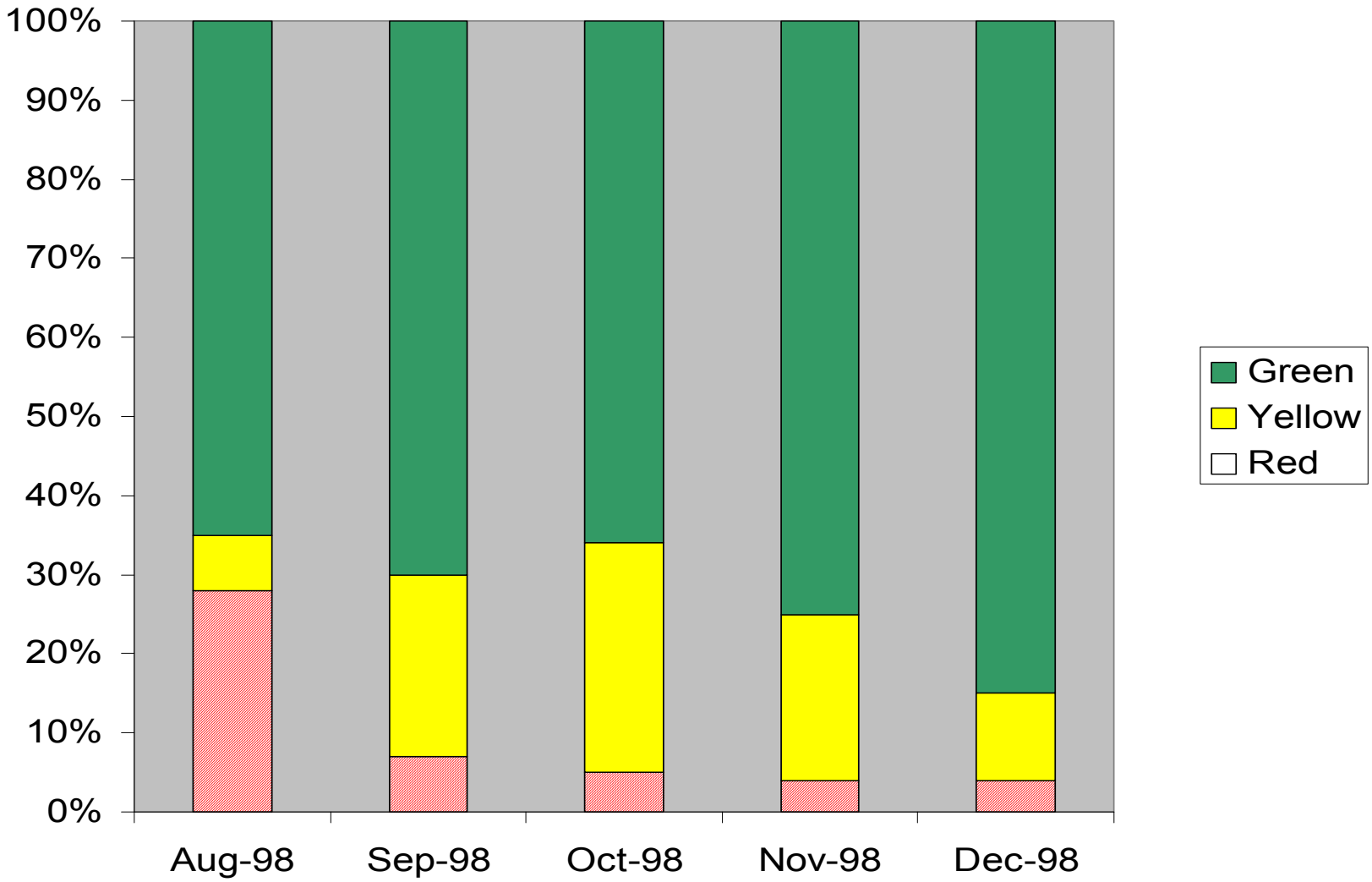
How are they interdependent when it comes to the 5S's?

Sample Socio-Tech Implementation



Adapted from MIT Sloan Fellows thesis by Sean Hilburt

Data on Technical Milestones



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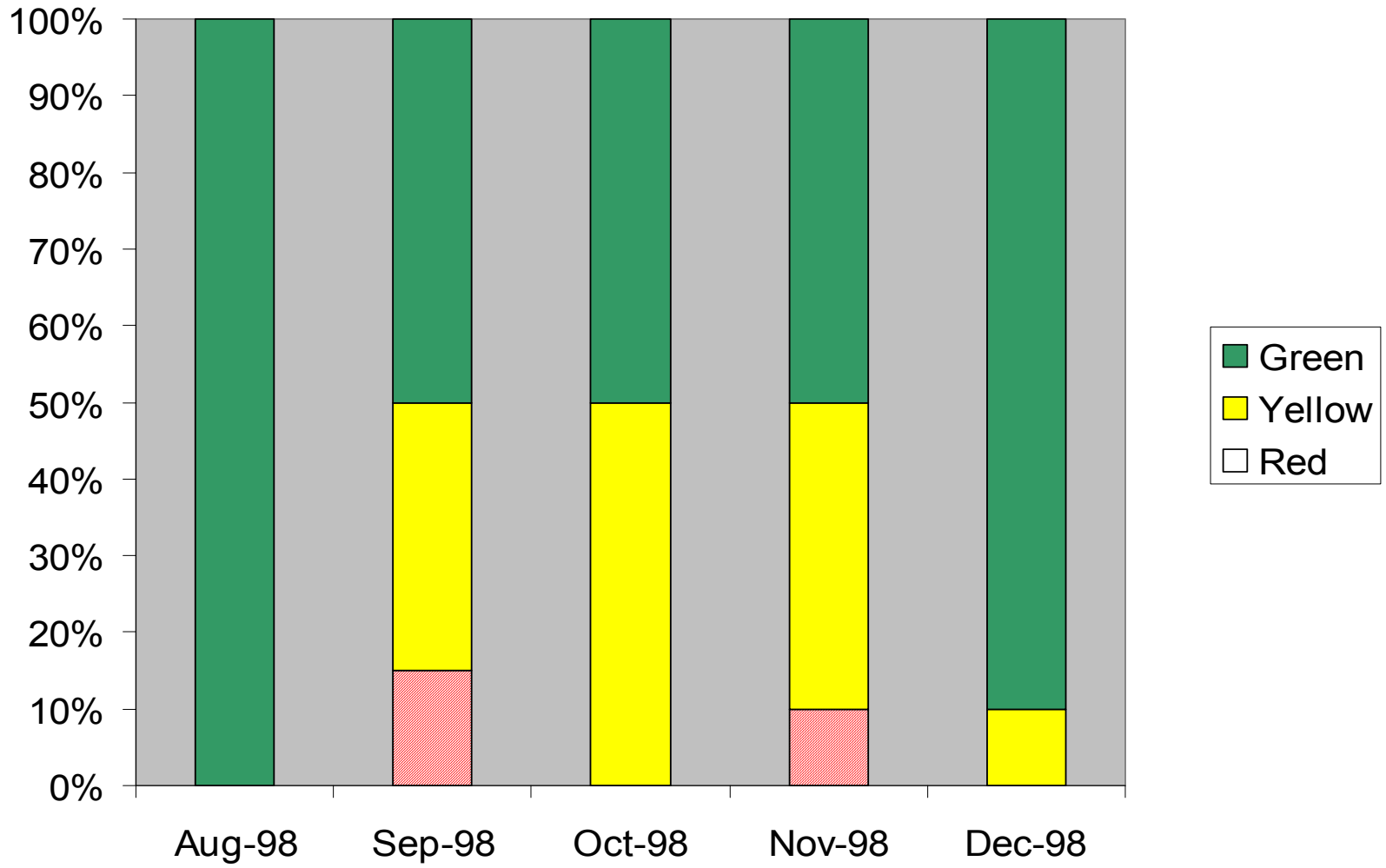
Data on Social Milestones



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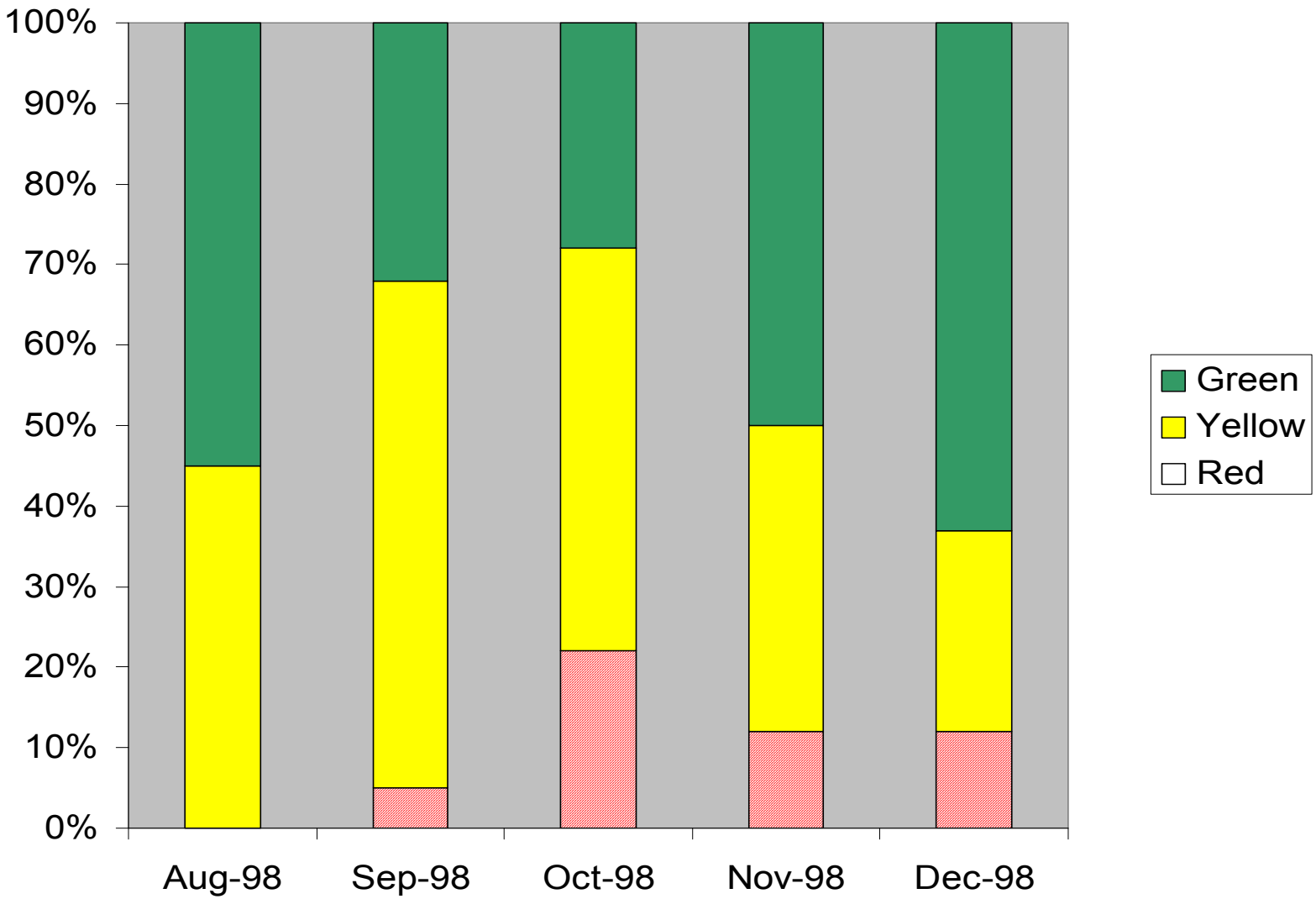
Socio-Tech Data



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Exercise: Cellular Manufacturing Socio-Tech Analysis

Step 1: Group Formation and Stakeholder Analysis

Form small groups of 2-3 people (individuals at remote locations may link by phone), study the "current state" and "desired state" illustrations on a hypothetical cellular manufacturing intervention (next slide), and list stakeholders involved in your phase of this intervention.

Note: Some groups will be assigned to "Preparing," "Implementing," and "Sustaining" phases of this intervention

Step 2: Social Systems

Identify the most important social system changes in this work system that are relevant to your phase of the intervention.

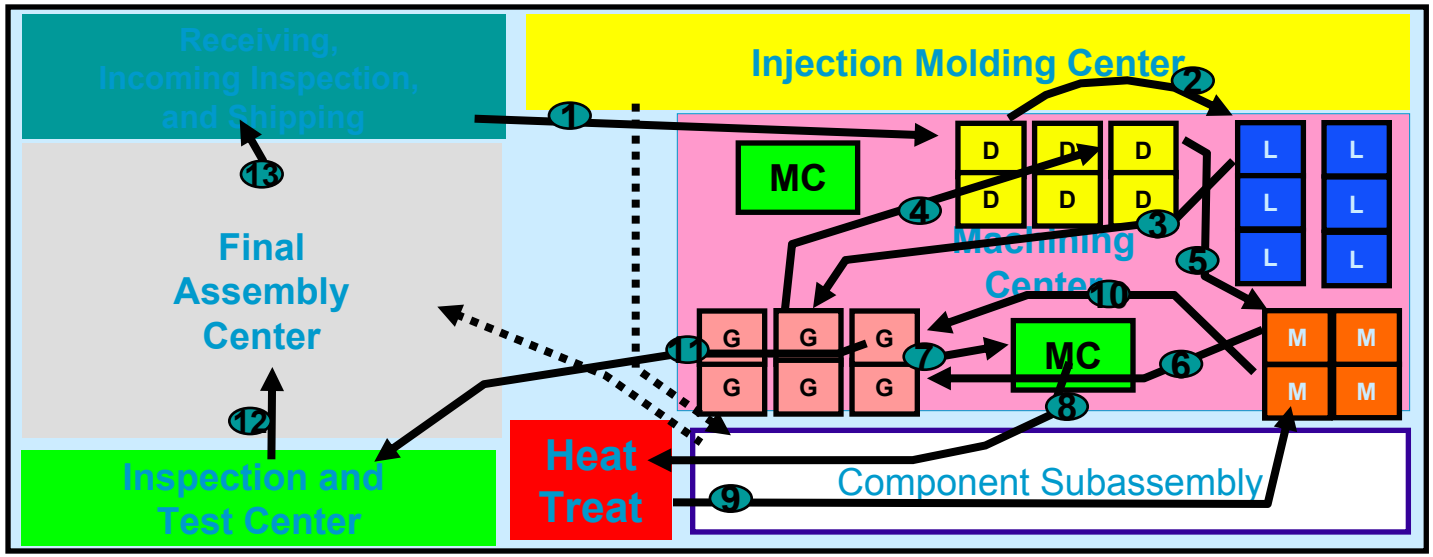
Step 3: Technical Systems

Identify the most important technical changes in this work system that are relevant to your phase of the intervention.

Step 4: Integration and Guiding Principles

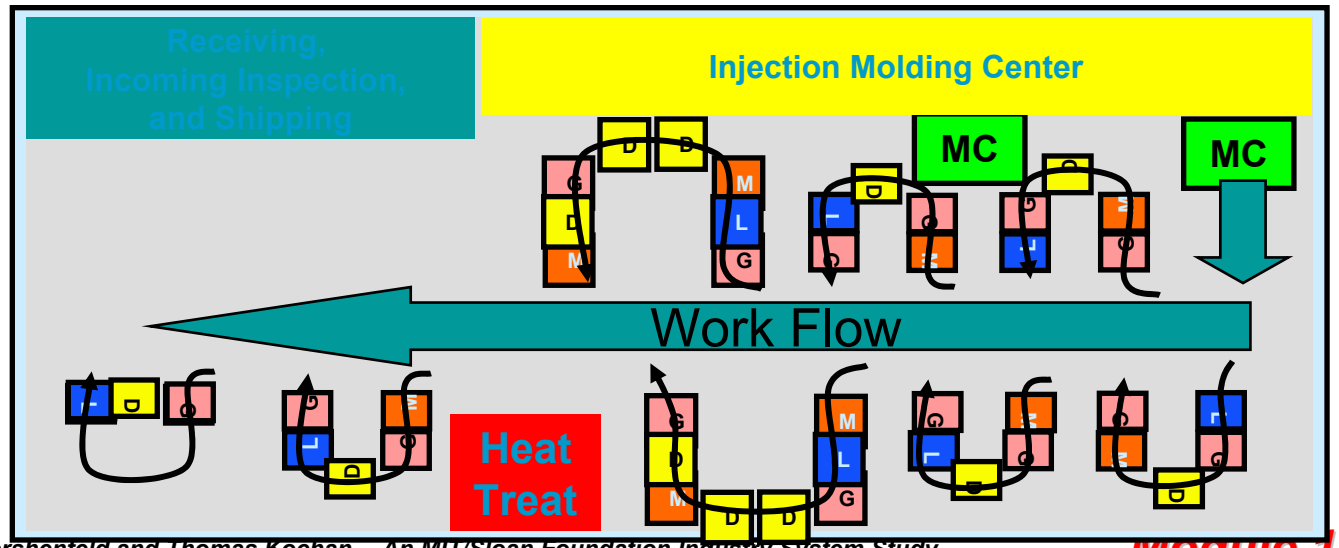
Discuss ways in which the social and technical changes are or are not interdependent. Derive 1-3 "Guiding Principles" for implementing a systems change of this type.

Exercise: Cellular Manufacturing

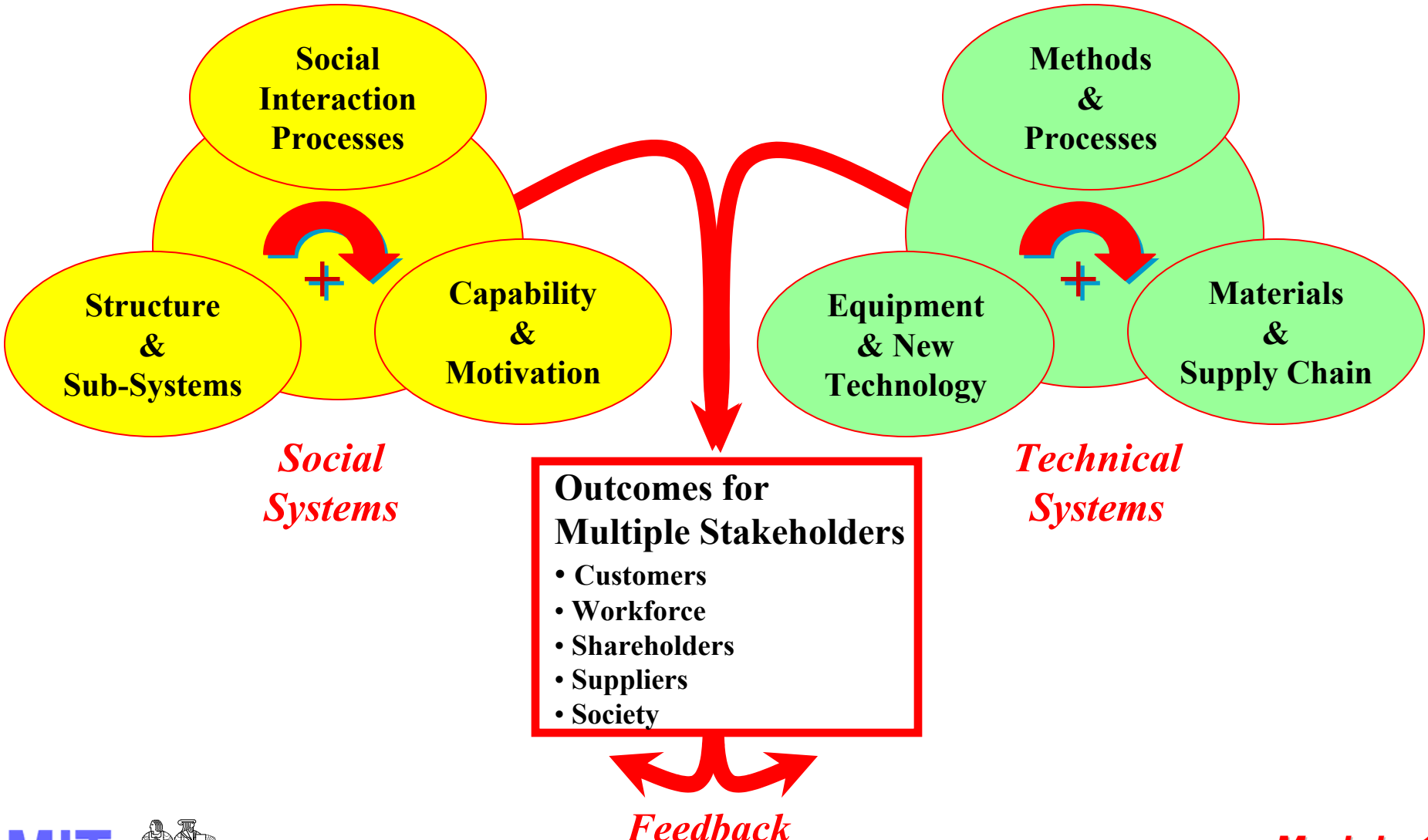


Current State

Desired State



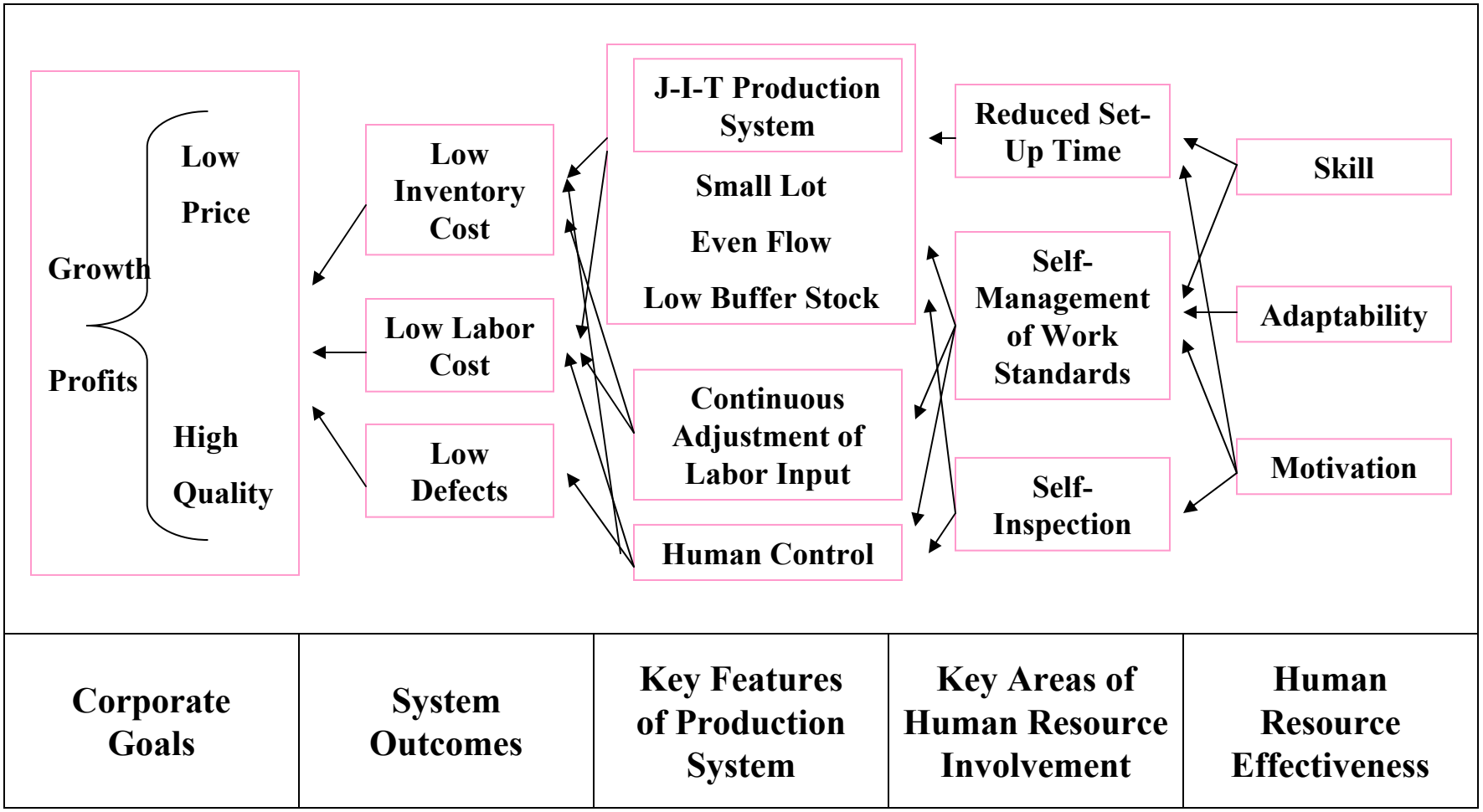
Revisit the Social and Technical Systems Framework



Conclusion

- A unique historical moment
- The constant challenge and opportunity presented by social and technical interdependency
- A fragile foundation for a global transformation

Appendix: Japanese Model of Production System and "Humanware"



Source Haruo*Shimada and John Paul MacDuffie, Industrial Relations and"Humanware" (Slaon School of Management Work Paper, September, 1986)*