

Systems Change Principles: Socio-Technical Dynamics in Launching a Lean Work Cell Module 2.3

Joel Cutcher-Gershenfeld

*Senior Research Scientist, MIT Sloan School of Management and
Executive Director, MIT Engineering Systems Learning Center*

Presentation for:

ESD.60 – Lean/Six Sigma Systems
MIT Leaders for Manufacturing Program (LFM)
Summer 2004

These materials were developed as part of MIT's ESD.60 course on "Lean/Six Sigma Systems." In some cases, the materials were produced by the lead instructor, Joel Cutcher-Gershenfeld, and in some cases by student teams working with LFM alumni/ae. Where the materials were developed by student teams, additional inputs from the faculty and from the technical instructor, Chris Musso, are reflected in some of the text or in an appendix

Overview

➤ Learning Objectives

- Build awareness of 1) social, 2) technical and 3) socio-tech milestones in the launch of a lean work cell
- Examine and learn from data on milestone accomplishment along all three dimensions
- Identify implications for other types of work/organization

➤ Session Design (20-30 min.)

- **Part I:** *Introduction and Learning Objectives (1-2 min.)*
- **Part II:** *Key Concept or Principle Defined and Explained (3-5 min.)*
- **Part III:** *Exercise or Activity Based on Field Data that Illustrates the Concept or Principle (7-10 min.)*
- **Part IV:** *Common “Disconnects,” Relevant Measures of Success, and Potential Action Assignment(s) to Apply Lessons Learned (7-10 min.)*
- **Part V:** *Evaluation and Concluding Comments (2-3 min.)*

Research Study Background

Who:

- Sean Hilbert, MIT LFM Student

What:

- Field study on the launch of a lean production work cell

When:

- Fall, 1999

Where:

- Automotive gear and axle components plant

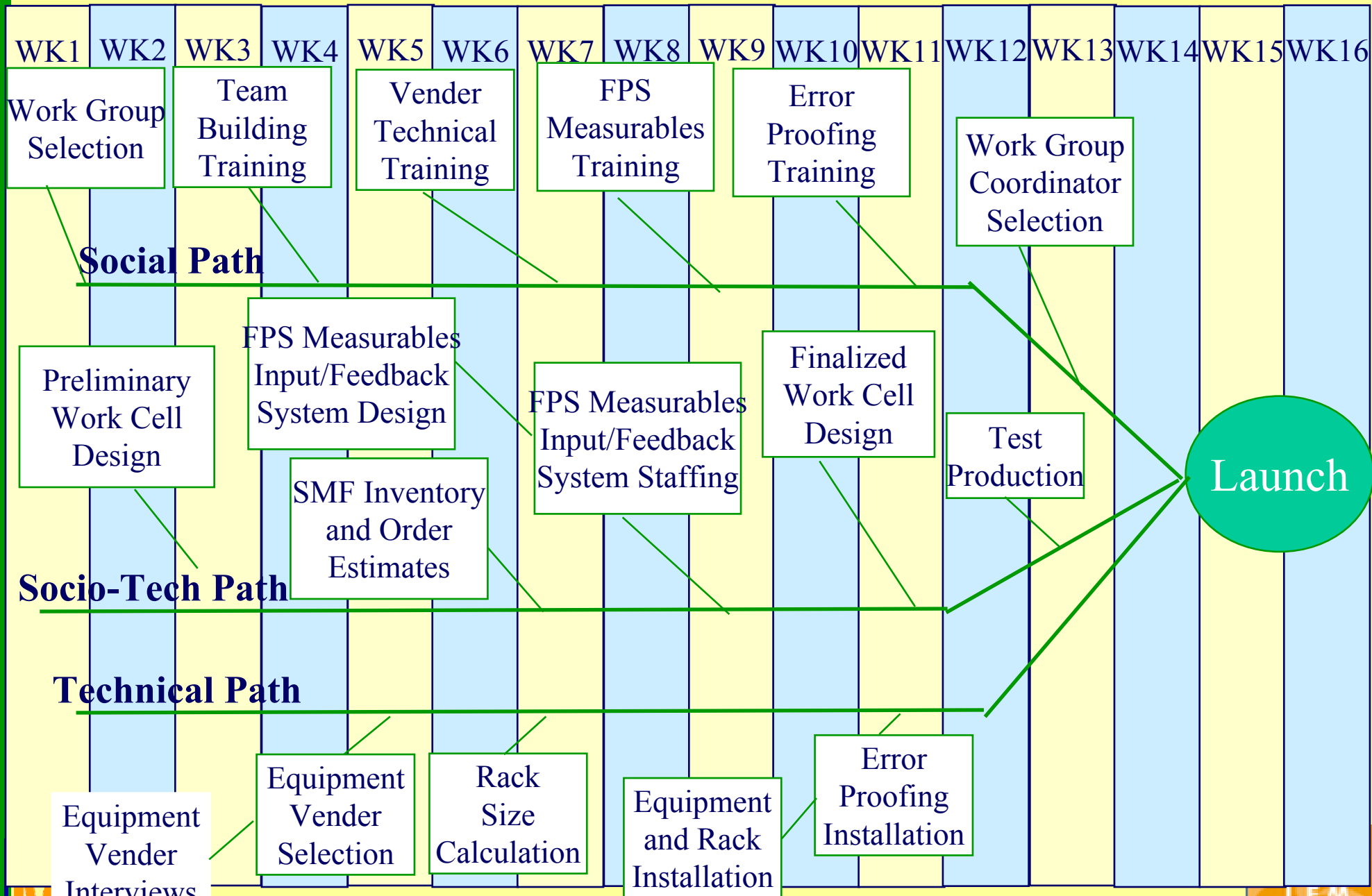
Why:

- A consistent pattern in the industry of undervaluing the interdependency of technical systems with social systems in the implementation of lean, team-based work systems

How:

- Participant/observer research design, including responsibility to establish weekly implementation milestones, support progress in accomplishing the milestones (participant role), and track/analyze progress (observer role)

"Fishbone" Diagram with Selected Weekly Milestones



Adapted from MIT LFM thesis by Sean Hilbert

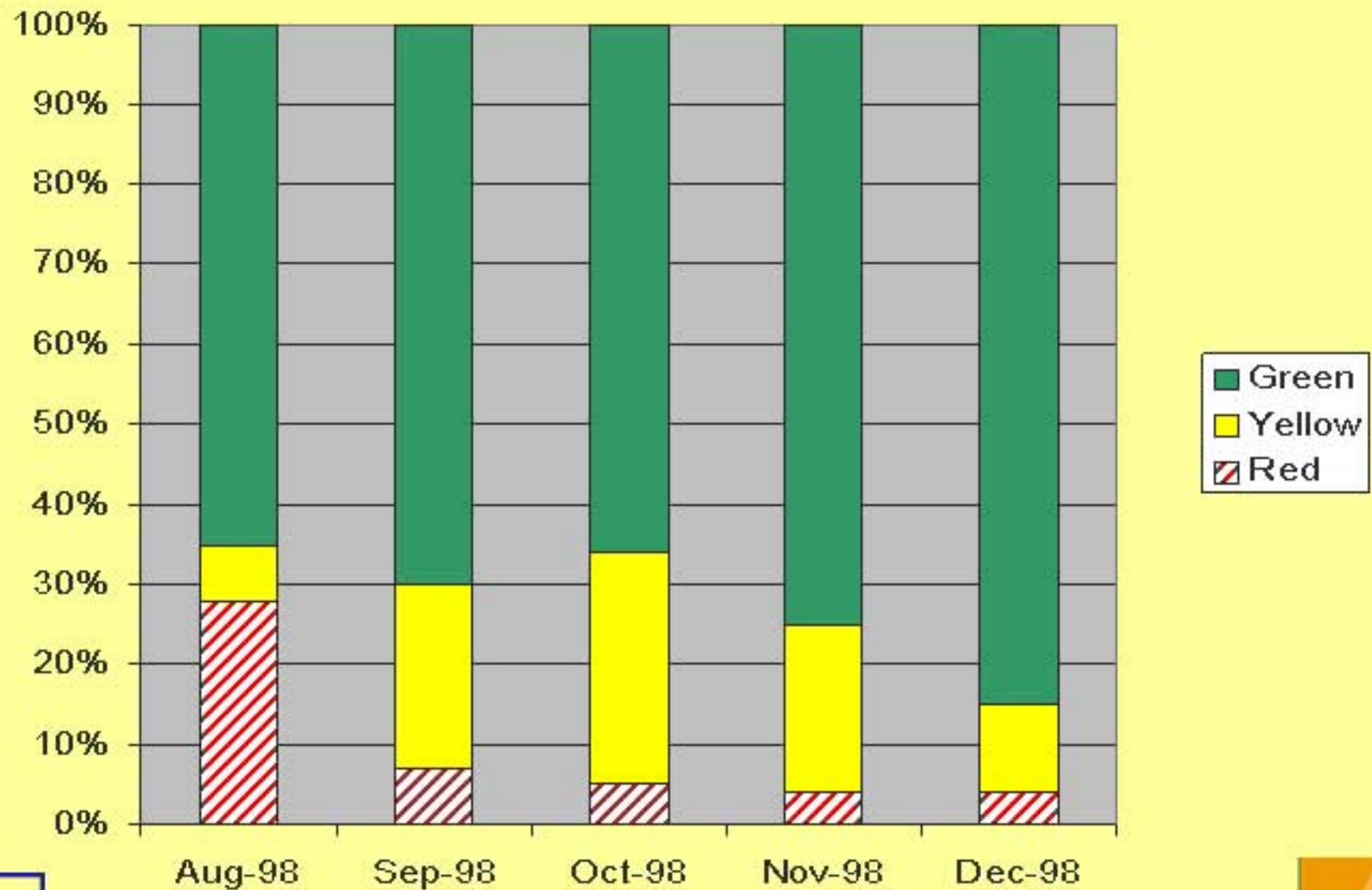
© Joel Cutcher-Gershenfeld – ESD.60 Lean/Six Sigma Systems, LFM, MIT

6/9/04 -- 4

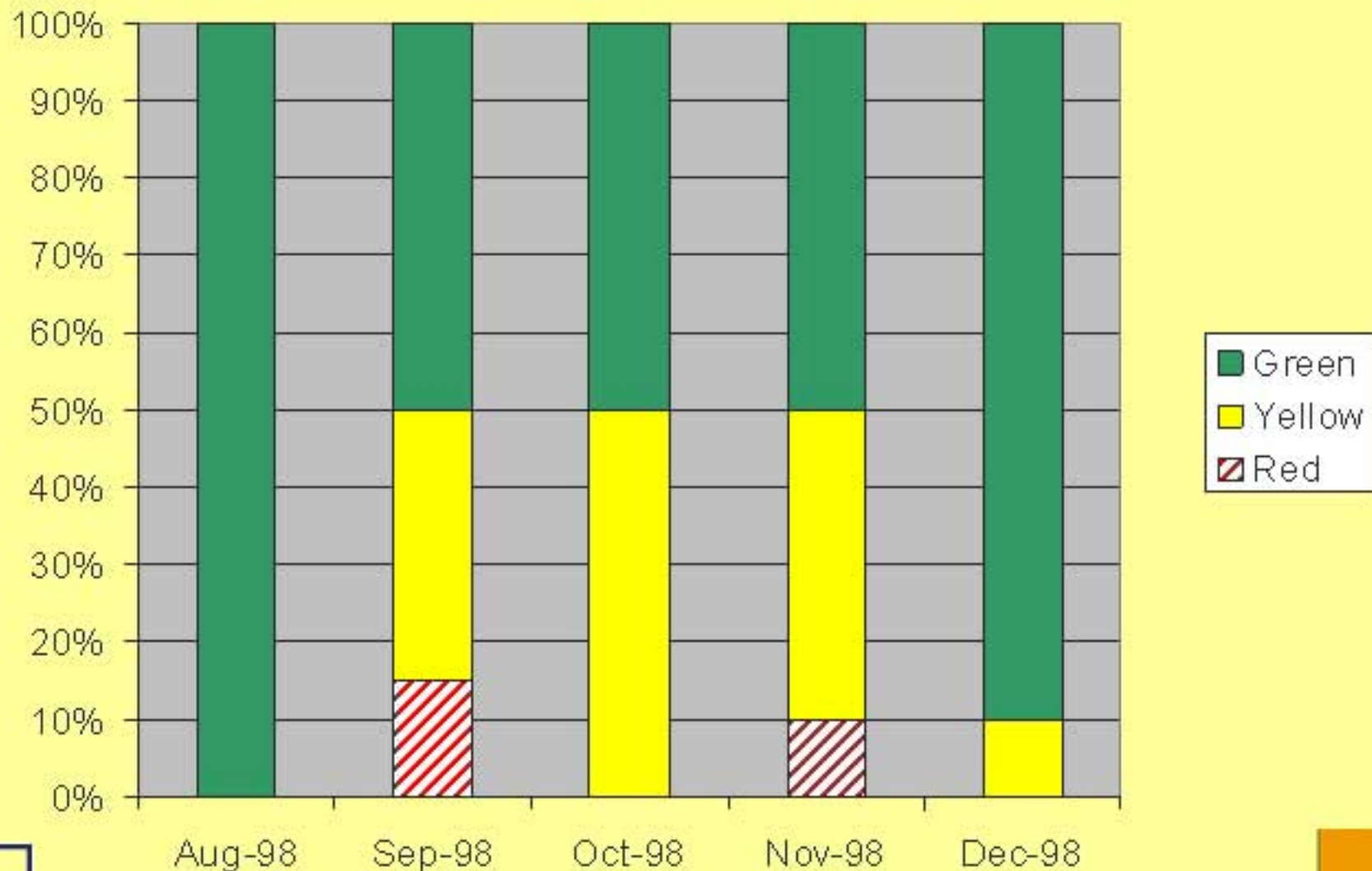


LFM

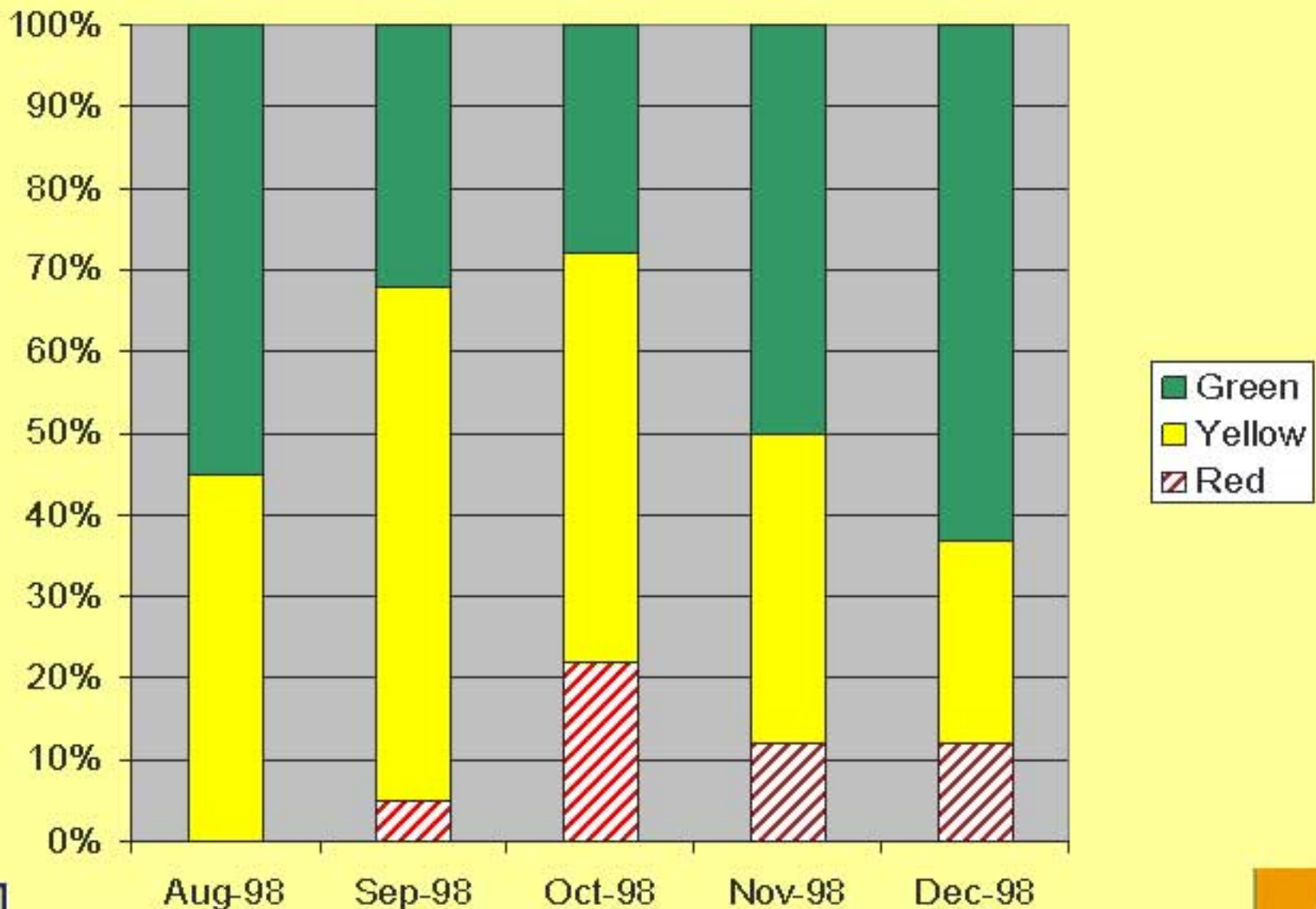
Data on Technical Milestones



Data on Social Milestones



Socio-Tech Milestone Data



Small Group and Full Group Discussion

- Small Groups (2-3 people)
 - Review the three charts with milestone performance data
 - Identify patterns and trends – be prepared to report out on your observations
- Full Group
 - What patterns or trends do you observe?
 - What might account for these results?
 - How might this be applicable to other organizations or other types of work?

Key Factors in the Launch – “Disconnects”

➤ Technical Factors

- Length of line too short
- Right size racks order, but held up and substitutes were wrong size
- Cycle time in constraint machine was too long
- “Kit” for parts didn’t hold one oversize component
- In-line repair area too small
- Cleaning time at end of shift used instead for production

➤ Social Factors

- Launch team split up and re-assigned half way through launch
- Turnover among engineers throughout launch
- Insufficient training for in-process control
- Key Work Group members not released for training
- Assumptions about pride in doing a complete job were overshadowed by the stress and peer pressure
- Jealousy between working in repair area and working on line
- Work Group Coordinator role was a “pinch” position – needing more preparation and support
- Social contract – support to do the job right – overshadowed by high schedules

Concluding Comments

- **Technical:** Management of technical milestones is well understood
- **Social:** Social milestones tend to be undervalued, with less discipline in managing performance to schedule
- **Inter-Dependence:** Delays in social milestones can have cascading impacts on Technical and Socio-Technical milestones, many of which are on the critical path for the project
- **Systems Perspective:** A systems perspective – focused on social and technical dimensions – is required

Appendix: Sample Instructor's Guide

Slide	Time	Topic	Additional Talking Points
1-2	2-3 min	Introduction, overview and learning objectives	<ul style="list-style-type: none">• Identify overall themes – don't just read from the slide• Review the 5Ws and How as background
3	2-3 min	"Fishbone" diagram on social, technical and socio-tech milestones	<ul style="list-style-type: none">• Review the concept of charting milestone performance• Review the framework – social , technical and socio-tech• Note that these are selected milestones – that actual chart had many more
4-6	3-5 min	Data on milestone performance along all three dimensions	<ul style="list-style-type: none">• Explain that the data charts tasks completed when scheduled (green), tasks begun but not complete (yellows), or not begin (red)
7	5-7 min	Small group discussion	<ul style="list-style-type: none">• Identify clusters and begin work
7	5-7 min	Full group discussion	<ul style="list-style-type: none">• Bring out themes from the small group to the full group
--	1-2 min	Concluding comments	<ul style="list-style-type: none">• Appreciation to all who make this learning viable