1990 The Machine that Changed the World
Glenn Ballard Last Planner System
Lauri Koskela Transformation-Flow-Value

1993 International Group for Lean Construction
1997 Lean Construction Institute
2005 Project Production Systems Laboratory at UC Berkeley
The Project Production Systems Laboratory (P²SL) is dedicated to
developing and deploying
knowledge and tools
to manage project production systems
and organizations producing and delivering goods and services through such systems.
1. Learning lab with ‘action research’ with groups of companies
2. Educational and training workshops
3. Knowledge dissemination
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YOUR COMPANY’S NAME BELONGS HERE TOO
Work Structuring

The extent of choices on the design of operations

Phase 1: Work Structuring and design activities

Phase 2: Last Planner
An Experiment with Takt Time
Project

- 7,500 SF Gut and Remodel
- Downtown San Mateo, CA
- OSHPD Project
- Occupied Building - Operational Hospital
- IFOA-IPD Contract with Trade Partners
- Last Planner
- Pull Scheduling
What is Takt time?

The German word for beat, the regularity with which something gets done.

DEFINITION: *The unit of time within which a product must be produced (supply rate) in order to match the rate at which that product is needed (demand rate).*

A design parameter used in a production setting (be it manufacturing, construction,...) that we can use in *Work Structuring.*
Work Structuring Objectives

1. Have trades work in a way they prefer
2. Aim for constant crew sizes and continuous work flow
3. Avoid trade stacking
4. Use timely *on Takt* handoffs
5. Balance the whole while pushing for speed
Takt Time Planning Process

Collect Data

Define Zones

Create Flow & Balance the System

Pull Plan to Reach Team Agreement

Fine Tune the System

Adapted from Ballard and Tommelein (1998) white paper on continuous flow.
Takt Time Planning Process

1. Collect Data
2. Define Zones
3. Create Flow & Balance the System
4. Pull Plan to Reach Team Agreement
5. Fine Tune the System

Adapted from Ballard and Tommelein (1998) white paper on continuous flow.
Overhead Phase LOB

- Begins with layout on the floor, ends with duct insulation, plumbing chlorinated and all overhead conduit installed.
- 44 days total
Individual Trade Workflows

Duct Sequence:
2, 1, 3, 6, 5, 4

Piping Sequence:
2, 1, 3, 6, 5, 4

Electrical Sequence:
5, 4, 1, 2, 3, 6
Overhead LOB
Communicating and controlling the space schedule

Daily progress reports and space schedule displayed via whiteboard
Interactive Daily Reports and Color Up
Continuous Improvement of the Plan

Initially structured with 4-day takt time, but we found that the crew sizes needed to be adjusted.
Overhead Phase Summary

Takt Time Planning Results

• 44 to 32 days

• Slowed down some trades, redirected some trades, sped up others, identified Last Responsible moment to speed up or slow down

• “9/10 when we accelerate, this costs us money. We’ve gone so much faster on this job and it hasn’t cost us a dime” - PM Jeff Stewart of Southland
“Make it Visual, Make it Simple”
Level 10
Facebook West Campus

😊 Interiors phase schedule > 60 pages
😊 Complicated to read
~ 100 different locations

Plan ➔ Do ➔ Check ➔ Act ➔ Plan

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## Schedule

**WELCOME**

**WHAT WOULD YOU LIKE TO DO?**

**UserForm1**

Enter date (mm/dd/yyyy)

Schedule Imported on (mm/dd/yyyy)

Color up all zones

**UserForm5**

I want to color up the following:

- [ ] AREA E
- [ ] AREA D
- [ ] AREA C
- [ ] AREA B
- [ ] AREA A
- [ ] All Areas

**STEP1:** Import New Schedule into Excel

**STEP2:** New schedule is imported. Update this Workbook.

**STEP3:** Color Up an Area

NAME FILE of MAPS POPULATED AND SAVE AS PDF

EXPERIENCING A PROBLEM?