

# Lean Construction Institute

Building Knowledge in Design and Construction

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# Phase Scheduling

Glenn Ballard

P2SL Research Workshop

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<http://p2sl.berkeley.edu/>

# Purpose of the Workshop

- P2SL and LCI are launching a program to develop training in lean methods. The training courses will be based on process benchmarks grounded in experimentation. There will be courses in phase scheduling, lookahead planning, reliable promising, learning from breakdowns ( $PDCA_B$ ), learning from experiments ( $PDCA_E$ ), value stream mapping, 5S, setting targets, designing to targets, set based design, and more.

# Purpose of the Workshop

- In recognition of the fact that all benchmarks can and should be improved over time, each publication of a process benchmark will be accompanied by description of the research that will be carried out to improve the benchmark. Taking phase scheduling as an example, we might decide to do research on the average duration of scheduled activities, or research how and when to allocate schedule contingency to individual tasks or to reserve it in a general schedule buffer for the phase as a whole.

# Desired Outcomes

1. Agreement on a process benchmark for phase scheduling.
2. Agreement on the research needed to improve the benchmark.

# Workshop Agenda

1. Start up
2. Framing by Ballard (the nominal standard for phase scheduling)
3. Reports from practice:
  - Jay Davison
  - Sakari Pesonen
  - George Zettel
  - Steve Knapp
4. Agree on a process benchmark for phase scheduling
5. Agree on the research needed to improve the benchmark
6. Wrap up

# Planning, Controlling & Correcting

SHOULD

Master Scheduling

Set milestones

Phase Scheduling

Specify handoffs

CAN

Lookahead Planning

Make ready &  
Launch  
replanning when  
needed

WILL

Weekly Work Planning

Promise

DID

Learning

Measure PPC &  
Act on reasons  
for failure to  
keep promises

# Purpose of Phase Scheduling

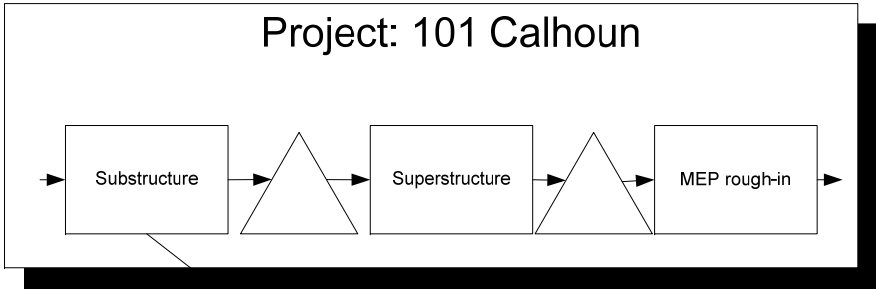
To produce a plan for completing a phase of work...

- that maximizes value generation;
- that everyone involved understands and supports;
- that specifies the handoffs between work groups;
- from which scheduled activities are drawn into the lookahead process to be exploded into operational detail and made ready for assignment in weekly work plans.

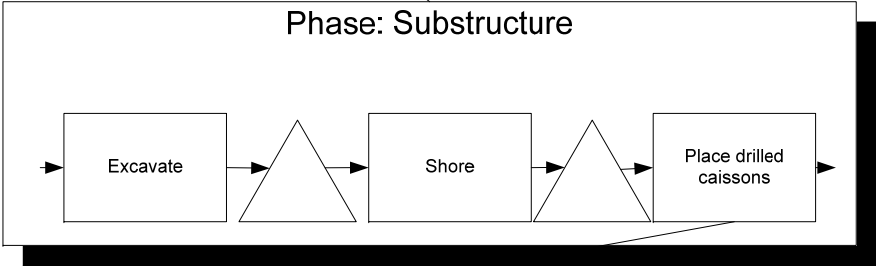




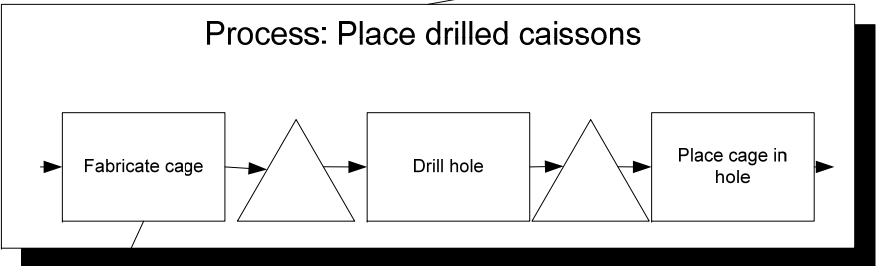
**Phases**



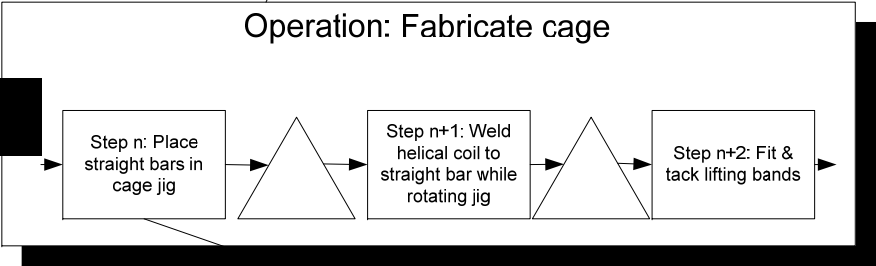
**Processes**



**Operations**



**Motions**



Motion Analysis of Steps into Therbligs

# Participants in Phase Scheduling

Participants in the phase scheduling process are representatives of those with work to do in the phase. For example, a team working to schedule a construction phase would typically involve the general contractor and subcontractors, and perhaps stakeholders such as designers, client, and regulatory agencies. Participants should bring relevant schedules and drawings including the master schedule and perhaps even the contract.

# Phase Scheduling Process

1. Define the work to be included in the phase; e.g., foundations, building skin, etc.
2. Determine the completion date for the phase, plus any major interim releases from prior phases or to subsequent phases.
3. Using team planning and sticky backed cards on a wall, develop the network of activities required to complete the phase, working backwards from the completion date, and incorporating any interim milestones.

# Phase Scheduling Process

4. Apply durations to each activity, with no contingency or padding in the duration estimates. Try to use the duration you would expect under normal conditions.
5. Reexamine logic to try to shorten the duration—ask each person what change in the requests they receive would enable them to shorten task durations.
6. Determine the earliest practical start date for the phase.

# Phase Scheduling Process

7. If there is time left over after comparing the time between start and completion with the duration of the activities on the wall, decide what activities to buffer or pad with additional time.
  - a. Which activity durations are most fragile?
  - b. Rank order the fragile activities by degree of uncertainty.
  - c. Allocate available time to the fragile activities in rank order.

*Note: this is contingency you intend to spend, unlike budget contingency.*

# Phase Scheduling Process

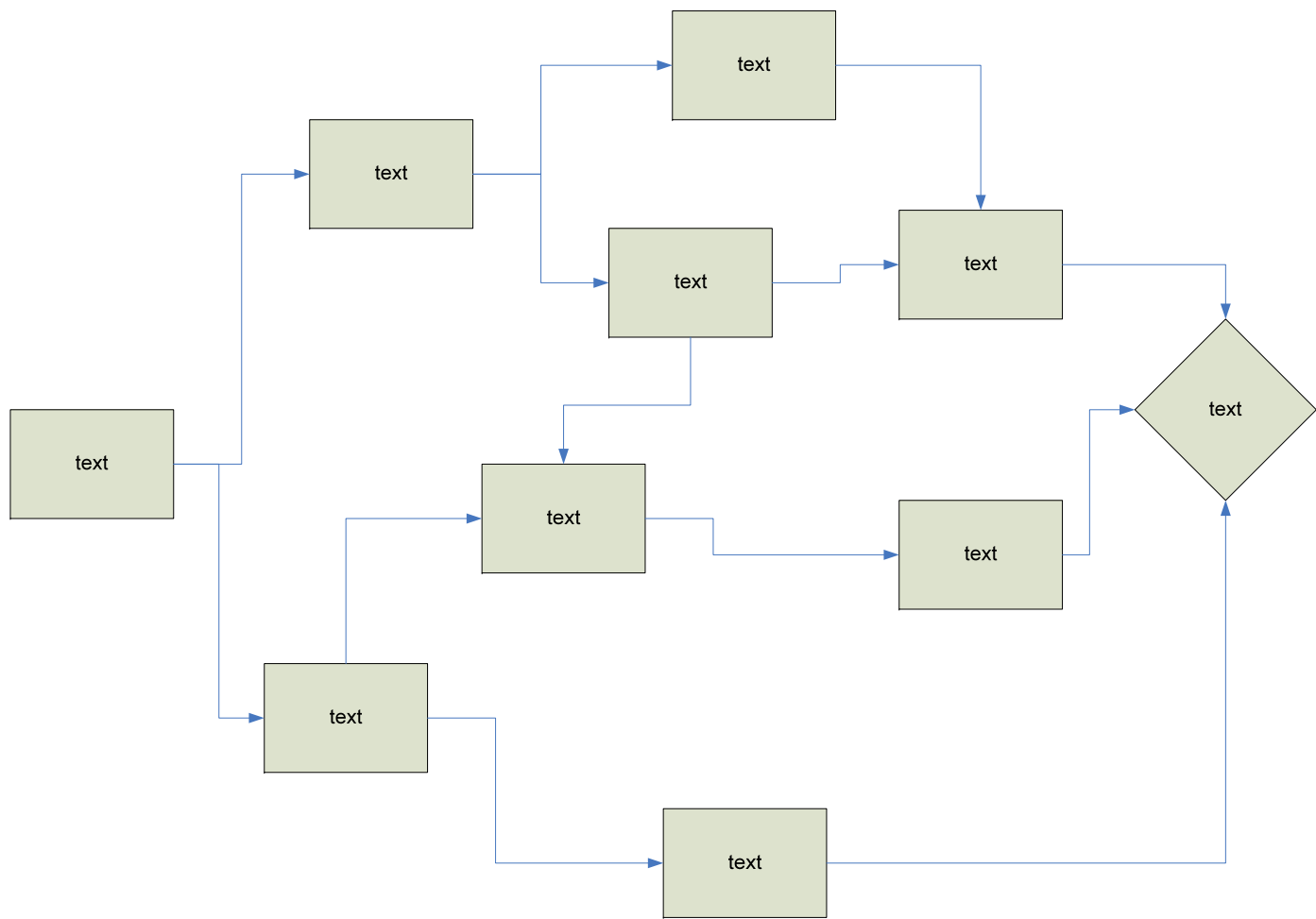
8. Is the team comfortable that the available buffers are sufficient to assure completion within the milestone(s)? If not, either replan or shift milestones as needed and possible.
9. If there is excess time available beyond that needed for buffering individual tasks, decide whether to accelerate the schedule or use the excess to increase the probability of on-time completion.
10. Reserve unallocated time in a general contingency buffer for the phase.





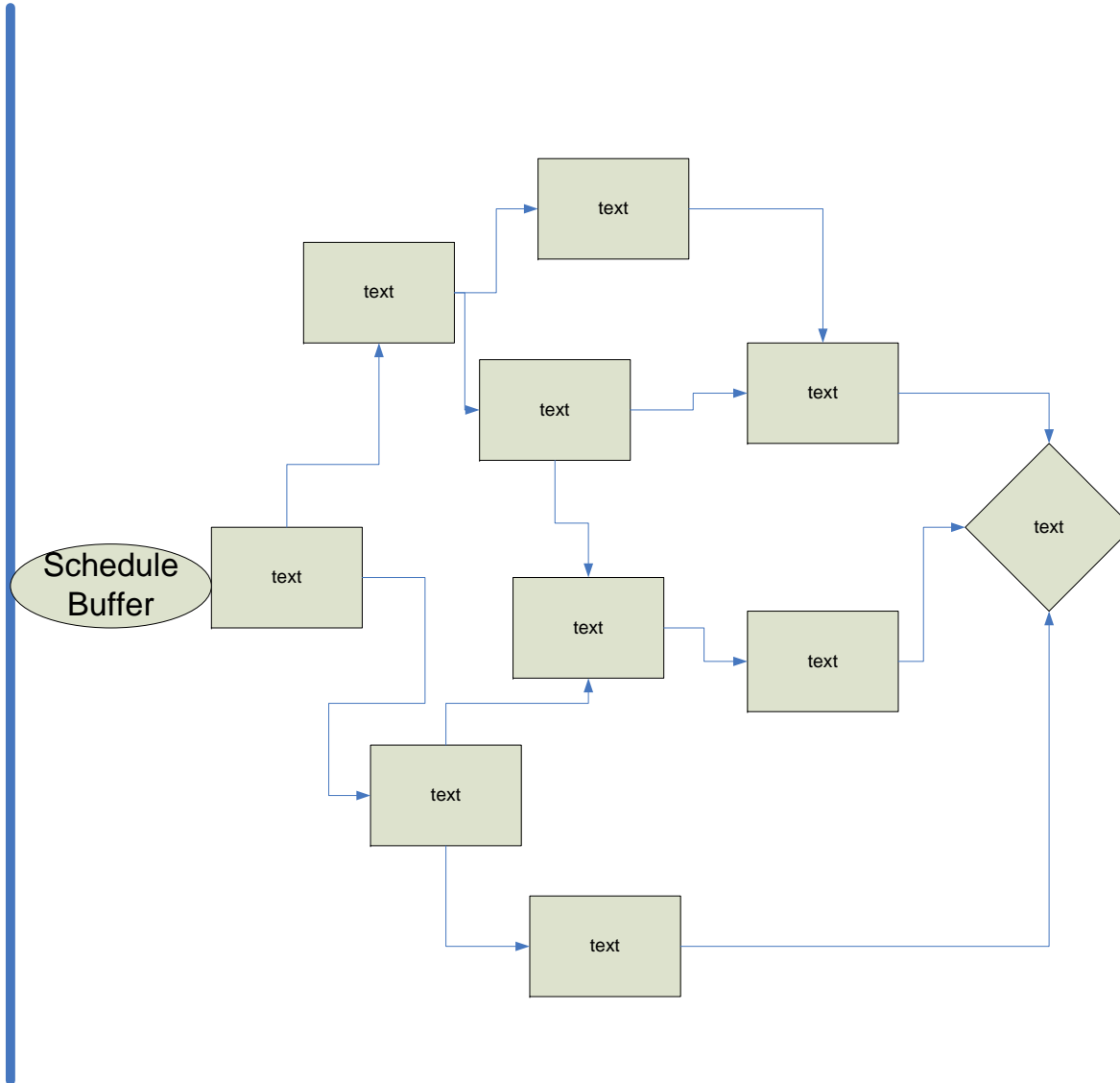
Date  
Project or  
Phase  
Must Start

End Date



Date  
Phase  
Must Start

End Date



# Workshop Agenda

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# Issues

- Pre-meeting instructions; preparation
- Getting started
- Knowing when to stop
- Level of detail: specifying, controlling
- Participants: acceptable substitutes, ...
- Multiple roles: leader, facilitator, ...?
- Tools; e.g., pre-printed sticky notes, line-of-balance visualization
- Calculating phase durations
- Testing and refining the phase schedule after the backward pass
- .....

# Questions

- Has anyone produced a phase schedule with float (schedule contingency) made evident?

What should be included in the current process benchmark?

What research is needed to improve the benchmark?