Effective Implementation of Work Packaging for Complex Projects

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Point of Departure : What is Advanced Work Packaging?

- Work packaging breaks the complete project scope of work into pieces so they can be planned and made ready to be designed, procured, and constructed, and so these processes can be monitored and controlled.
- The pieces in AWP are Construction Work Areas (CWAs), which consist of discipline-specific Construction Work Packages (CWPs), each of which are fed by one or more Engineering Work Packages (EWPs). CWPs are divided into Installation Work Packages (IWPs) consisting of the work a construction crew of the relevant craft can do in one or two weeks.

EWP → CWP → IWP

- "Advanced Work Packaging" appears to signify the explicit link between engineering and construction work, and the specification of the process of defining and assembling the work package documents.

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AWP Point of Departure

- Foreman + 1 crew
- Approx. 1 week or 500-1,000 hours

EWP1

EWP2

EWP3

- Contracts
- Information

e.g., design & fabrication drawings

CWP123

IWP123-1

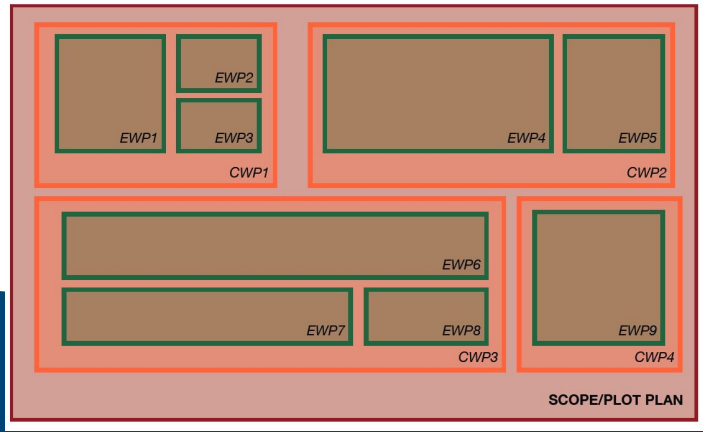
IWP123-2

IWP123-3

IWP123-4

COMMISSIONING
CLOSE-OUT
TURNOVER

- Vendor Supplied, Engineered Materials
- Commodity Materials
- Equipment, Scaffolding
- Tools
- Manpower



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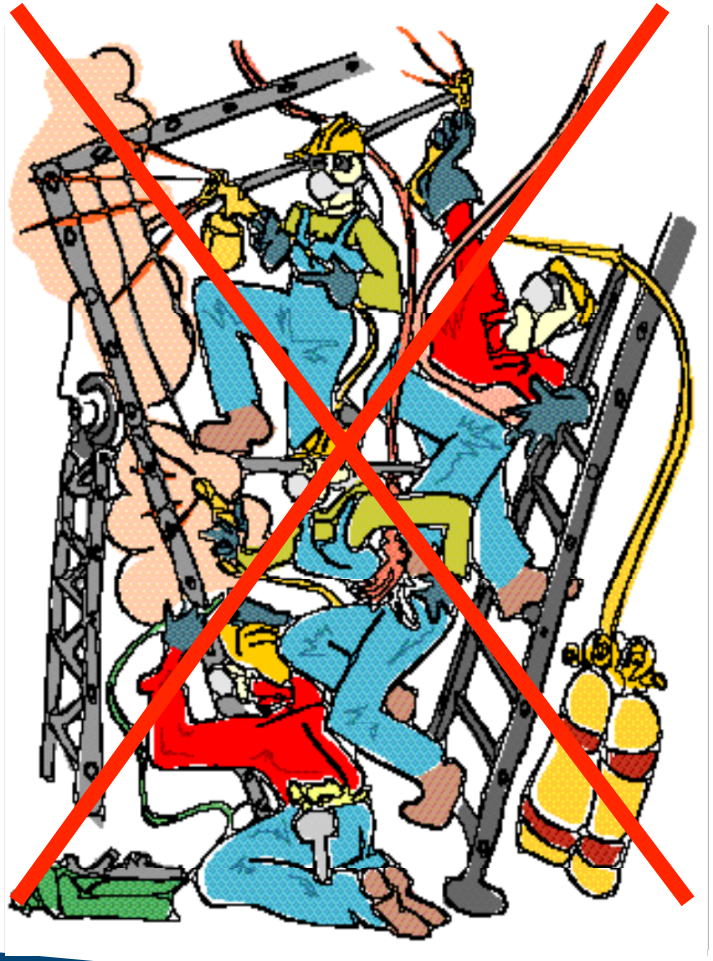
Production System Design
Characteristics and Parameters

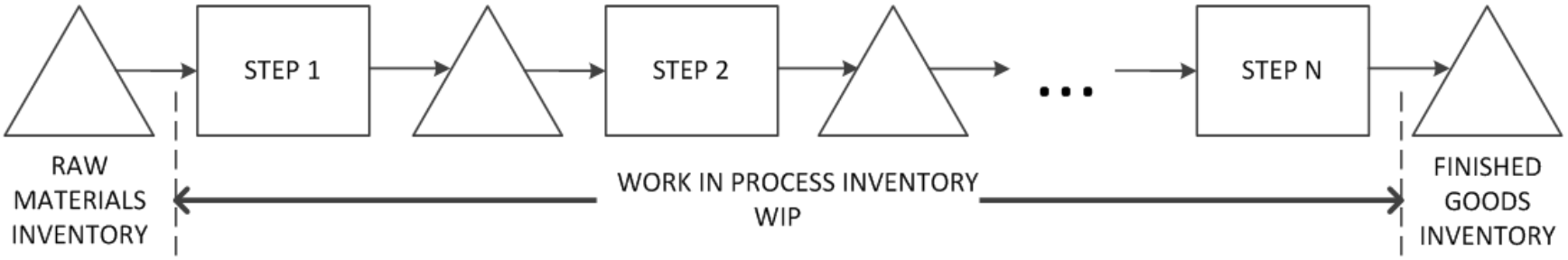
- Variation in duration (time)
- Variation in product characteristics
- Supply network connectivity
- Batching
  - Production Batches
  - Transfer Batches
- Matching
- Lead Times
- Buffering

Work Structuring Objectives

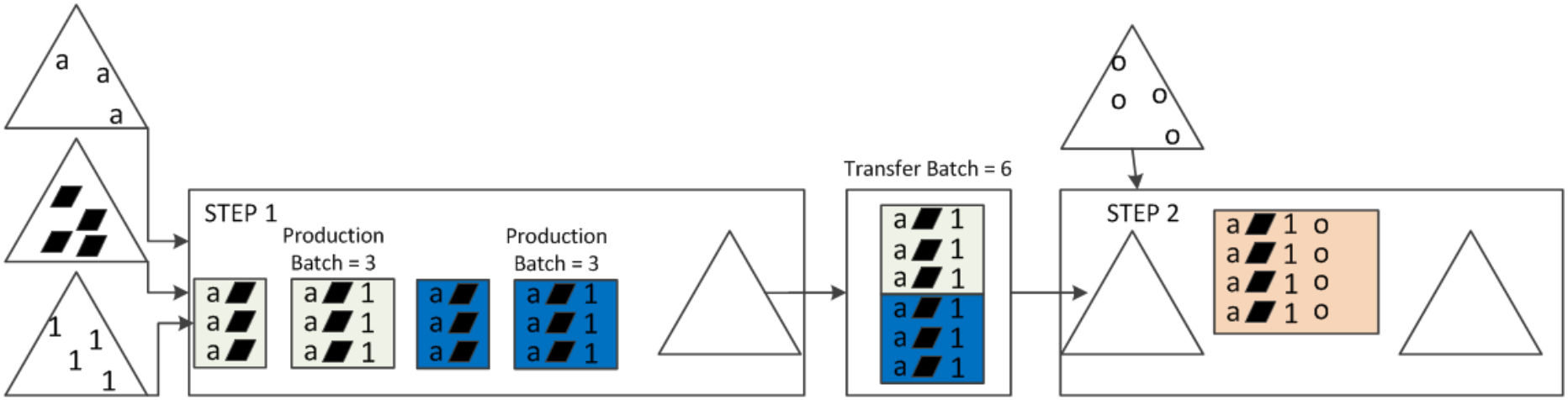


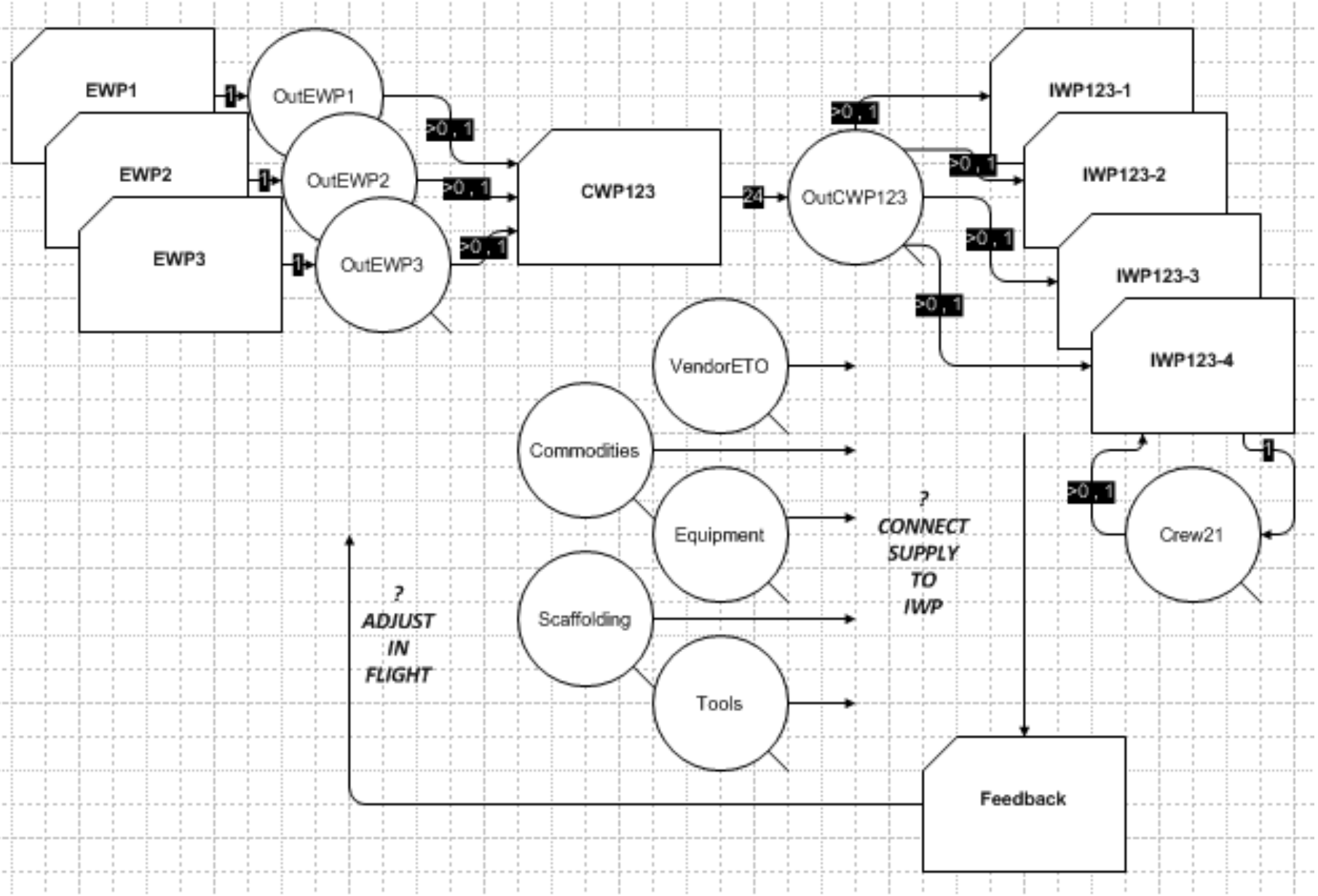
1. Have trades work in a way they prefer
2. Aim for constant crew sizes and continuous work flow
3. Avoid trade stacking
4. Use timely *on Takt* handoffs
5. Balance the whole while pushing for speed

Inventory

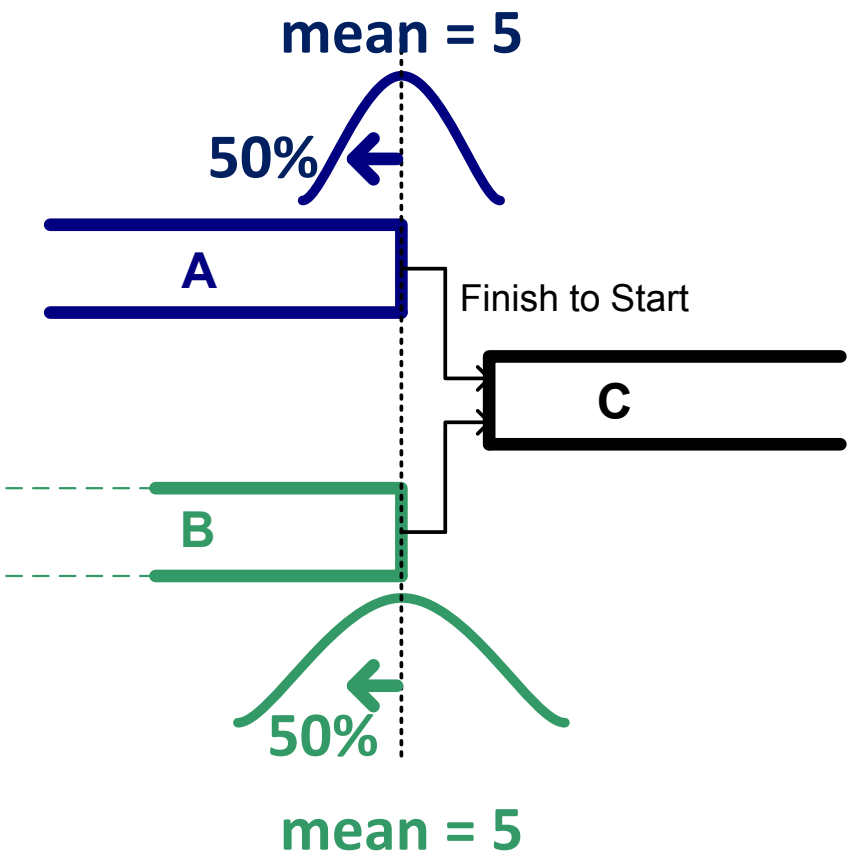

STEP 1
STEP 2
STEP N
RAW MATERIALS INVENTORY
WORK IN PROCESS INVENTORY
WIP
FINISHED GOODS INVENTORY

Batching


STEP 1
Production Batch = 3
Production Batch = 3
Transfer Batch = 6
STEP 2


EWP1
EWP2
EWP3
OutEWP1
OutEWP2
OutEWP3
>0, 1
CWP123
24
OutCWP123
IWP123-1
IWP123-2
IWP123-3
IWP123-4
VendorETO
Commodities
Equipment
Scaffolding
Tools
Crew21
? CONNECT SUPPLY TO IWP
? ADJUST IN FLIGHT
Feedback

Merge Bias Effect

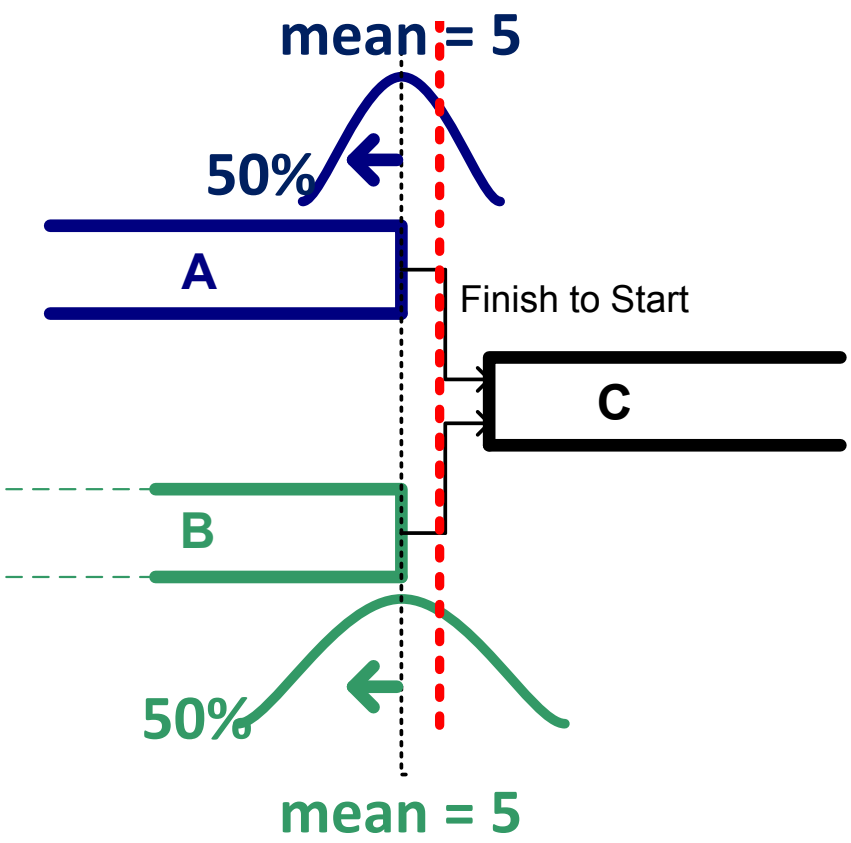


	A ≤ 5	A > 5
B ≤ 5	C can start at 5	C delayed
B > 5	C delayed	C delayed

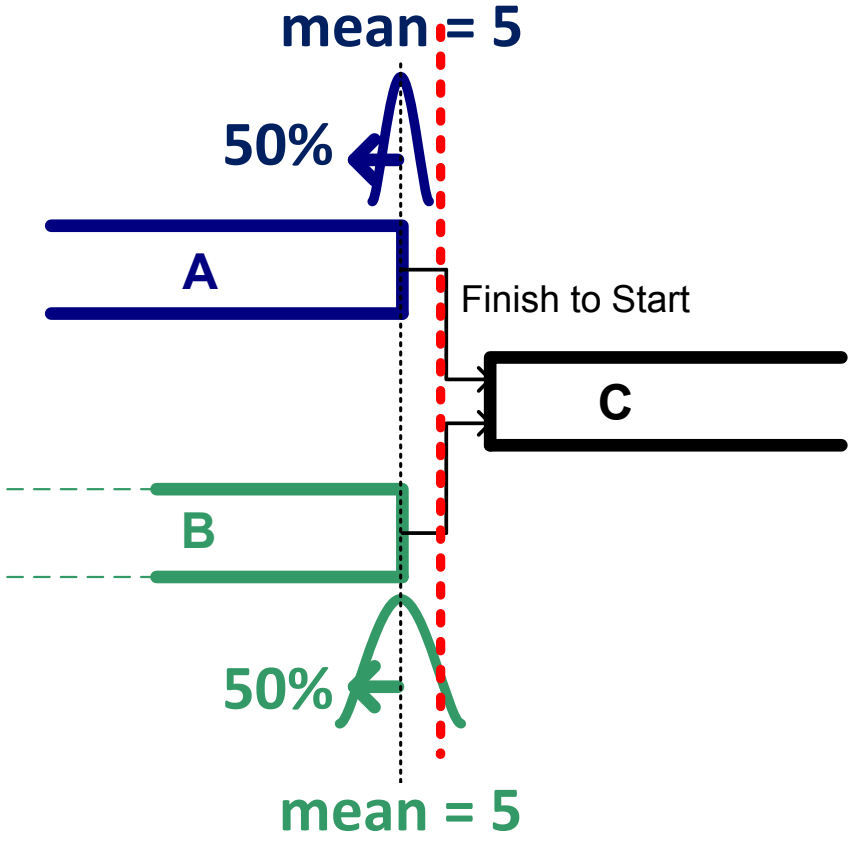
C has only 25% chance of being able to start at time 5

Which is more likely to have C start at time 6?

LEFT



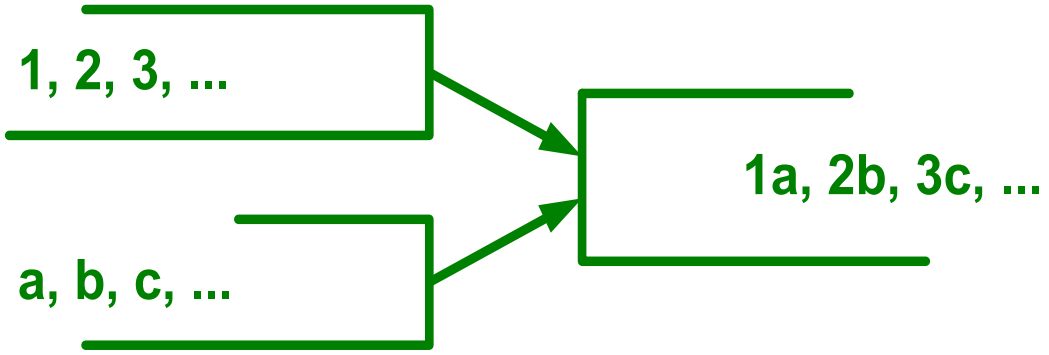
RIGHT



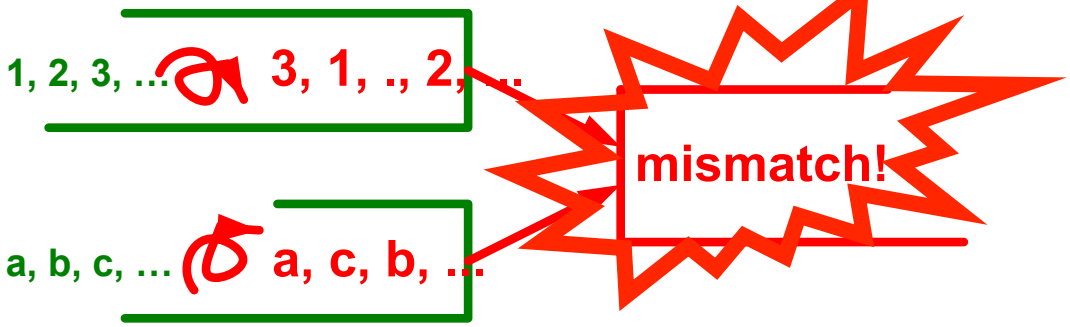
Matching Problems

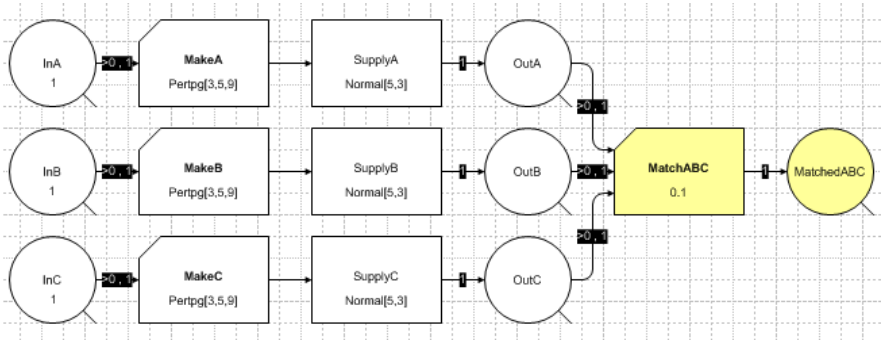
P2SL

EXPECTATION:

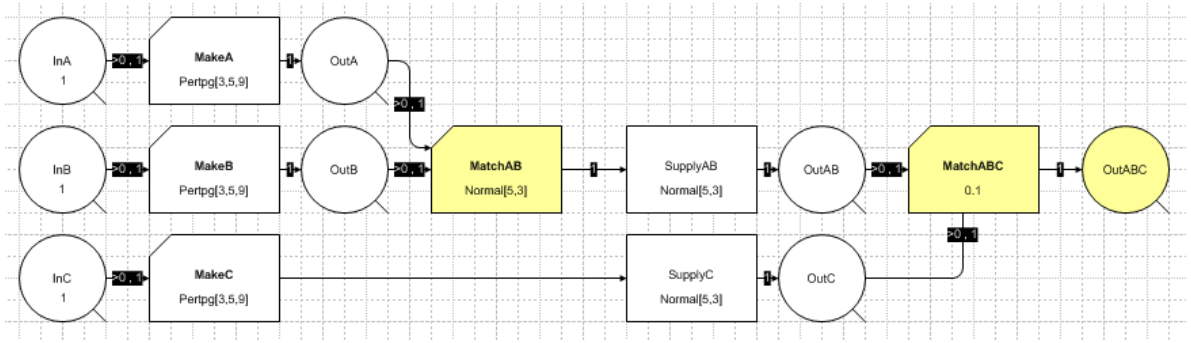


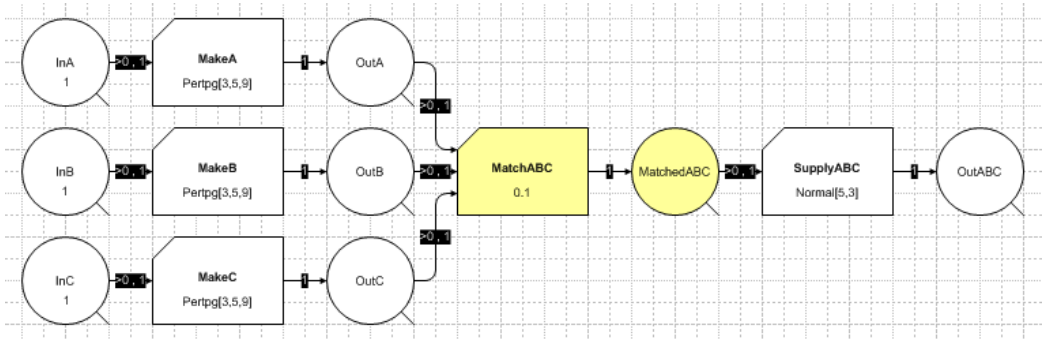
REALITY:





Matching Late vs Earlier - Kitting





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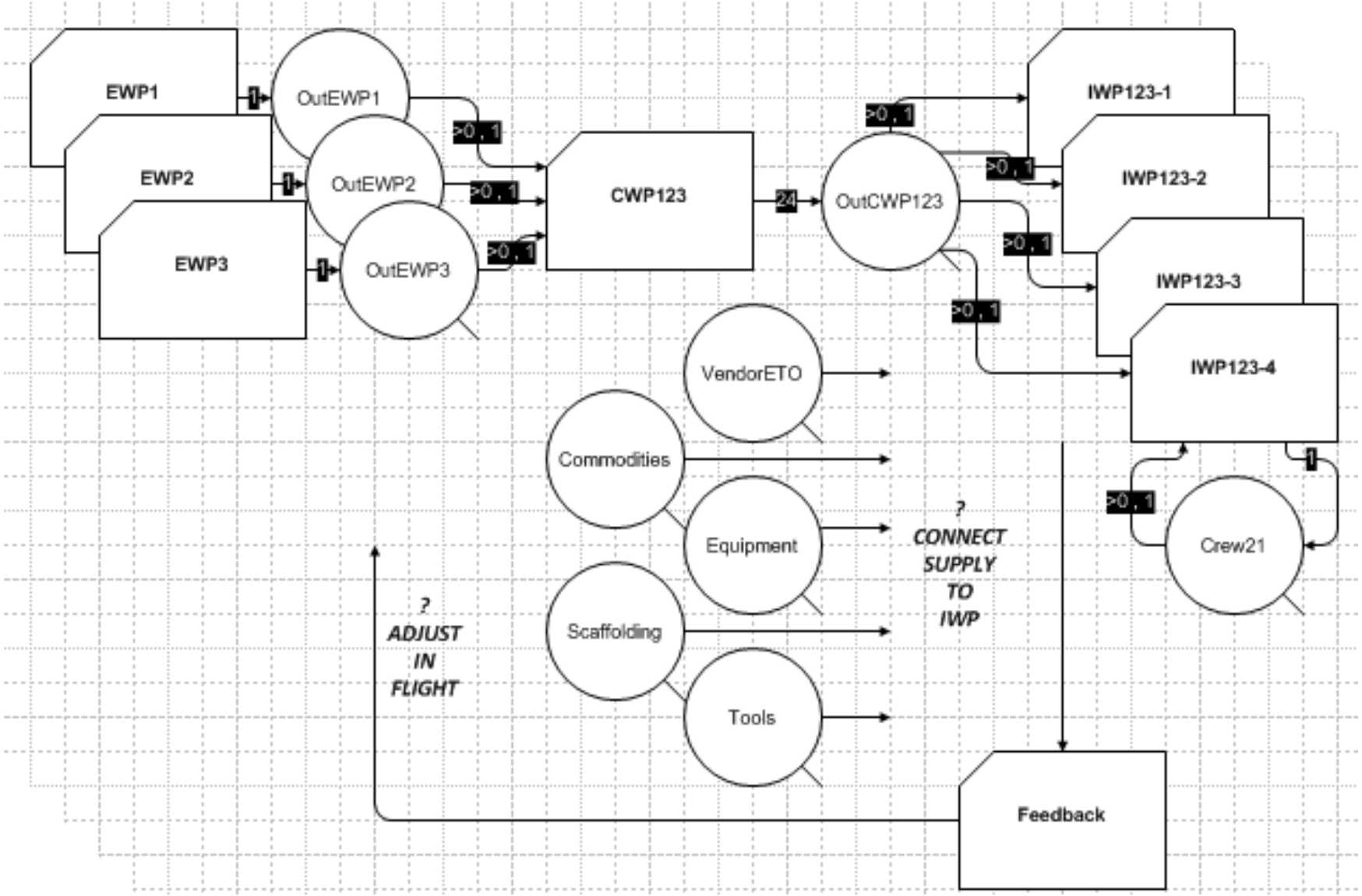
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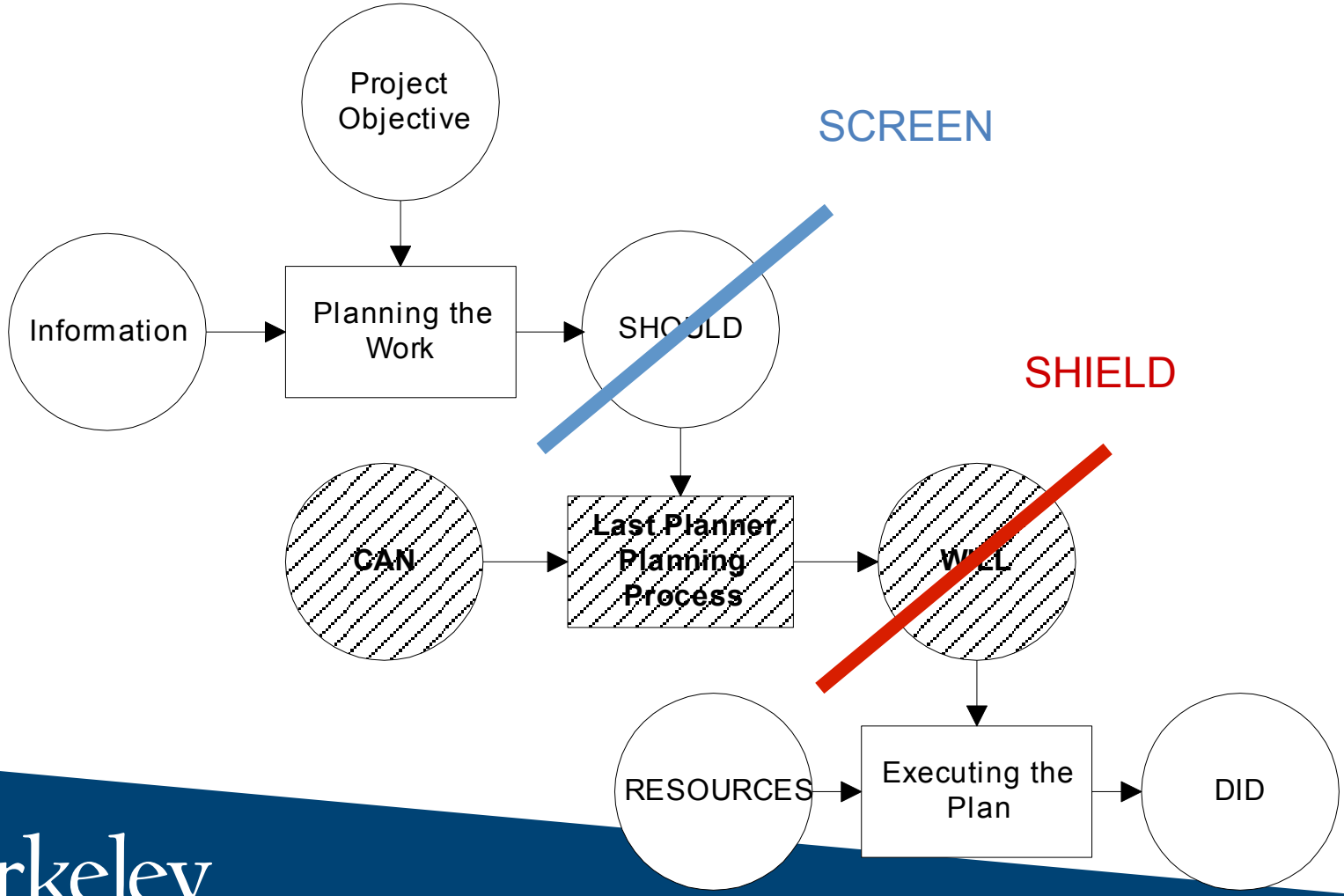
Last Planner™ System (Ballard and Howell 1994)



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Next Steps

1. Identify projects to study.
2. Describe their production system in detail (mapping, simulation).
3. Collect production data, such as inventory data, lead times, uncertainties, variation, etc.
4. Test our expectations.

P²SL Mission

The Project Production Systems Laboratory 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.

Initiatives

1. Learning lab with ‘action research’ with groups of companies, e.g., INITIATIVES on
    - Target Value Design
    - Takt Time Planning
    - Safety
2. Educational and training workshops
3. Knowledge dissemination

Members

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Clark Construction
DPR Construction
Graña y Monteiro
Herrero Contractors
Project Production Institute
Rhumbix
Rosendin Electric
Southland Industries
SunPower
Sutter Health
UC Berkeley
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Target Value Design Research Initiative Sponsors

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