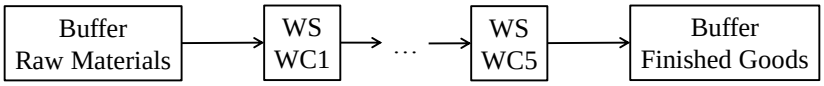
A Production Game

- Draw the process flow map.



- Set up SimQuick to simulate the production game.
  Estimate working time of WSs using Uni(a,b)

A Production Game

- What is the overall mean throughput?
  Final inventory of Finished Goods
- What is the overall mean cycle time of the process?
  Add all potential delays together including working times of work stations, cycle times of internal buffers of work stations, and cycle times of buffers.
- What is the utilization of a work station?
  Fraction time working of the work station

How to improve the throughput of the process?

- One easy solution is to add buffers – work-in-process (WIP) inventory

Concepts involved in manufacturing processes

- Throughput of a process:
  - Number of good units produced during some time period
- Cycle time of a process
  - The mean amount of time it takes one unit to go from the start to the finish of a process.
- Work-in-process (WIP) Inventory
- Utilization of a work station
- Causes of variability in a manufacturing process:
  - Processing times of machines/workers
  - Quality of output of machines/workers
  - Demand of customers (at end of process; i.e., the last "machine")
  - Reliability of suppliers (at beginning of process; i.e., the first "machine")

Principles from the production game (relationships between the concepts)

- As work-in-process inventory increases (from near zero):
  - Inventory costs increase.
  - Throughput of process increases (to a point, after which it remains the same).
  - Cycle time of process increases.

- As variability decreases, throughput of process increases.

Demo of graphical simulation packages

- AnyLogic
  - www.anylogic.com
- Simulation Visualization
  - https://www.runthemodel.com