

THE CARD GAME

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Objectives

- Hands-on experience
- Generate your own “process data”
- See first-hand the negative impacts of:
 - Defects
 - Variation
 - “Push” systems
- Obtain a tool for your use

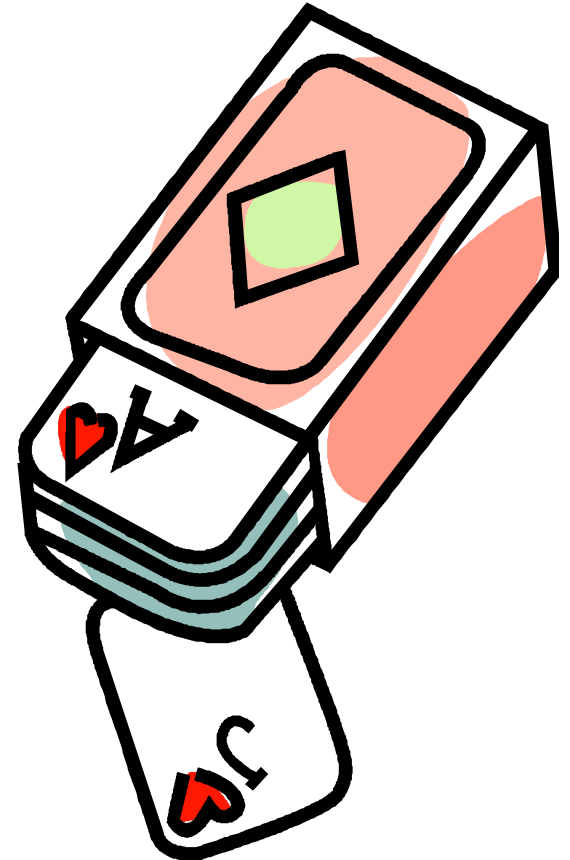
Ground Rules

- It's OK to have fun – as long as we remain respectful of one another
- Please try your best to follow the “rules” of the game
 - Improvising risks compromising the learning experience
 - Improvising increases confusion
- There is no such thing as a dumb question!

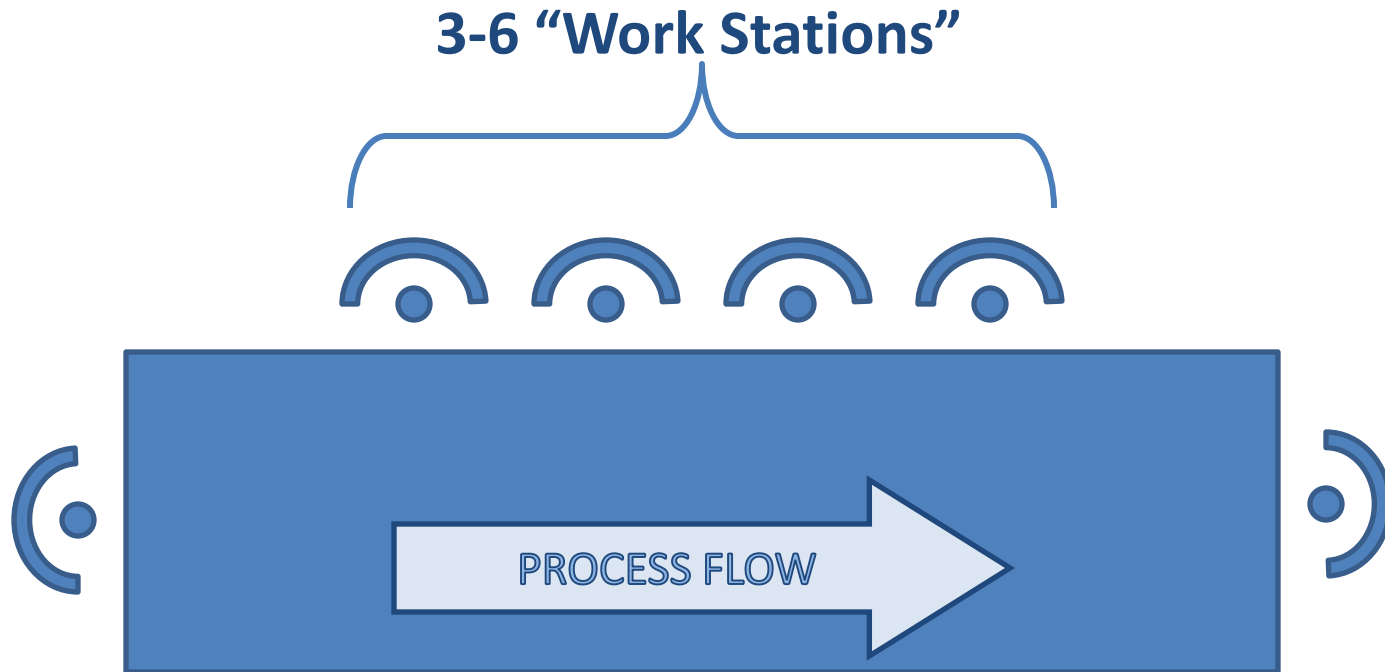
The Game

(Instructor Will Demonstrate)

- We are going to simulate a “process”
- The process consists of picking up a playing card and holding it for a period of time
- The period of time comes from the random number sheets that will be distributed (also in Appendix for your future use)
- Hold the card up until you hear the same number of “ticks” as your current random number



Setting Up The Game



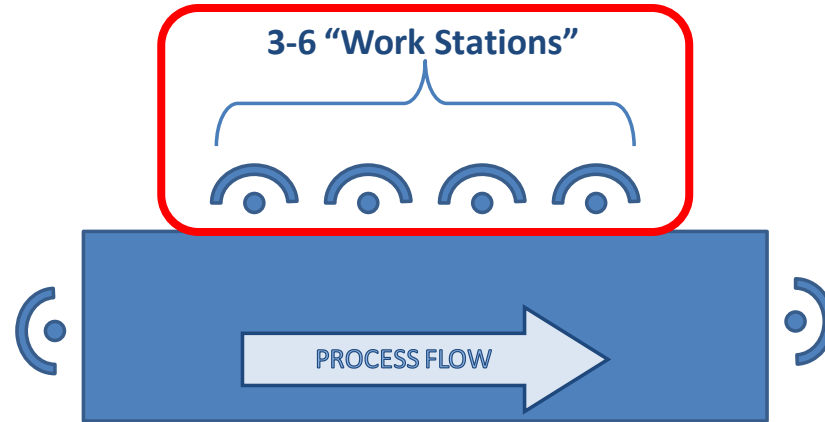
Each "Work Station" starts with two playing card in its "in box"

Using Random Number Sheets

- Make sure you are using the appropriate side of the sheet for the current round
- Pick any one reading on the random number sheet
- Proceed systematically in one direction: horizontally, vertically, or diagonally
- Move to the next row, column, or diagonal when you reach the end

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 3 | 2 | 3 | 2 | 6 | 6 | 4 | 5 | 1 |
| 6 | 4 | 4 | 4 | 2 | 2 | 4 | 2 | 1 | 3 |
| 3 | 3 | 5 | 2 | 1 | 1 | 2 | 3 | 4 | 2 |
| 5 | 5 | 2 | 6 | 4 | 1 | 6 | 4 | 1 | 6 |
| 3 | 1 | 2 | 6 | 3 | 4 | 4 | 3 | 3 | 4 |
| 2 | 6 | 6 | 1 | 4 | 6 | 4 | 6 | 3 | 1 |
| 4 | 3 | 1 | 1 | 3 | 3 | 1 | 2 | 2 | 5 |
| 2 | 1 | 6 | 2 | 4 | 2 | 3 | 2 | 2 | 2 |
| 6 | 3 | 4 | 2 | 3 | 6 | 2 | 2 | 6 | 6 |
| 4 | 6 | 5 | 1 | 6 | 5 | 2 | 1 | 4 | 5 |
| 4 | 6 | 4 | 1 | 6 | 4 | 6 | 3 | 4 | 5 |
| 6 | 3 | 1 | 1 | 4 | 5 | 5 | 1 | 1 | 2 |
| 5 | 1 | 1 | 2 | 1 | 1 | 5 | 5 | 1 | 6 |
| 6 | 2 | 4 | 1 | 1 | 4 | 4 | 5 | 2 | 5 |
| 4 | 2 | 1 | 3 | 1 | 3 | 5 | 2 | 2 | 1 |
| 4 | 6 | 6 | 2 | 4 | 2 | 4 | 1 | 1 | 2 |
| 4 | 4 | 5 | 5 | 3 | 2 | 6 | 4 | 2 | 4 |
| 6 | 6 | 1 | 6 | 6 | 6 | 2 | 6 | 3 | 4 |
| 2 | 4 | 2 | 2 | 5 | 3 | 5 | 1 | 1 | 4 |
| 2 | 6 | 2 | 1 | 3 | 2 | 6 | 2 | 1 | 3 |
| 6 | 1 | 6 | 6 | 2 | 4 | 5 | 2 | 1 | 3 |
| 5 | 5 | 2 | 4 | 2 | 1 | 6 | 1 | 6 | 3 |
| 4 | 5 | 5 | 4 | 1 | 5 | 1 | 1 | 6 | 2 |
| 4 | 5 | 1 | 2 | 2 | 1 | 4 | 4 | 6 | 4 |
| 3 | 4 | 3 | 1 | 2 | 5 | 2 | 2 | 6 | 1 |
| 2 | 6 | 6 | 6 | 3 | 4 | 3 | 6 | 3 | 1 |
| 2 | 2 | 5 | 3 | 1 | 6 | 4 | 1 | 6 | 3 |
| 1 | 6 | 3 | 5 | 4 | 5 | 3 | 1 | 2 | 5 |
| 1 | 3 | 5 | 3 | 6 | 2 | 1 | 6 | 1 | 3 |
| 1 | 4 | 3 | 4 | 6 | 5 | 5 | 4 | 6 | 1 |

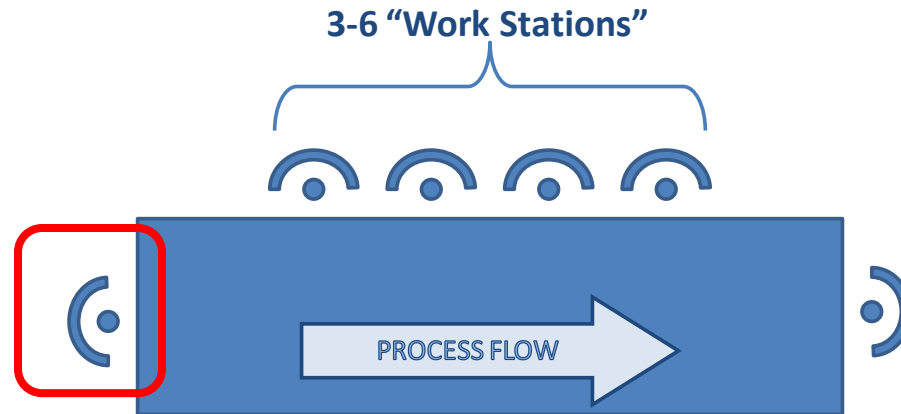
Work Station Instructions



The metronome will run throughout the exercise

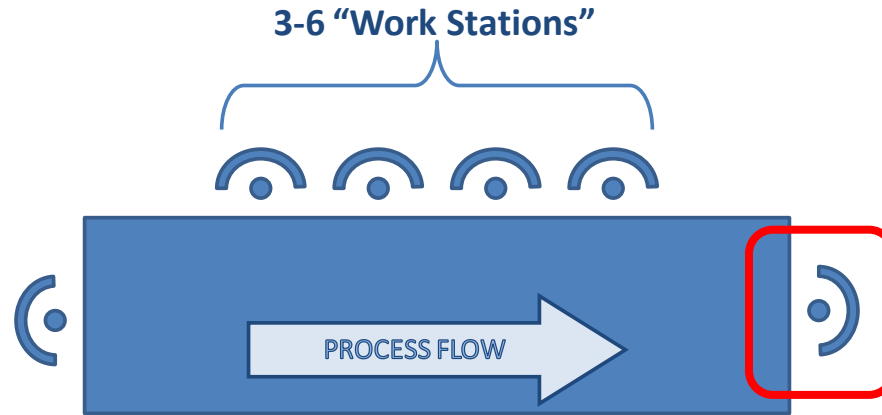
1. When the instructor says “go,” pick up a card from your “in box” (left of you)
2. Hold the card near your face until you hear the same # of ticks as your current random number – **don't** start the count until the card is being held near your face
3. Place the card in the next work station's in box
4. Pick up the next card (wait for a card if your in box is empty)
5. Repeat steps 2-4 until instructor says “stop”

“Production Controller” Instructions



1. At start of exercise, pick up one card from the deck
 - If it is a “Queen” or a “One-eyed Jack” put a Post-It™ on the card – this will represent a “defect”
 - For rounds 2 & 4 we won't be introducing any defects
2. Hold the card near your face for **a count of four ticks** – don't start the count until the card is being held near your face
3. Place the card in the in box of the first work station
4. Repeat steps 1-3 until the instructor says “stop”

“Inspector” Instructions



- Accumulate cards to your left – that will represent “finished goods”
- If a card comes to you with a “defect” (a Post-it™ note affixed):
 - Remove & discard the defect
 - Place the card in the first stations in box

Data Collection

- After each round we will track finished goods and work in progress (WIP)
- Finished Goods = # of cards to the left of the inspector
- WIP = the sum of:
 - All cards held in work station workers' hands
 - All cards in in boxes
 - Any cards that have been delivered to the inspector but not transferred to finished goods

Five Rounds of Simulation

1. Baseline / worst case:
 - Defective cards 11.5%
 - High variation in cycle times at work stations
 - Push processing
2. Eliminate defects – no Post-it™ notes
3. Reduce variation at work stations
4. Reduce “push” – introduce a new card every 6 beats
5. All three improvements

Practice Round – 20 Seconds

- This will not count for the data collection
- It is just a chance to verify that we understand the procedures
- Before we start, any questions?

BEGIN THE SIMULATION!

Debrief

- Did the improvement options have more or less impact than you anticipated?
 - Eliminate defects / rework
 - Load leveling
 - Less push processing
 - All three improvements
- Speculation on impact of these factors in your work place?
- What other measures might have been impacted?
- How can this learning experience benefit others?

Go Forth...

- This PowerPoint file contains everything you need for the exercise, except the metronome
- Contact me to email you the file:

JANDELL@ANDELLASSOCIATES.COM

Thank You For Participating!

- Any questions, comments, concerns?
- Suggestions for improvement?



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PEOPLE – PROCESS – DATA

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APPENDIX A

RANDOM NUMBER SHEETS

Rounds 1, 2, & 4

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | 3 | 2 | 3 | 2 | 6 | 6 | 4 | 5 | 1 |
| 6 | 4 | 4 | 4 | 2 | 2 | 4 | 2 | 1 | 3 |
| 3 | 3 | 5 | 2 | 1 | 1 | 2 | 3 | 4 | 2 |
| 5 | 5 | 2 | 6 | 4 | 1 | 6 | 4 | 1 | 6 |
| 3 | 1 | 2 | 6 | 3 | 4 | 4 | 3 | 3 | 4 |
| 2 | 6 | 6 | 1 | 4 | 6 | 4 | 6 | 3 | 1 |
| 4 | 3 | 1 | 1 | 3 | 3 | 1 | 2 | 2 | 5 |
| 2 | 1 | 6 | 2 | 4 | 2 | 3 | 2 | 2 | 2 |
| 6 | 3 | 4 | 2 | 3 | 6 | 2 | 2 | 6 | 6 |
| 4 | 6 | 5 | 1 | 6 | 5 | 2 | 1 | 4 | 5 |
| 4 | 6 | 4 | 1 | 6 | 4 | 6 | 3 | 4 | 5 |
| 6 | 3 | 1 | 1 | 4 | 5 | 5 | 1 | 1 | 2 |
| 5 | 1 | 1 | 2 | 1 | 1 | 5 | 5 | 1 | 6 |
| 6 | 2 | 4 | 1 | 1 | 4 | 4 | 5 | 2 | 5 |
| 4 | 2 | 1 | 3 | 1 | 3 | 5 | 2 | 3 | 1 |
| 4 | 6 | 6 | 2 | 4 | 2 | 4 | 1 | 5 | 2 |
| 4 | 4 | 5 | 5 | 3 | 2 | 6 | 4 | 2 | 4 |
| 6 | 6 | 1 | 6 | 6 | 6 | 2 | 6 | 3 | 4 |
| 2 | 4 | 2 | 2 | 5 | 3 | 5 | 1 | 1 | 4 |
| 2 | 6 | 2 | 1 | 3 | 2 | 6 | 2 | 1 | 3 |
| 6 | 1 | 6 | 6 | 2 | 4 | 5 | 2 | 1 | 3 |
| 5 | 5 | 2 | 4 | 2 | 1 | 6 | 1 | 6 | 3 |
| 4 | 2 | 5 | 4 | 1 | 5 | 1 | 1 | 6 | 2 |
| 4 | 2 | 1 | 2 | 2 | 1 | 4 | 4 | 6 | 4 |
| 4 | 5 | 1 | 2 | 2 | 1 | 4 | 4 | 6 | 4 |
| 3 | 4 | 3 | 1 | 2 | 5 | 2 | 2 | 6 | 1 |
| 2 | 6 | 6 | 6 | 3 | 4 | 3 | 6 | 3 | 1 |
| 2 | 2 | 5 | 3 | 1 | 6 | 4 | 1 | 2 | 5 |
| 1 | 6 | 3 | 5 | 4 | 5 | 3 | 1 | 2 | 5 |
| 1 | 3 | 5 | 3 | 6 | 2 | 1 | 6 | 1 | 3 |
| 1 | 4 | 3 | 4 | 6 | 5 | 5 | 4 | 6 | 3 |

APPENDIX B

COMPUTATION SPREAD SHEET

Spread Sheet

- Enter the number of seconds where the red text is – current default is 3 minutes
- Fill in data after each round of the simulation

| | Baseline | Reduce Rework | Reduce Variation | Reduce Utilization | All 3 Improvements |
|-------------------|----------|---------------|------------------|--------------------|--------------------|
| 180 | | | | | |
| Exit Number | | | | | |
| Exit Rate | 0 | 0 | 0 | 0 | 0 |
| WIP | | | | | |
| Process Lead Time | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |
| % Improvement | | #DIV/0! | #DIV/0! | #DIV/0! | #DIV/0! |