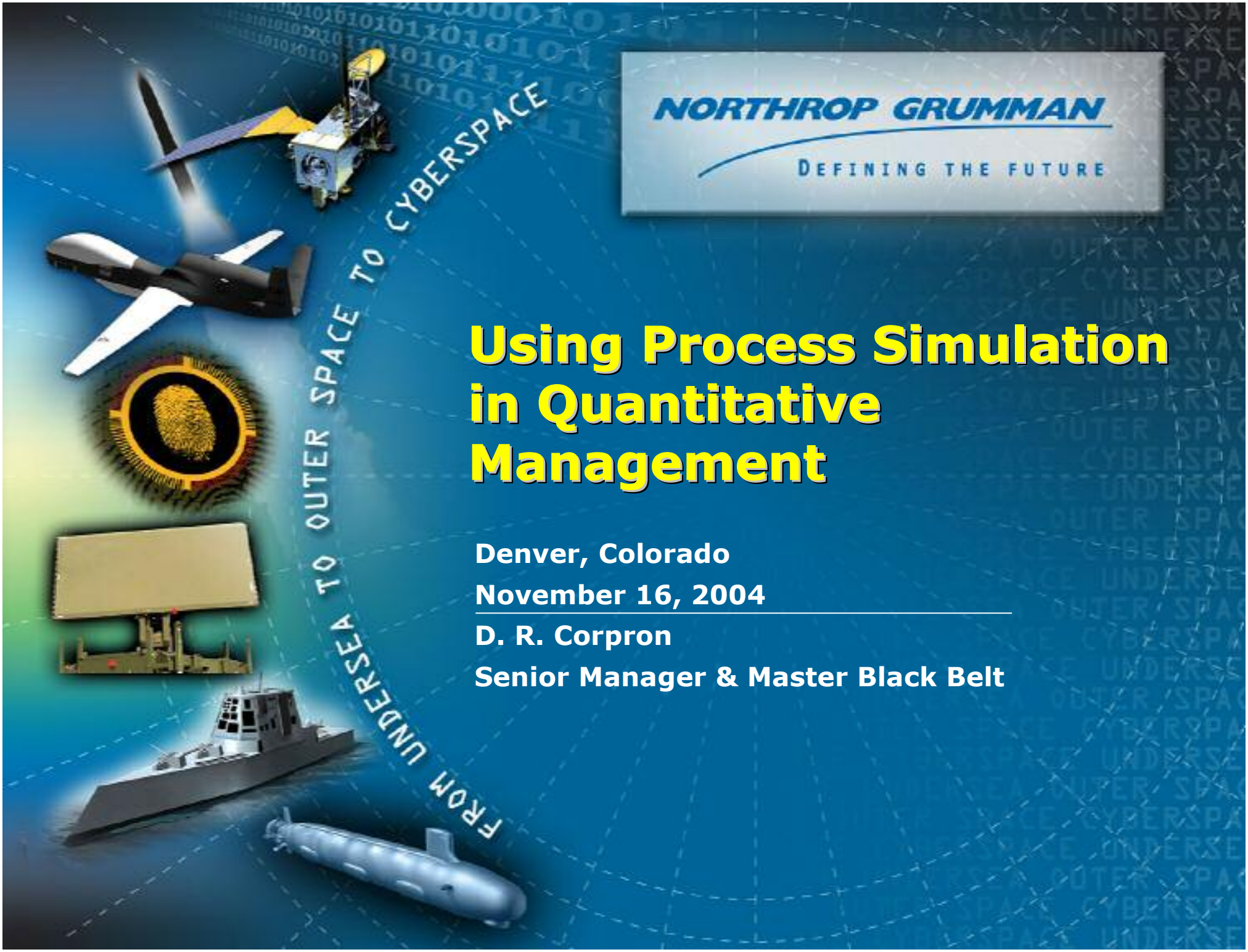


Using Process Simulation in Quantitative Management

Denver, Colorado

November 16, 2004

D. R. Corpron

Senior Manager & Master Black Belt

Preview

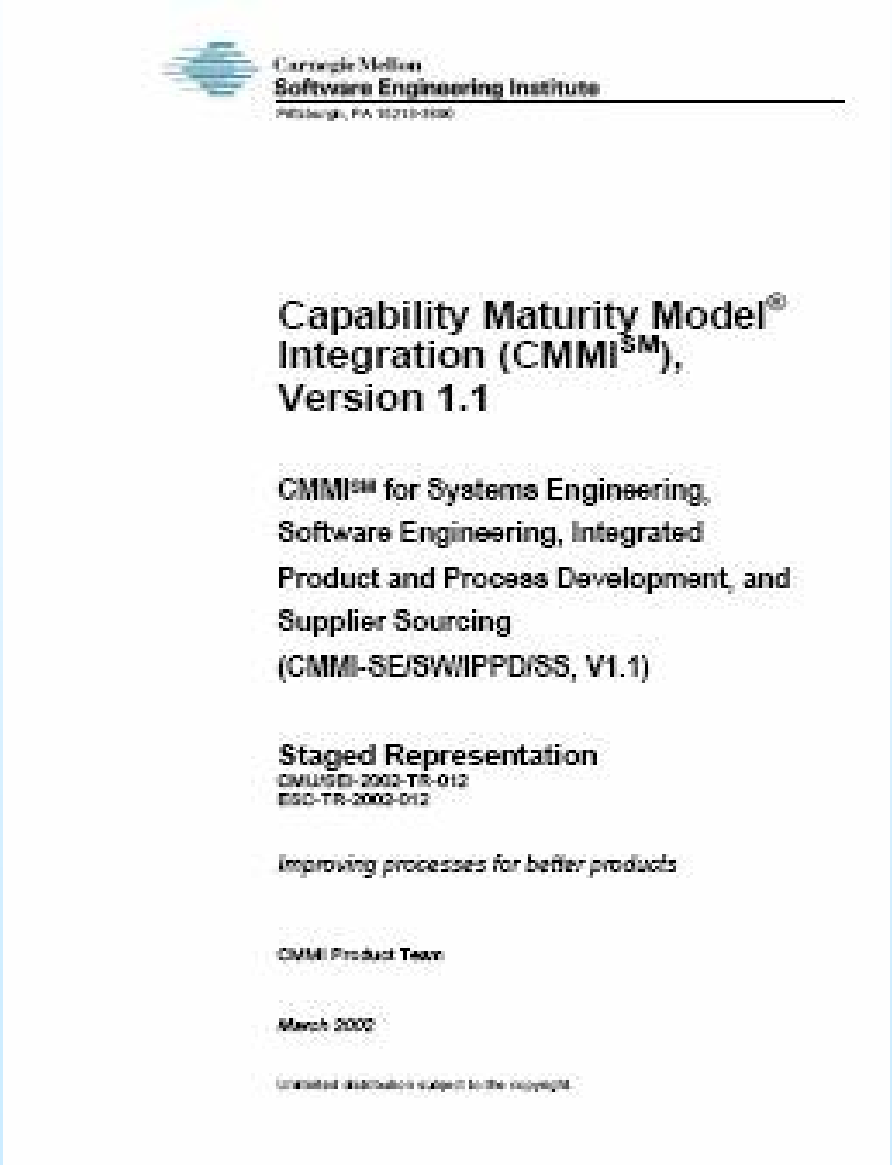
- What is the problem?
- Why process simulation?
- Steps to perform the simulation
- Data checks
- Mapping the process
- Animating the process
- Interpreting the results

What is the problem?

Can we achieve our project's objectives for quality and process performance? Subject to:

- Required to add new features or fix defects according to Customer change requests
- Two levels of priority...
  A. Must Have (90%)
  B. Nice to Have (45%)
- Required to perform work on a fixed allocation of hours in a specific time frame

What's the practice?


Carnegie Mellon
Software Engineering Institute

Capability Maturity Model® Integration (CMMI℠), Version 1.1

CMMI℠ for Systems Engineering, Software Engineering, Integrated Product and Process Development, and Supplier Sourcing (CMMI-SE/SW/IPPD/SS, V1.1)

Staged Representation
CMU/SEI-2002-TR-012
ESC-TR-2002-012

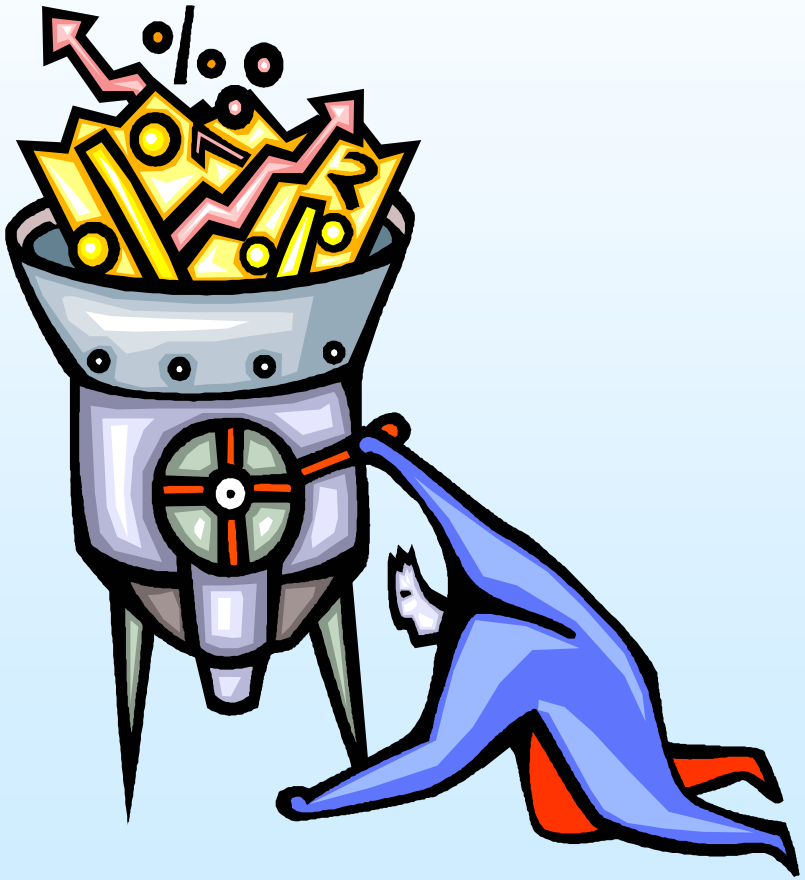
Improving processes for better products

CMMI Product Team

March 2002

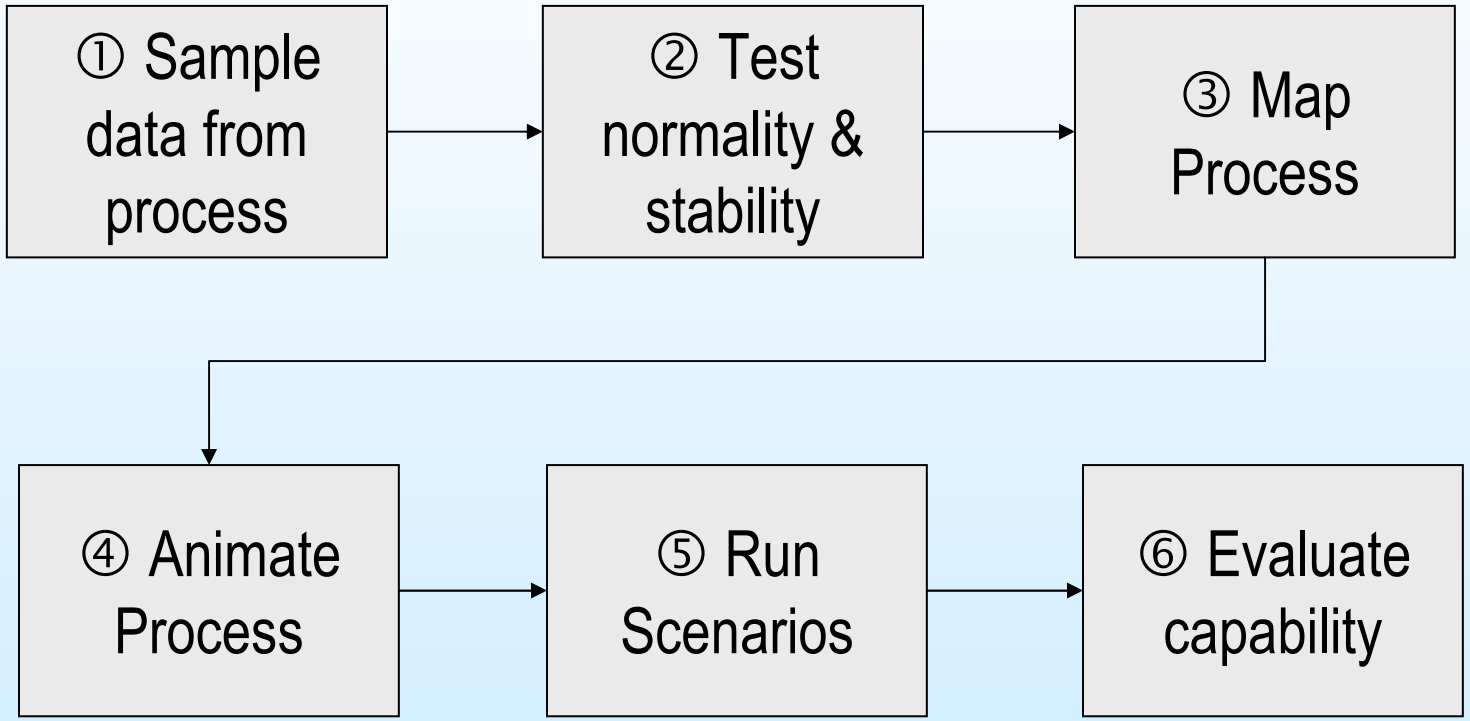
SP 1.4: Monitor the project to determine whether the project's objectives for quality and process performance will be satisfied, and identify corrective action as appropriate. [PA165.IG101.SP104]

Why process simulation?

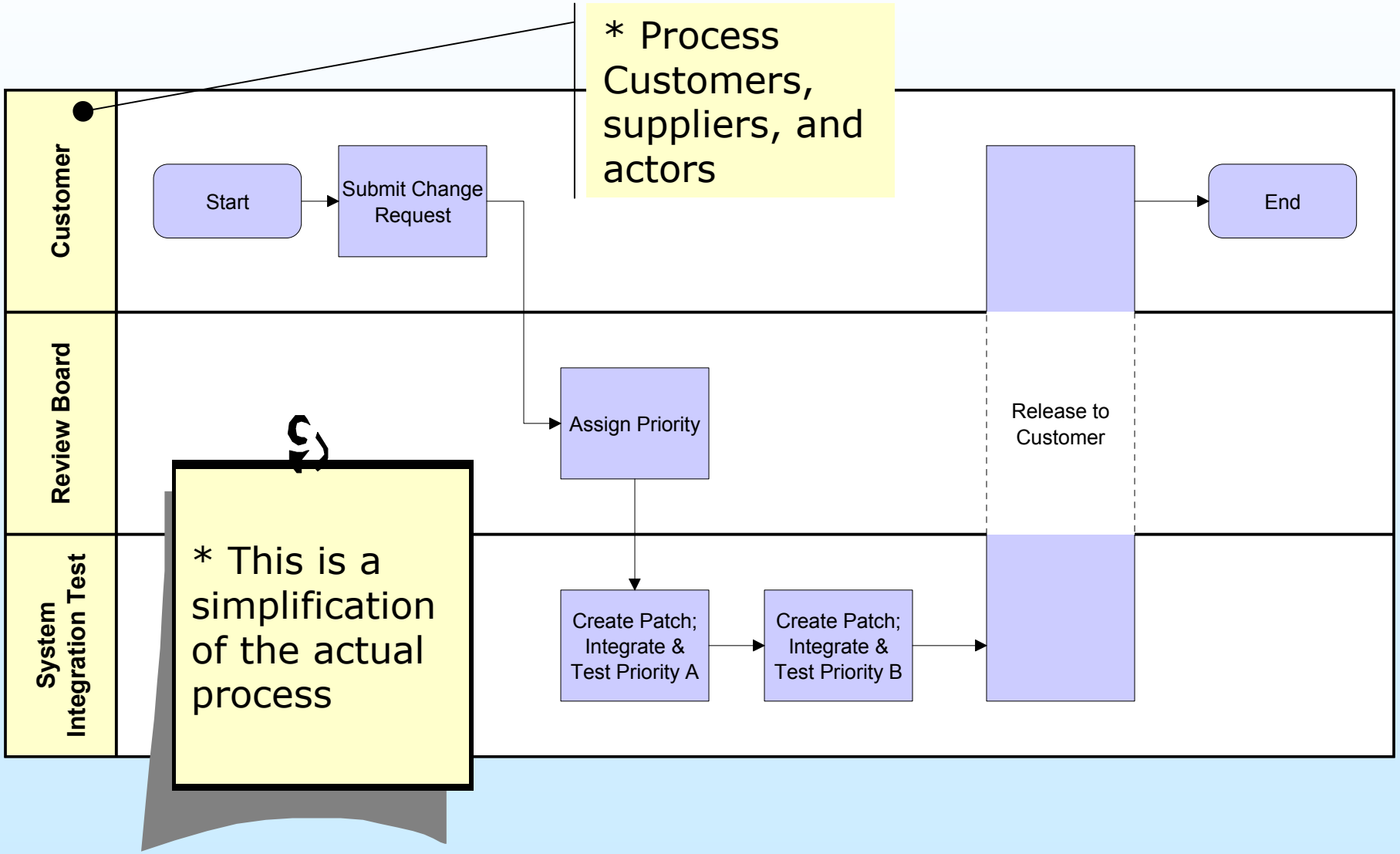


- Build on existing process maps
- Can judge common cause risk because it is probabilistic rather than deterministic
- Even aperiodic processes can be executed many times to see variability in time compressed views
- Easy to perform “what if” analysis with instant results and no disruption of the real process
- Aggregate performance of the parts to predict the mean and variability of the overall process
- Compare predicted performance to Customer’s critical-to-quality requirements

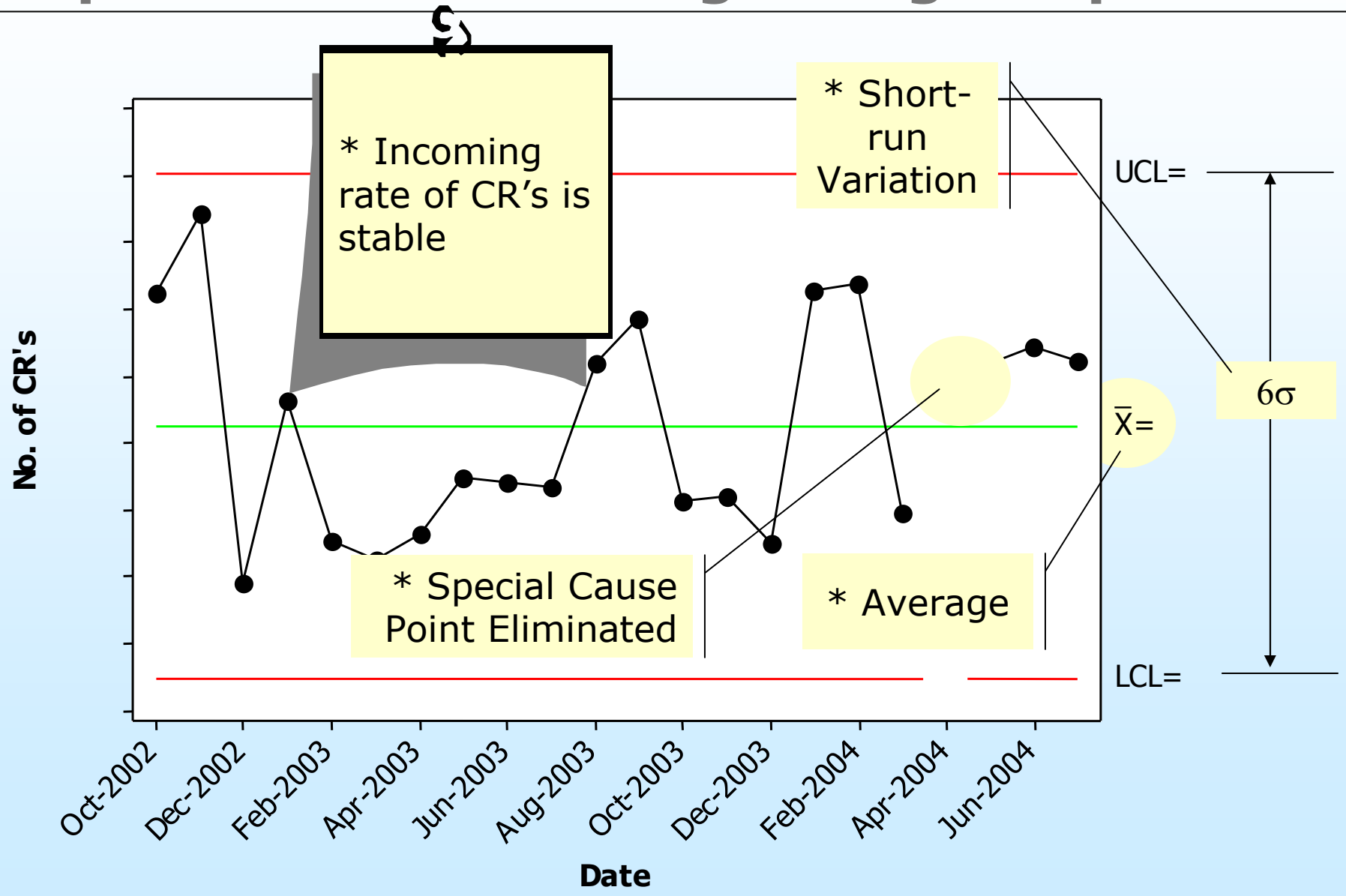
What steps are required?



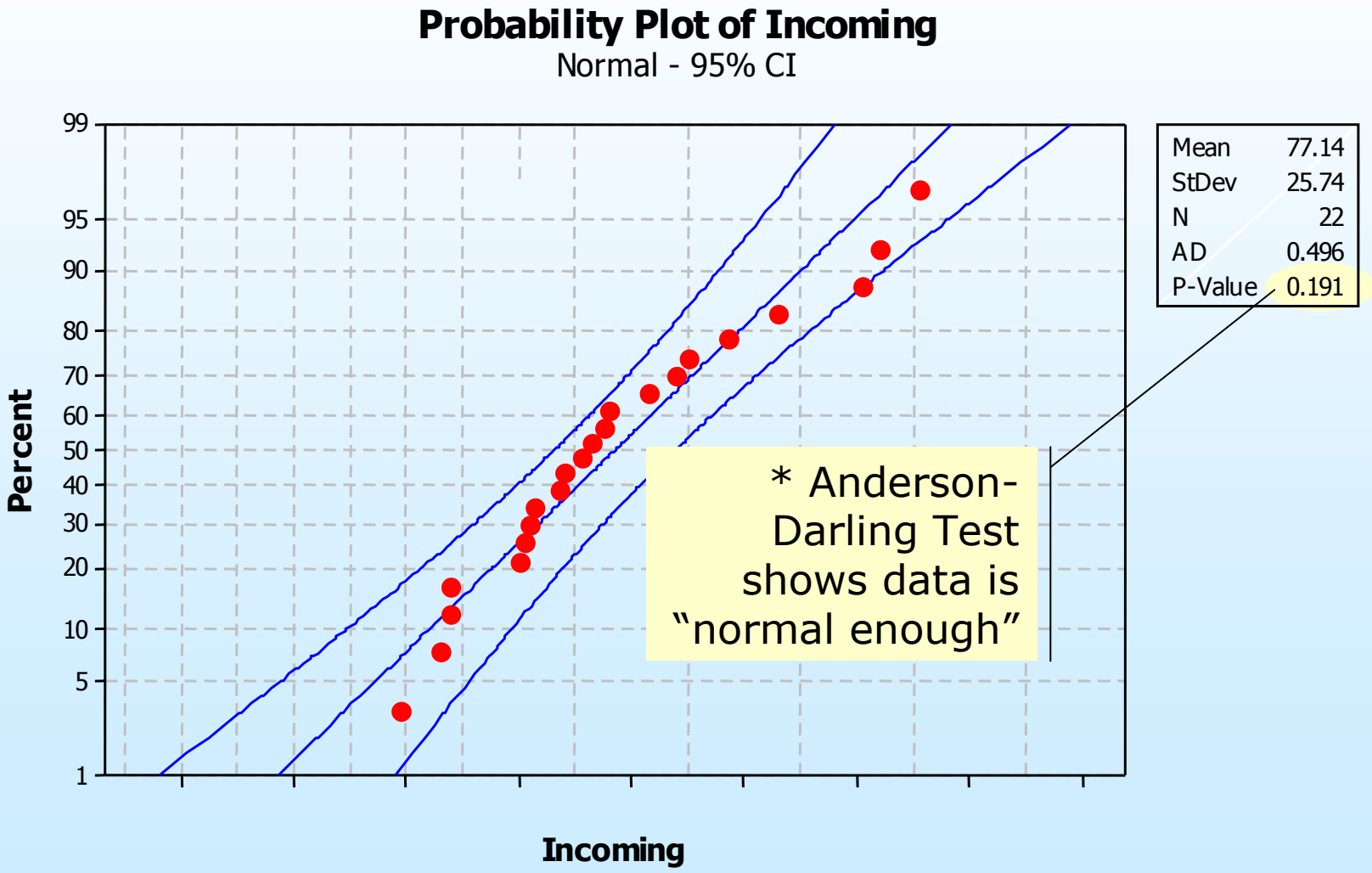
Start by mapping the process…



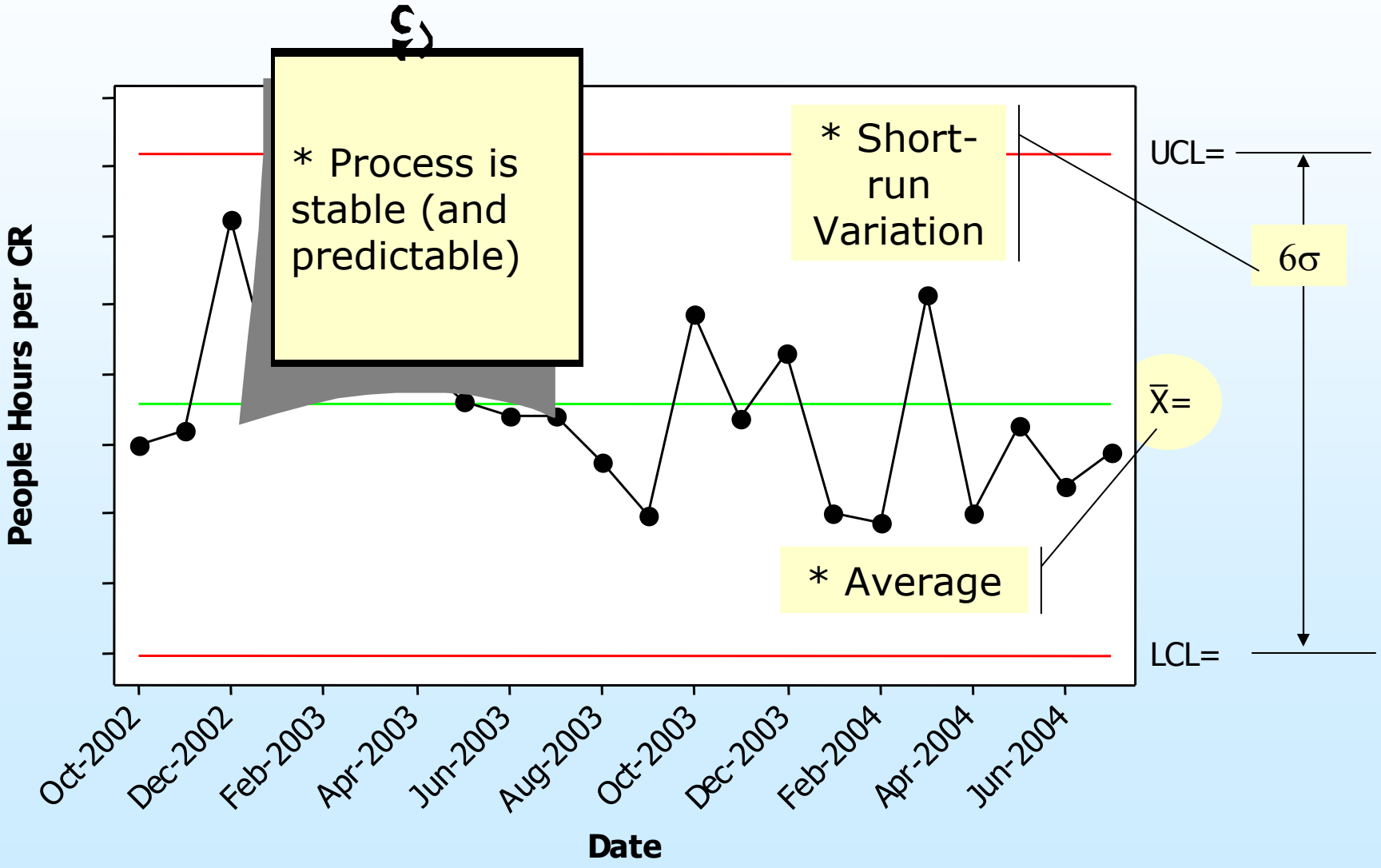
Sample data on incoming change requests…



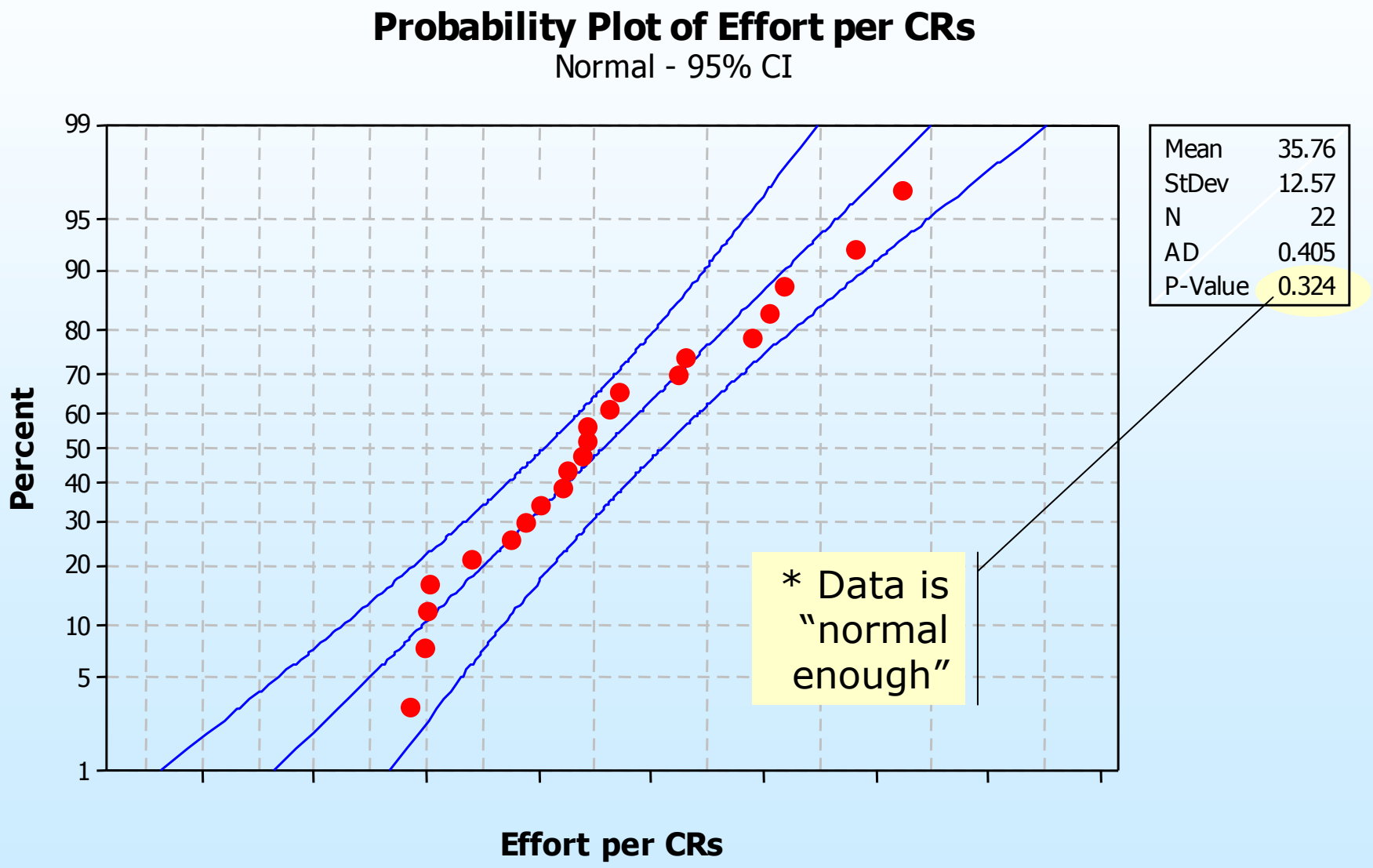
Check normality of incoming CR's...



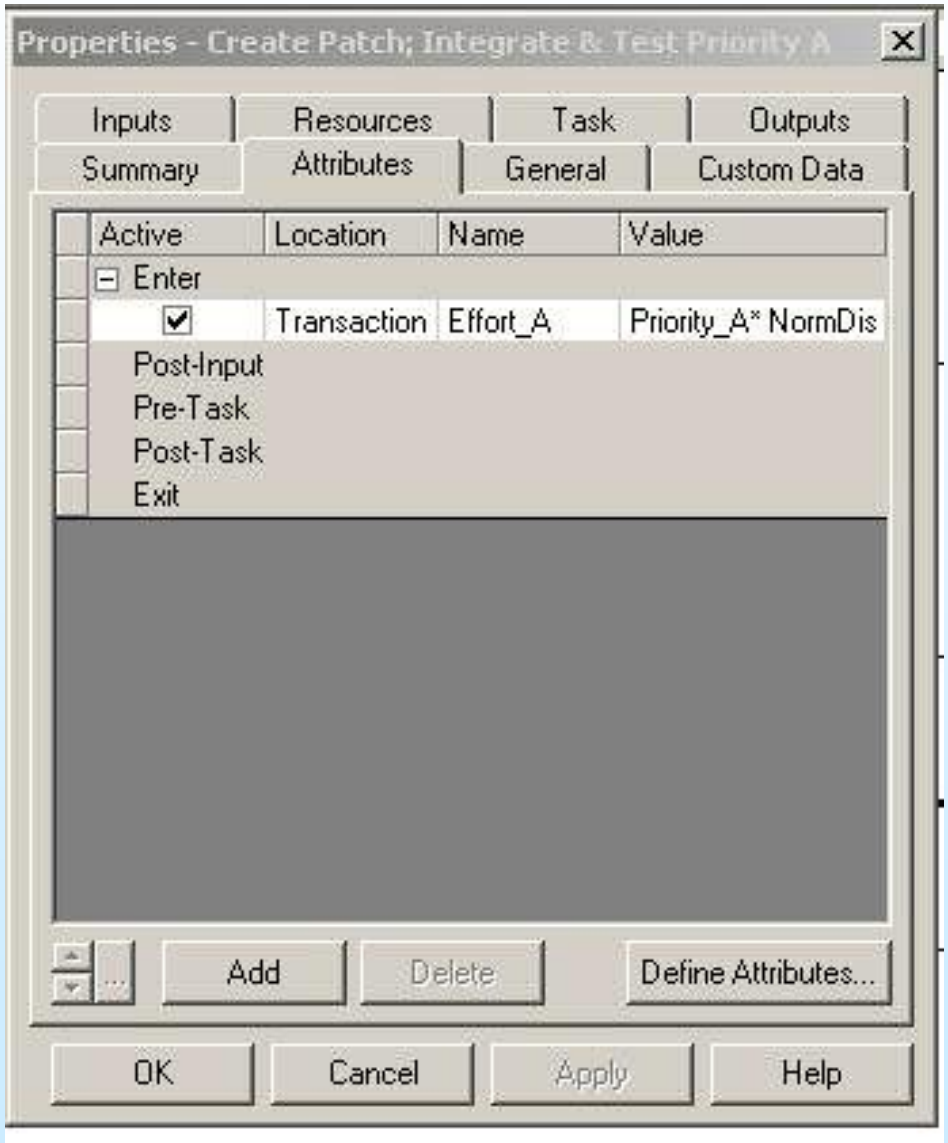
Sample productivity…



Productivity is normally distributed…



Input data via dialogue boxes…



- Resources: Number of workers required to perform the task
- Task: Time to perform the task (in this case a normal distribution with the mean and standard deviation entered)
- Attributes: Any data calculation that needs to be performed (in this case the number of Priority A change requests to be implemented)

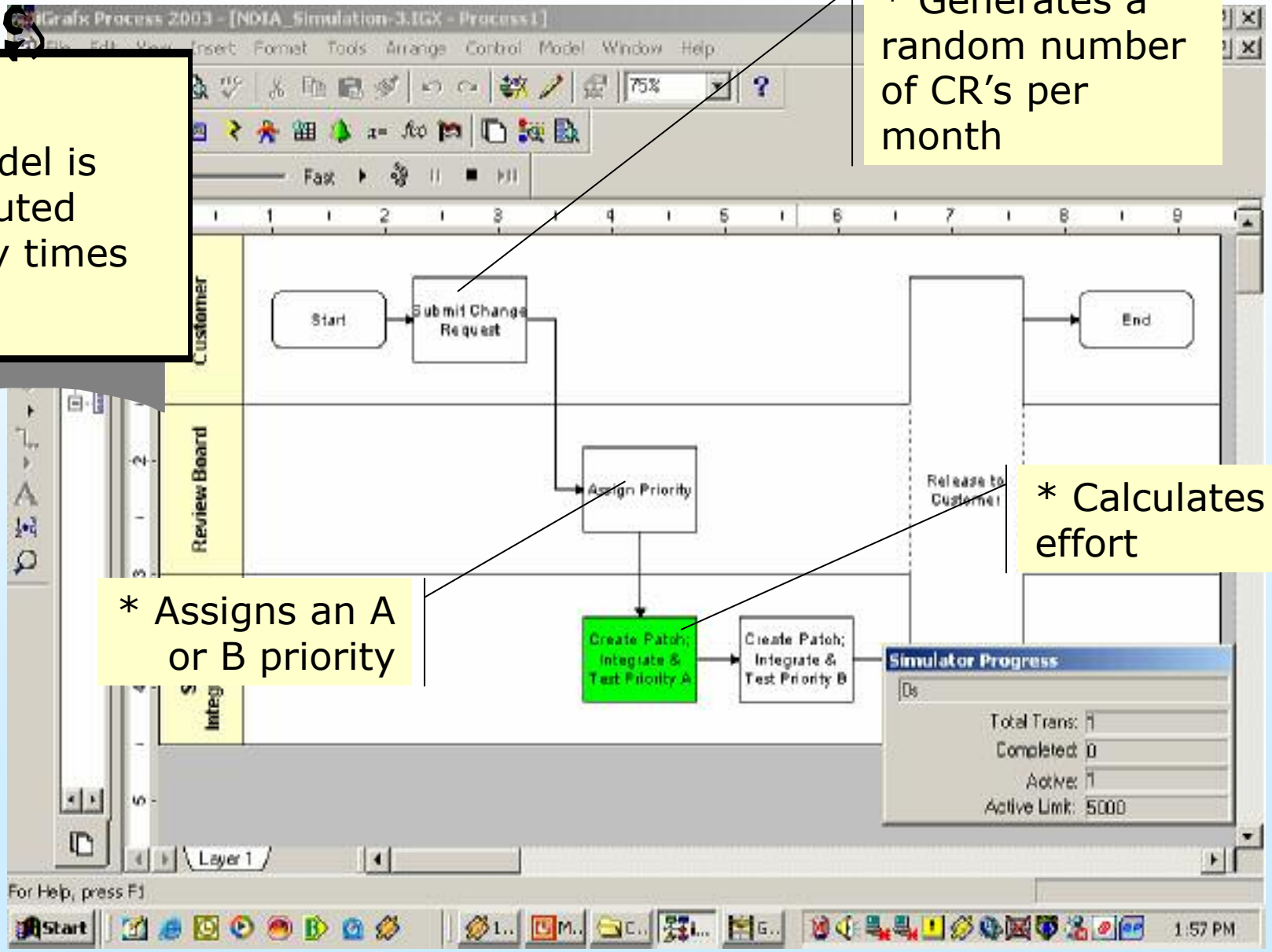
"Animate" the process…

* Model is executed many times

* Generates a random number of CR's per month

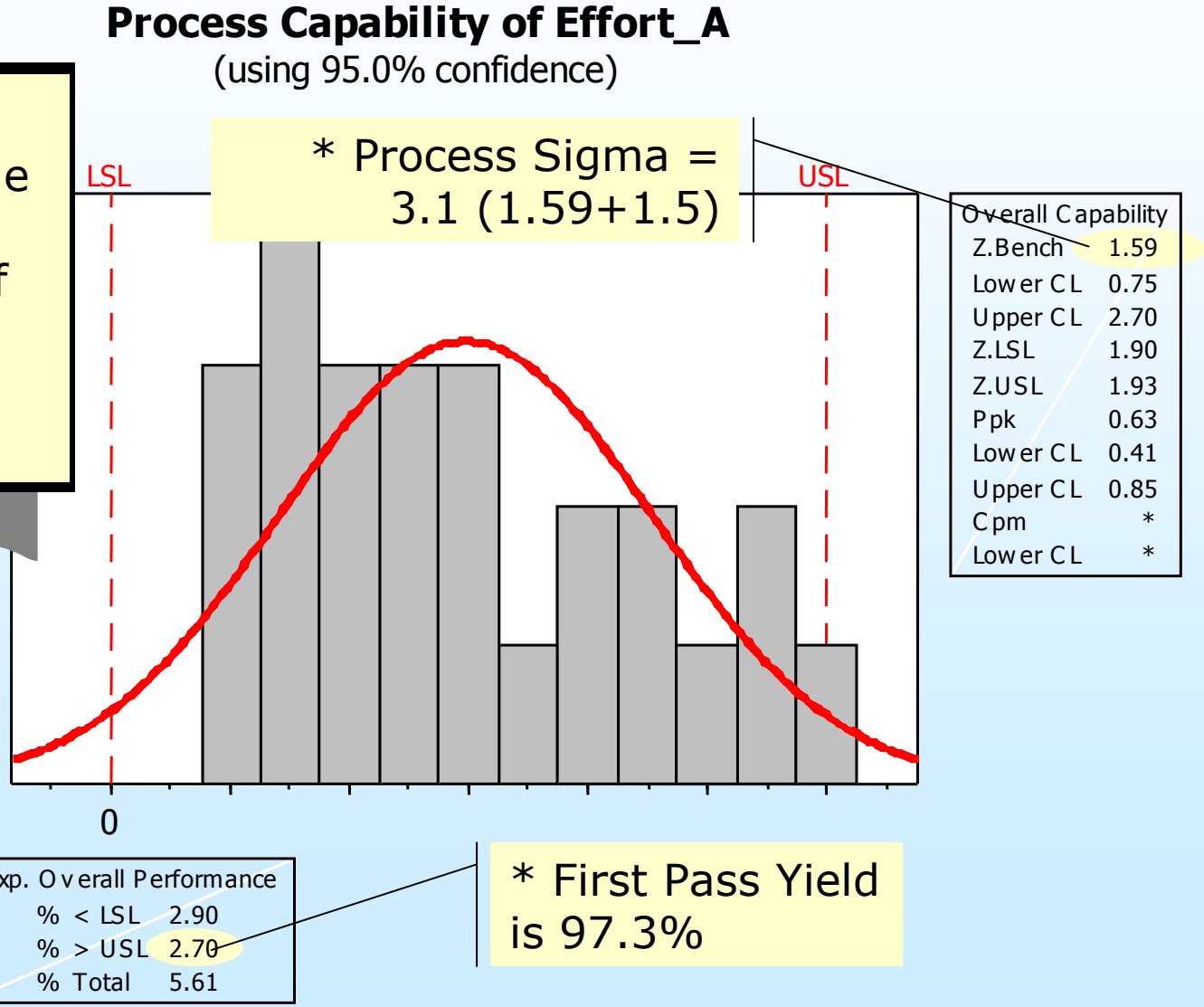
* Calculates effort

* Assigns an A or B priority



Analyze the results…

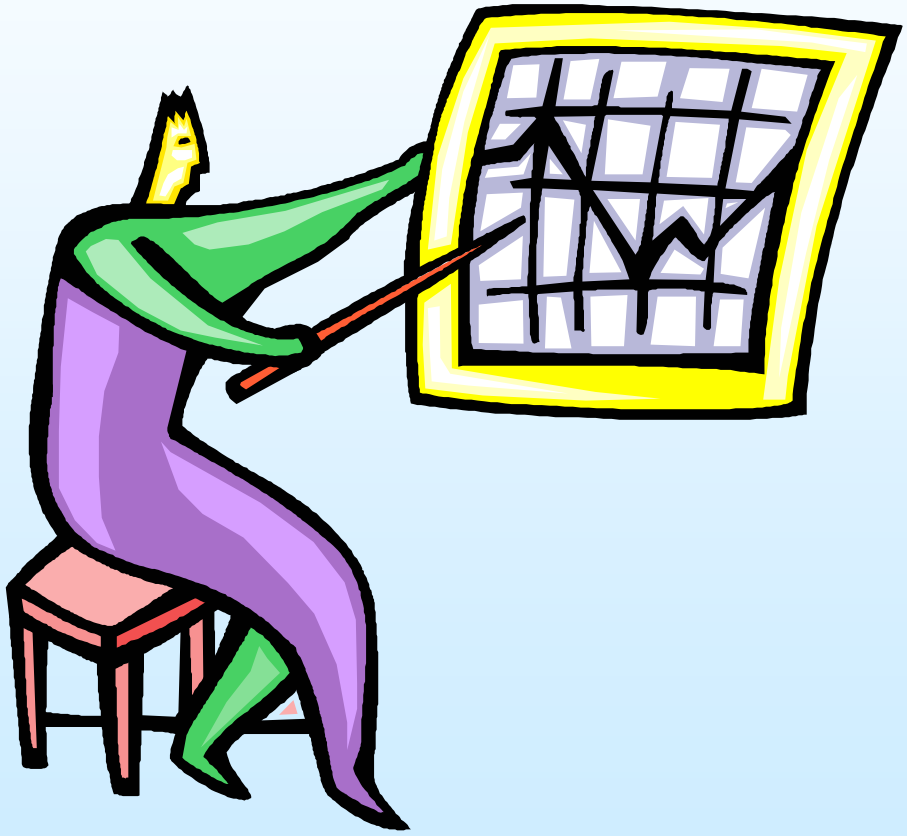
* Simulated results show the process more than capable of delivering required performance



* Process Sigma = 3.1 (1.59+1.5)

* First Pass Yield is 97.3%

Conclusion…



- High confidence that Customer's requirements can be met
- Know how to adjust process variables to handle more or less change request demand