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DEFINING THE FUTURE

Process Performance Baselines and Models: Duh, I Don't Get It

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- Knowing your goals
- Collecting data
- When do you have a baseline
- What is a model

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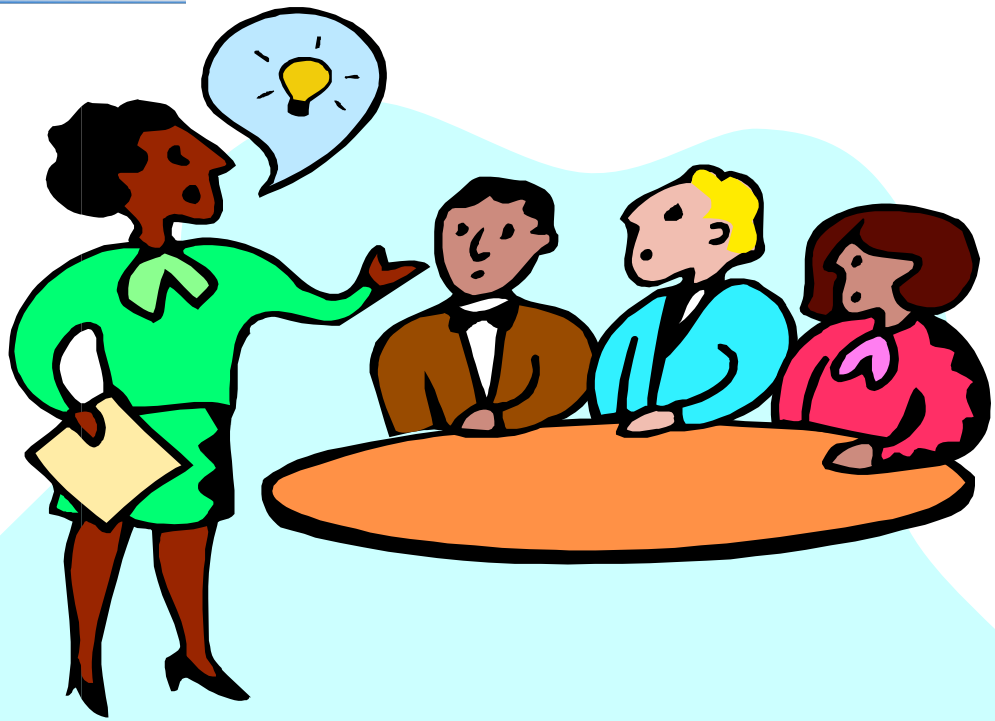

- Intended for people who are new to baselines and models.
- Uses an example that everyone can relate to,... how much time should I allocate to get to the airport gate on time.
- If you understand basic principles, you can apply it to your work.
- The bottom left corner of each slide describes how the same principles can be applied to peer reviews.

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oals, i.e., What is Important to You?

Goal 1

(focus for this presentation)

Save every minute possible so I can spend more time at home instead of sitting in an airport.

Cost and schedule,... sound familiar?

Goal 2

Save money. There are different ways to get to the airport that have different costs.

Never create a baseline and model if you have no goal.

Peer Reviews: Typical peer review goals are to find more defects and to be more efficient.

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Pain Sitting at the Airport?

Peer Reviews: Pain is the number of defects found during integration and test and system test.

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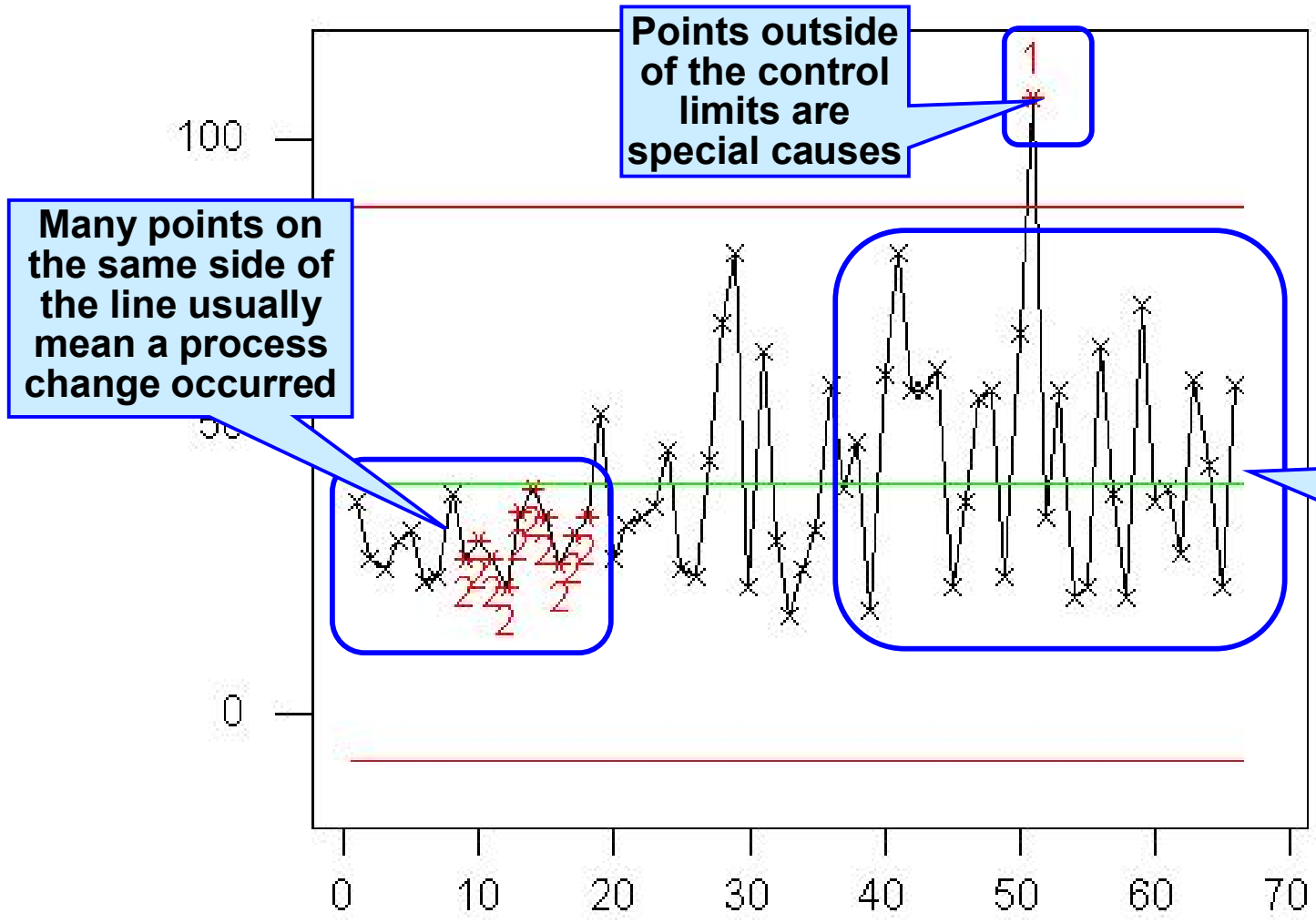
l Use a Stable Process



Data is too unstable in many ways to establish a baseline.

Peer Reviews: At first, you might have the number of defects over the project life cycle so the process may be unstable.

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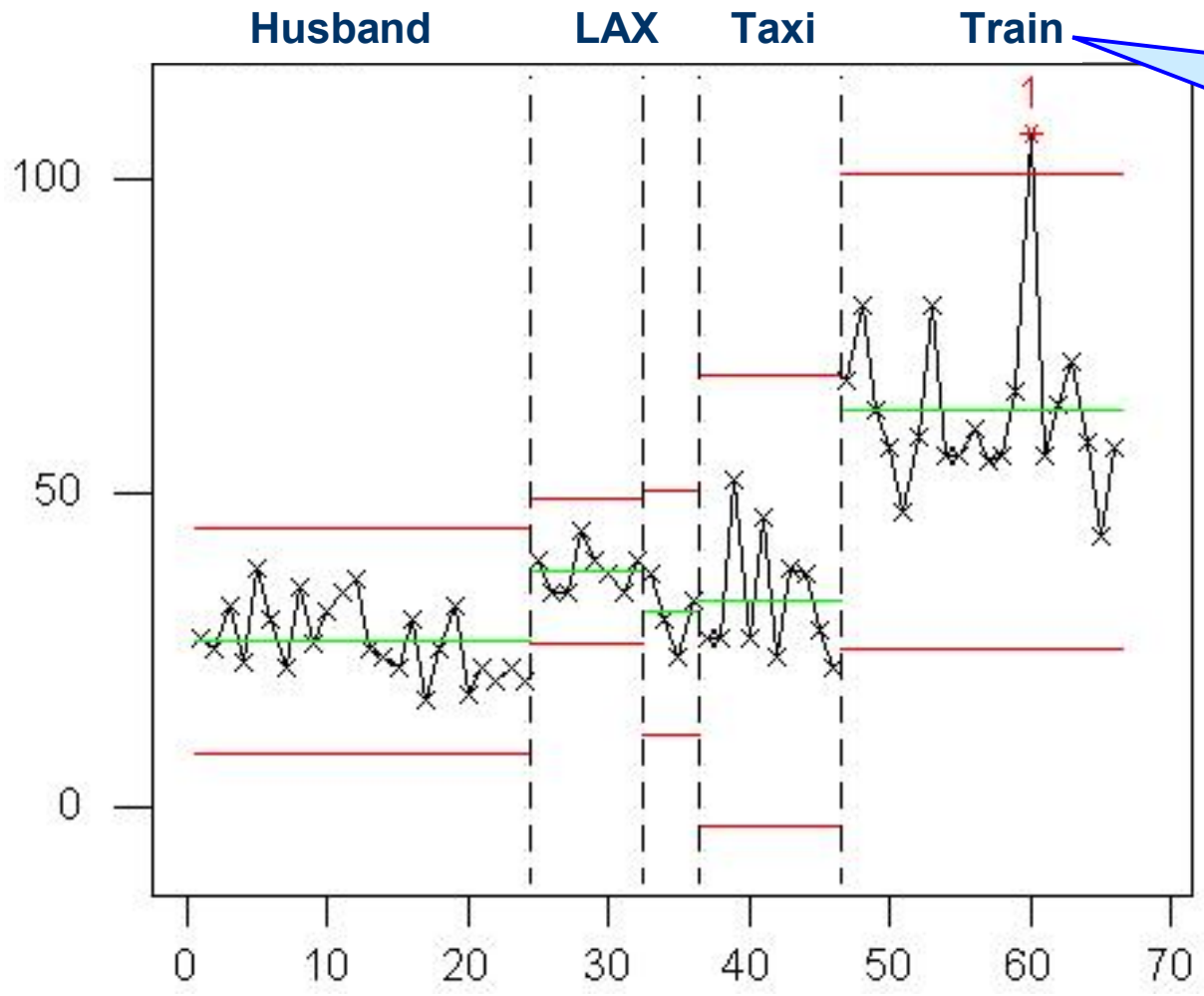
eally Unstable?



Disaggregation uncovered how I got to the airport

Disaggregation shows the data is actually more stable.

Peer Reviews: Breaking down the data by life-cycle phase, i.e., requirements, design, code, test, etc. may show the data is not unstable.

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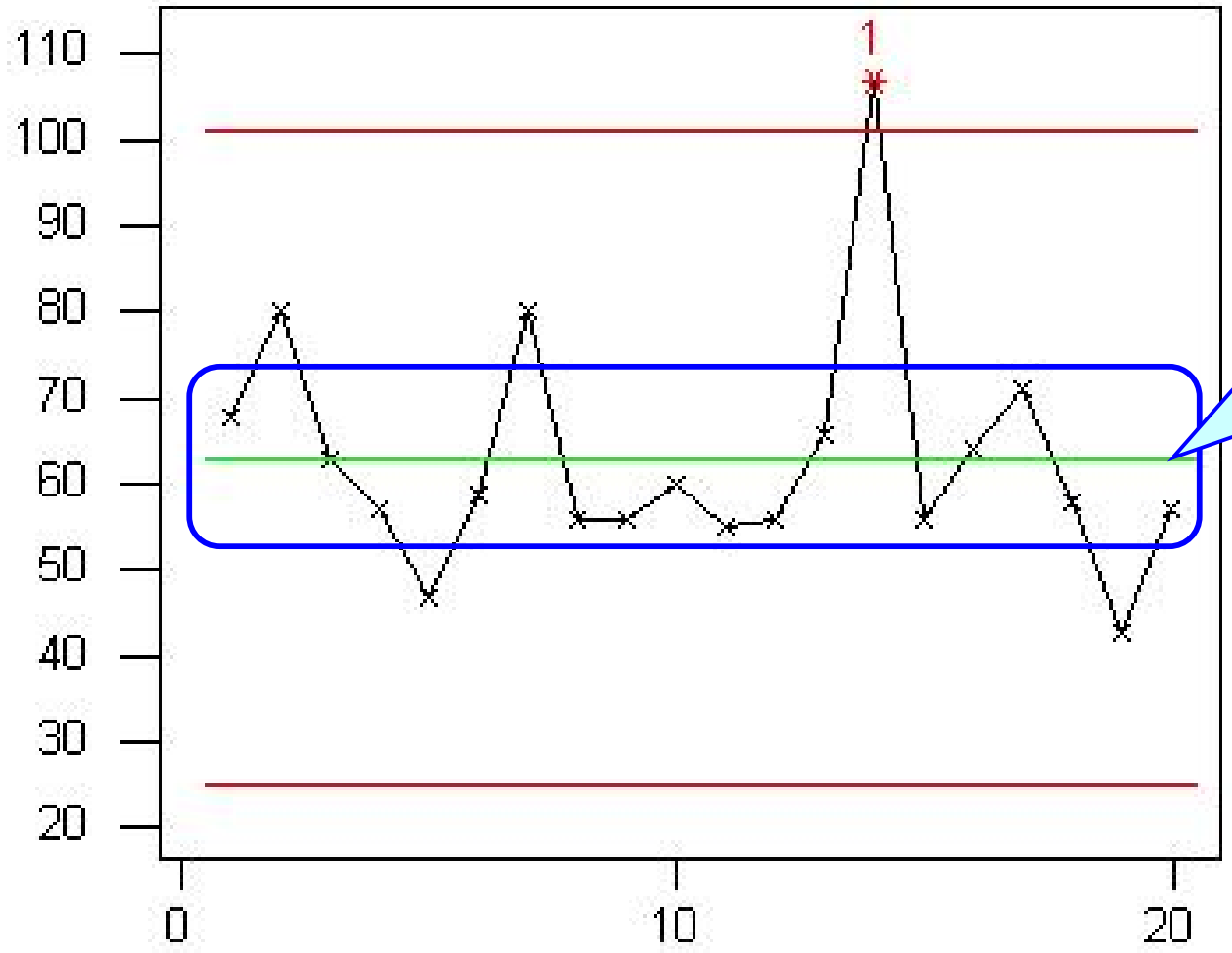
r Taking the Train



The data looks suspicious with most points near the mean. Probably an unstable process. Only 5 points out of 20 are not near the mean.

Disaggregate to see if there is a reason for the 5 outliers.

Peer Reviews: You might do a control chart of just code reviews and you might get some outliers.

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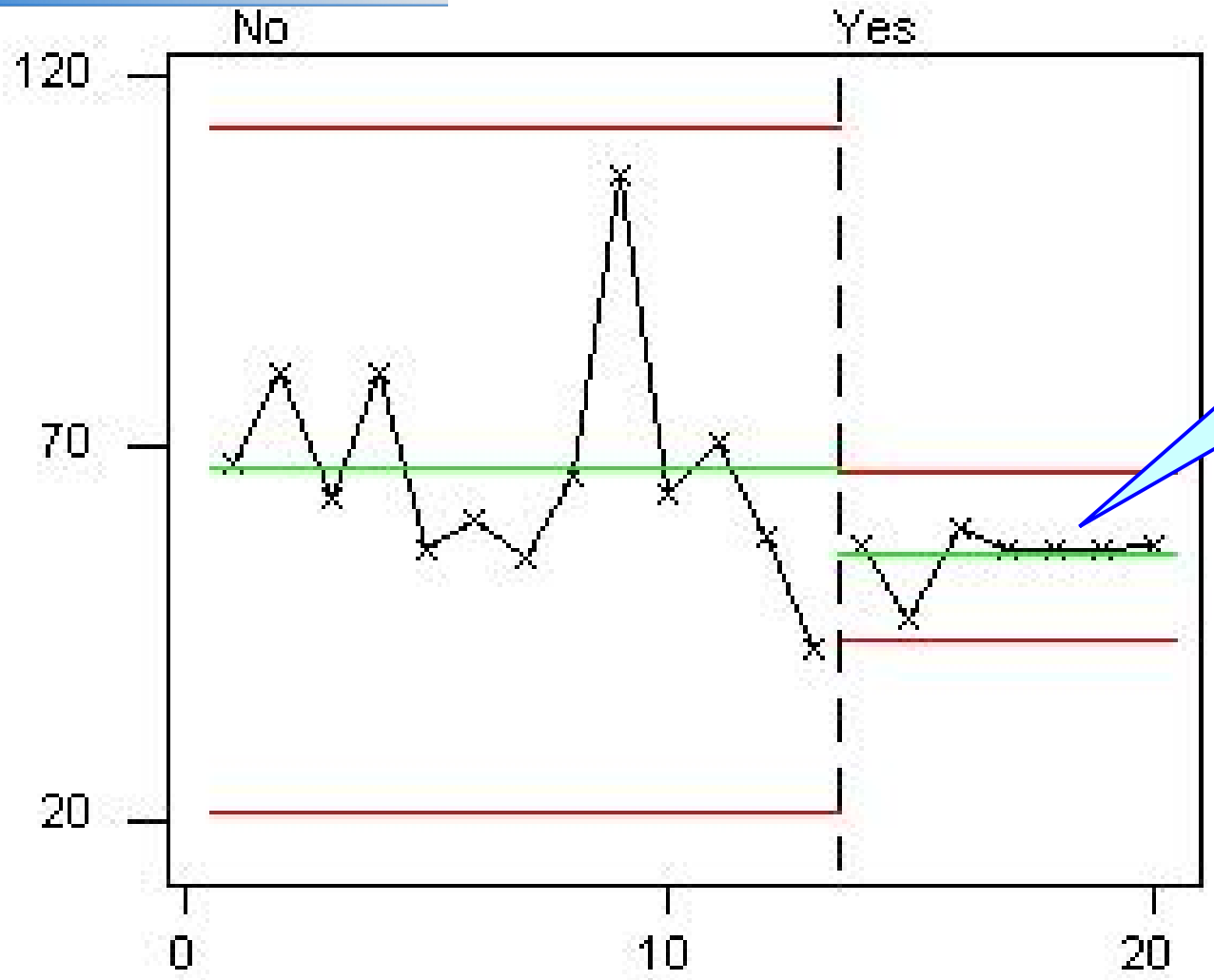
ons is Rush Hour



The best time to take the train is during rush hour.

Disaggregation helps to understand process variation.

Peer Reviews: An outlier could be complex code, an inexperienced developer, an unusually large number of reviewers, etc.

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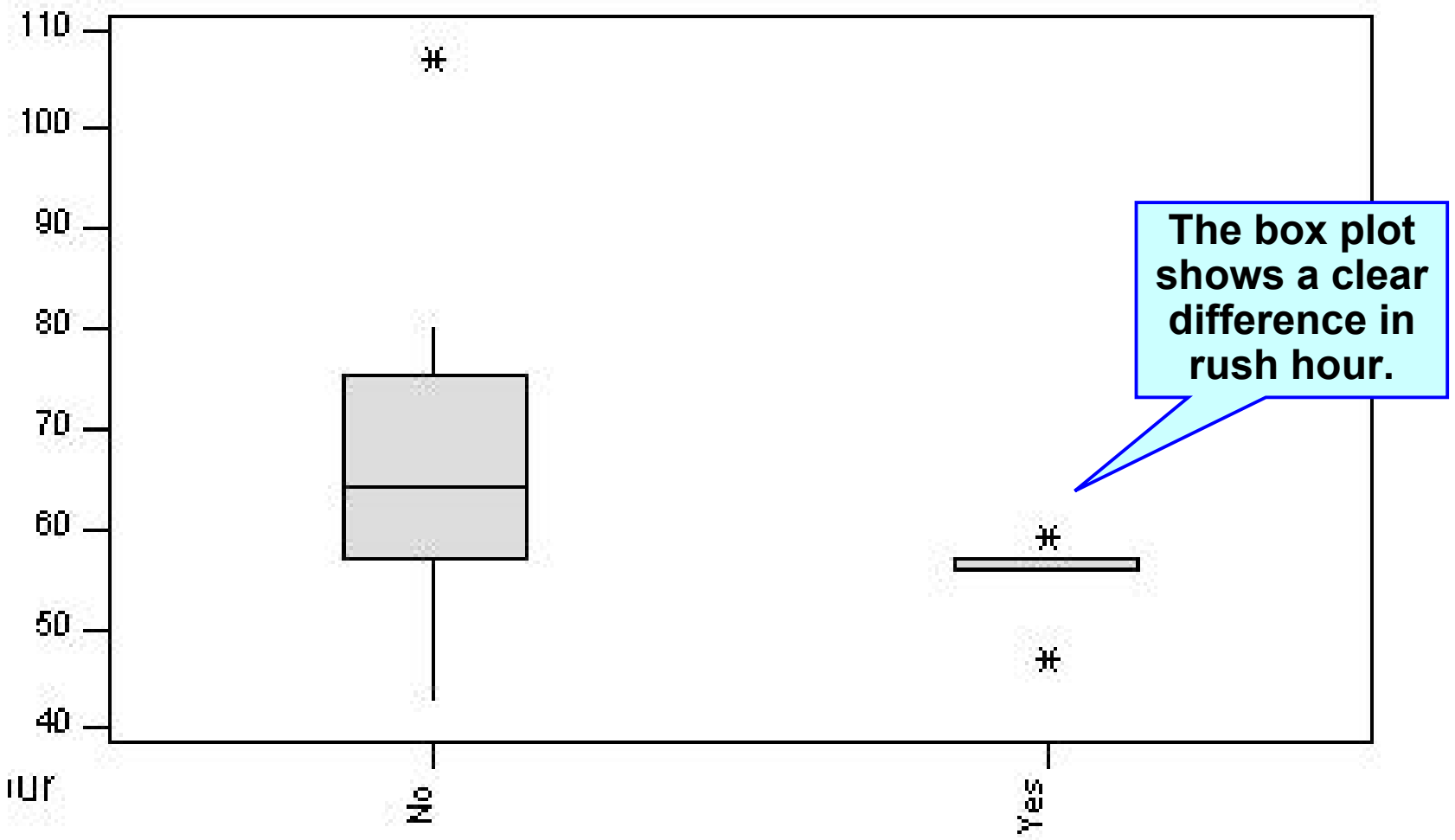
ence in Rush Hour Significant?



But is the difference significant enough to have two baselines?

Peer Reviews: Defects may be different for inexperienced developers but it may not be significant, whereas # of reviewers might be.

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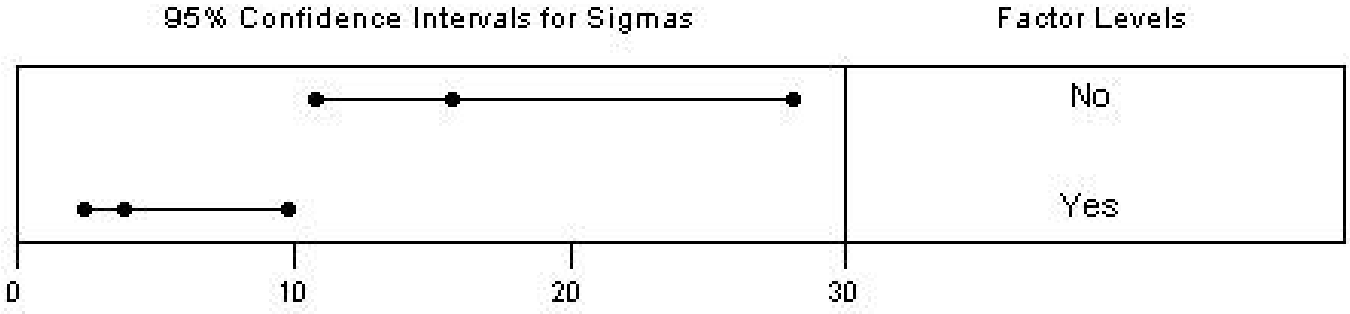
riance Provides the Answer



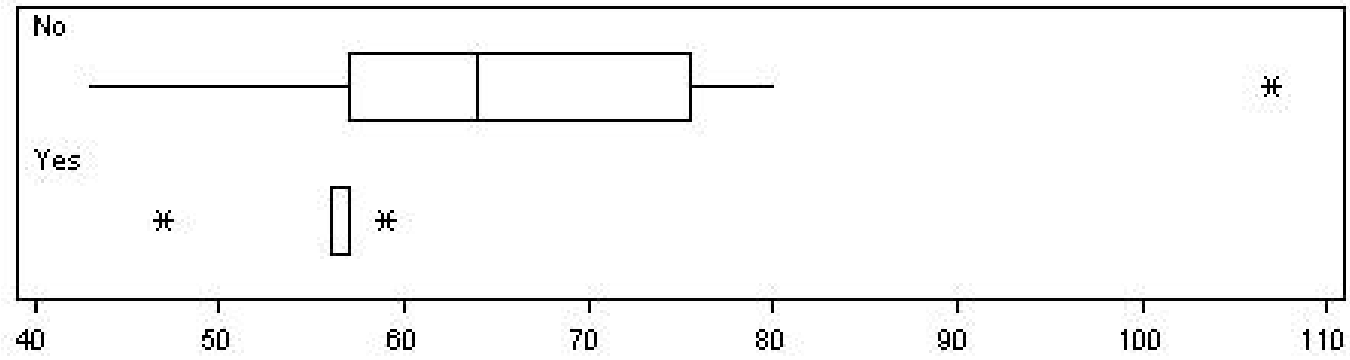
F-Test

Test Statistic: 16.452

P-Value : 0.003

Test for Equal Variance shows the difference is statistically significant. P-Value < 0.05 is significant.

Similar analysis should be done for other process variations, not just rush hour.



The difference is significant enough to warrant two baselines.

Peer Reviews: One area that has a significant difference is whether people review thoroughly before the meeting.

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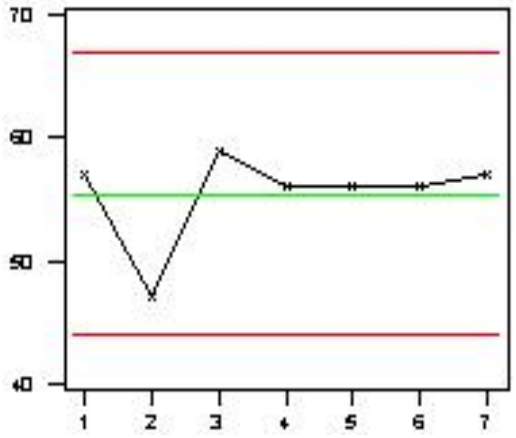
stablished for Rush Hour

Rush Hour Baseline

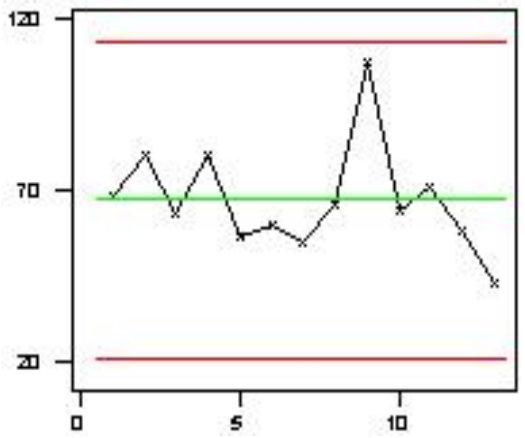


Mean	55.4286
StDev	3.8668
Variance	14.9524
Skewness	-2.19901
Kurtosis	5.49992
N	7
Minimum	47.0000
1st Quartile	56.0000
Median	56.0000
3rd Quartile	57.0000
Maximum	59.0000

The standard deviation is high. Consider lower-level baselines to refine this baseline.

Note: Collect at least 15 points.

Not Rush Hour Baseline



Mean	67.0000
StDev	15.6844
Variance	246
Skewness	1.28677
Kurtosis	2.89383
N	13
Minimum	43.000
1st Quartile	57.000
Median	64.000
3rd Quartile	75.500
Maximum	107.000

Baselines provide a range and distribution for performance.

Peer Reviews: The project may have separate baselines for peer reviews done with and without customers and managers.

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Need to Be Collected?

Actual data collection form used during train trips. Data was collected over the last 2.5 years for 17 trips.

Subprocess Step			
1	Home to Train		Time leave house
2	Waiting for Train		Time sit on bench at train station
3	Train Ride		Time train leaves
4	Waiting for Shuttle		Time train stops at Aviation
5	Shuttle Ride		Time shuttle leaves
6	Terminal 1 to Terminal 6		Time shuttle at Terminal 1
7	Terminal 6 Door to Gate		Time at Door C at Terminal 6
			Time at United gate

Break down the process into measurable subprocesses.

Peer Reviews: Subprocesses for peer reviews include preparing, reviewing before the meeting, the meeting, closing action items.

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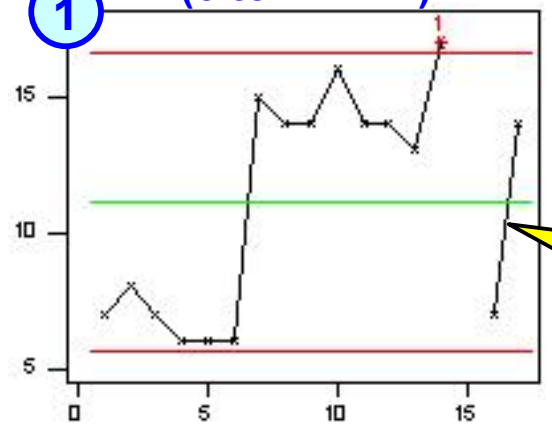
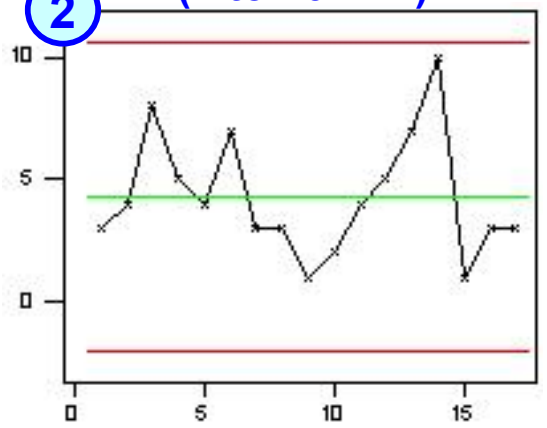
ocesses for Process Variation (1 of 2)

Home to Train (6 to 17 min)

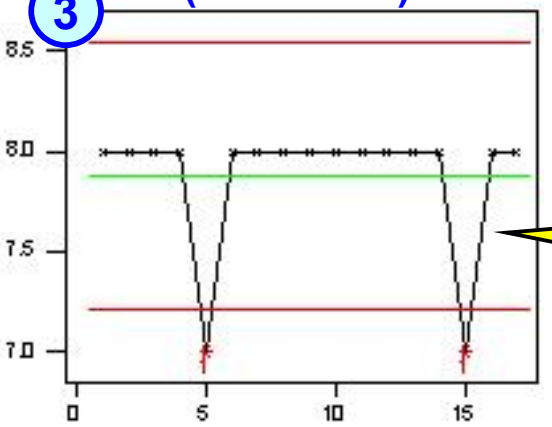


Waiting for Train (1 to 10 min)



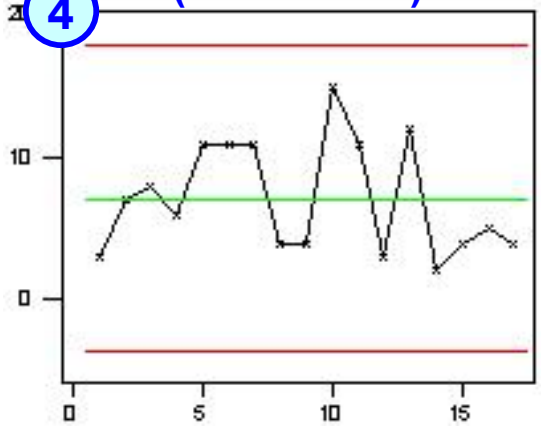
The distribution / range is unacceptable for 1 and 4. Need to understand better.

Train Ride (7 to 8 min)



Train Ride is extremely stable. No improvements possible.

Waiting for Shuttle (2 to 15 min)



If youôre unhappy with the range, investigate for improvements.

Peer Reviews: Probably see variation depending on the number of reviewers and the size of the product being reviewed.

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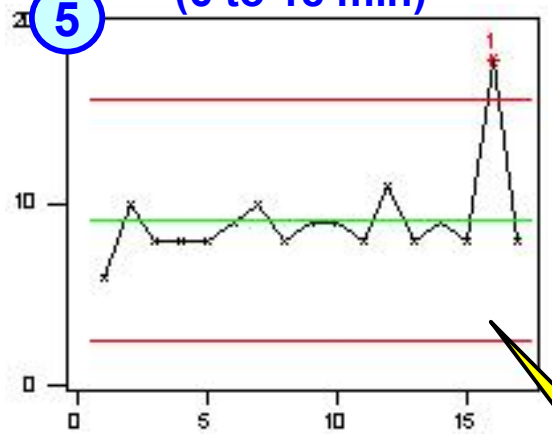
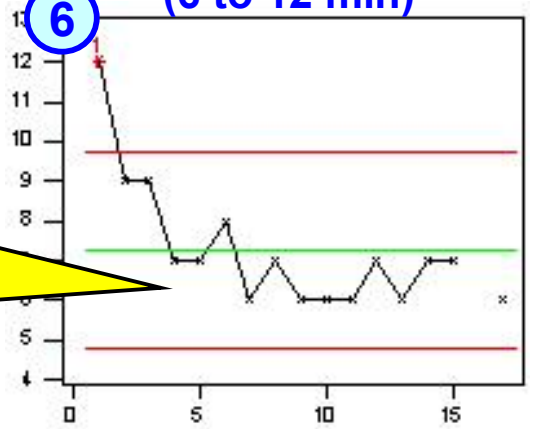
ocesses for Process Variation (2 of 2)

Shuttle Ride (6 to 18 min)

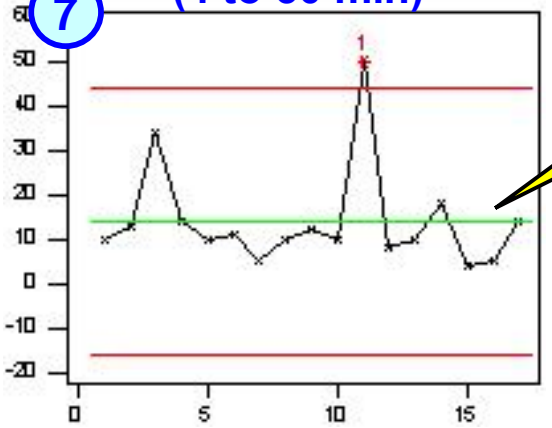


Terminal 1 to Terminal 6 (6 to 12 min)



Obvious the process was improved. Discovered it is faster to get off the shuttle and walk to Terminal 6.

Terminal 6 Door to Gate (4 to 50 min)



5 and 7 appear stable but both have outliers to investigate

Outliers are special causes which should be investigated.

Peer Reviews: Variation in preparing for a meeting could be whether the customer is there, in which case briefings are created.

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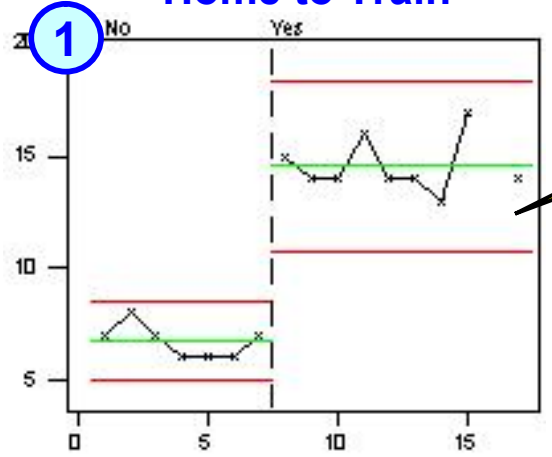
red Reasons for Process Variation

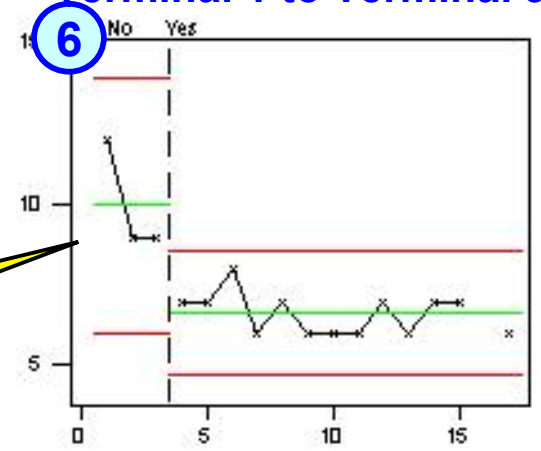
Home to Train



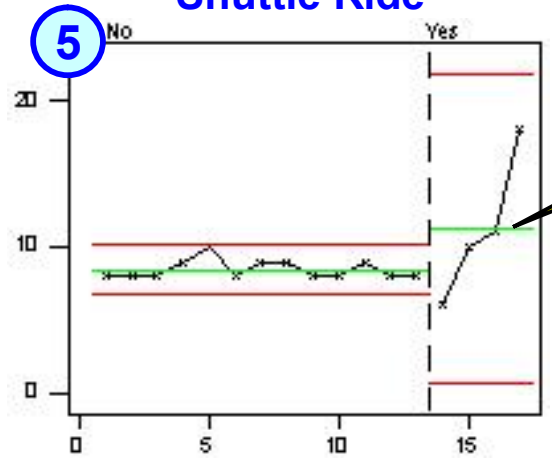
Driving vs Walking

Shuttle vs Walking

Terminal 1 to Terminal 6



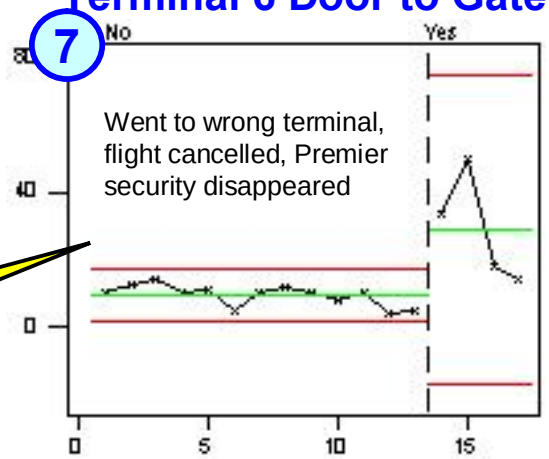
Shuttle Ride



Rush Hour vs No Rush Hour

Normal vs Special Case

Terminal 6 Door to Gate



Recall from previous slides about significant differences.

Peer Reviews: Collect enough data from each peer review subprocess so the graphs clearly show the difference.

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red 3 Variables for the Model

1 Rush Hour
(No translation needed)

2 Raining
(Translated for walking to the train and Terminal 6)

3 Normal Situation
(Translated for special causes)

Use terms that users of the model will understand.

Peer Reviews: This is not really a problem for peer reviews, except maybe ñinexperienced developerò which may be sensitive.

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Carlo Simulation

	Minimum Minutes	Median Minutes	Maximum Minutes	Mean	Standard Deviation	Monte Carlo Data Type
Train Details for Monte Carlo Simulation						
Home to Train (Car)	6	7	8			Triangular
Home to Train (Walk)				14.60	1.24	Lognormal
Wait for Train	1	3	5			Triangular
Train Ride	8	8	9			Triangular
Wait for Shuttle (Rush Hour)	3	4	7			Triangular
Wait for Shuttle (No Rush Hour)	2	8	16			Triangular
Shuttle Ride (Rush Hour)	6	11	18			Triangular
Shuttle Ride (No Rush Hour)	8	8	10			Triangular
Terminal 1 to United (Shuttle)	9	10	12			Triangular
Terminal 1 to United (Walk)	6	7	8			Triangular
To Gate (Special Cause)	14	30	50			Triangular
To Gate (Normal)				9.39	3.10	Normal

Need to know whether Triangular, Normal, Lognormal, or a constant should be used for the simulation

Variables for the Simulation

Rush Hour?	Yes
Raining?	No
Normal Situation?	Yes

3 variables for the simulation

Simulations assume you understand your data.

Peer Reviews: Can simulate the estimated number of defects, the estimated hours for doing peer reviews, etc.

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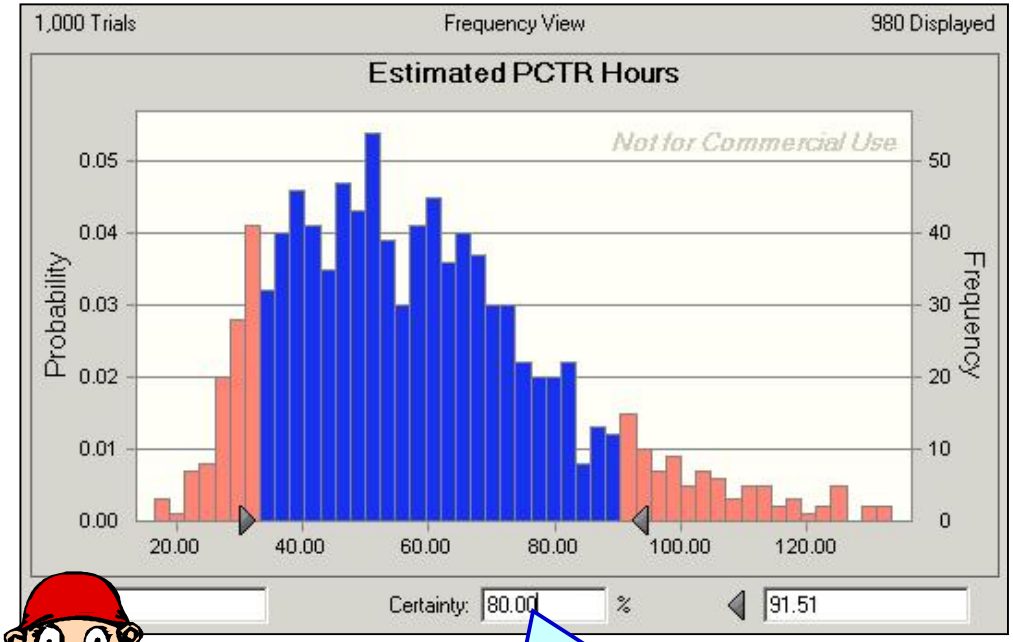
Train Trips

This is the actual model I use when I take the train. Based on the baselines, it says what time to leave the house.

Enter Departure Time:			8:20 AM
Look at Minimum Train Time:			6:55 AM
Enter Best Train Departure Time:			6:53 AM
Rush Hour (Yes or No):			Yes
Walk to Train (Yes or No):			Yes
Walk to Door C (Yes or No):			Yes
When to Leave House			**6:36 AM**
Time Home to Bench	0:14	0:07	6:36 AM
Time Waiting for Train to Leave	0:03		6:50 AM
			6:53 AM
Minimum Train Departure Time			**6:55 AM**
Time Train Start to Stop	0:08		7:03 AM
Time Waiting for Shuttle to Leave	0:10	0:05	7:11 AM
Time Shuttle Drive to Terminal 1	0:11	0:09	7:16 AM
Time Terminal 1 to Door C	0:11	0:07	7:25 AM
Time Door C to Gate	0:13		7:32 AM
Time Bathroom & Stand By Gate	0:05		7:45 AM
Time Sitting on Plane	0:30		7:50 AM
			8:20 AM

Monte Carlo Simulation Output

(Note: This is not the actual data for the train)



Select a percent. Means 80% probability it will take <= 91.51 minutes.

Models are powerful for predicting/estimating the future.

Peer Reviews: Probably don't need the one on the left, but doing a Monte Carlo simulation on the right would be useful.

- **Identify your goals before creating any baselines and models**
- **Analyze and disaggregate the data until it is stable (no special causes)**
- **Create multiple baselines when process variation (rush hour) is significant**
- **Understand each subprocess thoroughly to create better models. Analyzing subprocesses uncovers process variables (rush hour, car vs walking, shuttle vs walking, flight problems, etc.)**
- **Create models to estimate / predict the future**

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