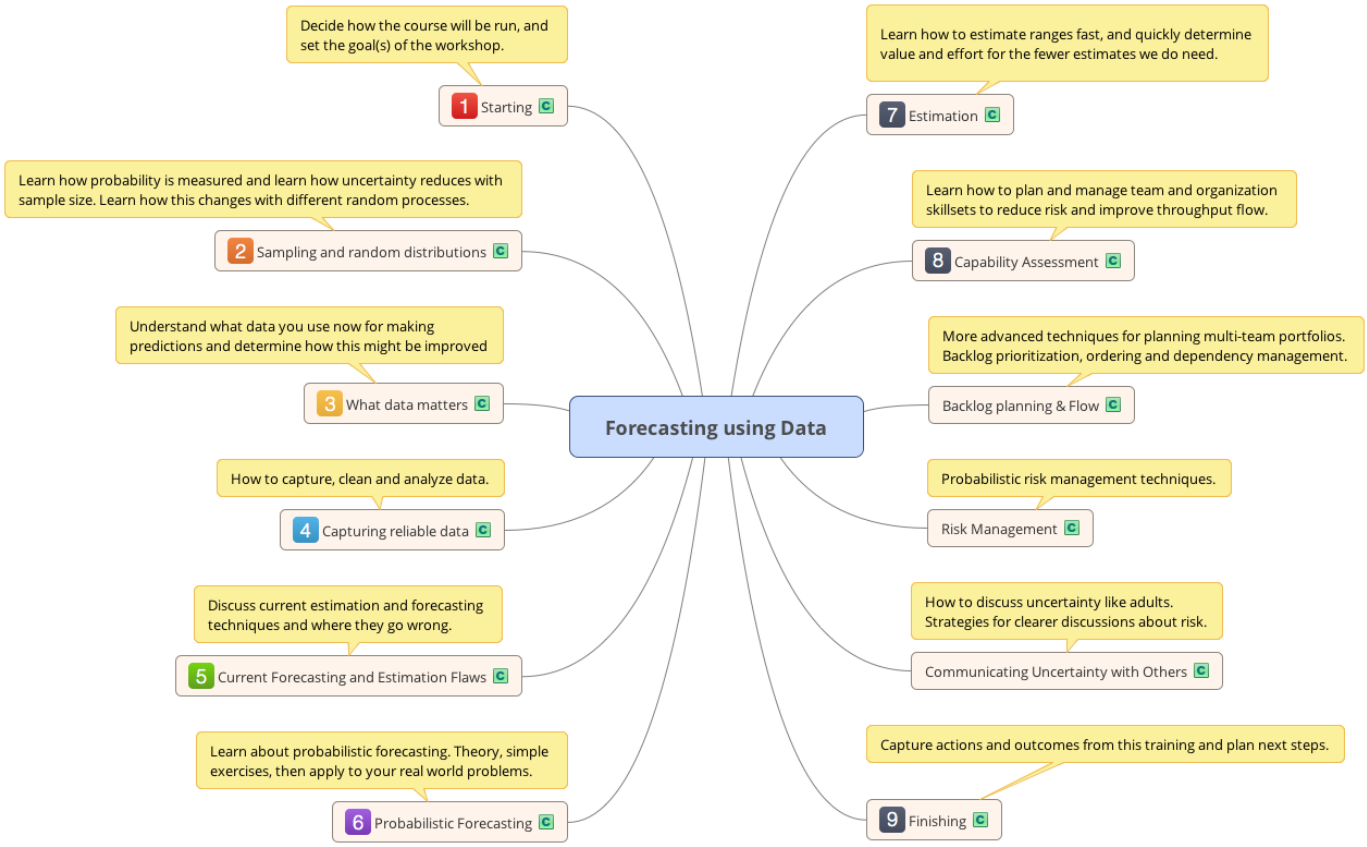
Focused Objective
forecasting - risk - staff - cost of delay

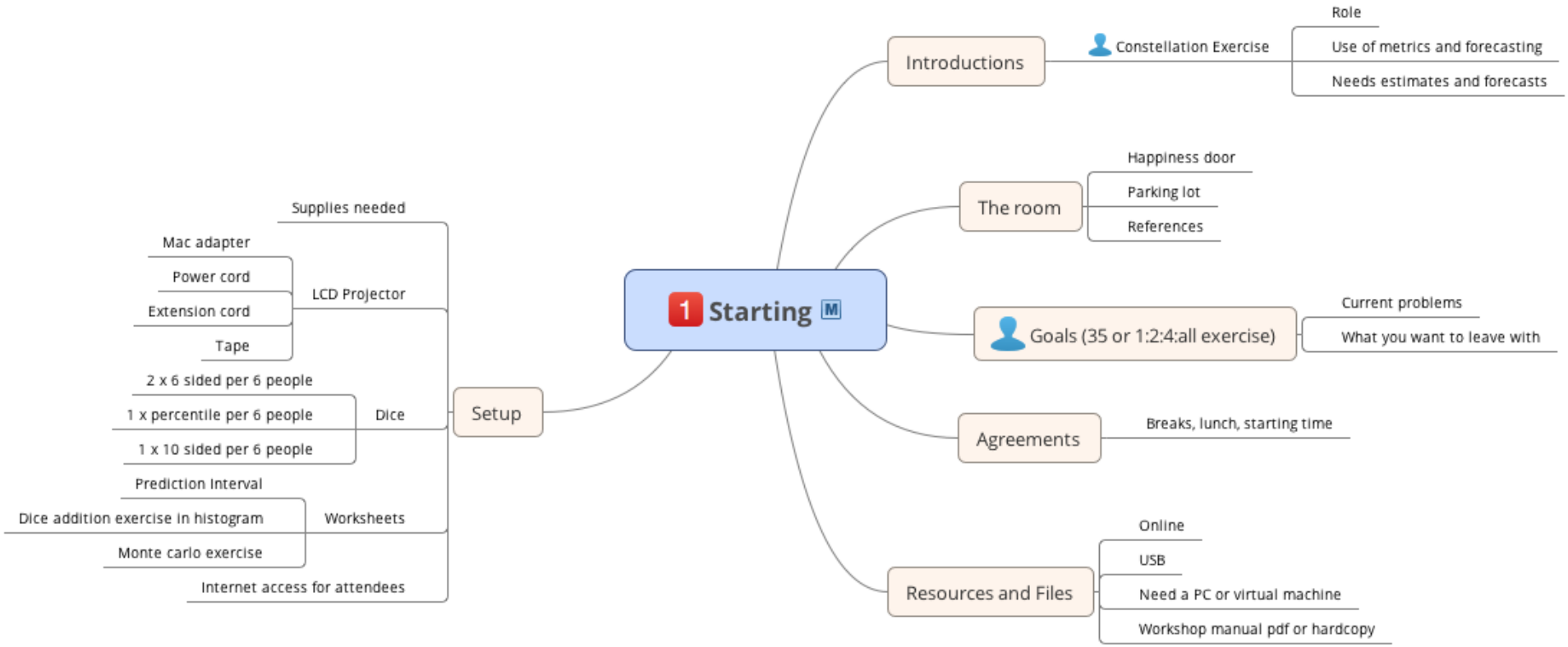
Forecasting using Data

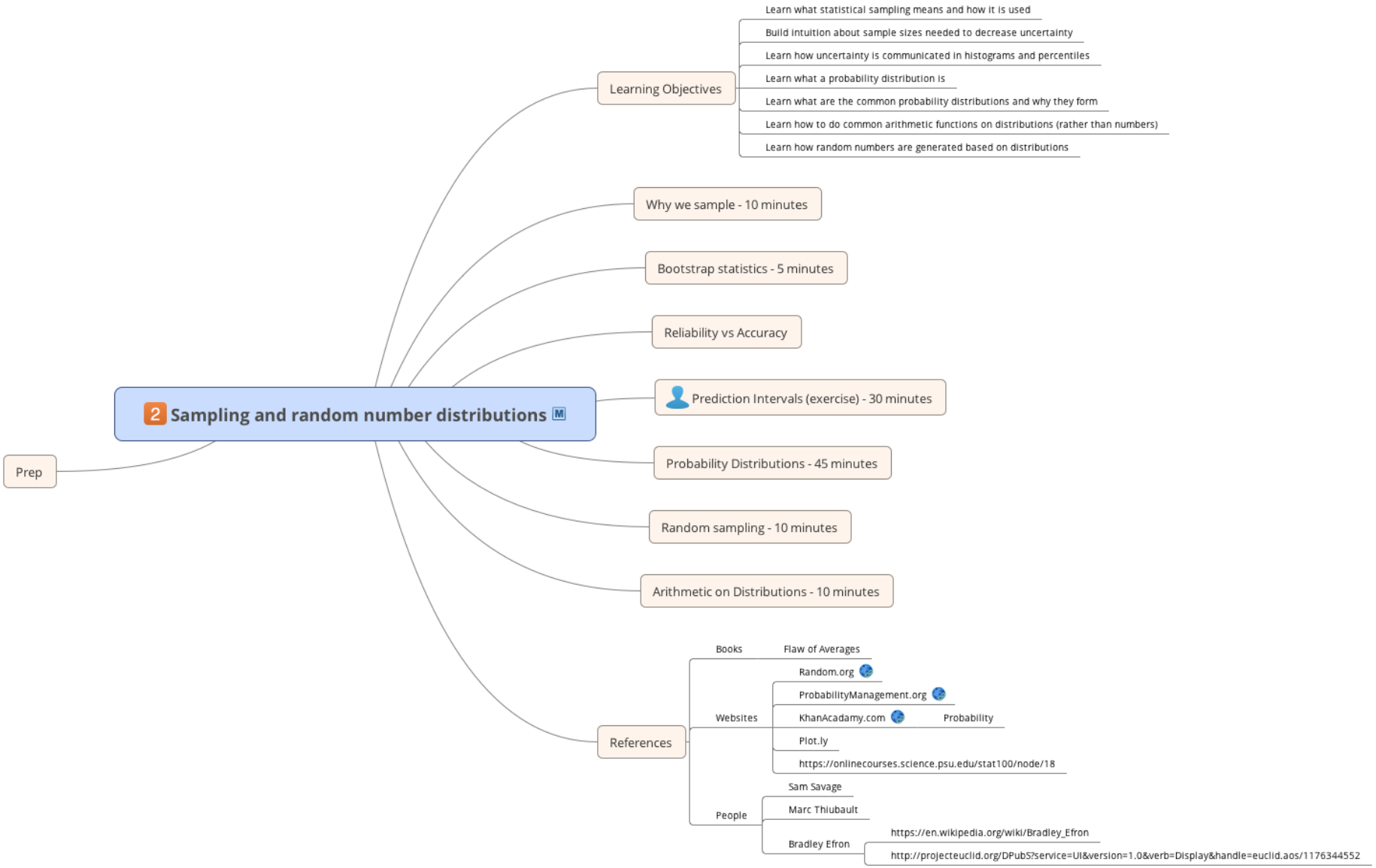
Capturing and using data for forecasting

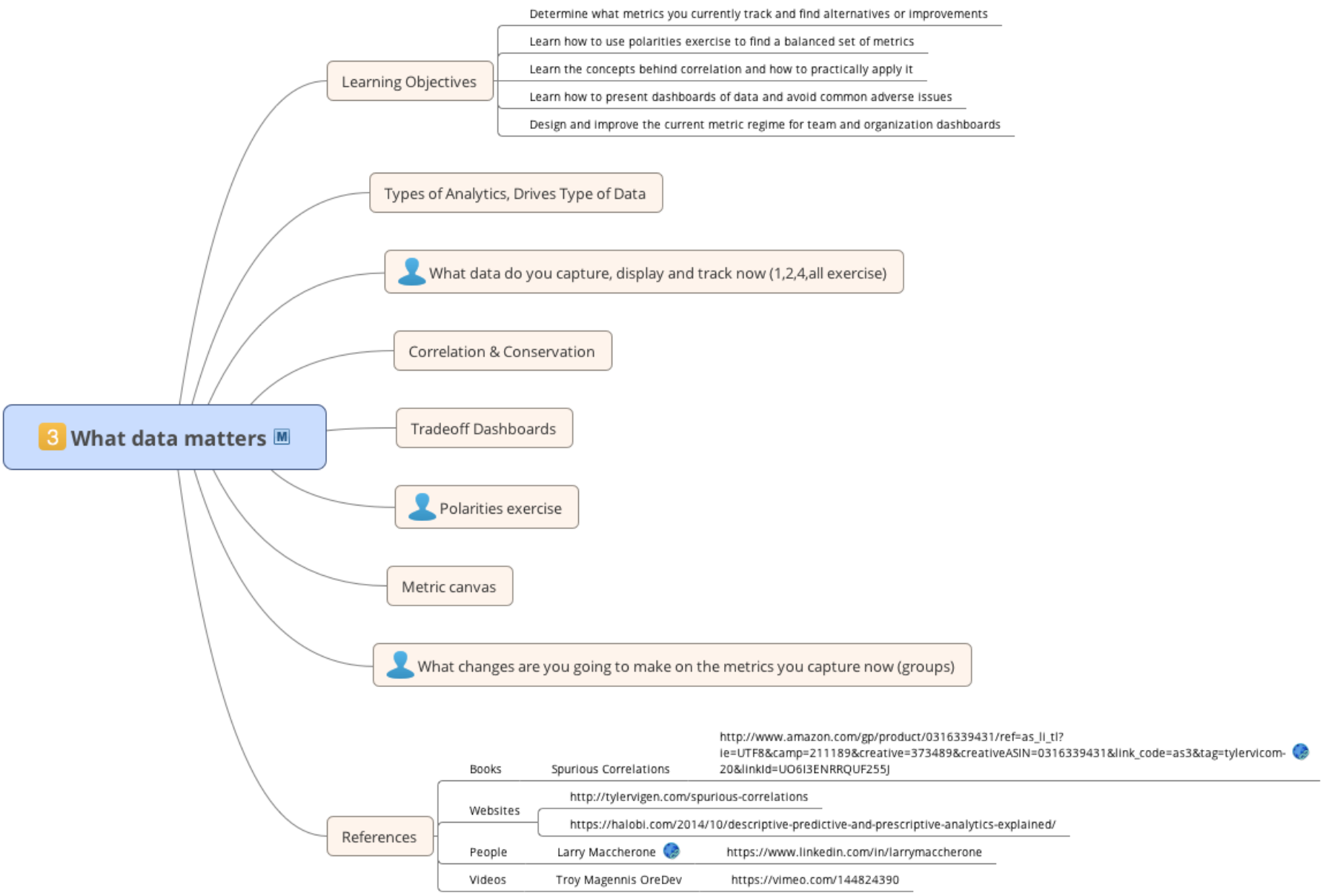


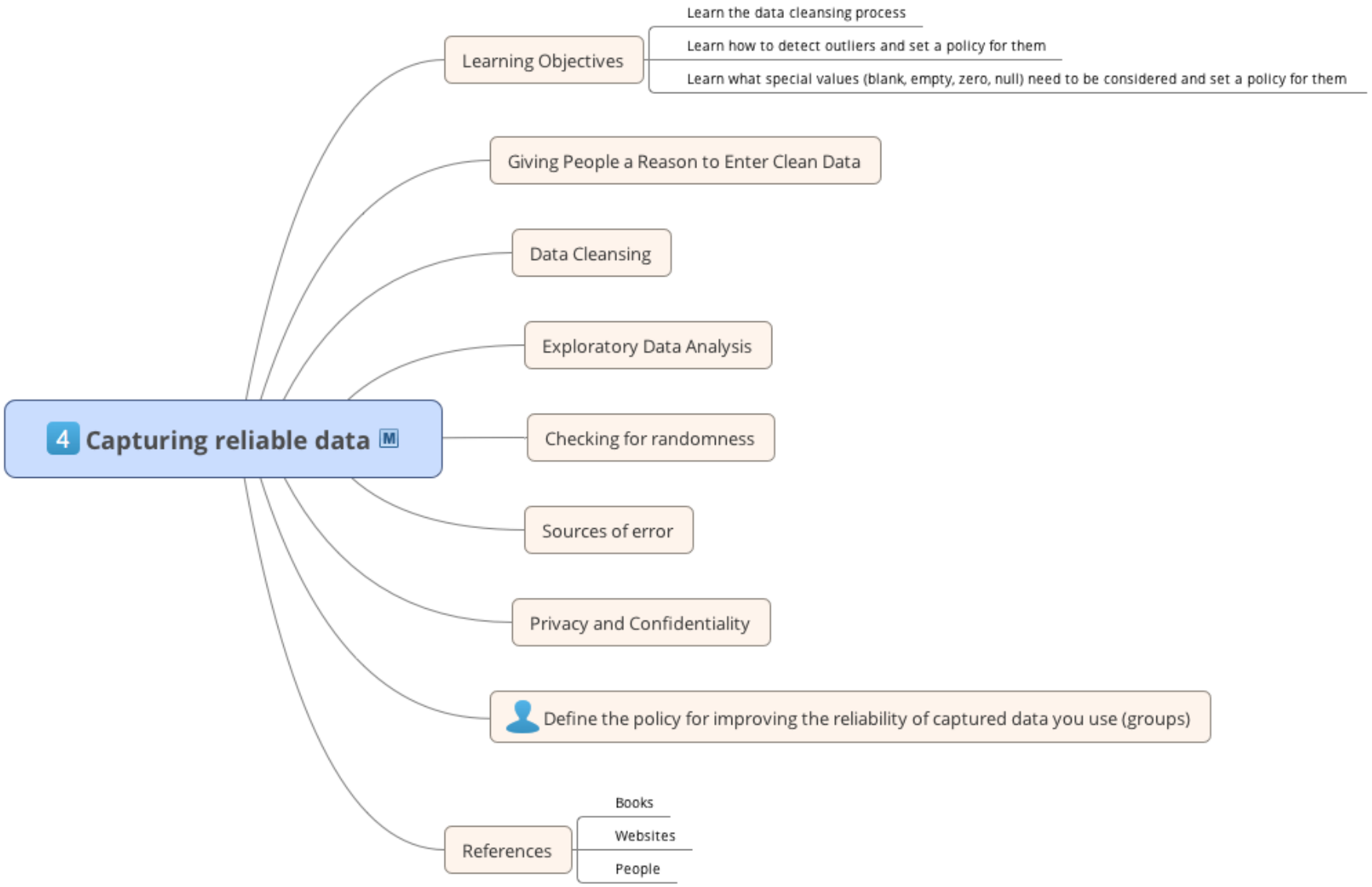
Workshop Manual

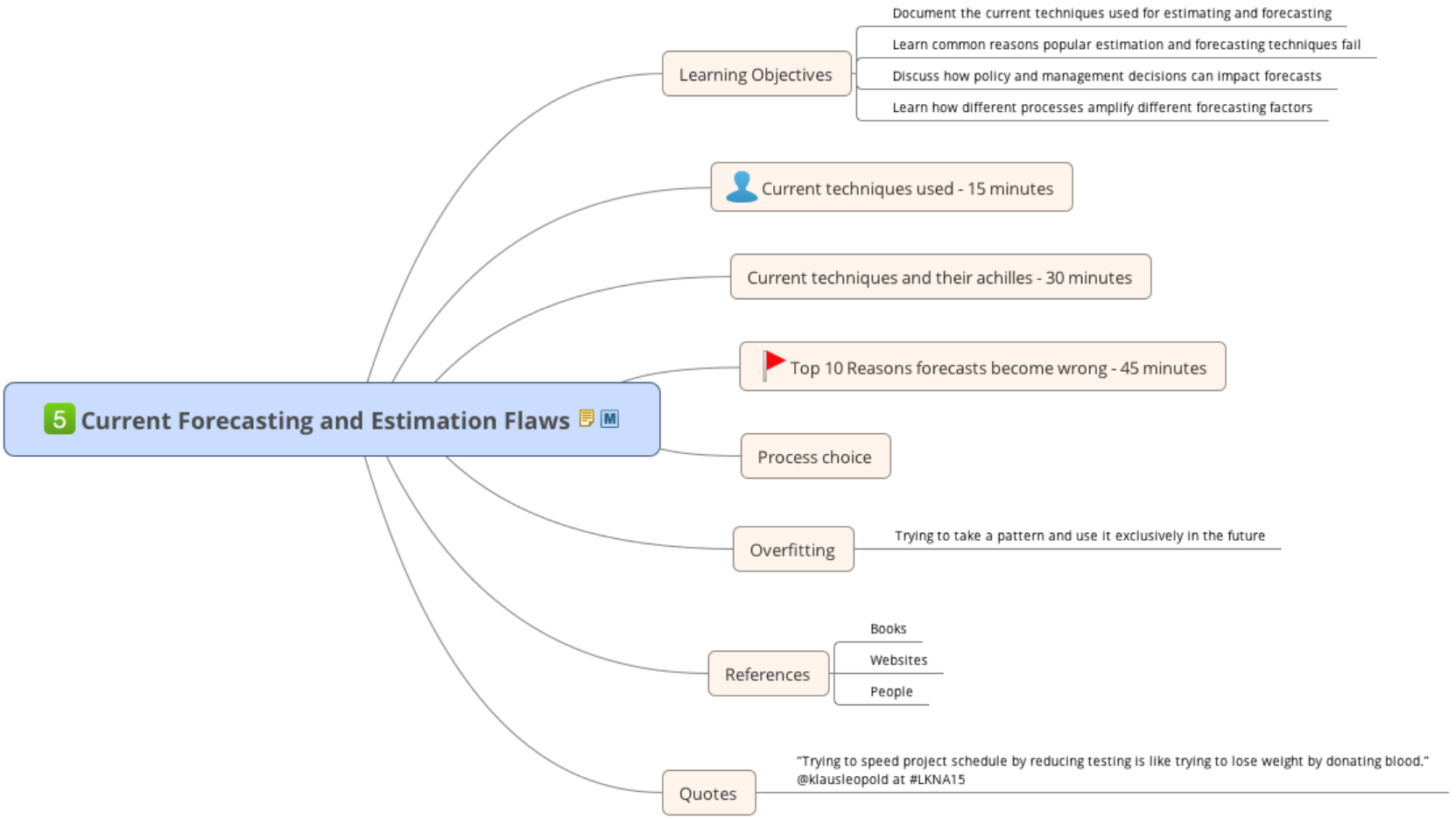
Version 1.0

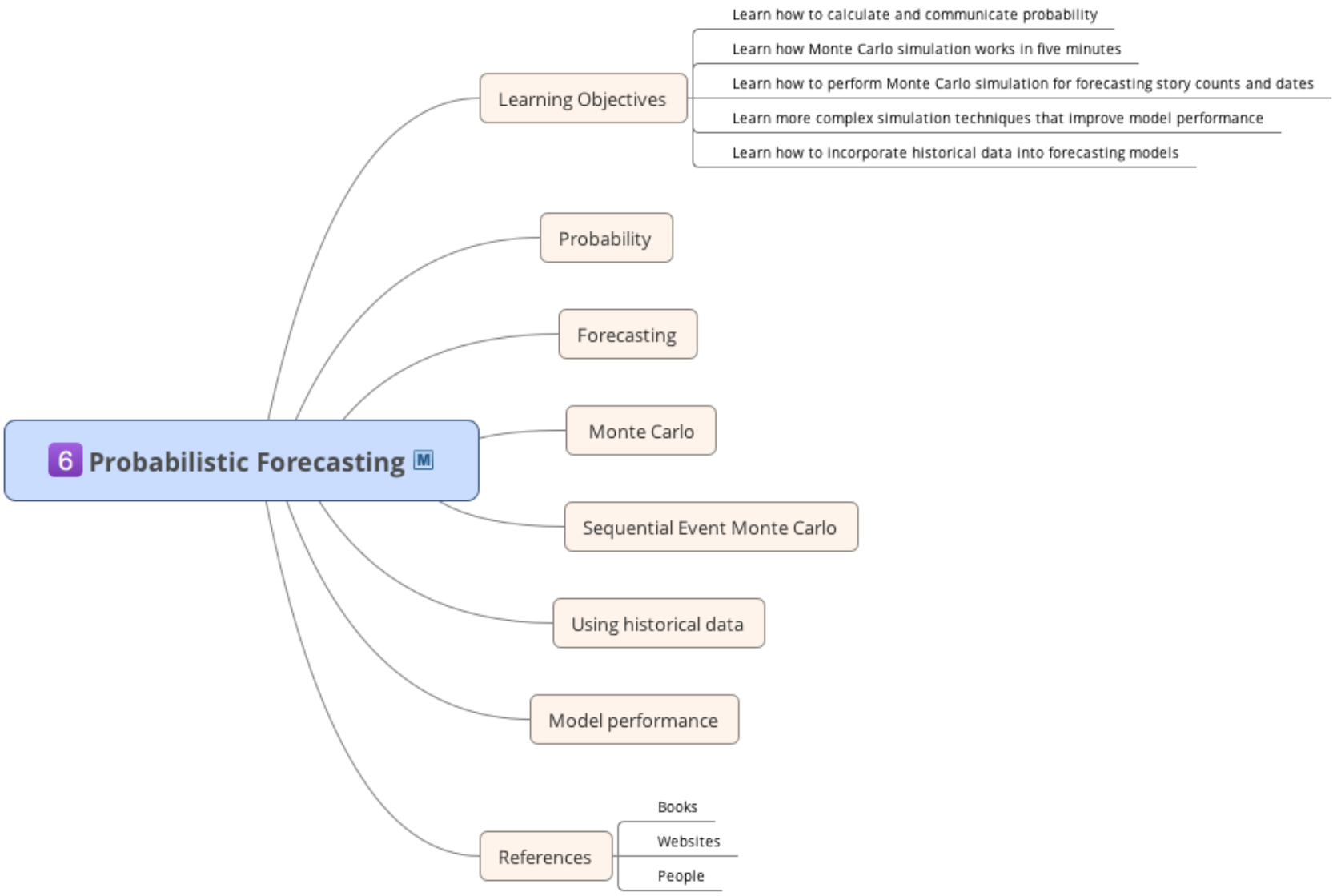

1 Starting M
Introductions
Constellation Exercise
Role
Use of metrics and forecasting
Needs estimates and forecasts
The room
Happiness door
Parking lot
References
Goals (35 or 1:2:4:all exercise)
Current problems
What you want to leave with
Agreements
Breaks, lunch, starting time
Resources and Files
Online
USB
Need a PC or virtual machine
Workshop manual pdf or hardcopy
Setup
Supplies needed
LCD Projector
Mac adapter
Power cord
Extension cord
Tape
Dice
2 x 6 sided per 6 people
1 x percentile per 6 people
1 x 10 sided per 6 people
Worksheets
Prediction Interval
Dice addition exercise in histogram
Monte carlo exercise
Internet access for attendees

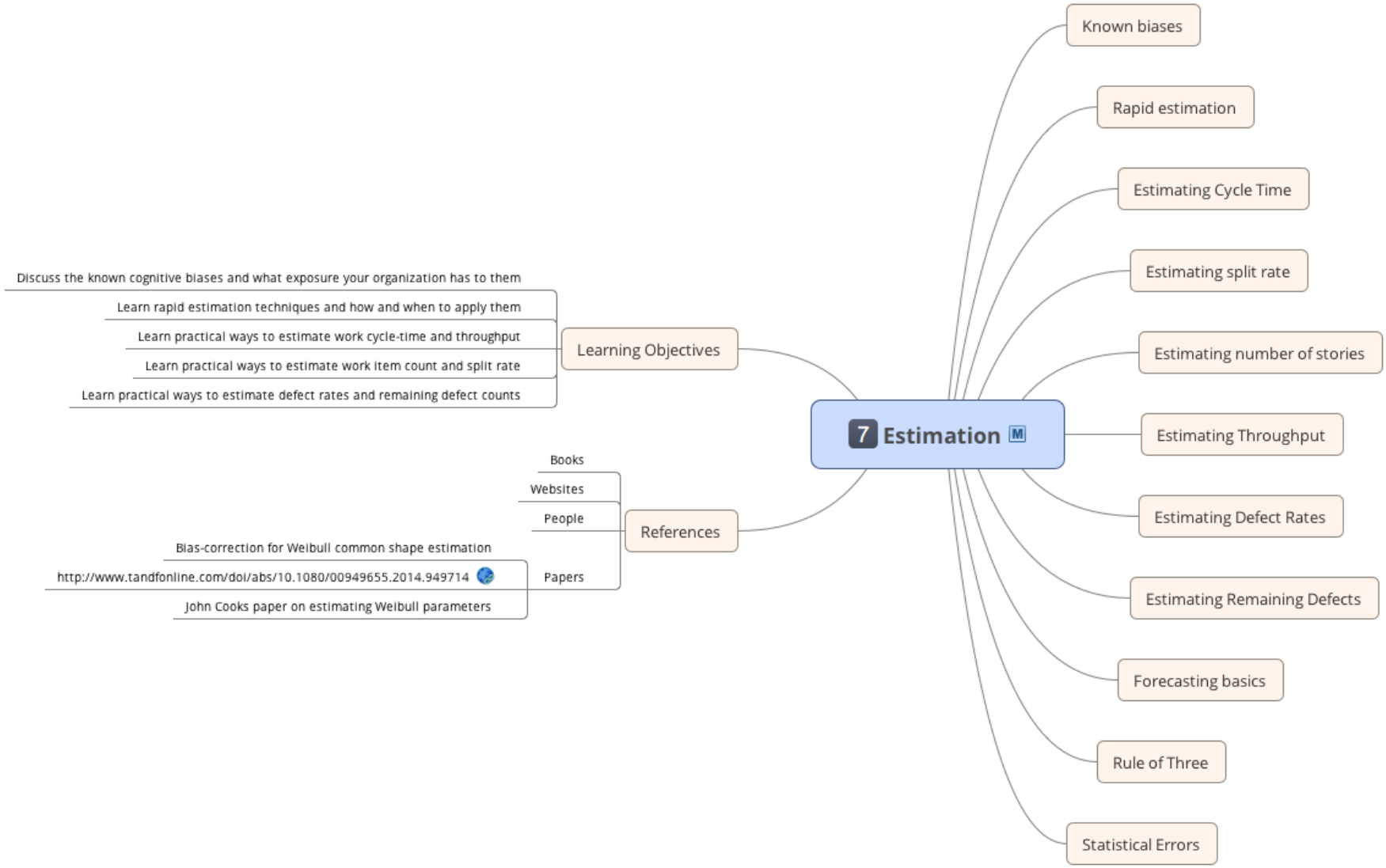

2 Sampling and random number distributions
Prep
Learning Objectives
Learn what statistical sampling means and how it is used
Build intuition about sample sizes needed to decrease uncertainty
Learn how uncertainty is communicated in histograms and percentiles
Learn what a probability distribution is
Learn what are the common probability distributions and why they form
Learn how to do common arithmetic functions on distributions (rather than numbers)
Learn how random numbers are generated based on distributions
Why we sample - 10 minutes
Bootstrap statistics - 5 minutes
Reliability vs Accuracy
Prediction Intervals (exercise) - 30 minutes
Probability Distributions - 45 minutes
Random sampling - 10 minutes
Arithmetic on Distributions - 10 minutes
References
Books
Flaw of Averages
Websites
Random.org
ProbabilityManagement.org
KhanAcadamy.com
Probability
Plot.ly
https://onlinecourses.science.psu.edu/stat100/node/18
People
Sam Savage
Marc Thiubault
Bradley Efron
https://en.wikipedia.org/wiki/Bradley_Efron
http://projecteuclid.org/DPub5?service=UI&version=1.0&verb=Display&handle=euclid.aos/1176344552

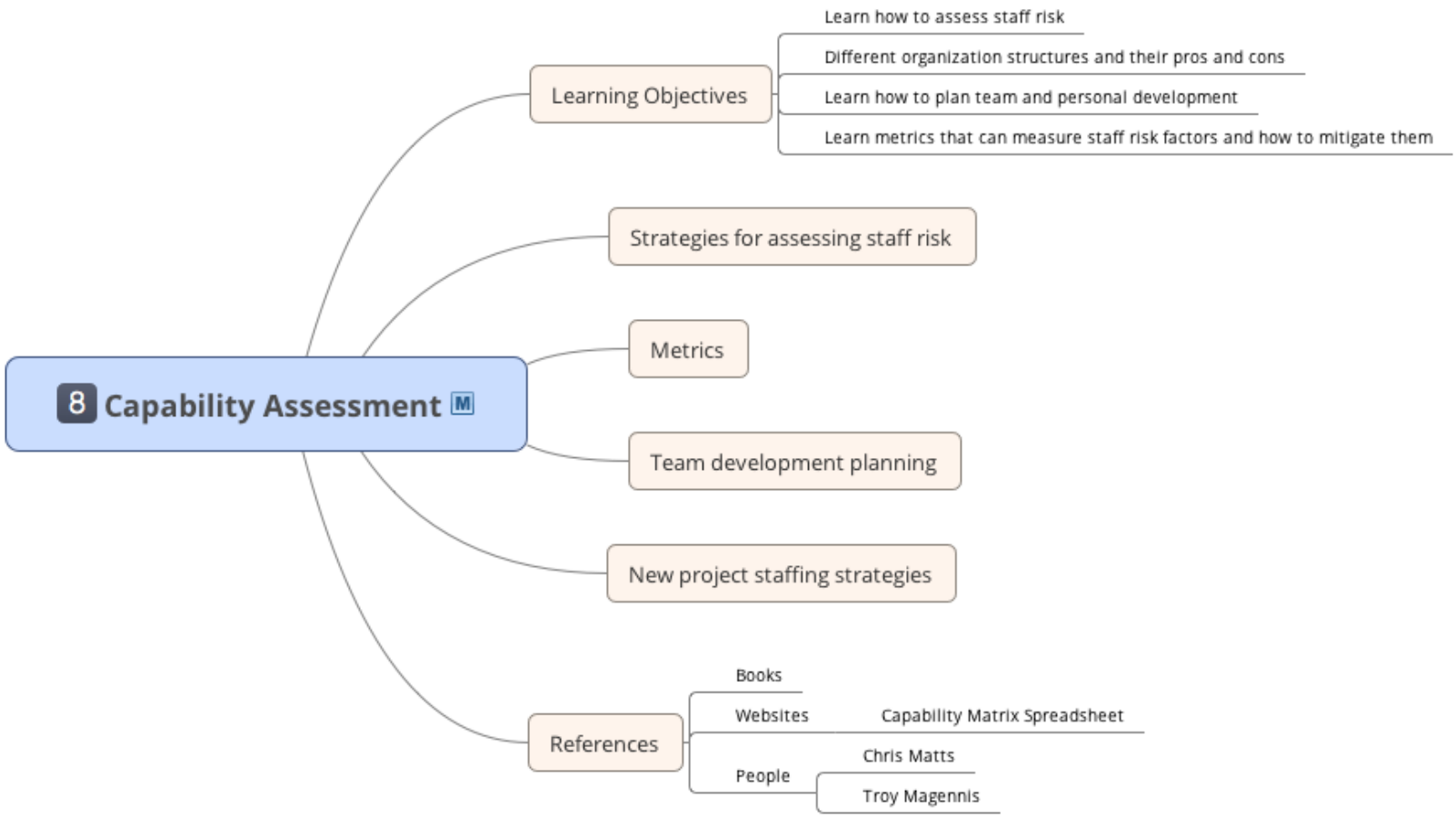

3 What data matters
Learning Objectives
Determine what metrics you currently track and find alternatives or improvements
Learn how to use polarities exercise to find a balanced set of metrics
Learn the concepts behind correlation and how to practically apply it
Learn how to present dashboards of data and avoid common adverse issues
Design and improve the current metric regime for team and organization dashboards
Types of Analytics, Drives Type of Data
What data do you capture, display and track now (1,2,4,all exercise)
Correlation & Conservation
Tradeoff Dashboards
Polarities exercise
Metric canvas
What changes are you going to make on the metrics you capture now (groups)
References
Books
Spurious Correlations
http://www.amazon.com/gp/product/0316339431/ref=as_li_tl?ie=UTF8&camp=211189&creative=373489&creativeASIN=0316339431&link_code=as3&tag=tylervicom-20&linkId=UO6I3ENRRQUF255J
Websites
http://tylervigen.com/spurious-correlations
https://halobi.com/2014/10/descriptive-predictive-and-prescriptive-analytics-explained/
People
Larry Maccherone
https://www.linkedin.com/in/larrymaccherone
Videos
Troy Magennis OreDev
https://vimeo.com/144824390

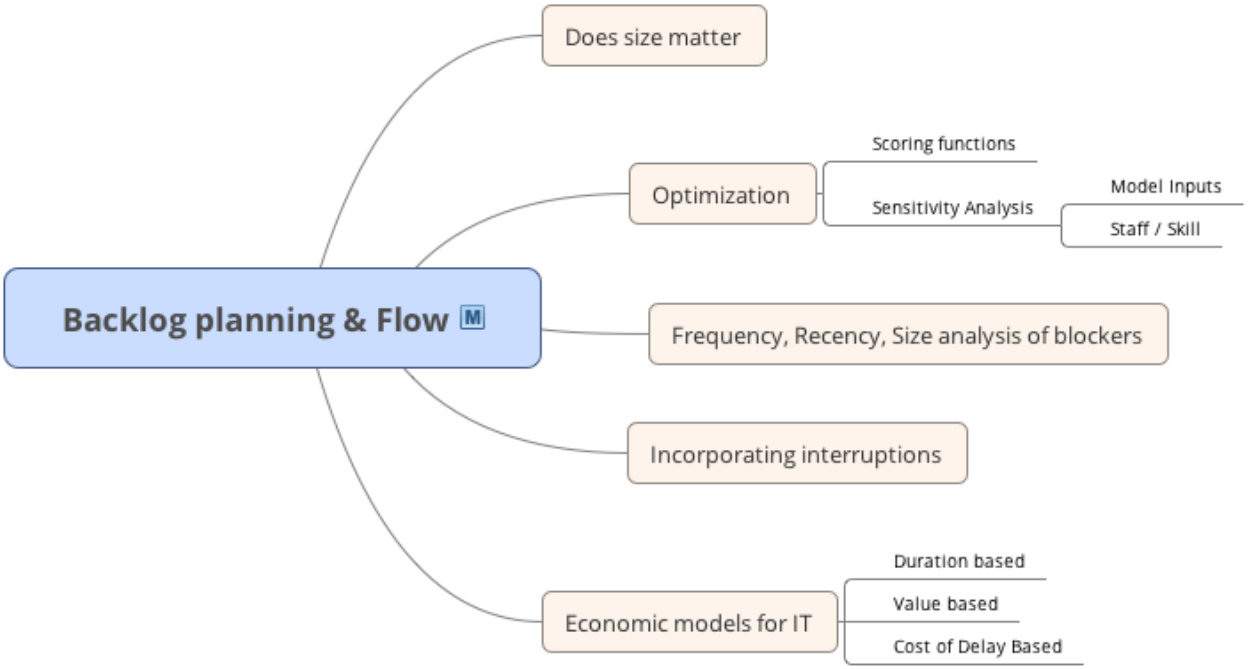

4 Capturing reliable data M
Learning Objectives
Learn the data cleansing process
Learn how to detect outliers and set a policy for them
Learn what special values (blank, empty, zero, null) need to be considered and set a policy for them
Giving People a Reason to Enter Clean Data
Data Cleansing
Exploratory Data Analysis
Checking for randomness
Sources of error
Privacy and Confidentiality
Define the policy for improving the reliability of captured data you use (groups)
References
Books
Websites
People

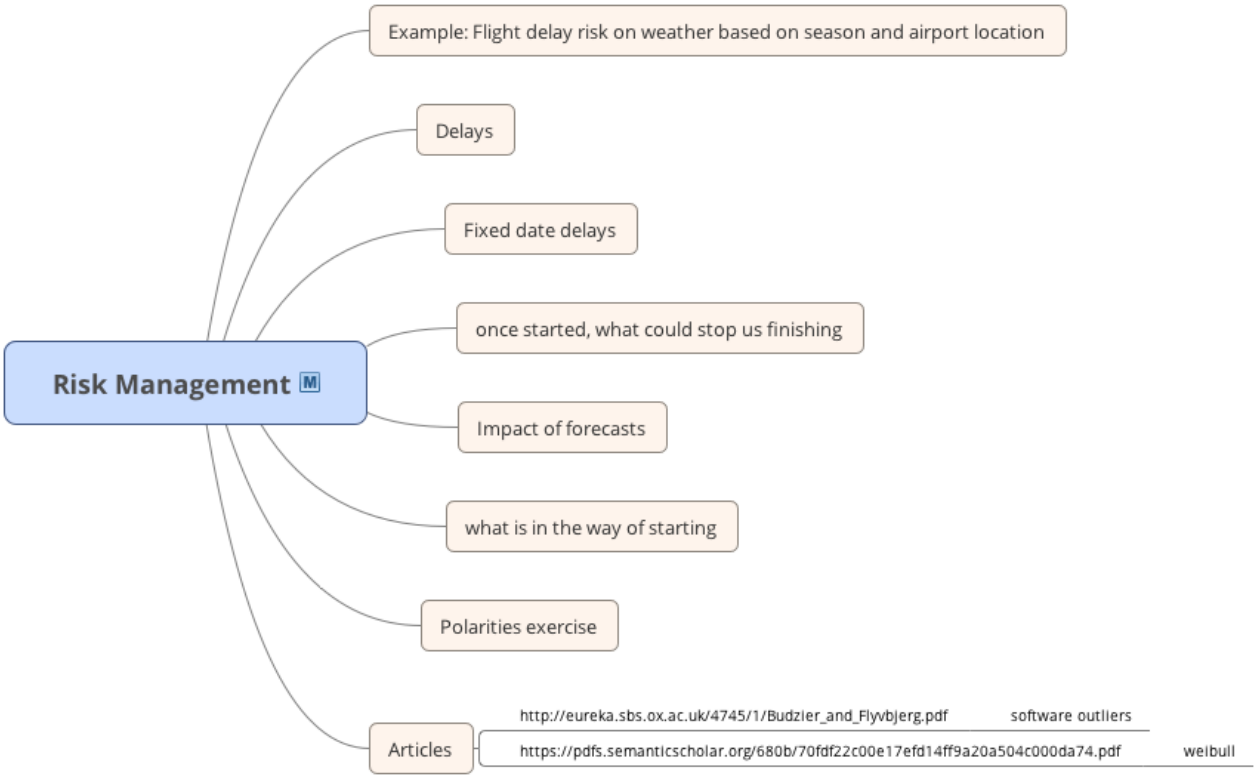

5 Current Forecasting and Estimation Flaws
Learning Objectives
Document the current techniques used for estimating and forecasting
Learn common reasons popular estimation and forecasting techniques fail
Discuss how policy and management decisions can impact forecasts
Learn how different processes amplify different forecasting factors
Current techniques used - 15 minutes
Current techniques and their achilles - 30 minutes
Top 10 Reasons forecasts become wrong - 45 minutes
Process choice
Overfitting
Trying to take a pattern and use it exclusively in the future
References
Books
Websites
People
Quotes
"Trying to speed project schedule by reducing testing is like trying to lose weight by donating blood."
@klausleopold at #LKNA15

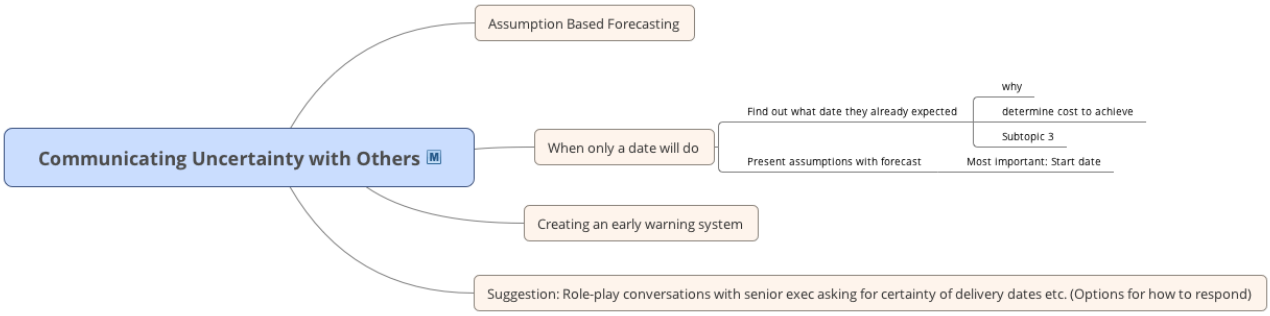

6 Probabilistic Forecasting M
Learning Objectives
Learn how to calculate and communicate probability
Learn how Monte Carlo simulation works in five minutes
Learn how to perform Monte Carlo simulation for forecasting story counts and dates
Learn more complex simulation techniques that improve model performance
Learn how to incorporate historical data into forecasting models
Probability
Forecasting
Monte Carlo
Sequential Event Monte Carlo
Using historical data
Model performance
References
Books
Websites
People


7 Estimation M
Learning Objectives
Discuss the known cognitive biases and what exposure your organization has to them
Learn rapid estimation techniques and how and when to apply them
Learn practical ways to estimate work cycle-time and throughput
Learn practical ways to estimate work item count and split rate
Learn practical ways to estimate defect rates and remaining defect counts
References
Books
Websites
People
Papers
Bias-correction for Weibull common shape estimation
http://www.tandfonline.com/doi/abs/10.1080/00949655.2014.949714
John Cooks paper on estimating Weibull parameters
Known biases
Rapid estimation
Estimating Cycle Time
Estimating split rate
Estimating number of stories
Estimating Throughput
Estimating Defect Rates
Estimating Remaining Defects
Forecasting basics
Rule of Three
Statistical Errors


8 Capability Assessment
Learning Objectives
Learn how to assess staff risk
Different organization structures and their pros and cons
Learn how to plan team and personal development
Learn metrics that can measure staff risk factors and how to mitigate them
Strategies for assessing staff risk
Metrics
Team development planning
New project staffing strategies
References
Books
Websites
Capability Matrix Spreadsheet
People
Chris Matts
Troy Magennis


Backlog planning & Flow
Does size matter
Optimization
Scoring functions
Sensitivity Analysis
Model Inputs
Staff / Skill
Frequency, Recency, Size analysis of blockers
Incorporating interruptions
Economic models for IT
Duration based
Value based
Cost of Delay Based

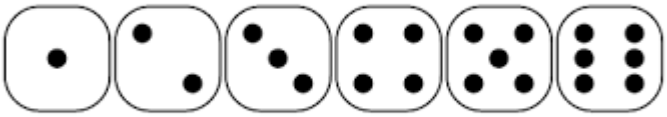

Risk Management
Example: Flight delay risk on weather based on season and airport location
Delays
Fixed date delays
once started, what could stop us finishing
Impact of forecasts
what is in the way of starting
Polarities exercise
Articles
http://eureka.sbs.ox.ac.uk/4745/1/Budzier_and_Flyvbjerg.pdf
software outliers
https://pdfs.semanticscholar.org/680b/70fdf22c00e17efd14ff9a20a504c000da74.pdf
weibull


Assumption Based Forecasting
Communicating Uncertainty with Others
When only a date will do
Find out what date they already expected
why
determine cost to achieve
Subtopic 3
Present assumptions with forecast
Most important: Start date
Creating an early warning system
Suggestion: Role-play conversations with senior exec asking for certainty of delivery dates etc. (Options for how to respond)


Clean-up
Outcomes
9 Finishing
Survey

Understanding probability - Exercises

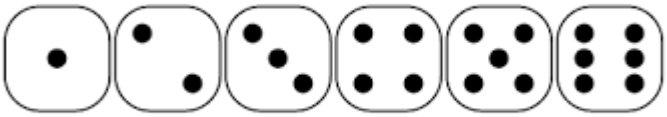
Q1. How many different possible values are there for a standard six-sided dice?



A:

Q2. How many values of a six sided dice are less than 4?

Tip: Circle the values that are less than 4.



A:

Q3. What is the probability of rolling a value less than 4 on a standard six side dice?

Tip: Count the number of “right” values and divide by the total number.

$p = \frac{Number\ of\ "right"\ values}{Total\ possible\ values}$ A:

Q4. What is the probability of rolling at LEAST a 2 on a standard six side dice?

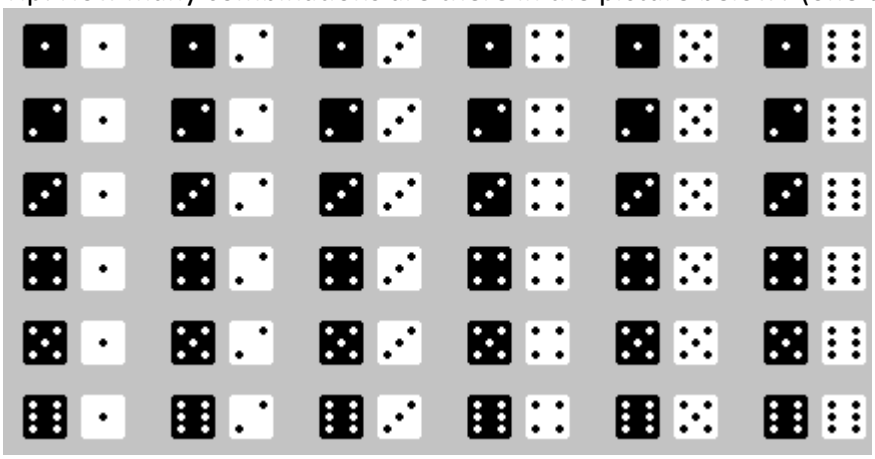
A:

Q5. What is the probability of rolling a value less than 5 on a standard six side dice?

A:

Q6. How many possible outcomes are there for rolling two fair six sided dice?

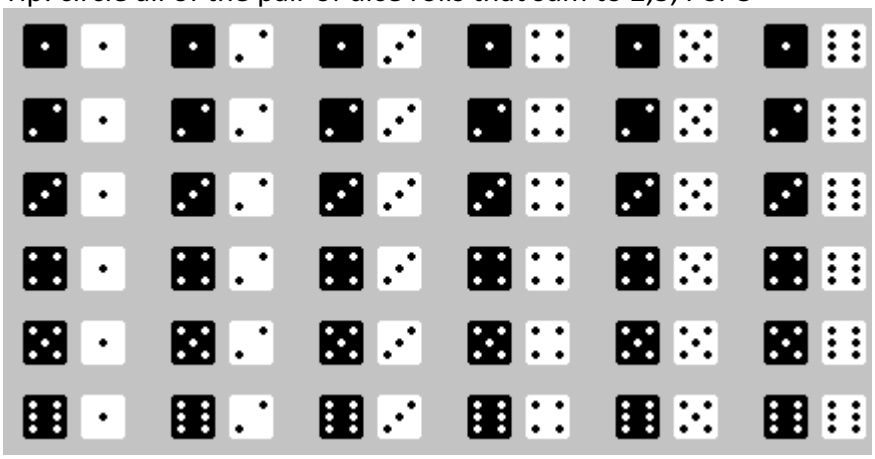
Tip: How many combinations are there in the picture below? (one dice is black, the other white)



A:

Q7. How many values (sum of the two dice) are less than 6?

Tip: circle all of the pair of dice rolls that sum to 2,3,4 or 5



A:

Q8. What is the probability of rolling a combination of less than 6?

Tip: Count the number of "right" values and divide by the total number.

$p = \frac{Number\ of \text{correct}\ values}{Total\ possible\ values}$ A:

Answers: Q1: 6 Q2: 3 Q3: 3/6 = 0.5 Q4: 5/6 = 0.83 Q5: 4/6 = 0.67 Q6: 36 Q7: 10 Q8: 10/36 = 0.278

Prediction Intervals Exercise

To find how many samples it takes to find the lower and upper bounds of a sample set on average? This exercise simulates finding the upper and lower boundary of a sequential range by sampling the result of dice rolls.

The process

1. **Roll Dice**: Create a random number with a range of 1 to 100. Options:
    a. A random number generator app on your phone (Randomizers)
    b. Use three rolls of a six-sided dice (see next page for chart)
    c. Sum two 10 sided dice (00 – 90 by 10's) and a traditional (0-9)
2. **Repeat**: Repeat 20 times and record the results in the table below.
3. **Examine Results**: Look at the range between the lowest rolled and highest rolled. Compare against expected.

3 x 6 Sided Dice

2 x 10 Sided

42

7

99

Note: Rolling a 00 and 0 = 100

Questions and discussion topics

1. **What probability distribution is a single roll?**
2. **What guarantee do I have that I have found the range expected?**
3. **What happens if the data is a Normal (bell curve) distribution?**
4. **What happens if the data is left or right skewed?**

Results table

Record each roll & calculate the ranges seen so far after each roll. Compare to expected.

n prior rolls	This Roll	Lowest So Far	Highest So Far	Range So Far = Highest-Lowest	Expected Range $\frac{(n-1)}{(n+1)} \times 100$
0					
1					0
2					33.3
3					50
4					60
5					66.6
6					71.4
7					75
8					77.8
9					80
10					81.2
11					83.3
12					84.6
13					85.7
14					86.7
15					87.5
16					88.2
17					88.9
18					89.5
19					90

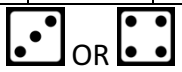
One to One Hundred (1-100) Random Numbers Using Six Sided Dice

First Roll

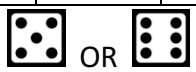
Second Roll

Third Roll

	1	2	3	4	5	6
	7	8	9	10	11	12
	roll again	13	14	15	16	17
	18	19	20	21	22	23
	24	roll again	25	26	27	28
	29	30	31	32	33	34



	35	36	roll again	37	38	39
	40	41	42	43	44	45
	46	47	48	roll again	49	50
	51	52	53	54	55	56
	57	58	59	60	roll again	61
	62	63	64	65	66	67



	68	69	70	71	72	roll again
	73	74	75	76	77	78
	79	80	81	82	83	84
	roll again	85	86	87	88	89
	90	91	92	93	94	95
	96	roll again	97	98	99	100

Example:

1. Roll three six-sided dice, or one six-sided dice 3 times.
2. Consider:
   Roll 1 = **3** (table)
   Roll 2 = **5** (vertical)
   Roll 3 = **4** (horiz.)
3. The value is at the intersection of

Throughput Forecast Monte Carlo – Read First

To estimate the number of stories that will be completed by a team for a six (6) week timespan using historical weekly throughput samples from the same team. To understand the probability of achieving those estimates.

The process

1. **Simulate one possible result**: A single six week throughput result is simulated (called a trial) by summing together six historical one-week throughput samples picked at random.
2. **Repeat**: This simulation process is repeated many times (eleven here, but it can be thousands of repetitions). Each trial represents a "possible" six-week throughput result given the team's historical rate of delivery.
3. **Calculate likelihoods**: The proportion of trials that meet or exceed a given throughput value versus the total number of trials is the likelihood that value is achievable in the future.

Questions and discussion topics

5. **What could pollute the throughput samples (make them a poor predictor of the future)?**
6. **How might you correct for these sample pollution events?**
7. **Why can't we just use the average or median values to forecast the next six weeks?**
8. **If life depended on this forecast, how many stories would you sign-up for?**
9. **How might you choose a likelihood to target in your company?**
10. **How many trials were needed before the actual average (57.75) was included in the range you saw?**
11. **How would you get more definition in the likelihood percentages?**
12. **What does 100% likelihood mean in this case?**
13. **How would you track progress against this forecast?**
14. **What is the impact of not returning the sample each time?**

Why it works

Historical throughput data for teams measures delivery rate for a wide portion of the development system (the wider the better). Team throughput per week accounts for delays; for example waiting time, impediments, staff availability, interruptions and un-recorded work. The impact of these delays is more significant to a forecast than the hands-on time alone. This is a reason developer estimates are unreliable when forecasting projects, they don't account for delays and system dynamics. In a stable system (e.g. the team isn't blown-up), throughput will be a good predictor of future delivery rate even with large item size variability.

Team Throughput Sample Data

Samples represent the number of stories completed per week by the same team taken from an actual project.

Samples: 16,3,10,6,19,11,17,17,15,9,11,8,5,13,5,7,8,6,10,10,8,5,5,7

Count: 24 Sum: 231 Minimum: 3 Median: 8.5 Average: 9.625 Maximum: 19

Resources

Forecasting spreadsheets: https://github.com/FocusedObjective/FocusedObjective.Resources
(these spreadsheets do the process described here thousands of times instantly. This exercise is for learning purposes, don't do it by hand!)

Exercise – Throughput Forecast Monte Carlo Worksheet

Aim: To estimate the number of stories that will be completed by a team for a six (6) week timespan using historical weekly throughput samples for that team. To understand the probability of achieving those estimates.

Process:

1. Shuffle the 24 throughput cards or dice (whichever method you choose)
2. Pick a card at random or throw dice and record sample in the table below
3. Return the card to the deck and reshuffle ("sample with replacement")
4. Repeat until all squares are filled

We randomly sampled trials 4 to 11 for you to save

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Trial 11
			7	11	7	5	17	5	10	16
			19	7	10	5	13	13	5	7
			6	5	5	3	5	16	6	5
			6	19	5	3	5	3	6	3
			5	7	10	5	6	8	8	6
			5	7	19	10	16	8	10	16

5. **Sum of all samples for each trial by column (upper) / Nearest "tens" grouping rounded down (lower)**

			48	**56**	**56**	**31**	**62**	**53**	**45**	**53**
			40+	50+	50+	30+	60+	50+	40+	50+

6. **Sum all trials (a):** **Average all trials (a/11):**

   Actual data average 6 week throughput = **57.75**. How close was your average?

7. **Probabilities of achieving at least n stories for a six-week timespan**

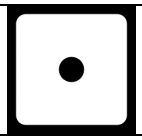
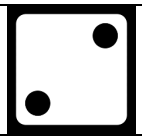
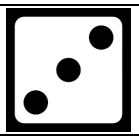
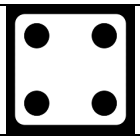
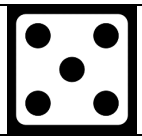
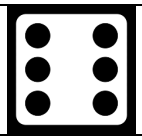
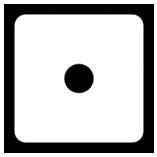
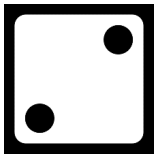
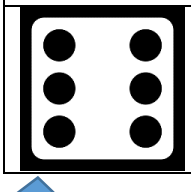
Six Week Throughput	Count trial sum groups at least 30,40, 50, etc. stories	(Count / 11) Likelihood
At least **30** stories		
At least **40** stories		
At least **50** stories		
At least **60** stories		
At least **70** stories		
At least **80** stories		
At least **90** stories		

This value is 0 to 1 Multiply it by 100 to get a percentage. 0% = no chance, 100% means every trial achieved at least this level.

Samples: Random Samples of Throughput by Six-Sided Dice

To generate random samples from the throughput history, throw two six-sided dice (or throw one six-sided dice twice) and use the sample value at the intersection of the two dice results. It's important to make certain samples are taken at random, and using a dice is often the fairest way to ensure you don't introduce bias!

First dice throw

Second dice throw						
	16	3	10	6	19	11
	17	17	15	9	11	8
	5	13	5	7	8	6
	10	10	8	5	5	7
	Roll again	Roll again	Roll again	Roll again	Roll again	Roll again
	Roll again	Roll again	Roll again	Roll again	Roll again	Roll again

Exercise – Throughput Forecast Monte Carlo Completed Example

Aim: To estimate the number of stories that will be completed by a team for a six (6) week timespan using historical weekly throughput samples for that team. To understand the probability of achieving those estimates.

Process:

1. Shuffle the 24 throughput cards
2. Pick a card at random from the deck and record in the table below
3. Return the card to the deck and reshuffle ("sample with replacement")
4. Repeat until all squares are filled

Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Trial 11
17	5	17	7	11	7	5	17	5	10	16
5	8	16	19	7	10	5	13	13	5	7
17	5	16	6	5	5	3	5	16	6	5
13	6	7	6	19	5	3	5	3	6	3
7	7	5	5	7	10	5	6	8	8	6
11	8	7	5	7	19	10	16	8	10	16

5. **Sum of all samples for each trial by column (upper) / Nearest "tens" grouping rounded down (lower)**

70	39	68	48	56	56	31	62	53	45	53
70+	30+	60+	40+	50+	50+	30+	60+	50+	40+	50+

6. **Sum all trials (a): 581** **Average all trials (a/11): 52.81**

   Actual data average 6 week throughput = **57.75**. How close was your average?

7. **Probabilities of achieving at least n stories for a six week timespan**

6 Week Throughput	Count trial sum groups at least 30,40, 50, etc. stories	(Count / 11) Likelihood
At least **30** stories	11	1
At least **40** stories	9	0.82
At least **50** stories	7	0.63
At least **60** stories	3	0.28
At least **70** stories	1	0.09
At least **80** stories	0	0
At least **90** stories	0	0

This value is 0 to 1 Multiply it by 100 to get a percentage. 0% = no chance, 100% means every trial achieved at least

Capture Recapture Exercise 1: **DO NOT START UNTIL ASKED**

In each of the groups of words below there may or may NOT be a spelling mistake. If a word is misspelled, circle it. Remember, not all groups have a spelling mistake.

1. fuzzes, laundrys, sufficient	21. subtle, judgement, ancient
2. turkeys, trophies, arrival, armies	22. said, envirement, interest
3. acrage, analysis, dosage	23. realize, alleys, acheive
4. acompaniment, played, interviewed	24. preference, convenient, releif
5. privilege, excelling, eighth	25. awkward, considerably, neccessasry
6. adolescence, contemporary, ninty	26. activity, aproach, familiar
7. athletic, conscious, mathmatics	27. quantity, couragous, niece
8. performence, fiery, recede	28. irresponsible, concuring, vein
9. leisure, familiar, proffessor	29. accumulate, benefit, fourty
10. undoubtly, experience, succeed	30. surprize, audience, proceed
11. seize, acceptance, grammer	31. acquire, condemm, interpret
12. pleasant, slyly, watches	32. recommend, required, conscience
13. accidentally, embarass, intelligence	33. forfiet, appreciate, extremely
14. prejudice, preferred, lieutenant	34. protein, accomplish, fasinate
15. payed, characteristic, intelligence	35. seperate, diaries, receipt
16. sergeant, noticable, deceit	36. athlete, careful, marriage
17. particuler, arbitrarily, attorneys	37. analyze, decision, occurence
18. neither, acknowledge, goverment	38. sophmore, supersede, conceit
19. permmit, referring, foreign	39. thieves, agressive, occasion
20. halves, accross, attendant	

Total mistakes found: **Total mistakes found by both groups:**

Capture Recapture Exercise 2: **DO NOT START UNTIL ASKED**

Circle the spelling mistakes in the following paragraph.

George new that he shouldn't drink alchohol on a Wedsday night, especially since his govermnet proffesor had schedualed an important exam on Thrusday. However, he beleived he would loose his friends if he didn't go out with them. The pressure to fit in with his peers was worst then the fear of bad grades. To be popular among his friends, one had to be either a musclar athelete or a wild and crazy drinker. George realy could not concieve how it was posible for a student to consume huge quanities of liquor and still suceed in school. Maybe the drinkers were just more briliant than he was. He didn't even enjoy the passtime of spending ours in a bar trying to persue a temperary feeling of excitement and "fun." Somehow he expected the cheif of campus security to catch him and the university administration to expell him. But George didn't posses enough courage to express his opion to his friends. He was certian they would tell him to mind his own buisness. Also, he did't want to be seperated from his friends. So he planed to meet them at a local restaraunt, have a few drinks, leave early, take some asprin, and spend a few ours studing for the exam.

Total mistakes found:

Total mistakes found by both groups:

Answers

1. fuzzes, laundrys, sufficient	21. subtle, judgement, ancient
2. turkeys, trophies, arrival, armies	22. said, enviroment, interest
3. acrage, analysis, dosage	23. realize, alleys, acheive
4. acompaniment, played, interviewed	24. preference, convenient, releif
5. privilege, excelling, eighth	25. awkward, considerably, neccessasry
6. adolescence, contemporary, ninty	26. activity, aproach, familiar
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9. leisure, familiar, proffessor	29. accumulate, benefit, fourty
10. undoubtly, experience, succeed	30. surprsie, audience, proceed
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18. neither, acknowledge, goverment	38. sophmore, supersede, conceit
19. permmit, referring, foreign	39. thieves, agressive, occasion
20. halves, accross, attendant	

1. laundries 2. none 3. acreage 4. accompaniment 5. none 6. ninety 7. mathematics

8. performance 9. professor 10. undoubtedly 11. grammar 12. none 13. embarrass 14. none

15. paid 16. noticeable 17. particular 18. government 19. permit 20. across 21. judgment

22. environment 23. achieve 24. relief 25. necessary 26. approach 27. courageous

28. concurring 29. forty 30. surprise 31. condemn 32. none 33. forfeit 34. fascinate

35. separate 36. none 37. occurrence 38. sophomore 39. aggressive

33 actual mistakes

ANSWERS:

George new that he shouldn't drink alchohol on a Wedsday night, especially since his govermnet proffesor had schedualed an important exam on Thrusday. However, he beleived he would loose his friends if he didn't go out with them. The pressure to fit in with his peers was worst then the fear of bad grades. To be popular among his friends, one had to be either a musclar athelete or a wild and crazy drinker. George realy could not concieve how it was posible for a student to consume huge quanities of liquor and still suceed in school. Maybe the drinkers were just more briliant than he was. He didn't even enjoy the passtime of spending ours in a bar trying to persue a temperary feeling of excitement and "fun." Somehow he expected the cheif of campus security to catch him and the university administration to expell him. But George didn't posses enough courage to express his opion to his friends. He was certian they would tell him to mind his own buisness. Also, he did't want to be seperated from his friends. So he planed to meet them at a local restaraunt, have a few drinks, leave early, take some asprin, and spend a few ours studing for the exam.

Corrected -

George knew that he shouldn't drink alcohol on a Wednesday night, especially since his government professor had scheduled an important exam on Thursday. However, he believed he would lose his friends if he didn't go out with them. The pressure to fit in with his peers was worse than the fear of bad grades. To be popular among his friends, one had to be either a muscular athlete or a wild and crazy drinker. George really could not conceive how it was possible for a student to consume huge quantities of liquor and still succeed in school. Maybe the drinkers were just more brilliant than he was. He didn't even enjoy the pastime of spending hours in a bar trying to pursue a temporary feeling of excitement and "fun." Somehow he expected the chief of campus security to catch him and the university administration to expel him. But George didn't possess enough courage to express his opinion to his friends. He was certain they would tell him to mind his own business. Also, he didn't want to be separated from his friends. So he planned to meet them at a local restaurant, have a few drinks, leave early, take some aspirin, and spend a few hours studying for the exam.

Total errors: 36

Source: **STUDENT LEARNING ASSISTANCE CENTER (SLAC).** Texas State University-San Marcos

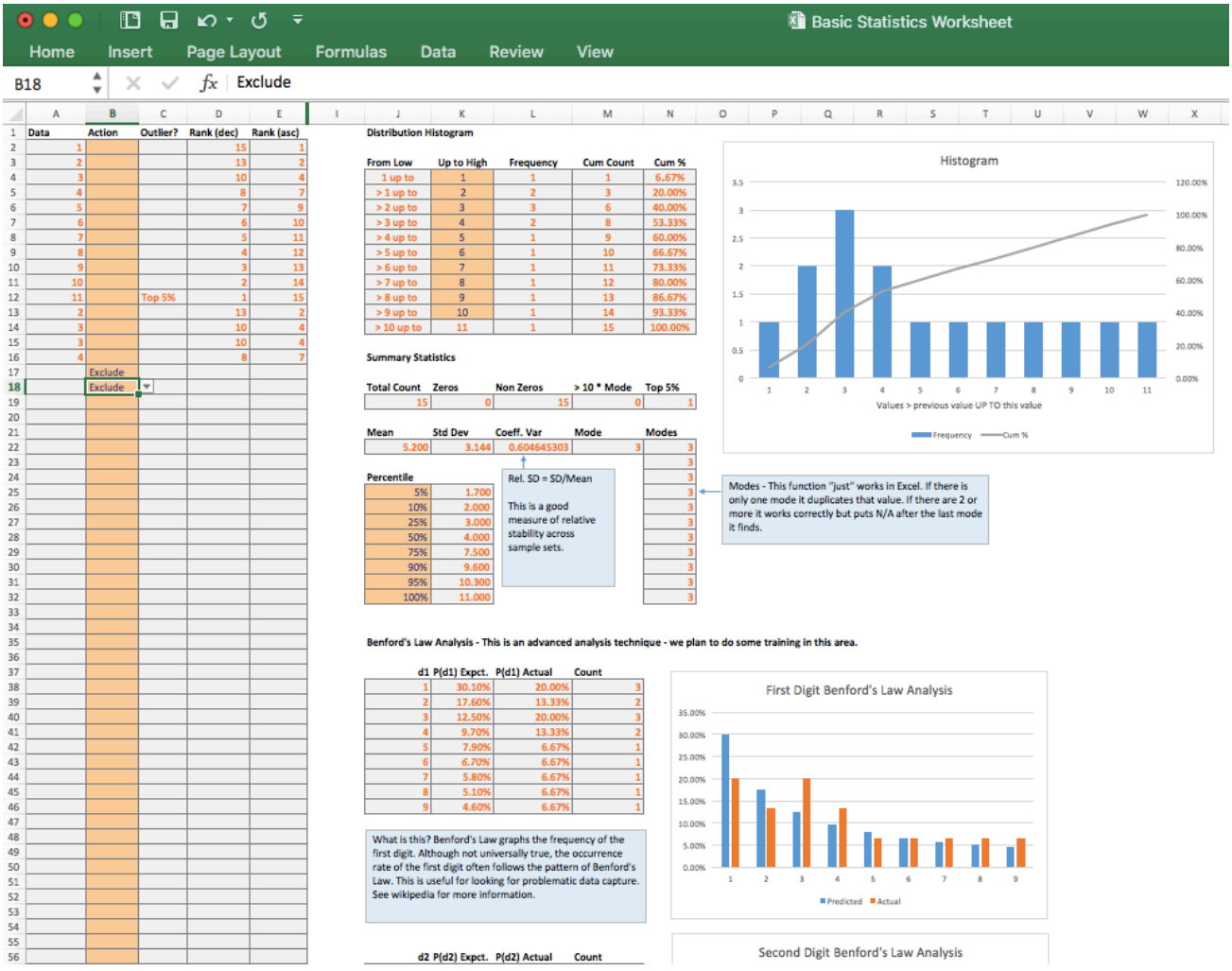
Basic Statistics Worksheet

Get from: Bit.ly/SimResources – Spreadsheets/Basic Statistics Worksheet

Use it to analyze numerical data for consistency, outliers and special cases that might reflect good or bad data quality issues.

Discuss –

- Statistical Terms: mean vs median
- Histograms: Why they are useful
- Outlier Management: What is an outlier, what do you do
- Zero and empty management: How to avoid these causing errors
- Benfords Law: Detecting non random….



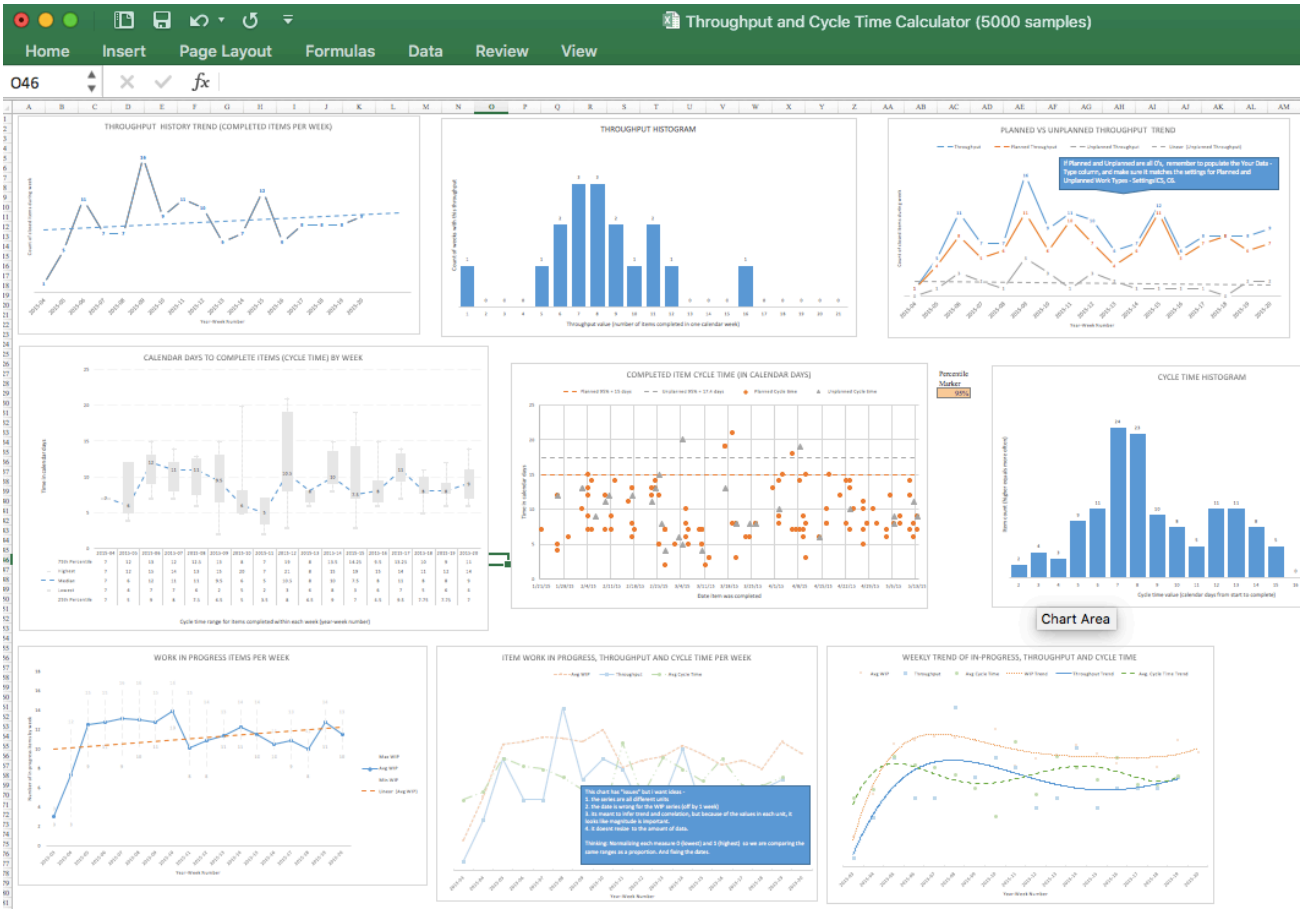
Throughput and Cycle Time Calculator

Get from: Bit.ly/SimResources – Spreadsheets/ Throughput and Cycle Time Calculator (5000 samples).xlsx

Use it to analyze story completion and start dates and generate throughput and cycle time. Also produces 17 other charts.

Discuss –

- How to get the date data
- The different charts it produces
- Planned versus un-planned work settings
- Where to copy cycle time and throughput values



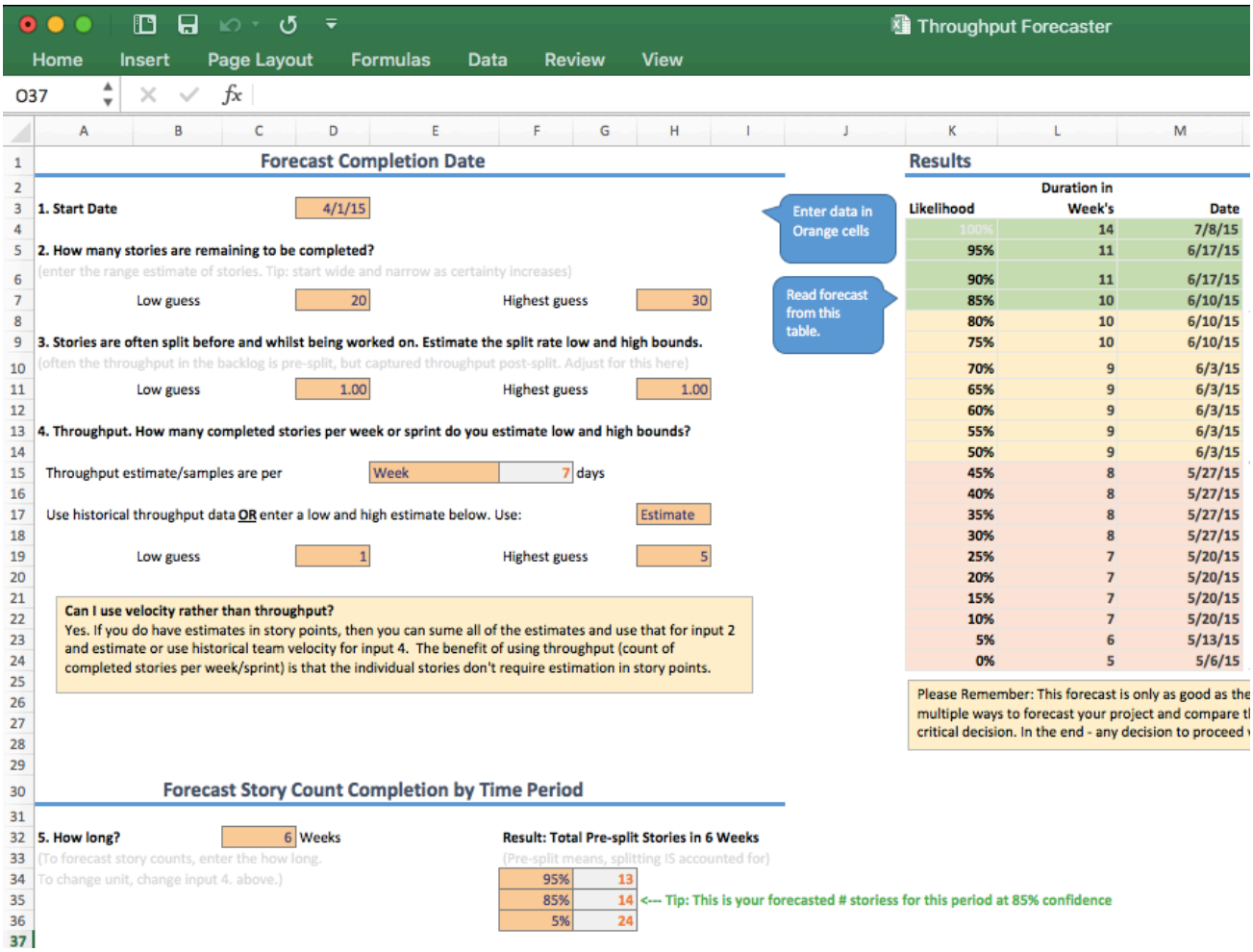
Throughput Forecaster

Get from: Bit.ly/SimResources – Spreadsheets/Throughput Forecaster.xlsx

Use it to forecast a single feature or how much work fits within a fixed time-frame. Can use historical data or range guesses

Discuss –

- The charts and how it works
- How to get the throughput data
- How to perform the range estimates
- How to track actual versus estimates
- Modeling and Forecasting Risks



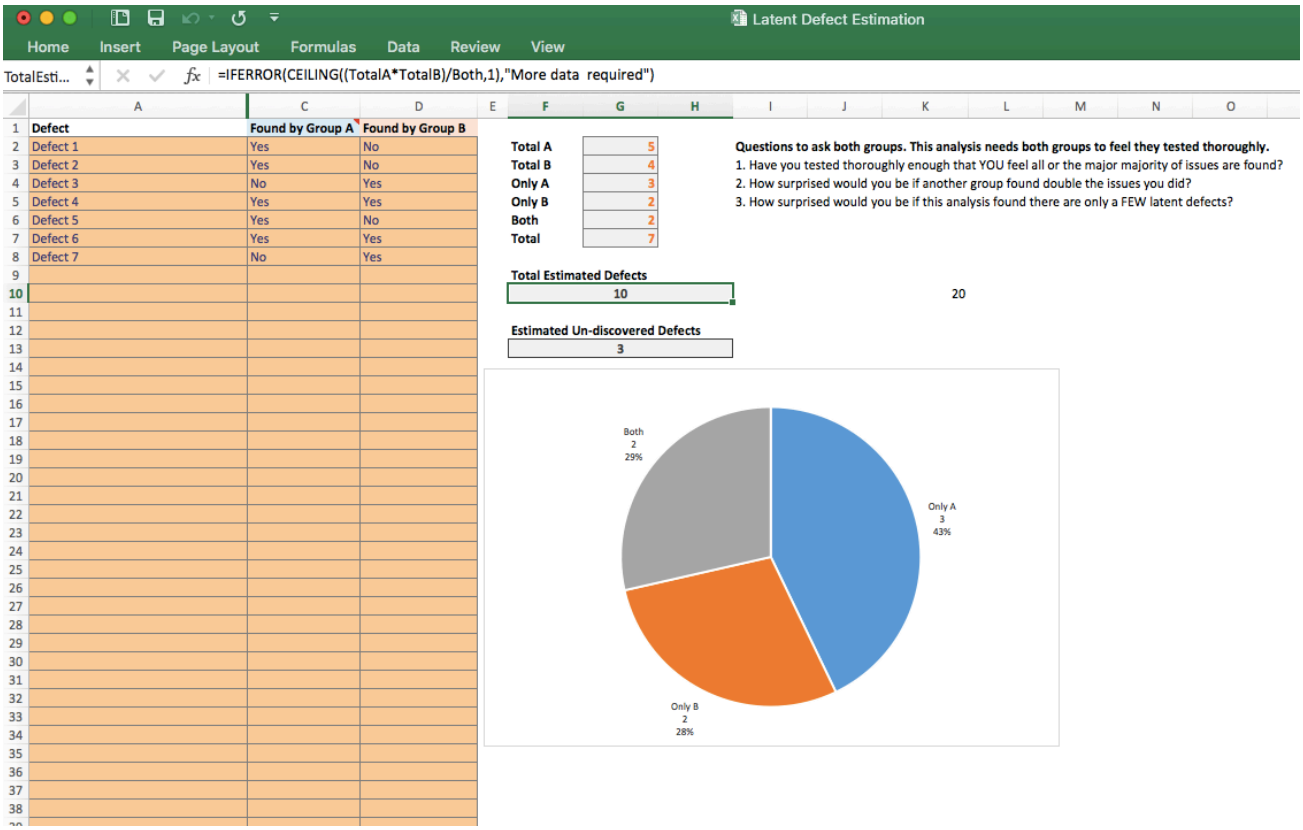
Latent Defect Estimation

Get from: Bit.ly/SimResources – Spreadsheets/Latent Defect Estimation

Use it to estimate the number of defects remaining after two groups independently check,

Discuss –

- How to perform this analysis when beta testing
- How to perform this analysis with bug bash days



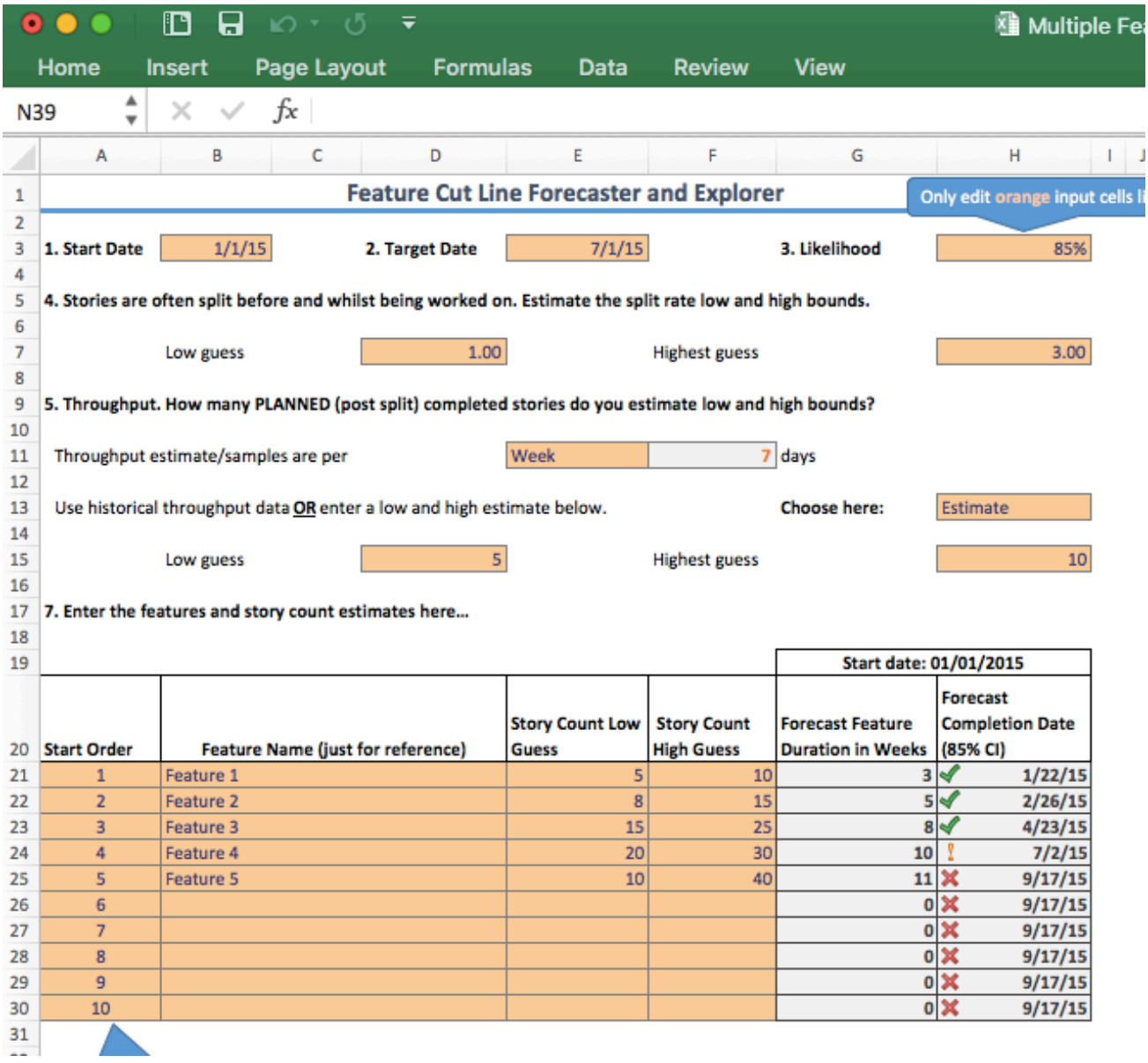
Multiple Cut Line Forecaster

Get from: Bit.ly/SimResources – Spreadsheets/Multiple Feature Cut Line Forecaster.xlsx

Use it to forecast a what features will likely deliver by a target date, and to simulate different start orders of those features to maximize value delivery.

Discuss –

- How to split features
- How to set split rate
- Using estimates before sample data is available
- How to simulate order change
- Why to use month adjustments (vacation, staff increases, conferences, etc)



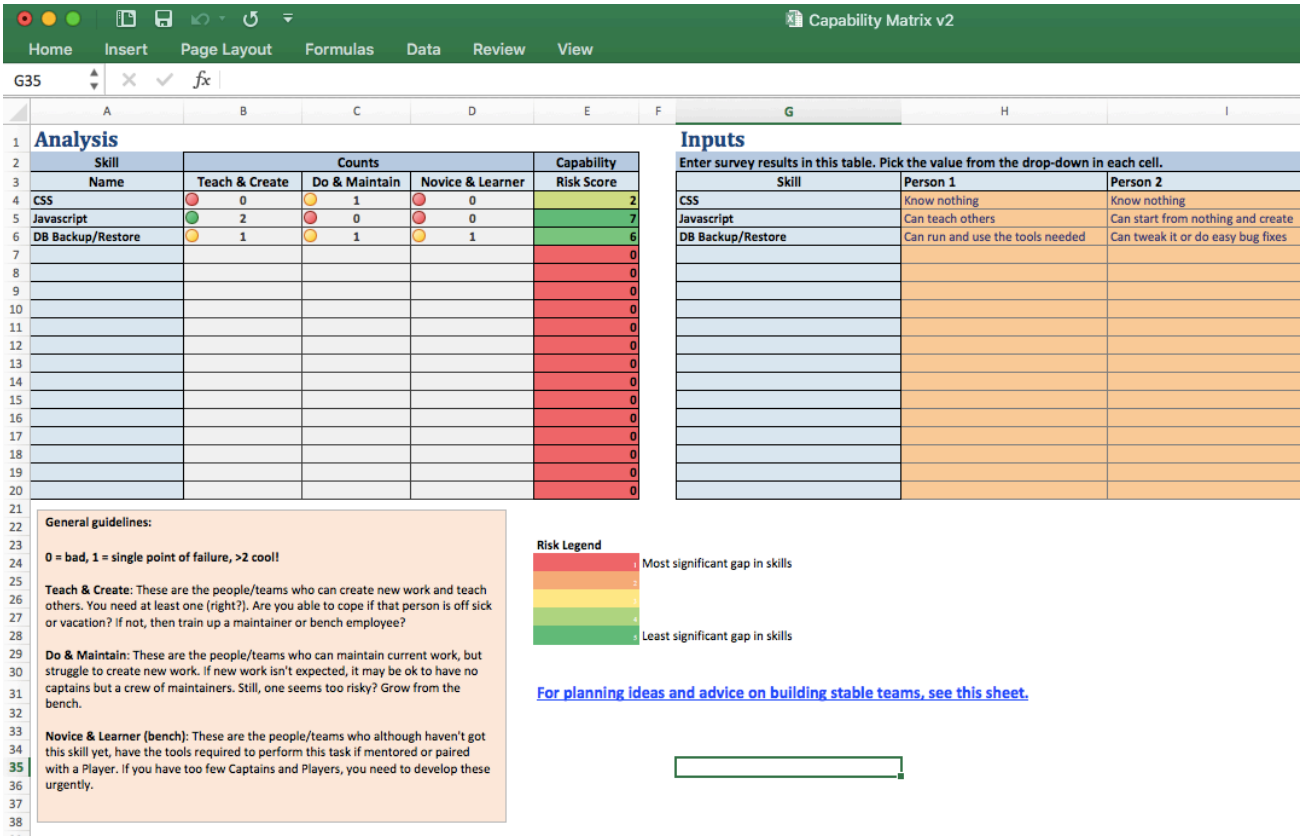
Capability Matrix v2

Get from: Bit.ly/SimResources – Spreadsheets/Capability Matrix v2.xlsx

Use it to quickly survey for available skills and understand who can teach those skills.

Discuss –

- How to decide what skills to survey
- How to maximize honest answers
- How to plan team growth and splitting points



Analysis

Skill	Counts			Capability
Name	Teach & Create	Do & Maintain	Novice & Learner	Risk Score
CSS	0	1	0	2
Javascript	2	0	0	7
DB Backup/Restore	1	1	1	6

Inputs

Enter survey results in this table. Pick the value from the drop-down in each cell.

Skill	Person 1	Person 2
CSS	Know nothing	Know nothing
Javascript	Can teach others	Can start from nothing and create
DB Backup/Restore	Can run and use the tools needed	Can tweak it or do easy bug fixes

General guidelines:

0 = bad, 1 = single point of failure, >2 cool!

Teach & Create: These are the people/teams who can create new work and teach others. You need at least one (right?). Are you able to cope if that person is off sick or vacation? If not, then train up a maintainer or bench employee?

Do & Maintain: These are the people/teams who can maintain current work, but struggle to create new work. If new work isn't expected, it may be ok to have no captains but a crew of maintainers. Still, one seems too risky? Grow from the bench.

Novice & Learner (bench): These are the people/teams who although haven't got this skill yet, have the tools required to perform this task if mentored or paired with a Player. If you have too few Captains and Players, you need to develop these urgently.

Risk Legend

Most significant gap in skills

Least significant gap in skills

For planning ideas and advice on building stable teams, see this sheet.

20 COGNITIVE BIASES THAT SCREW UP YOUR DECISIONS

1. Anchoring bias.

People are **over-reliant** on the first piece of information they hear. In a salary negotiation, whoever makes the first offer establishes a range of reasonable possibilities in each person's mind.

2. Availability heuristic.

People **overestimate the importance** of information that is available to them. A person might argue that smoking is not unhealthy because they know someone who lived to 100 and smoked three packs a day.

3. Bandwagon effect.

The probability of one person adopting a belief increases based on the number of people who hold that belief. This is a powerful form of **groupthink** and is reason why meetings are often unproductive.

4. Blind-spot bias.

Failing to recognize your own cognitive biases is a bias in itself. People notice cognitive and motivational biases much more in others than in themselves.

5. Choice-supportive bias.

When you choose something, you tend to feel positive about it, even if that **choice has flaws**. Like how you think your dog is awesome — even if it bites people every once in a while.

6. Clustering illusion.

This is the tendency to **see patterns in random events**. It is key to various gambling fallacies, like the idea that red is more or less likely to turn up on a roulette table after a string of reds.

7. Confirmation bias.

We tend to listen only to information that confirms our **preconceptions** — one of the many reasons it's so hard to have an intelligent conversation about climate change.

8. Conservatism bias.

Where people favor prior evidence over new evidence or information that has emerged. People were **slow to accept** that the Earth was round because they maintained their earlier understanding that the planet was flat.

9. Information bias.

The tendency to **seek information when it does not affect action**. More information is not always better. With less information, people can often make more accurate predictions.

10. Ostrich effect.

The decision to **ignore dangerous or negative information** by "burying" one's head in the sand, like an ostrich. Research suggests that investors check the value of their holdings significantly less often during bad markets.

11. Outcome bias.

Judging a decision based on the **outcome** — rather than how exactly the decision was made in the moment. Just because you won a lot in Vegas doesn't mean gambling your money was a smart decision.

12. Overconfidence.

Some of us are **too confident about our abilities**, and this causes us to take greater risks in our daily lives. Experts are more prone to this bias than laypeople, since they are more convinced that they are right.

13. Placebo effect.

When **simply believing** that something will have a certain effect on you causes it to have that effect. In medicine, people given fake pills often experience the same physiological effects as people given the real thing.

14. Pro-innovation bias.

When a proponent of an innovation tends to **overvalue its usefulness** and undervalue its limitations. Sound familiar, Silicon Valley?

15. Recency.

The tendency to weigh the **latest information** more heavily than older data. Investors often think the market will always look the way it looks today and make unwise decisions.

16. Salience.

Our tendency to focus on the **most easily recognizable features** of a person or concept. When you think about dying, you might worry about being mauled by a lion, as opposed to what is statistically more likely, like dying in a car accident.

17. Selective perception.

Allowing our expectations to **influence how we perceive** the world. An experiment involving a football game between students from two universities showed that one team saw the opposing team commit more infractions.

18. Stereotyping.

Expecting a group or person to have certain qualities without having real information about the person. It allows us to quickly identify strangers as friends or enemies, but people tend to **overuse and abuse** it.

19. Survivorship bias.

An error that comes from focusing only on surviving examples, causing us to **misjudge a situation**. For instance, we might think that being an entrepreneur is easy because we haven't heard of all those who failed.

20. Zero-risk bias.

Sociologists have found that **we love certainty** — even if it's counterproductive. Eliminating risk entirely means there is no chance of harm being caused.

SOURCES: Brain Biases; Ethics Unwrapped; Explorable; Harvard Magazine; HowStuffWorks; LearnVest; Outcome bias in decision evaluation, Journal of Personality and Social Psychology; Psychology Today; The Bias Blind Spot: Perceptions of Bias in Self Versus Others, Personality and Social Psychology Bulletin; The Cognitive Effects of Mass Communication, Theory and Research in Mass Communications; The less-is-more effect: Predictions and tests, Judgment and Decision Making; The New York Times; The Wall Street Journal; Wikipedia; You Are Not So Smart; ZhurnalyWiki

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