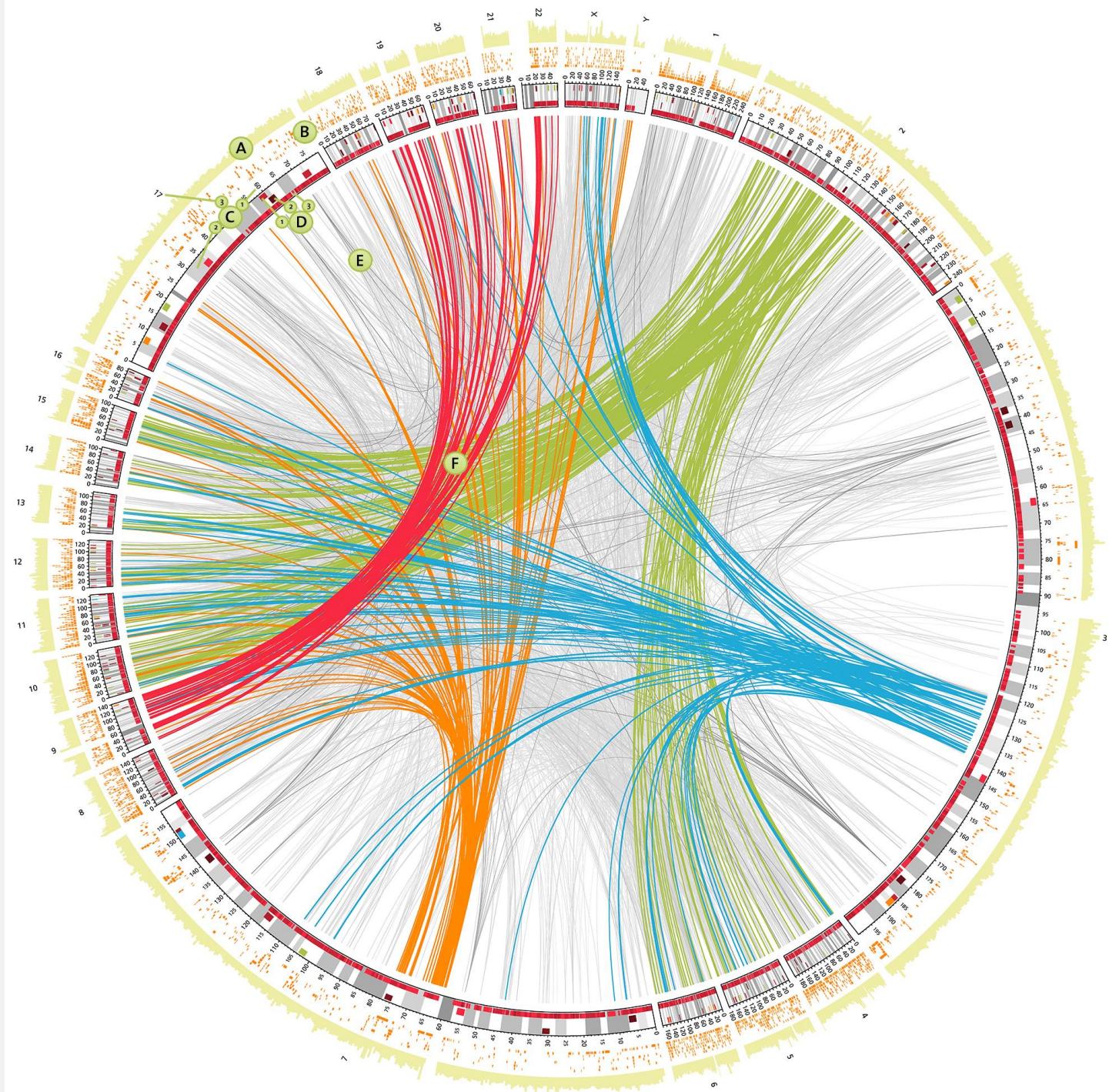




Design Thinking



Data Science



Most Data Science projects go nowhere

BIG DATA // BIG DATA ANALYTICS

NEWS

2/2/2015
09:40 AM

Big Data Success Remains Elusive: Study



Jeff Bertolucci
News

Connect Directly



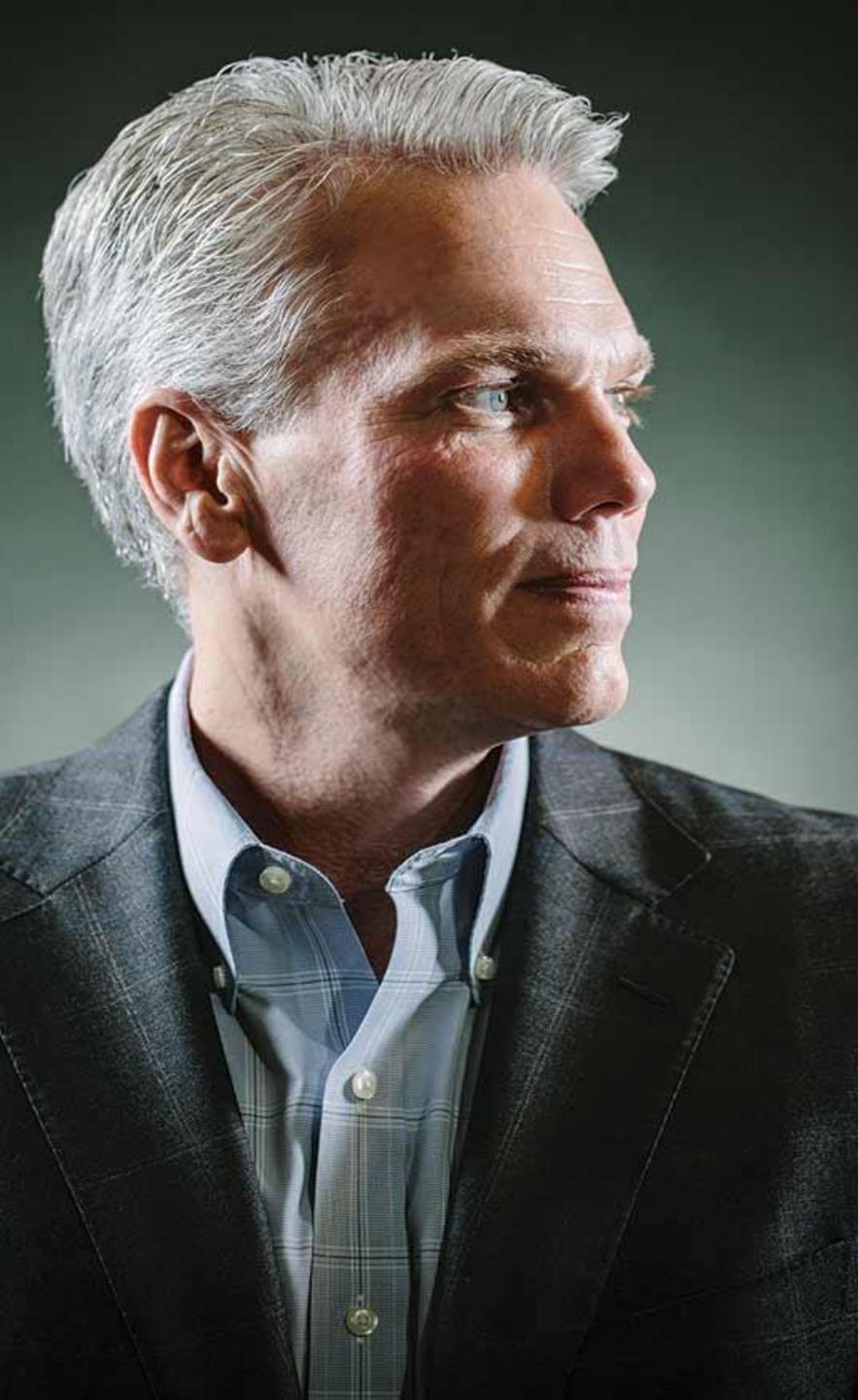
Just over a quarter of organizations say their big data initiatives are a success, according to a recent Capgemini study. So why are three of four unsuccessful?

Nearly eight out of ten organizations have big data projects underway, but only 27% describe their efforts as "successful," and just 8% as "very successful." But despite this dim view of their data-driven efforts thus far, 60% of executives surveyed recently by consulting firm



What a waste

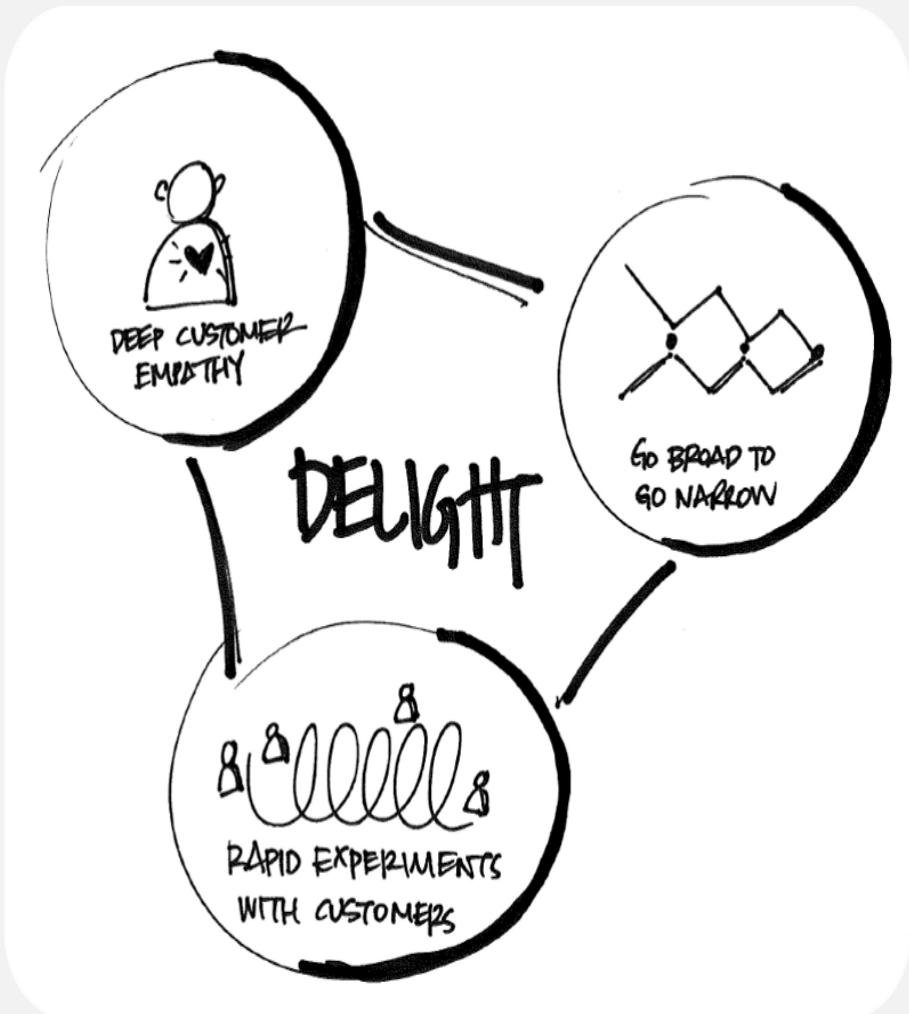




“ We've challenged everyone who works for us—even our lawyers and accountants—to think deeply about how design should be part of their jobs.”

CEO Brad Smith
Harvard Business Review
January 2015

Design for Delight



“ Design for Delight articulates Intuit’s approach to design thinking, based on deep customer empathy, idea generation, and experimentation.

D4D provides the entire company with a common framework for building great products.”

CEO Brad Smith
Harvard Business Review
January 2015

Innovation Catalysts



What is a Data Scientist?



Data Science products



Analysis



*Decision
Support
System*



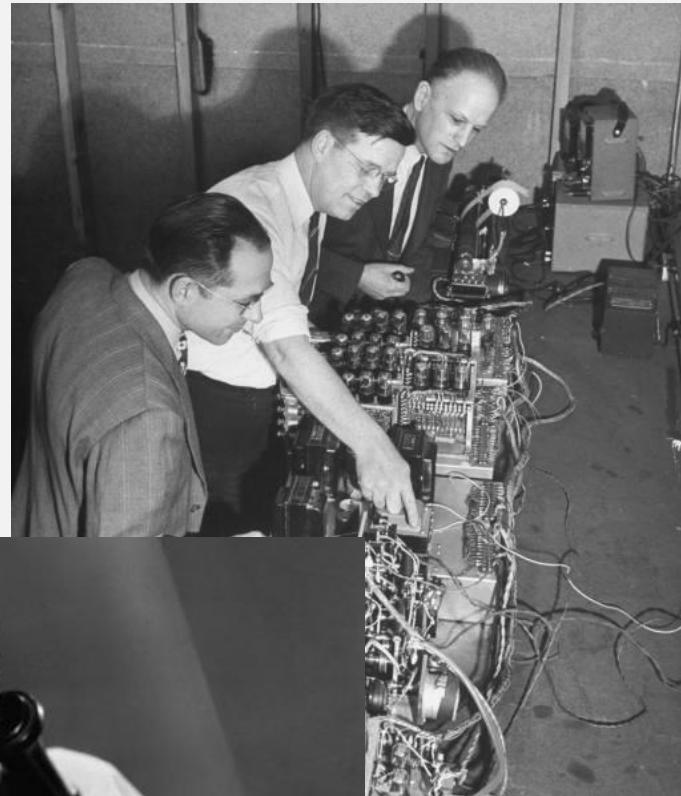
*Decision
Engine*

Data Science customers

Consumers



Engineering



Business

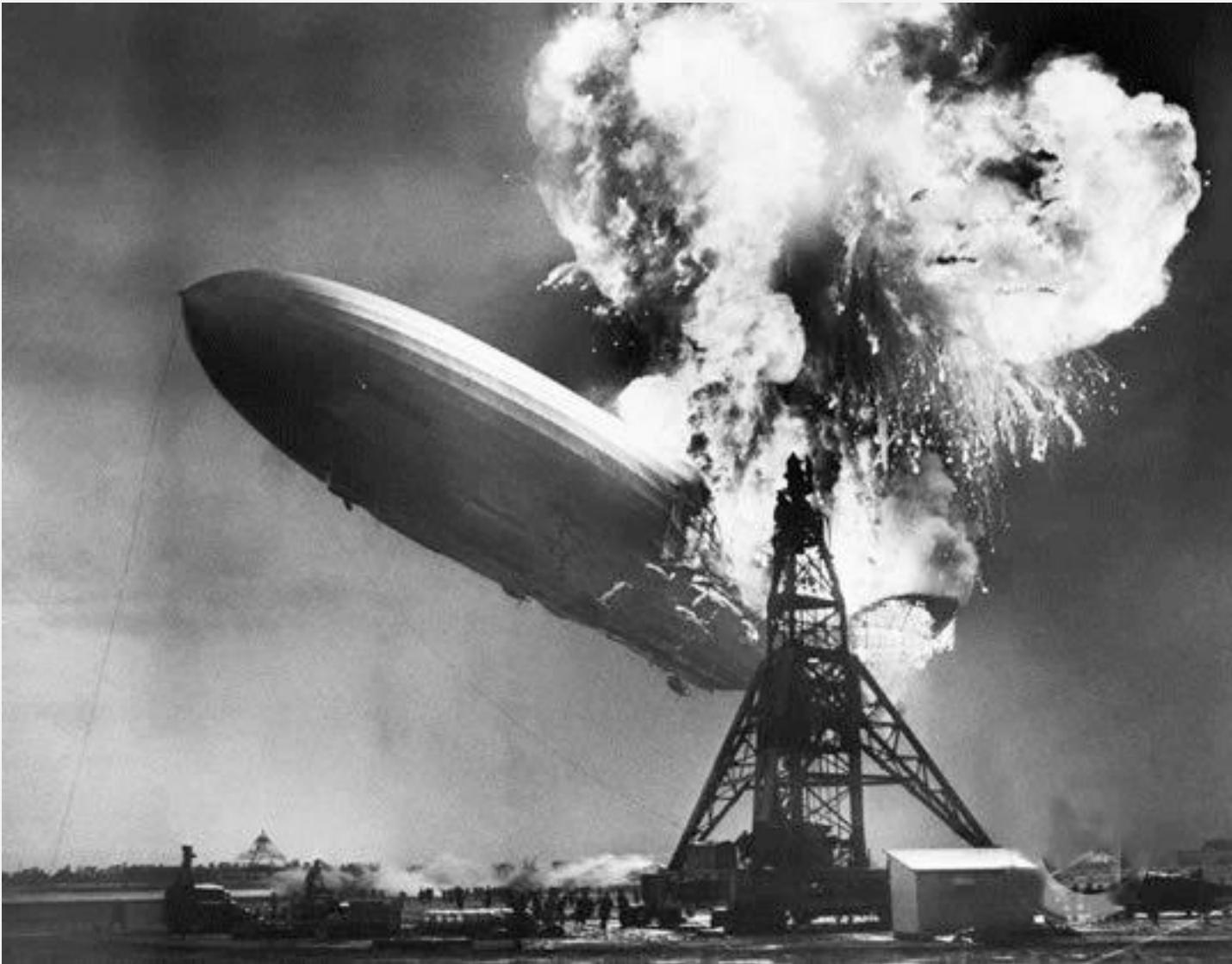
Data Science as exploring the unknown



Design Thinking raises the odds of success



Top Ten Data Science failure modes



10. Behave like a stereotype

Deference



Condescension



Obliviousness



9. Don't ask uncomfortable questions



8. Don't map the business processes



7. Ignore the emotional landscape



6. Just start hacking away



5. Go radio silent



4. Reinvent the wheel



3. Don't build prototypes



2. Use an uninterpretable algorithm

$$\begin{aligned} & \text{dva. } \Delta x_i = \int_{x_{i-1}}^{x_i} \exp t^2 dt \quad (1) \\ & \left| \frac{d}{dt} \right| = \frac{1}{2} (\cos t)^2 |t| \leq \frac{1}{2} \cos t |\sin t| \quad \lim_{n \rightarrow \infty} \sum_{i=1}^n \left[1 + \frac{2\pi}{n} + \left(\frac{2\pi}{n} \right)^2 \right] \frac{2\pi}{n} \\ & \left| \sum_{i=1}^n f(\bar{x}_i) \Delta x_i - L \right| \quad \int_{-t}^t \exp t^2 dt \quad (1) \\ & \left| \frac{dS}{dt} \right| = 2\pi \left| \sin \frac{wt}{2} \right| \Rightarrow (1) = D_x e^{\sqrt{x}} = e^{\sqrt{x}} D_x \sqrt{x} \\ & \frac{d^2y}{dt^2} + 3y = 0 \\ & \int_0^t f(u) du = \sum_{k=1}^n f(\bar{x}_k) \Delta x_k \quad (1) \\ & \lim_{n \rightarrow \infty} \sum_{k=1}^n f(\bar{x}_k) \Delta x_k = \int_a^b f(x) dx \\ & \int_a^b f(x) dx = \lim_{n \rightarrow \infty} \sum_{k=1}^n f(\bar{x}_k) \Delta x_k \quad (1) \\ & \int_a^b f(x) dx = \int_a^b \nabla P_L \cdot \frac{dx}{dt} dt + \int_a^b \frac{\nabla P}{t^2 \sqrt{t}} dt \quad \lim_{t \rightarrow \infty} \sum_{k=1}^n t^2 \quad \lim_{t \rightarrow \infty} \left(\frac{t \ln t - t}{t} \right) + y_0. \\ & D_x \left[\frac{x^{\ln t}}{t+1} + C \right] \quad ? \end{aligned}$$



1. Don't worry about what happens next



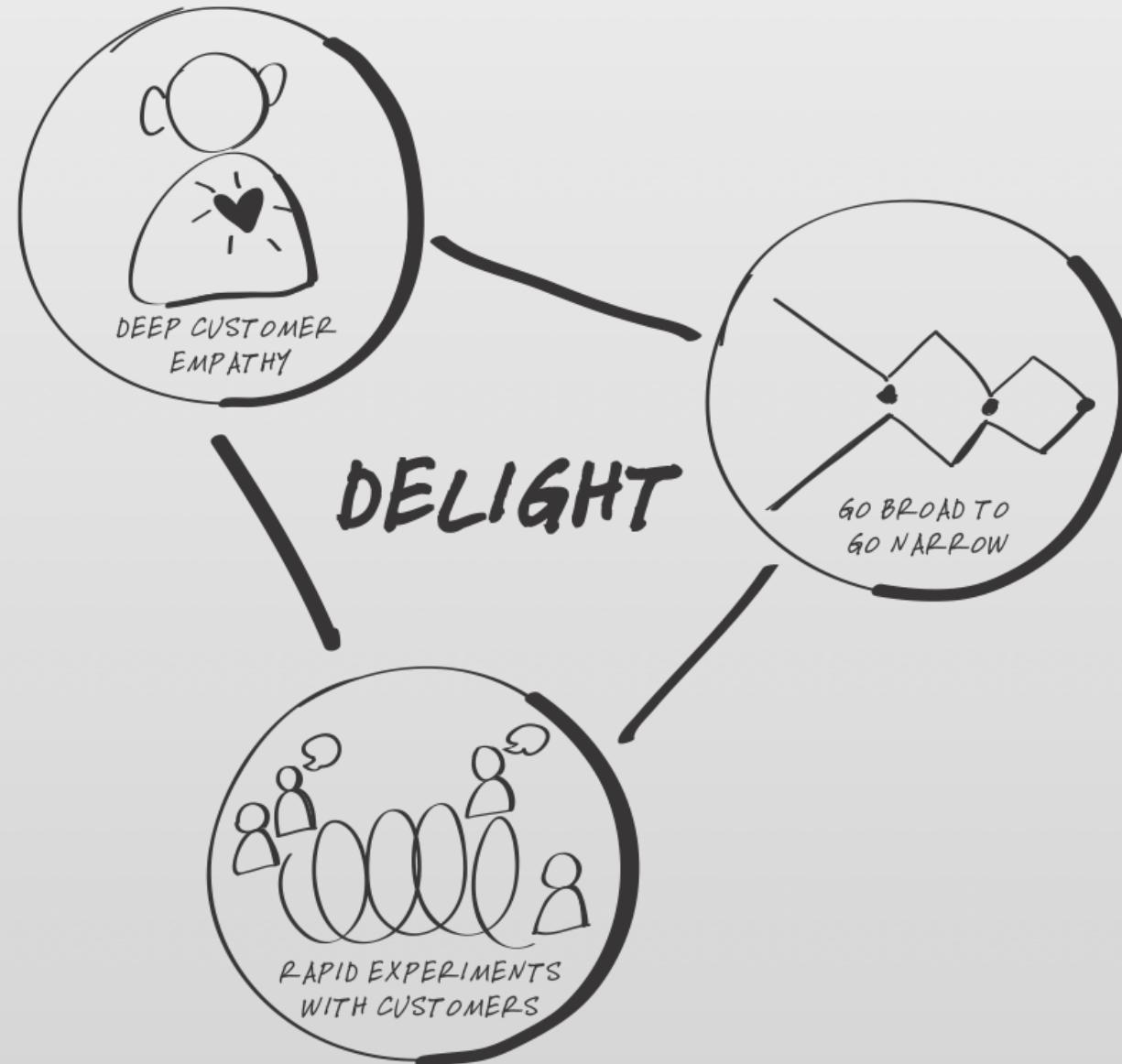
So many ways to fail...



The Data Scientist as Design Thinker



Design for Delight

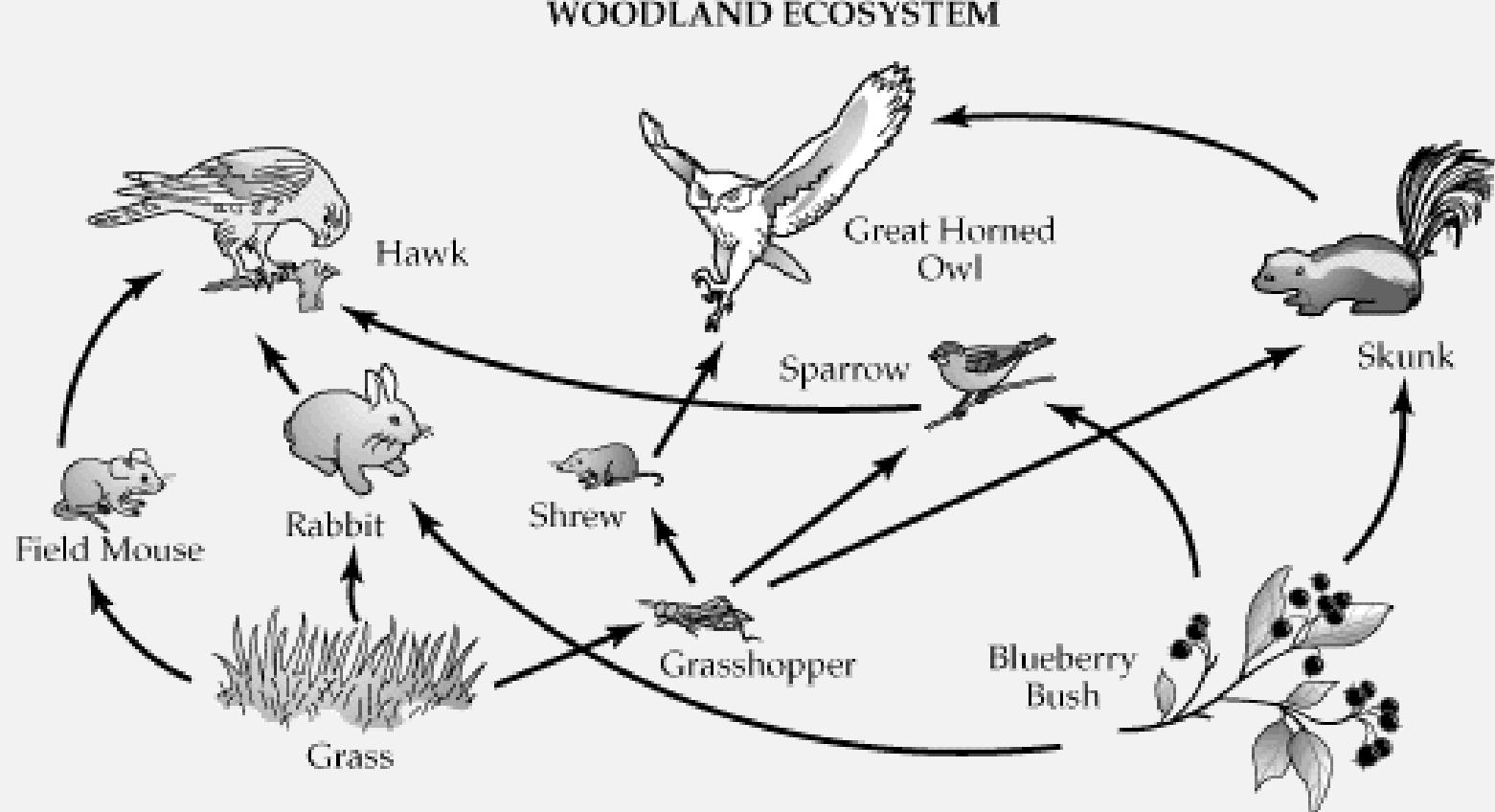




DEEP CUSTOMER
EMPATHY



Identify all the customers



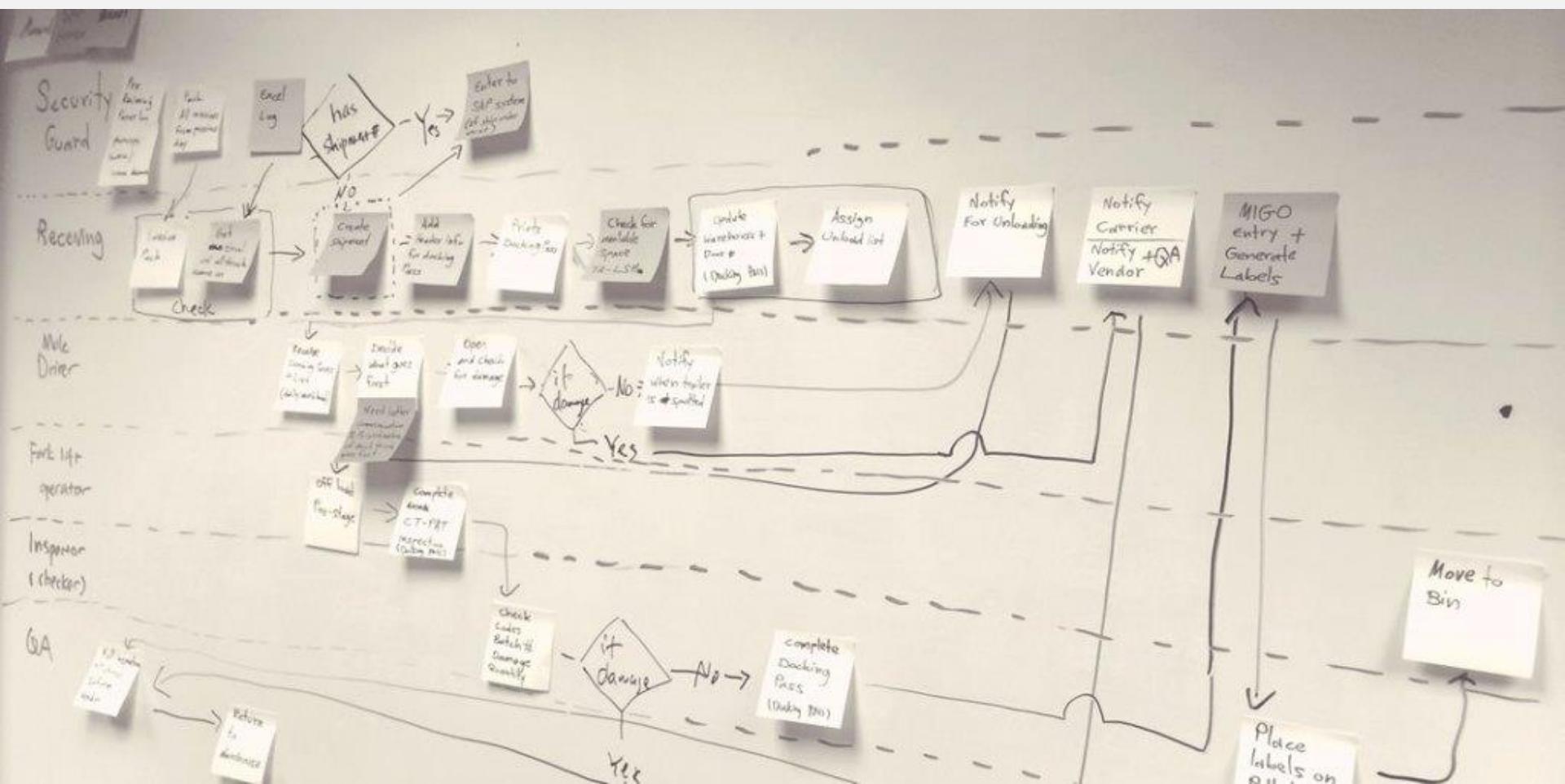


Interview and observe





Map the relevant business processes, workflows, and constraints





*Play back what you learned
to test your understanding*





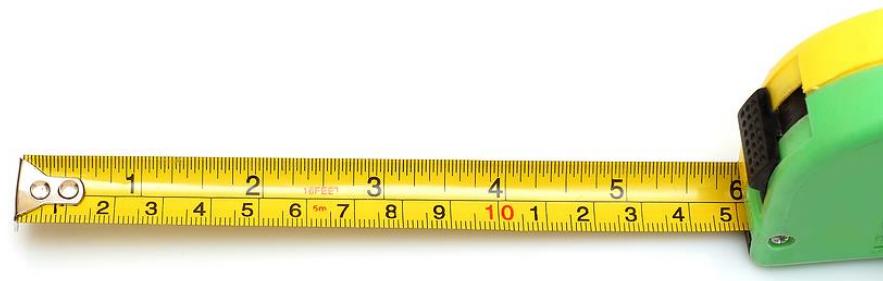
Synthesize into a problem statement, design criteria, and success metrics

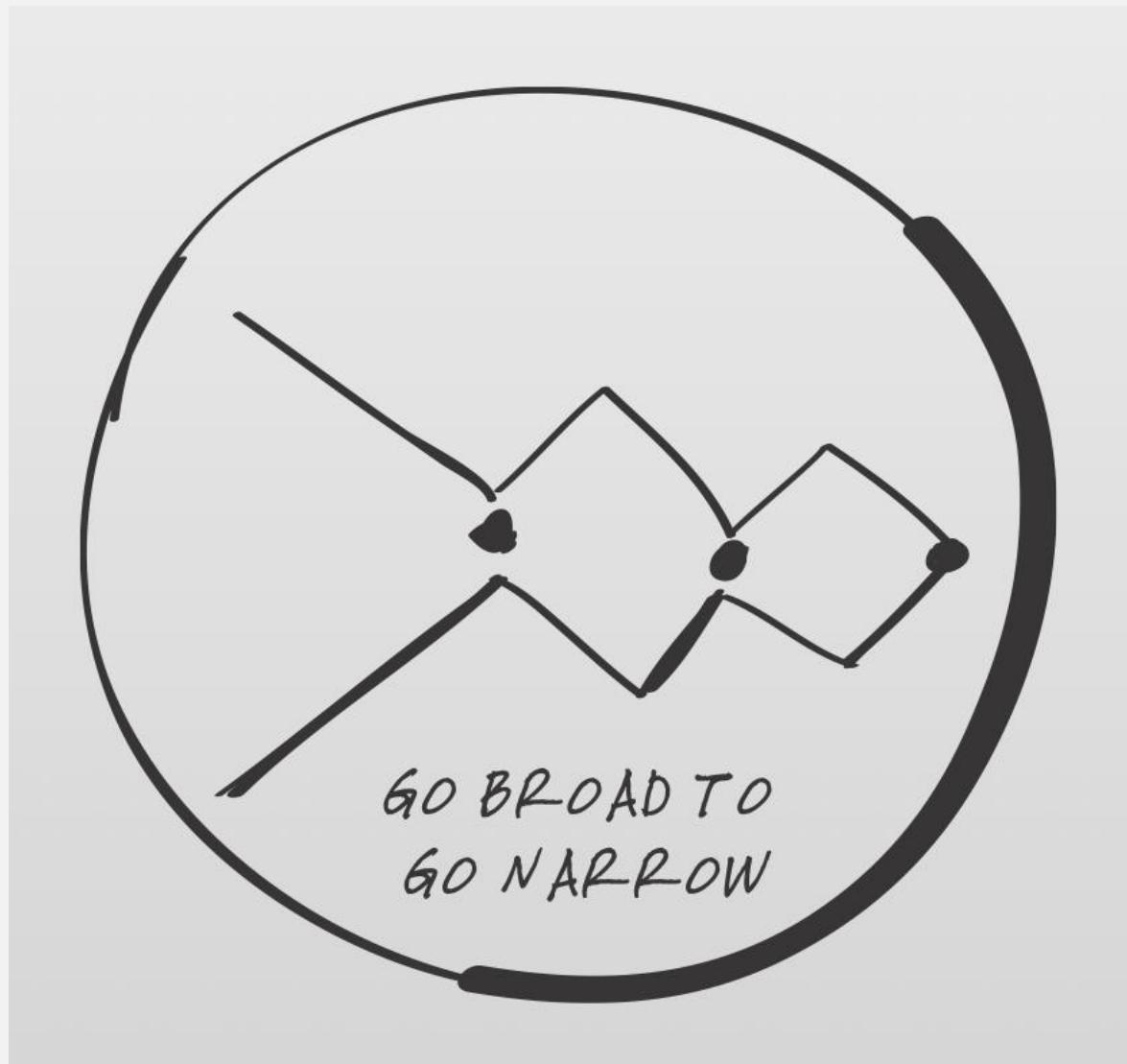
Problem Statement

- I am _____.
"Who" with 3 characteristics
- I am trying to _____,
Outcome/Job
but _____
Problem/Barrier
because _____
Root Cause
which makes me feel _____.
Emotion



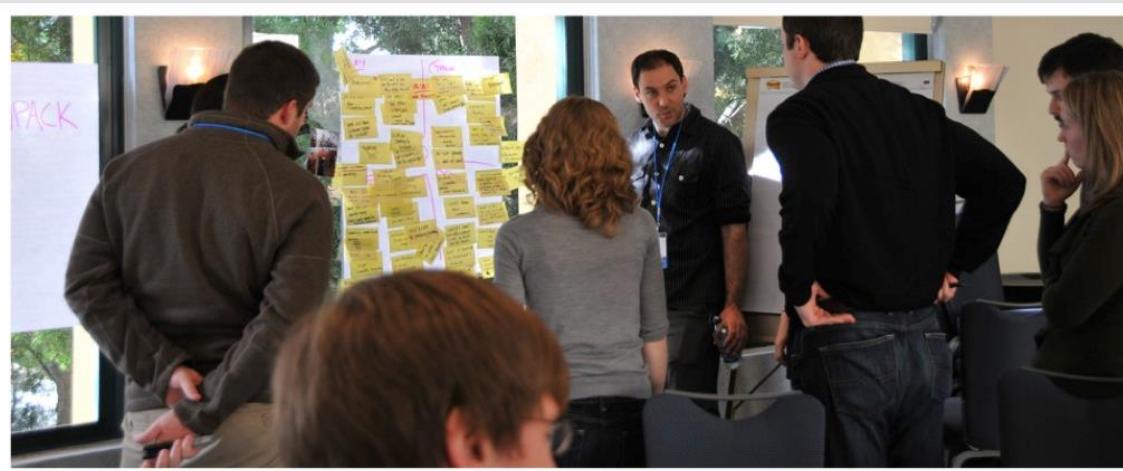
SUCCESS







The Data Scientist as convener





The Data Scientist as facilitator

Brainstorming

- Defer Judgment
- Encourage Wild Ideas
- Build on the Ideas of Others
- Stay Focused on Topic
- One Conversation at a Time
- Be Visual
- Go for Quantity

IDEAS

TECHNOLOGIES

PEOPLE

SUSTAINABILITY

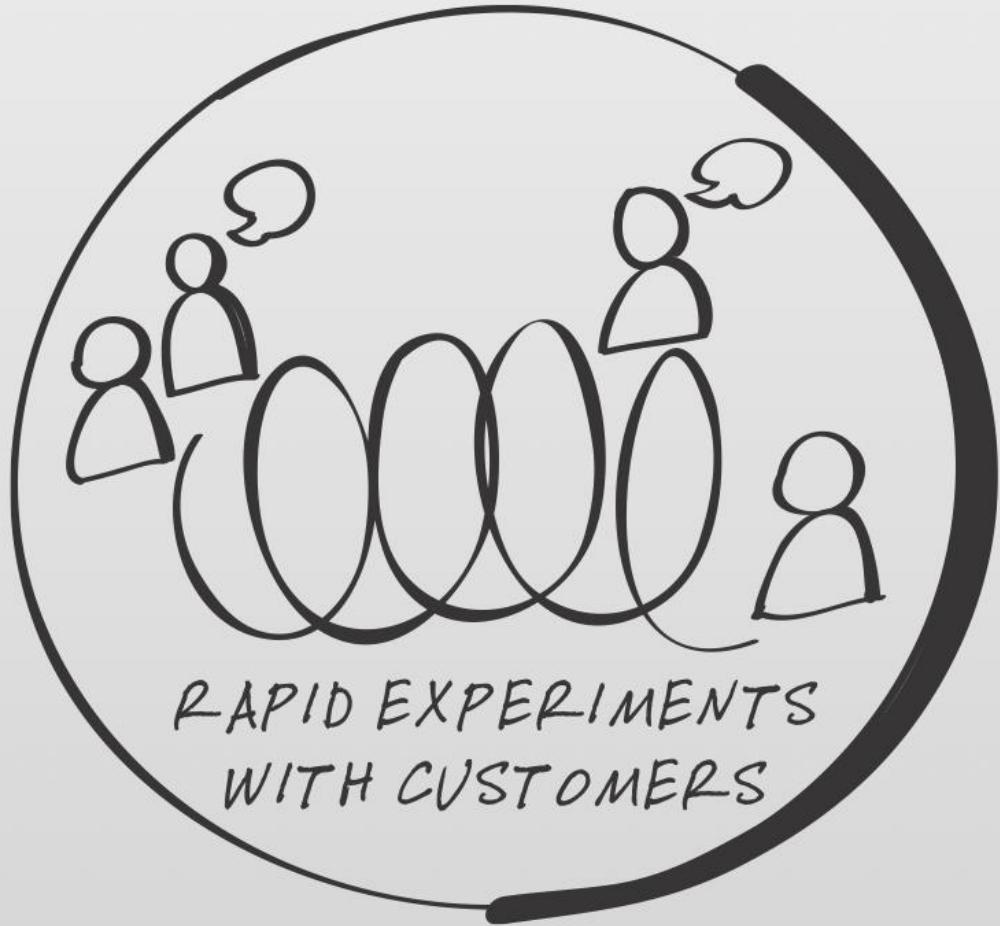
INNOVATIONS



Outputs are solution hypotheses and experimentation plans

A 5-Step Guide to Hypothesis Outputs

OUR INSIGHT(S) - An a-ha that changes your perspective and makes you think beyond your customer's expectations.	OUR VISION - A bold statement about the opportunity based on our customer-backed insight(s)	OUR IDEA - A concept that delivers on our vision and customer needs					
<p>Customers expect to pay 1st employee in less than 20 minutes</p> <p>1 Leap of faith assumptions - Riskiest assumptions about our idea that's keeping us up at night (if people don't behave this way, we need to change our idea).</p> <p>Sequence your leap of faith assumptions and tackle them one at a time (start with riskiest)</p> <p>Employers choose to Pay Now instead of Finish Set Up (1)</p> <p>Employers that choose Pay Now will write checks at a higher rate (2)</p>	<p>Pay your first employee in less than 5 minutes</p> <p>2 Hypotheses - Brainstorm a list of solutions/features that could prompt the behavior change underlined in the selected leap of faith assumption Hypothesis = "If we do X, Y% of people will behave in way Z"</p> <p>Employers choose to Pay Now instead of Finish Set Up</p>	<p>Pay Now option</p> <p>An option within Intuit Online Payroll where employers can defer full set up until after paying employees</p> <p>Most important</p> <p>If we present Pay Now, 55% will choose it</p> <p>known</p> <p>If we enable Pay Now, 40% will run a second payroll</p> <p>unknown</p> <p>If we enable Pay Now, 80% will complete tax set up in time for 1st tax payment</p> <p>Not as important</p> <p>Selected hypothesis</p> <p>If we present Pay Now, 55% will choose it</p>					
<p>3 Our Experiments - Brainstorm potential experiments we can run quickly (starting today/tomorrow for example) to test our hypothesis. Select 2 experiments, build them and go out in the real world to test them.</p> <p>Experiments we could run (go broad)</p> <ul style="list-style-type: none"> Pay Now A/B test Pay Now vs. Finish set up Default tax set up and have care agents set up later Use Paycheck City to calculate check <p>Experiments we will run (narrow to 2)</p> <p>⚠ NO SURVEYS</p> <table border="1"> <thead> <tr> <th>Description:</th> <th>Metrics:</th> </tr> </thead> <tbody> <tr> <td>Pay Now test: Pay Now vs. Finish set up</td> <td># of employers who choose Pay Now</td> </tr> <tr> <td>Enable Pay Now (no prior payroll + care state defaults)</td> <td># of employers complete 2nd payroll</td> </tr> </tbody> </table>	Description:	Metrics:	Pay Now test: Pay Now vs. Finish set up	# of employers who choose Pay Now	Enable Pay Now (no prior payroll + care state defaults)	# of employers complete 2nd payroll	<p>4 What did we learn? - What did our experiments reveal about our hypothesis. What did we learn? What surprised us? Did we uncover any insights? How would we run the experiment differently?</p> <p>only 10% approved checks the same day</p> <p>60% chose Pay Now</p> <p>after 2 weeks, 32% paid employees</p> <p>learning: Majority of employers prefer to pay first and then finish full set up</p>
Description:	Metrics:						
Pay Now test: Pay Now vs. Finish set up	# of employers who choose Pay Now						
Enable Pay Now (no prior payroll + care state defaults)	# of employers complete 2nd payroll						
<p>5 Our decision - Based on our learnings, what would we do next?</p> <p>Change the idea (Pivot)?</p> <p>We invalidated our leap of faith assumption. We need to pivot our idea and go back to the drawing board.</p>	<p>Next steps: run experiment #2 (Persevere)?</p> <p>We validated our leap of faith assumption. We can continue testing our hypothesis.</p>						



RAPID EXPERIMENTS
WITH CUSTOMERS



Start with paper prototypes

Dippler learning analytics

Compare with
group X
group 2013
group 2012
group 2011

TIME SPEND ON ASSIGNMENTS

TIME (HOUR)

WEEK

TIME SPENT ON LEARNING RESOURCES

TIME (HOUR)

WEEK

TIME SPEND ON BLOGS

TIME (HOUR)

WEEK

STUDENT LIST

- 1) STUDENT 1
- 2) _____
- 3) _____
- 4) _____
- 5) _____
- 6) _____
- 7) _____

Social network

```

graph TD
    S1[Student 1] --- S2[Student 2]
    S1 --- S3[Student 3]
    S2 --- S4[Student 4]
    S2 --- S5[Student 5]
    S3 --- S6[Student 6]
    S4 --- S7[Student 7]
    S4 --- S8[Student 8]
    S5 --- S9[Student 9]
    S6 --- S10[Student 10]
    S6 --- S11[Student 11]
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    S93 --- S98[Student 98]
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```

Cluster analysis

Filters
task
sex
quantiles
subject



Then iterate

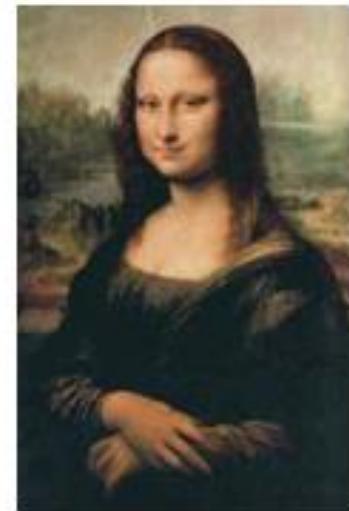
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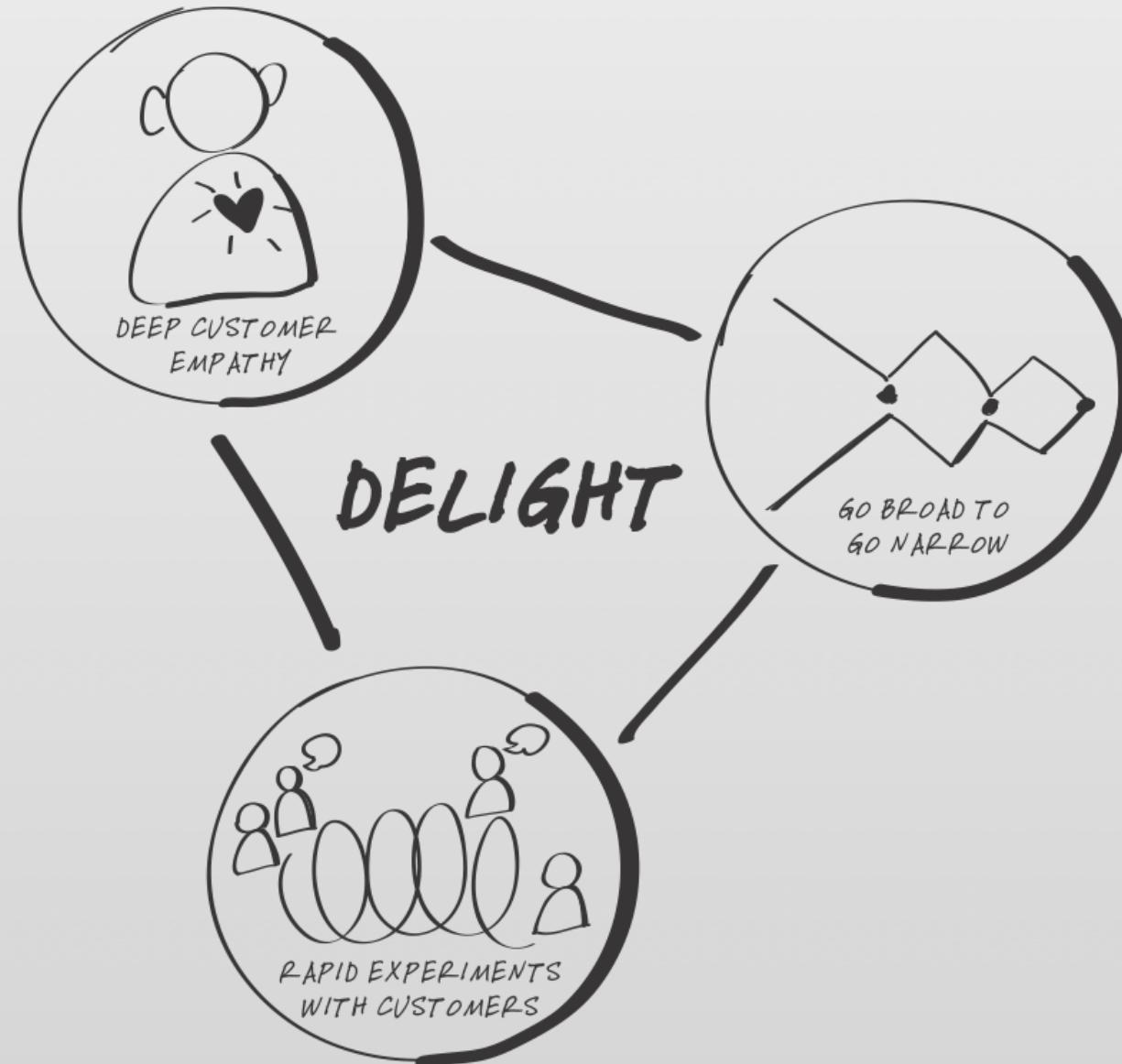
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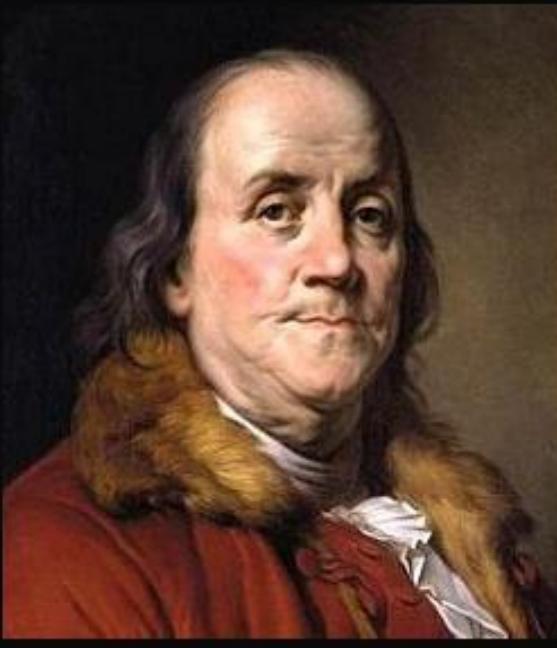


3



Design for Delight



A portrait painting of Benjamin Franklin, an American polymath and Founding Father. He is shown from the chest up, wearing a red velvet jacket over a white cravat and a blue waistcoat. His hair is powdered and powdered white. He has a serious expression and is looking slightly to his left.

*Take time for all things: great haste makes
great waste.*

(Benjamin Franklin)