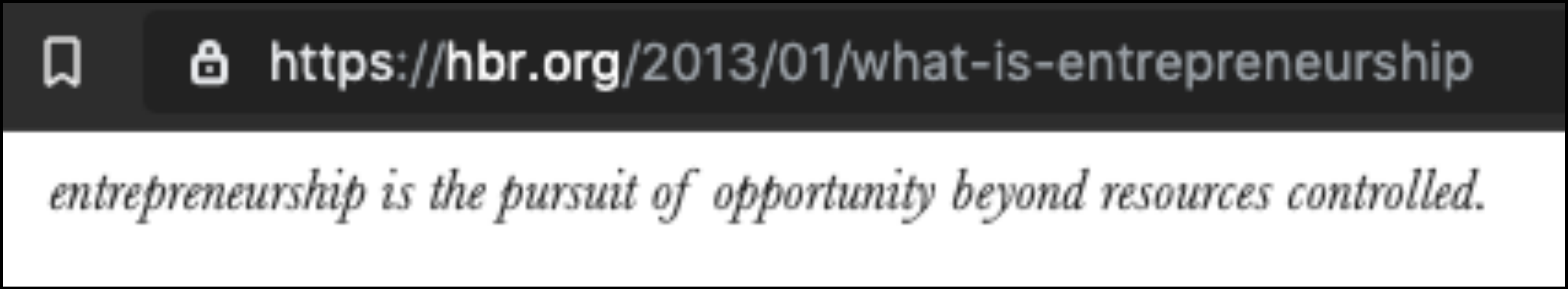
entrepreneurship, science, and columbia

chris wiggins

associate prof @ columbia
chief data scientist @ nyt
cofounder @ hackNY

outline:

1. innovation and entrepreneurship
2. resources available to you
3. lessons learned


https://hbr.org/2013/01/what-is-entrepreneurship

entrepreneurship is the pursuit of opportunity beyond resources controlled.

1. innovation and entrepreneurship:

1. innovation and entrepreneurship:

1. innovation and entrepreneurship:

boundary conditions+constraints:

1. innovation and entrepreneurship:

boundary conditions+constraints:

- resources

1. innovation and entrepreneurship:

boundary conditions+constraints:
- resources
  - institutional (e.g., R+D)

1. innovation and entrepreneurship:

boundary conditions+constraints:

- resources
  - institutional (e.g., R+D)
  - awarded

1. innovation and entrepreneurship:

boundary conditions+constraints:
- resources
  - institutional (e.g., R+D)
  - awarded
  - startups: dilutive / controlling

1. innovation and entrepreneurship:

boundary conditions+constraints:

- resources
  - institutional (e.g., R+D)
  - awarded
  - startups: dilutive / controlling
- users/customers

1. innovation and entrepreneurship:

boundary conditions+constraints:

- resources
  - institutional (e.g., R+D)
  - awarded
  - startups: dilutive / controlling
- users/customers
  - time and money

1. innovation and entrepreneurship:

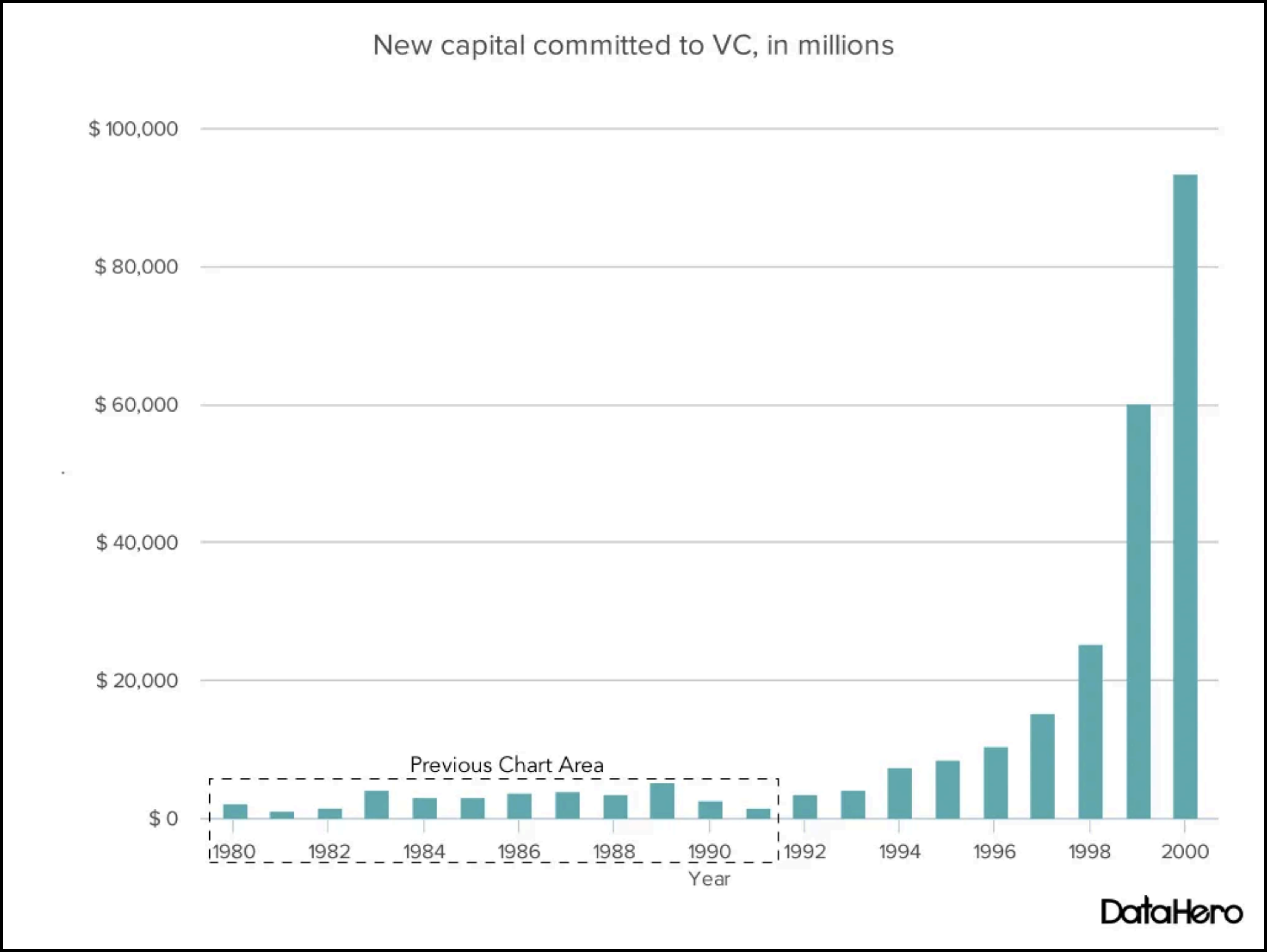
boundary conditions+constraints:

- resources
  - institutional (e.g., R+D)
  - awarded
  - startups: dilutive / controlling
- users/customers
  - time and money

1. institutional innovation, e.g.,

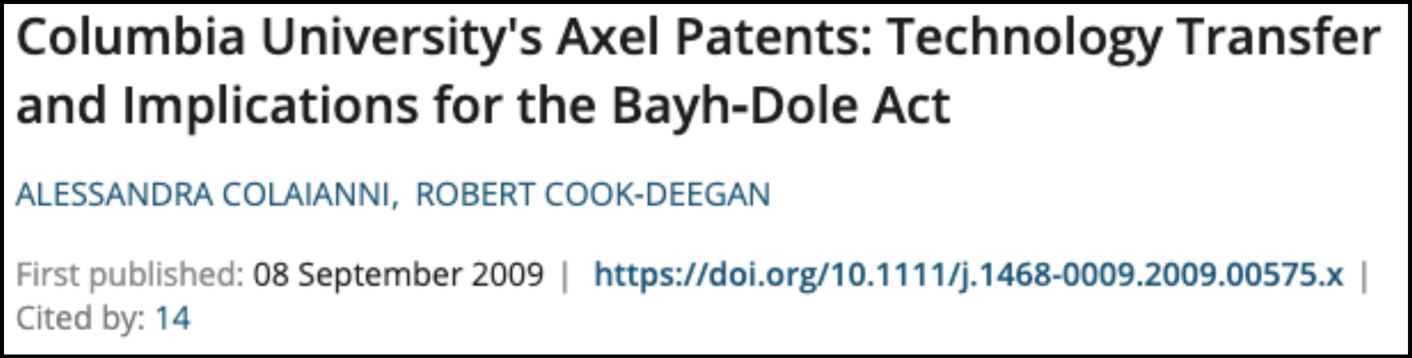
…led to dilutive/controlling

..which led to


New capital committed to VC, in millions
$ 100,000
$ 80,000
$ 60,000
$ 40,000
$ 20,000
$ 0
Previous Chart Area
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
Year
DataHero

2. resources available to you, doing:

1. patent/license (e.g., GOOG)
- CTV
- IRL (NYC lawyers, etc)
2. newco/startup (e.g., YHOO)
- CTV
- IRL (NYC investors)


Columbia University's Axel Patents: Technology Transfer and Implications for the Bayh-Dole Act

ALESSANDRA COLAIANNI, ROBERT COOK-DEEGAN

First published: 08 September 2009 | https://doi.org/10.1111/j.1468-0009.2009.00575.x | Cited by: 14

2. resources available to you, learning:

1. classes
2. books+blogs
3. CTV
4. entrepreneurship @ SEAS
5. entrepreneurship @ CU
6. people:

"The best way to send information is to wrap it up in a person.” - RJ Oppenheimer outline:

1. innovation and entrepreneurship
2. resources available to you
3. lessons learned: “lean theory”

theory:

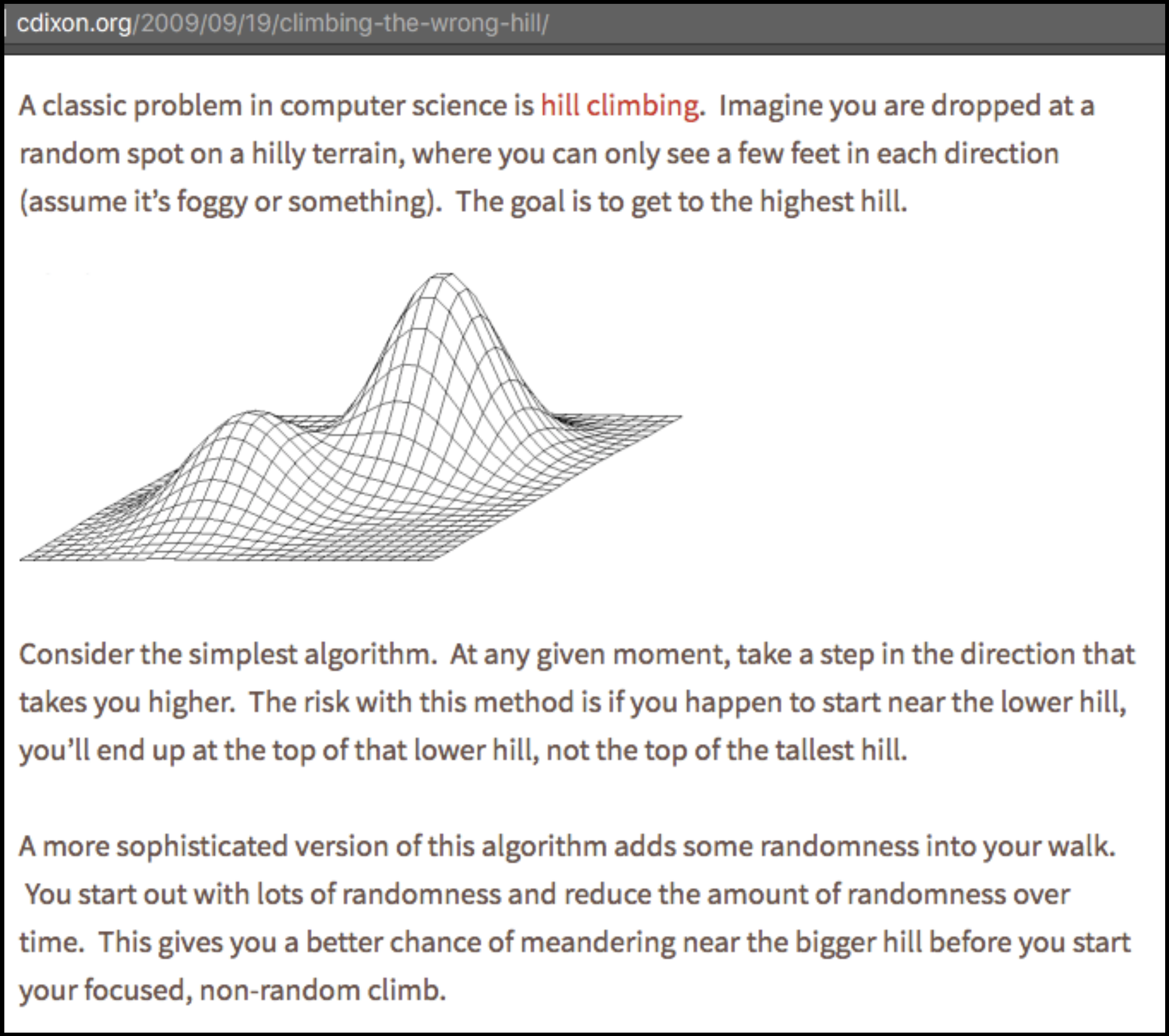
1. peer review vs. counterpart review
2. explore before exploit

grand unified theory: special cases

- startups: “lean startups”
- design: “design thinking”
- software: “agile development”

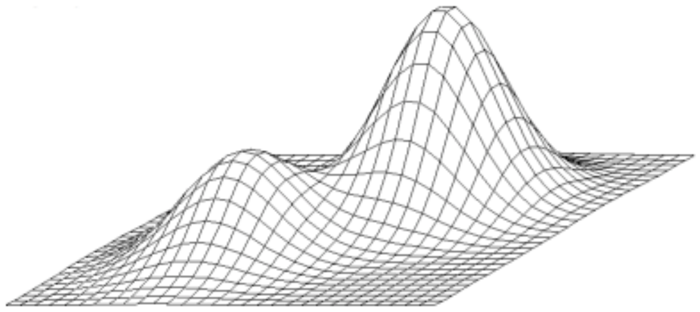
you can tell something’s a good idea if every field makes up its own name for the same idea.

lean: efficient improvement



cdixon.org/2009/09/19/climbing-the-wrong-hill/

A classic problem in computer science is hill climbing. Imagine you are dropped at a random spot on a hilly terrain, where you can only see a few feet in each direction (assume it's foggy or something). The goal is to get to the highest hill.

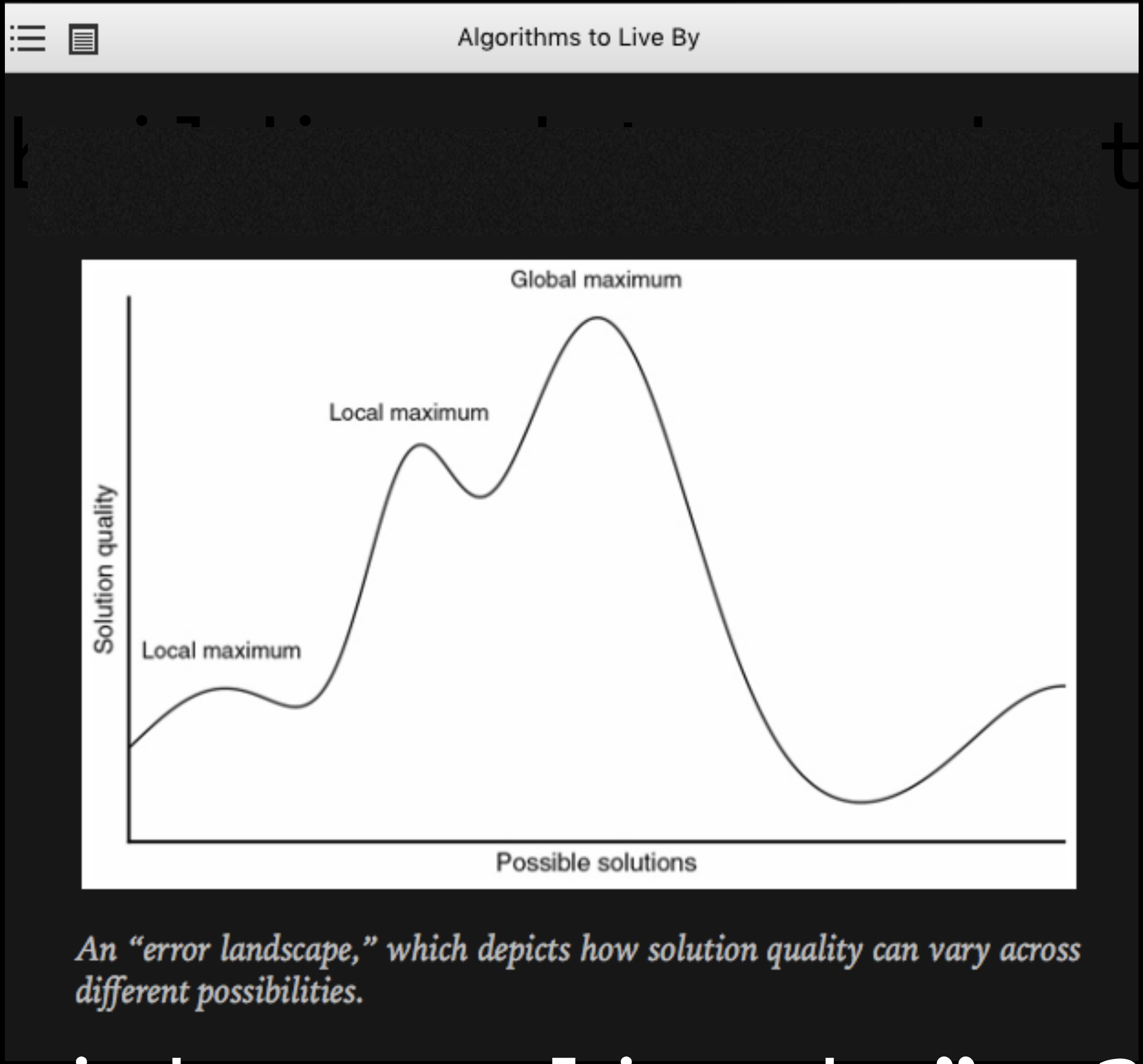


Consider the simplest algorithm. At any given moment, take a step in the direction that takes you higher. The risk with this method is if you happen to start near the lower hill, you'll end up at the top of that lower hill, not the top of the tallest hill.

A more sophisticated version of this algorithm adds some randomness into your walk. You start out with lots of randomness and reduce the amount of randomness over time. This gives you a better chance of meandering near the bigger hill before you start your focused, non-random climb.

chris dixon, 2009:
"climbing the wrong hill"

lean: efficient improvement



An "error landscape," which depicts how solution quality can vary across different possibilities.

"algorithms to live by", 2016
chapter 2: "explore/exploit"

lean: efficient improvement

doing things right
vs.
doing the right thing

lean: efficient improvement

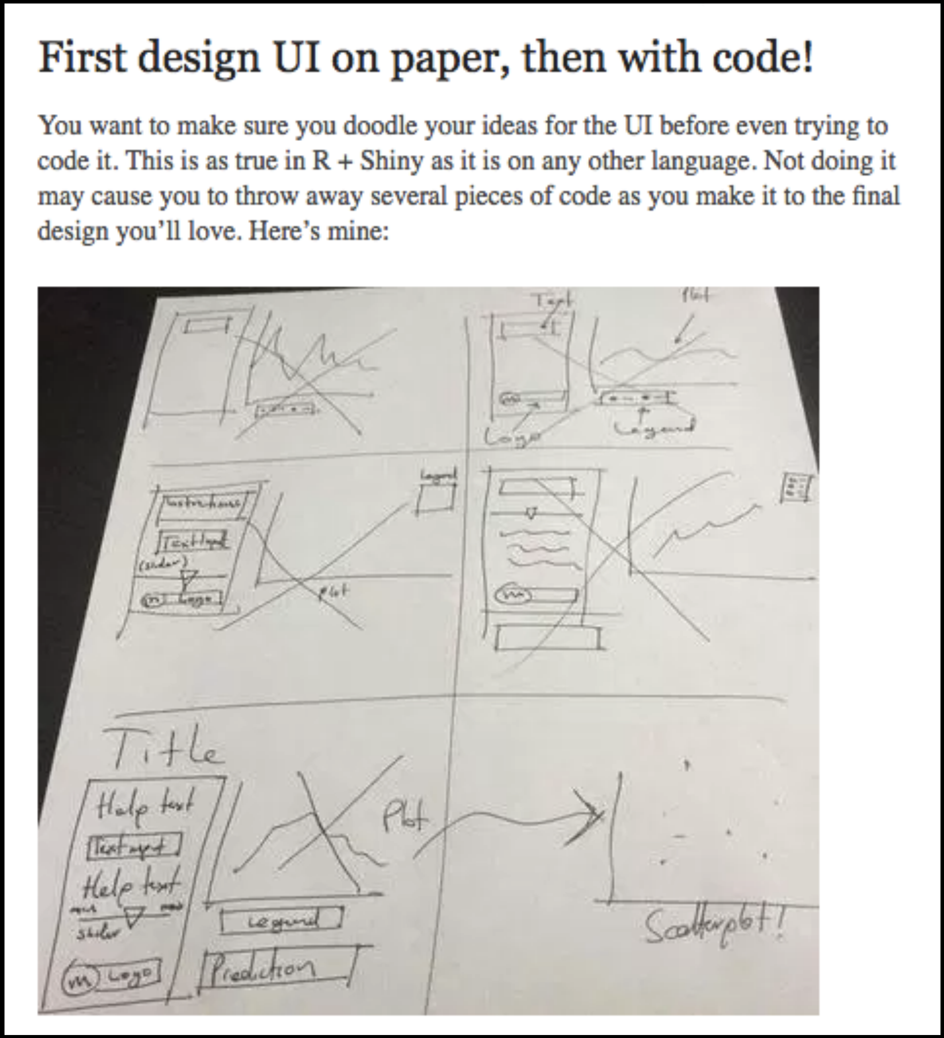
doing things right
vs.
doing the right thing

"a startup is a temporary organization <u>in search</u> of a repeatable and scalable business model" – Steve Blank role of the tech nugget:

1. customer interviews
2. pain-driven development
3. actual science
4. ops includes engagement ops

actual science

1. mockup*
2. develop method
3. validate method*
4. deploy*
5. ops*



First design UI on paper, then with code!

You want to make sure you doodle your ideas for the UI before even trying to code it. This is as true in R + Shiny as it is on any other language. Not doing it may cause you to throw away several pieces of code as you make it to the final design you'll love. Here's mine:

http://www.r-bloggers.com/lessons-learned-from-developing-a-data-product/

actual science *with customer iteration

1. mockup*
2. develop method
3. validate method*
4. deploy*
5. ops*

simpler frameworks

1. “lean”
2. design thinking
3. “agile”

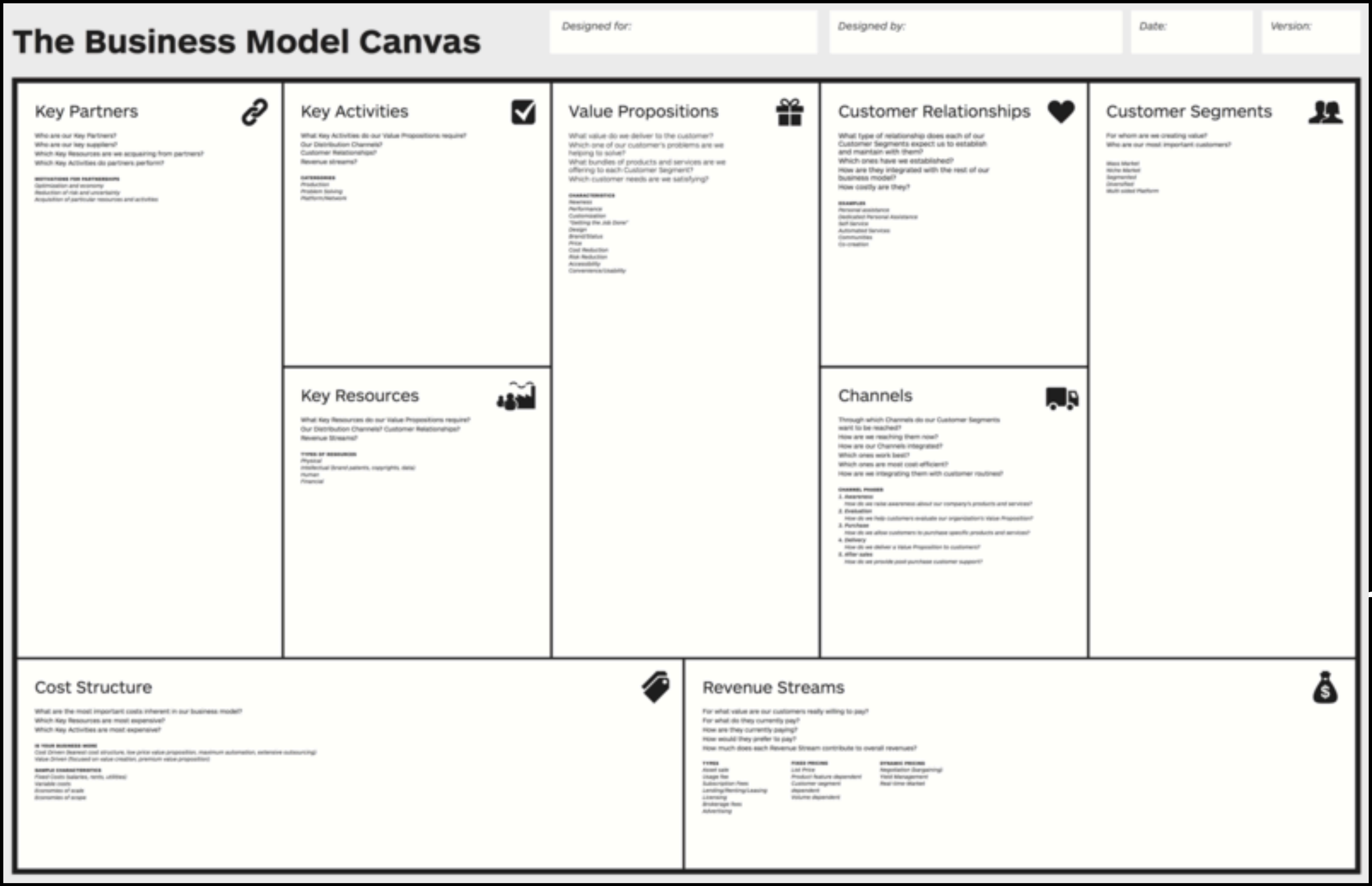
defining “lean”

“an innovation method for startup companies that claims that the most efficient innovation is the one for which there is an actual demand by the users”

Design Thinking vs. Lean Startup, 2016

defi

“an
comp
effi
whic he
user



The Business Model Canvas

Designed for:

Designed by:

Date:

Version:

Key Partners

Who are our Key Partners?
Who are our key suppliers?
Which Key Resources are we acquiring from partners?
Which Key Activities do partners perform?

MOTIVATIONS FOR PARTNERSHIPS
Optimization and economy
Reduction of risk and uncertainty
Acquisition of particular resources and activities

Key Activities

What Key Activities do our Value Propositions require?
Our Distribution Channels?
Customer Relationships?
Revenue streams?

CATEGORIES
Production
Problem Solving
Platform/Network

Key Resources

What Key Resources do our Value Propositions require?
Our Distribution Channels? Customer Relationships?
Revenue Streams?

TYPES OF RESOURCES
Physical
Intellectual (brand patents, copyrights, data)
Human
Financial

Value Propositions

What value do we deliver to the customer?
Which one of our customer's problems are we helping to solve?
What bundles of products and services are we offering to each Customer Segment?
Which customer needs are we satisfying?

CHARACTERISTICS
Newness
Performance
Customization
"Getting the Job Done"
Design
Brand/Status
Price
Cost Reduction
Risk Reduction
Accessibility
Convenience/Usability

Customer Relationships

What type of relationship does each of our Customer Segments expect us to establish and maintain with them?
Which ones have we established?
How are they integrated with the rest of our business model?
How costly are they?

EXAMPLES
Personal assistance
Dedicated Personal Assistance
Self-Service
Automated Services
Communities
Co-creation

Channels

Through which Channels do our Customer Segments want to be reached?
How are we reaching them now?
How are our Channels integrated?
Which ones work best?
Which ones are most cost-efficient?
How are we integrating them with customer routines?

CHANNEL PHASES
1. Awareness
   How do we raise awareness about our company's products and services?
2. Evaluation
   How do we help customers evaluate our organization's Value Proposition?
3. Purchase
   How do we allow customers to purchase specific products and services?
4. Delivery
   How do we deliver a Value Proposition to customers?
5. After sales
   How do we provide post-purchase customer support?

Customer Segments

For whom are we creating value?
Who are our most important customers?

Mass Market
Niche Market
Segmented
Diversified
Multi-sided Platform

Cost Structure

What are the most important costs inherent in our business model?
Which Key Resources are most expensive?
Which Key Activities are most expensive?

IS YOUR BUSINESS MORE
Cost Driven (leanest cost structure, low price value proposition, maximum automation, extensive outsourcing)
Value Driven (focused on value creation, premium value proposition)

SAMPLE CHARACTERISTICS
Fixed Costs (salaries, rents, utilities)
Variable costs
Economies of scale
Economies of scope

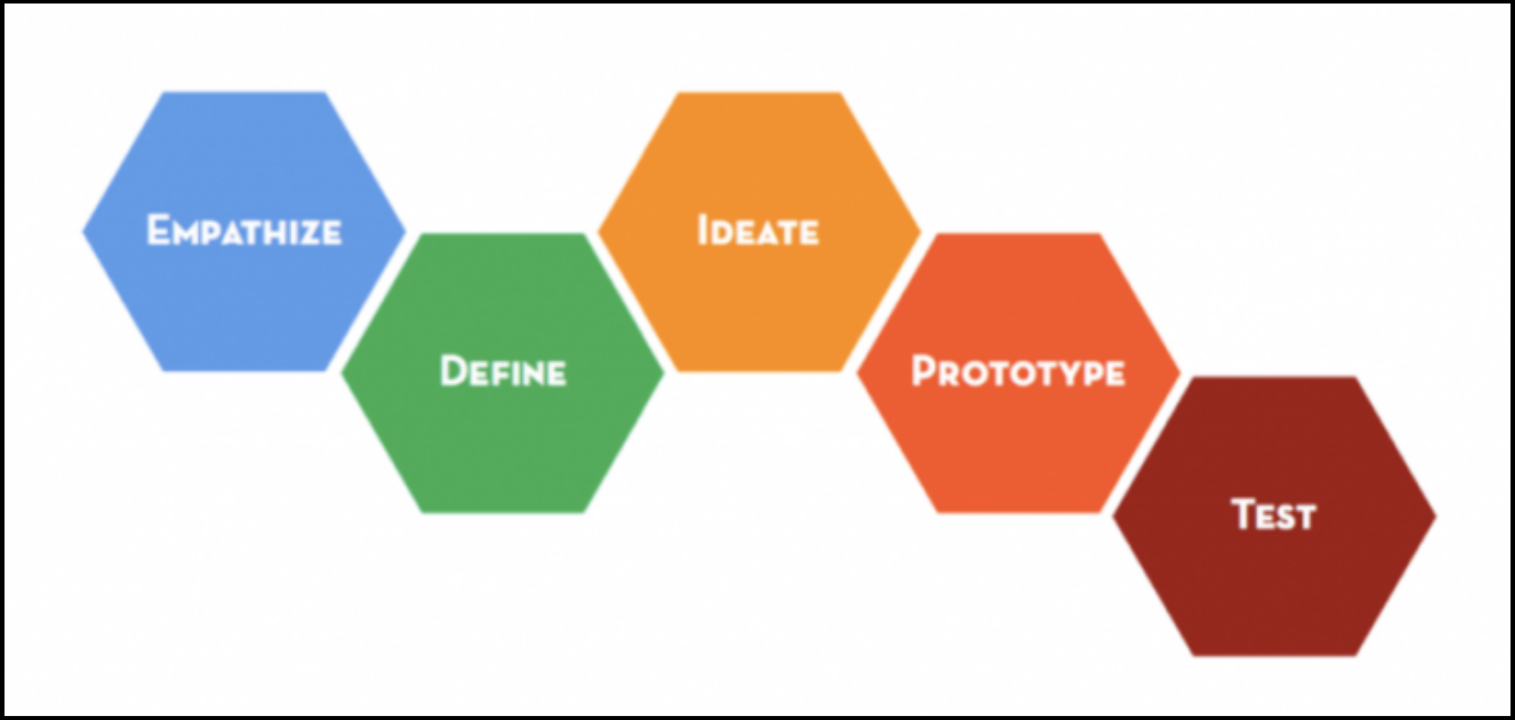
Revenue Streams

For what value are our customers really willing to pay?
For what do they currently pay?
How are they currently paying?
How would they prefer to pay?
How much does each Revenue Stream contribute to overall revenues?

TYPES	FIXED PRICING	DYNAMIC PRICING
Asset sale	*List Price*	*Negotiation (bargaining)*
Usage fee	*Product feature dependent*	*Yield Management*
Subscription Fees	*Customer segment dependent*	*Real-time-Market*
Lending/Renting/Leasing	*Volume dependent*	
Licensing		
Brokerage fees		
Advertising		

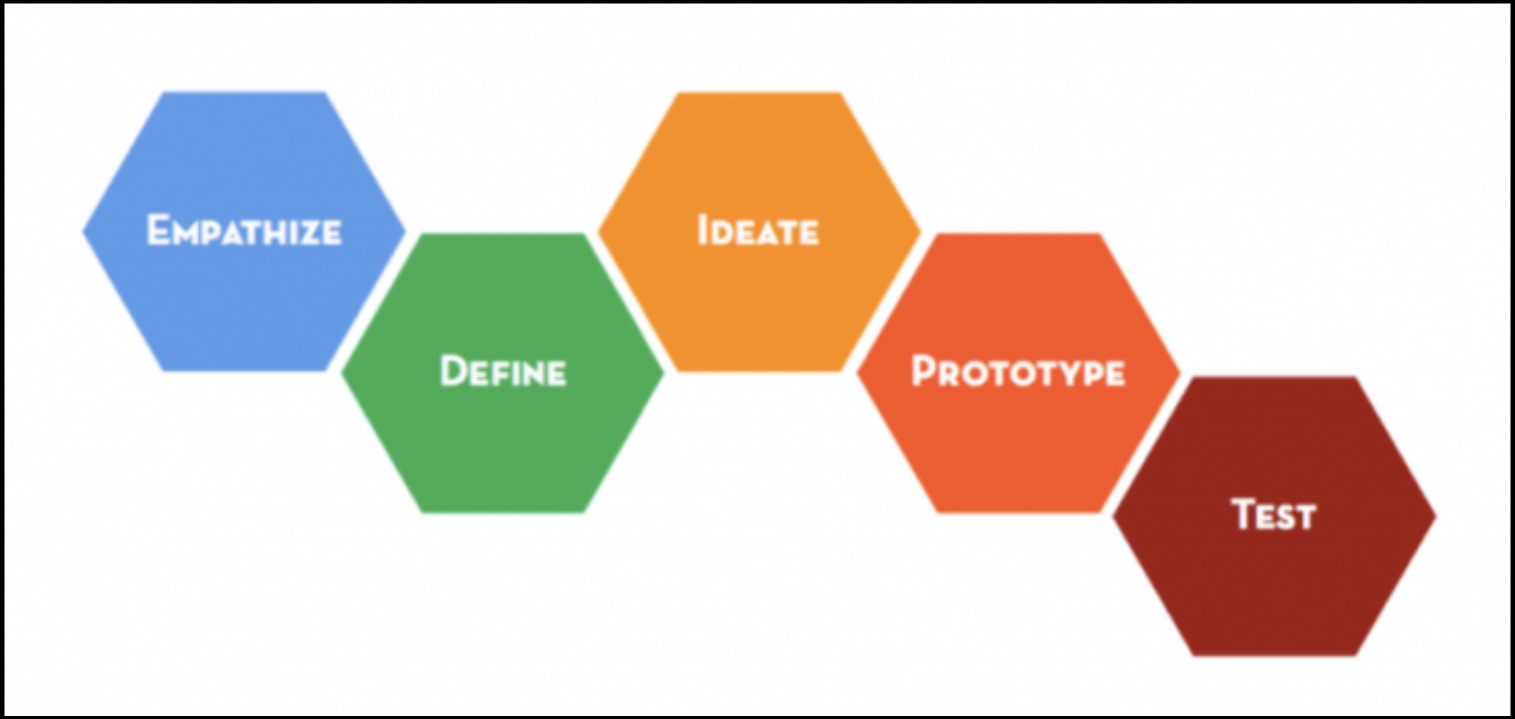
Design Thinking vs. Lean Startup, 2016

defining “design thinking”



http://dschool.stanford.edu/dgift/

defining “design thinking”



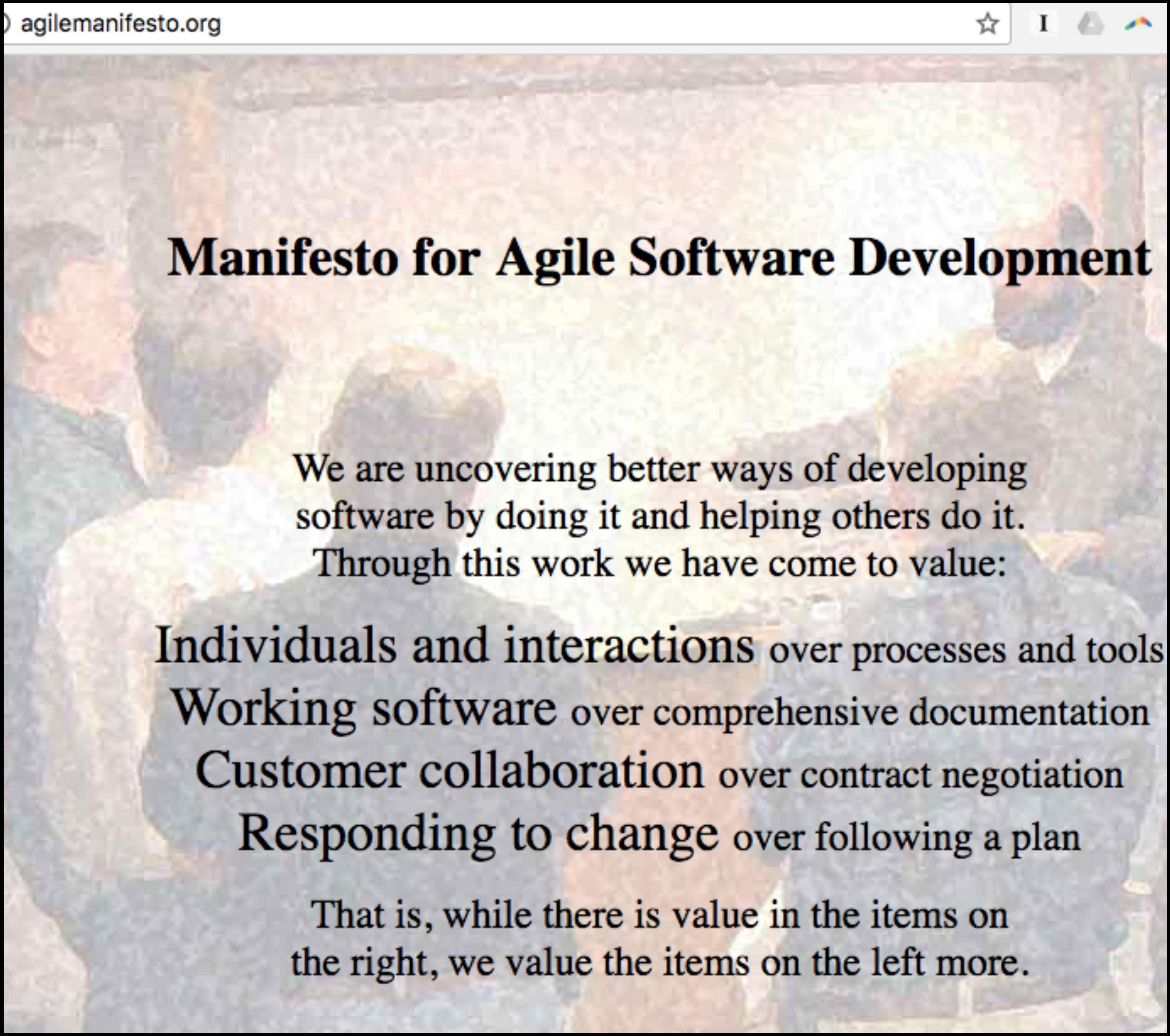
empathy… or data!!

http://dschool.stanford.edu/dgift/

in common:

1. discovery oriented approach
2. learning as unit of understanding
3. focus on customers needs,
    - not biz plan
    - not your tech

Design Thinking vs. Lean Startup, 2016

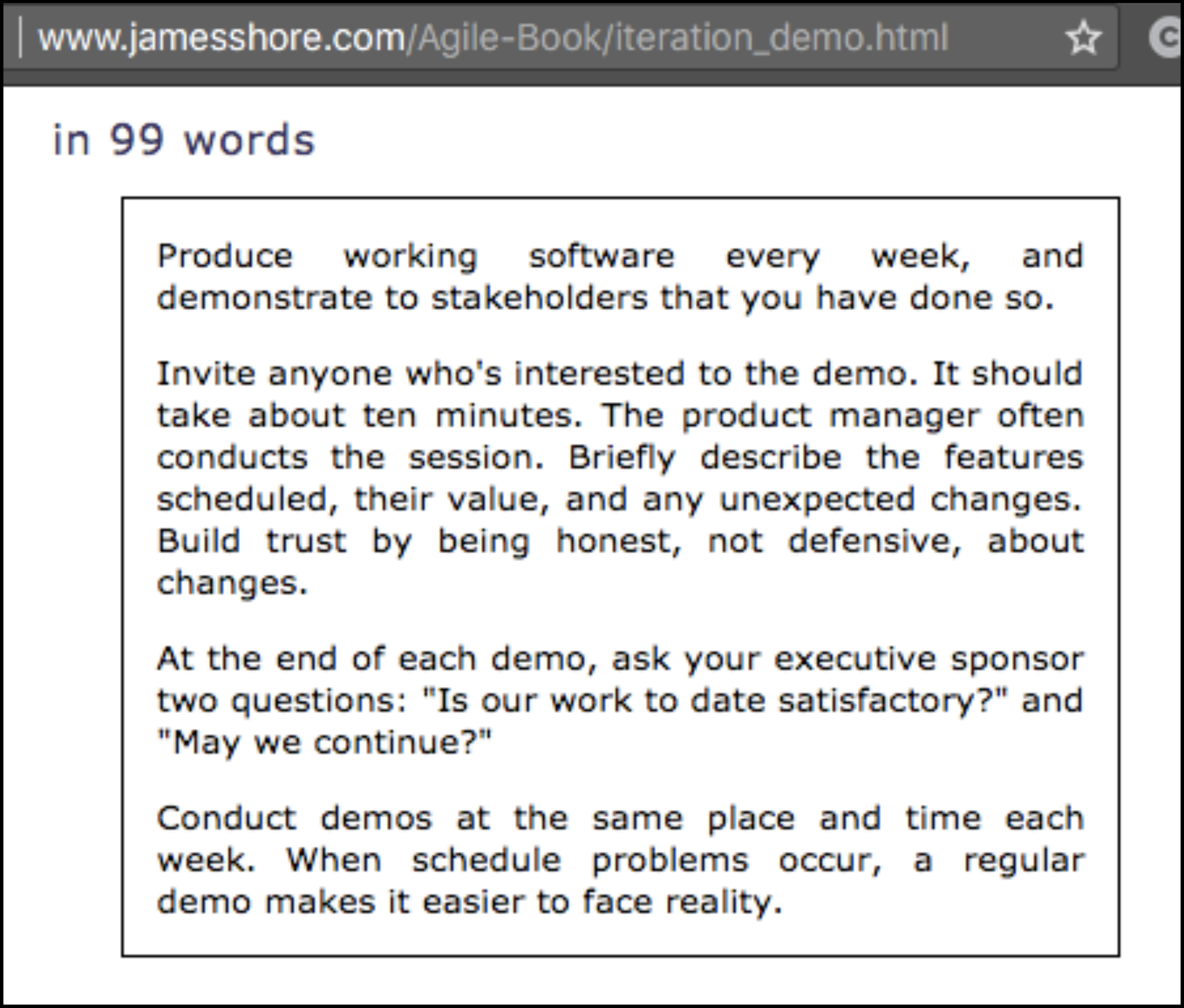

agilemanifesto.org

Manifesto for Agile Software Development

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.



in 99 words

Produce working software every week, and demonstrate to stakeholders that you have done so.

Invite anyone who's interested to the demo. It should take about ten minutes. The product manager often conducts the session. Briefly describe the features scheduled, their value, and any unexpected changes. Build trust by being honest, not defensive, about changes.

At the end of each demo, ask your executive sponsor two questions: "Is our work to date satisfactory?" and "May we continue?"

Conduct demos at the same place and time each week. When schedule problems occur, a regular demo makes it easier to face reality.