Entrepreneurship for Scientists

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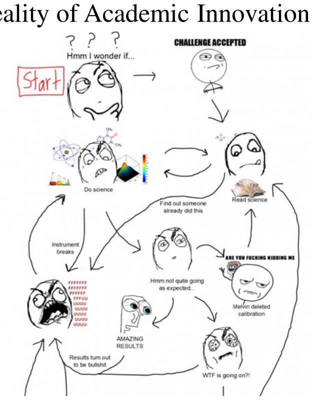
September 20, 2016

Leadership Skills for PhDs

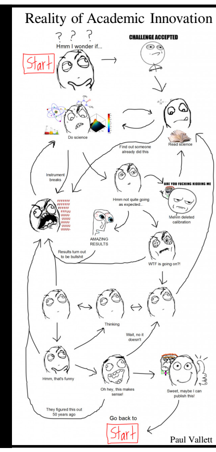
Public Perception of Academic Innovation

Paul Vallett

Reality of Academic Innovation



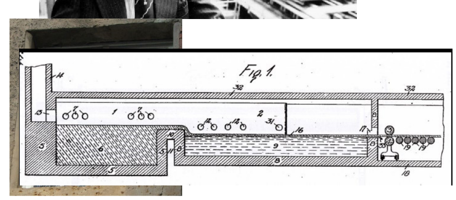
Paul Vallett



Academic's View of Tech Commercialization

Apologies to Paul Vallett

It is possible to come up with a blockbuster invention…



But it is much more likely that…

- Your “invention” was thought up by someone else already…
- Your “invention” confers a marginal advantage in a process or a value chain…
- You initial “invention” is rarely the most valuable patent in your portfolio…

None of these diminish your potential to develop a commercial success

Values systems in academia vs. industry are different

Academic culture

- Best research is that which is “interesting”
- Novelty is rewarded: application of pre-existing inventions is trivial and banal
- Complex solutions are valued above simple solutions

Industry culture

- Best research is that which is “useful”
- Novelty is problematic: application of already-validated inventions is ideal
- Simple solutions are valued above complex solutions (rightly!)

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On the winding road from basic research to commercial product, perseverance and serendipity often play a role along with scientific expertise. Such was the path for two separate Lab Directed Research and Development (LDRD) projects. The research led to the Parker THM Analyzer, a tabletop tool that lets water system operators easily measure potentially dangerous disinfection by-products (DBPs) in less than 30 minutes at their own facilities.

In 2005 Sandia researcher Curt Mowry presented the initial results of research using sensors for water safety at a water quality conference. Someone from the Parker Hannifin Corporation, who heard about the conference presentation from someone else, contacted Mowry. Sandia and Parker began working together in 2006 to develop a water analyzer under a Work for Others (WFO) agreement.

Tech transfer will ALWAYS involve chance encounters, random opportunities, and serendipity…

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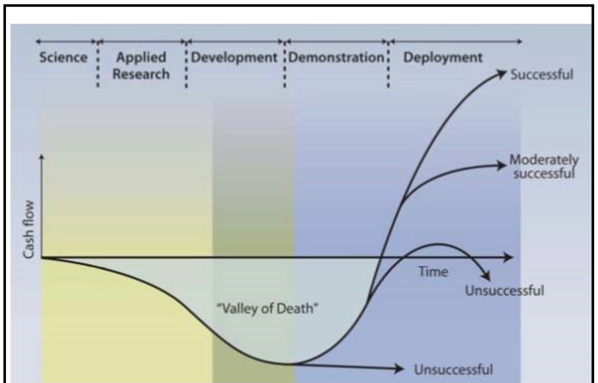

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The "Valley of Death"

- Academic research rarely carries a technology through to the point of scaled demonstration
  - Expensive
  - Not "interesting" ("…that is just Engineering")
- Industry rarely picks up a technology before it has been proven through scaled demonstration (and has commercial viability)
  - Too risky

Academic Tech Transfer "Pathologies"

- Thinking that the technology is more important than the Business Model
- Thinking that better technology automatically confers a business advantage
- Thinking that patents and publications are the vectors of technology transfer

What is an "Entrepreneur"

en·tre·pre·neur /ˌäntrəprəˈno͝or/

A person who organizes and operates a business or businesses, taking on financial risk to do so.

"Entrepreneur" versus "entrepreneurial"

- Entrepreneur = a career
- entrepreneurial = a personal quality

Leading an entrepreneurial life does NOT require you to follow an Entrepreneurial career…

"Entrepreneurship is not about starting a company. Entrepreneurship is an approach to life. It is about leaving footprints."

Ed Zschau, 10/6/00

What is a "start-up"?

A startup is a temporary organization used to search for a repeatable and scalable business model.

- Steve Blank

Searching Is An Experimental Process

Steve Blank

What happens in a start-up?

Build
Measure
Learn

Steve Blank

So… scientists make GREAT start-up people

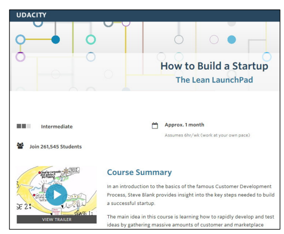
- Accustomed to resolving uncertainty
- Familiar with building and testing hypotheses
- Versatile, multi-talented
- Resourceful, efficient, penny-wise
- Comfortable with temporary gigs
- Able to live on meager pay and long hours..

BUT

- Scientists tend toward technophilia
- Scientists want to look the answers up in the library
- Scientists like complexity
- Scientists like to teach, and don't like to sell

Steve Blank

- Author: The Start-up Owner's Manual
- Professor – UC Berkeley
- Course: Lean Launchpad

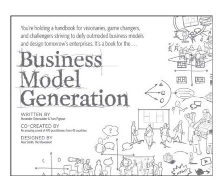


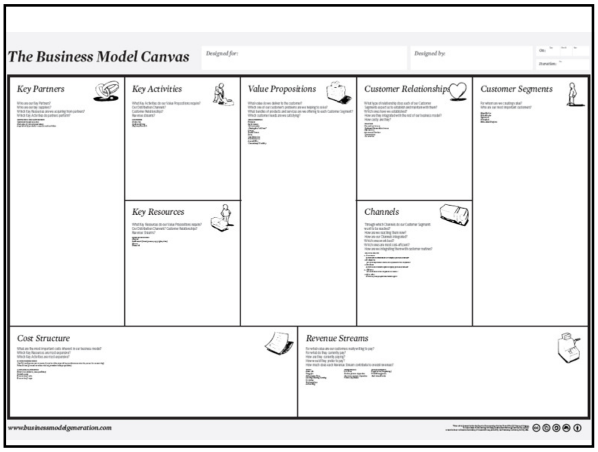
Discovery

- How big is the market?
- Who's the customer?
  - What's their problem/need
- What's the product/service/need?
  - Does it solve the customers problem?
- How do you create demand?
- How do you deliver the product?
- How do you make money?

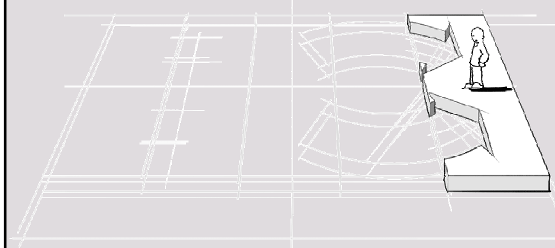
The Business Model:

Any company can be described in 9 building blocks



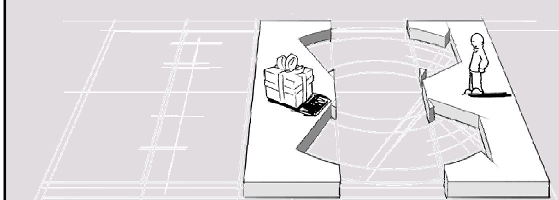


CUSTOMER SEGMENTS



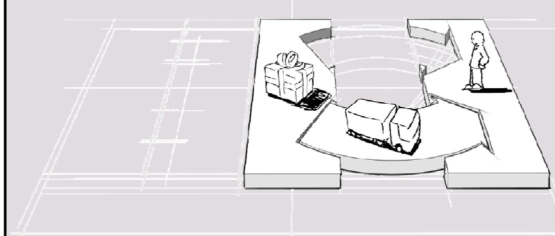
which customers and users are you serving?
which jobs do they really want to get done?
who has pains or needs gains?

VALUE PROPOSITIONS



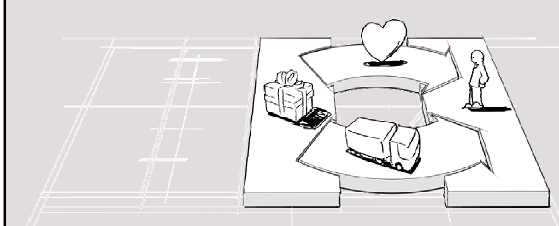
what are you offering them? what is
getting done for them? do they care?

CHANNELS



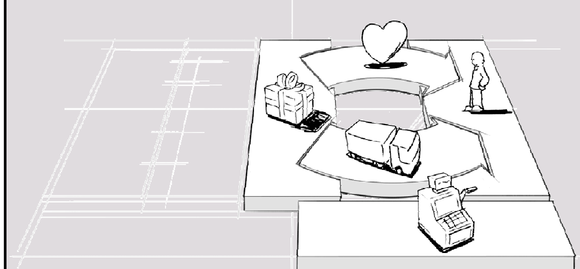
how does each customer segment want to be reached?
through which interaction points?

CUSTOMER RELATIONSHIPS



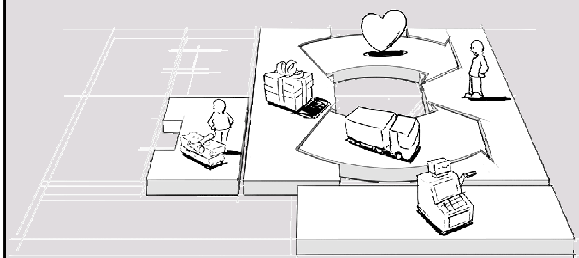
what relationships are you establishing with each segment?
personal? automated? acquisitive? retentive?

REVENUE STREAMS



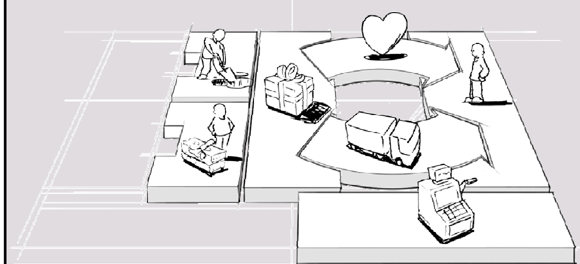
what are customers really willing to pay for? how?
are you generating transactional or recurring revenues?

KEY RESOURCES



which resources underpin your business model? which assets are essential?

KEY ACTIVITIES



which activities do you need to perform well in your business model? what is crucial?

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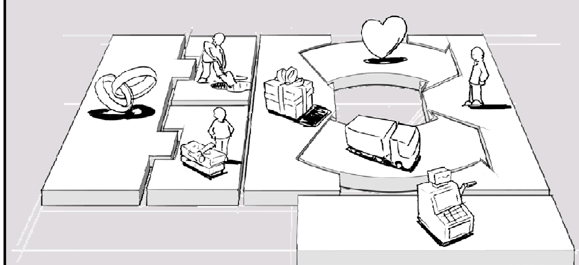
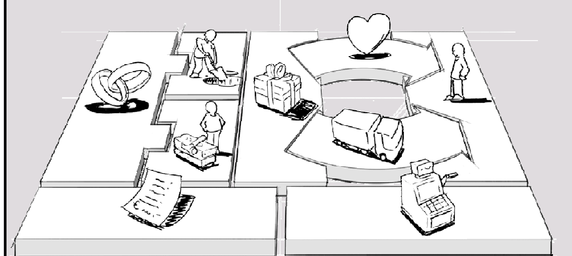
KEY PARTNERS

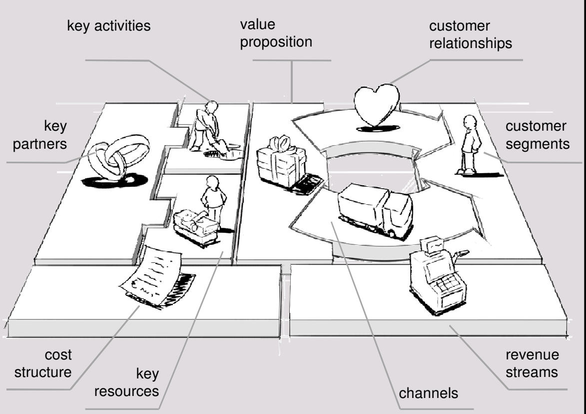


which partners and suppliers leverage your model? who do you need to rely on?

COST STRUCTURE



what is the resulting cost structure? which key elements drive your costs?



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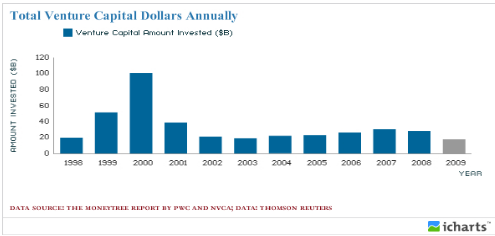
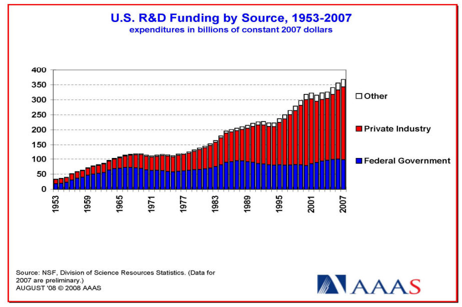
images by JAM

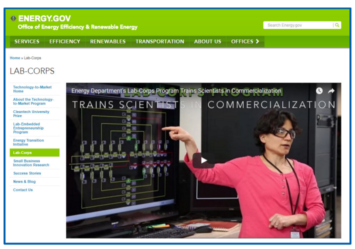
Meet the world's most important Venture Capitalist:





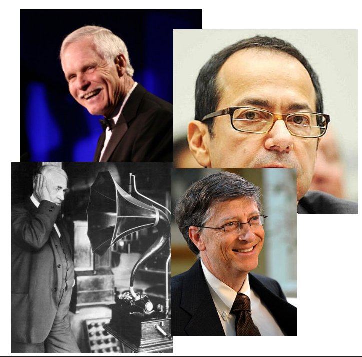
Addressing the culture (and competence) for tech transfer

- DOE-EERE
  - And soon to be others…
- DOE-lab scientists funded to do <u>business model analysis</u>
  - Multiple customer interviews
  - Team overseen by experienced technology entrepreneurs



"Risk-taking" is not all that it seems…

- Daring
- Visionary
- Risk-taking
- Confident



The Ted Turner story…

- Owned a small billboard company in the South
- Made a big bet on television
  - Bought a broken down UHF TV station (Channel 17, Atlanta)
- Made a big bet on sports
  - Bought the Atlanta Braves
- Turned both into a media POWERHOUSE

The REAL Ted Turner story

- Billboards generated a LOT of cash – and had very favorable depreciation rules
  - Ted needed a loss-making venture to offset the tax gains
- TV and billboards were very similar businesses (selling ads)
- All Channel 17 needed was better billboard ads
  - 15% of Ted's billboards around Atlanta were unused
    - Free advertising for Channel 17
- Purchase price for Channel 17 was $2.5M
  - Other TV stations sold for 10x that price
  - Ted engineered a stock swap with equity from his billboard company
    - Channel 17 was purchased <u>without ANY cash</u>

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Oh… and that purchase of the Braves in 1976?

- Channel 17 had acquired broadcast rights for the (perennially losing) Braves 4 years earlier on a long-term contract ($600K/yr)
- Owners were losing $1M a year – and wanted to sell for $10M
- Ted's analysis of Braves' finances allowed him to discover $1M on their books they hadn't realized
- Ted negotiated the following:
  - $1M down payment (he used their own money)
  - Pay-out of $9M over 8 years
    - (He was already paying the Braves $600K a year for the broadcast rights)
- For an additional $600K/yr for 8 years Ted Turner could keep the broadcast rights <u>AND own the entire team</u>

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Actual track-record of successful entrepreneurs is the opposite of the myth…

- Careful
- Analytical
- Risk-averse
- Patient

Qualities of the predator…

- Patient
- Observant
- Willing to range over a wide area
- Smarter than their prey
- Analytical
- Competitive
- Risk-averse

The early bird may get the worm…
But it's the <u>second</u> mouse that gets the cheese
("First mover advantage" is often a HUGE liability)

Where PhDs tend to fail…

- Timidity: facing the moment when things could come together, many PhDs focus on the risks
- Loss Aversion: believing that if they try and fail, they can never come back
- Inexperience: lack of awareness of how businesses are created, funded and run
- Cultural aversion: lack of identifiable and admirable role models

Some final thoughts

1. Don't do a start-up for the money
2. The more people you know, the greater your "opportunity cross section"
3. A good company ≠ a good VC opportunity
4. DOE is KEENLY interested in commercialization of research

So get out there, and get to WORK!