



**Silicon Valley**  
**May 1, 2017**



# Apex Innovation & Prototyping



**Alberto Savoia**

PRETOTYPE LABS LLC



**Stanford**  
University




**WELCOME**  
and  
**THANK YOU**


# CONGRATULATIONS

edp  
EDP ANNUAL REPORT  
KEY NUMBERS


SOCIAL	ENVIRONMENTAL	ECONOMICAL	GENERATION
11,992 employees	271g/kWh Specific overall emissions CO <sub>2</sub> <sup>3</sup>	14,595MC Revenues from energy sales and services and other	25,223MW Installed capacity
24% female employees	32,724ktCO <sub>2</sub> <sup>3,4</sup> CO <sub>2</sub> avoided emissions	5,738MC Gross profit	73% renewable installed capacity over total installed capacity
6.38% turnover	59% recovered Waste	3,759MC Gross operating profit	70,011GWh Net generation
3.12% absenteeism rate	93% Net maximum installed capacity certified	2,264MC Operating profit	65% renewable generation over total generation
389,883h total hours of training	41% Installed capacity of substation certified	1,200MC net profit	78,214GWh Electricity distributed
93% employees with training	100% Gas distribution certified	1,964MC Net Investment	66,904GWh Electricity supplied
30 EDP workplace accidents <sup>1</sup>			9.8 millions Electricity customers
1.37Tf frequency rate <sup>2</sup>			33,555GWh Gas distributed




**EDP OPEN INNOVATION**  
EDP open innovation is an acceleration program for development of new business projects focused on technological innovation or business model innovation in the area of clean technologies in the energy sector.  
In partnership with Expresso, this program results from the alliance between Energia de Portugal and the EDP Innovation Awards (both running in Portugal and Brazil).  
Leveraging in this cross-border experience, this year it is time to open applications worldwide, with a selected jury from three EDP's key geographies - Portugal, Spain and Brazil.



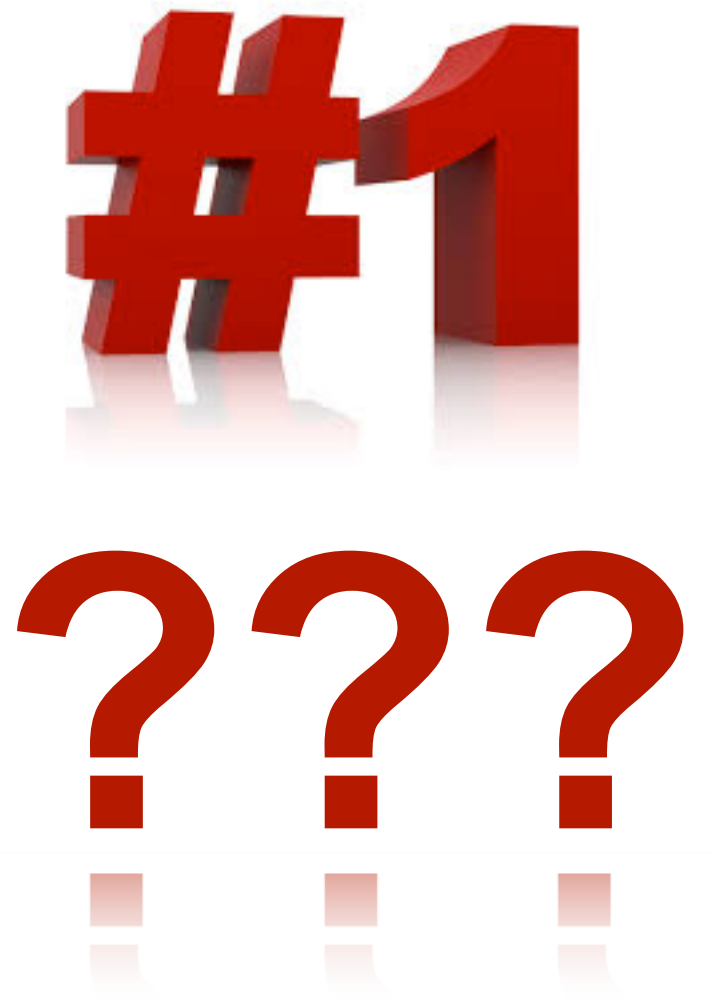
**PURPOSE**  
We are looking for new technologies and business models for the energy industry.  
[Read more >](#)



**TIMELINE**  
Don't miss any of the important moments of the new edition. Keep track of the key dates to apply and participate.  
[Read more >](#)



**AWARD**  
We reward the best projects in the contest.  
[Read more >](#)



# You qualify for becoming an Apex Innovator

**Can large and  
successful companies  
innovate and grow  
with the speed,  
agility, and courage  
of startups?**

I ONLY WORK WITH  
**HIGHLY SUCCESSFUL**  
**COMPANIES**  
THAT  
WANT TO BECOME  
**EVEN MORE SUCCESSFUL**



**PRETOTYPE**LABS LLC

Make sure you are building **The Right It** before you build **It** right



# ALBERTO SAVOIA

**INNOVATION AGITATOR**  
**DOCTOR OF FAILOSOPHY**



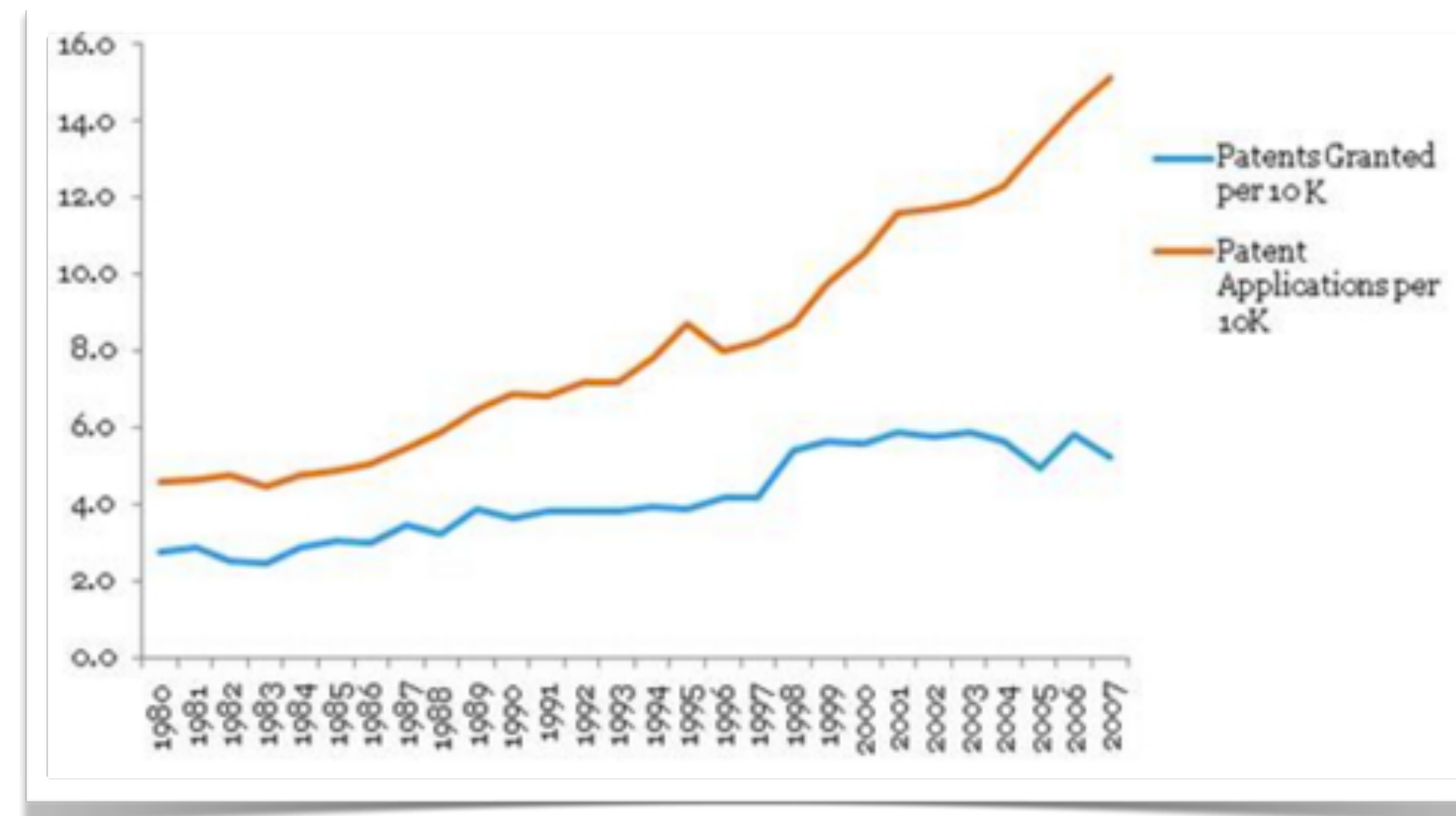
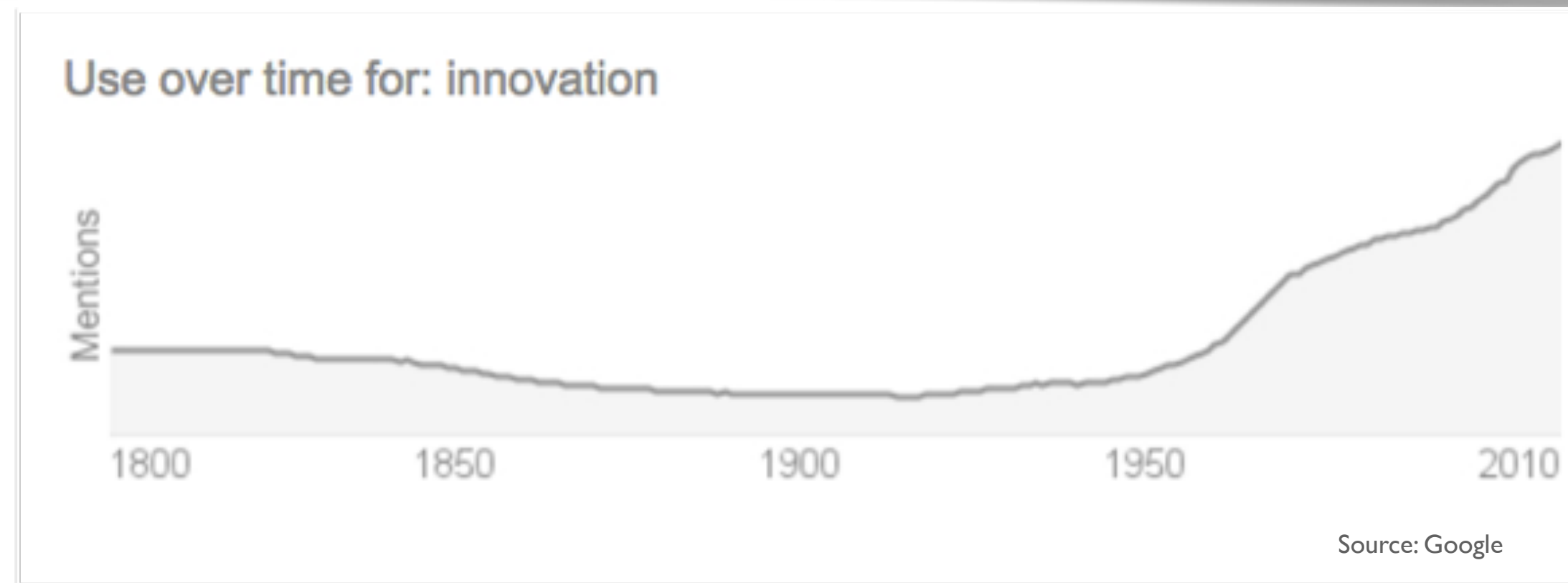
STANFORD  
UNIVERSITY



# Buzzword of the decade?

## Innovation

Innovation this  
Innovation that  
Innovation here  
Innovation there



# It's Not Just Talk ... Innovation **Is** Happening

**If you don't innovate ...**

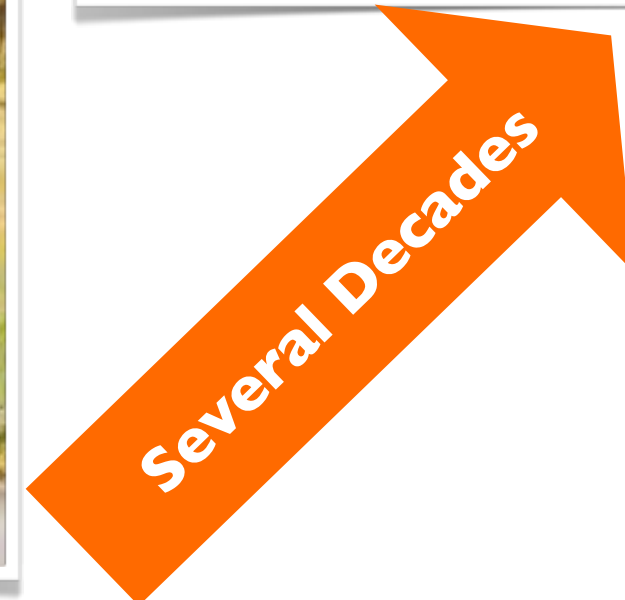


**... someone else  
will**



**... and so on ...**

# The Rate Of Innovation Is **Accelerating**



# Combinatorial **[Explosion]** Innovation



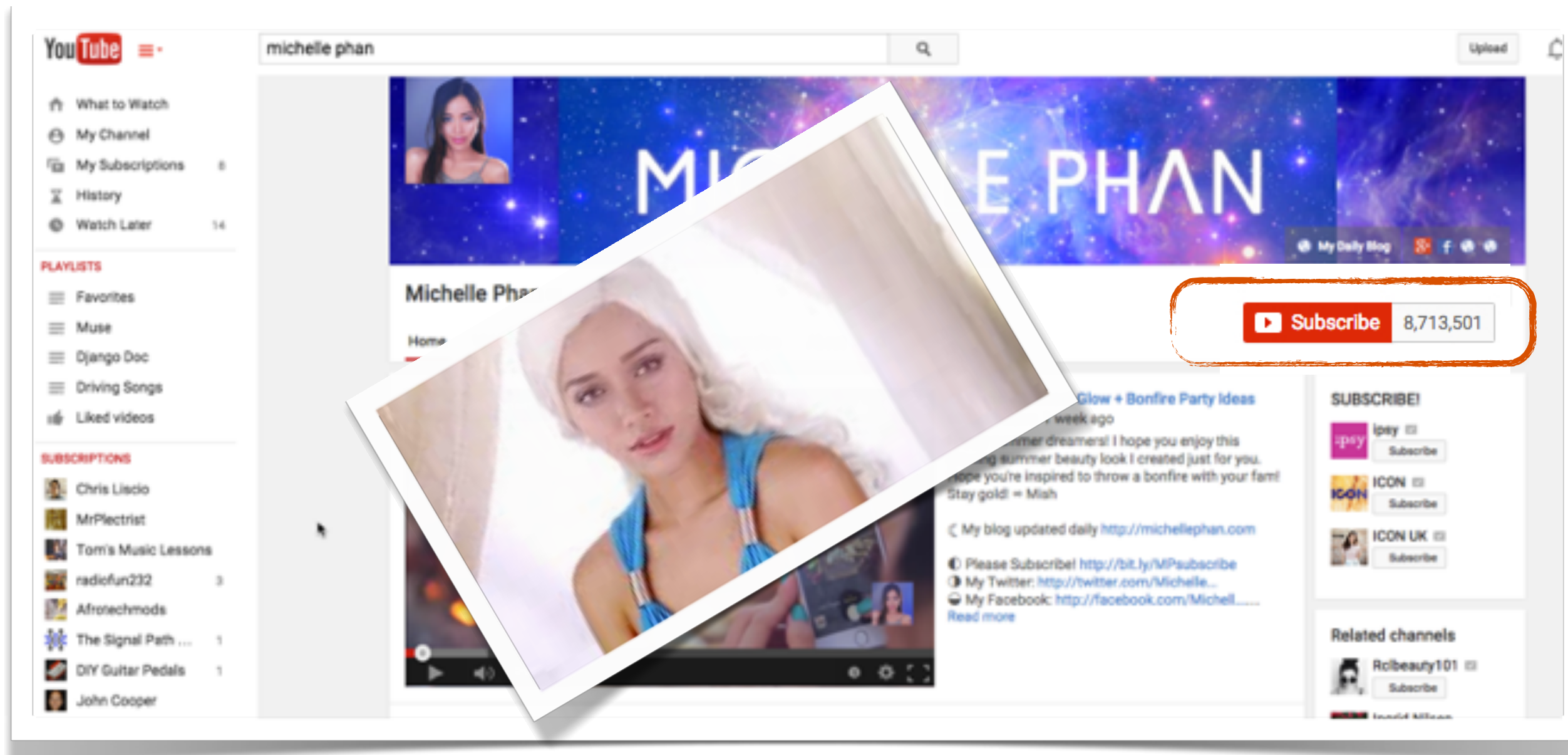
# Combinatorial [Explosion] Innovation





**Innovation is not just about  
new *products!***

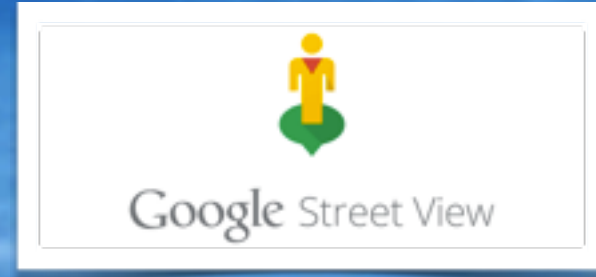
# Powerful New Marketing Tools



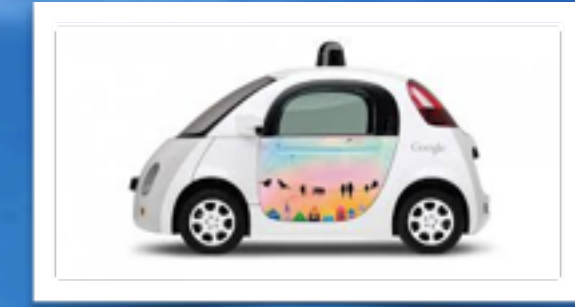
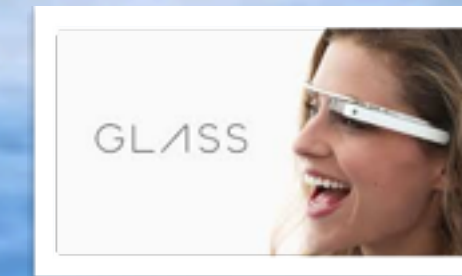
VS.



# PRODUCT INNOVATION



Product	Revenue	Profit
Google	1,000,000,000	100,000,000
Google AdWords	1,000,000,000	100,000,000
Google Analytics	1,000,000,000	100,000,000
Google Maps	1,000,000,000	100,000,000
Google Scholar	1,000,000,000	100,000,000
Google Books	1,000,000,000	100,000,000
Google News	1,000,000,000	100,000,000
Google Play	1,000,000,000	100,000,000
Google Earth	1,000,000,000	100,000,000
Google Translate	1,000,000,000	100,000,000
Google Cloud	1,000,000,000	100,000,000
Google Fiber	1,000,000,000	100,000,000
Google X	1,000,000,000	100,000,000
Google Research	1,000,000,000	100,000,000
Google AI	1,000,000,000	100,000,000
Google Quantum	1,000,000,000	100,000,000
Google AR/VR	1,000,000,000	100,000,000
Google Self-Driving	1,000,000,000	100,000,000
Google Glass	1,000,000,000	100,000,000
Google Project Loon	1,000,000,000	100,000,000
Google Project Titan	1,000,000,000	100,000,000
Google Project Ara	1,000,000,000	100,000,000
Google Project Sky	1,000,000,000	100,000,000
Google Project Wing	1,000,000,000	100,000,000
Google Project Orion	1,000,000,000	100,000,000
Google Project Starline	1,000,000,000	100,000,000
Google Project Skyway	1,000,000,000	100,000,000
Google Project Loon 2	1,000,000,000	100,000,000
Google Project Starline 2	1,000,000,000	100,000,000
Google Project Skyway 2	1,000,000,000	100,000,000
Google Project Orion 2	1,000,000,000	100,000,000
Google Project Starline 3	1,000,000,000	100,000,000
Google Project Skyway 3	1,000,000,000	100,000,000
Google Project Orion 3	1,000,000,000	100,000,000
Google Project Starline 4	1,000,000,000	100,000,000
Google Project Skyway 4	1,000,000,000	100,000,000
Google Project Orion 4	1,000,000,000	100,000,000
Google Project Starline 5	1,000,000,000	100,000,000
Google Project Skyway 5	1,000,000,000	100,000,000
Google Project Orion 5	1,000,000,000	100,000,000
Google Project Starline 6	1,000,000,000	100,000,000
Google Project Skyway 6	1,000,000,000	100,000,000
Google Project Orion 6	1,000,000,000	100,000,000
Google Project Starline 7	1,000,000,000	100,000,000
Google Project Skyway 7	1,000,000,000	100,000,000
Google Project Orion 7	1,000,000,000	100,000,000
Google Project Starline 8	1,000,000,000	100,000,000
Google Project Skyway 8	1,000,000,000	100,000,000
Google Project Orion 8	1,000,000,000	100,000,000
Google Project Starline 9	1,000,000,000	100,000,000
Google Project Skyway 9	1,000,000,000	100,000,000
Google Project Orion 9	1,000,000,000	100,000,000
Google Project Starline 10	1,000,000,000	100,000,000
Google Project Skyway 10	1,000,000,000	100,000,000
Google Project Orion 10	1,000,000,000	100,000,000



**HUMAN RESOURCES**

**R&D TOOLS**

**ANALYTICS METRICS  
FEEDBACK SYTEMS**

**MARKETING**

**SALES PROCESS**

**IT/INFRASTRUCTURE**

**INNOVATION MODELS**

# TOTAL INNOVATION



**All companies  
talk the  
talk ...**

**... but are they  
aggressive enough?**

# Large Companies Have Huge Innovation Potential

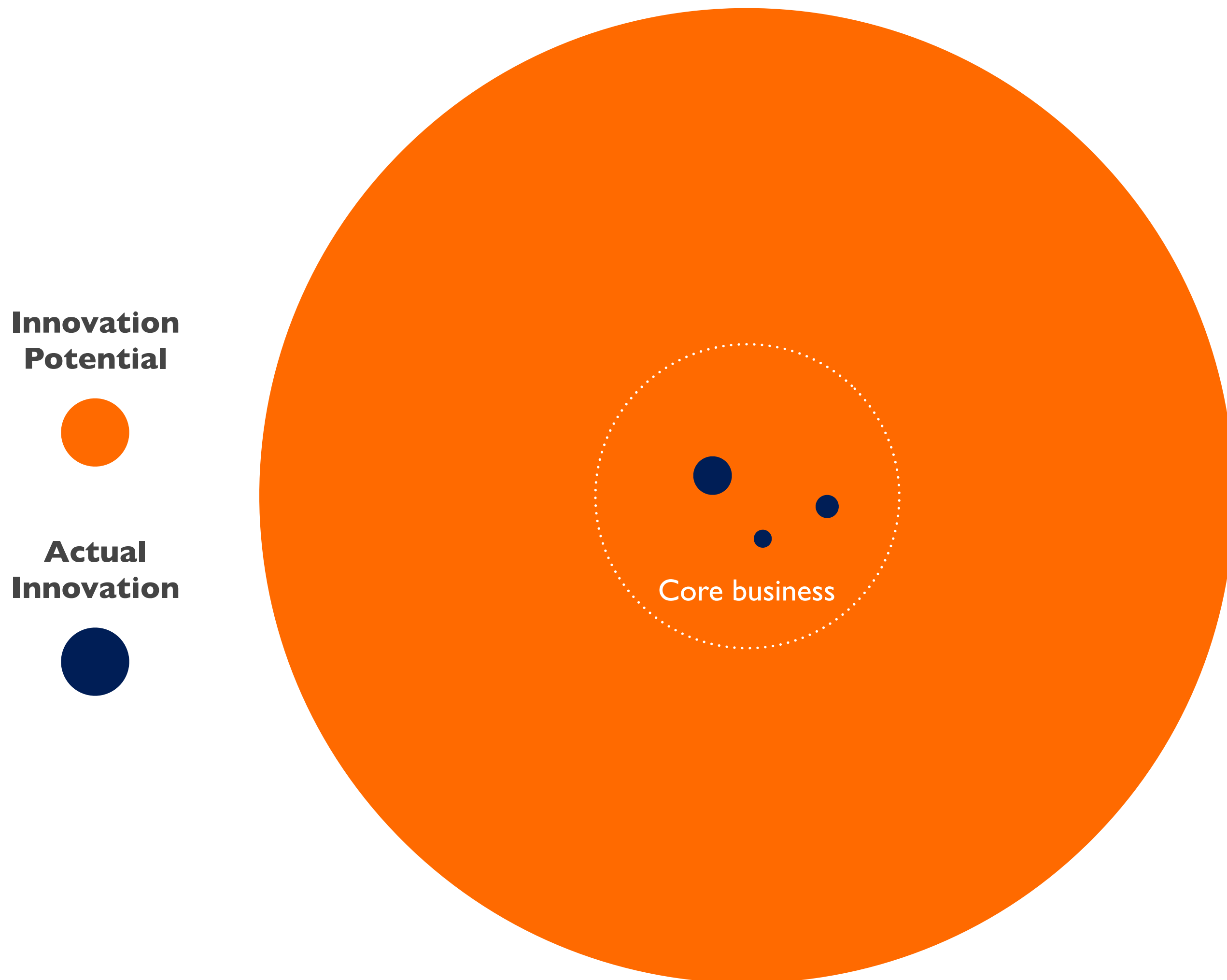


Innovation Potential =

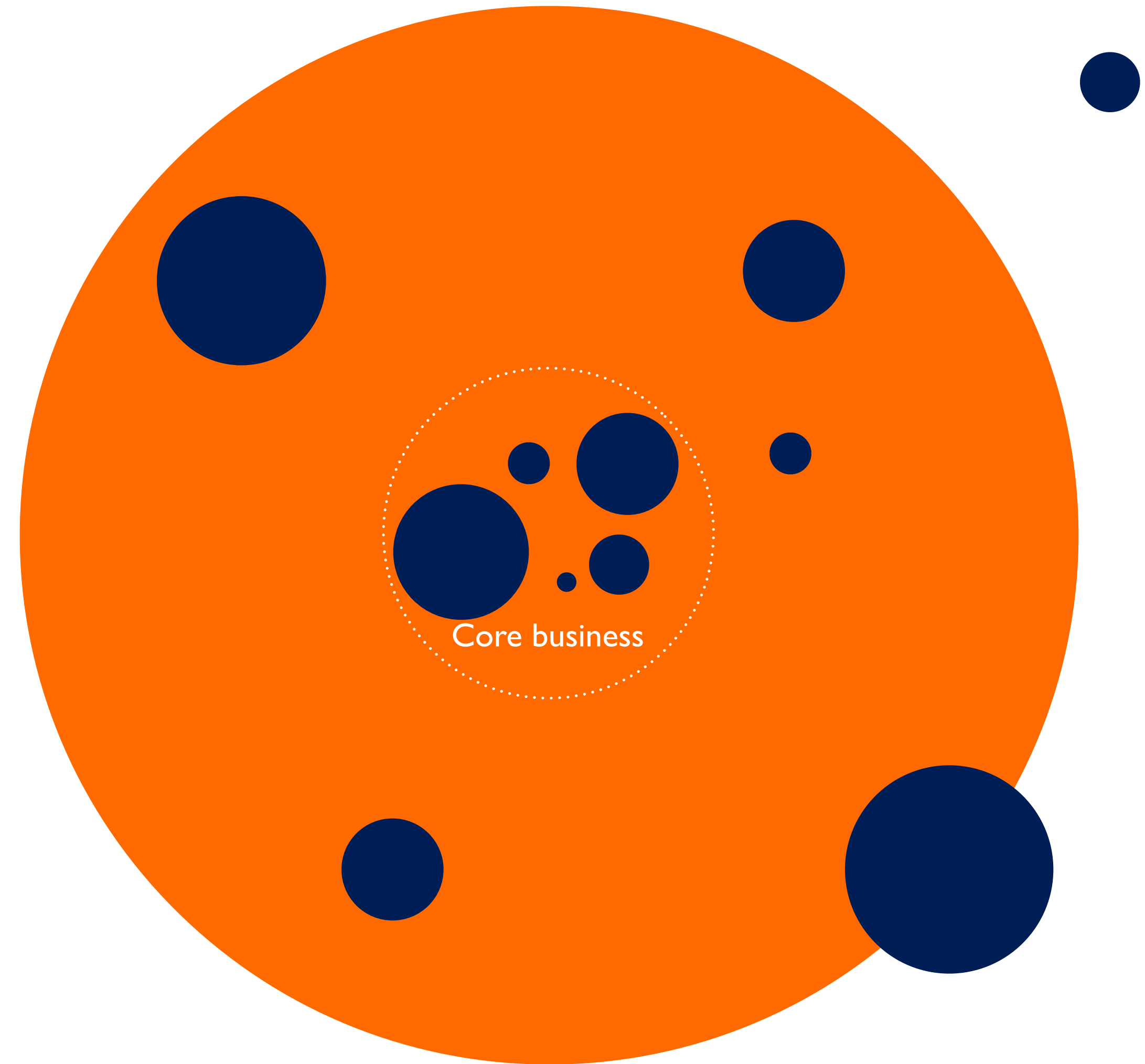
People x  
IP/IT x  
Know How x  
Brand x  
Financial x

...

## How Most Companies Innovate



## APEX INNOVATORS





# *Apex Innovators* Attack New Markets



# *Apex Innovators* Attack Even Their Own Products

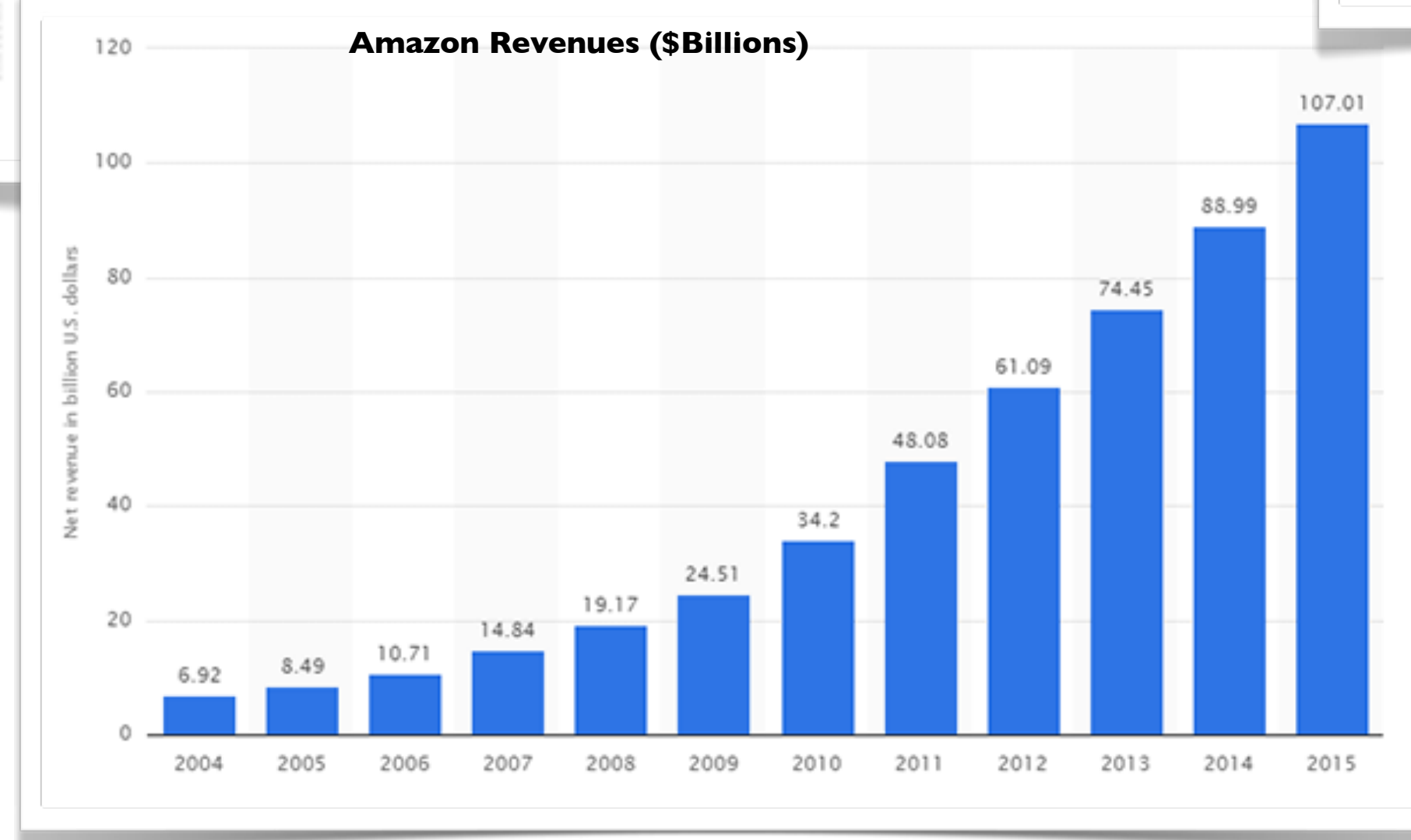
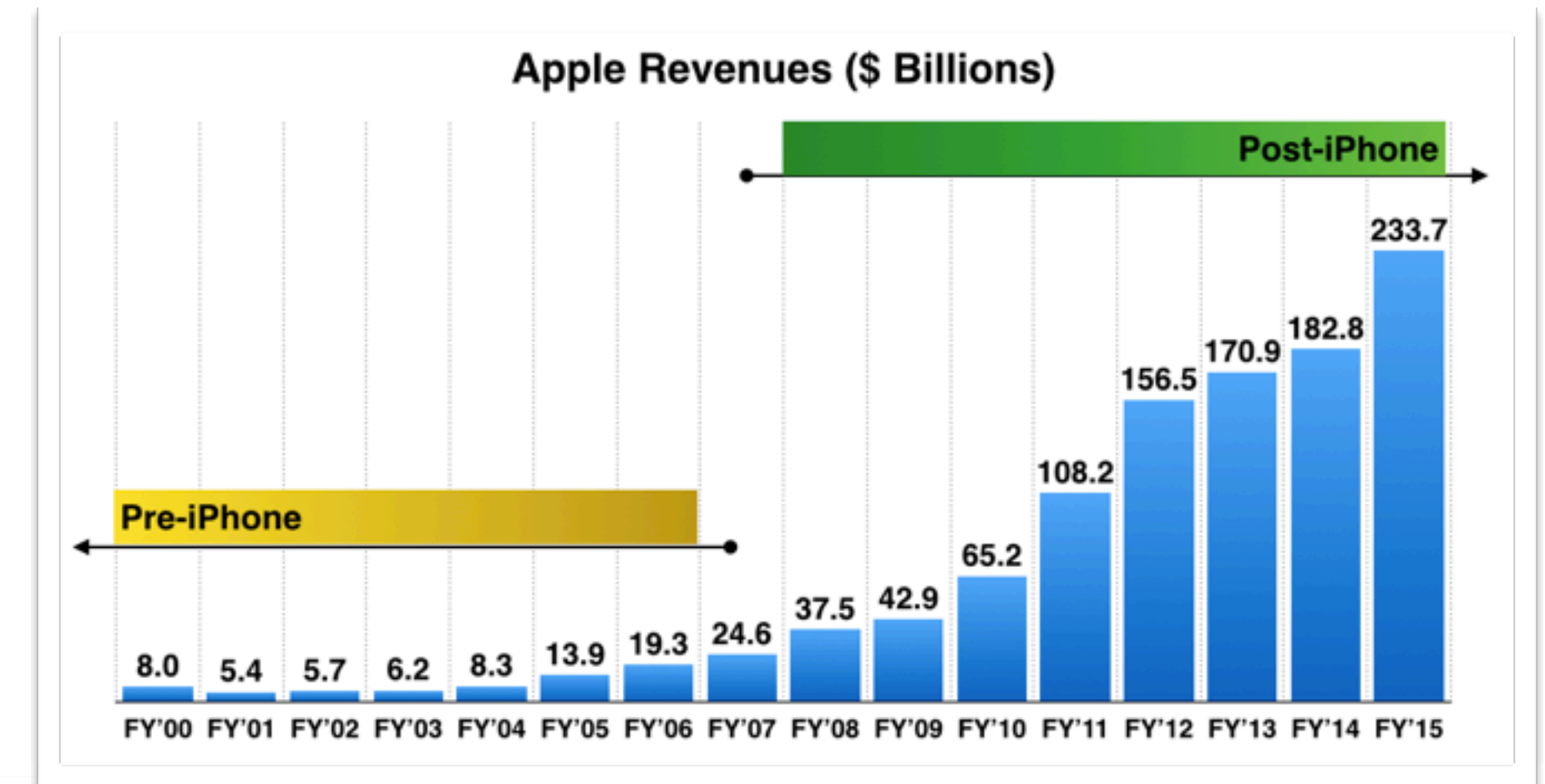
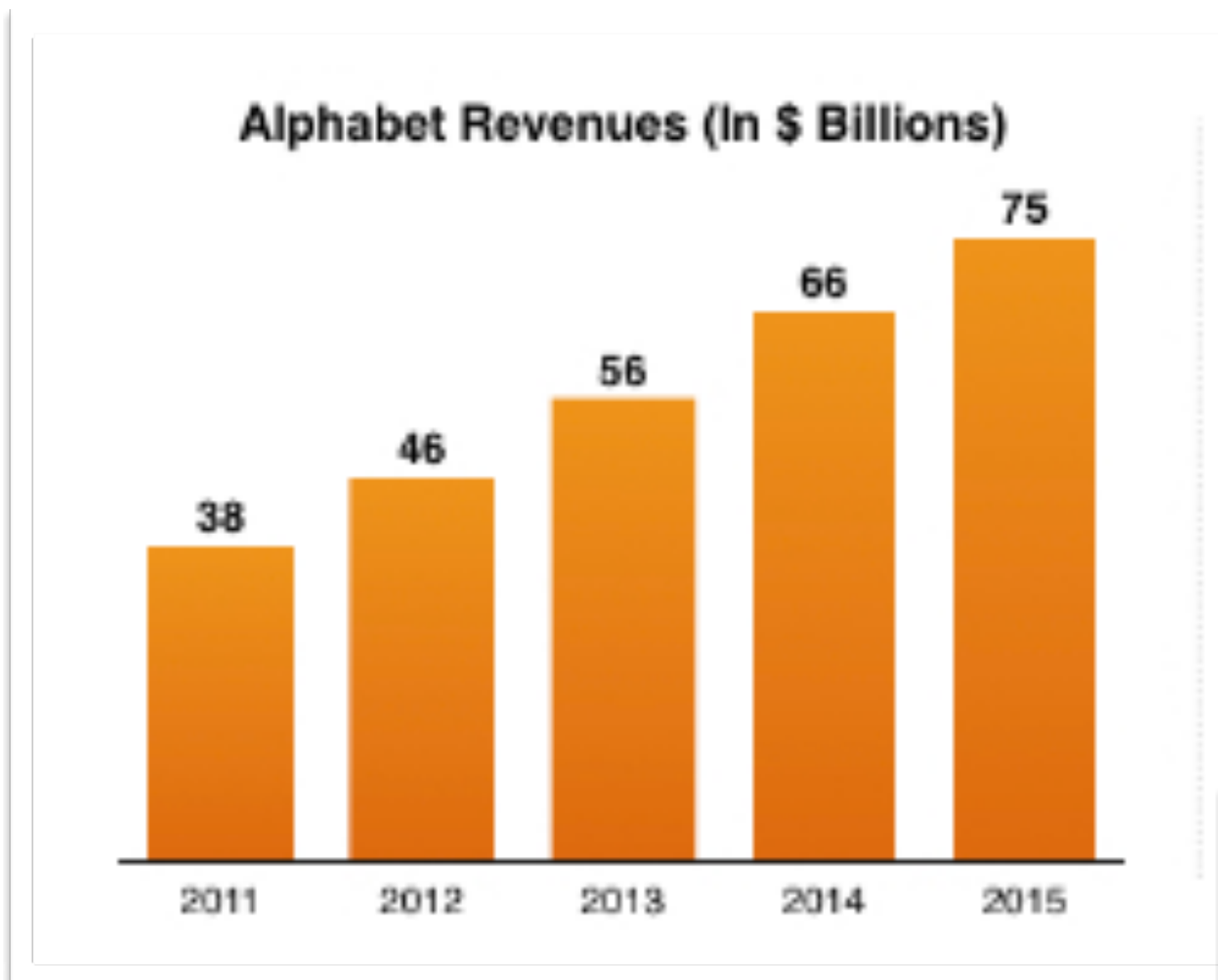


# What Business Is Amazon In?

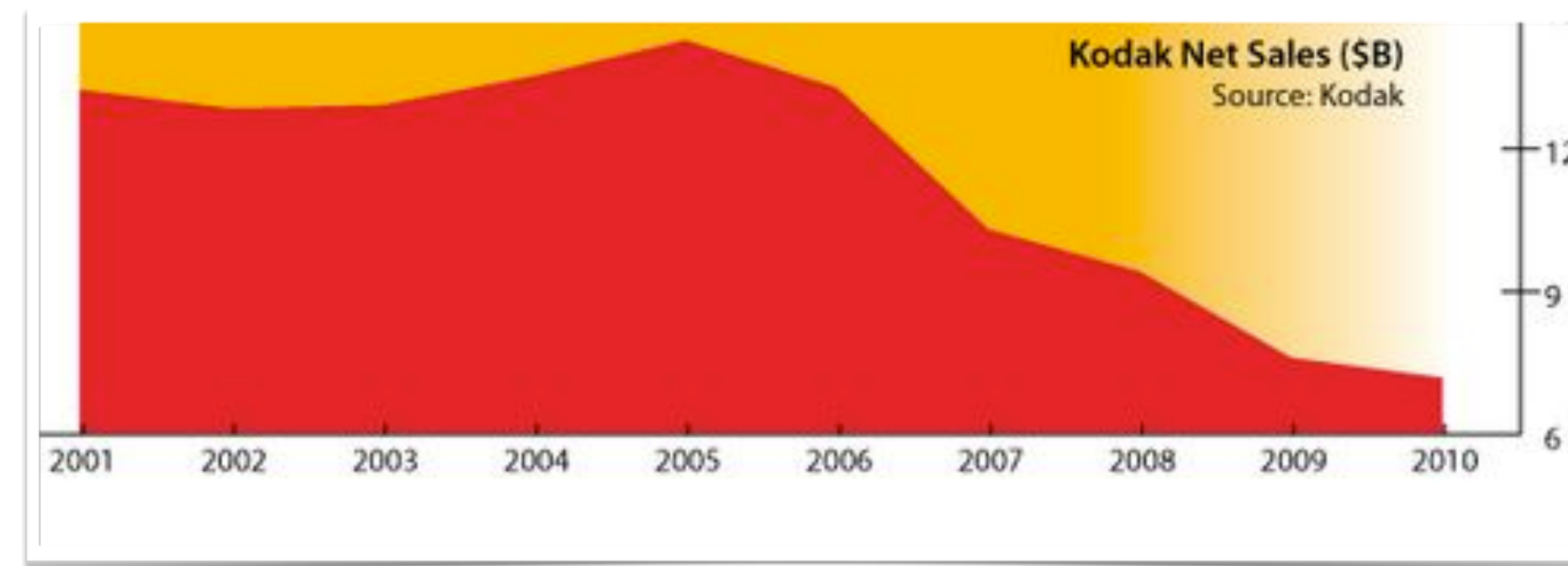
amazon



# Apex Innovators + Giant Companies = Double-digit \$B growth

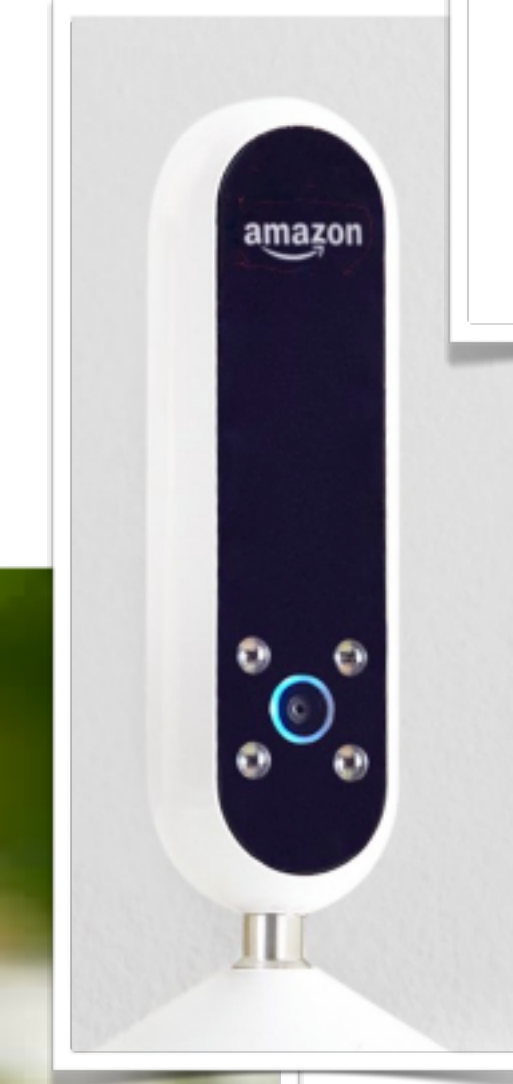


# Conservative Innovation + Giant Companies = Double-digit \$B Decline



# ... There's Always A Next Innovation

????



# What is going on ???

THE ERA OF  
**THE APEX**  
**INNOVATORS**

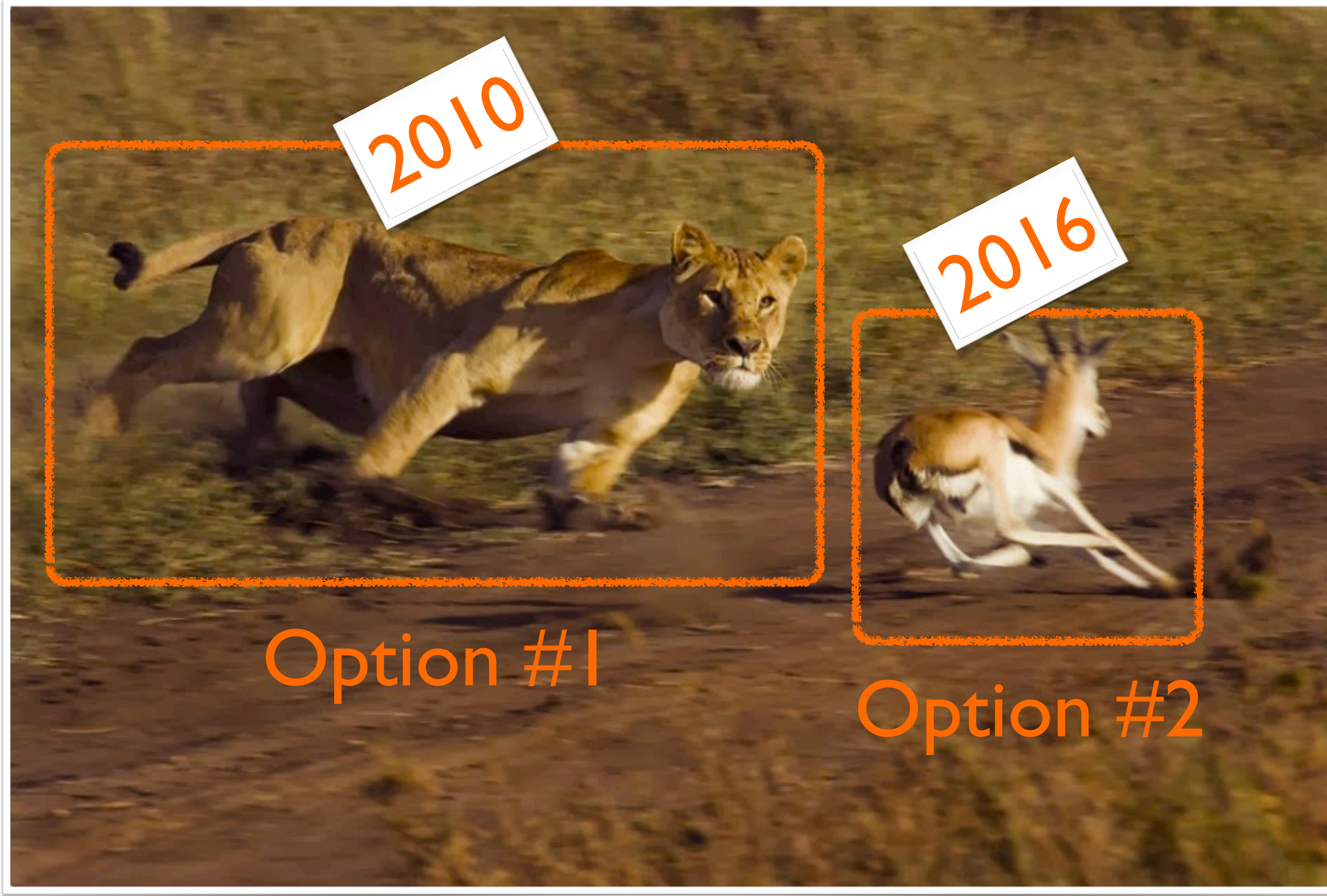
# SUCCESS THEN



# SUCCESS NOW

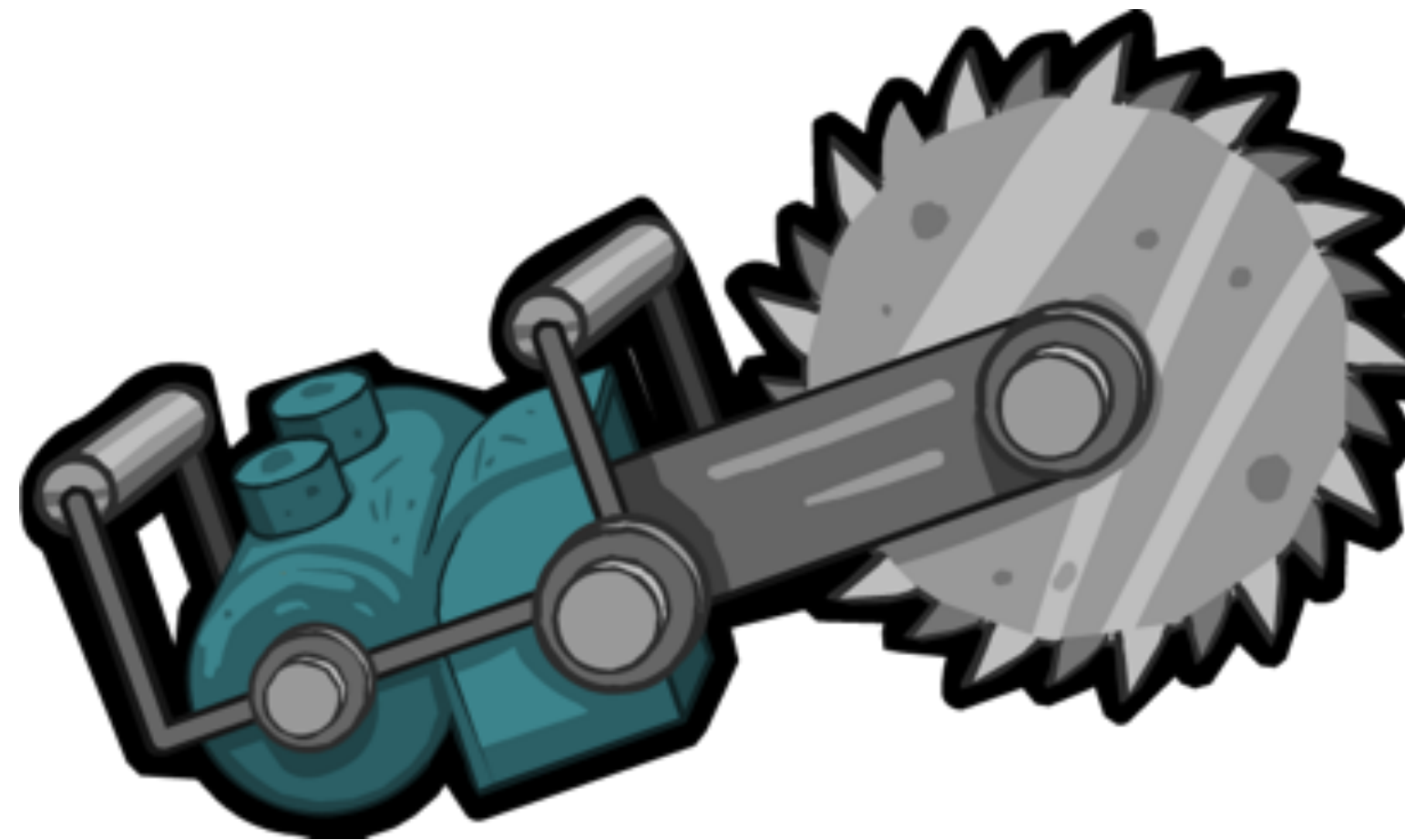


**RELENTLESS INNOVATION**



# Innovation

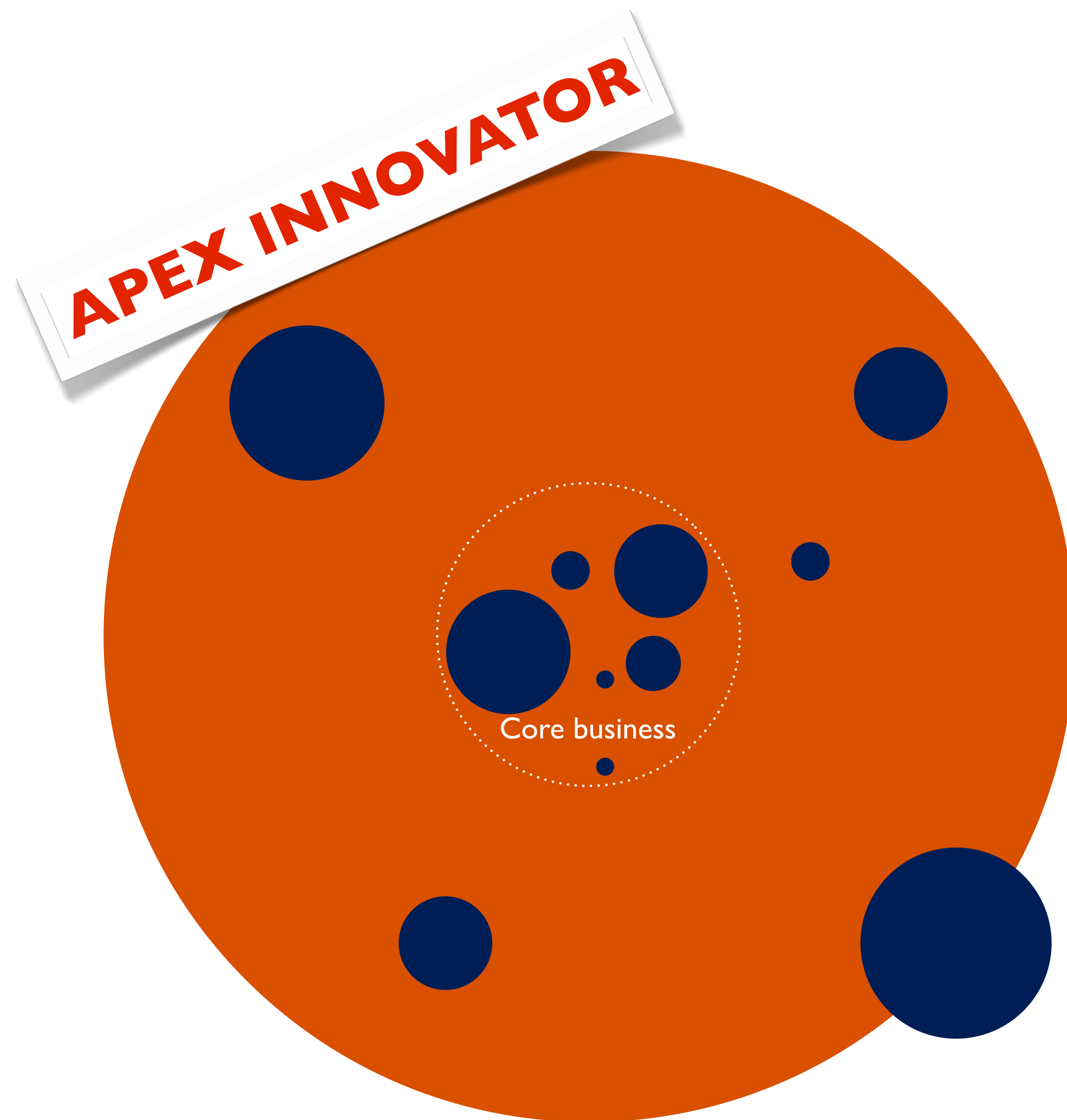
~~Buzzword?~~



Buzzsaw!

You already have 100x  
the assets and resources  
you need to be an  
**Apex Innovator**

You just need to  
**UNLEASH  
THEM**



# Apex Innovators

Quantity

Test a **LOT** of ideas

Dozens, hundreds / year

Scope

from a **WIDE** range

Small & Big  
Incremental & Disruptive  
Sensible & **Crazy**

Speed

in a **SHORT** time

Days, weeks  
... months at most



# Two BIG Challenges

Fear of **FAILURE**


Lack of **RESOURCES**

# The Law of **FAILURE**

Most new  
ideas will **FAIL** ...

... even if  
competently executed

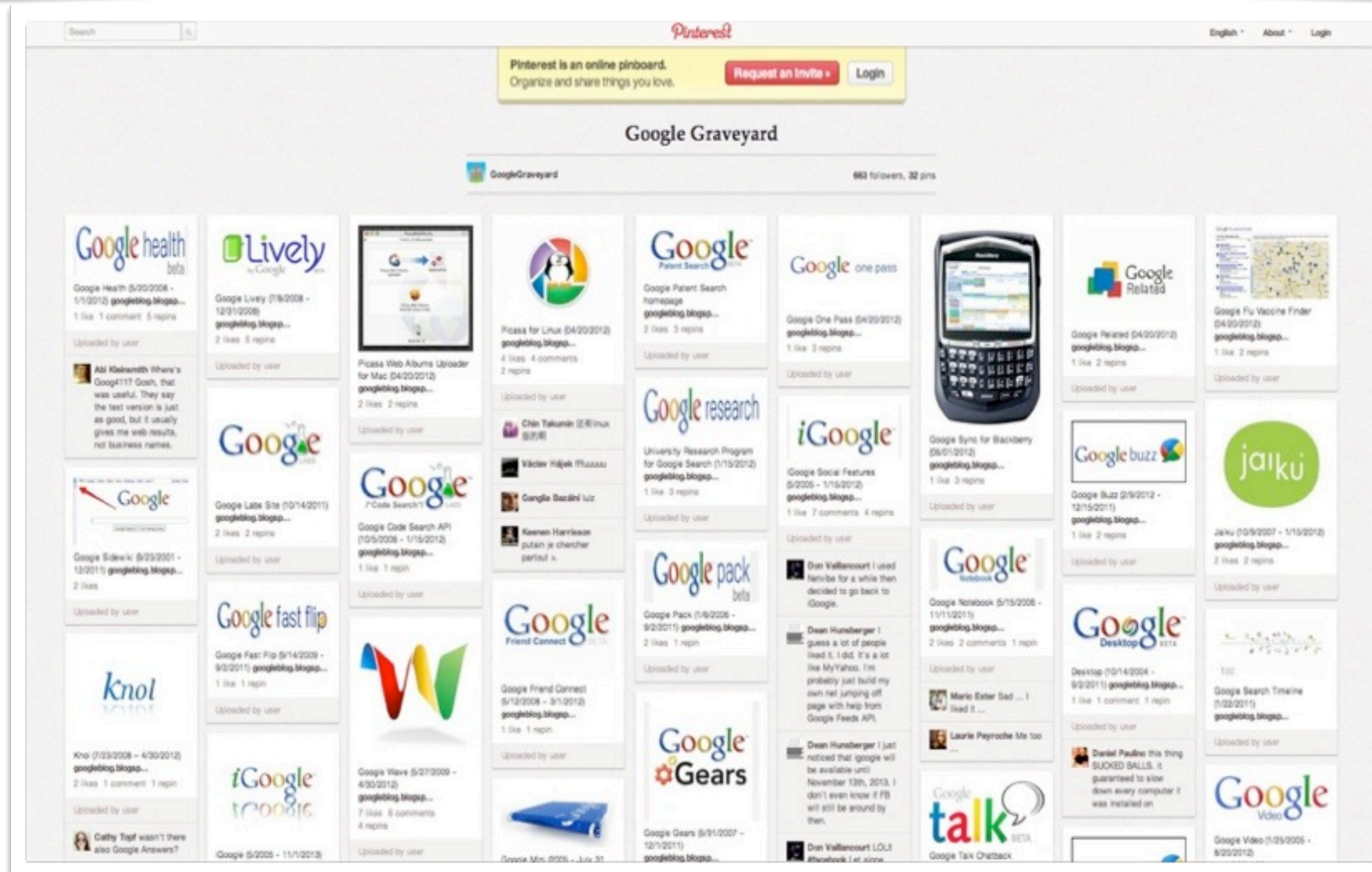
# One year: 24,543 new products\*



Failed	27%
Disappointed	16%
Cancelled	37%
Success	14%
Star	6%
<b>Total</b>	<b>100%</b>

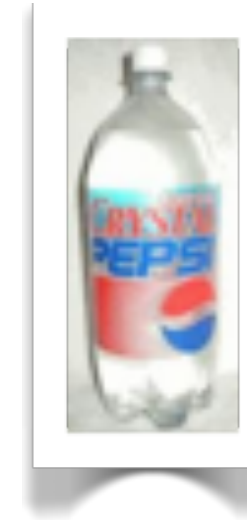
\* Nielsen

# The Google Graveyard





**Crystal Pepsi (est. \$50M)**



**The movie “John Carter” (\$275M + \$100M marketing)**



**Some Notable  
(Well-Executed)  
Failures**

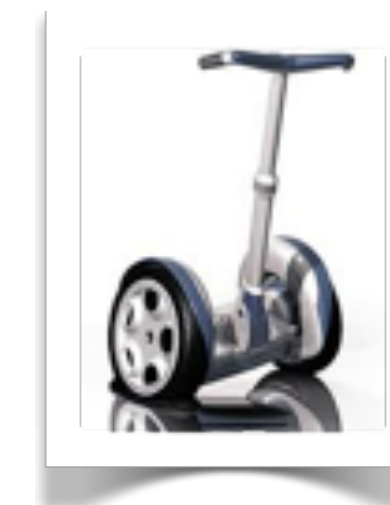
**Google Wave (\$20-30M)**



**Iridium Satellite Phone (\$6.3B)**

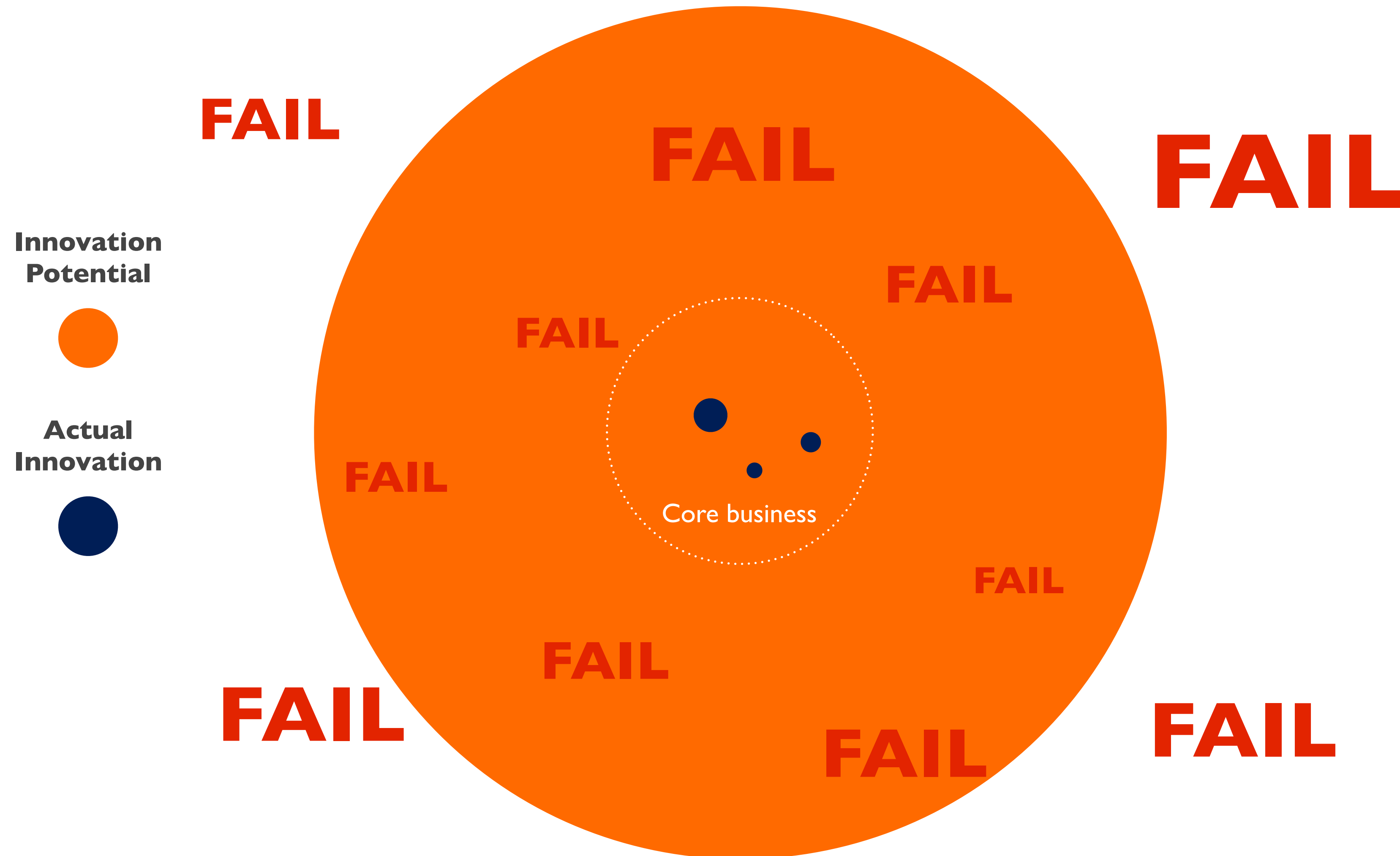


**Segway transporter (~\$180M in funding)**



**FAILURE** IS THE  
DEFAULT OUTCOME  
FOR MOST INNOVATION

# How Most Companies Innovate



# FAILOPHOBIA

**Persistent irrational fear or aversion to failure**

**If untreated, it leads to diminished creativity, lack of innovation and, eventually, ...**



**Alberto Savoia**

Doctor of Failosophy



**I CAN  
CURE YOU!**

# WHY?

WHY DO MOST NEW  
IDEAS FAIL?

# HIT or FLOP

**F.L.O.P.**

**F**ailure in

**L**aunch

**O**perations or

**P**remise

**Make sure you  
are building  
THE RIGHT IT  
before you  
build IT  
right.**

**How do I know  
I have  
THE RIGHT IT ?**

**Don't ask.  
LITERALLY!**

Ideas  
+  
Questions  
=



IDEA

OPINION

OPINION

OPINION

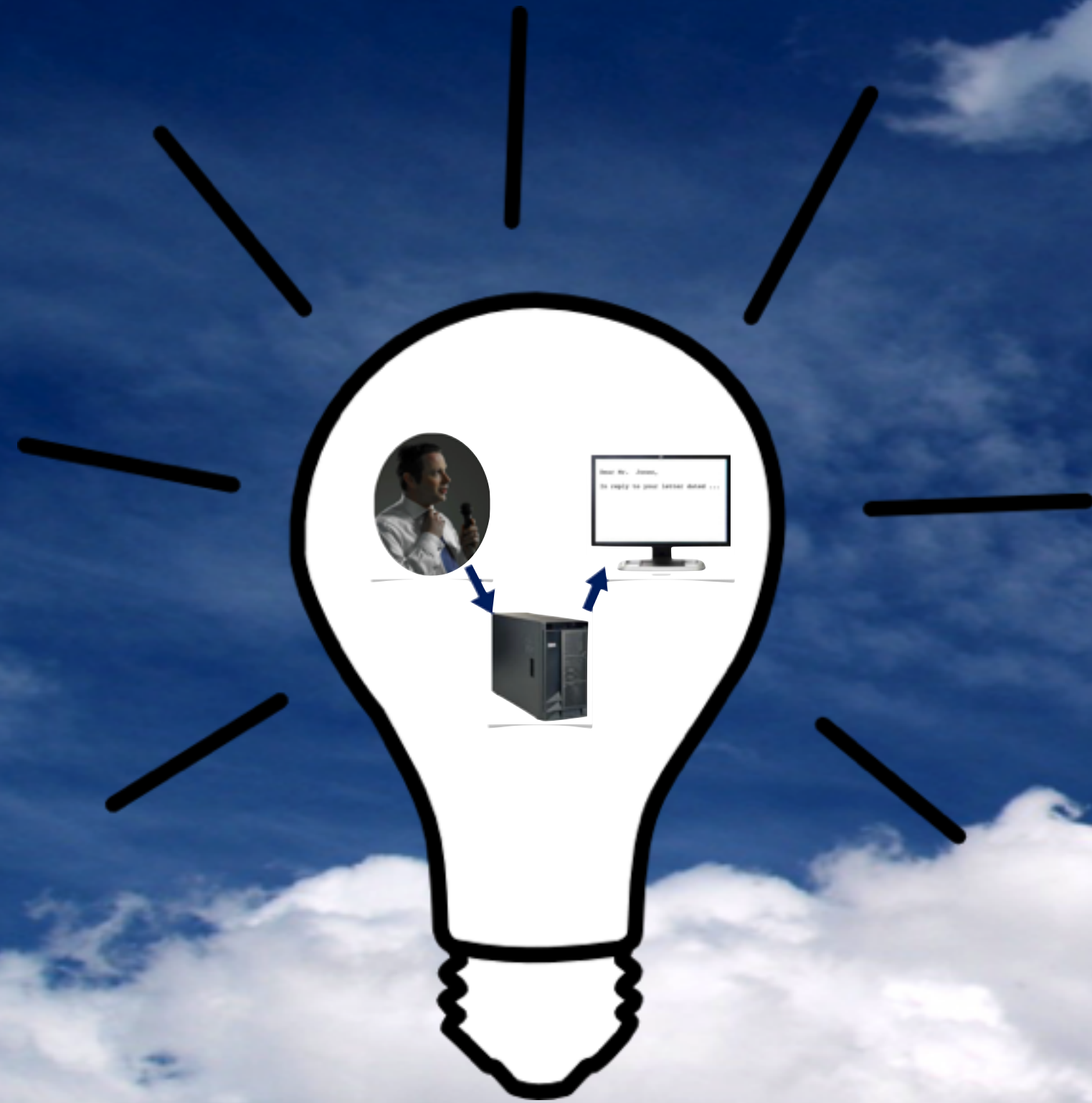
Welcome to  
**Thoughtland**  
Pop. ∞



??????

# Computers For All Business People

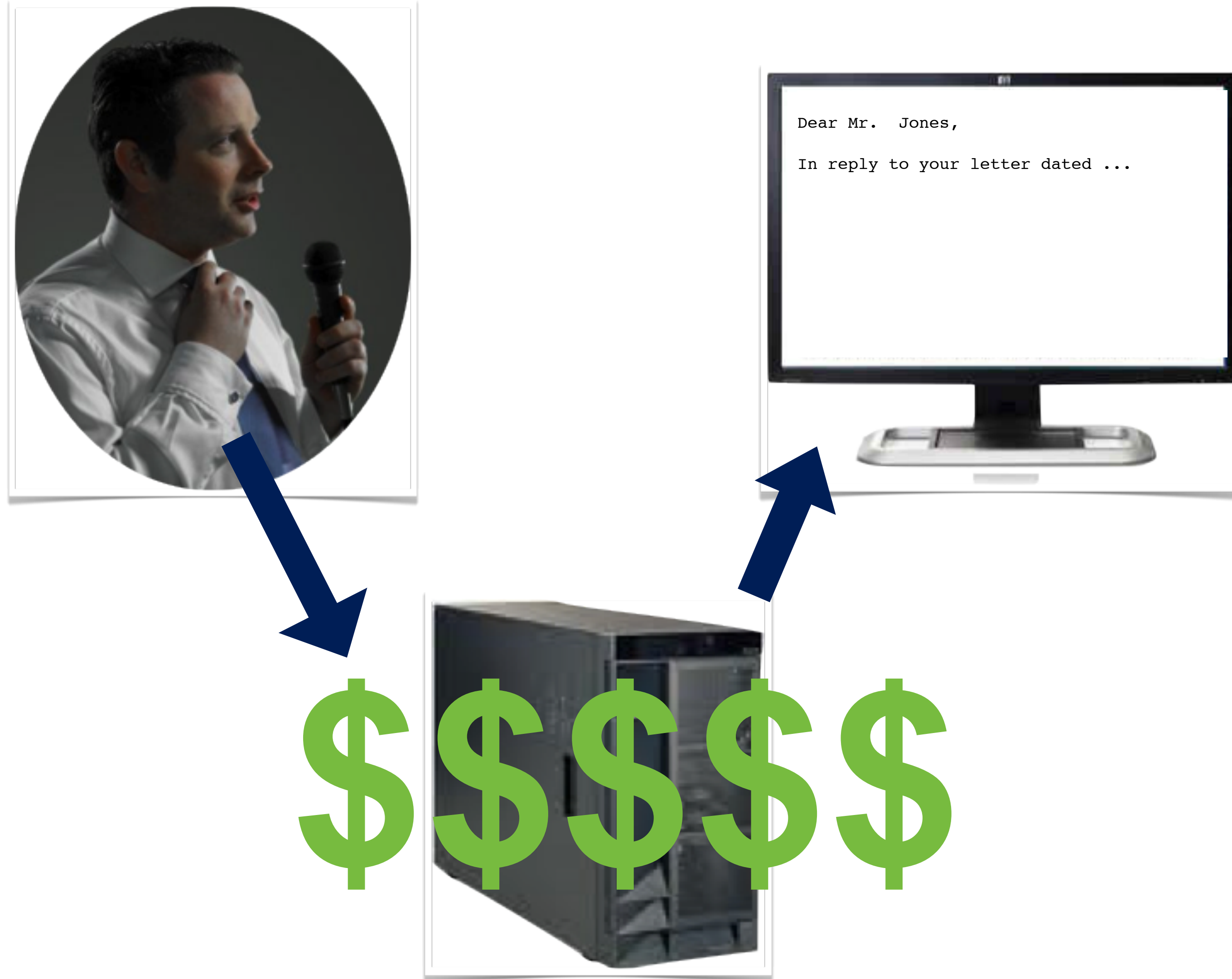




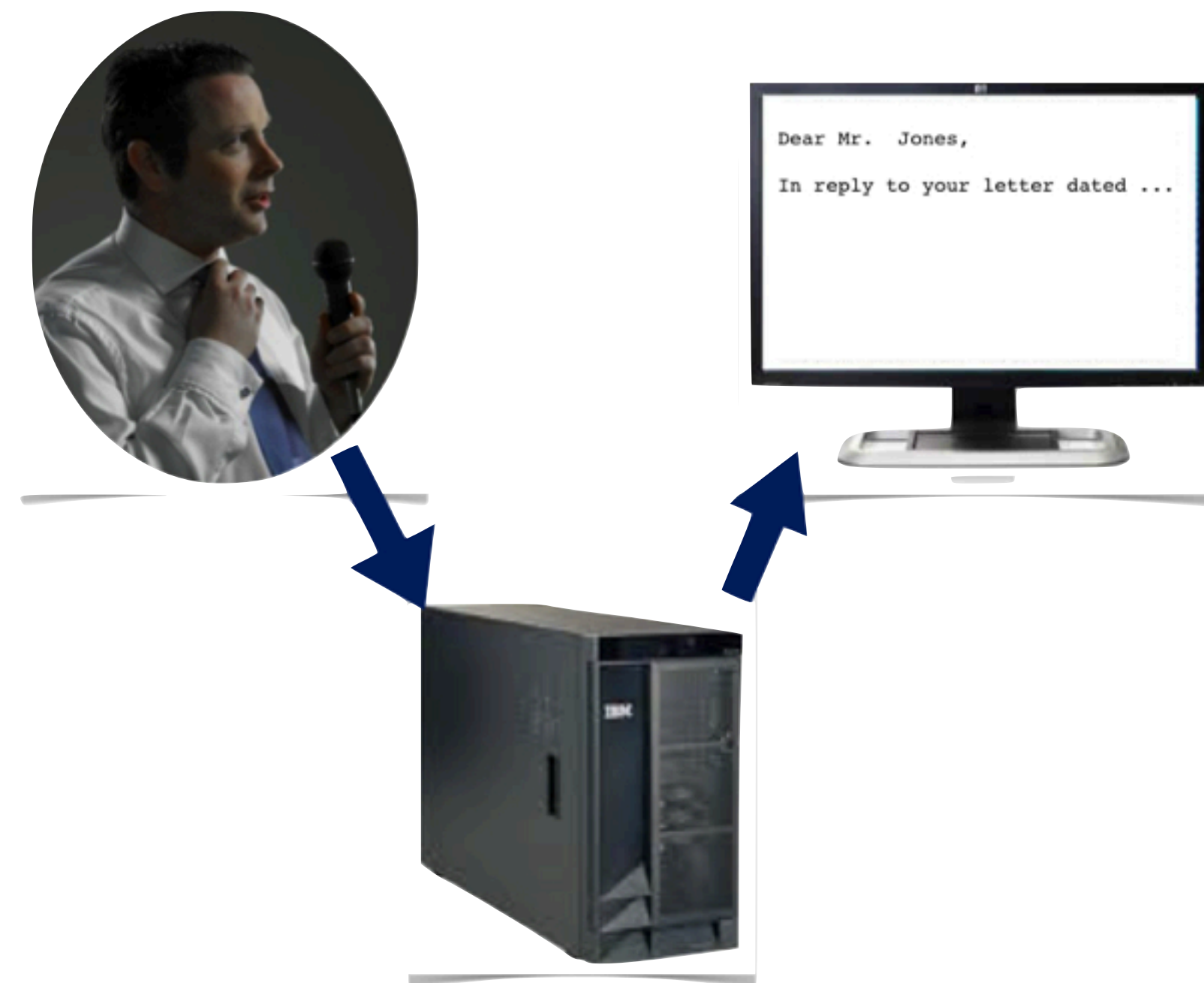
Welcome to  
**Thoughtland**  
Pop. ∞

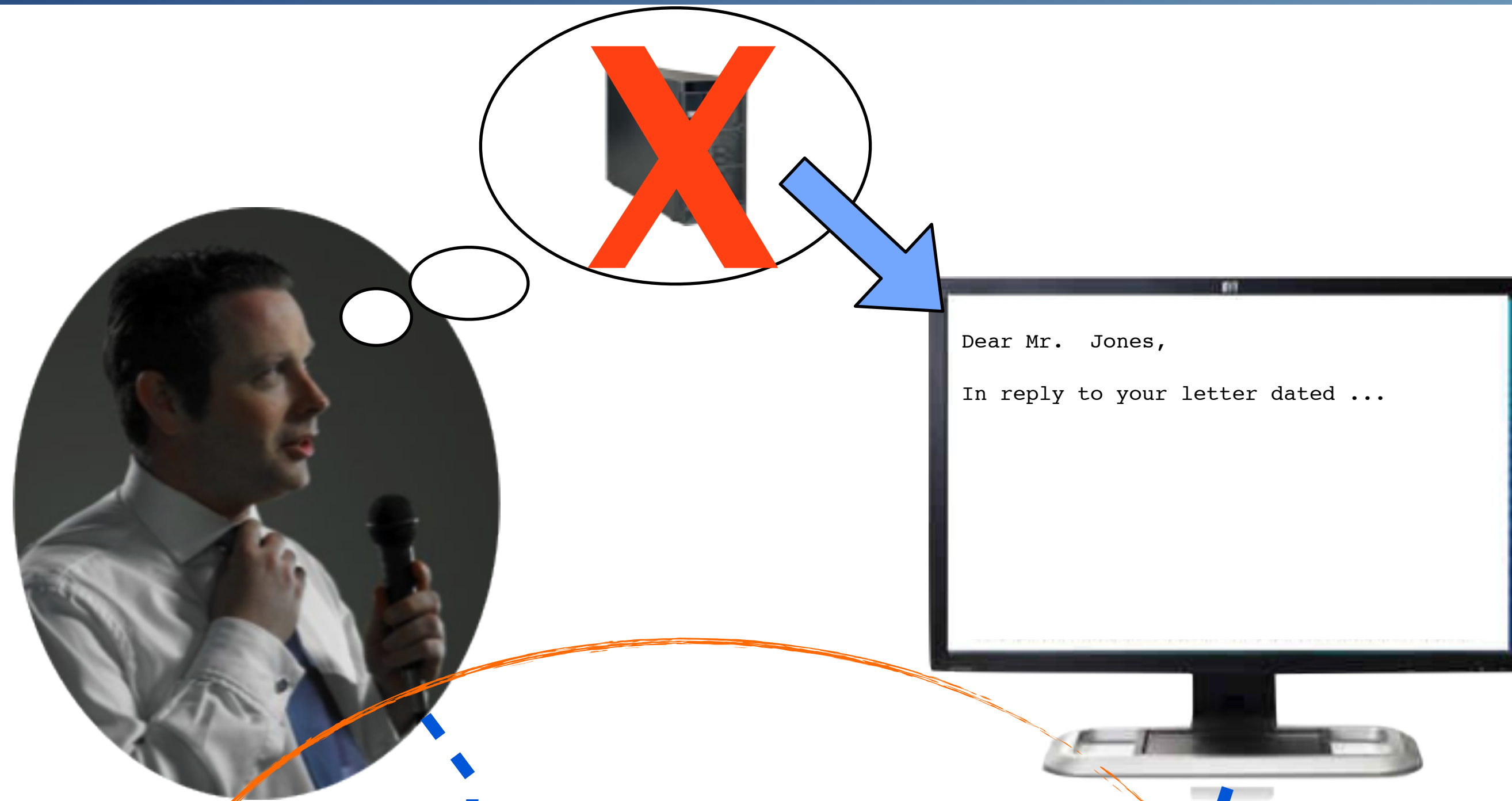


# Speech-to-Text Innovation



# Is Speech-to-Text **THE RIGHT IT?**





Pretendotype  
**Pretotype**

**“We love the idea of speech-to-text  
and we’ll pay big \$ for it  
if you can built it right.”**

**Thoughtland**



**Before  
prototype  
tests**



**After  
prototype  
tests**

**Real-world**



**FALSE POSITIVE**



# THOUGHTLAND FALSE POSITIVES

## The Law of **Failure**

Most new ideas  
will **fail**—even if  
competently executed

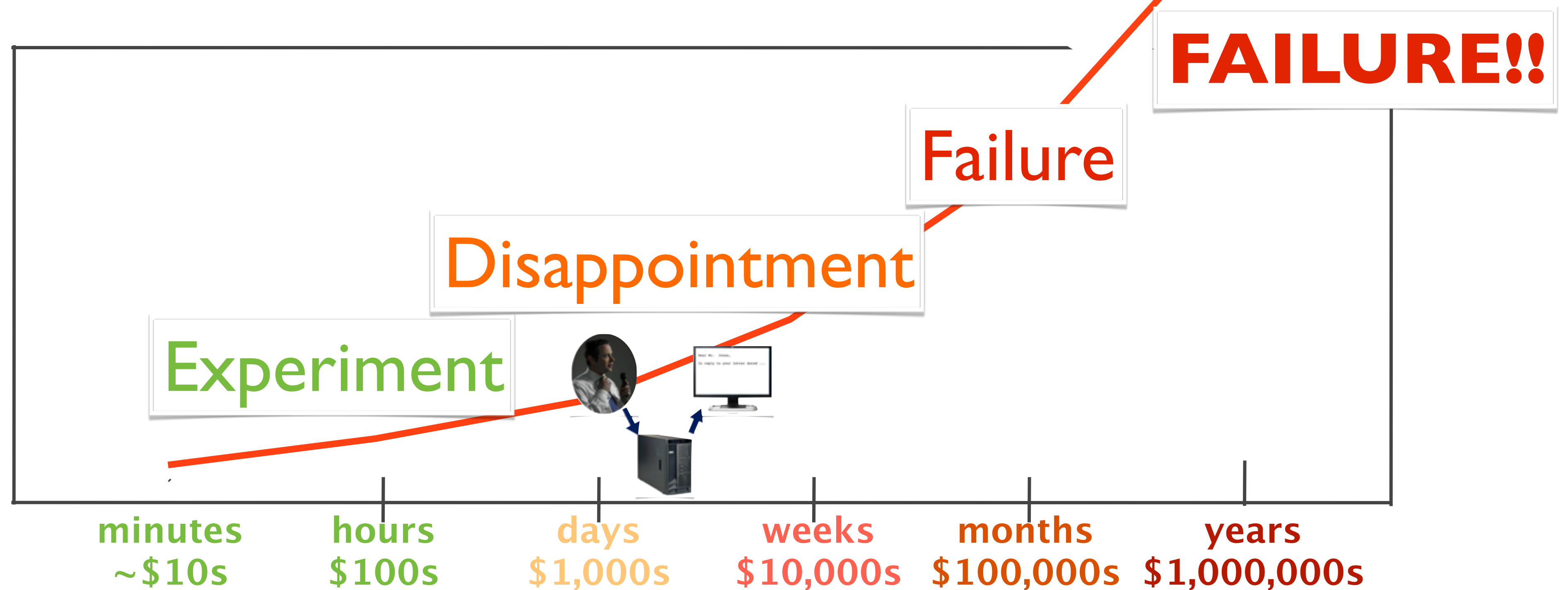
*Alberto Savoia*



# Fail Ferrari Fast ... and FIAT Frugal



Compulsion to keep going at all costs



## Time & \$ Invested



**FALSE NEGATIVE**



??????

# GET OUT OF THOUGHTLAND ... ASAP!

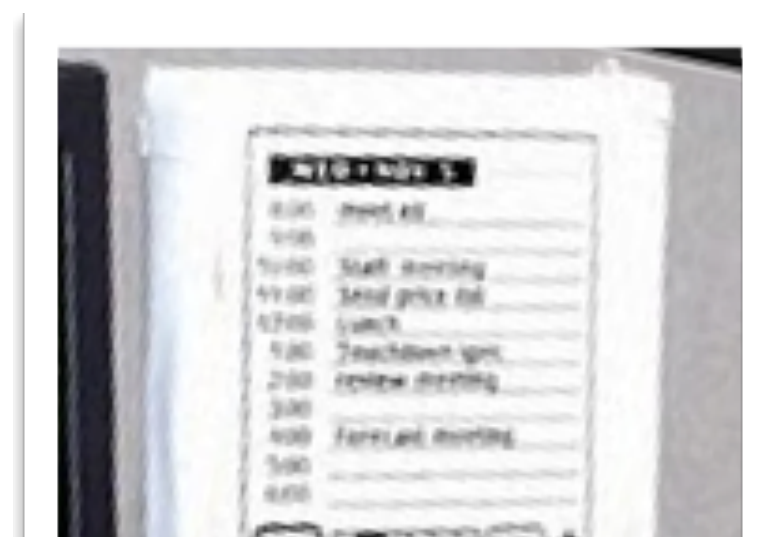
**Opinions** → **Data**  
**Questions** → **Actions**  
**Ideas** → **Pretotypes**

# The Palm Pilot Pretotype

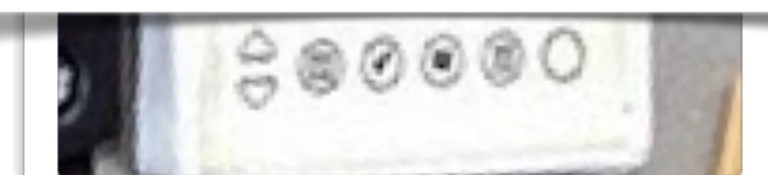


# Pretotyping

**Investment:**  
Hours, days  
\$\$

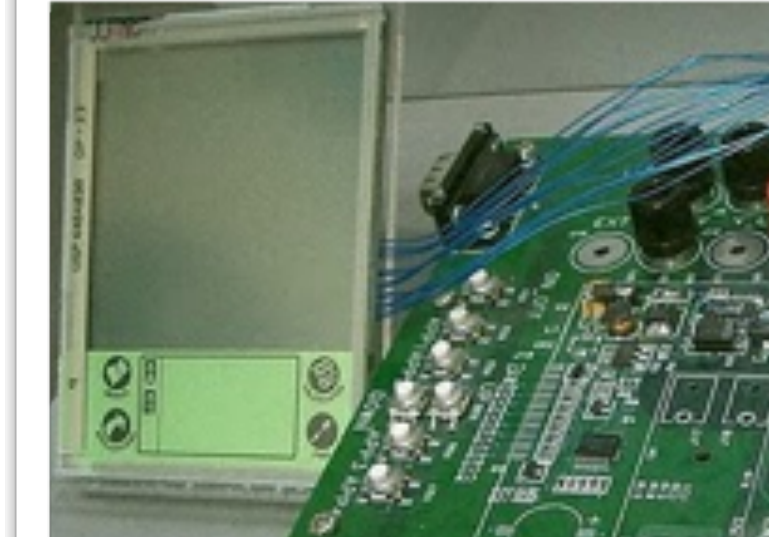


**Should we build it?**



# Prototyping

**Investment:**  
Weeks, months, years  
\$\$\$\$\$



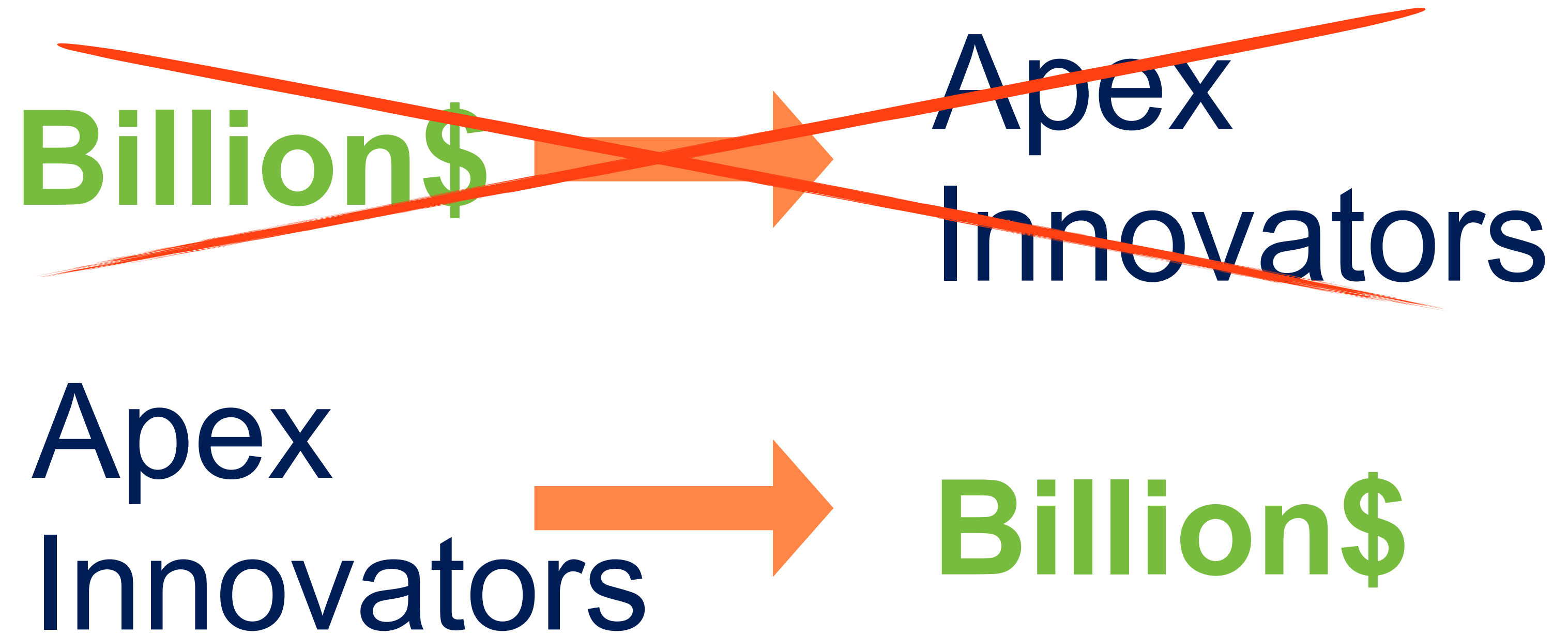
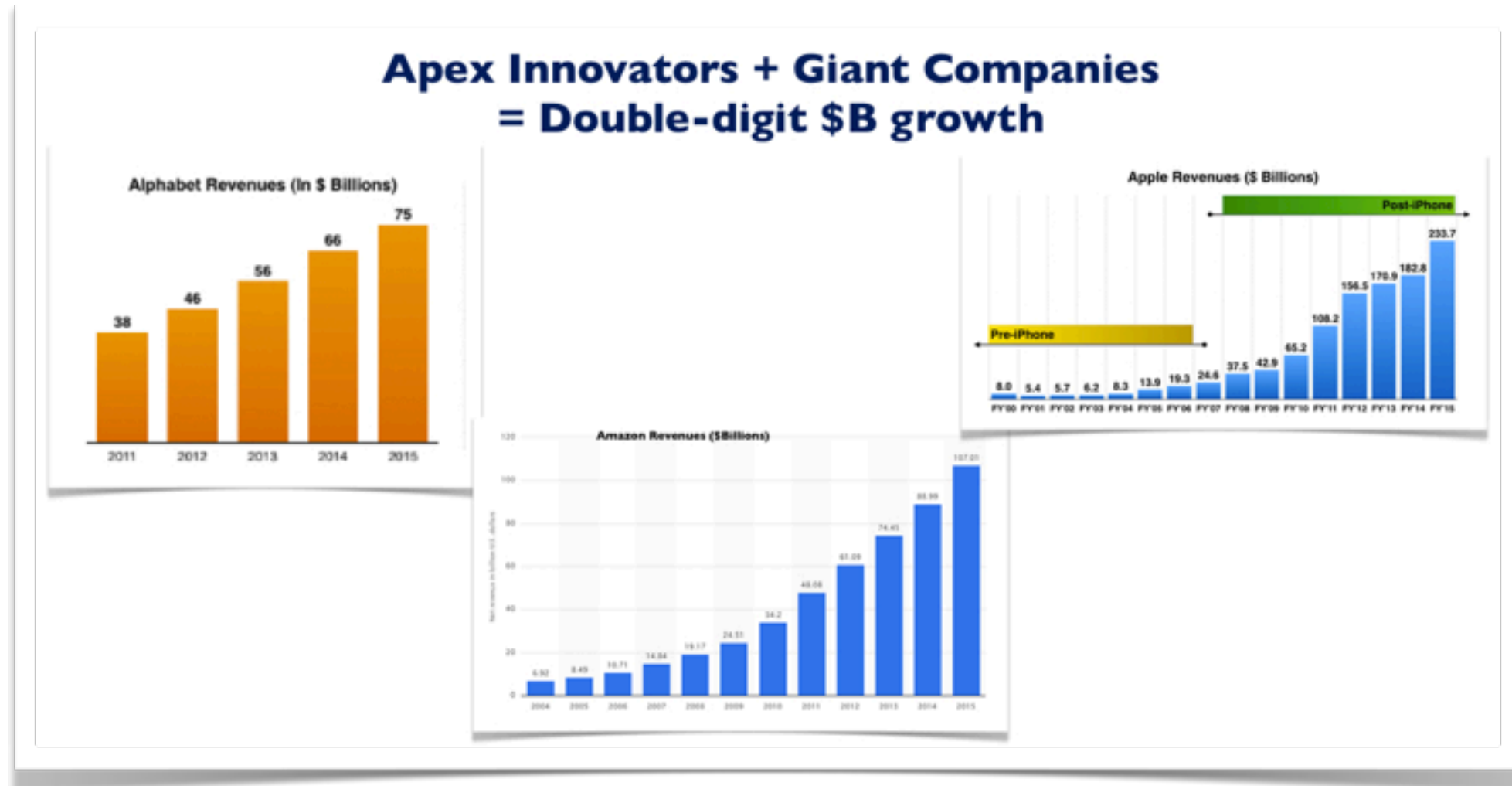
**Can we build it?**



# Two BIG Challenges

Fear of **FAILURE**

Lack of **RESOURCES**

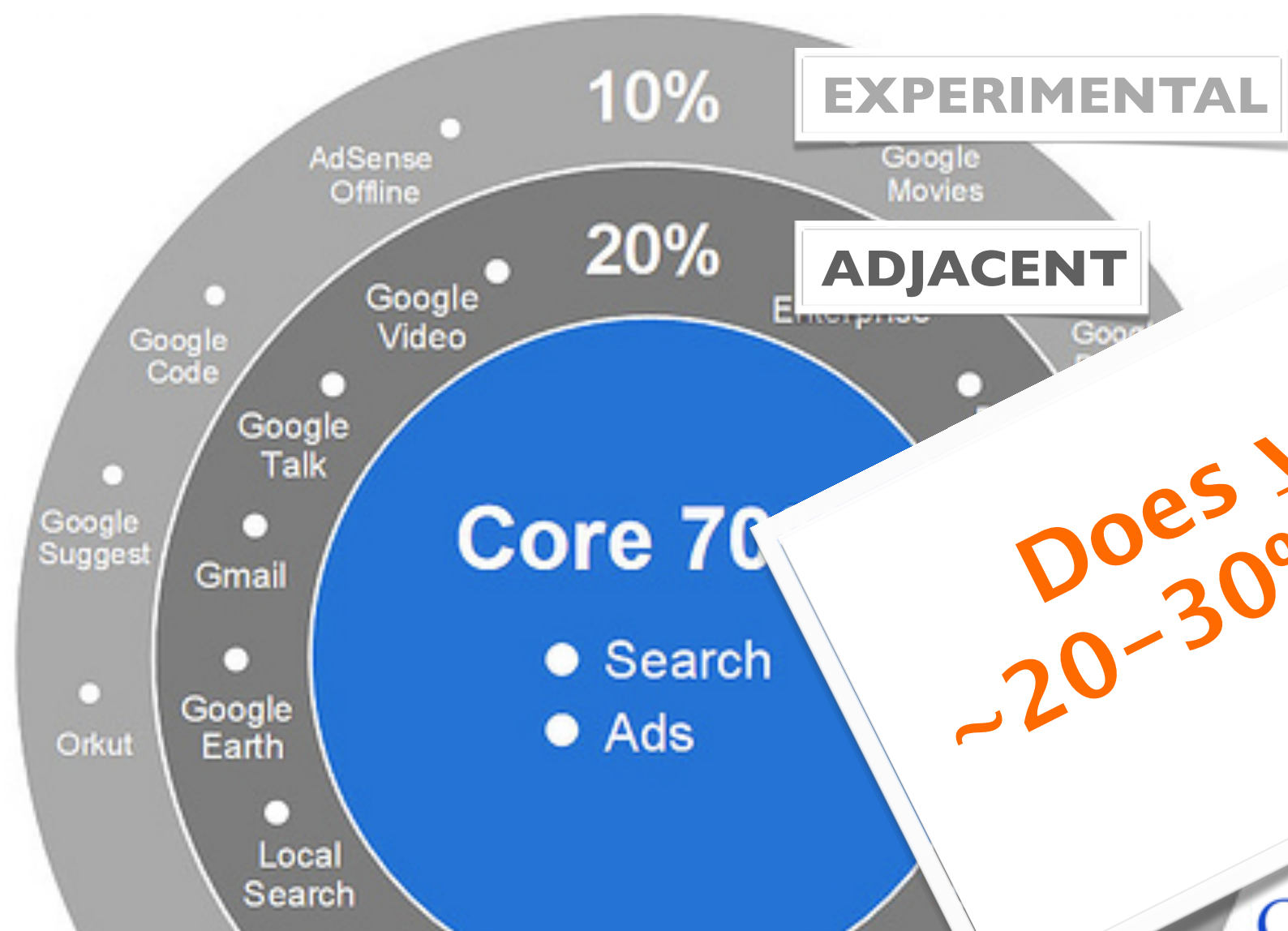




# Entrepreneurial Innovation at Google

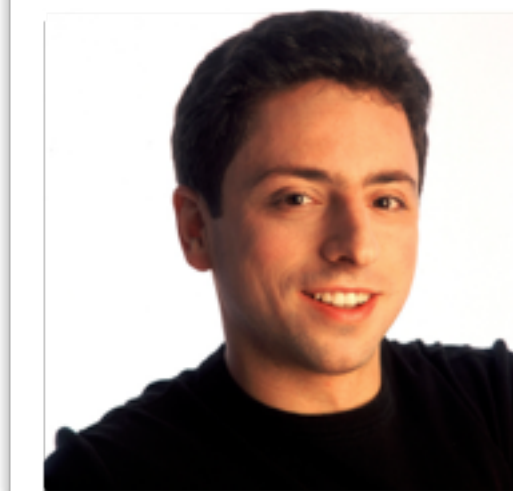
70/20/10

20%



Vintage sample. Not current 70/20/10.

*Does your organization have ~20-30% of resources to spare for innovation?*



... encourage our employees, in addition to their major projects, to spend 20% of their time working on what they think will most benefit Google.

...

Many of our significant advances have happened in this manner.

Sergey Brin, Google co-Founder

**CORE / ADJACENT / EXPERIMENTAL  
RESOURCE ALLOCATION**

**ENTREPRENEURIAL INNOVATION  
ALLOCATION**



**70/20/10**

**20%**



**APEX  
INNOVATORS  
&  
DISRUPTORS**

**90/8/2**

**2%**

**DISRUPTED  
&  
DEVASTATED**



**98/1.8/.2**

**.2%**



**100/0/0**

**0%**

**EVERY ORGANIZATION MUST FIND ITS OWN FORMULA**

It's not how much  
you invest in innovation ...

it's how you invest it!

LESS IS MORE

# PRETOTYPING IN ACTION

From



to



Entrepreneurial Innovation  
On A Shoestring  
(<.2%) Budget



**2001**

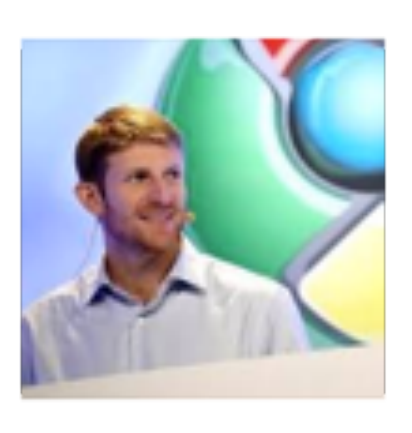


**Paul Bucheit**



**Sanjeev Singh**

**2002**



**Brian Rakowski  
Prod. Mgr.**

**2003**

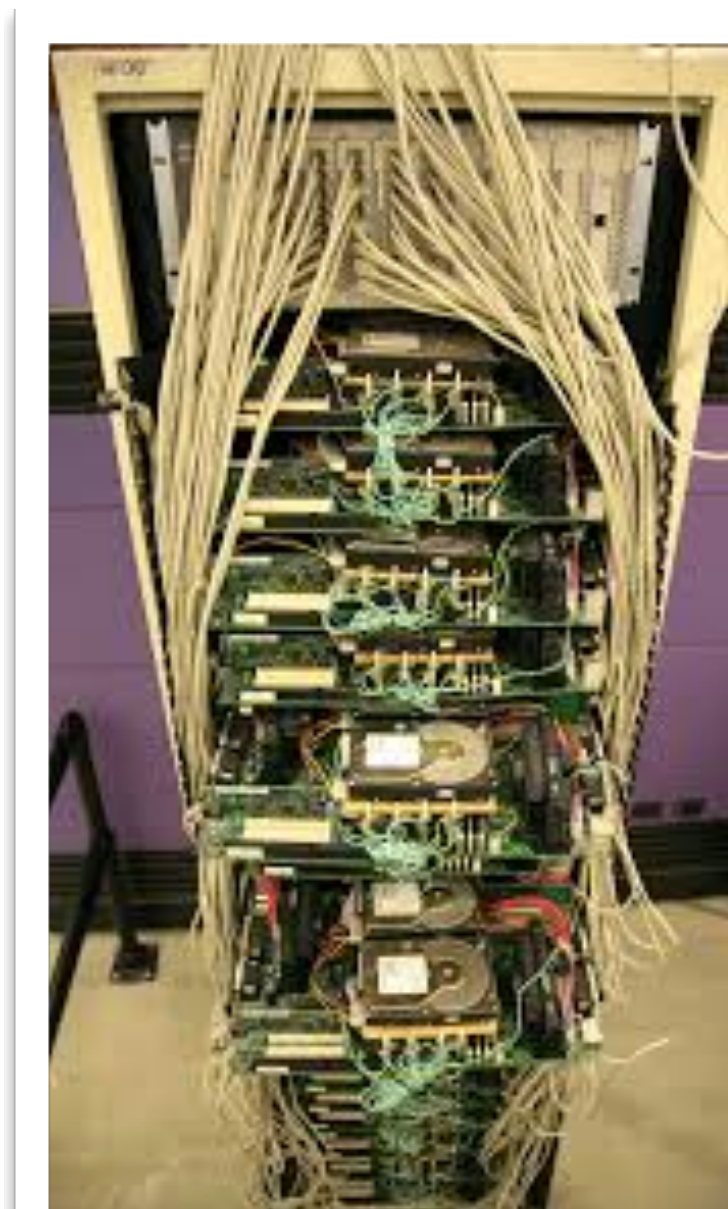
**Official  
Google  
Internal  
Email  
System**

**2004**

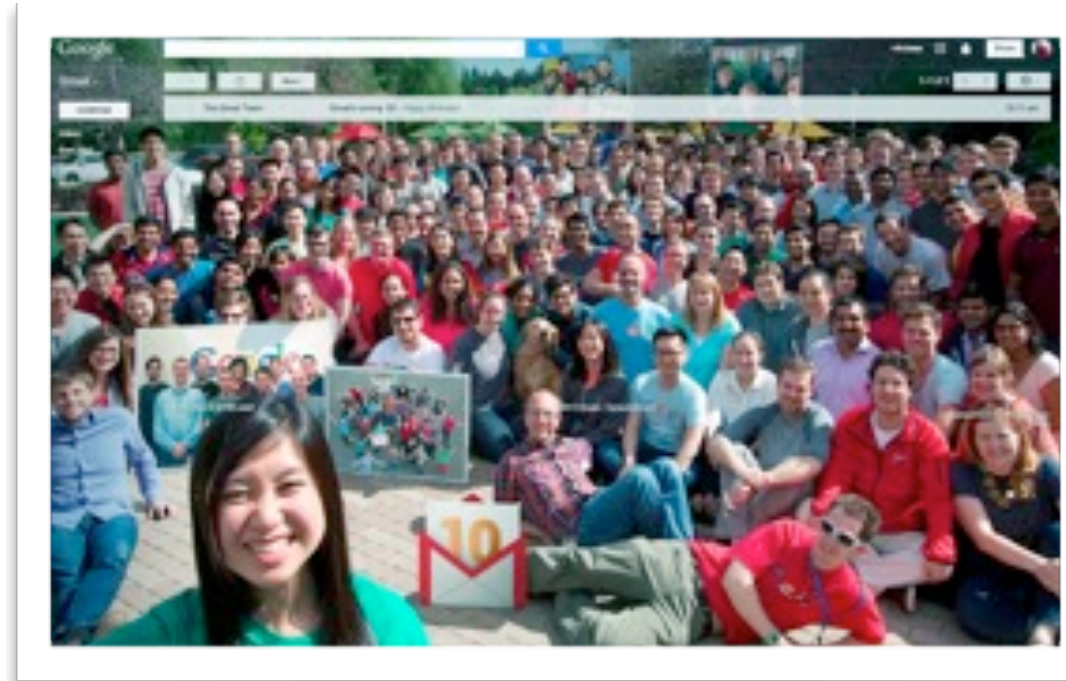
**External Launch  
Invitation Only  
~1,000 Users**

**<<.2% of Google's Resources**

**For years, GMail ran on  
racks of old Pentium III  
servers nobody else at  
Google wanted!**



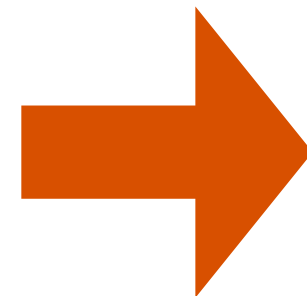
# BIG THINGS OFTEN HAVE SMALL BEGINNINGS



## Instagram

\$1B+ acquisition with 13 employees!

0.2%



20000%



## AirBnB

...



# NON-PRETOTYPING IN ACTION



# *Creativity Loves Constraints*

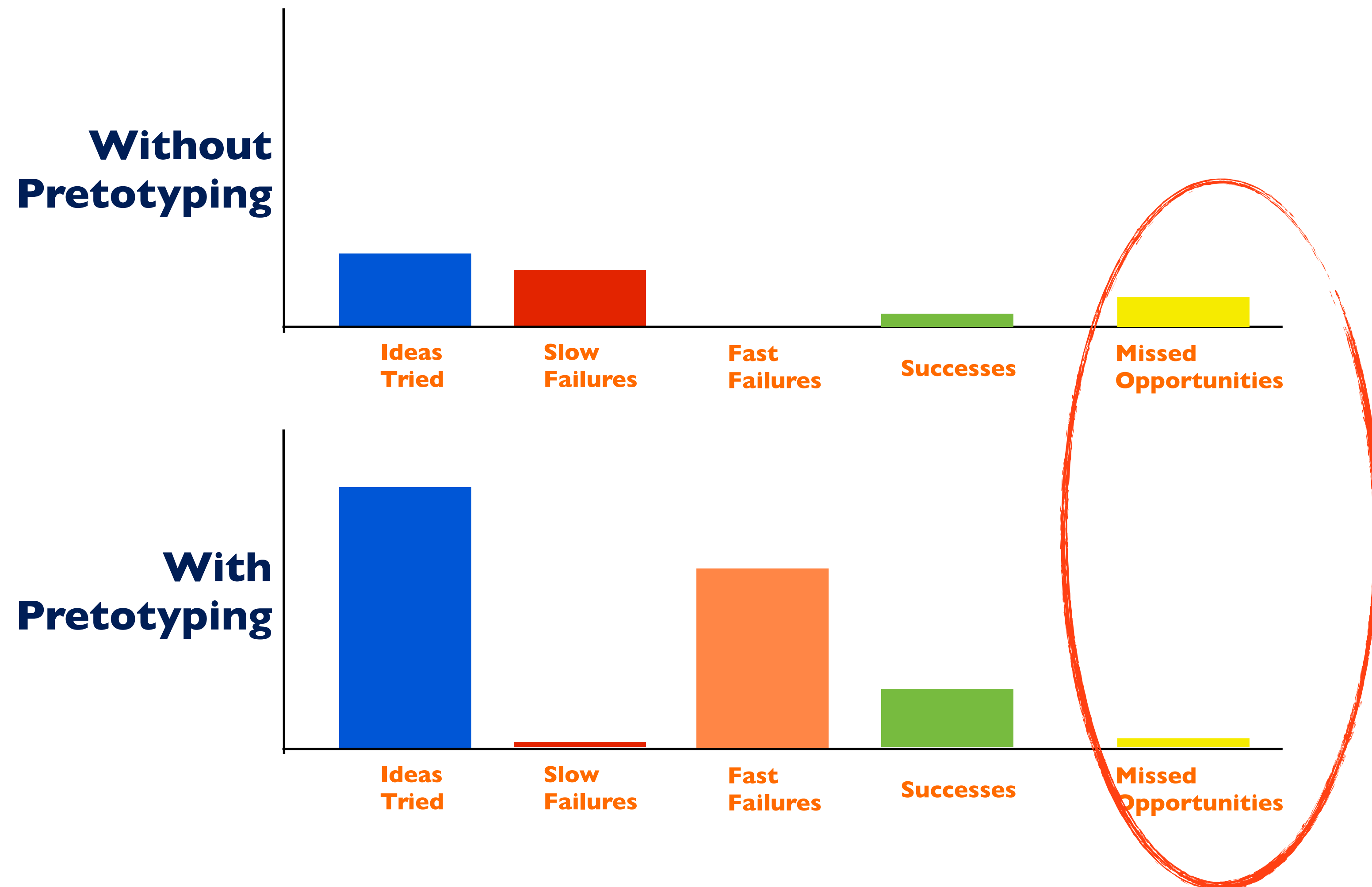
20000%



0.2%



# The Pretotyping Effect on Innovation



# A Sampling of Prototyping Techniques

## QUICK REFERENCE: Basic Prototyping Techniques

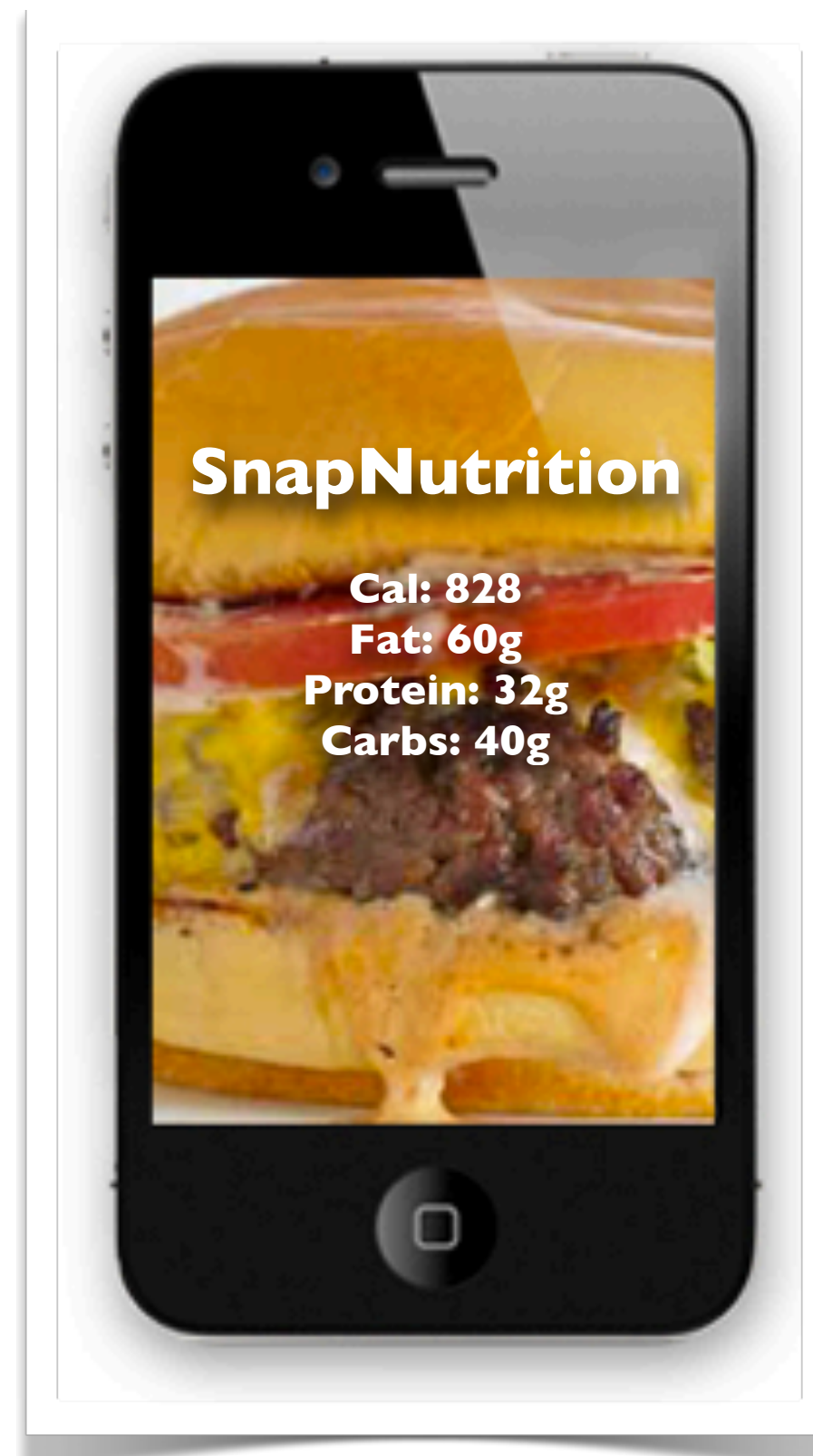
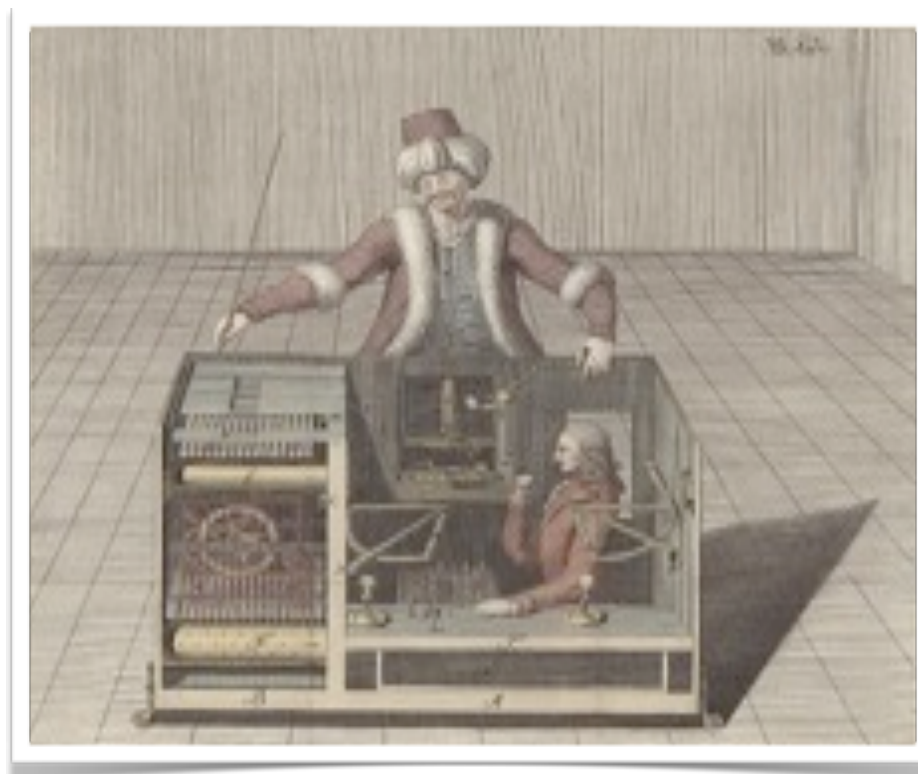


MS&amp;E 277 / Fall 2016

Tina Seelig / Alberto Savoia

Name	Description	Example
<b>Fake Door</b>	Test the Initial Level of Interest (ILI) in a yet-to-be-developed product or service by creating artifacts that suggest that the product exists and it's available to see if people would buy it.	Would anyone order <b>McSpaghetti</b> at a McDonalds? Don't cook a single strand of pasta! Put McSpaghetti on the menu (either in a store or online if applicable) and see if anybody orders it. If someone orders it, say that it's not currently available, apologize and offer them a free burger instead.
<b>Facade</b>	Test the Initial Level of Interest (ILI) in an existing but not yet broadly available/scalable product or service by creating artifacts that suggest greater availability (or scale.)	Would people buy used cars online (in late 90s)? Bill Gross bought some ads in a newspaper advertising <b>CarsDirect</b> , a new way to buy cars online. He had no car inventory, but created a simple website to see if people would actually go for it. When people clicked on a "buy" button, he bought the car at retail and delivered it to the customer. Over a week-end he sold a few cars. He lost money on every transaction, but validated the business model for his idea.
<b>Pinocchio</b>	Create a non-operational version of your product and use your imagination to pretend that it actually works to see if and/or how you would use it.	Jeff Hawkins created a wooden version of the <b>Palm Pilot</b> to test two key hypotheses: 1) Would I carry something with this form factor (i.e. pocket-sized) around? 2) What would I use it for? He learned that the form factor was just right and that he would use it primarily for calendar, address book and simple note taking.
<b>Mechanical Turk</b>	Before making a major investment in designing and building a complex mechanism or back-end, consider using human skills to simulate the desired outcome.	IBM tested if and how people would interact with a <b>speech-to-text</b> computer by simulating the actual hardware and software using a hidden typist. The users, were given a microphone and a monitor but no keyboard; when text appeared on the screen they thought that their commands were being processed by a computer, not a person.
<b>YouTube</b>	Through the "magic of movies" you can make products that don't yet exist come to life and see how people react to them: Are they intrigued? Interested? Will they sign up to learn more or, better yet, commit to buy?	<b>Google Glass</b> was first introduced to the world via a YouTube video that showed not what the actual glasses looked like, but what the world would look like through the glasses. People who found the vision (pun intended) of Google Glass compelling had an opportunity to sign up and pay \$1,500 to receive an "Explorer Toolkit." This way, before producing a single consumer-ready Glass, Google was able to gauge Initial Level of Interest (ILI) and gain other valuable feedback.
<b>Provincial</b>	Before committing to launch a new product or service formally and publicly on a large scale, test it in a smaller, more private and informal context to see if people are interested in it.	<b>BestBuy</b> pitched a tent in <u>one</u> of their store parking lots and advertised locally for a new service (tentatively named NextPlay) to see if people would be interested in swapping old electronic gear in exchange for store coupons. It worked, and the service is now available in all stores (and not in tents!)
<b>One-night Stand</b>	Offer a prototype version of your product or service on a very limited time basis to see if there is any interest before making any long-term commitments.	Sacrificing their own apartment for one night, <b>Airbnb</b> founders created a simple website in which they offered an alternative to hotel rooms: An air-mattress + simple breakfast for \$80/night (a bargain in San Francisco.) Much to their surprise, 3 people signed up very quickly and they collected \$240 on their first night. Airbnb is now valued at over \$10B!
<b>MVP</b>	Create a first iteration of your product with the <i>absolute minimum</i> set of features that would make it valuable and useful—at least to early adopters.	The first version of the <b>iPhone</b> did not support cut-and-paste, it offered a very limited number of apps, it did not support notifications or the über-popular Microsoft Exchange email back-end; and it required iTunes to activate/use it. But people wanted it so much that they did not care about the missing functionality—a great indicator of interest.
<b>Infiltrator</b>	Take advantage of the customer traffic in an existing store (brick-and-mortar or online) to stick an artifact of your idea (it could be a one off, even an empty box) on the shelves to see if people would buy it.	With a used employee shirt bought on eBay to look like an <b>IKEA</b> worker, Upwell Labs' founder sneaked in a few prototypes of his new product into an IKEA store and put them on display to see if people would buy them. They did! He proved that his new product would sell in a store ... without owning a store.
<b>Impostor</b>	Use an existing product or service as a starting point for your new product. Most new products or services are not completely new and different from existing ones. Many times there are other products and services that are close enough and, with some work, can be used to <i>impersonate</i> the new product you have in mind.	<b>Tesla's</b> Elon Musk took an existing car (a Lotus roadster) that was close enough to the all-electric roadster he had envisioned, ripped off the internal-combustion engine, put an electric engine in it (along with slightly different body) and drove it around. Now he had an artifact, a really sexy and fast one, to show around. People were obviously interested in the new car; but would anyone be interested enough to buy one? He needed data not opinions. So he asked people who expressed interest if they were interested enough to write him a \$5,000 deposit check to be on the waiting list for one.

# Mechanical Turk Pretotypes



**Powerful Image Analysis**

Google Cloud Vision API enables you to understand the content of an image by encapsulating powerful machine learning models in an easy to use REST API. It quickly classifies images into thousands of categories (e.g. "sailboat", "Eiffel Tower"), detects individual objects and faces within images, and finds and reads printed words contained within images.

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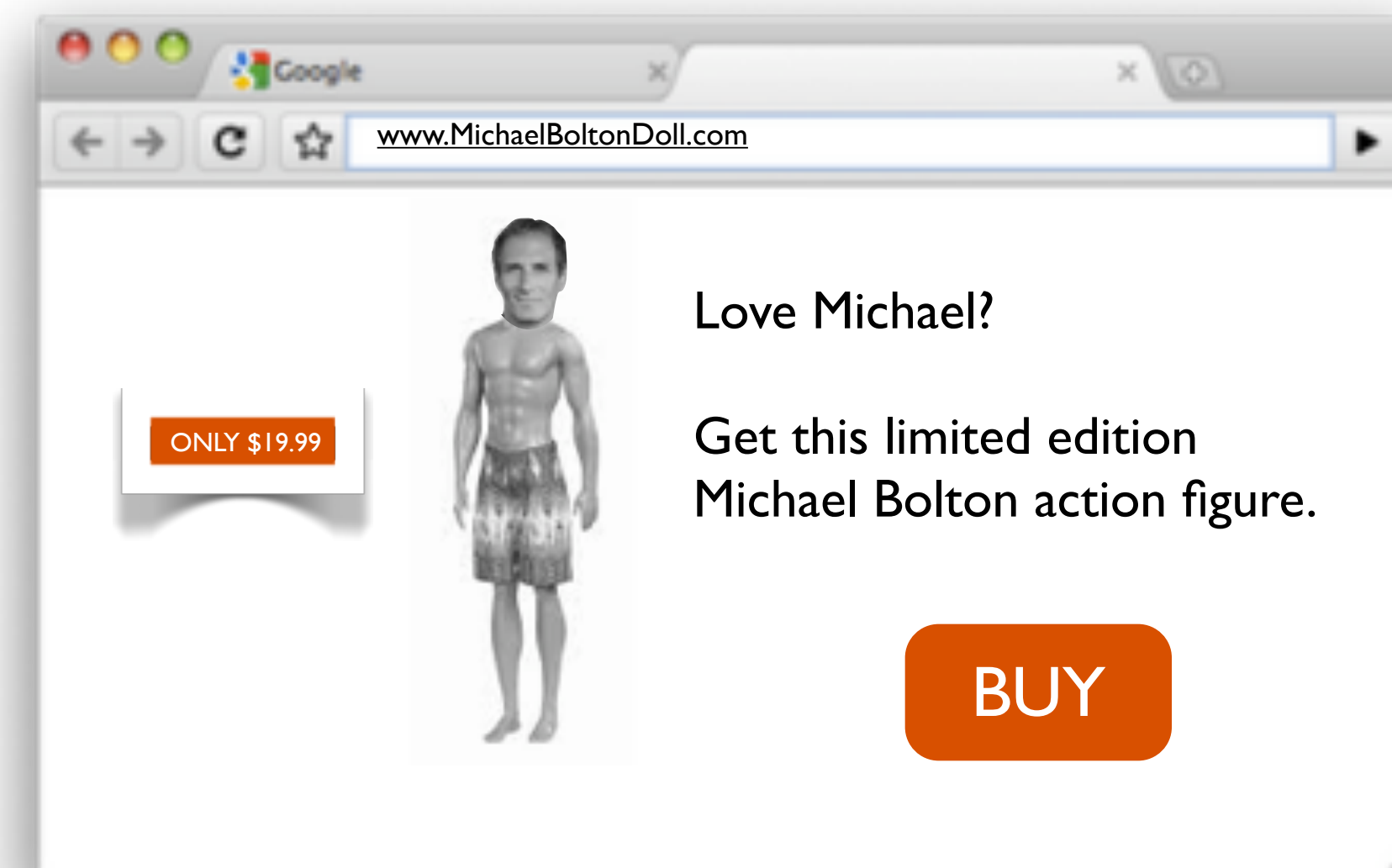


# Pinocchio Pretotypes



# The Fake Door Pretotypes

**Love Michael Bolton?**  
[www.MichaelBoltonDoll.com](http://www.MichaelBoltonDoll.com)  
Awesome 12" action figure of your  
favorite singer. Only \$19.95!



# The Facade Pretotypes





# Infiltrator Pretotypes



<http://www.youtube.com/watch?v=oVjOMP7ziKA>



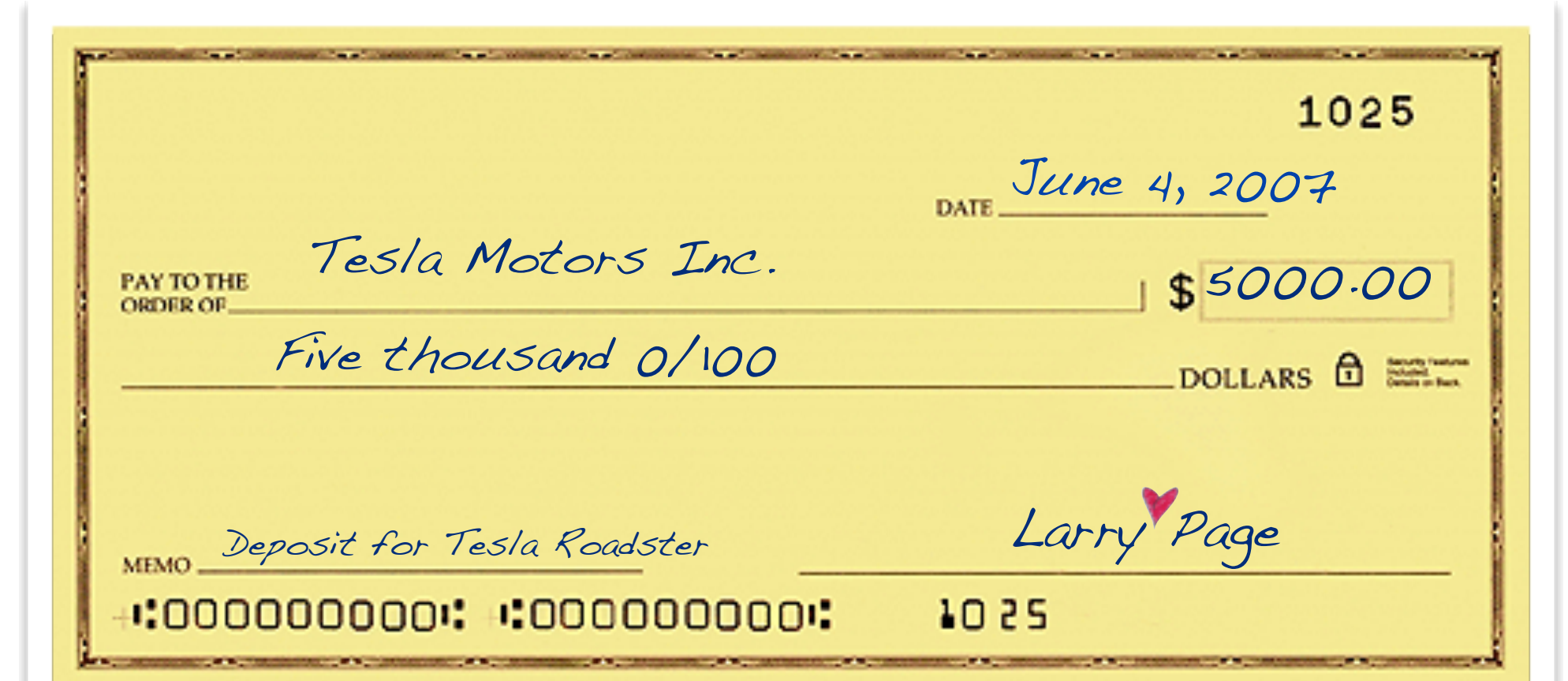
# Impersonator Pretotypes



# Opinion vs. Data

**OPINION:** Would you buy this car?

**DATA:**



# PRETOTYPING CHALLENGES



# Pretotyping Practice



**PRETOTYPE IT!**

# Say It With Numbers!

## Pretotyping Metrics

# ILI Initial Level of Interest

If we build it, will they want it?

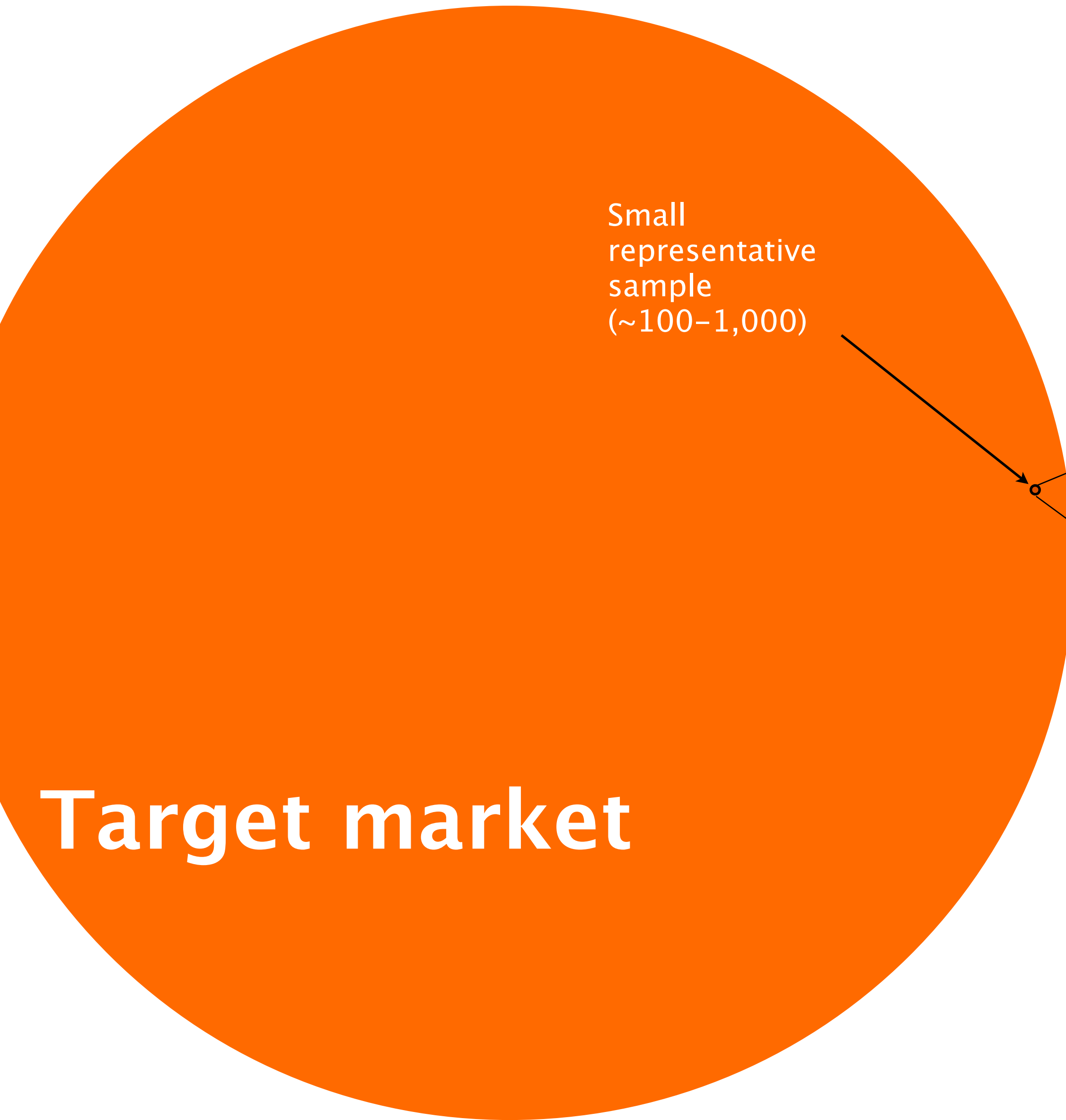
**ILI** = # who've actually tried 'it'



# invited to try 'it'

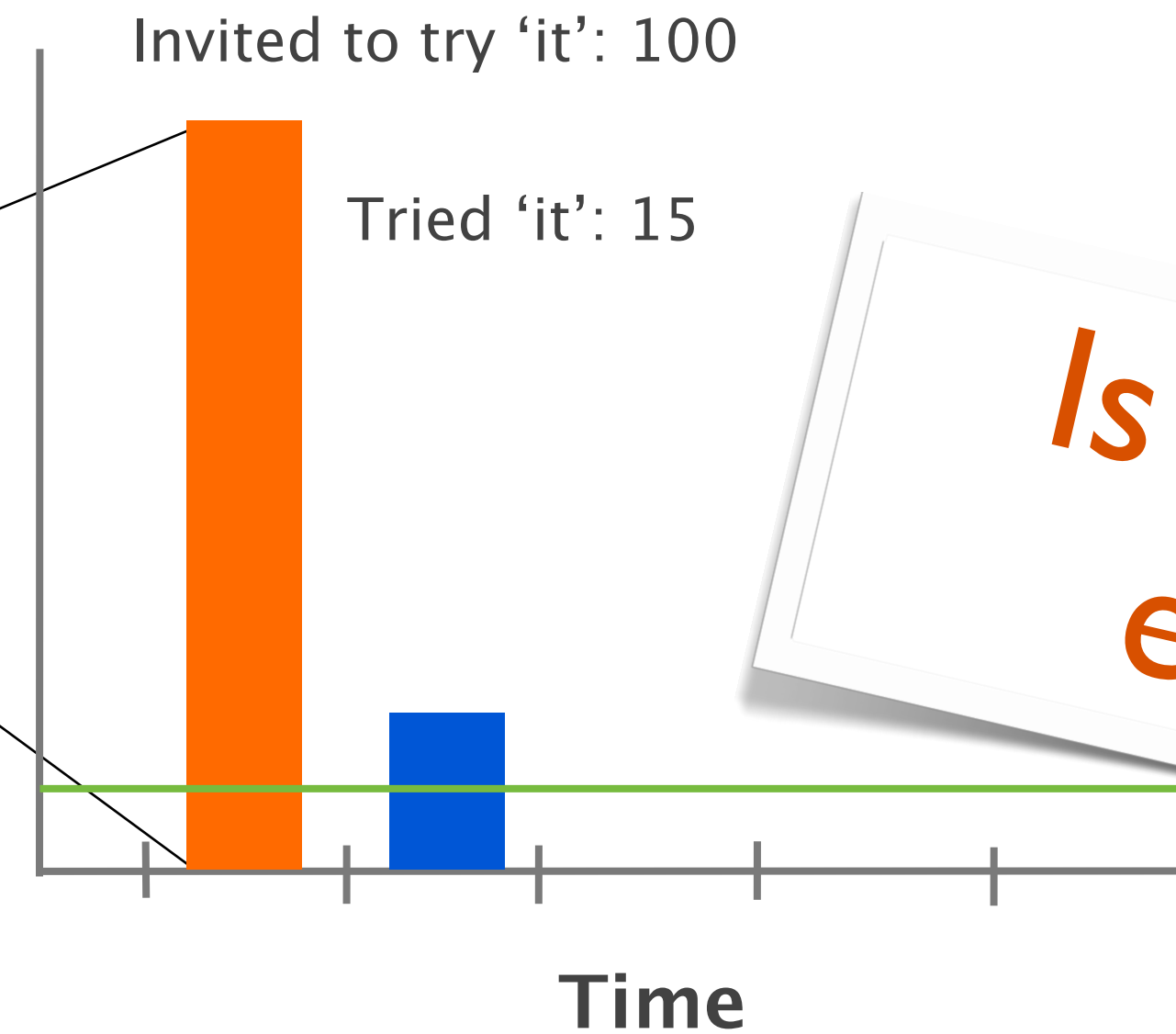


# ILI in Action



Small representative sample (~100-1,000)

Target market



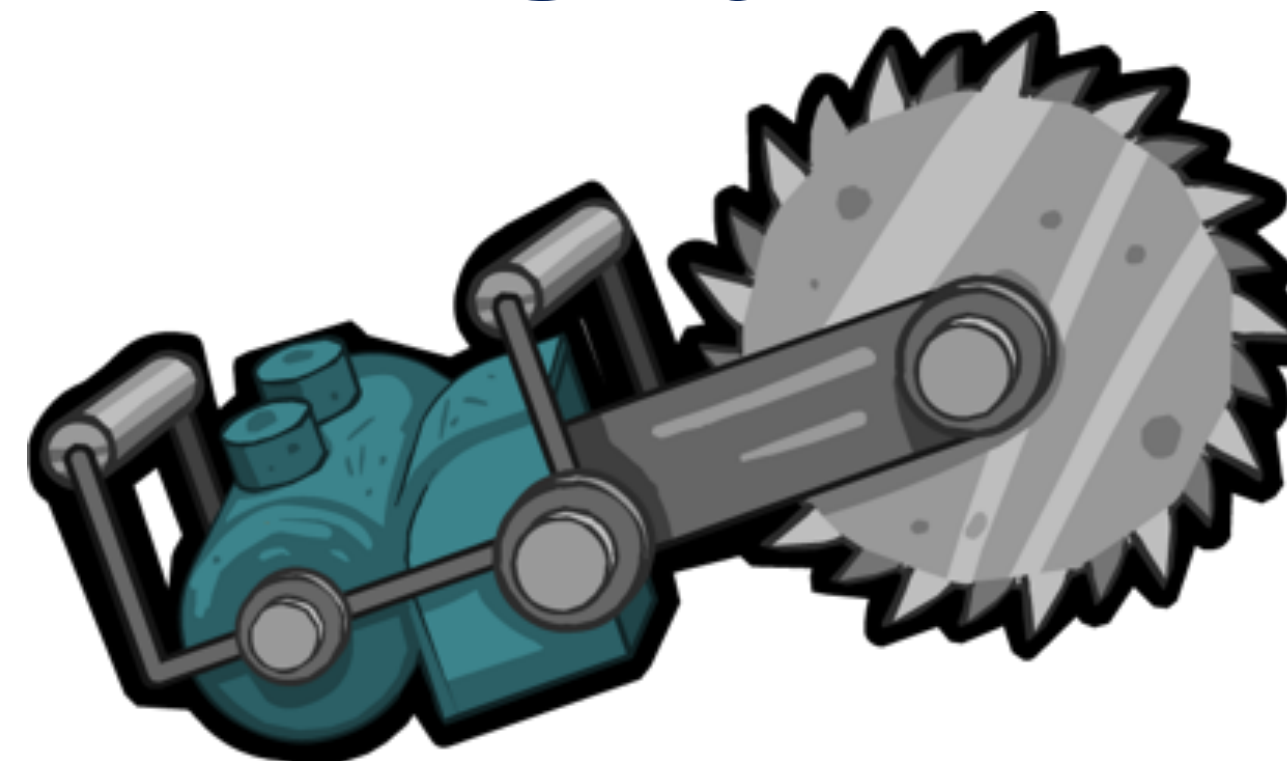
*Is this good enough?*

$$ILI = 15 / 100 = 15\%$$

# PRETOTYPING

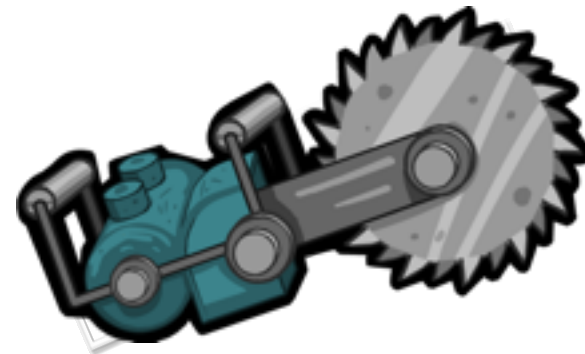
[TOOLS, TECHNIQUES, TACTICS]

Deceptively **Simple**  
Immediately **Useful**  
Frighteningly **Powerful**



# Summary + Pop Quiz

## APEX Innovation



Quantity

Scope

Speed



Fear of **FAILURE**

Lack of **RESOURCES**



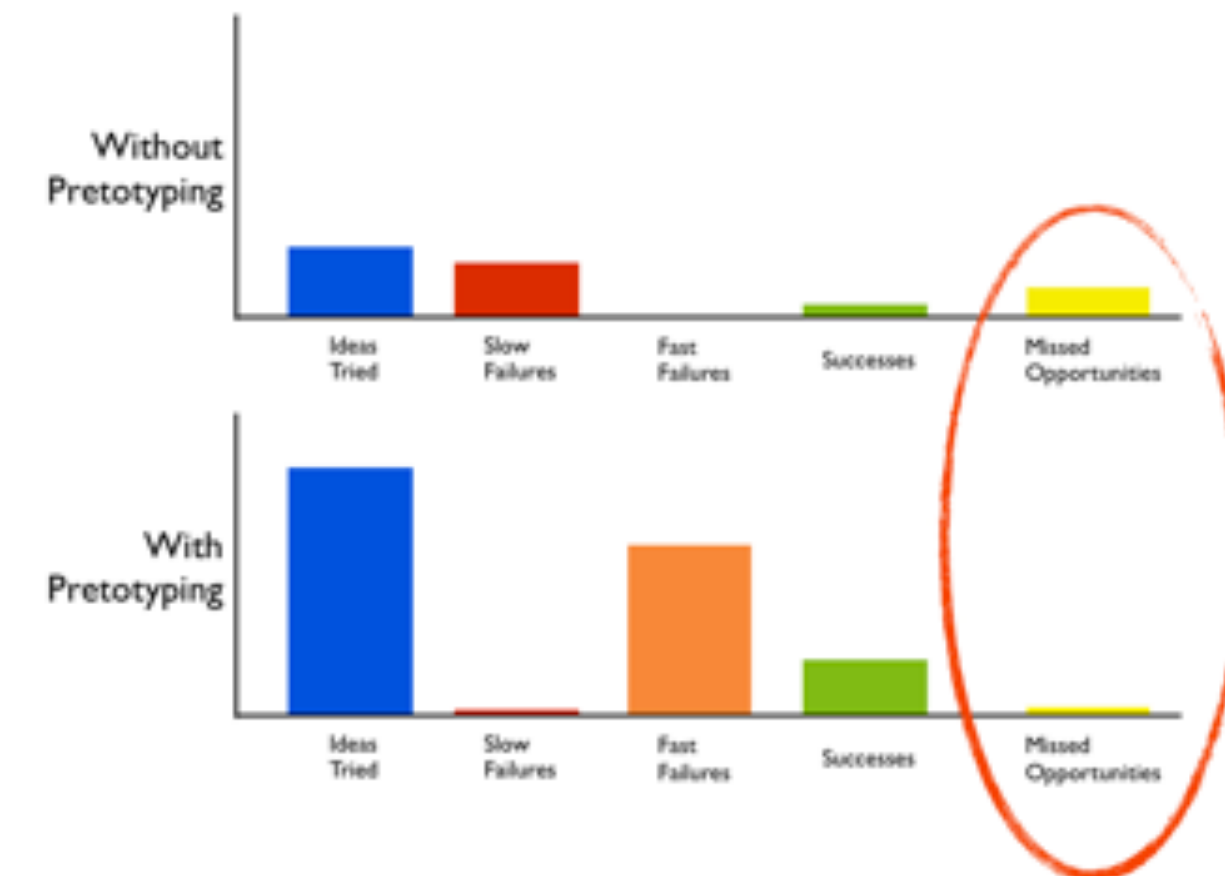
**F  
A  
L  
U  
R**  
**INNOVATION**



**0.2%**

**PRETOTYPING**

### The Prototyping Effect on Innovation



PRETOTYPING + 

APEX INNOVATORS

INNOVATORS



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# THANK YOU!



Alberto Savoia

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