

Innovation & Innovators

Vinod Khosla

vk@khoslaventures.com

Nov, 2010

...do we question assumptions?



Should fever be reduced in critically ill patients?

“there were seven deaths in people getting standard treatment and only one in those allowed to have fever.....at which point the study was halted due to ethical concerns”

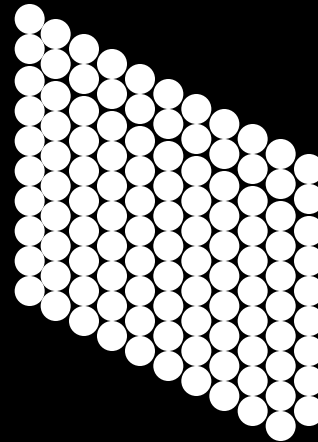
Experts & Pundits

Mckinsey : US mobile subscribers

1986 forecast for 2000



forecast



actual

yesterday's technology, tomorrow's forecast

1980's phone:



year 2000 phone:



2010 phone:



300,000 available apps
7bn+ apps downloaded



the folly of predictions: tetlock study

hundreds of experts.

80,000+ “expert” forecasts & 20+ years

**results: experts about the same accuracy
as dart-throwing monkeys**

India: Land of many cell phones, fewer toilets

Posted 2d 1h ago | Comment  | Recommend 

E-mail | Save | Print | [RSS](#)



 Enlarge

by Rafiq Maqbool, AP

In this Oct. 22, 2010 photo, a boy walks to a latrine outside his makeshift home at a slum in Mumbai, India. When U.S. President Barack Obama visits India Nov. 6, 2010, he will find a country of startlingly uneven development and perplexing disparities, where more people have cell phones than access to a toilet, according to the United Nations. (AP Photo/Rafiq Maqbool)

By Ravi Nessman, The Associated Press

MUMBAI, India — The Mumbai slum of Rafiq Nagar has no clean water for its shacks made of ripped tarp and bamboo. No garbage pickup along the rocky, pocked earth that serves as a road. No power except from haphazard cables strung overhead illegally.

And not a single toilet or latrine for its 10,000 people.

Yet nearly every destitute family in the slum has a cell phone. Some have three.

When President Barack Obama visits India Nov. 6, he will find a country of startlingly uneven development and perplexing disparities, where more people have cell phones than access to a toilet, according to the United Nations.

It is a country buoyed by a vibrant business world of call centers and software developers, but hamstrung by a bloated, corrupt government that has failed to deliver the barest of services.

Its estimated growth rate of 8.5 percent a year is among the

highest in the world, but its roads are crumbling.

It offers cheap, world-class medical care to Western tourists at private hospitals, yet has some of the worst child mortality and maternal death rates outside sub-Saharan Africa.

And while tens of millions have benefited from India's rise, many more remain mired in some of the worst poverty in the world.

Businessman Mukesh Ambani, the world's fourth-richest person, is just finishing off a new \$1 billion skyscraper-house in Mumbai with 27 floors and three helipads, touted as the most expensive home on earth. Yet farmers still live in shacks of mud and cow dung.

INSPIRATIONAL TWEET:

"Cynics never do the impossible, achieve the improbable, take on the inadvisable. Hope is only path to *extraordinary* success."

TWEET?

Did not exist 5 years ago!

Today: More than 100 million users
65 million tweets are posted each day

- 140 characters that millions of people follow
- Can tell the mood of a nation
- Creates an instantaneous backchannel
- Formation of a personal brand
- Promotes content

SF Giants win World Series...

Timeline Favorites Following Followers Lists ▾



ninakix ninakix by vkhosla
Taking developers hostage [#SFriot](#)
8 hours ago



darian314 Darian Shirazi by vkhosla
If SFPD has any trouble getting around the city, I hear Ubercab is available. [#sfscanner](#)
from SoMa, San Francisco
8 hours ago



ninakix ninakix by vkhosla
Painting solar panels black [#SFriot](#)
9 hours ago



dsrsleepy Sleepy by vkhosla
If SFPD wised up, they'd read the [#sfriot](#) hash tag for "I'm about to light this here trash can on fire at _____"
8 hours ago



rembry Raymond Embry IV by vkhosla
Do I get a riot bage for checking into a riot? [#SFRiot](#)
8 hours ago



levie Aaron Levie by vkhosla
If you run into any great developers at the [#SFRiot](#), please send them our way.
8 hours ago



gaberivera Gabe Rivera by vkhosla
"... 10-4 ... If we can't disperse them, let's gradually push them all into the Tenderloin" [#sfscanner](#) [#sfriot](#)
8 hours ago



Betoll Beto Juarez III by vkhosla
RT [@ninakix](#): Setting fire to compost; using fair trade matches [#SFriot](#)
8 hours ago



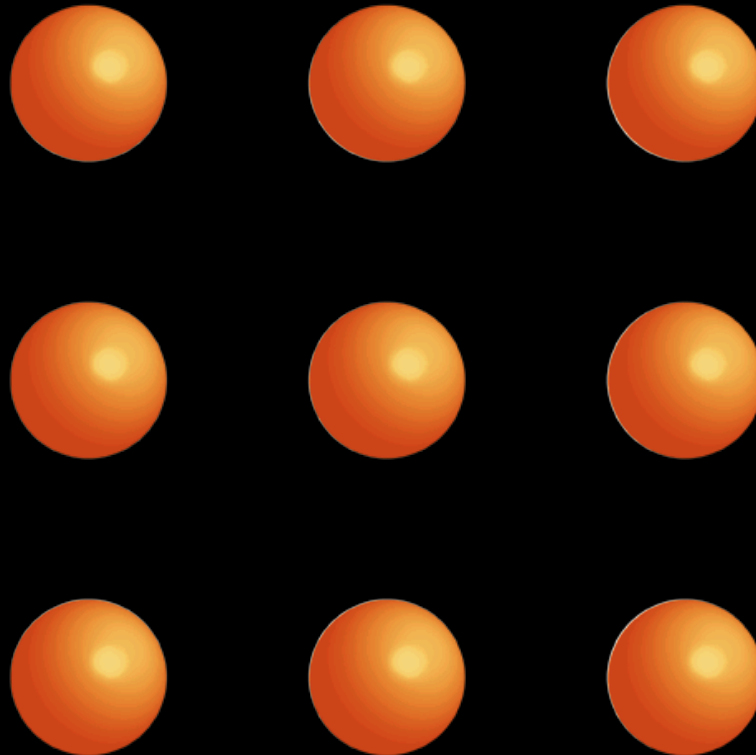
vkhosla Vinod Khosla
RT [@Mitzula](#) How hard is it to light Hybrids and Electric Cars on fire???? [#SFRiot](#)
9 hours ago



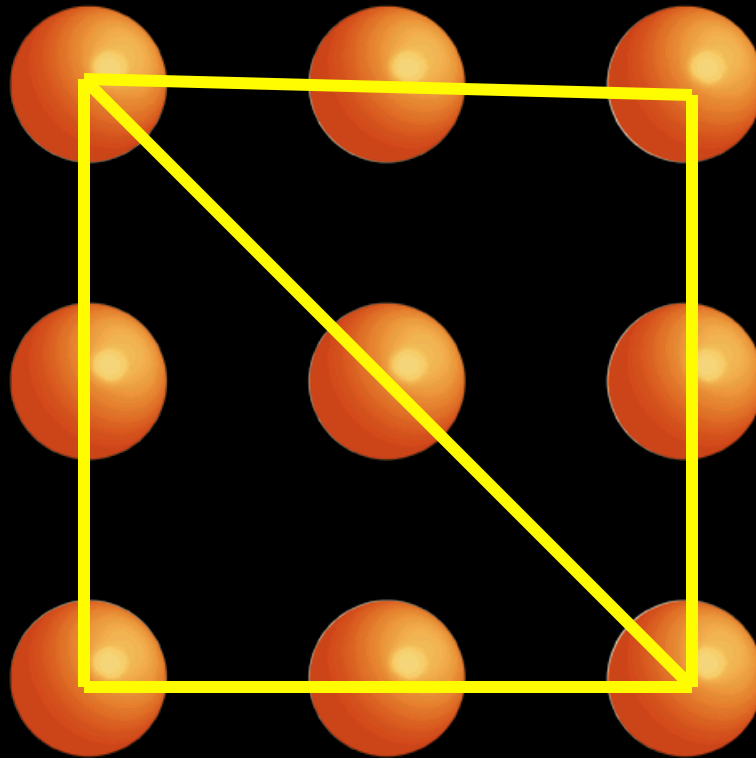
vkhosla Vinod Khosla
SF Riotous RT [@gaberivera](#) I just threw a recyclable into the regular, non-recyclable trash bin [#SFRiot](#)
9 hours ago

Could McKinsey or an analyst
have predicted Twitter?

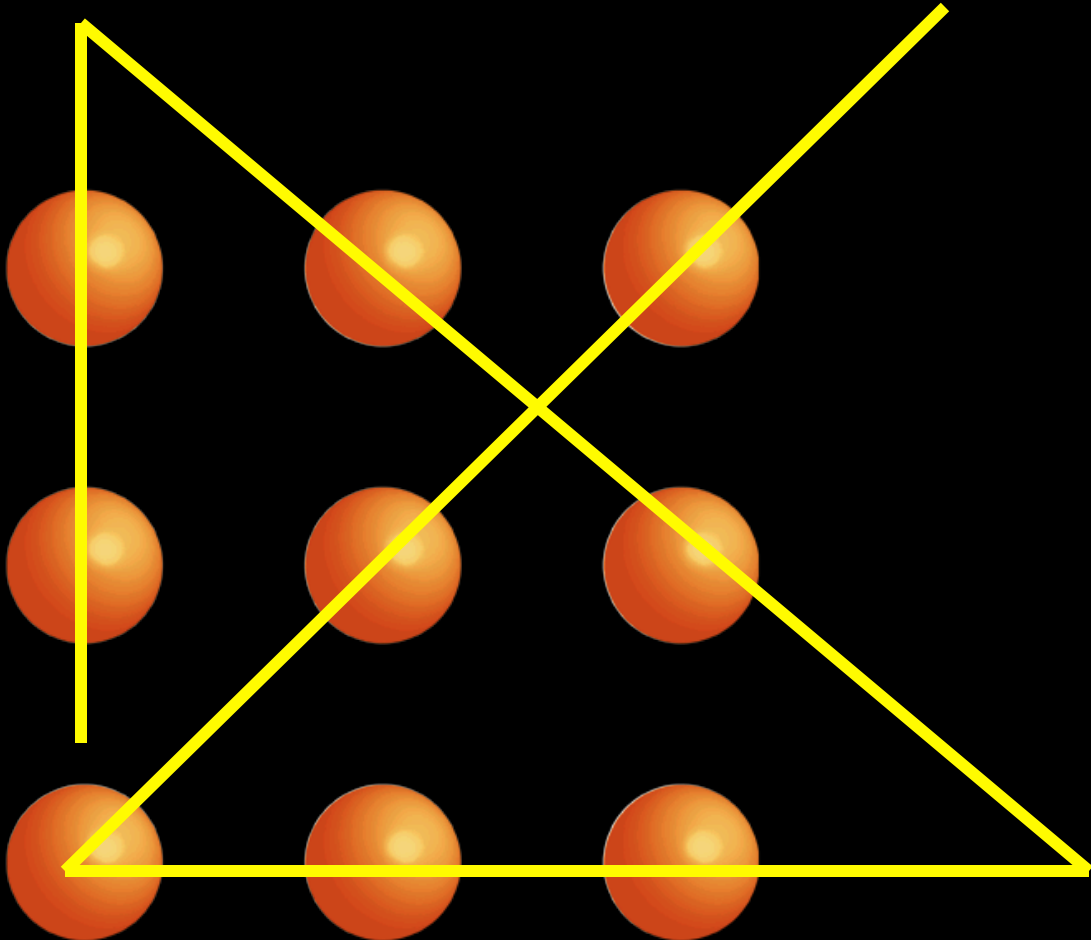
The nine dots problem



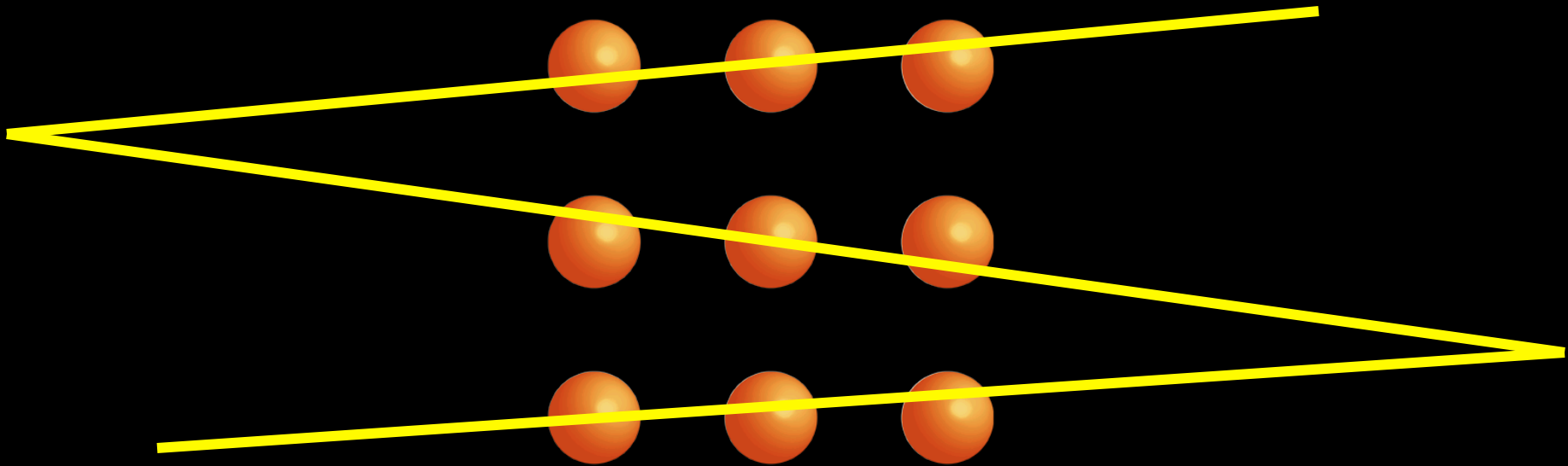
Standard nine dots solution



Standard nine dots solution

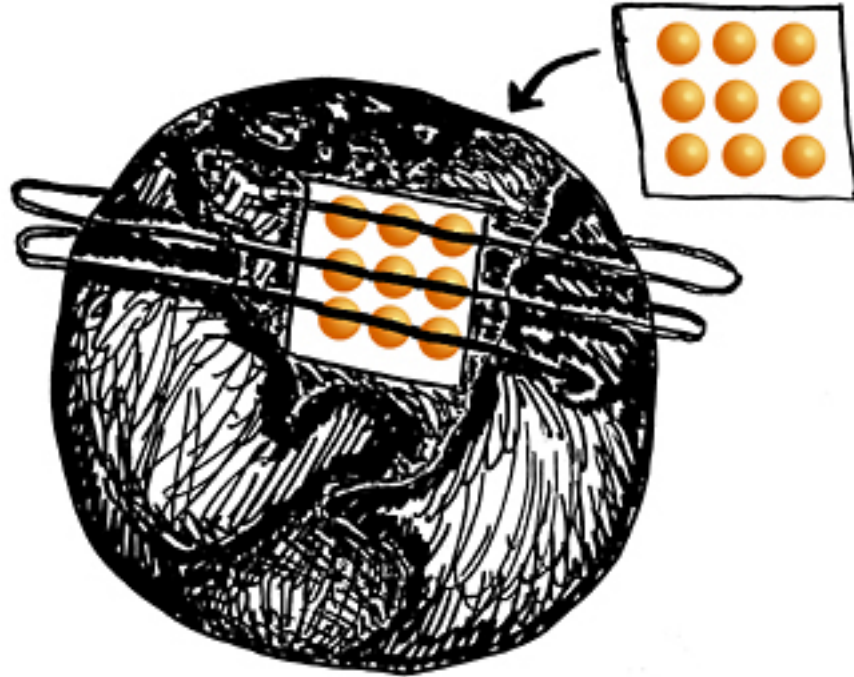


Better: use just three lines



But...how about just *one* line?

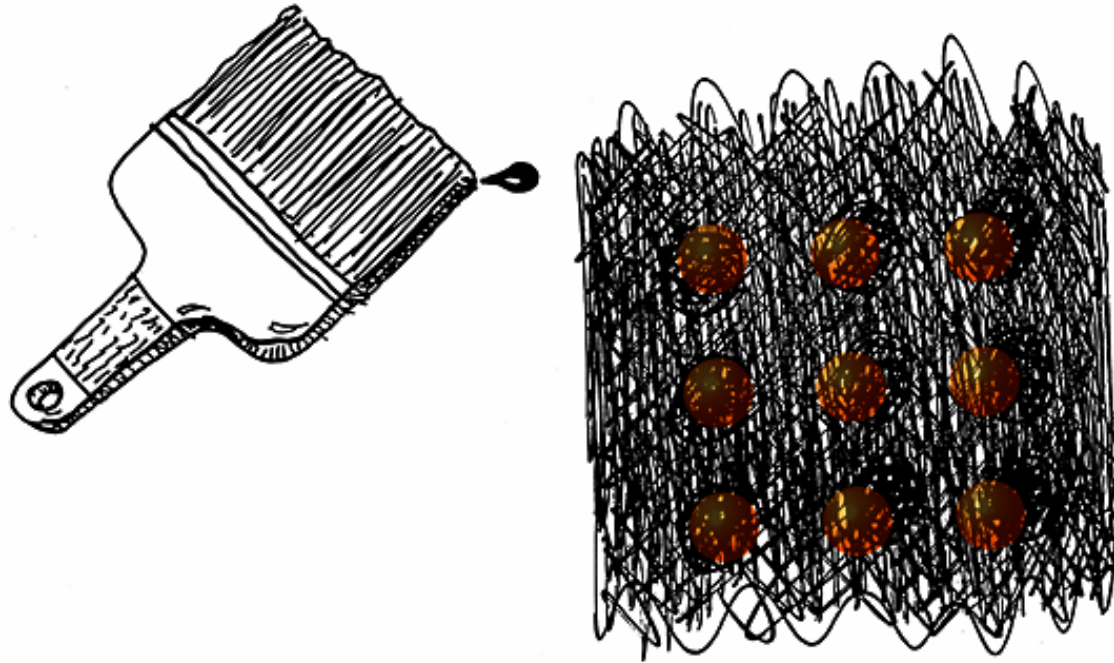
Geographer's solution



Mechanical Engineer's Solution



Wide line solution



example: high oil prices

Standard solution: drill, baby, drill

Three line solution: cellulosic ethanol

One line solution: renewable crude oil

example: data center power

Standard solution: faster and more powerful servers

3 line solution: server cpu virtualization

One line solution: 80% less power *purpose built low power servers*

example: battery life

Standard solution: Make bigger batteries

3 line solution: low power wireless

One line solution: 10x more efficient “amped” wireless

...and

2004: Facebook

2006: Twitter

2007: Iphone

What else to come:
Four Square....?

2008: Smart grid

...the sources of innovation

Google, Facebook, Twitter : Fox, NBC, CBS

Amazon : Walmart

First Solar : Shell & BP Solar

Cree : GE

DNA Sequencing

disruptive innovation & disruptors

Low-End Segment Strategy

Re-invent Consumption Strategy

New-Consumption Strategy

introduce a low-end loss leader...

use design to re-invent product

a product that hasn't existed

...move up market with lower cost

Create a new experience

Create a new market...

Disrupt the market

Invent by design

Invent the market

Amazon.com / Netflix...

iPod / iTunes/Kindle/ Netflix Online

Google / iPhone / iPad / Facebook Twitter...

iPhone + Android Apps – fundamental disruption

Existing static products...

Landline phone

Standalone radio

Portable DVD

Low-end Cameras/
camcorders

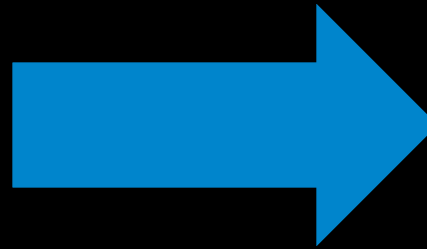
MP3 players

GPS

Portable gaming

Voice recorders

Translator/
dictionary



Iphone
Ipad
Android

Innovators

“The fine line separating the delusional from the visionaries amongst us is often not foresight, but rather hindsight.”

Ben Semel

How not to:

Financial tools:
DCF, NPV, IRR

Stage gate
development

Top down market
analysis

Decisions based on
customer wish list

dream the dreams...

"Those who dare to dream the dreams,
and then are foolish enough to try to
make those dreams come true."

Attitude matters: Ecomotors (50% increase in engine efficiency)

Response when told it can't be done “everyone told me...”

1. It is not possible to convert a gasoline engine to a Diesel, using the same transfer line. I did it and it is the most successful Diesel in the world and it was copied by everybody.

2. The combustion for a high speed Diesel is not possible. I started production with a 5000 rpm Diesel with 2000 engines/day on the gasoline engine transfer line.

3. You cannot use a rubber toothed belt to drive the camshaft and the injection pump. I did it and it is the standard solution today.

4. It is not possible to use an aluminum radiator because the corrosion will destroy the engine. I did it and it is the standard solution today.

5. It is not possible to create an “emission free” natural gas burner. I did it. It is in mass production at VIESSMANN. BUDERUS sued VIESSMANN about “emission free” and lost.

How to:

Tackle hard problems

Imagine what could be

Let technology lead market

Fail often, fail early, keep trying

Find the best people, *who disagree with you*

“It is not because things are difficult that we do not dare, it is because we do not dare that they are difficult.”

- ***Seneca***

“Try and fail, but don't fail to try.”

- ***Stephen Kaggwa***

“Courage is doing what you're afraid to do. There can be no courage unless you're scared.”

- ***Eddie Rickenbacker***

“Only those who dare fail greatly can achieve greatly.”

- ***Robert F. Kennedy***

“You will face many defeats in your life, but never let yourself be defeated.”

- ***Maya Angelou***

The willingness to fail gives us the
freedom to succeed

Evaluating “Failures”

When did it fail?

Why did it fail?

Causal vs. experiential reasoning

Assumptions change vs. Environments
change

HOW DO I DO IT BETTER NEXT TIME??

Iteration is key

“Tried that before and it doesn’t work”

Accumulated experience restrains/constrains thinking

Assumptions change all the time

Reexamine everything

innovation culture

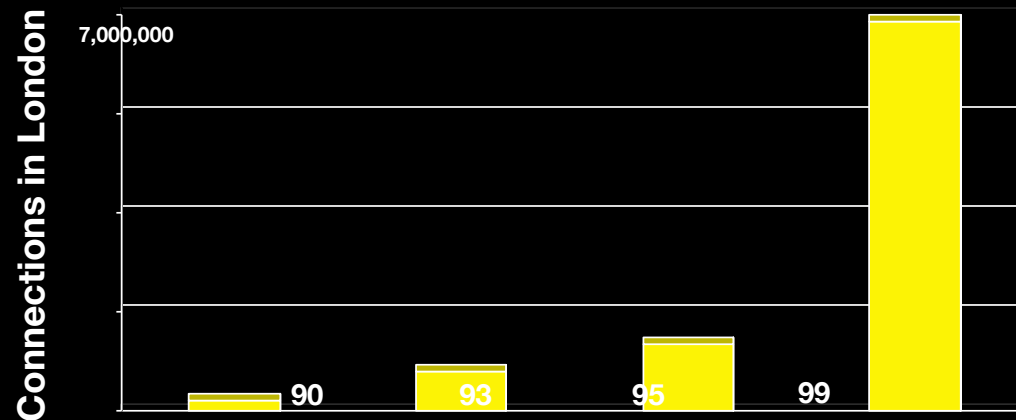
reward failure

plan without planning
(evolve thru iteration)

don't listen to customers too closely

ignore IRR calculations

Evaluate but don't follow input?



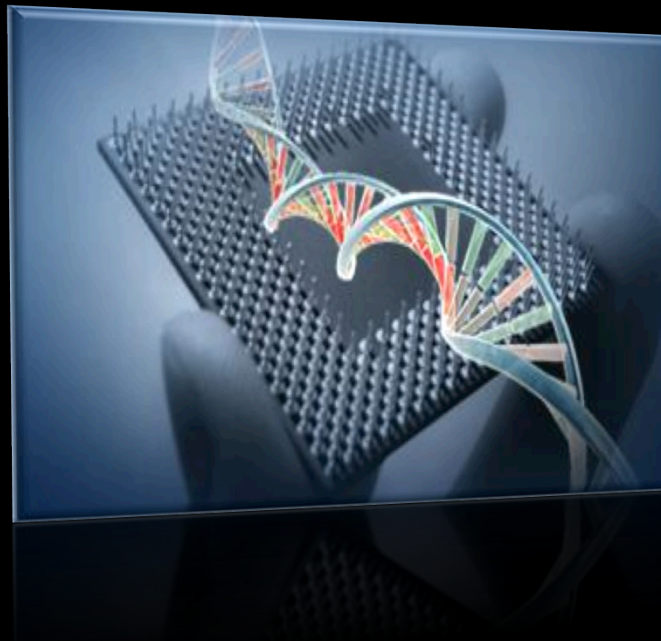
“In 1885, Yale students who were getting ‘more light than they relished’ chopped down an electric pole erected at the corner of the campus...”

passif

“Standards-compatible 5-10x lower power Rx and Tx”

Verayo

“non-clonable zero cost ID”



Aliph



...another new applications platform

...wearable computing

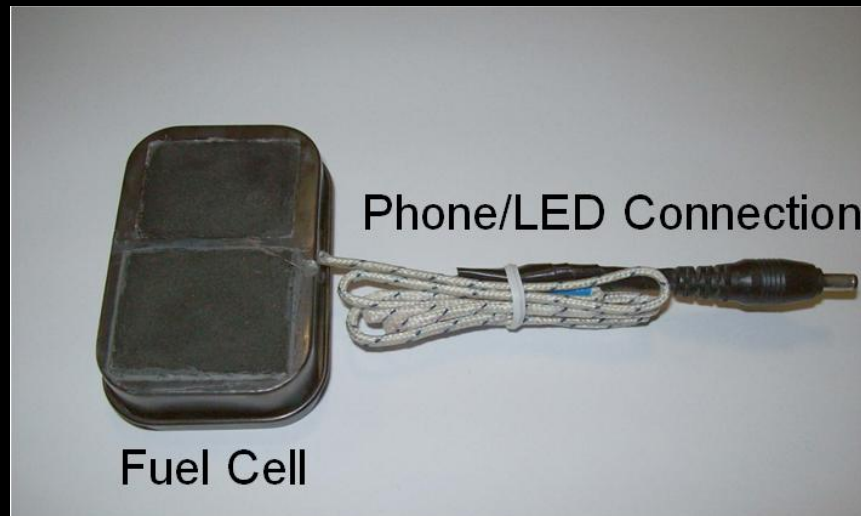
square



“revolutionary point-of-sale system for all”

point source power

“Can \$1M fuel cell technology become a \$4 charger?”



Sakti3

“2-3x energy density SOLID STATE batteries”

soraa

“green lasers & LED”

Moka5

“Take your computing environment everywhere”

Boku

“Mobile payments, wallet not included”

sks

“can a for-profit venture do well by doing good?”

Big companies vs. innovators

Focus on Process

Focus on Vision

Existing markets

Invent new Markets/Paths

Focus on DCF, NPV, EPS

Ignore financial analysis

Careful not to fail

Constantly iterate

“Push” into the market

Create “Pull”

Incrementalism

Disruption

The Weather Forecast ...

Rate of change will accelerate...

Adaptability, agility & momentum are
the key to success!

Fun, fortunes & failure will be in abundance

Disruption is the order of the day...

Innovation & entrepreneurship will thrive

Avoiding the bandwagon

What assumptions are others making?

Are there scenarios where those assumptions are wrong?

Significant technical contribution

Enabling a significant new capability

Being Right is Insufficient

	Be Wrong	Be Right
Be Contrarian	X	✓
Join Bandwagon	X	X

New bandwagons

Payments

Location

Power

Personal Area Networks

Analysis: Network,
behavior,...

NFC

What's next?

Existing static products...

Landline phone

Standalone radio

Portable DVD

Low-end Cameras/
camcorders

MP3 players

GPS

Portable gaming

Voice recorders

Translator/
dictionary



Iphone
Ipad
Android



????????
????????

**Difficult to predict the future, when
innovation is the name of the game**



NFC

Advertising/Commerce

privacy & authentication

sensors

Voice recognition

social

Anticipate needs (agents)

Everything everywhere

medicine

gadgets

steve jobs

Read "wellness"

personalization

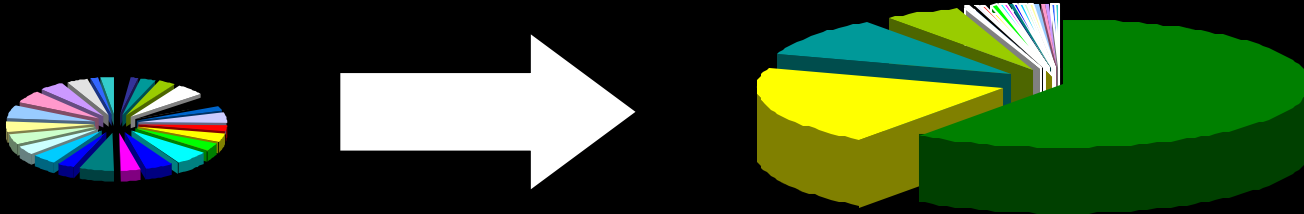
payments

Group-sourced innovation

winners take (almost) all =investment viability

5 years out, the group's
market cap has grown...

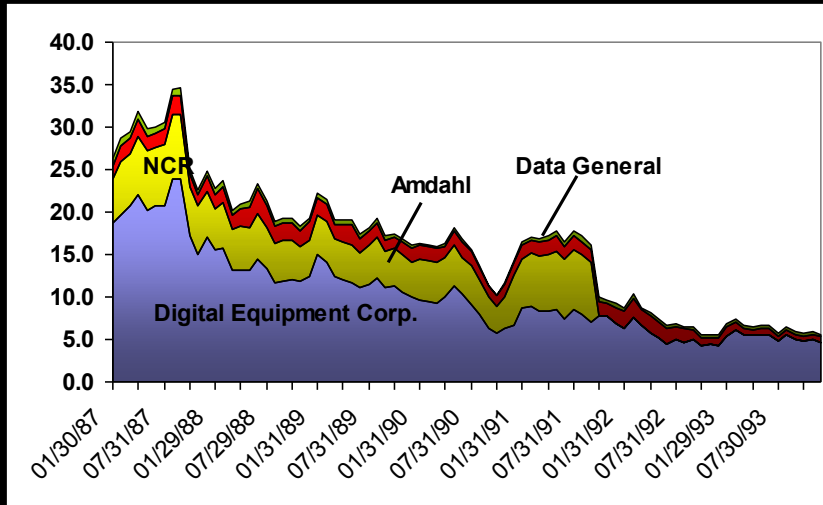
Starting Industry Structure



But leaders far exceed the also-rans

Value Transitions follow Technology Transitions

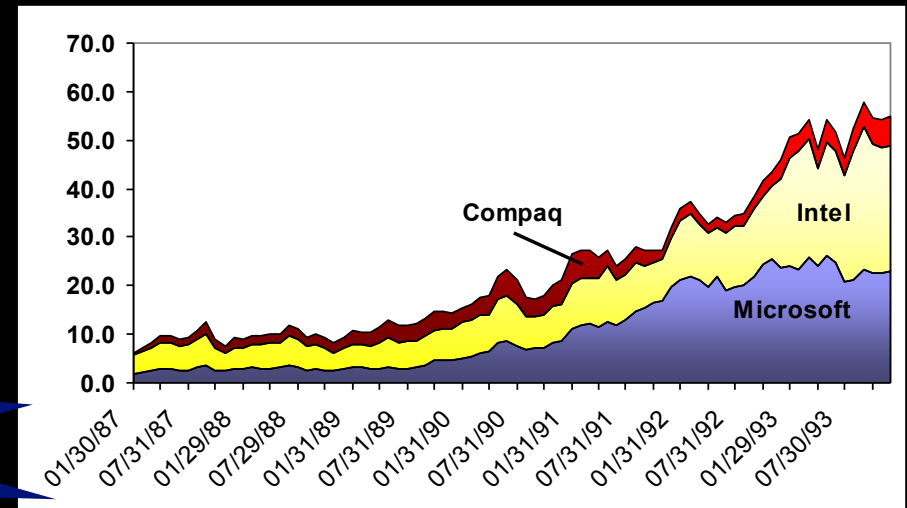
Mainframe to PC Transition



Capital fled
legacy systems

New winners emerged

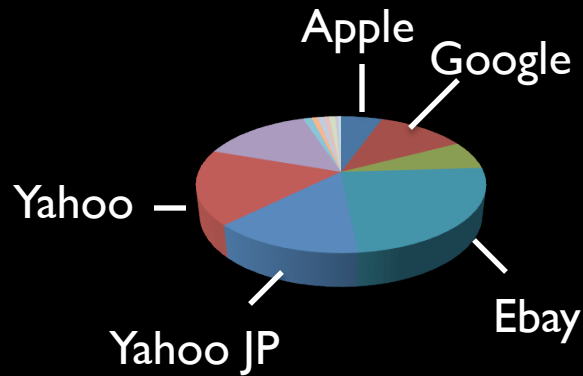
**This time the
stakes
are larger!**



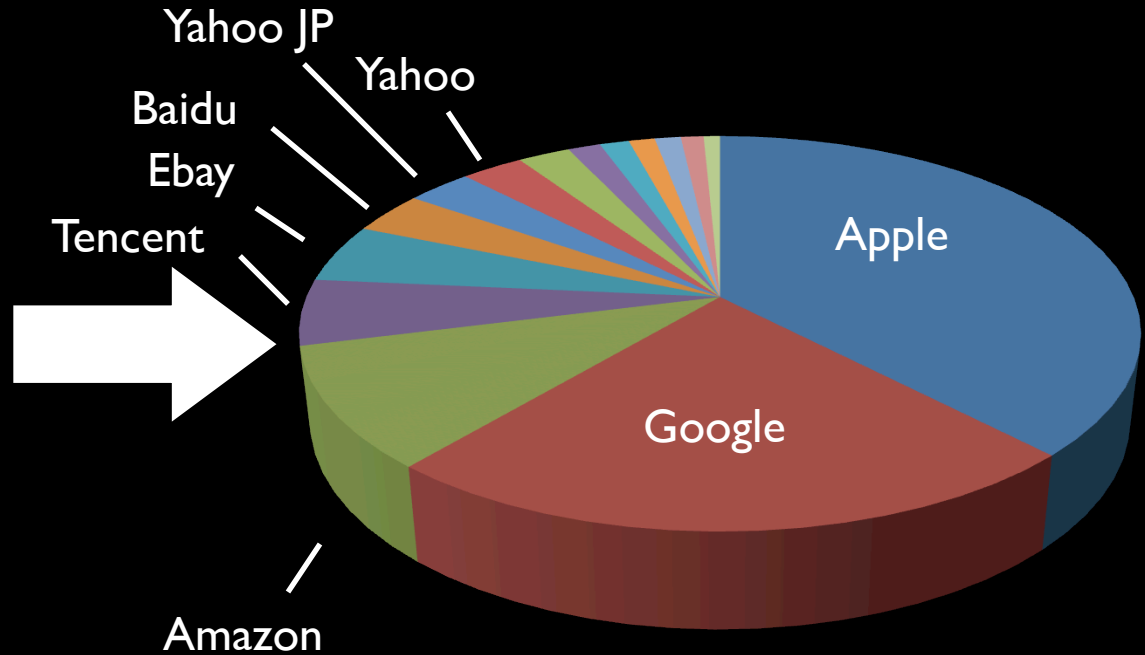
Things change quickly

Top Global 15 Publicly Traded Internet Companies by Market Value – 2004 vs. 2010

2004



2010



Top 15 cap: \$262B

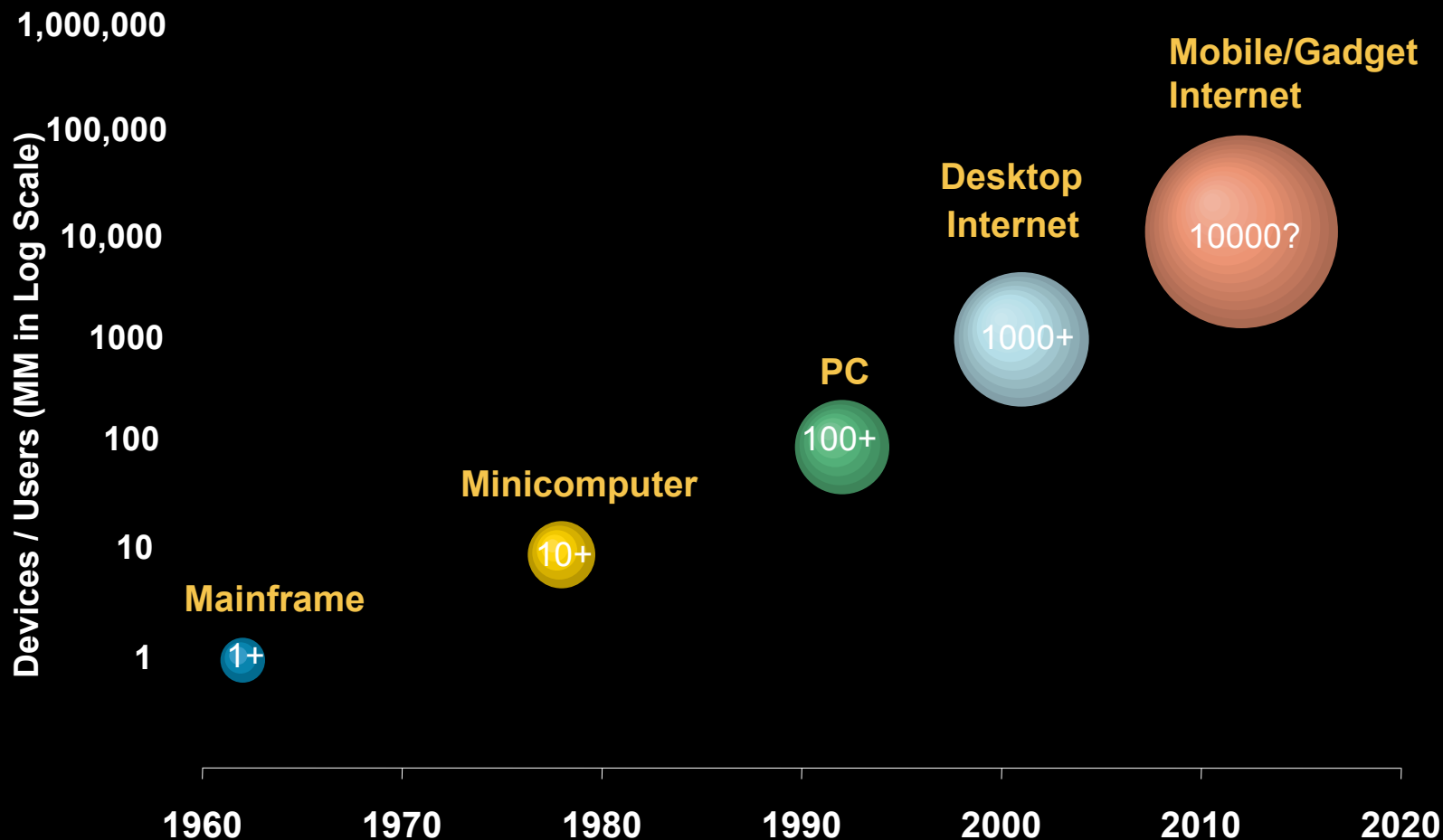
Top 15 cap: \$667B

**Prediction is impossible: this is only public
companies...**

**Facebook, Twitter, Groupon & Zynga aren't even on
here!**

New Computing Cycle Characteristics

Computing Growth Drivers Over Time, 1960 – 2020E



Note: PC installed base reached 100MM in 1993, cellphone / Internet users reached 1B in 2002 / 2005 respectively;
Source: ITU, Mark Lipacis, Morgan Stanley Research.

The old don't innovate – the new “create the future”

Mainframes 1960s

New Winners

IBM
NCR
Control Data
Sperry
Honeywell
Burroughs

Mini Computing 1970s

New Winners

Digital Equipment
Data General
HP
Prime
Computervision
Wang Labs

Personal Computing 1980s

New Winners

Microsoft
Cisco
Intel
Apple
Oracle
EMC
Dell
Compaq

Desktop Internet Computing 1990s

New Winners

Google
AOL
eBay
Yahoo!
Amazon.com

Mobile Internet Computing 2000s

New Winners

Facebook
Twitter
Apple (exception?)
??
??

as surely as...

1985: **NOT** a PC in every home

1990: **NO** email for grandma

1995: **NOT** the internet

2000: **NO** pervasive mobile

2005: **NO** facebook / iphone

2008: **NO** Goldman/Morgan
near bankruptcy?

2010+: reason for optimism



to predict the future,
invent it!

-Alan Kay