

Copyrighted Material

**Scalable Innovation**  
A Guide for Inventors, Entrepreneurs,  
and IP Professionals

EUGENE SHTEYN  
MAX SHTEIN

CRC Press  
Taylor & Francis Group

**Thoughts on Principles of Scalable Innovation & Their Importance for Entrepreneurship Education**

Eugene Shteyn  
[yeshteyn@stanford.edu](mailto:yeshteyn@stanford.edu)

Max Shtein  
[mshtein@umich.edu](mailto:mshtein@umich.edu)

I once knew a little boy in England who asked his father, “Do fathers always know more than sons?” and the father said, “Yes.”

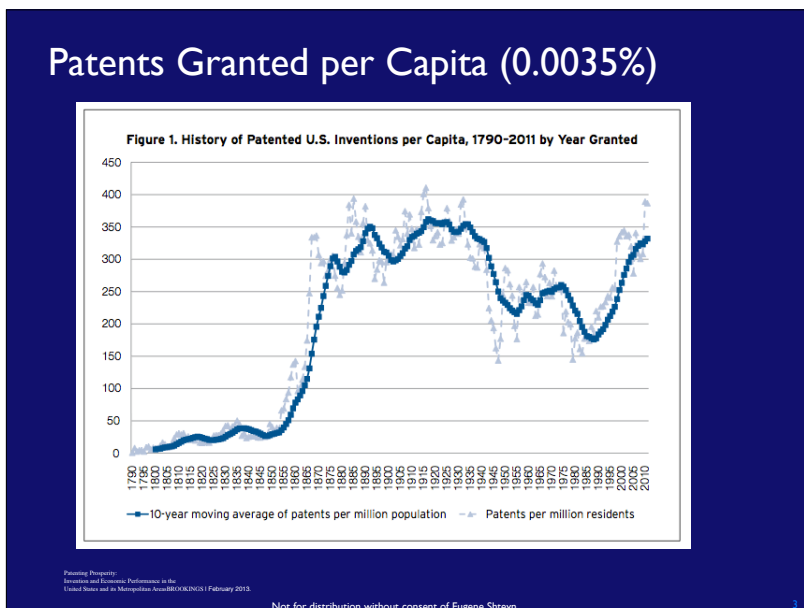
The next question was, “Daddy, who invented the steam engine?” and the father said, “James Watt.”

And then son came back with “ – but why didn’t James Watt’s father invent it?”

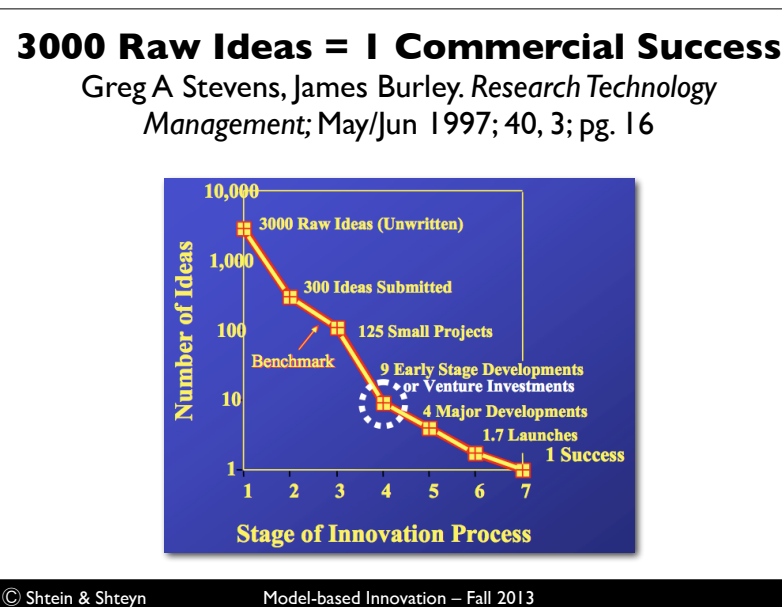
Source: Gregory Bateson. The Ecology of Mind.

Not for distribution without consent of Eugene Shteyn

2



3



4

## Invention in context

- 3,000 raw ideas result in just 1 successful product
- only 1.5 % of issued US patents are valuable enough to fight in courts
- Success is unlikely when we use standard approaches learned in school and at work

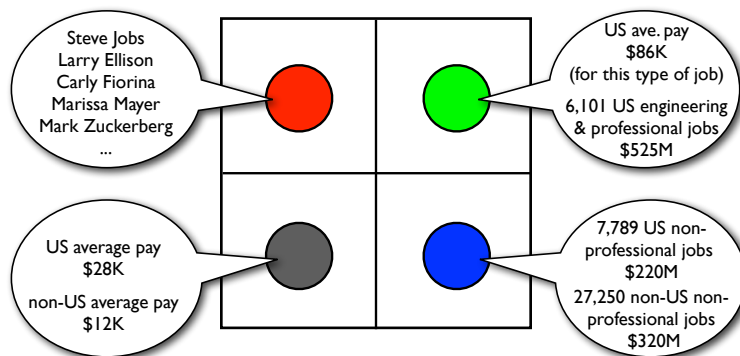
## The iPod economy\*

“Globalization skeptics argue that the benefits of globalization, such as lower consumer prices, are outweighed by job losses, lower earnings for U.S. workers, and a potential loss of technology to foreign rivals. To shed light on the jobs issue, we analyze the iPod, which is manufactured offshore using mostly foreign-made components. In terms of headcount, we estimate that, in 2006, the iPod supported nearly twice as many jobs offshore as in the United States. Yet the total wages paid in the United States amounted to more than twice as much as those paid overseas. Driving this result is the fact that Apple keeps most of its research and development (R&D) and corporate support functions in the United States, providing thousands of high-paid professional and engineering jobs that can be attributed to the success of the iPod. This case provides evidence that innovation by a U.S. company at the **head of a global value chain** can benefit both the company and U.S. workers.”

\*Source: Greg Linden et al, (2011)

“Innovation and Job Creation in a Global Economy. The Case of Apple iPod.”

## The iPod economy\*

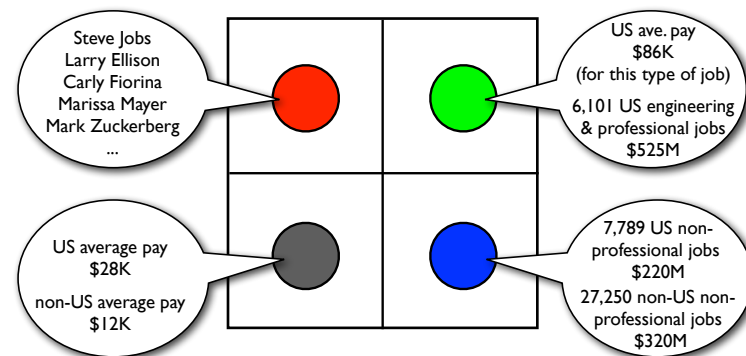


\*Source: Greg Linden et al, (2011)

“Innovation and Job Creation in a Global Economy. The Case of Apple iPod.”

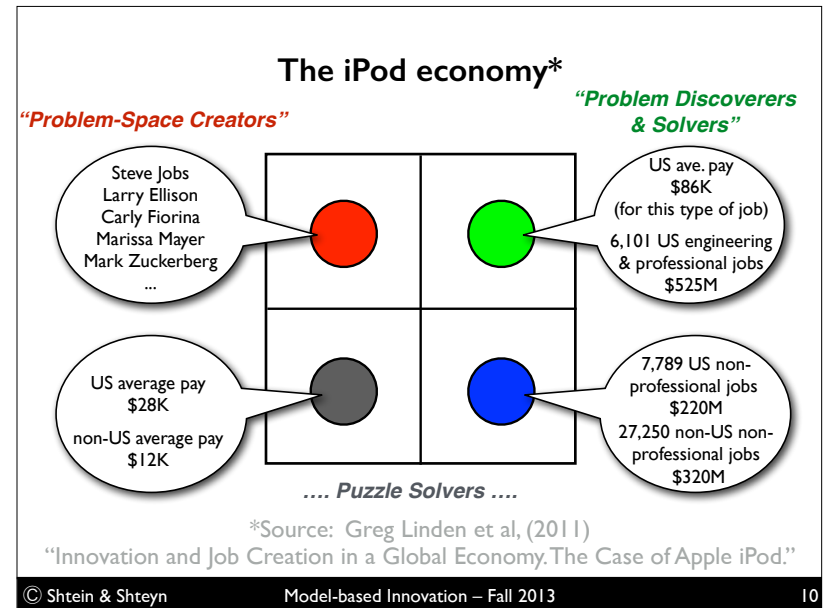
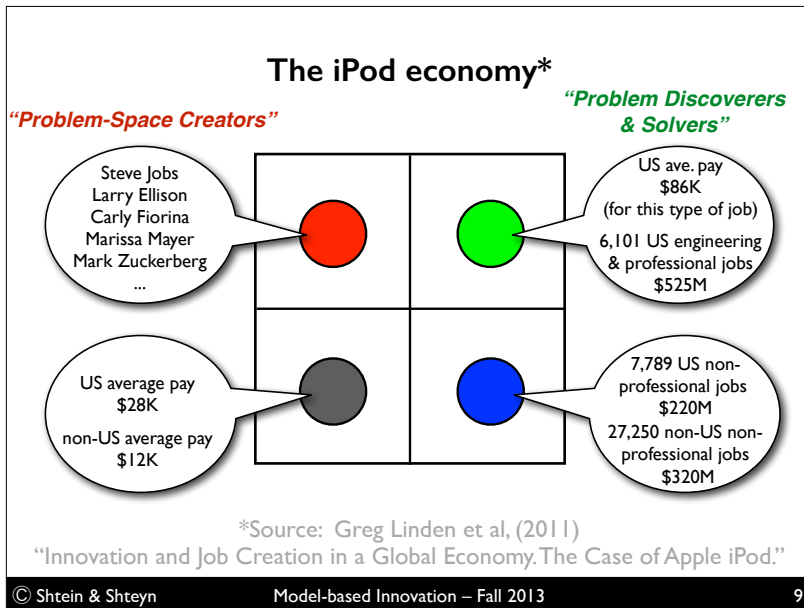
## The iPod economy\*

*“Problem-Space Creators”*



\*Source: Greg Linden et al, (2011)


“Innovation and Job Creation in a Global Economy. The Case of Apple iPod.”



### Puzzles vs. Problems

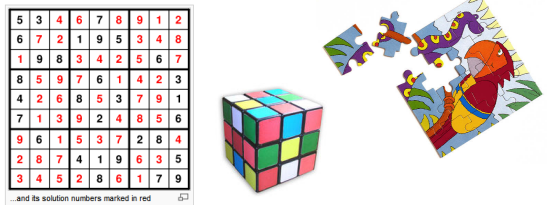
Year 1766, London, England. The British Empire is now a major sea power. John Spilsbury, formerly the apprentice to the Royal Geographer, designs and successfully commercializes first **jigsaw puzzles**.

<http://innovationprinciples.blogspot.com/2010/08/invention-of-day-jigsaw-puzzle.html>



© Shtein & Shteyn Model-based Innovation – Fall 2013 11

### Puzzles:



- have pre-defined answers
- considered solved when the answer is found
- don't create any risk
- ideal for artificial environments, e.g. education and recreation, because it's **easy to check the answers**

© Shtein & Shteyn Model-based Innovation – Fall 2013 12

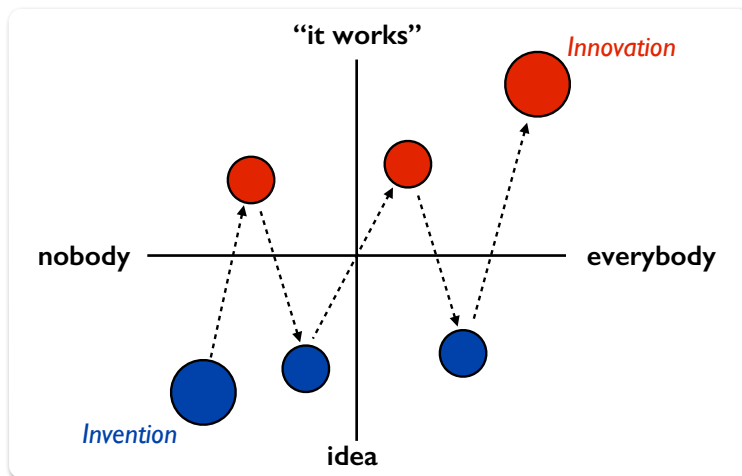
## Problems:

- may or may not have a solution (open-ended)
- when a solution is found it doesn't necessarily mean it's going to succeed in implementation or in the marketplace
- carries investment risks and has unintended consequences

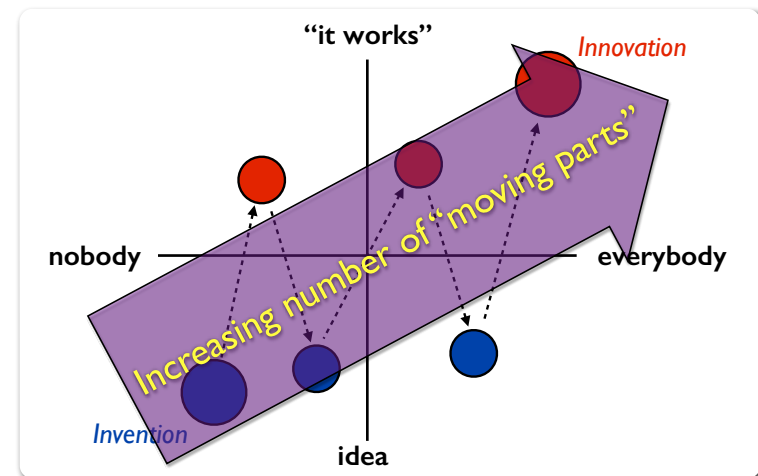
## Key questions:

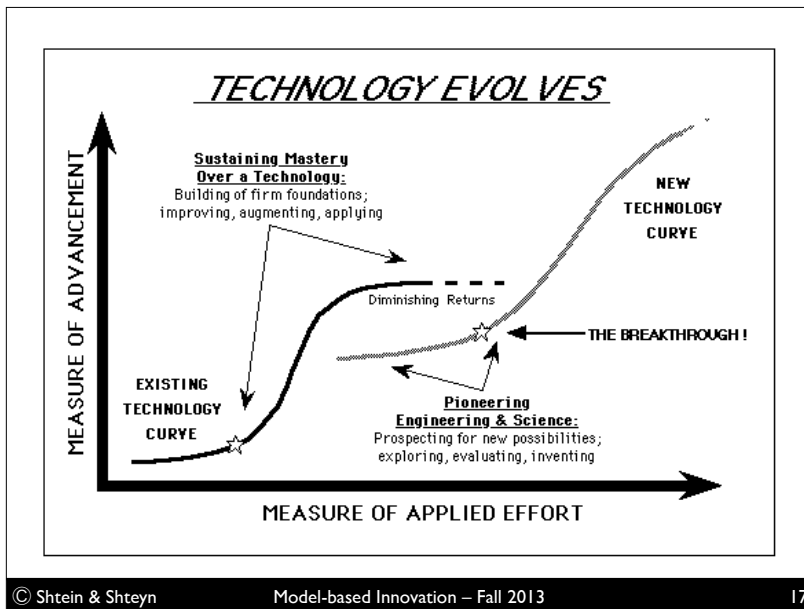
1. Are we preparing our students effectively?
2. Are they timing invention / innovation well?
3. Can we raise effective problem-SOLVERS?..  
Can we raise effective problem-FINDERS?..  
Can we raise effective problem-CREATORS?..
4. How can we “check” solutions to open-ended problems?

## 2-dimensional view of the invention-innovation process



## 2-dimensional view of the invention-innovation process





Geoffrey West: “The Surprising Math of Cities and Corporations”



<http://www.youtube.com/watch?v=XyCY6mjWOPc>

What kind of problems do we want to work on?..

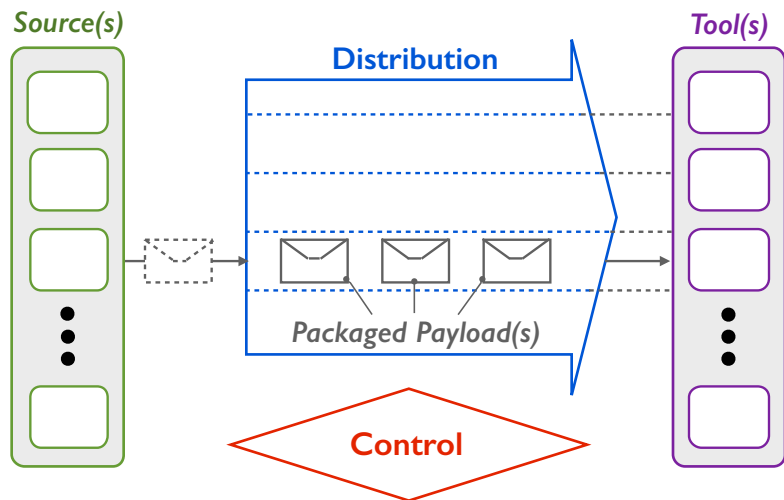
**SCALABILITY problems = S-curve problems**

What kind of problems do we want to work on?..

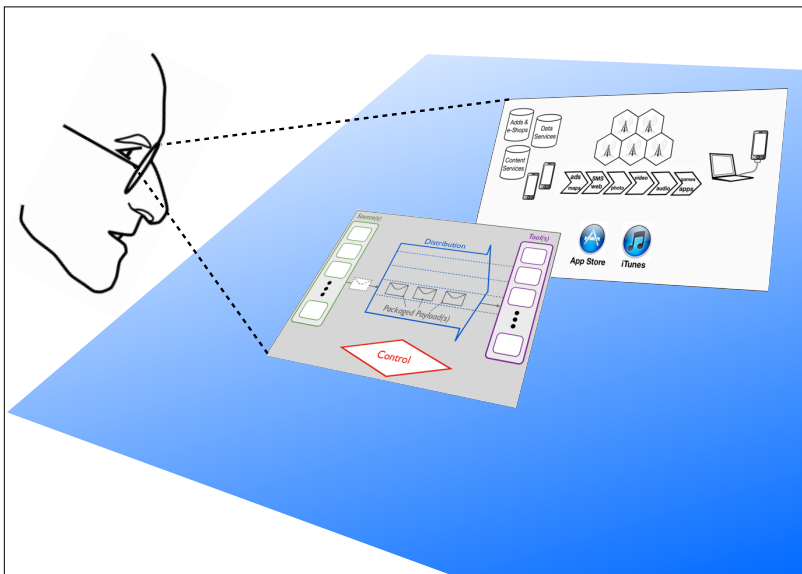
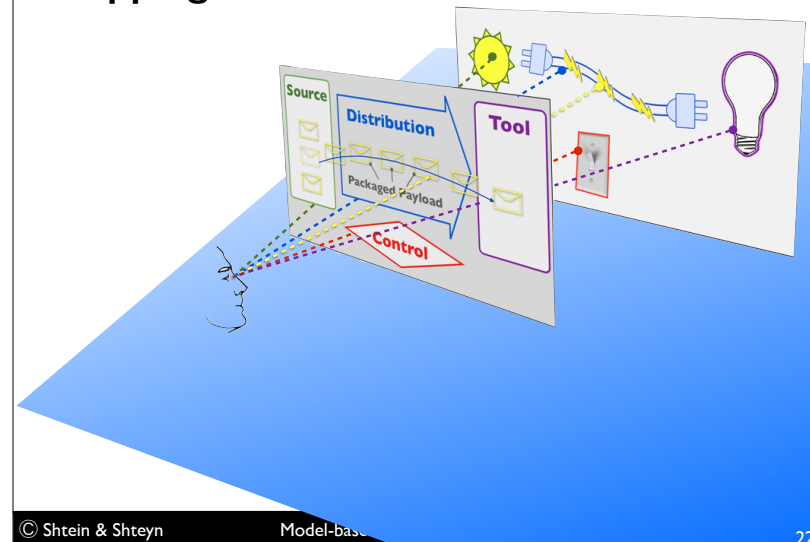
**SCALABILITY problems = S-curve problems**

**All scalable solutions look similar...**

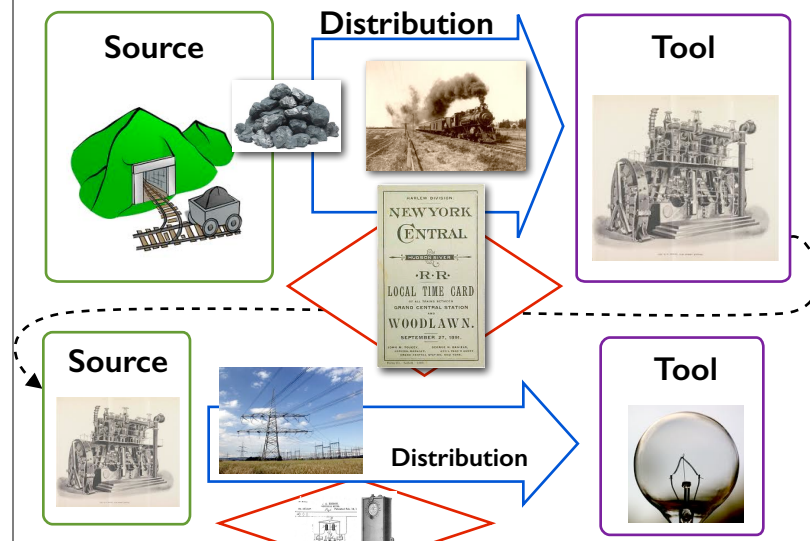
## All scalable systems have 5 components

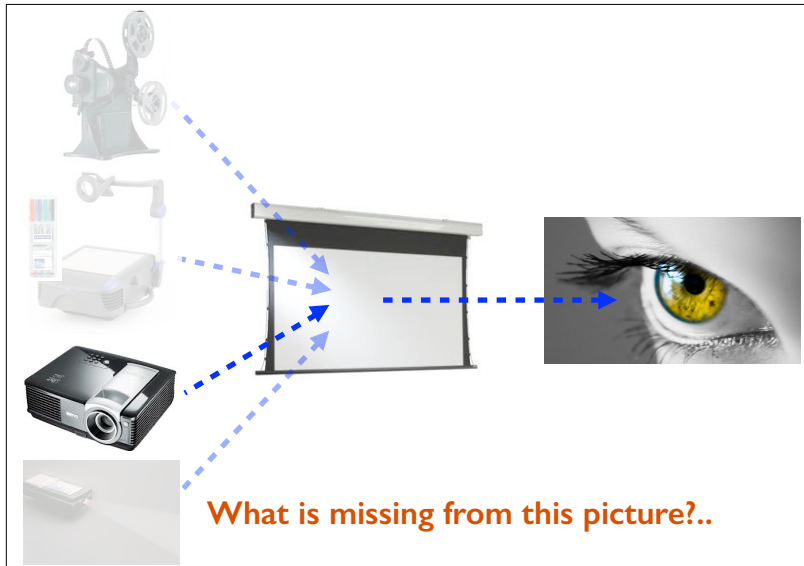


## “Mapping”



## Seeing the systems... Example: ENERGY





(No Model.)  
T. A. EDISON.  
LAMP BASE.  
No. 438,310. Patented Oct. 14, 1890.

### Emergence of new interfaces (including UIs) signals major transitions

“My object is to adapt my incandescent electric lamps for use not only with the socket ordinarily employed in my systems of electric lighting, but also with sockets employed in other electric-lighting systems.

This interchangeable feature is frequently of great value—for example, when a building has been wired and equipped by one lighting company and for some reason it is desired to substitute my lamps. In this case with the interchangeable terminals the ordinary sockets may be left in place and used in connection with the substituted lamps.”

– Thomas Edison, US Patent 438,310

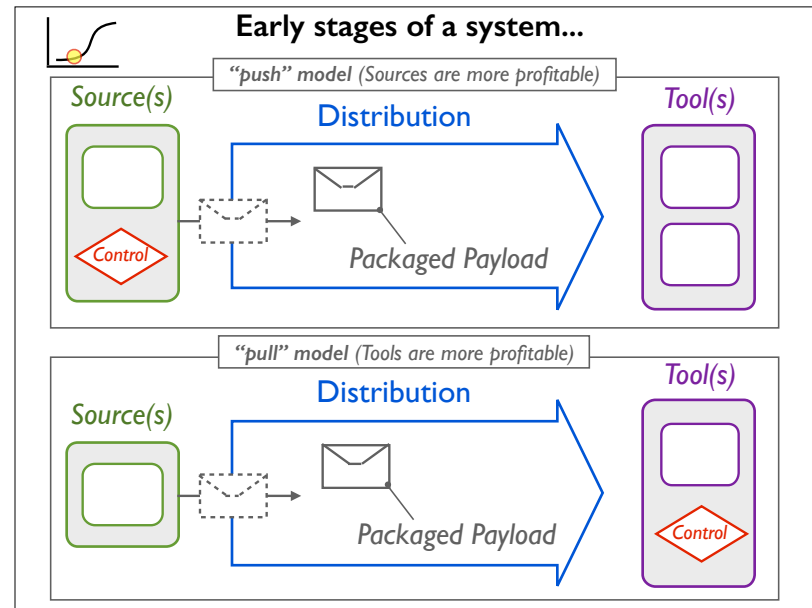
(No Model.)  
T. A. EDISON.  
LAMP BASE.  
No. 438,310. Patented Oct. 14, 1890.

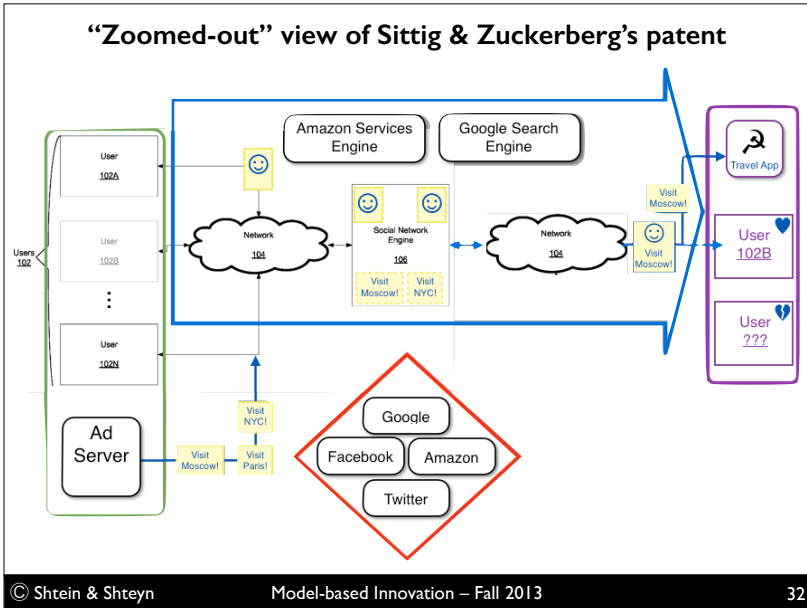
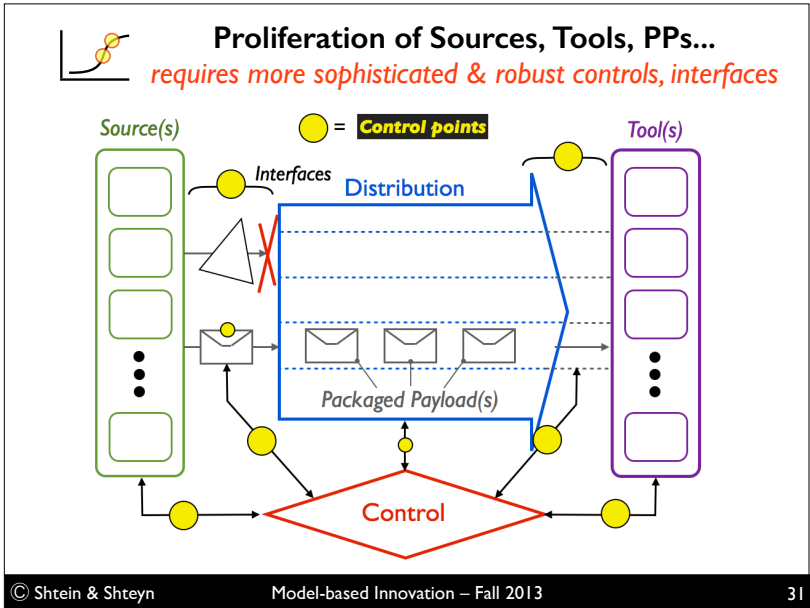
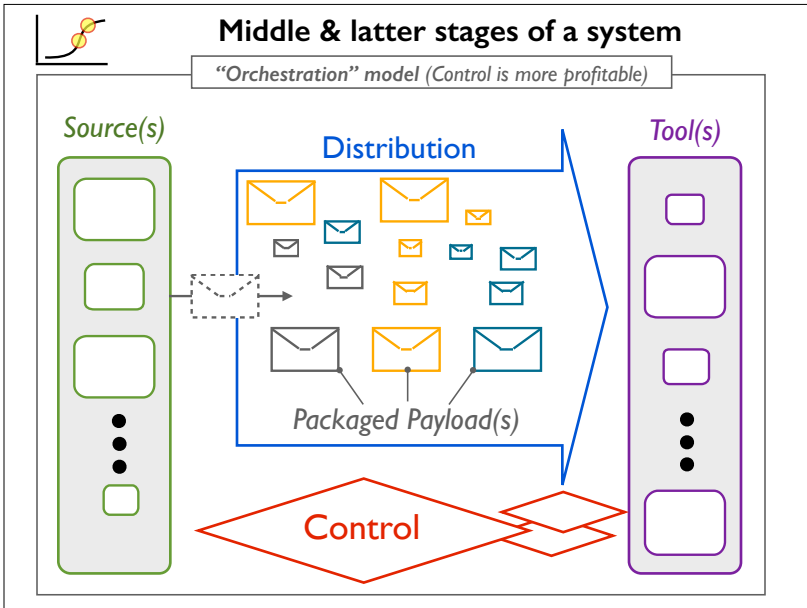
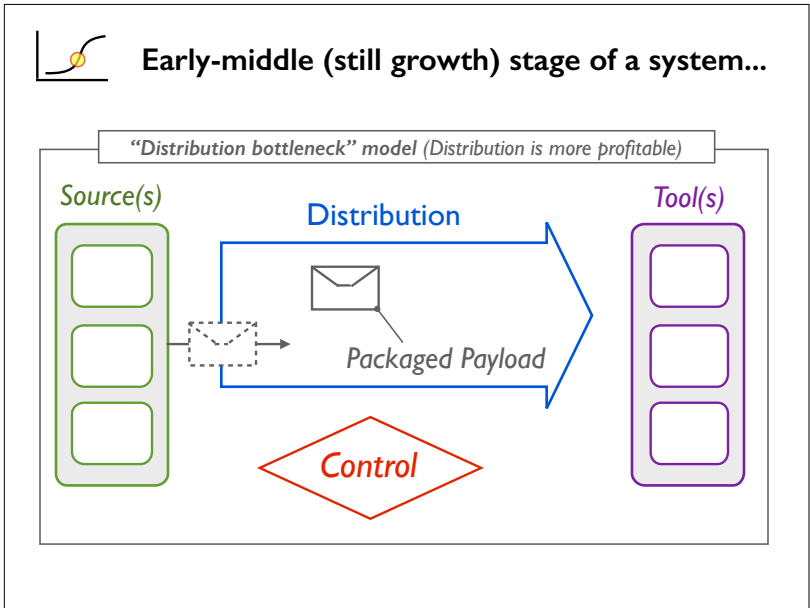
## INTERFACES BETWEEN COMPONENTS

Early model GE toaster

ric  
tily  
so  
ing  
  
eat  
ed  
ne  
his  
he  
in

– Thomas Edison, US Patent 438,310







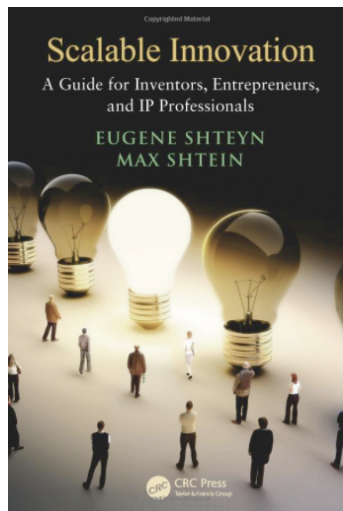
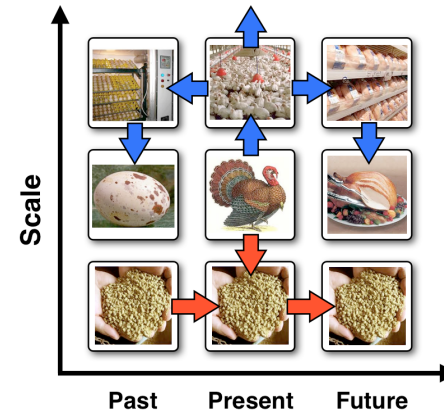
## 3 Magicians

**Magician 1: Divide-Connect (What is it? Does it work?)**

**Magician 2: Climb-On-The-Roof (Does it scale?)**

**Magician 3: Fall Back-Spring Ahead (Is there a need for scale?)**

## The 9-screen view



Eugene Shteyn

Max Shtein



[innovationprinciples.blogspot.com](http://innovationprinciples.blogspot.com)

[http://www.amazon.com/dp/1466590971/ref=rd\\_r\\_ext\\_tmb](http://www.amazon.com/dp/1466590971/ref=rd_r_ext_tmb)