

Reducing Risk in New-Category Innovation

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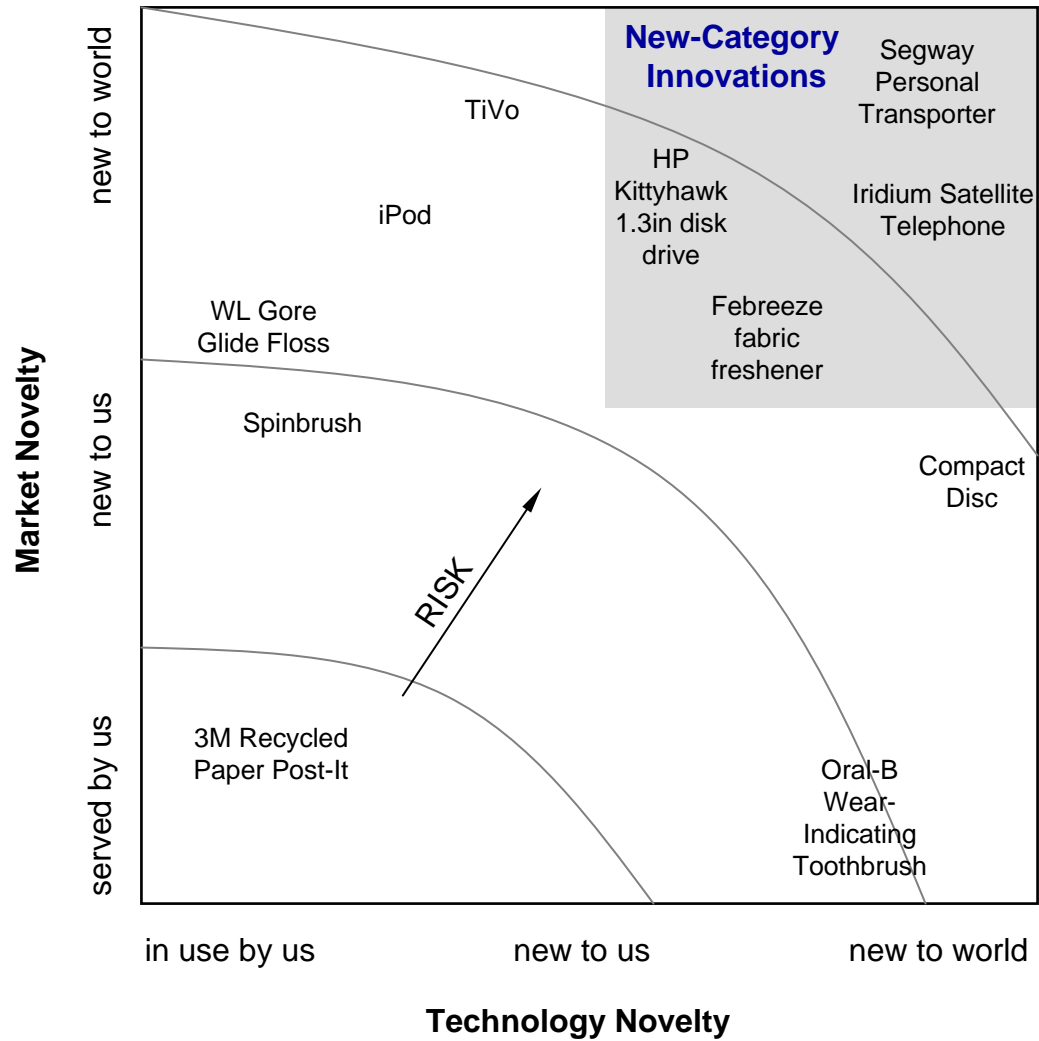
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This material is drawn from a book in progress:
Mastering Innovation: Managing the Value Creation Process
by Christian Terwiesch and Karl Ulrich.





\$80 mm investment by Kleiner-Perkins, CSFB

Specifications:

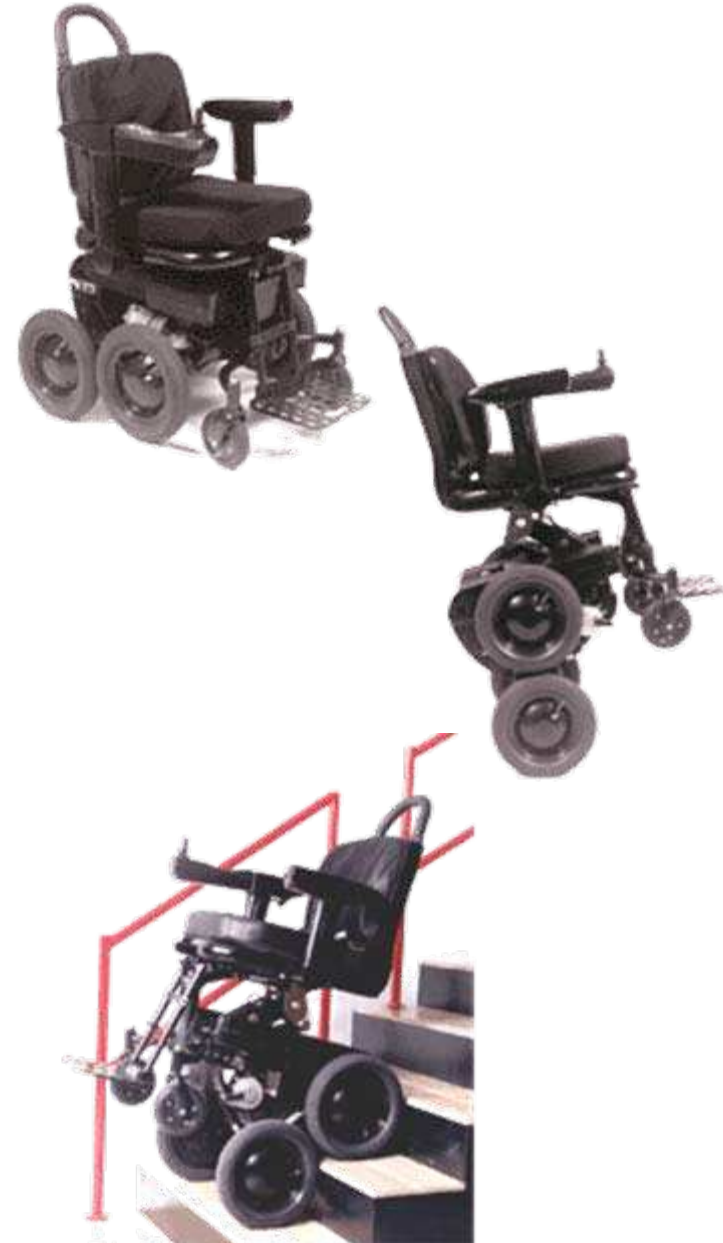
- 12.5 mph
- 80 lbs
- 11 miles range
- \$9000
(consumer version \$4950)

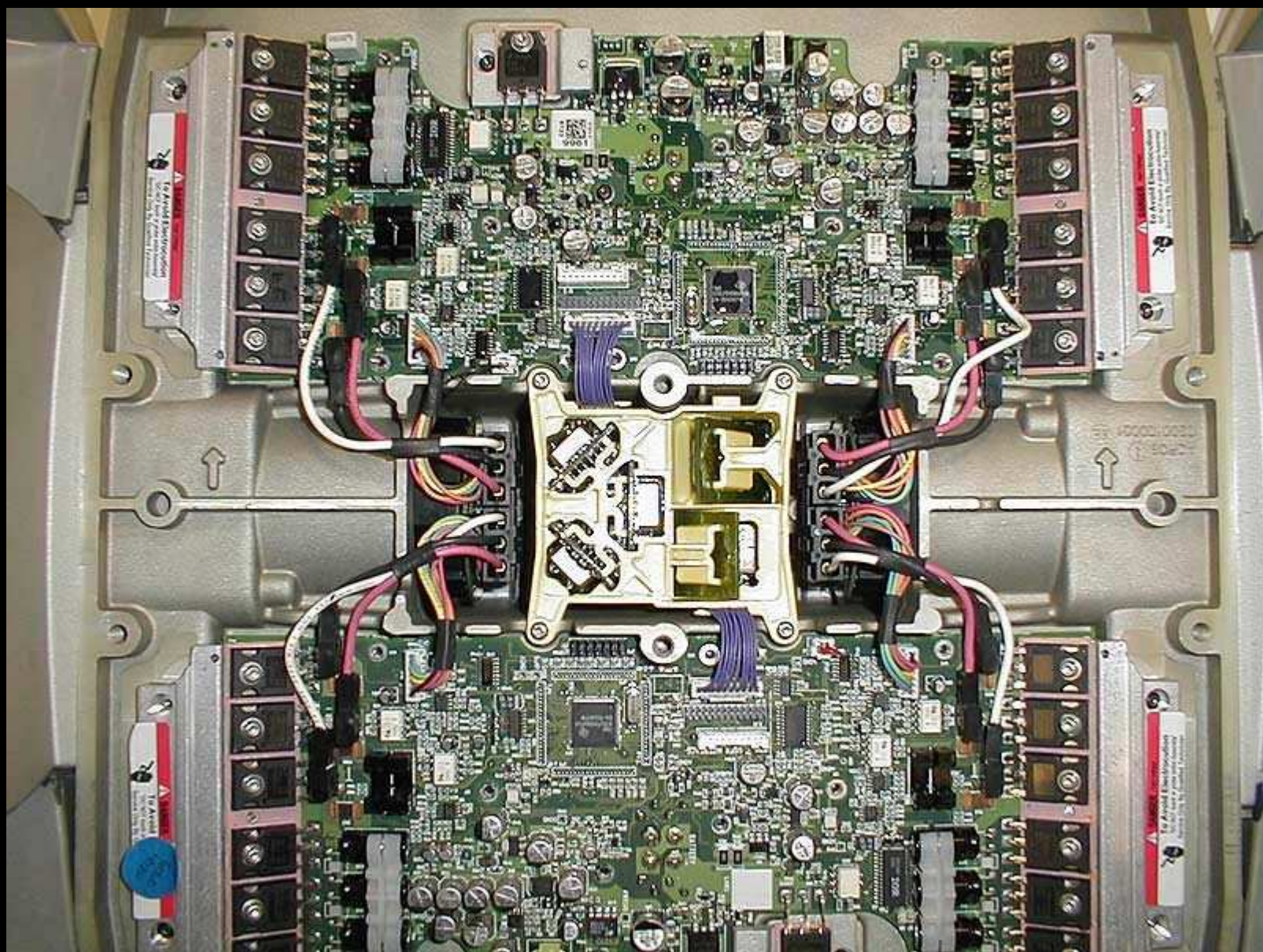
Original volume projections:
40,000 units/month by end of 2002.

"I would stake my reputation, my money and my time on the fact that 10 years from now, this will be the way many people in many places get around. If all we end up with are a few billion-dollar niche markets, that would be a disappointment. It's not like our goal was just to put the golf-cart industry out of business"

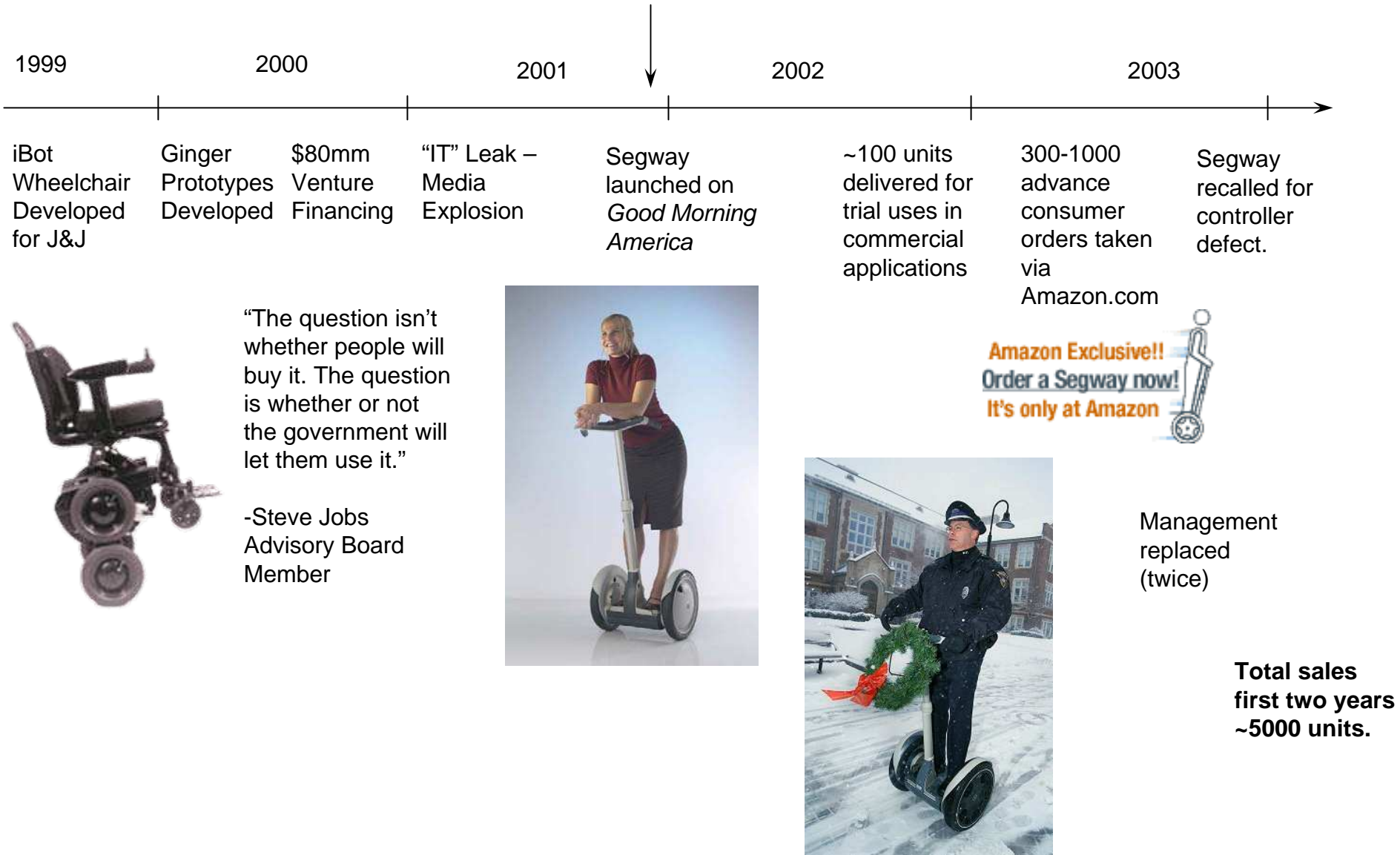
– Dean Kamen

iBot Self-Balancing Wheelchair

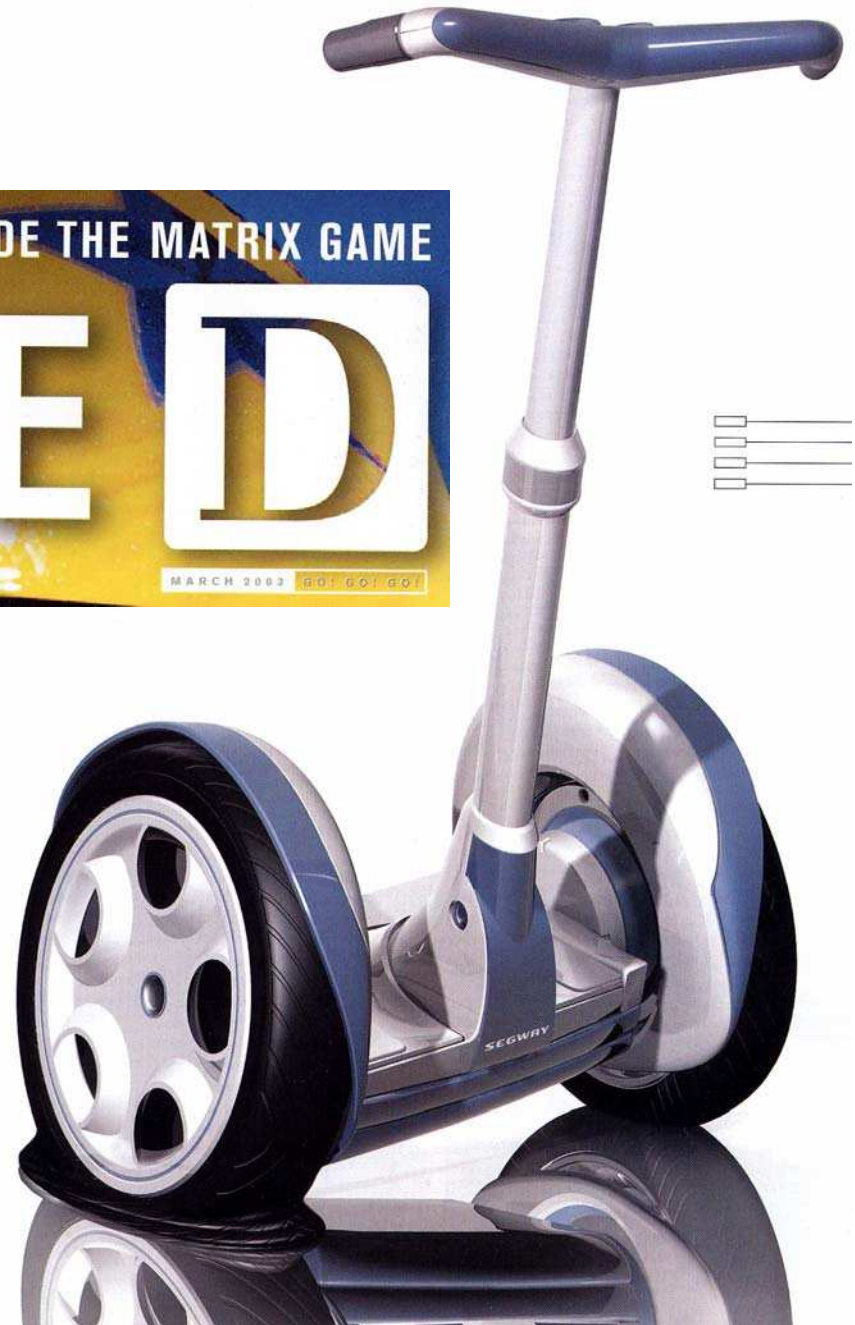
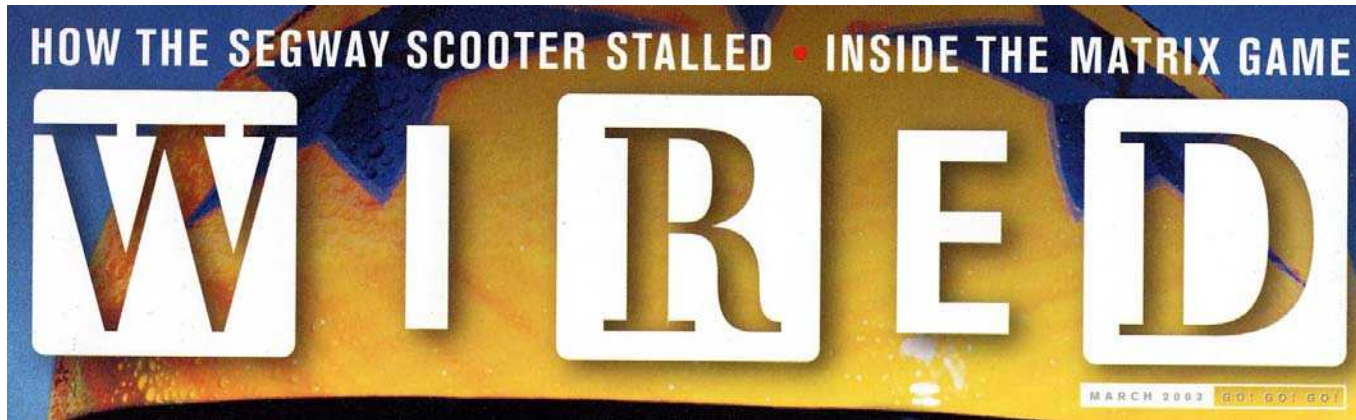




Segway Timeline



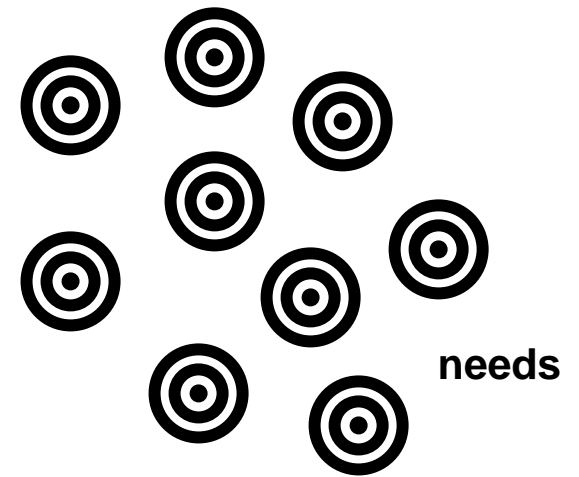
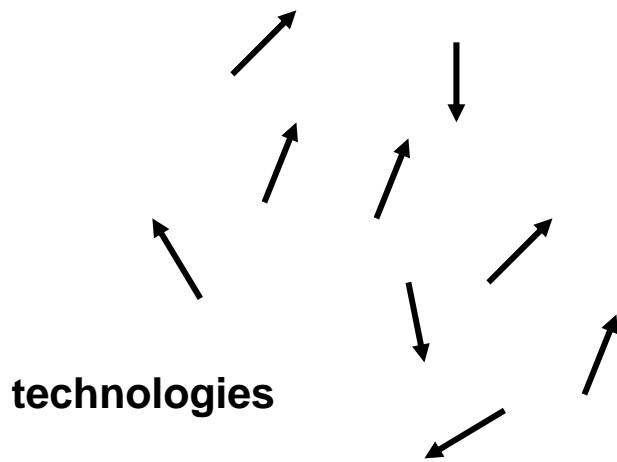
For a fascinating narrative, see "Machine of Dreams," *Vanity Fair*, May 2002.



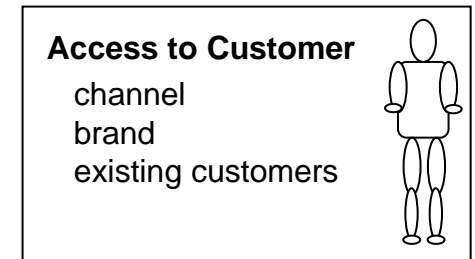
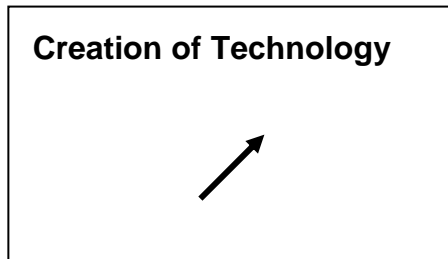
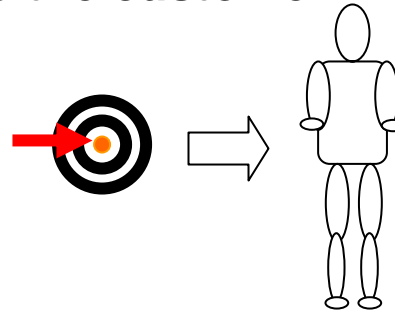


Three Risk Pitfalls in New-Category Innovation

1. Violation of the “what-not-how” principle
2. Failure to account for typical diffusion rates
3. Unnecessary “swinging for the fence”



INNOVATION =
New match between a solution and need,
delivered to the customer



The What-Not-How Principle

- Frame new-category product development problems in terms of **WHAT** need the product should address and not in terms of a technology (**HOW**) you hope to solve a problem.

Pose problem as:

- *improve the efficiency of mail carriers*
- *extend the range and mobility of police officers*
- *provide a fun transportation sensation to consumers*

NOT

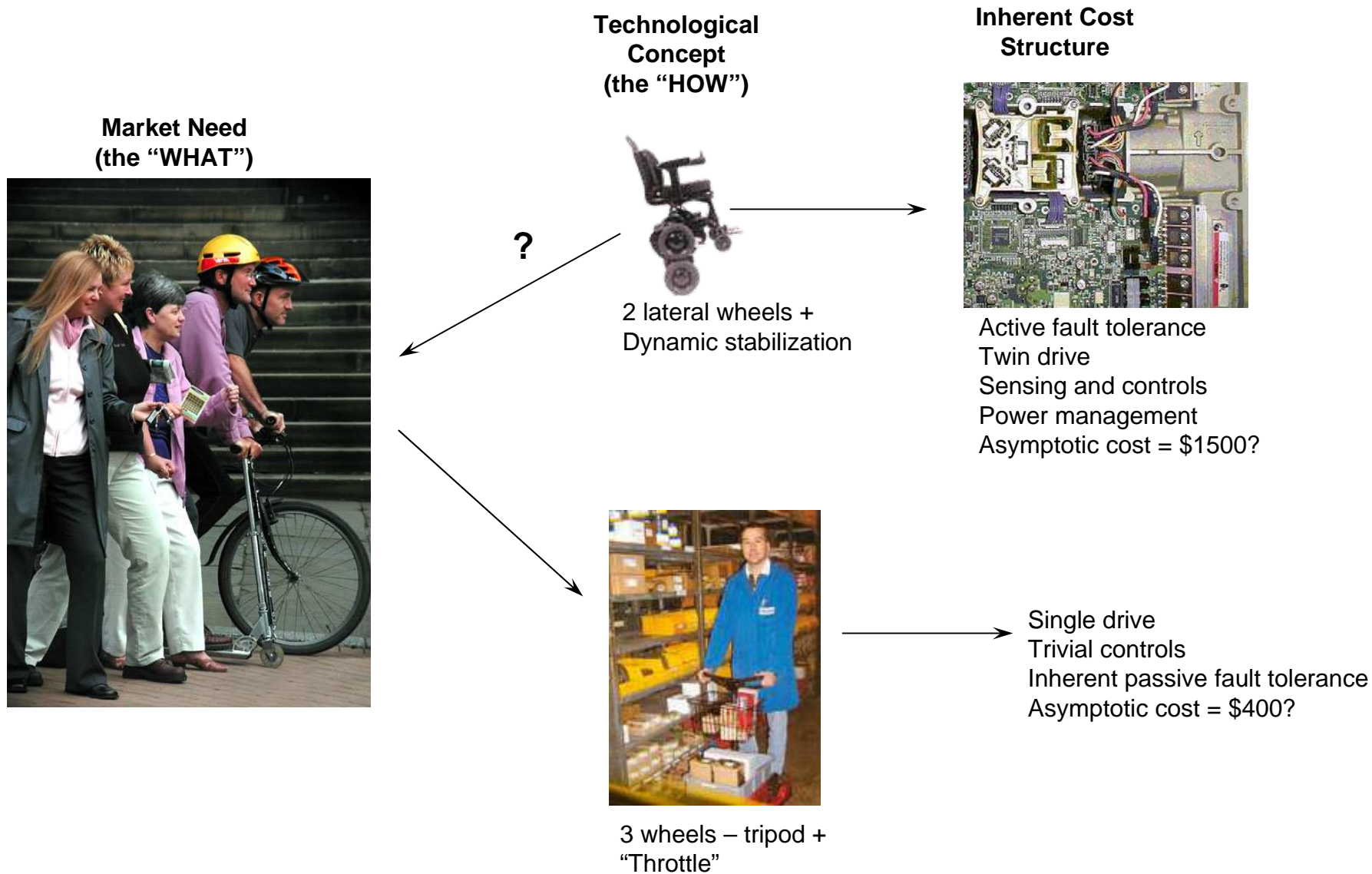
- *What can we do with a two-wheel dynamically stabilized mobility technology?*

Thought experiment:

- What can you do with a Segway that can not be done with a simple, statically stabilized three-wheel design?



The Peril of Technology Push





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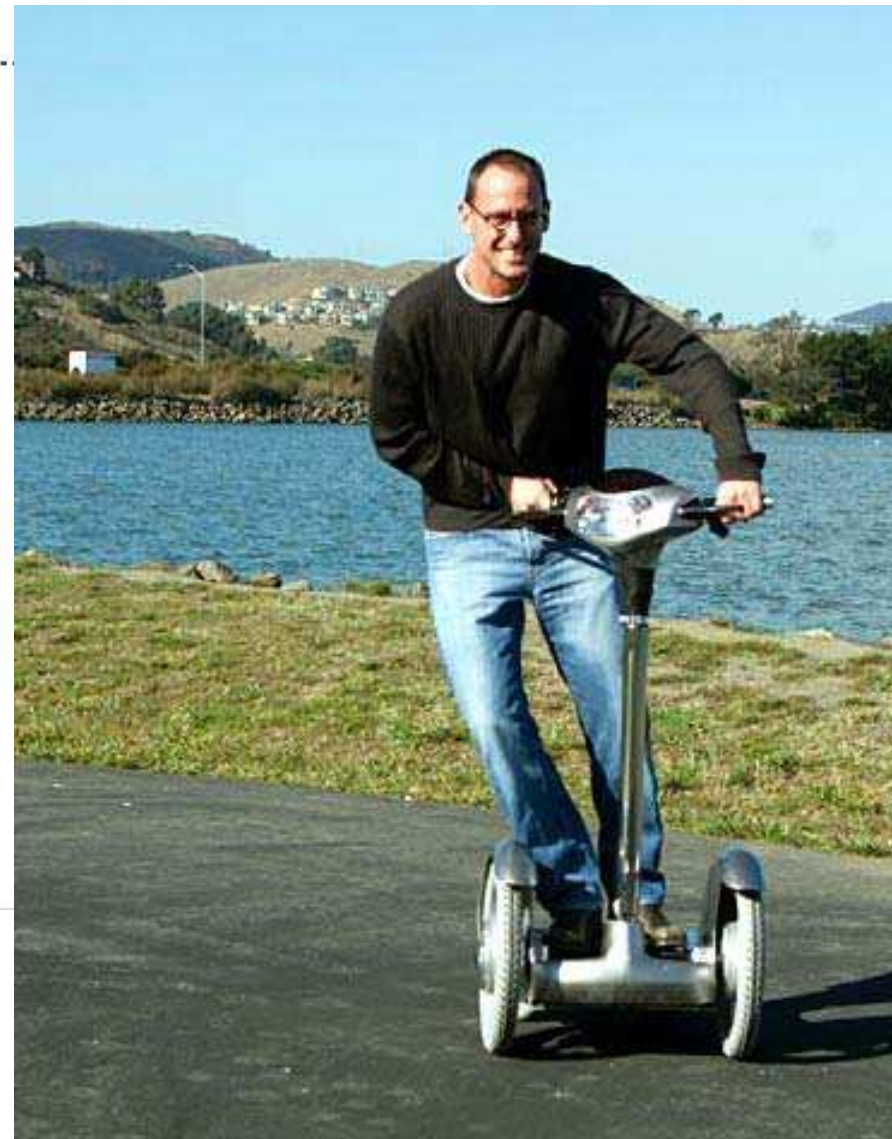
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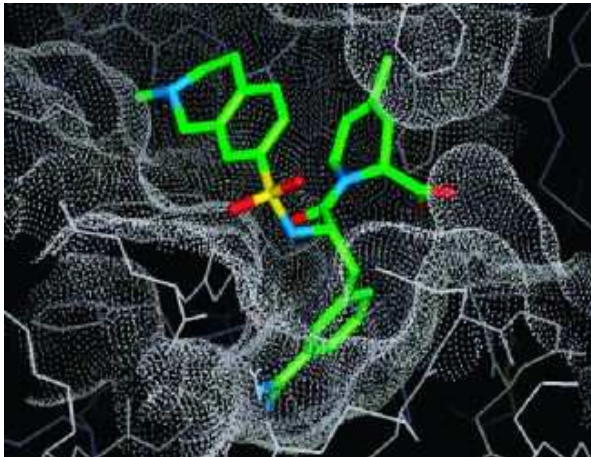
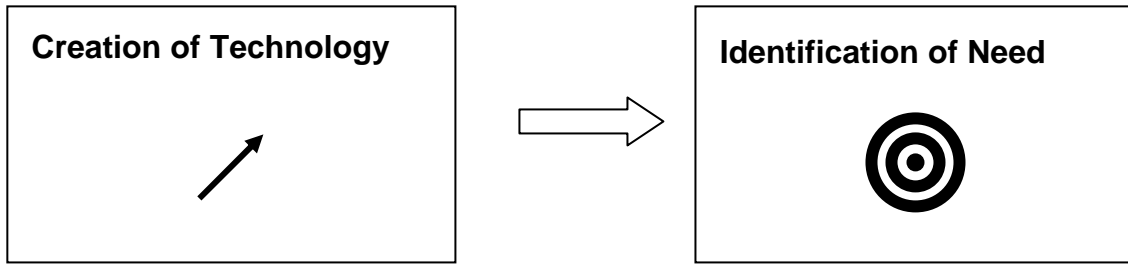
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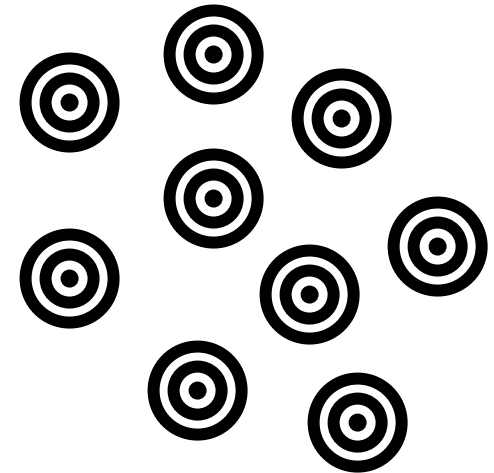


Technology Push May Be the Only Alternative, e.g. Pharmaceuticals



No truly effective methods of synthesizing a new compound based on a desired therapeutic effect.

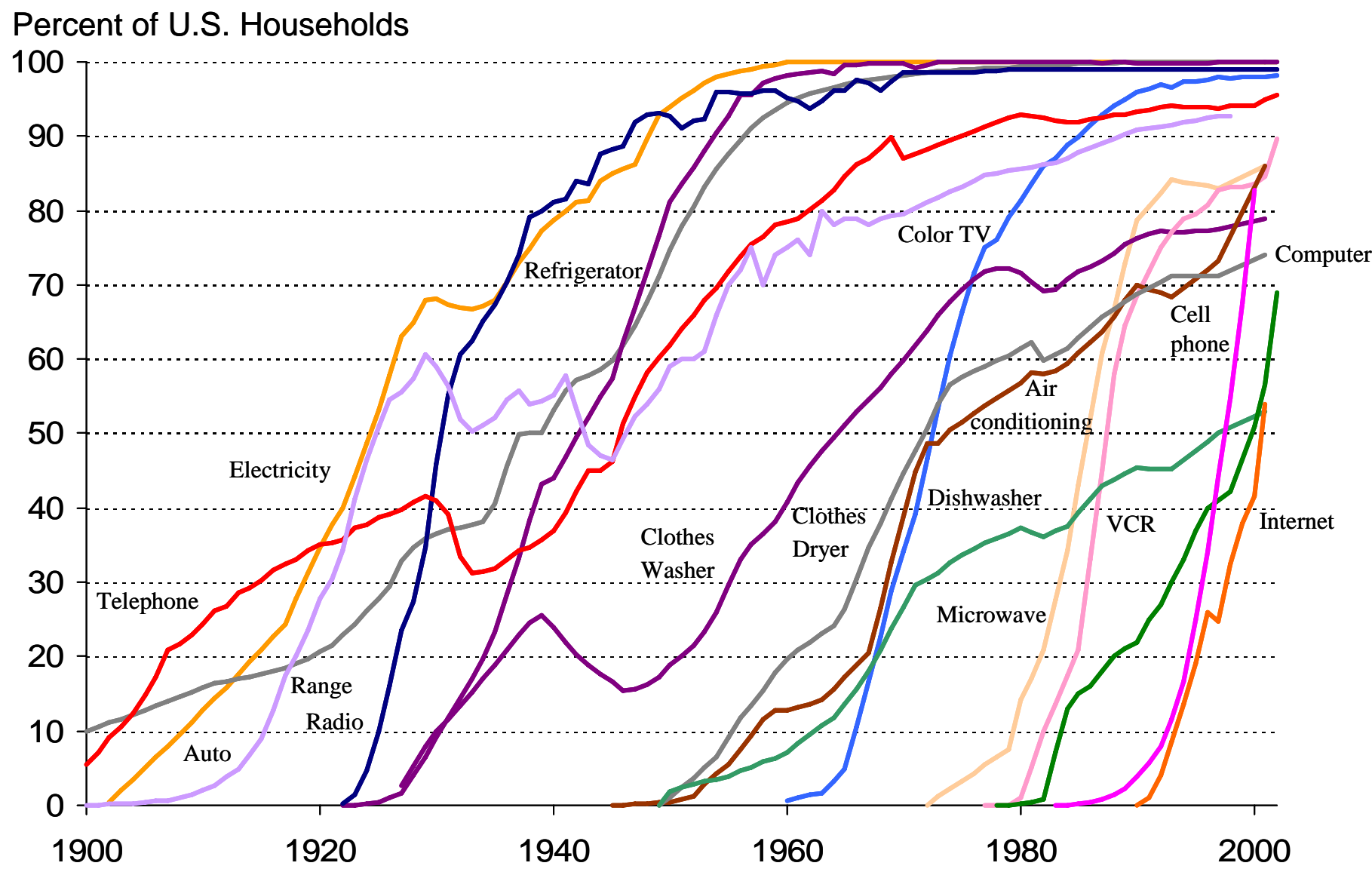
compounds are
screened against
known targets.



Proposition:

For **domains lacking effective methods of need-driven technology synthesis** (e.g., pharmaceuticals), technology push will be the dominant innovation model.

Diffusion Rate of New-Category Products

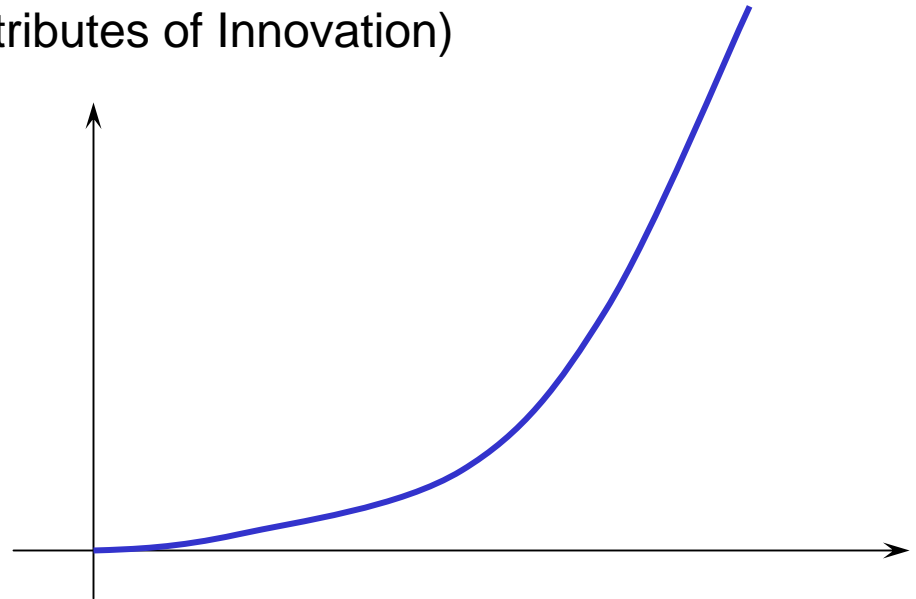


Source: W. Michael Cox, Federal Reserve Bank of Dallas

Explaining Diffusion Rates

Rogers' Five Factors (Intrinsic Attributes of Innovation)

1. Relative advantage
2. Compatibility
3. Complexity
4. Trialability
5. Observability



Everett M. Rogers, *Diffusion of Innovations*, Fourth Edition, Free Press, New York, 1995.

Timing of Key Problems Tackled by Segway LLC

\$50mm+
2000-2001

Technical performance

Production capacity

Reliability and robustness

Legality

Patents

Staffing a large organization

\$??
2002

Where to ride

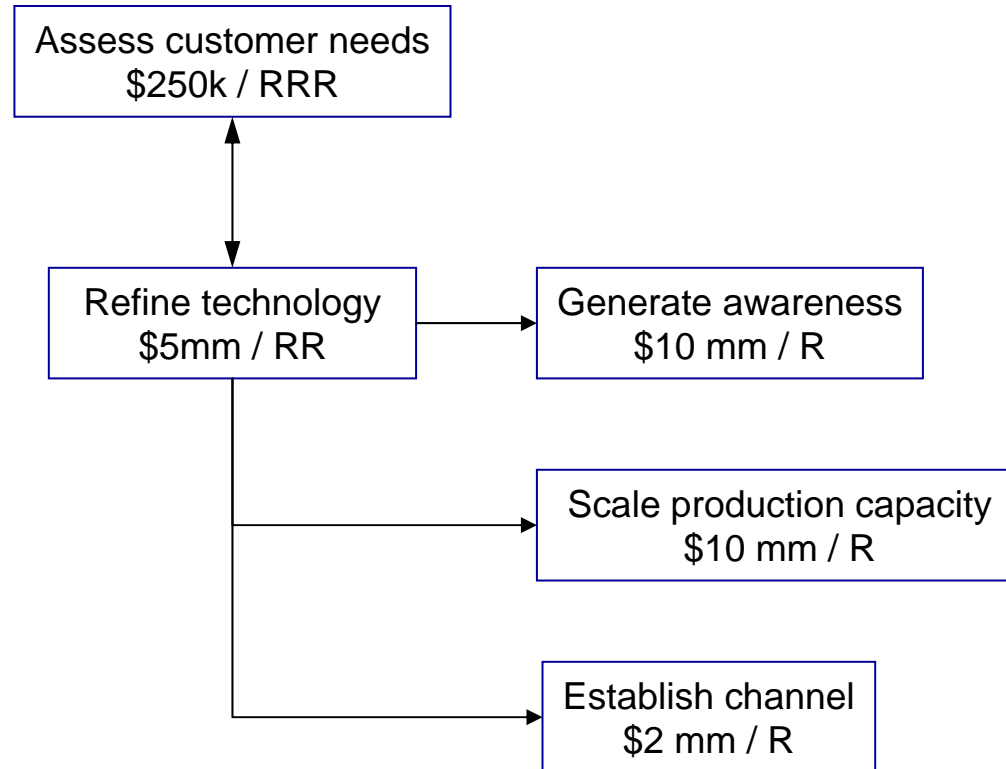
Which markets

What price point

Demand forecast

What benefits

Inherent Task Structure



RRR = high risk
RR = moderate risk
R = low risk

Dependencies reflect the extent to which the results of one task influence the completion of another task.

Task Sequencing – Estimated Actual

Commit
\$80mm?



Refine technology
\$5mm / RR

Assess customer needs
\$250k / RRR

Generate awareness
\$10 mm / R

Scale production capacity
\$10 mm / R

shipping
product

Establish channel
\$2 mm / R



2001

2002

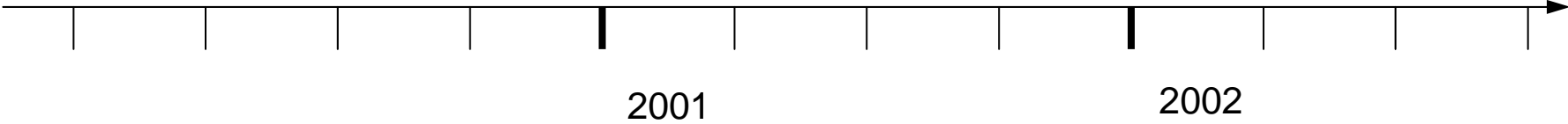
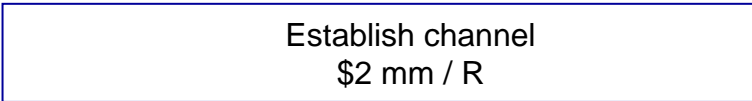
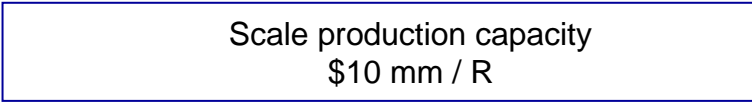
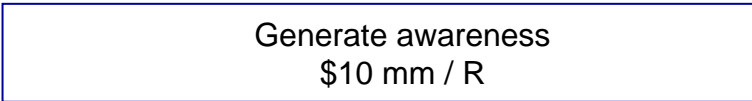
Task Sequencing - Hypothetical

Commit \$250k?

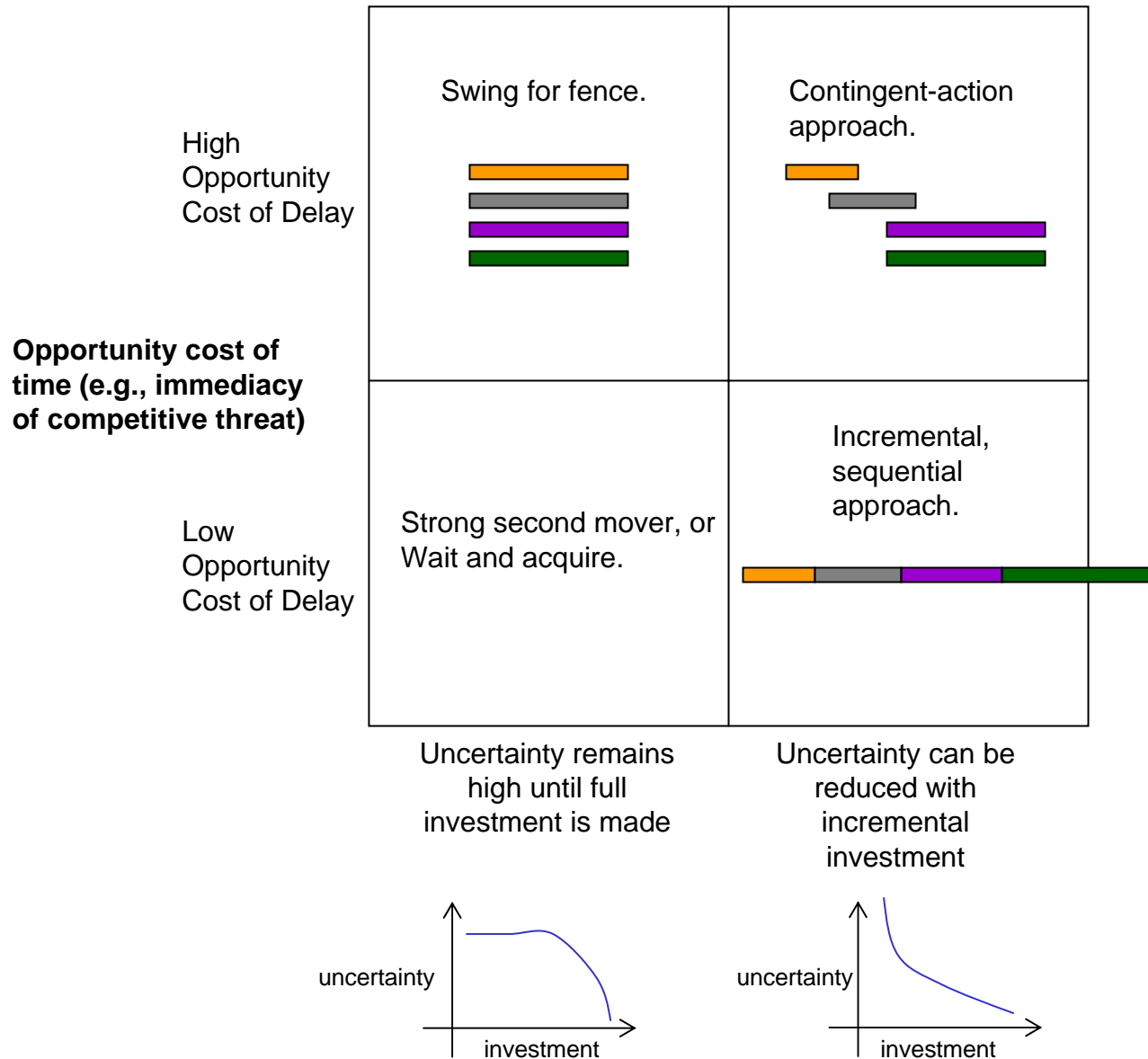
Commit \$5mm?

Commit \$22mm?

shipping
product



When to “Swing for the Fence”



Extent to which uncertainty can be reduced with incremental investment.

Survey Results

If the Segway HT Consumer Model were available from a retailer near you, and were priced at \$4995, how likely would you be to buy the product within the next 12 months?

definitely would not buy	probably would not buy	may or may not buy	probably would buy	definitely would buy
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
0	0	0	0	0

Assessing the Opportunity Cost of Time

Tend to increase opportunity cost of time

- Demand Window
 - External drivers of opportunity
- Strategic Factors
 - Intense competitive efforts
 - First-mover advantages
 - Network externalities
 - Substantial scale economies

Tend to reduce opportunity cost of time

- Uncertainty in customer needs
- Steep trajectories for critical inputs

Segway Revisited



- **Key benefits are:**

- Novelty
- Fun
- High visibility
- Pedestrian-like “footprint”
- Small turning radius

- **Which targets might resonate with these benefits?**

- Ambassadorial positions, e.g., theme park staff, police officers, resort staff.
- Rental operations focused on fun.
- Attention getting activities, e.g., sales, promotions.
- Golf cart market?

- **Potential market?**

- Guess: 10,000 units per year at \$1500/unit (factory price) = \$15MM/yr revenue.
- (Sales to date after 5 years are 23,000 units.)

