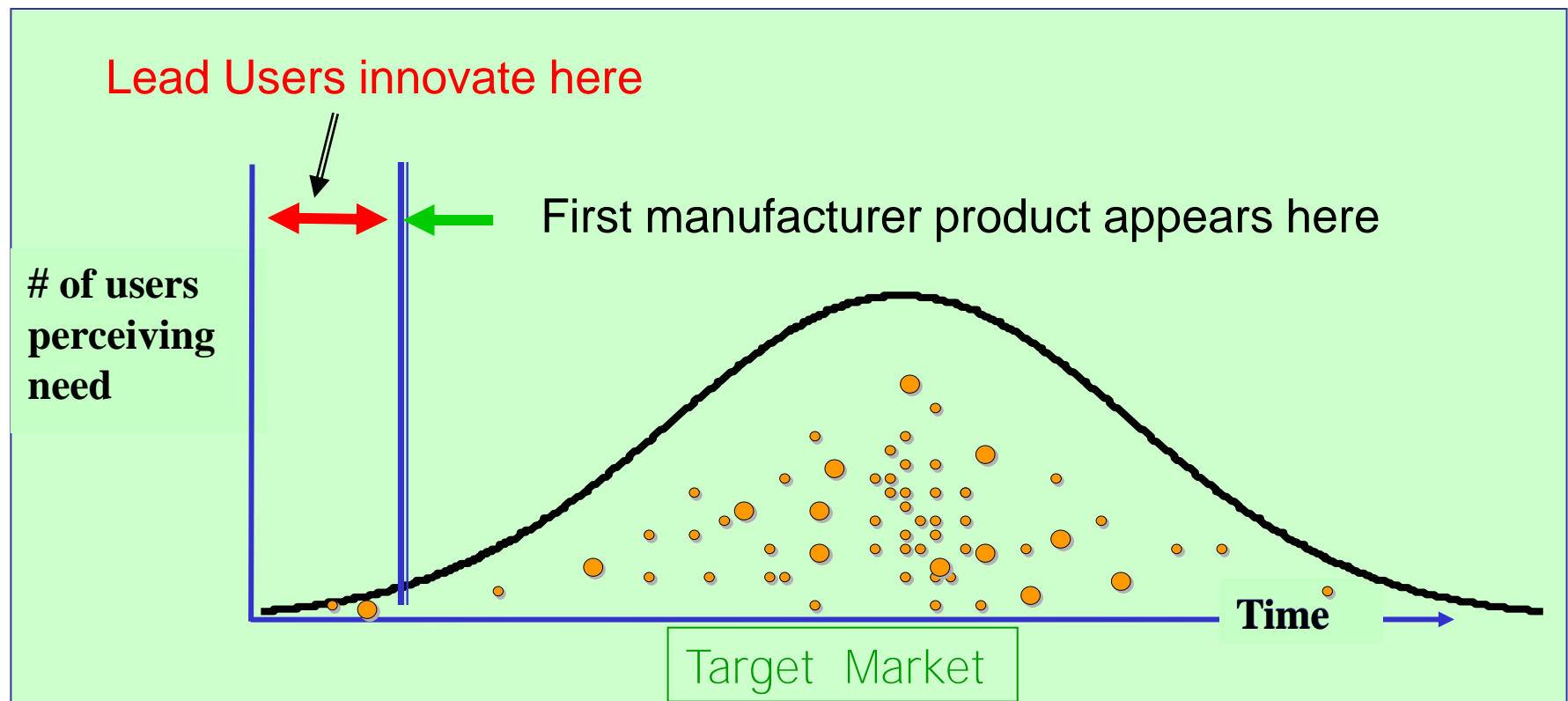


Basing New Commercial Products on “Lead User” Innovations

Professor Eric von Hippel
MIT Sloan School of Management

Two ways to identify lead user innovations:

- (1) Observe crowd adoptions of new user innovations;
- (2) Explore activity at the leading edge of a known trend



Lead users are...

“Lead User” innovations form the basis for new products and services of value to manufacturers.

“Lead Users” are users that:

1. Have needs that ***foreshadow general demand*** in the marketplace;
2. Expect to ***obtain high benefit*** from a solution to their needs. (Such users are more likely to innovate – “Necessity is the mother of invention!”)

The pathway from user innovation to commercial products

- “Lead users” innovate and usually reveal what they have done
- IF others want the same innovation, they copy and adopt it
- User-founded firms enter to serve the growing market
- Finally, after the market opportunity has become clear, larger producers enter – and some user startups grow large

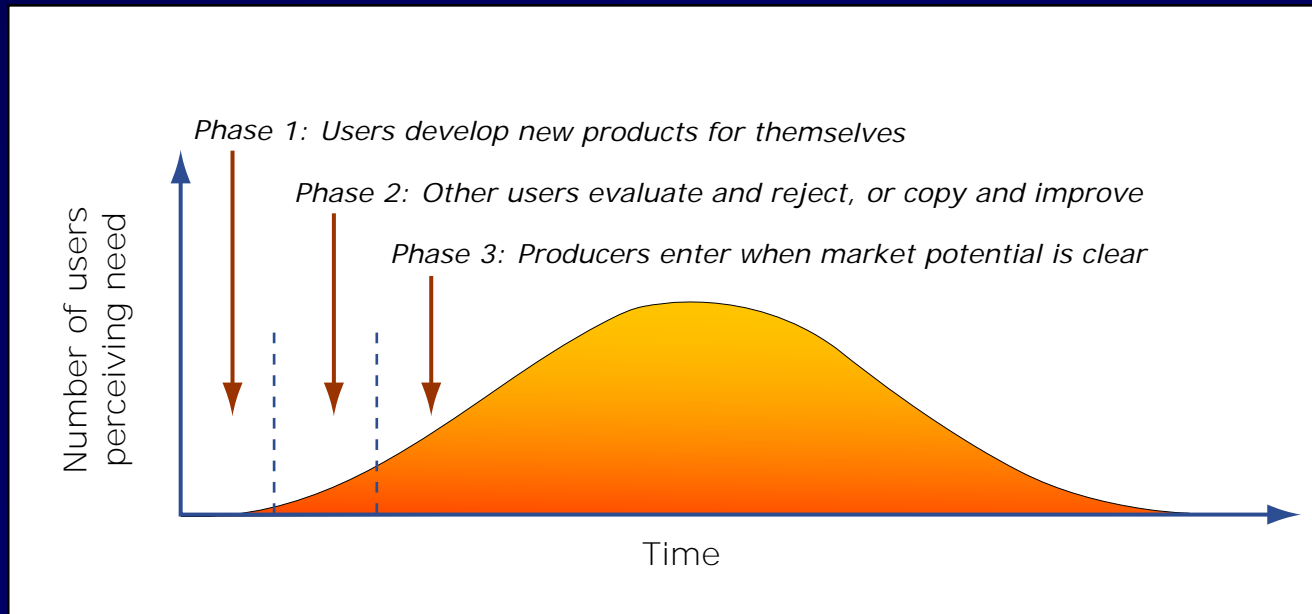


Image by MIT OpenCourseWare.

Users innovate when markets are small and uncertain

John Heysham Gibbon – physician, USER - inventor of the heart-lung machine.

- “The death of a young patient in 1931 motivated Dr. Gibbon to develop a heart-lung bypass machine, to enable more effective heart surgery techniques.
- Gibbon was dissuaded by all with whom he broached the subject but persevered
- In 1935 he successfully used a prototype heart-lung bypass machine on animals... In 1953 first used a heart-lung machine on a human patient...

Why did a *USER* have to develop the first heart-lung machine?

**At the start of something really new
*there is no “proven” market!***



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Approach (1) Finding the crowd: Learning from what they are doing

May be the source of most firms in some industries: 80% of juvenile products firms were founded by user- innovators (Source: Shah and Tripsas 2008)

Example: In 1980, Phil Baechler decided he wanted to go for a run with his son in tow. He realized that the standard wheels on his baby stroller would never last. So he decided to replace them with bicycle wheels from his garage. - and the three-wheeled "Baby Jogger" was born.



Original
Jogging stroller
User innovation



Commercial
version – not so
different!

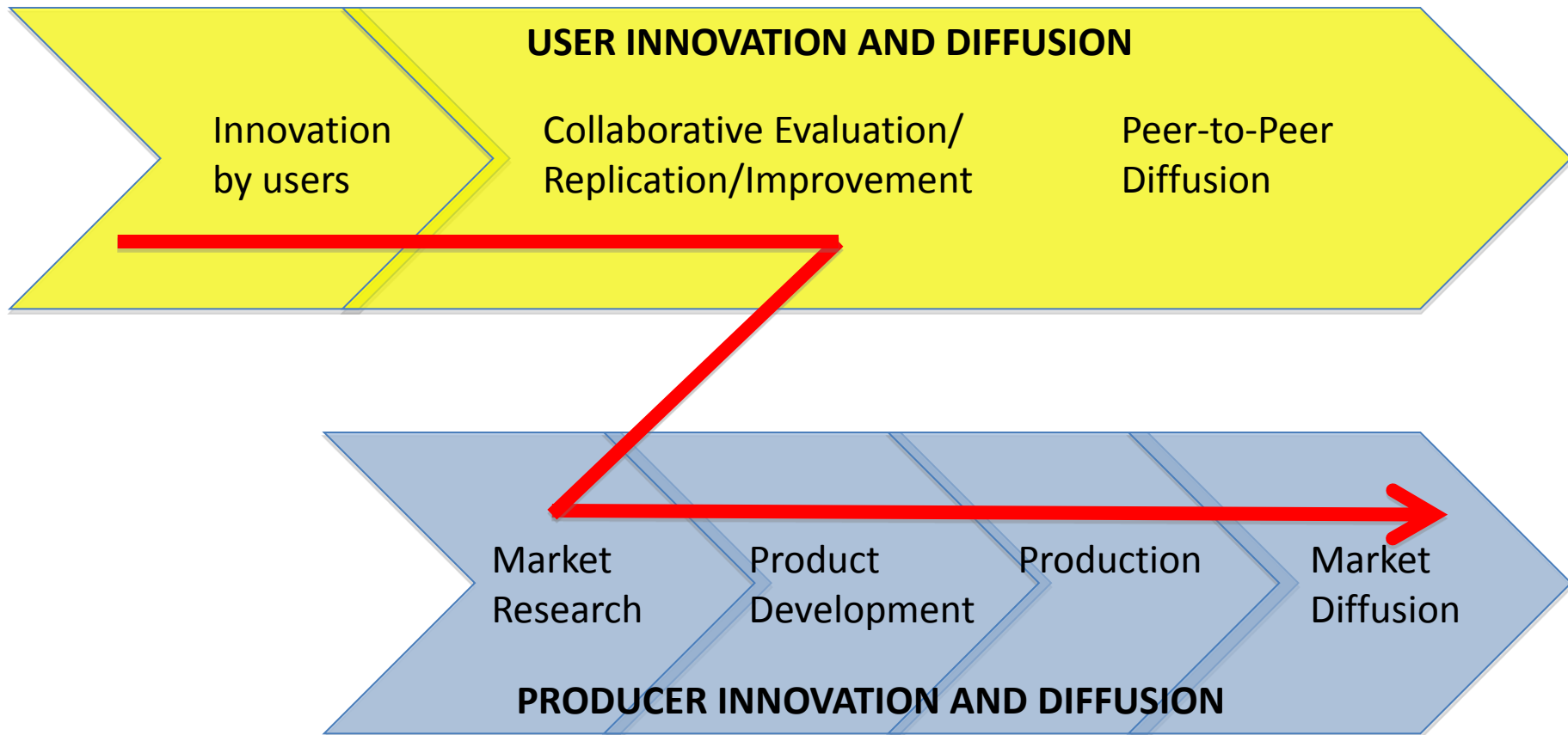
Many other examples:
E.g., Car seat for
low birth-weight babies
also developed by a user



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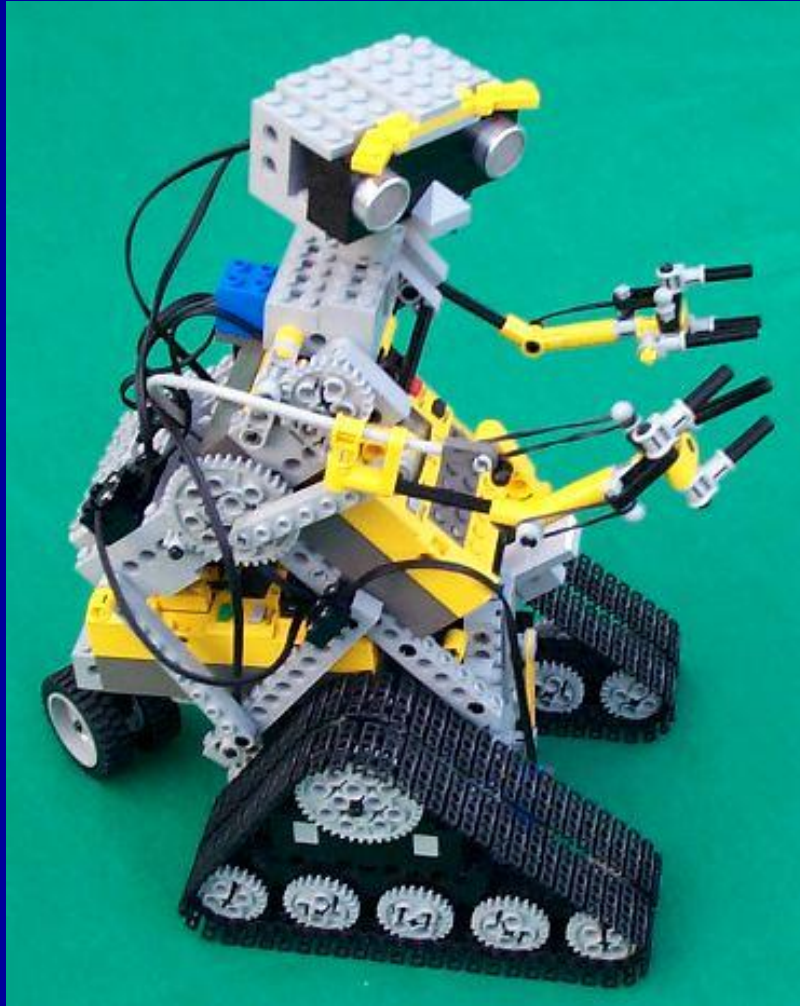
Often, the first to “observe the crowd” and develop a firm are **members** of the crowd.

46.6% of US ventures based upon innovations and surviving 5 years were founded by users (Shah et al. 2011 Kauffman report)



New questions for innovation management – How do you integrate / benefit from user innovation?

Consider Lego Mindstorms



Mindstorms robot kit

The brain

- Computer “brain” within Lego brick

Movement

- 3 stepper motors

Sensors

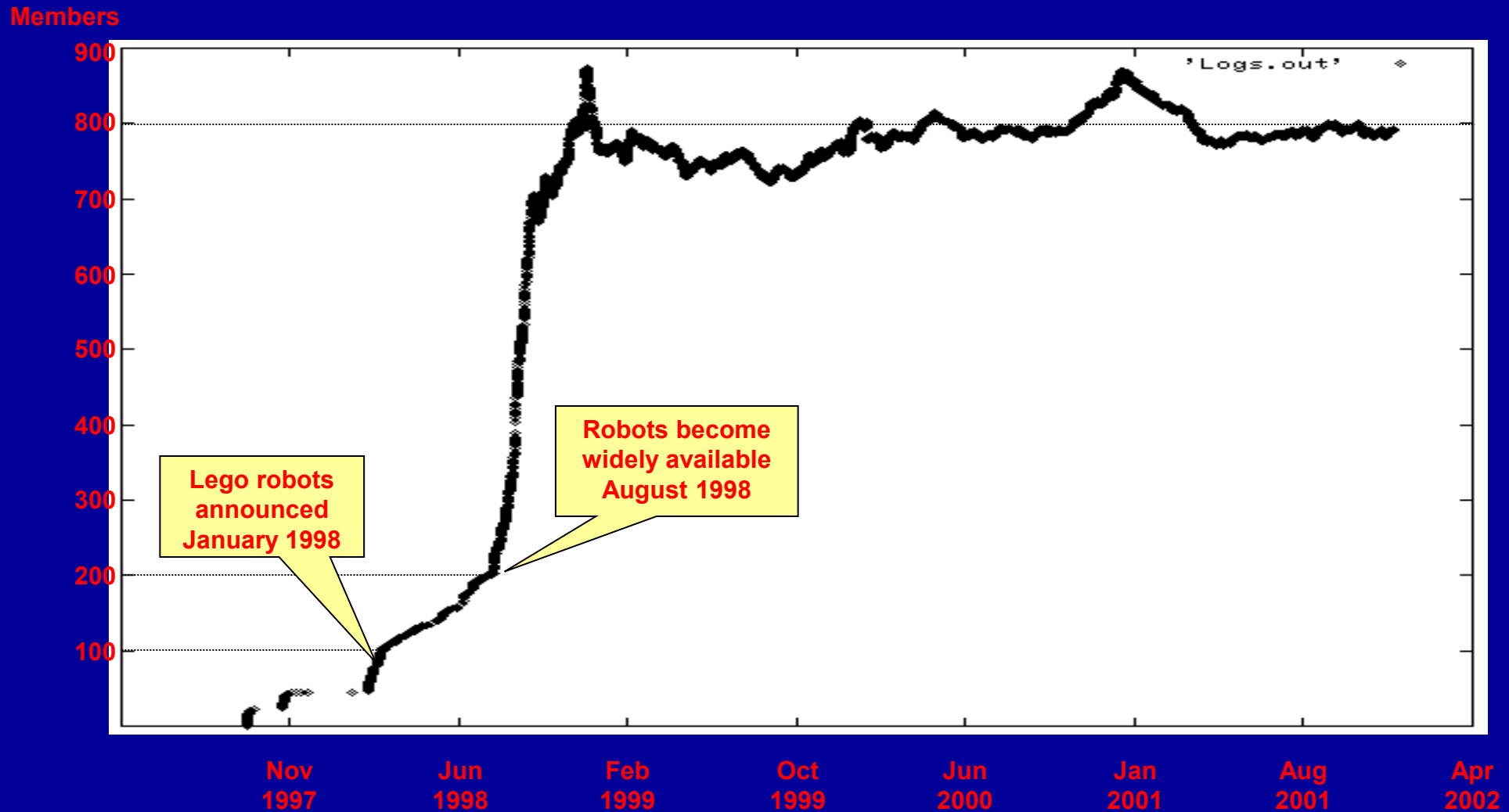
- Light
- Touch
- Temperature

Teaching

- Kid-friendly, graphical programming environment
- Programs downloaded from PC via infrared

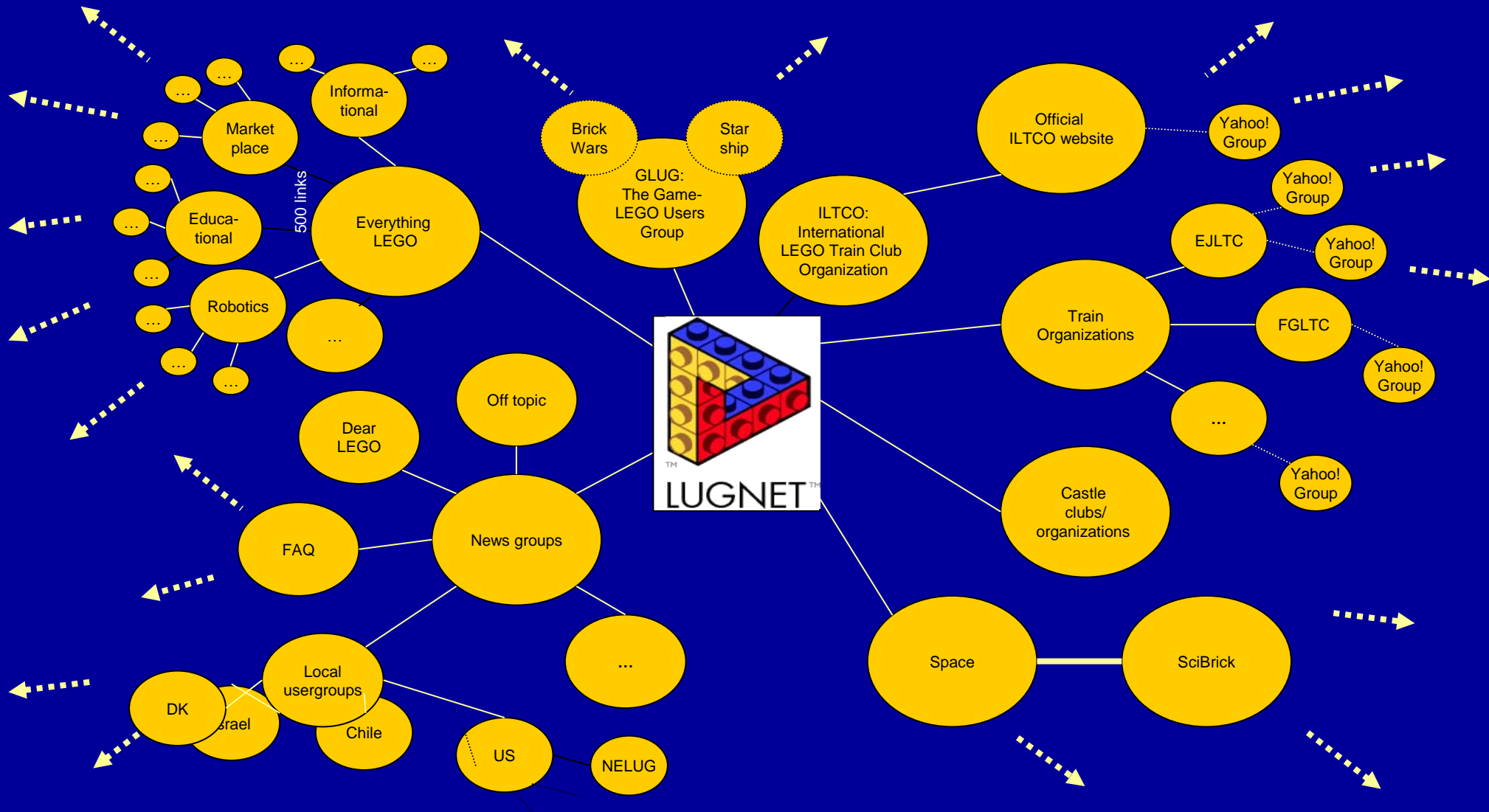
Price ~ \$200

Lego mindstorms user communities grew rapidly - without company involvement



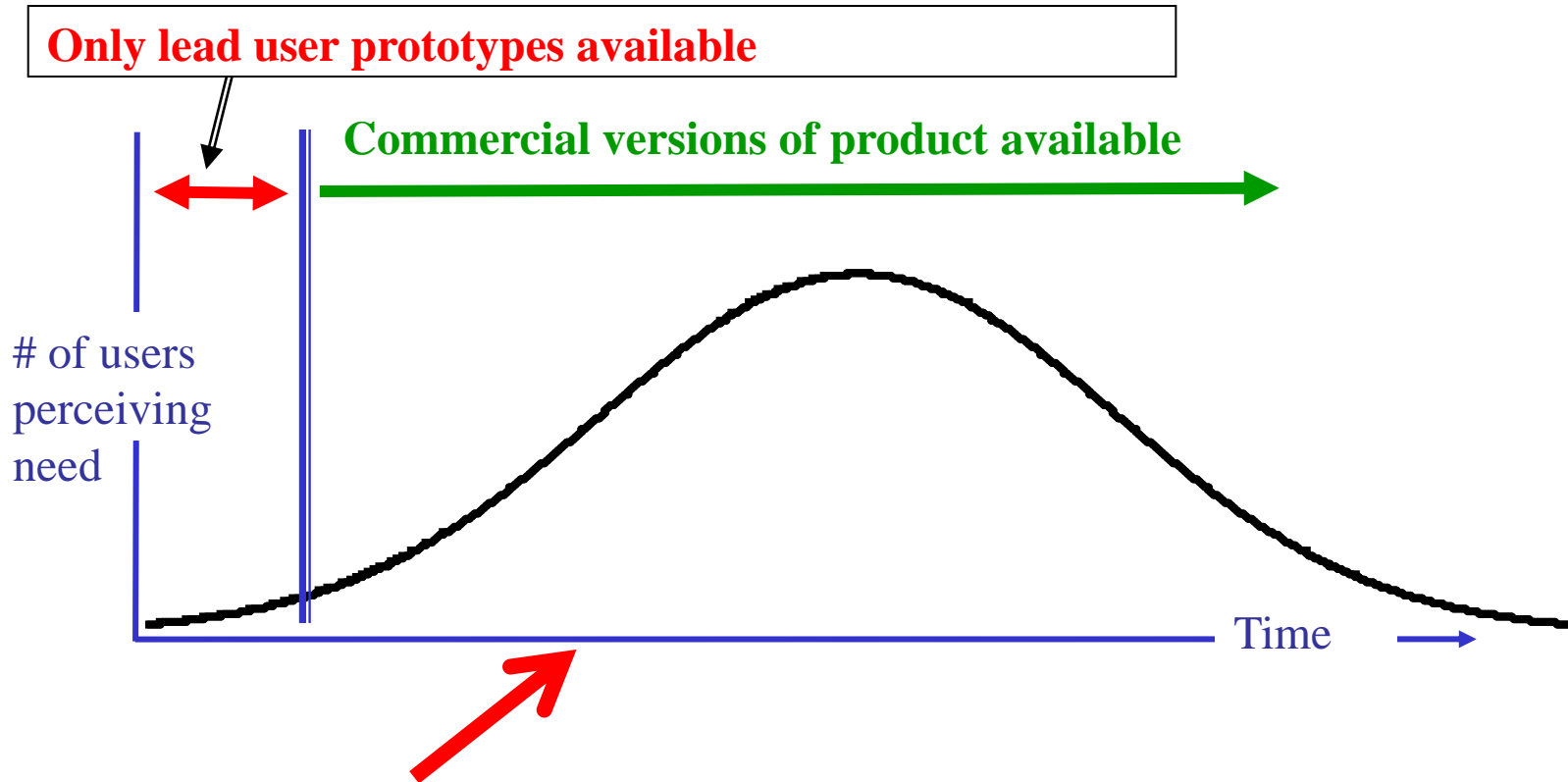
(1) Lego Users Group NETWORK. An independent discussion site for Lego enthusiasts
Source: Russel Nelson, administrator of lego-robotics (russnelson.com)

There are ~ 50 internal model developers at Lego.
There are 20,000+ AFOL's – many innovate.
More Lego-related R&D outside Lego than inside?



Approach (2):

Find an important marketplace trend and learn what users are doing at the leading edge



**Identify and focus on an important marketplace trend
"Name that trend!"**

It is not easy to find lead users who have developed THE innovation: Users who develop important innovations seldom do it twice

Few users developed more than one major commercialized innovation

Innovation Type	Number of users developing this Number of major innovations					na	(n)
	1	2	3	6			
Scientific Instruments*	28	0	1	0	1	32	
Scientific Instruments**	20	1	0	1	0	28	
Process equipment***	19	1	0	0	8	29	
Sports equipment****	7	0	0	0	0	7	

* Source, von Hippel 1988, Appendix: GC, TEM, NMR Innovations

** Source, Riggs and von Hippel, Esca and AES

*** Source, von Hippel 1988, Appendix: Semiconductor and pultrusion process equipment innovations.

**** Source, Shah 2000,

Example: was a trend towards longer Bike races – but which users had the best solution to problems like hydration?

U.S. Troops Make Use of Water Gear The New York Times July, 2003

Many troops have custom backpacks that serve as personal water-carrying and drinking systems.

Camelbak's patented "personal hydration system" was invented in 1988 by a Texas paramedic, Michael Edison. To prevent dehydration during a summer bike race, he fashioned a drinking system from surgical tubing and an IV bag that he sewed to his shirt.



Image is in the public domain. Source: [Wikipedia](#).



Camelbak photograph courtesy of [ussocom_ru](#) on Flickr.

A free practical workbook and videos on how to do lead user innovation projects

<http://mit.edu/evhippel/www/teaching.htm>

Performance Assessment of Lead User Research at 3M

Research Team: Prof. Gary Lilien, Penn State University;
Prof. Pam Morrison, University of New South Wales; Dr. Kate
Searls, ASI Associates, Mary Sonnack, Division Scientist, 3M;
Prof. Eric von Hippel, MIT

For the complete article and other Lead User Videos and
articles: Go to leaduser.com on the Web

Assessment Results: Lead User vs. Non-Lead User Funded Ideas

	LU Ideas (n=5)	NON-LU Ideas (n=42)	Sig.
“Newness” of Idea			
■ Novelty compared to competition	9.6	6.8	0.01
■ Newness of needs addressed	8.3	5.3	0.09
Projected Profitability			
■ % market share in year 5	68%	33%	0.01
■ Estimated sales in year 5	\$146m	18m	0.00
Strategic Value			
■ Strategic importance	9.6	7.3	0.08
■ Fit with Strategic plan	9.8	8.4	9.24
Fit with Business			
■ Intellectual property protection	7.1	6.7	0.80
■ Fit with mfr. Capabilities	7.8	6.7	0.92
■ Fit with distribution channels	8.8	8.0	0.61

Note: Items measured on 10 pt. Scale, 10=high, 1=low

Essential Definitions

“Breakthrough:”

- Determines Future Business Growth and Margins
- Major Product line >20% of Division Sales

Incremental improvement:

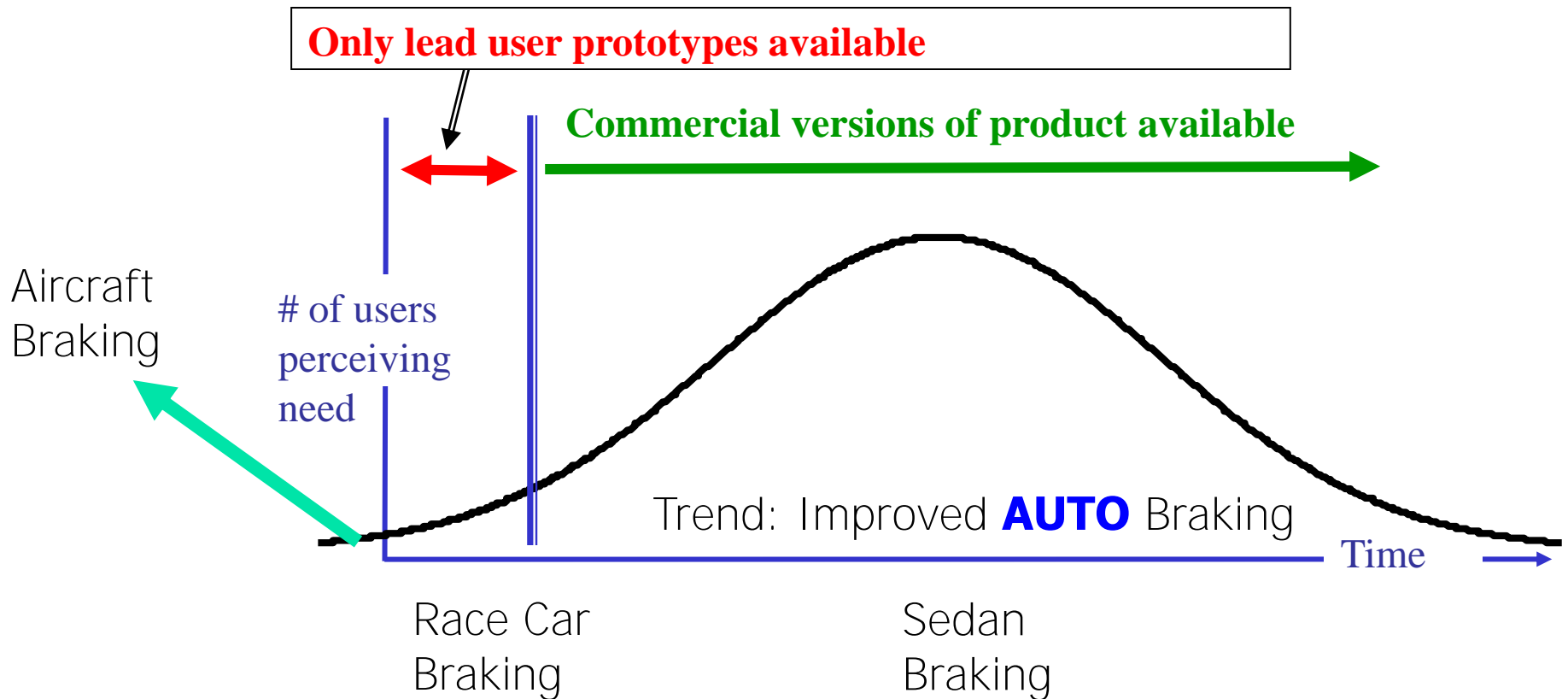
- Valuable to existing business
- Extension to existing line

	Incremental	Breakthrough
Traditional 3M Method	41	1
LU Method At 3M	0	5

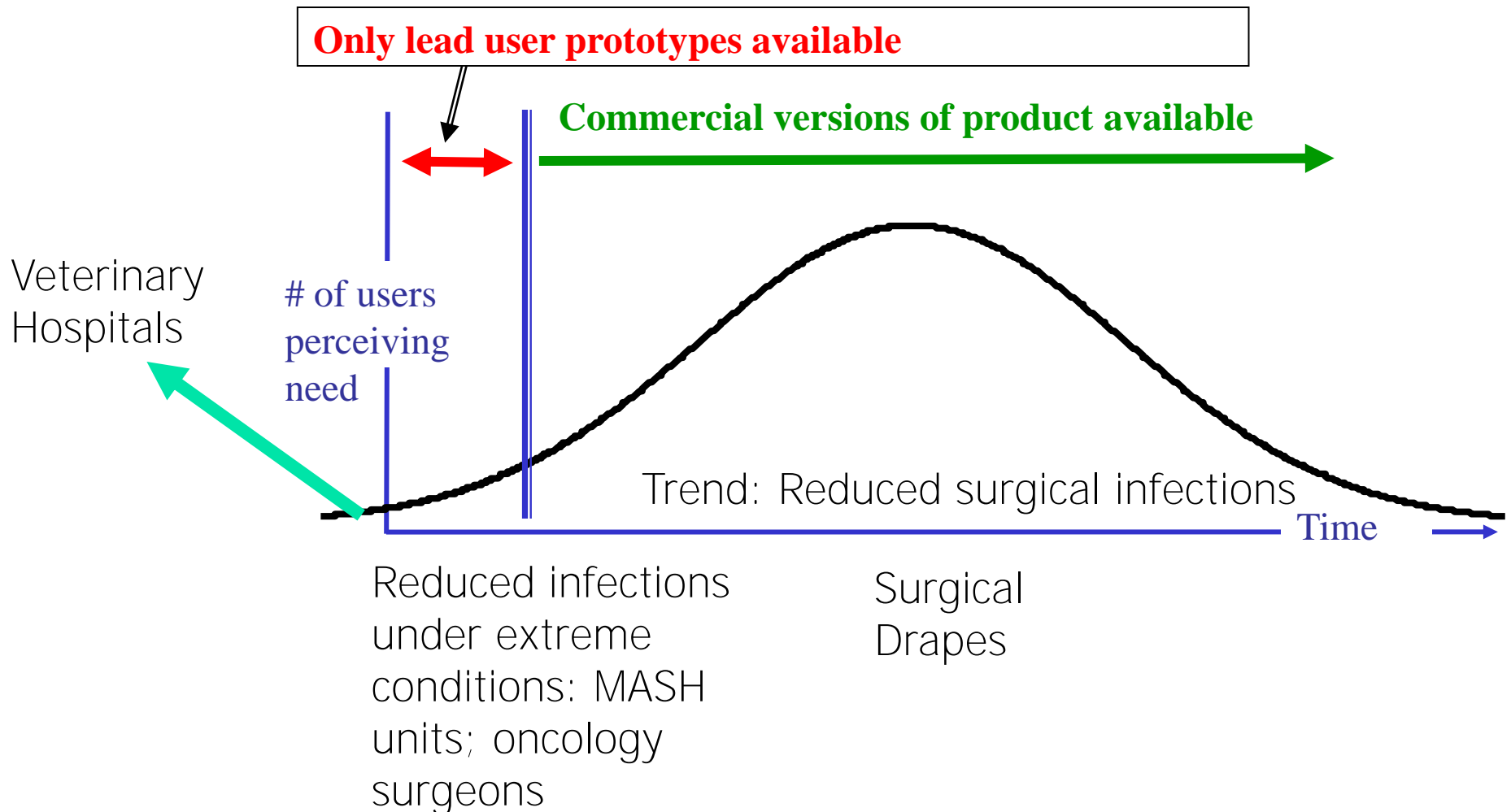
ACTIVITY: Think about possible Lead Users in *your* markets

- Step 1** **Select a specific market & specific *major* trend to think about**
- Step 2** **Brainstorm possible lead users *within* that target market**
- Which types of individuals or firms have needs at the leading edge of the trends?
 - Which ones have a high incentive & the resources to solve their leading edge needs?
- Step 3** **Brainstorm possible lead users *outside* target market**
- Which types of users in other fields & applications are facing a similar need but in a more demanding form?
- Step 4** **Specify what you might learn from each type of LU**

Breakthrough solutions are often found in “advanced analog” applications and markets



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15.356 How to Develop Breakthrough Products and Services

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