

Users Working Together in Communities are Powerful Innovators

Eric von Hippel

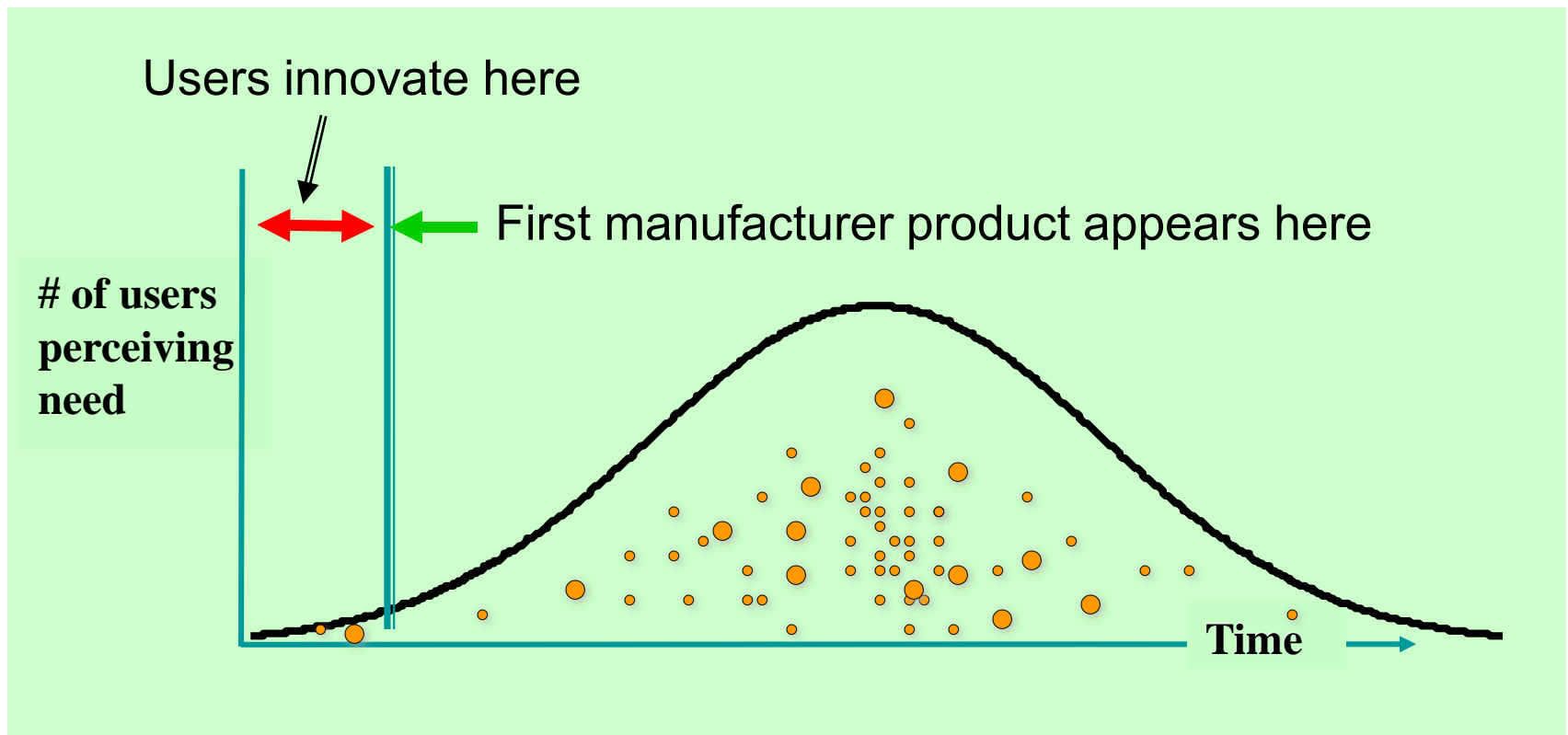
MIT Sloan School of Management

Traditional, Manufacturer-Centered Innovation Paradigm

Manufacturers identify user needs, develop products at private expense, And profit by protecting and selling what they have developed.

User-Centered (Democratized) Innovation Paradigm

Lead Users innovate to solve their own needs at private expense - and then freely reveal their innovations.

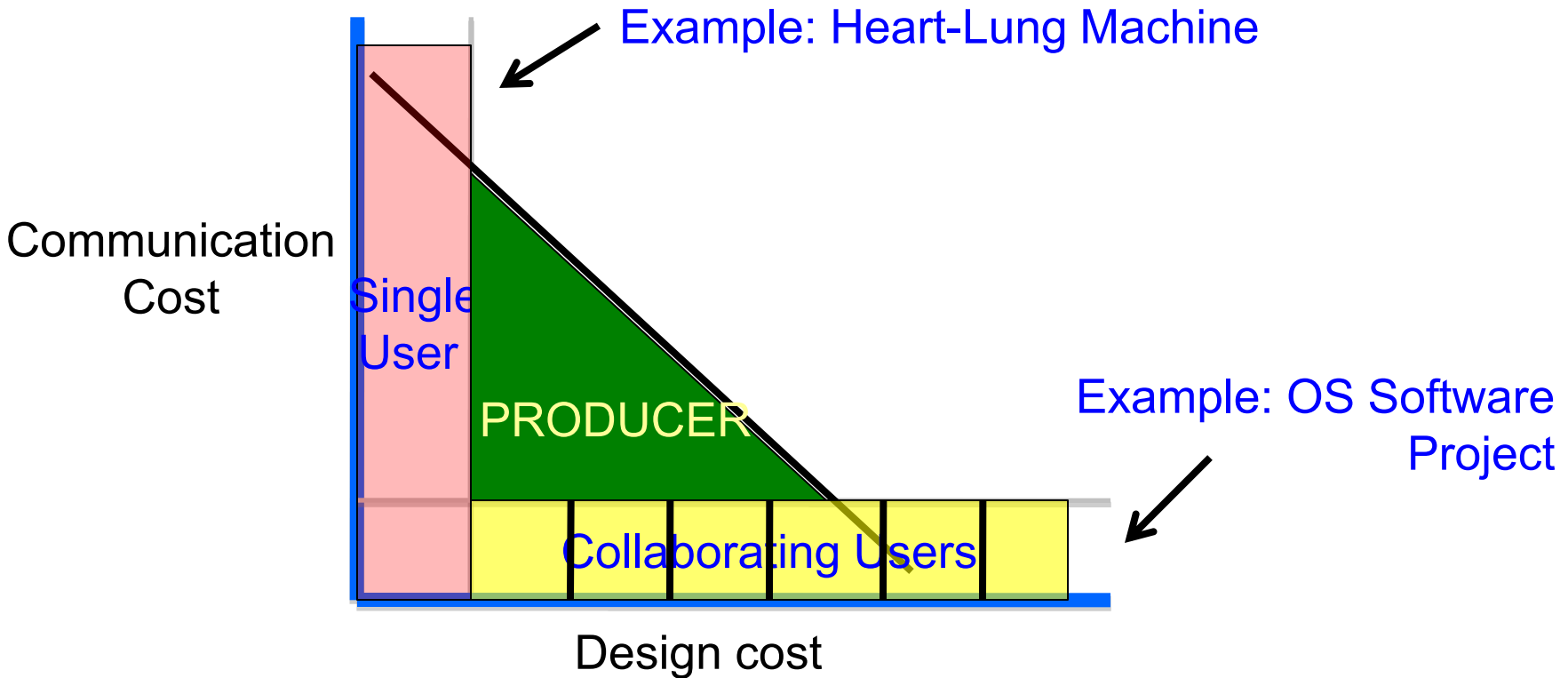


Essential Definition

The “functional” source of innovation depends upon the *functional* relationship between innovator and innovation:

- An innovation is a **USER innovation** when the developer expects to benefit by USING it;
- An innovation is a **MANUFACTURER innovation** when the developer expects to benefit by SELLING it.

Here is where single users, collaborating users, or producers dominate innovation design



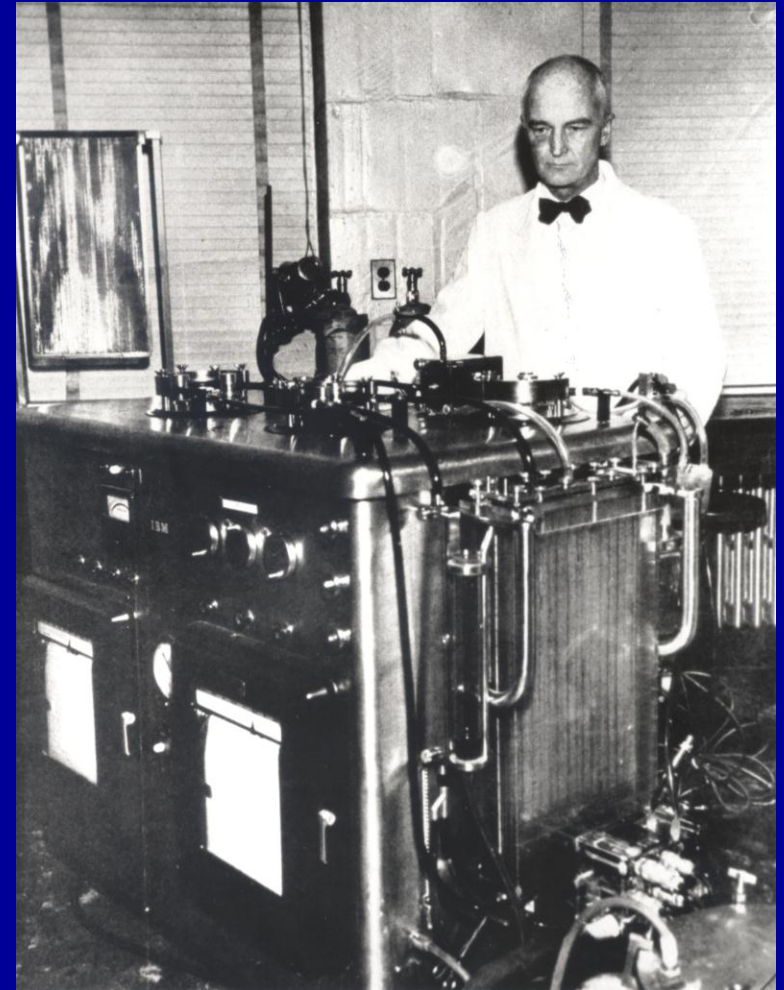
John Heysham Gibbon is an example of a *SINGLE user-innovator*

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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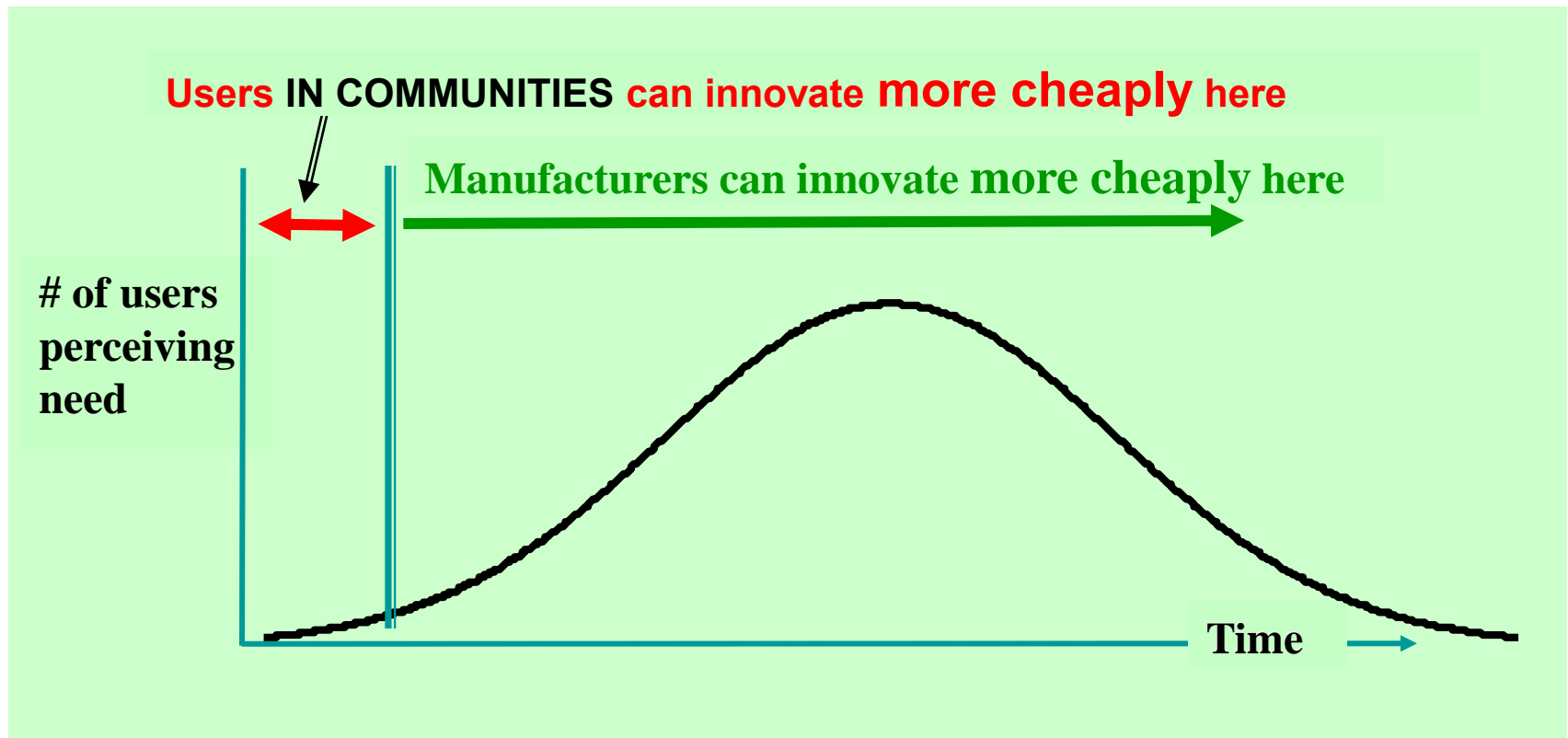
Studies show that *Many* users innovate

Industrial products	n	% innovating
Printed Circuit CAD Urban and vH		24.3%
Pipe Hanger Hardware Herstatt and vH		36%
Library IT Systems Morrison, Roberts, vH		26%
Software security features Franke and vH		19.1%
Surgical Equipment Luthje		22%
Consumer products	n	% innovating
Outdoor Products Luthje		9.8%
“Extreme” sports equipment Franke & Shah		37.8%
Mountain biking equipment Luthje, Herstatt, vH		19.2%

Why do so many users develop products for themselves? Because many have “custom” needs

- 2 meta analyses of market segmentation studies show heterogeneity of need is generally high:
 - 5.5 segments specified on average: 46% within-segment variation remaining (Franke and Reisinger, 2003)
 - 3.7 segments specified on average: 54% within-segment variation remaining (Franke and von Hippel, 2003)

Users tend to quickly form communities that freely reveal – an economically-efficient solution



User innovation communities can *supplant* product development by manufacturers



Consider Kitesurfing



Photographs courtesy of [Joseph Dsilva](#) and [Michael Hanscom](#) on Flickr.

Users develop and post kite designs - often **better** than designs by kite manufacturers

EXAMPLE: Super high AR mountain board kite

“From Sebastian in Argentina..
a super high AR inflatable
design for mountain boarding...”



Posted by saul at 05:58 PM

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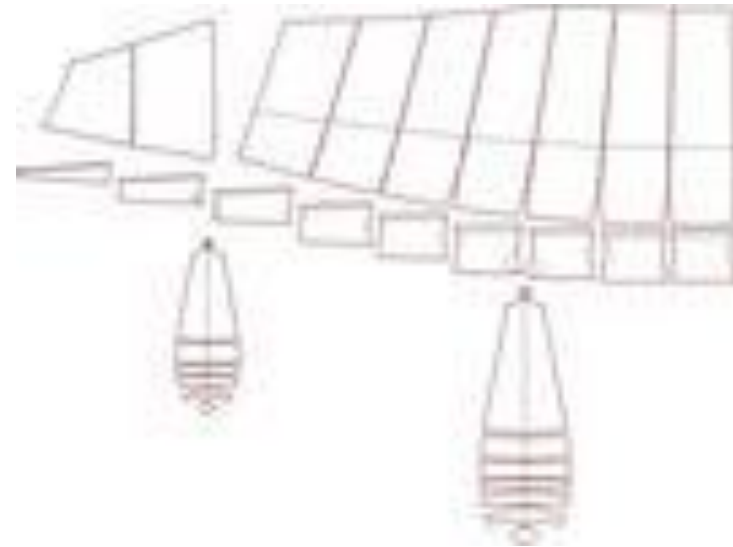
Kite design **tools** posted by users on Zeroprestige.org are often **better** than manufacturers' internal tools

Kite modeling tools

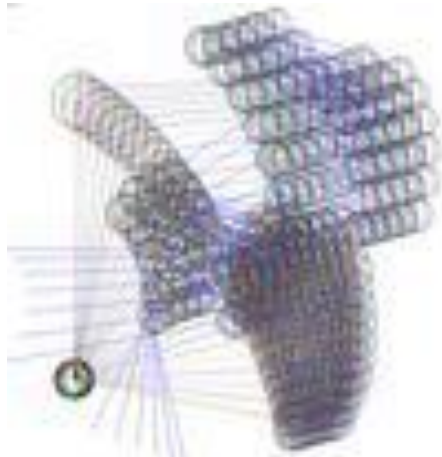


Patterns for building kites

(Can be sent to sail lofts as CAD files.)



Aerodynamic modeling tools

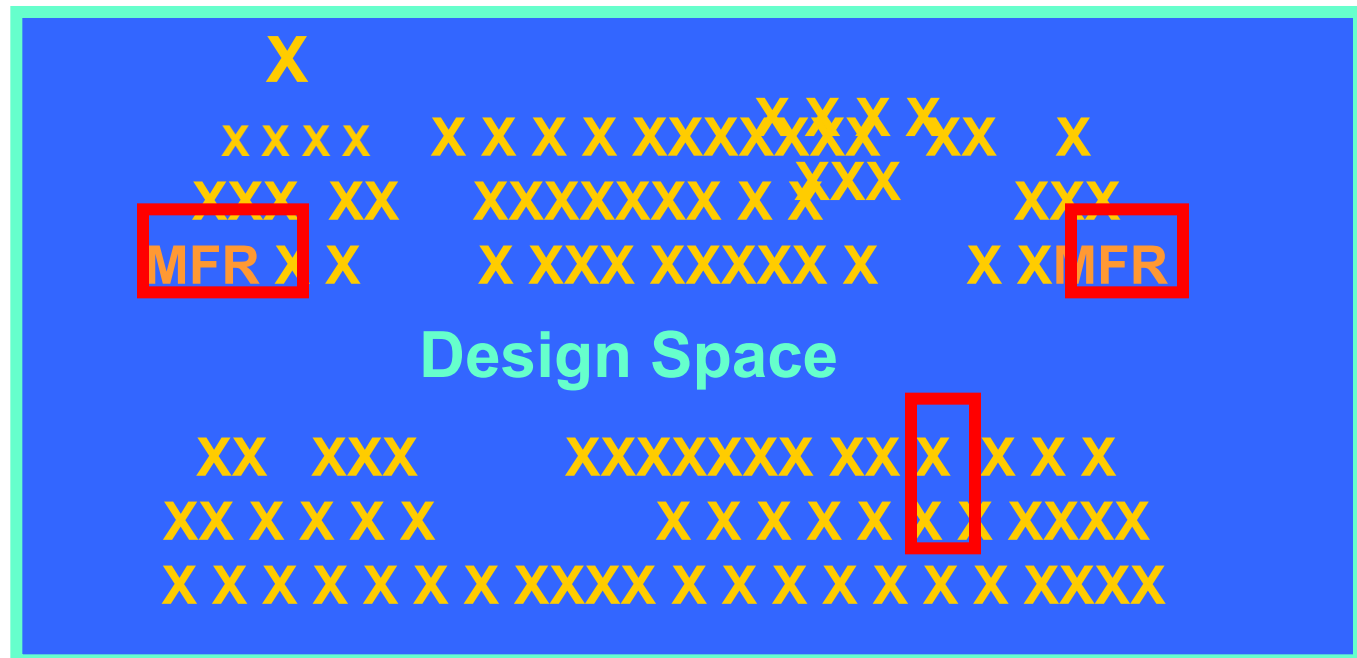


RESULT: User Innovation Communities may drive kite manufacturers right out of product design – innovation is being “democratized”

- **HAS BEEN** An industry of manufacturers that develop and sell kites of their own design.
 - \$100mm in equipment sales in 2002 – growing fast.
- **TODAY** – some firms are moving to a “build only” specialization – leaving product innovation to the user community (Firms are starting to download and build user designs instead of creating their own kite designs.)

Why user collaboratives can out-compete producers in design:

Given modularity, heterogeneous users innovating independently and freely revealing can produce more and better design work that is collectively available than can individual producers that each protect their private innovations.



Companies often ignore user communities – and miss valuable innovations – consider Lego Mindstorms



Mindstorms robot kit

The brain

- Computer “brain” within Lego brick

Movement

- 3 stepper motors

Sensors

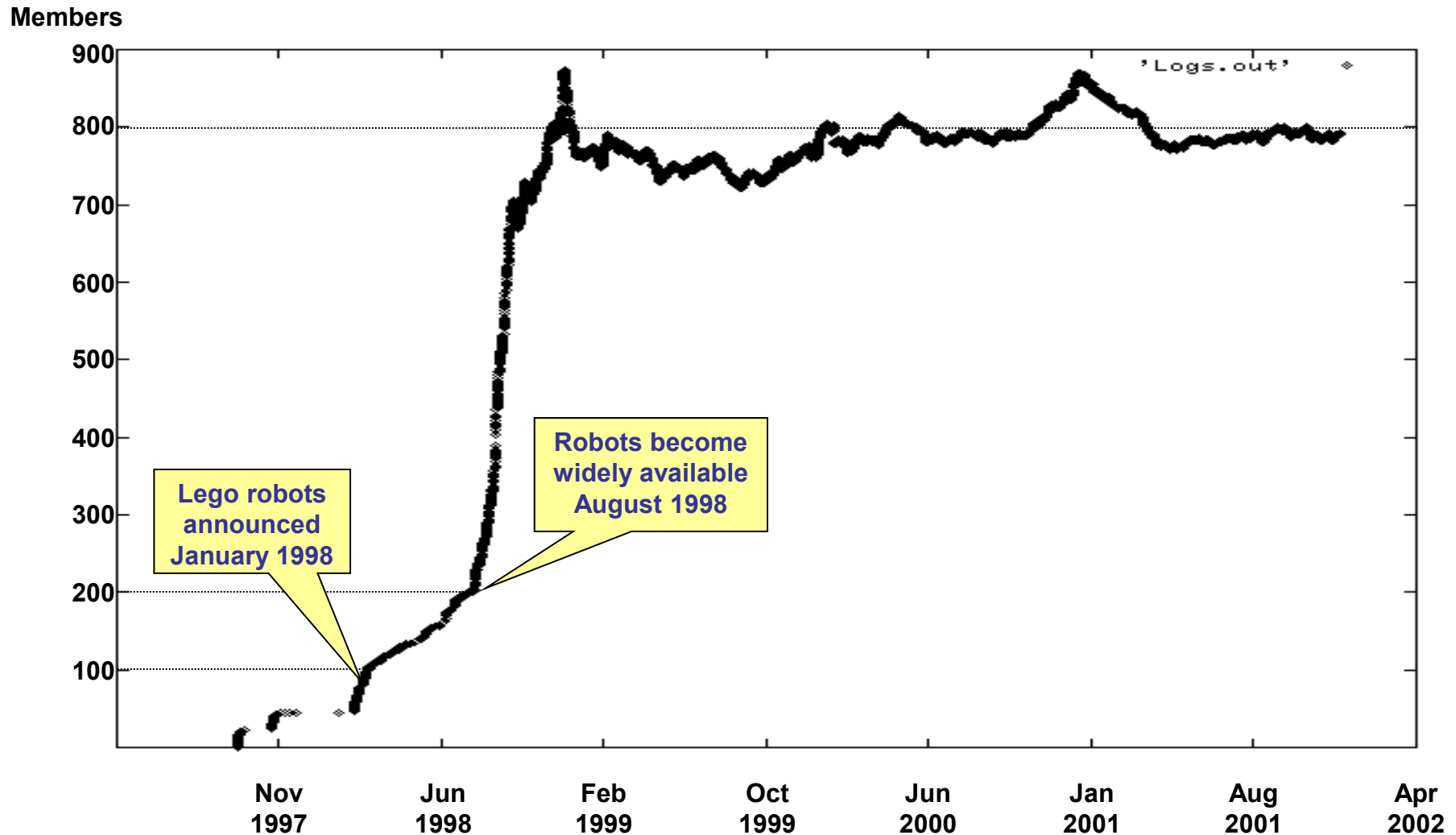
- Light
- Touch
- Temperature

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)

Within 3 weeks of commercial introduction of Lego Mindstorms system, users had improved it significantly

The rules

Robots follow 7 meter “track” of tape

- Light sensors detect tape
- Internal software tells robot how to move

Fastest time around track wins

About one dozen participants



The results

Winner (below left)

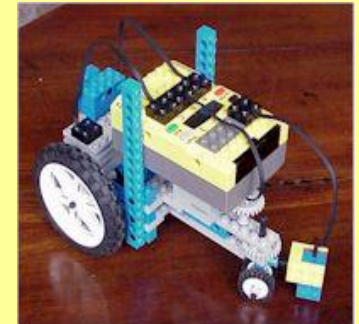
- Used hacker-developed LegOS software
- Time under 10 seconds (73 cm/s)

Second place (below right)

- Used program based on LEGO firmware
- Time of 25 seconds (28 cm/s)



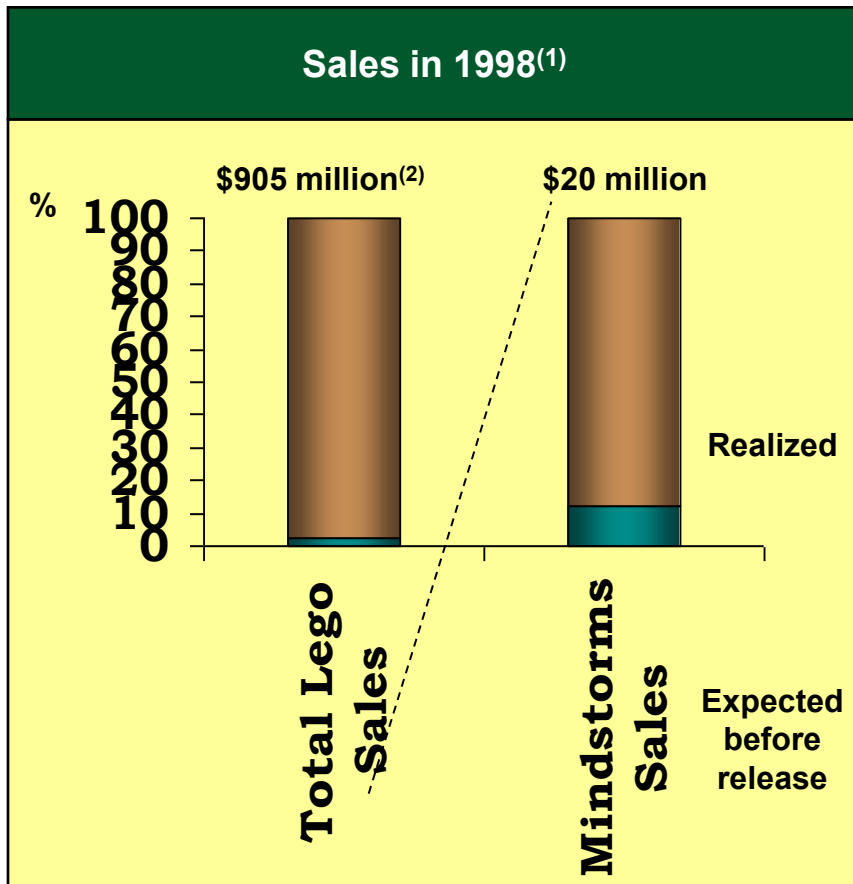
LegOS



Lego firmware

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Mindstorm sales greatly surpassed Lego expectations



Adults drove increased sales

70% of customers over age 18

- Craze among “techie” adults
- Silicon valley firms forced to ban Lego’s at work

Online communities accelerated purchasing

Lego unable to keep up with demand

- Sold out 2 weeks before Christmas 1998

Major universities built curriculum around Lego

- Hacker software allows advanced robotics using Lego’s hardware
- MIT, Duke among campuses using Mindstorms

(1) First year toys were offered

(2) Lego sales include theme parks, retail outlets and other non-core businesses

Source: Business 2.0, Boston Consulting Group Analysis

Lego was not sure how to respond **- for several years**

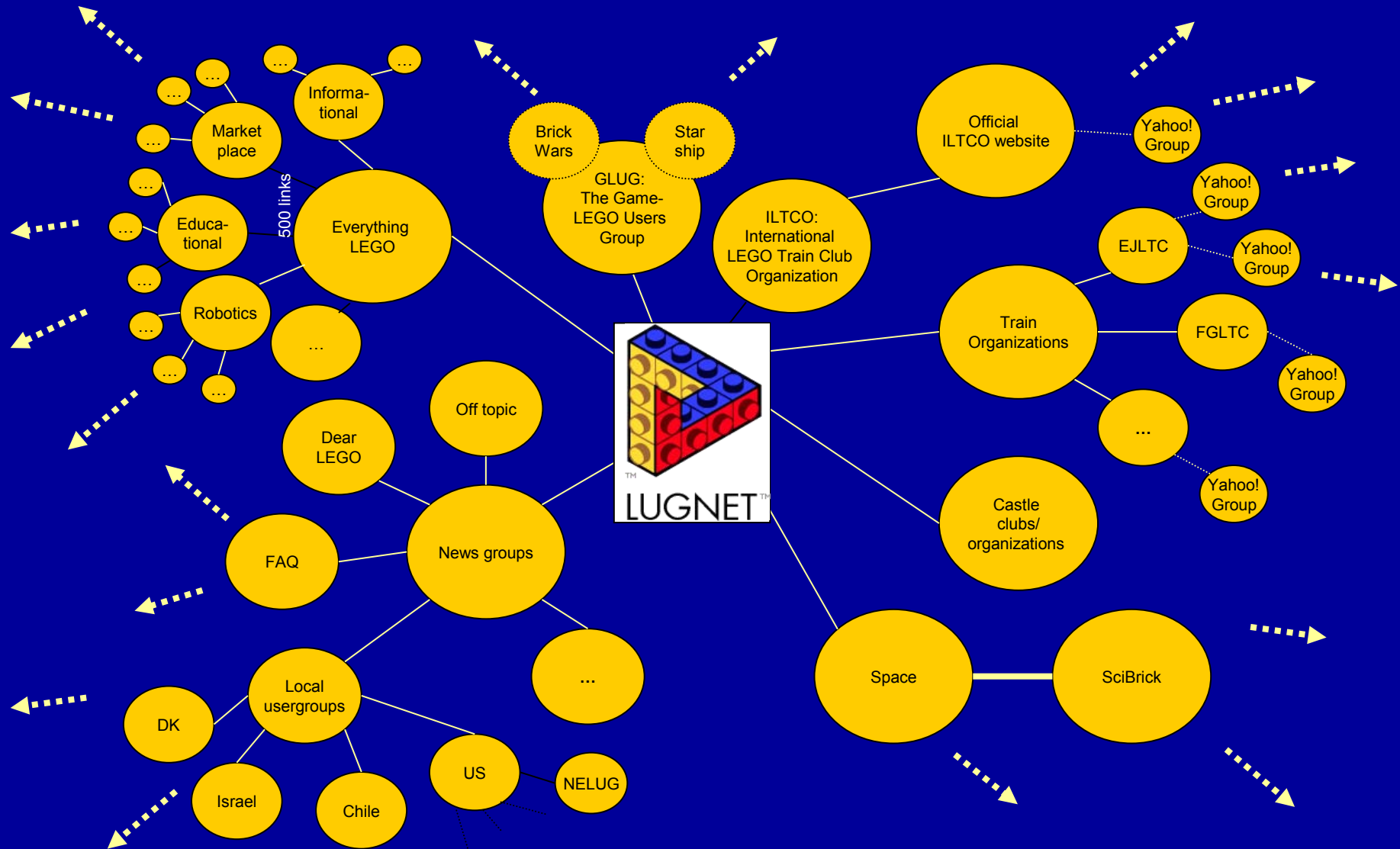
“There was almost a full year without a word from Lego: Neither acknowledgement of what was going on, nor threats towards the hackers.”

-David Baum, Lego Hacker

-“Lego executives simply didn’t know what to do...”

-Internal Lego Executive

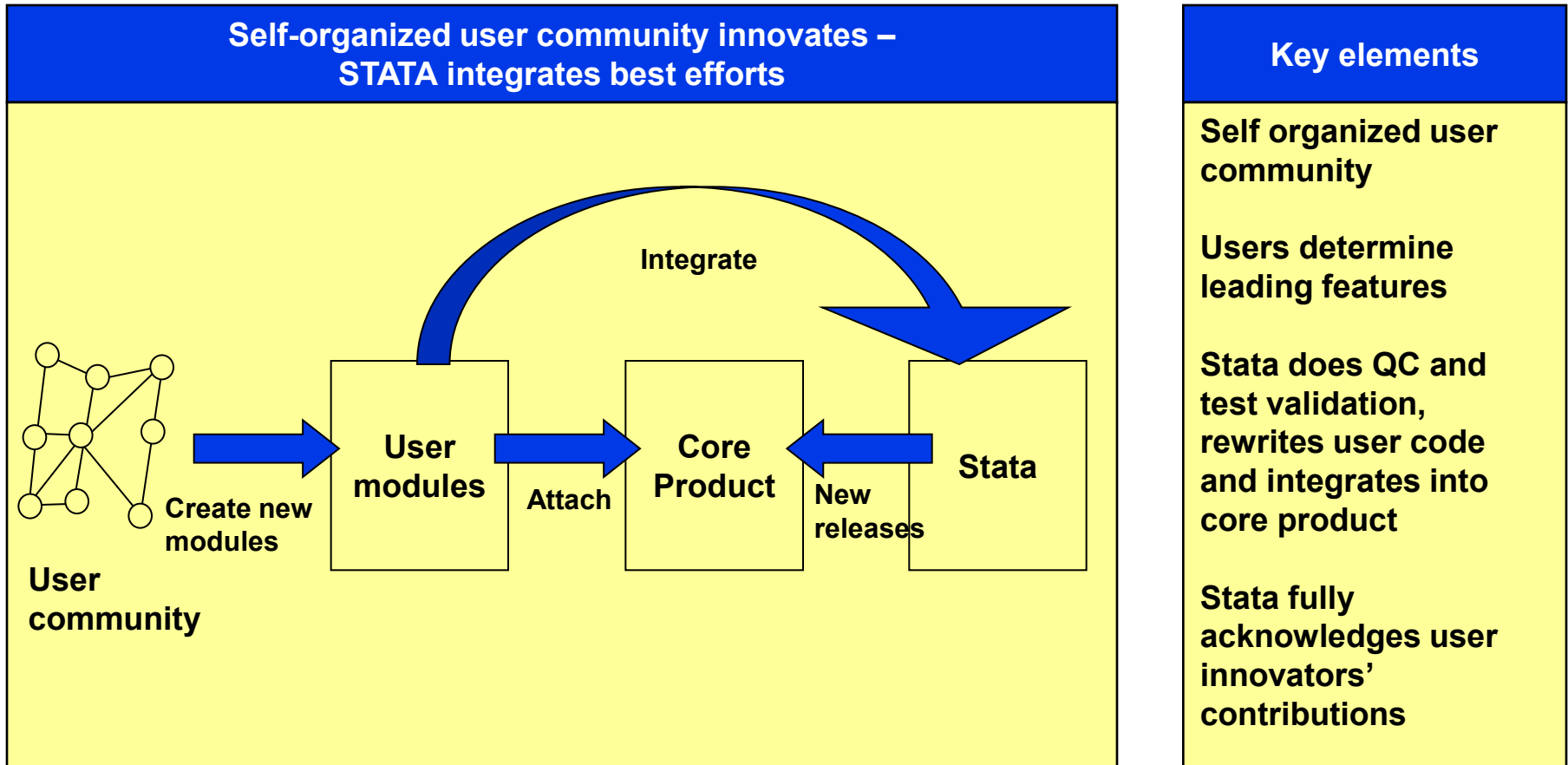
There are ~ 200 internal R&D people at Lego.
There are 20,000+ AFOL's – many innovate.
More Lego-related R&D outside Lego than inside?



Now LEGO is learning to outsource some of its product development to innovating users

The screenshot displays the LEGO Factory website interface. At the top, there is a navigation bar with the LEGO logo and buttons for HOME, PRODUCTS, CLUB, SHOP, and LEGOLAND. A search bar with a 'GO!' button and a 'club SIGN IN Register Now' link are also present. Below this is a dark blue header with the 'FACTORY BUILDING YOUR WAY' logo and buttons for HOME, DESIGN, GALLERY, PRODUCTS, and HELP. The main content area is divided into three columns: 'CREATE' (CREATE YOUR 3D MODEL IN LEGO DIGITAL DESIGNER), 'SHARE' (SHARE YOUR MODEL WITH OTHER LEGO FANS IN THE ONLINE GALLERY), and 'BUY' (BUY THE BRICKS NEEDED FOR YOU TO BUILD YOUR MODEL). Each column features a corresponding image: a 3D model in a software interface, a gallery of four designs, and a LEGO set box. Below the main content are three promotional boxes: 'News!' about new versions of LEGO Digital Designer, a photo of a young boy with text about design winners, and a 'NEW LEGO DIGITAL DESIGNER 1.4' box with text about downloading the software for PC and Mac.

Good Practice: Statacorp has learned to integrate user-developed innovations into its commercial product on a regular basis



Significant portion of STATA product built on user-developed tests

Still another way to benefit: User communities can assist producers with product support

Examples:

In Microsoft “newsgroups,” Two million volunteers help Microsoft customers solve their technical problems.

- 2mm contributors per year.
- 40K contributors contribute more than 36 times per year.

(Source, Larry Lessig)

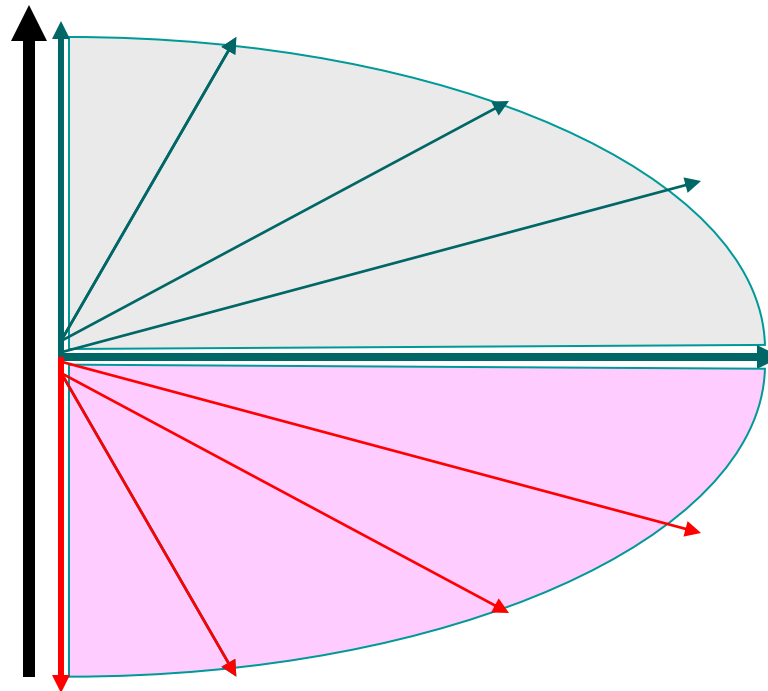
At Westwood Studios: Consumer-to-consumer support is 13 times the Westwood official game toolkit support.

- The highest-quality support is provided by just a few users:
- 6 of the most active consumers each provide as much support as the entire Westwood contribution

(Source: Lars Bo Jeppesen)

The interests of a user innovation community and a “host” firm *may not be aligned*

**User
community
Can ADD
value for
Manufacturer**



**User community
Can SUBTRACT value for
Manufacturer**

Automakers can find themselves at odds with some members of “their” user innovation communities

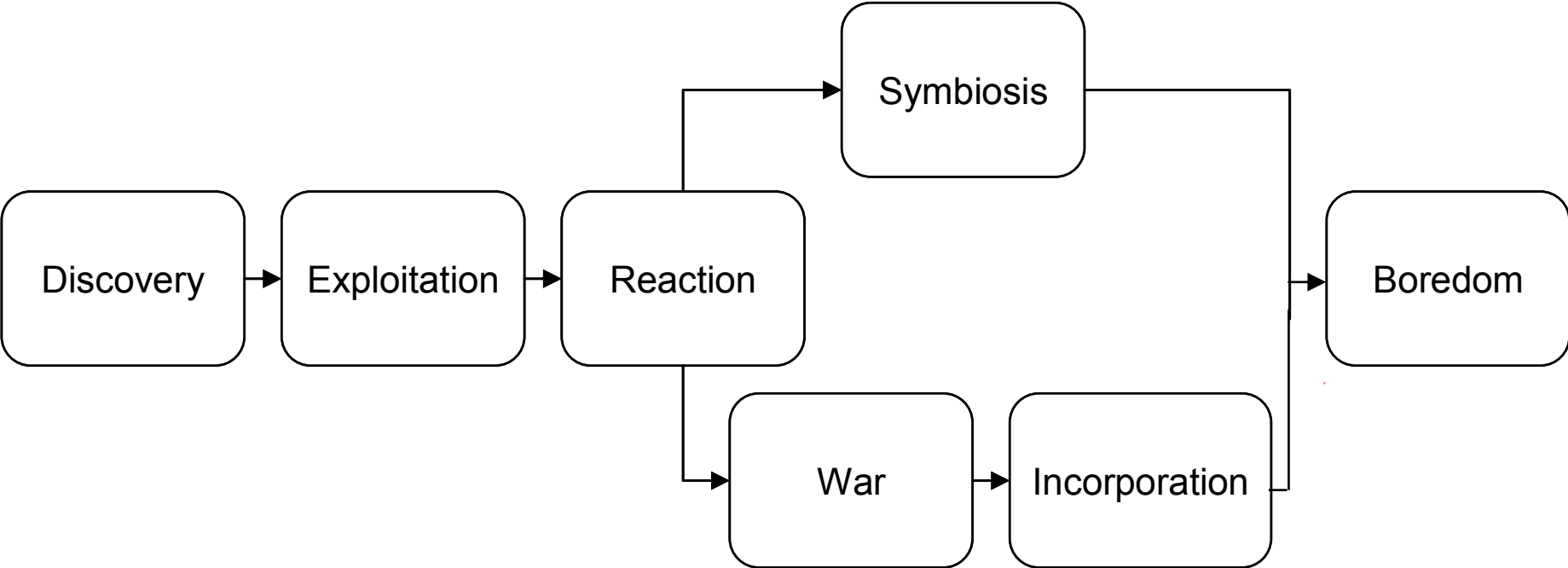


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**Users reprogram / replace their auto engine chips
to get higher performance –
Manufacturers worry about consequent warranty costs**

New York Times, February 12, 2004

You can fight initially or cooperate – you get to the same point in the end



Does your product have an *innovating* user community? First step: Check the web

EXAMPLE:

When I Googled “Ford Mustang Forums” Lots came up, including Mustang Modding sites – indicates possible user innovation

Modded Mustangs - Ford Mustang Enthusiasts

Modded Mustangs –

Ford Mustang Performance modding community and Mustang Forums.

Enthusiasts of V6,. ModdedMustangs.com. The home of serious Ford

Mustang ...

www.moddedmustangs.com/

Forums at Modded Mustangs

Modded Mustangs is the premier Ford Mustang Forum on the internet.

We discuss all aspects of the Ford Mustang on the forum.

www.moddedmustangs.com/forums/

Welcome to the John Deere Garden Tractor Club - aka "JDGTC"

JD ownership is not a membership requirement to join this group, which was created to discuss the operation, repair, and classified ads for John Deere lawn care equipment (including hand held, walk behind, lawn tractor, garden tractor, and compact utility tractors); as well as JD related material and other brands too.

- We are a "Lurker" friendly group! Post as much, or little, as you wish.
- When applying for membership, please include your interest in John Deere equipment.
- Discussions on bypassing safety switches or the operation of equipment in an unsafe manner or condition (including but not limited to bypassed switches, over riding the governor, or lack of shields) are NOT permitted in this group!
- Deere & CO. copyrighted material is not permitted to be posted or uploaded to the group.
- After joining, check your email setting, the Yahoo default is "Individual", which is a copy of each message.
- Usage of this group implies your consent to follow the JDGTC's guidelines, which were sent to each new member and can be found in the "Files" area. Please unsubscribe if you are unwilling to follow our guidelines.

Microsoft introduces the Kinect controller for their X-box 360 on Nov 4, 2010. A couple of days later, users open it up to figure out how it works. *They DO want to buy it* – but they want to use it for other applications

The Kinect controller
Recognizes human gestures



Image courtesy of [Dekuwa](#) on Flickr.



Image courtesy of iFixit.

← **What's inside**

What happened next (NYT 11-21-2010)

On the day the Kinect went on sale, [Nov 4, 2010] Limor Fried of Adafruit and Phillip Torrone of Make magazine announced a \$3,000 cash bounty for anyone who creates and releases free software allowing the Kinect to be used with a computer instead of an Xbox.

Microsoft quickly gave the contest a thumbs-down. In an interview with CNet News, a company representative said that it did not “condone the modification of its products” and that it would “work closely with law enforcement and product safety groups to keep Kinect tamper-resistant.”

Then Microsoft changed its mind

“Anytime there is engagement and excitement around our technology, we see that as a good thing,” said Craig Davidson, senior director for Xbox Live at Microsoft.

“It’s naïve to think that any new technology that comes out won’t have a group that tinkers with it.”

Microsoft and other companies would be wise ... to consider wrapping some of the creative advances into future products, said Loren Johnson, an analyst at Frost & Sullivan who follows digital media and consumer electronics.

“These adaptations could be a great benefit to their own bottom line,” he said.

“It’s a trend that is undeniable...”

Example: Philipp Robbel combined an iRobot and the new Microsoft controller that can recognize gestures.

He calls it the KinectBot.

Image of Kinectbot removed due to copyright restrictions. Original image can be viewed here: <http://www.nytimes.com/imagepages/2010/11/22/hackjump1.html>.

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