

Open and User Innovation: Implications for Innovation Statistics



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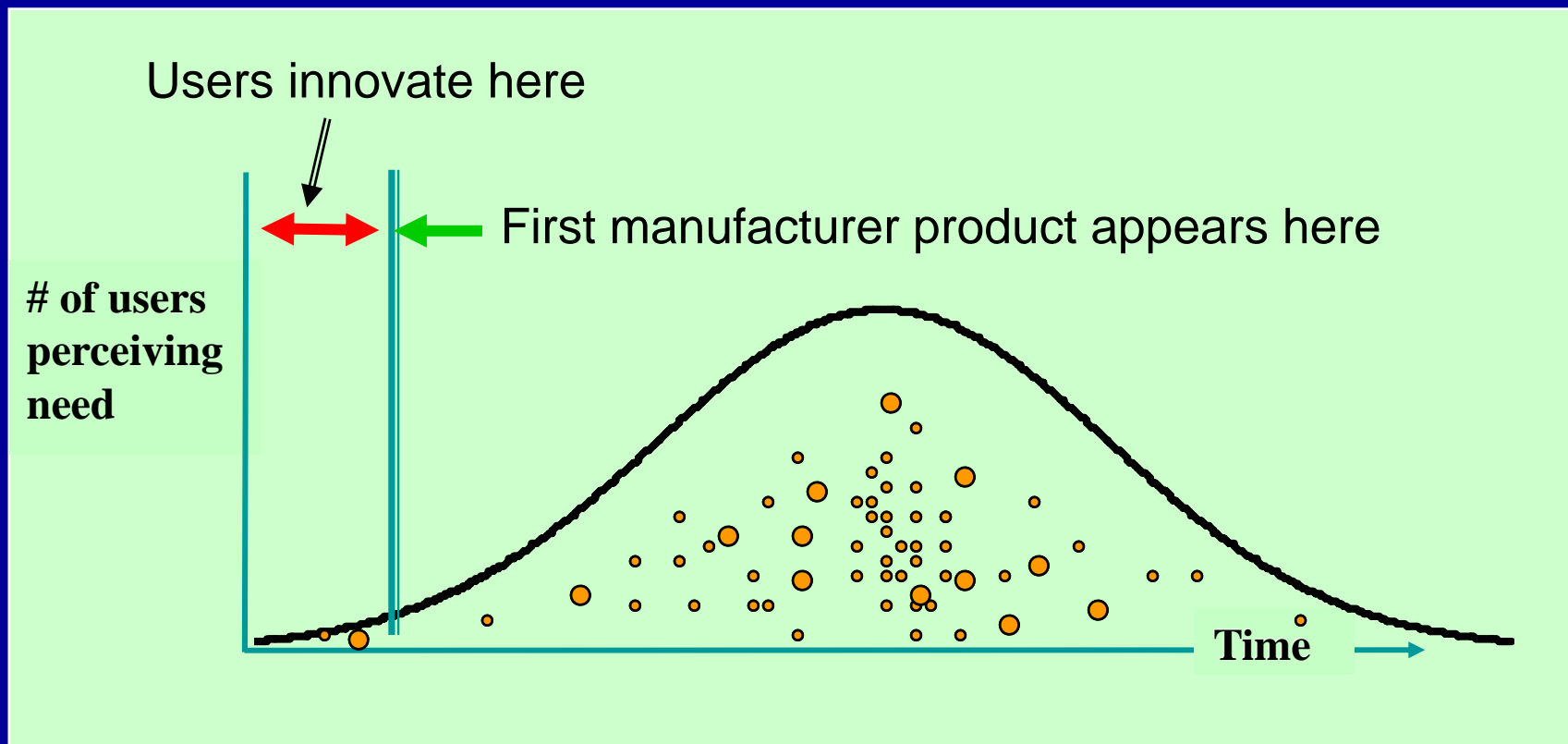
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Traditional, Manufacturer-Centered Innovation Paradigm

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



Users at the leading edge are termed “lead users:” They (1) lead the market and (2) have a strong need

**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...

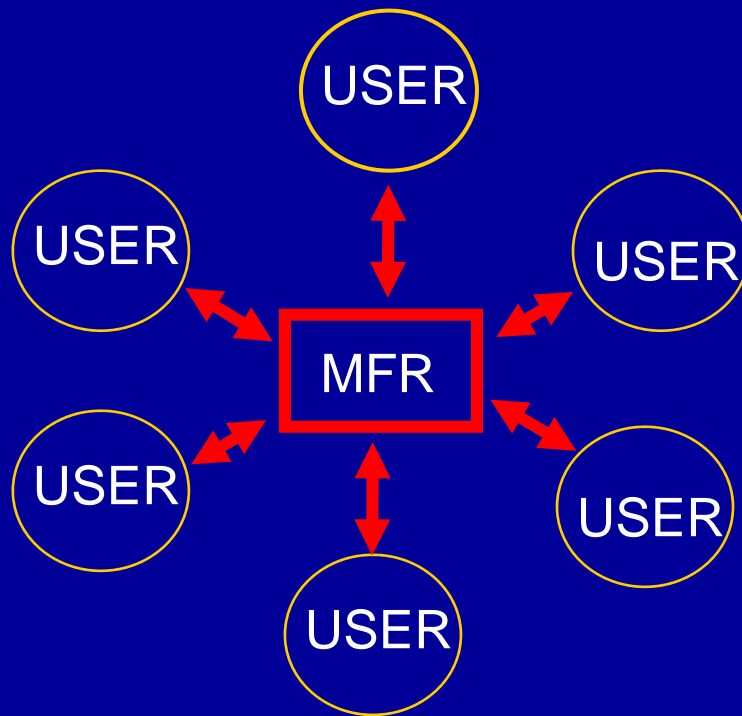
**Why did a *USER* have to develop the first heart-lung machine?
At the start of something really new
*there is no “proven” market!***



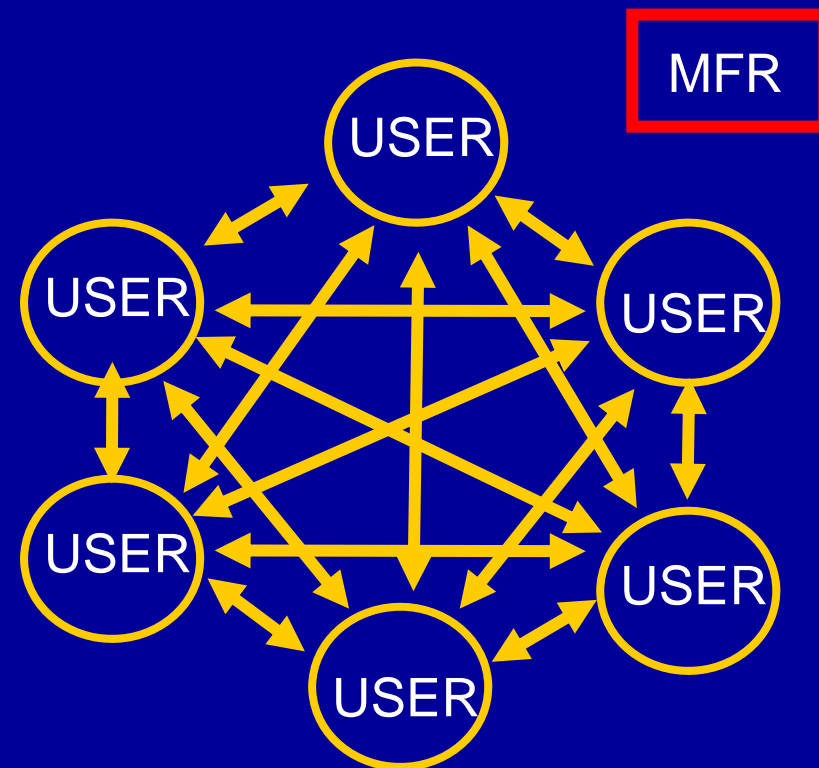
Studies show that *Many* users innovate

Industrial products	n	% innovating
Printed Circuit CAD Urban and vH	136	24.3%
Pipe Hanger Hardware Herstatt and vH	74	36%
Library IT Systems Morrison, Roberts, vH	102	26%
Software security features Franke and vH	131	19.1%
Surgical Equipment Luthje	262	22%
Consumer products	n	% innovating
Outdoor Products Luthje	153	9.8%
"Extreme" sports equipment Franke & Shah	197	37.8%
Mountain biking equipment Luthje, Herstatt, vH	291	19.2%

The Internet is enabling individual user innovators to join into *user innovation collaboratives* - an increasingly powerful competitor to manufacturer-based design

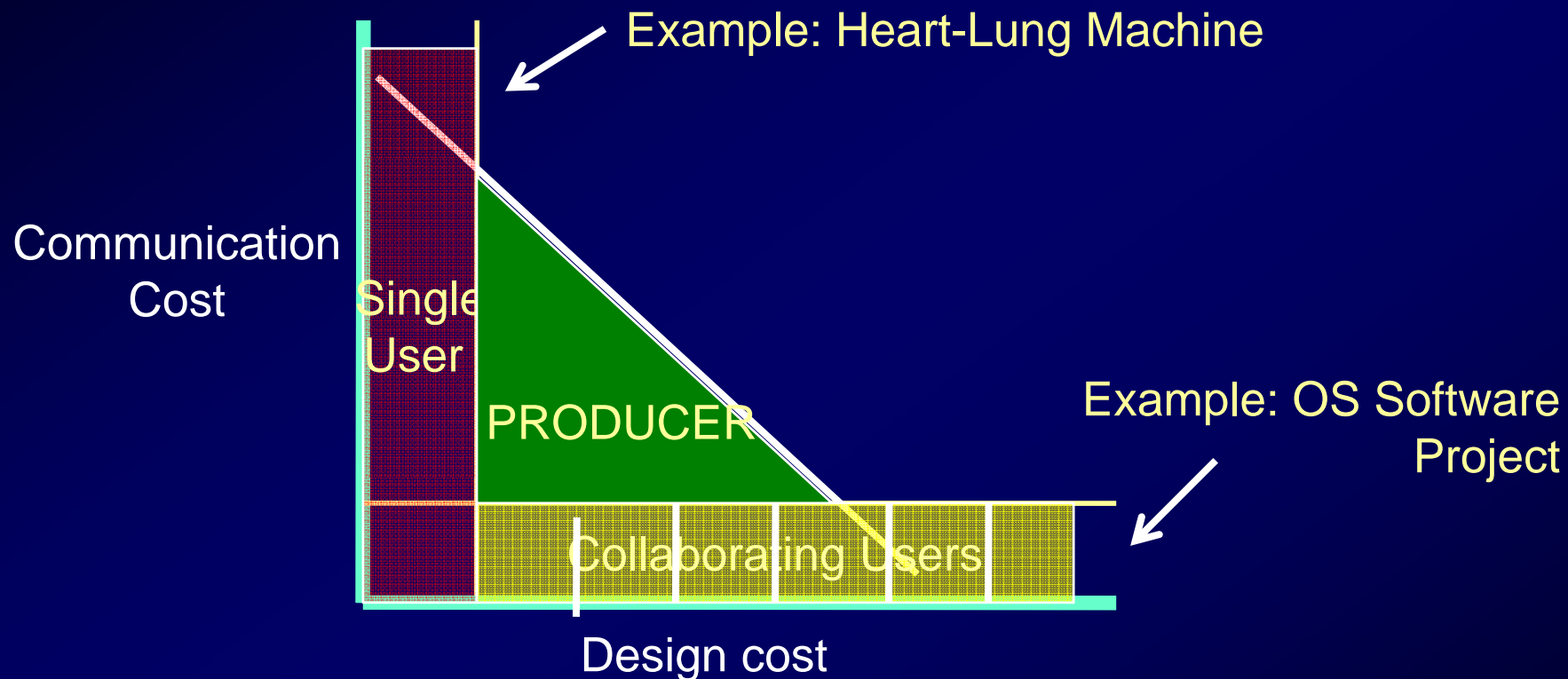


The way it was:
Producer-Innovators and
Robinson Crusoe
User-Innovators



The way it increasingly is:
User innovation
Collaboratives

Where do single users, collaborating users, or producers dominate design?



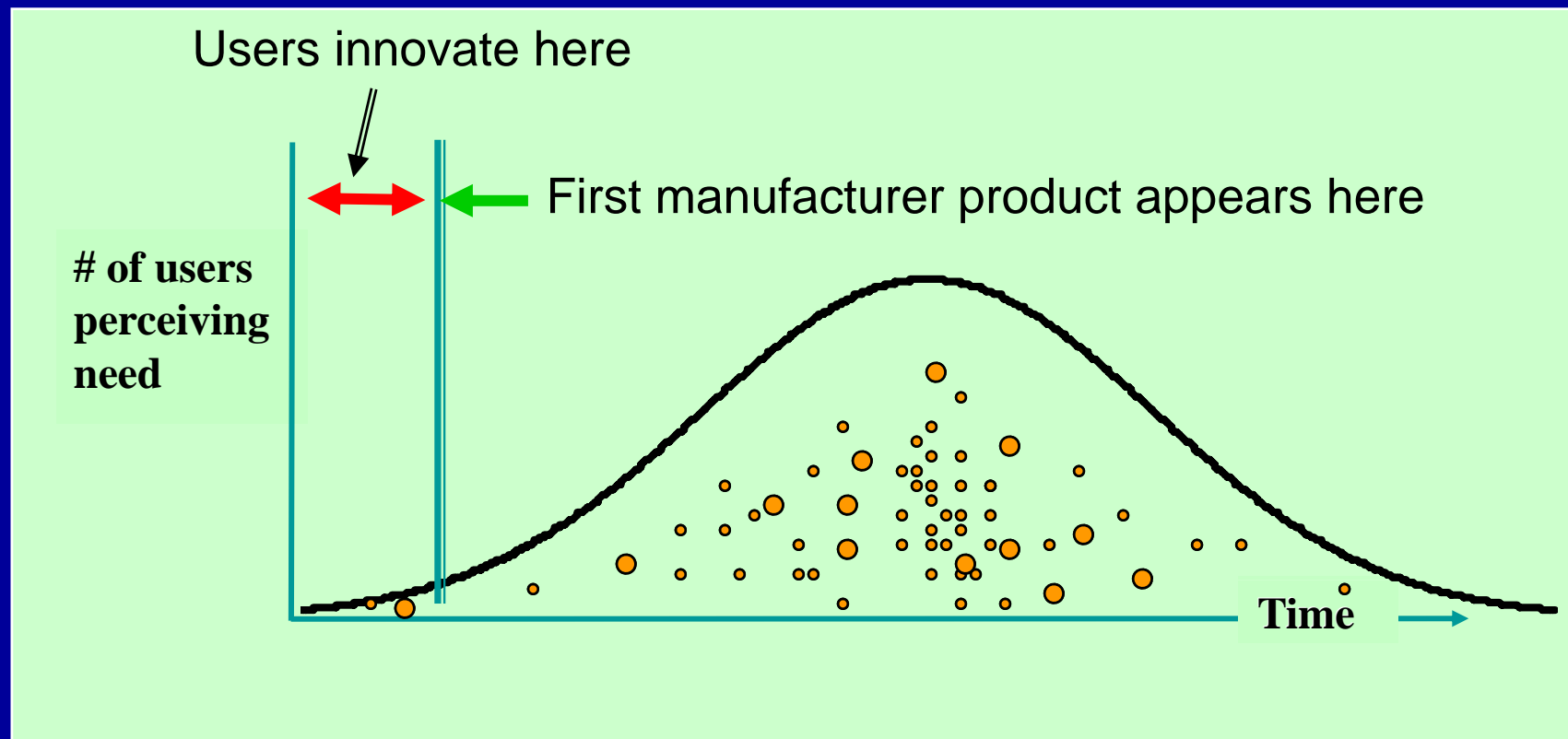
Source: Baldwin and von Hippel 2009

User innovation and the research-driven innovation model

Have very different policy implications.

Basic Research → Applied Research → Technology Development → Product/Process Development → Production → Marketing

For example: should we focus so much on R&D and patents?
We should also consider user innovation metrics and policies!



First Trial in UK: How many UK consumers innovate?

Total User Innovators in UK = 3.8 million people	8%
Modified a consumer product for own use	5.9%
Created a consumer product for own use	4.4%
Thought they were the first to develop the innovation they reported	4%
Sample	(n=2109) Consumers aged 15+

Source: Flowers et al. NESTA 2010

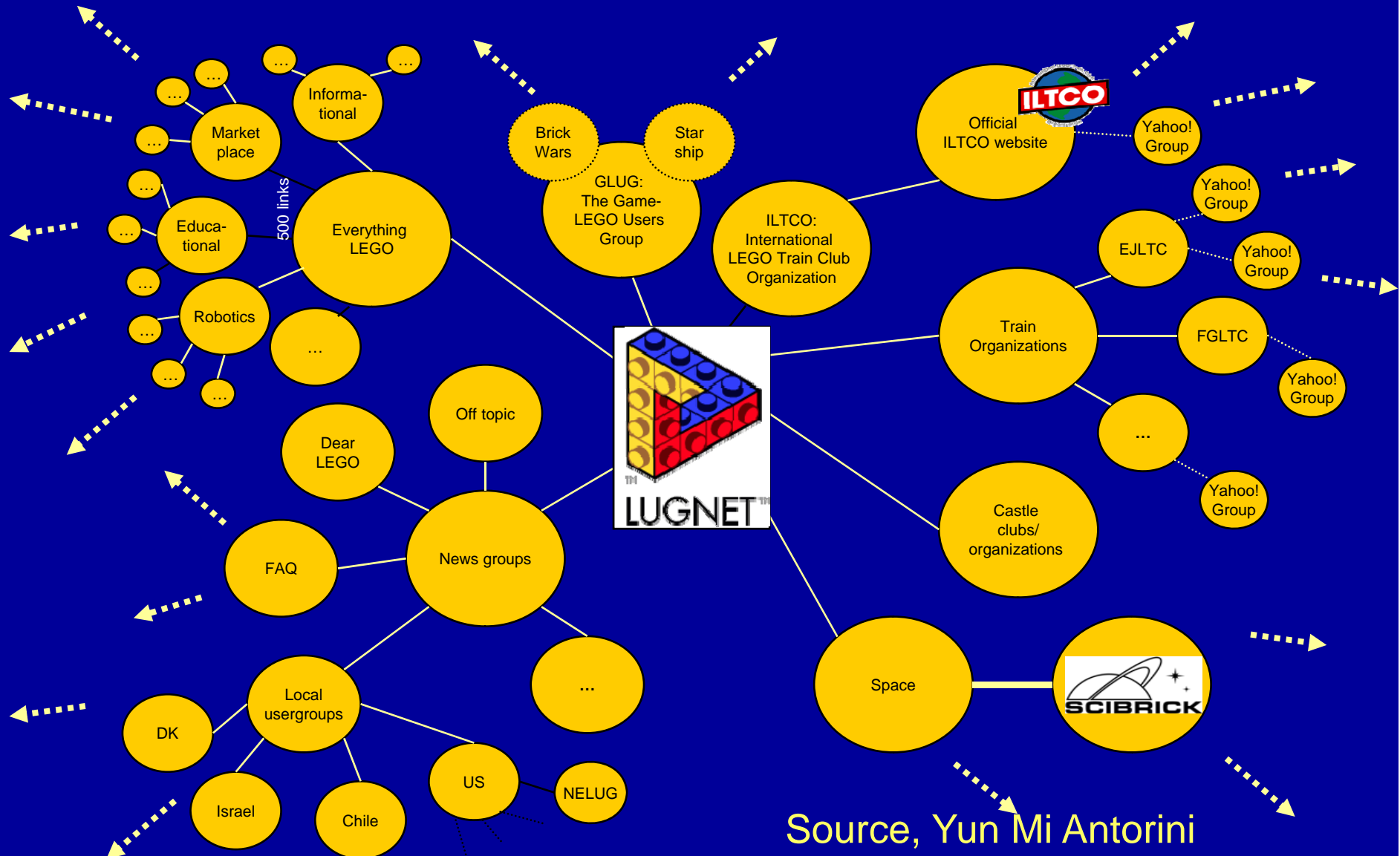
Who are the consumer-innovators? What skills do they need?
The Ministry of Science, Technology and Higher Education (MCTES)
in Portugal will lead the way to learning more

In the UK:

- Frequency increases with education
 - **People with college degrees or more 12%**
 - **People with secondary education only 6%**
- Frequency drops after age 65+
- 70% are male
- What do they do with their innovations?
 - **50% transferred their innovations to peers**
 - **25% transferred their innovations to producers**
 - **90% transferred their innovations at no charge**

Consumers innovate in networks and transfer their innovations to firms

– consumer innovation is not measured today



Users may spend more on innovation than producers – but what they spend and who spends it is invisible today

INVESTMENTS OVER TIME	TECHNIQUE INNOVATIONS	HARDWARE INNOVATIONS		
	ONLY developed by users	User Investment	User / mfr Investment	Manufacturer Investment
1950's and 60's	455 man-years	455 man-years	-	5 man-years
investment		\$1.250 million	-	\$ 100,000
1970's	975 man-years	975 man-years		5 man-years
investment		\$ 9.375 million		\$ 200,000
1980's	264 man-years	134 man-years	-	-
Investment		\$ 1.040 million	-	-
1990's	2,470 man-years	210 man-years	20 man-years	4 man-years
investment		\$ 1.350 million	\$ 600,000	\$ 300,000
Total - hours	4,164 man-years	1,781 man-years	20 man-years	14 man-years
Total - costs		\$13.015 million	\$ 600,000	\$ 500,000

USERS

USERS

PRODUCERS

Hi

User FIRM process equipment innovation frequencies: International comparisons

	UK	Netherlands	Canada
Total User Innovators	15.3%	54%	43.3%
Modifiers	10.3	32	21.1
Creators	8.6	41	22.2
Sample	(n=1004) All firms 10-249 employees	(n=364) Hi-tech firms 1-100 employees	(n=1219) Manf firms >10 employees

Transfers of process innovations from user firms to process equipment producers **not measured today**

	UK	Holland	Canada
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% of Most recent User Innovations transferred to producers	21.7% (n=199)	25% (n=191)	25.8% (n=524)
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% of innovations transferred that were transferred at no cost	56.5% (n=112)	48% (n=92)	60.7% (n=318)
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Why does user innovation require policymaking intervention?

(1) Major Spillovers exist:

Most innovating users give away their unprotected innovations

13%	Share of user innovations that is somehow protected (mainly with patents)
25%	Share of user innovations adopted by producer firms that users are aware off

Shared voluntarily?

yes=87%

No=13%

Compensation?

None=48%

Informal = 39% (reductions, advice, staffing services)

Royalties = 13%

Source: Sample of 364 user innovations in technology-based SMEs, 2007

more accurate measurement of user innovation
changes innovativeness rankings of industries – A NL
basis for policymaking

	Share of firms with... in past 3 years		
	Process innovation	User innovation	Rank order
All SMEs (n=2 416)	30%	21%	
Industries:			
- Farming (n=169)	29%	23%	6 → 3
- Manufacturing (n=562)	45%	36%	1 → 1
- Construction (n=168)	19%	21%	8 → 5
- Trade (n=547)	29%	17%	5 → 8
- Lodging and meals (n=81)	12%	10%	9 → 9
- Transport (n=187)	28%	21%	7 → 6
- Financial services (n=72)	30%	19%	4 → 7
- Business services (n=496)	37%	25%	2 → 2
- Other services (n=134)	32%	22%	3 → 4