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Many users innovate – and many develop commercially valuable innovations

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Essential Definitions

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

- An **INNOVATION** is anything new that is actually used ("enters the marketplace") – whether major or minor.

- 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.

Major finding: many users innovate

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

WHY do so many users *want* custom products? Because many have "custom" needs.

- Two analyses of published market segmentation studies (done by cluster analysis) show that about markets are typically divided into about 5 segments, and 50% of total variation in need is within-segment variation.

- This means that when manufacturers divide a market into a few segments, many are dissatisfied by the products on offer – some seriously so.

Luxury focus

"Sporty" auto Driving focus

Car buyers with a reliabilty and safety focus
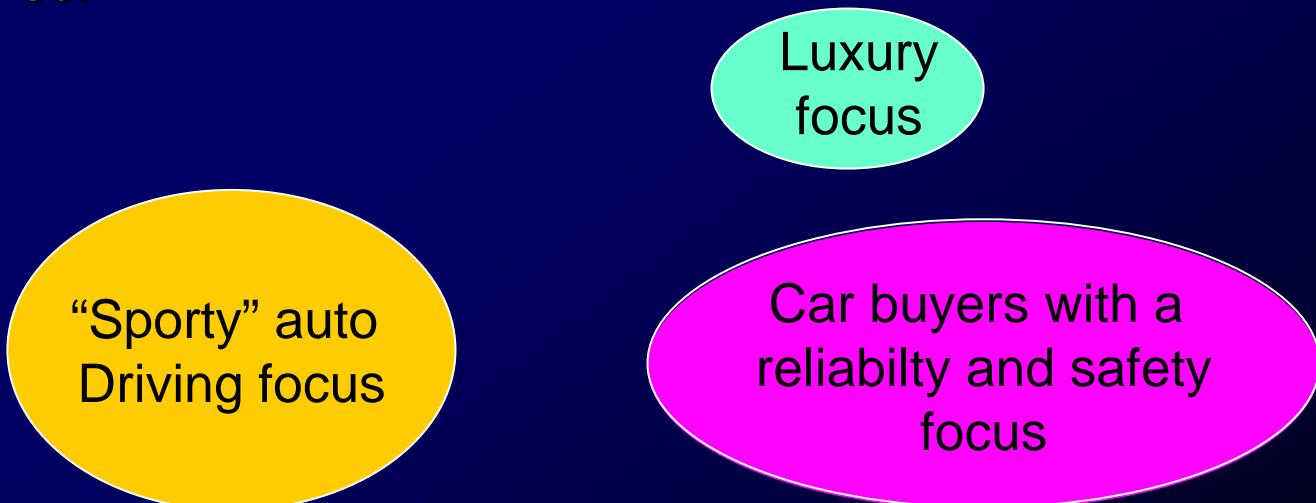
WHY do so many users want custom products? Because many have "custom" needs.
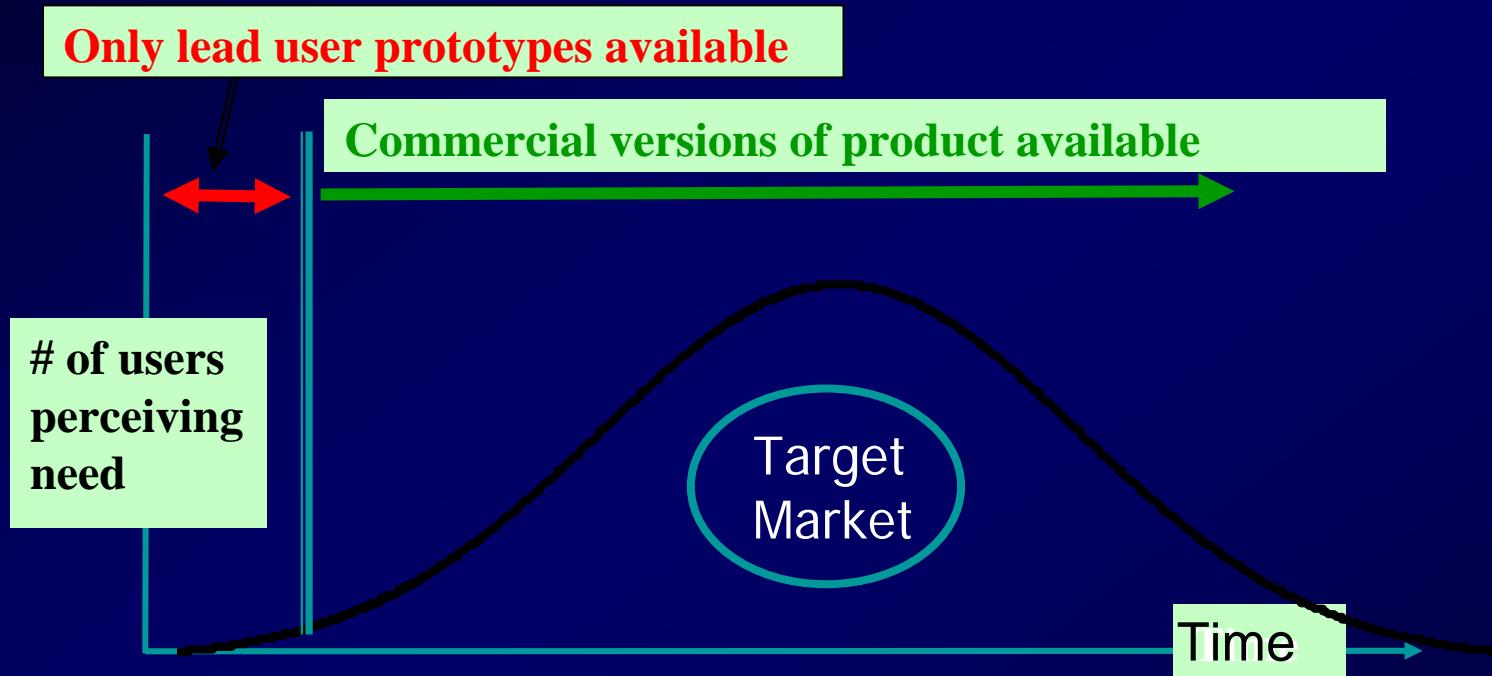
- Let's test this statement against your personal experience.

- Discuss 3 items in turn:
    1. What product type do you care most passionately about?
    2. What shortcomings does the specific product of that type you bought (built?) have in your view?
    3. Do you think a lot of other people have the same unmet need as you do? Or are your needs pretty "custom?" Why are your needs so special?

Innovating users tend to develop commercially valuable products - because they tend to be "lead users"

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!")

"Lead User" innovations offer the *basis for new products and services of value to manufacturers*. Lead Users are *today* facing target market "emerging needs"

Only lead user prototypes available

Commercial versions of product available

# of users perceiving need

Target Market

Time

In PC-CAD Lead Users were innovating - Routine Users were not

Expected Lead User Attribute	Type of Questions We Asked	LEAD Users	Routine Users
At Front of "High Density" Trend?	What are your: • Avg. Number of layers? • Avg. Line width (mils)? (1988 data)	6.8 11	4.1 15
High Need For Improved System?	"Are you satisfied with your present PCB CAD system?	No	It's OK
Active In Solving Own Problem?	Did you build own PCB CAD System	82% Yes	1% Yes
Number in Sample		33	99

User innovation has been shown to be the source of prototypes for many "manufacturer" product successes

Innovations Affecting	First Device	Major Improvement	Minor Improvement
Gas Chromatography	1	11	-
Nuclear Magnetic Resonance Spectrometry	1	14	-
Ultraviolet Spectrophotometry	1	5	-
Transmission Electron Microscopy	1	14	63
Total	**4**	**44**	**63**
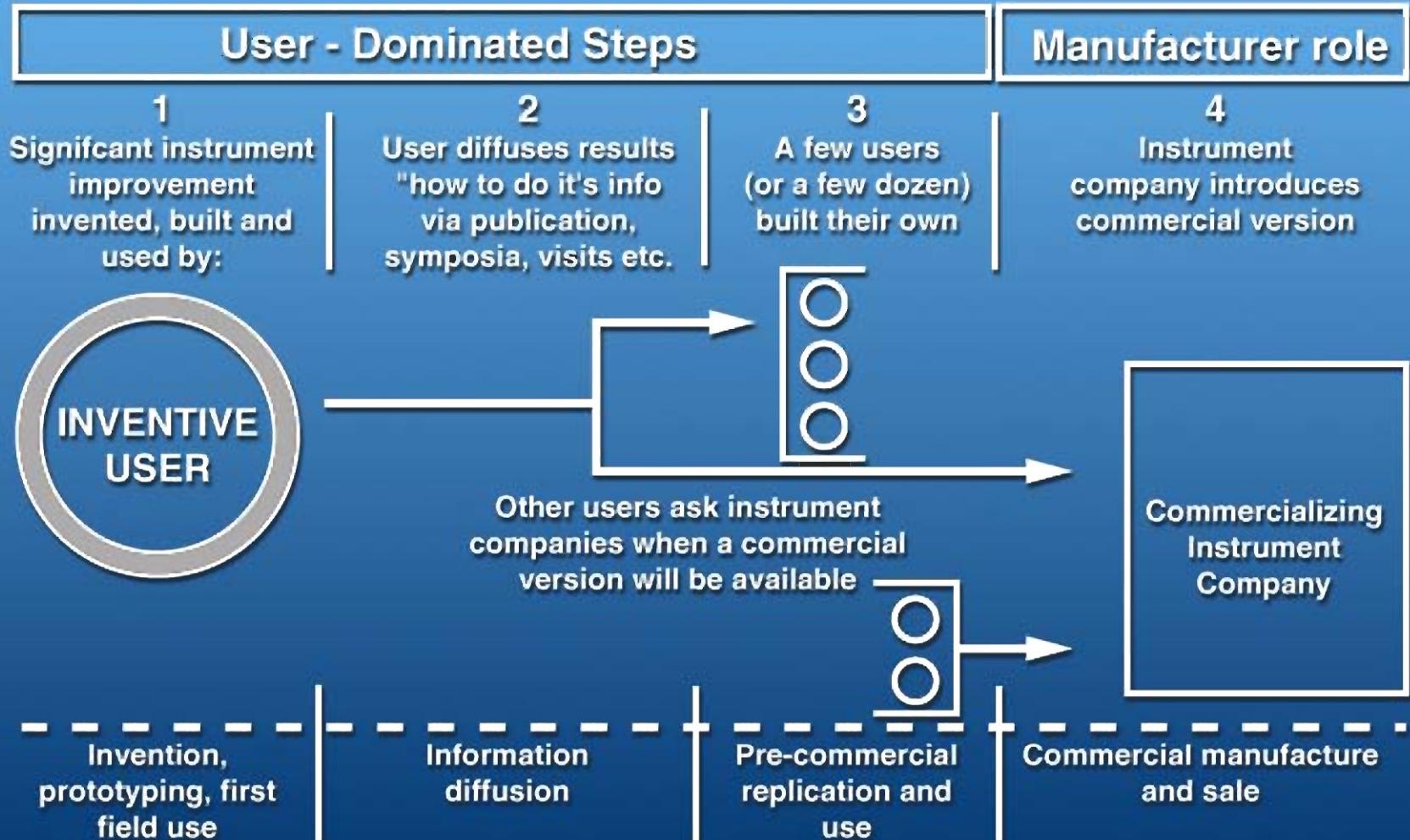
Innovations Affecting	% User	First device used in field developed and built by:	
		User	Mfg.
Gas Chromatography	83%	10	2
Nuclear Magnetic Resonance Spectrometry	80%	12	3
Ultraviolet Spectrophotometry	100%	6	0
Transmission Electron Microscopy	72%	44	17
Total	**77%**	**72**	**22**

The World Wide Web – A Lead User Innovation

"Tim Berners-Lee did not set out to invent a contemporary cultural phenomenon; rather, he says, "it was something I needed in my work." He wanted to simply to solve a problem that was hindering his efforts as a consulting software engineer at CERN.

Berners-Lee's innovation was to apply hypertext to the growing reality of networked computers. He expanded the idea he had developed at CERN and made it available on the Internet in the summer of 1991.

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Technology Review, July 1996, p.34

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Many commercially important consumer products also have roots in user innovation.

Familiar product examples:

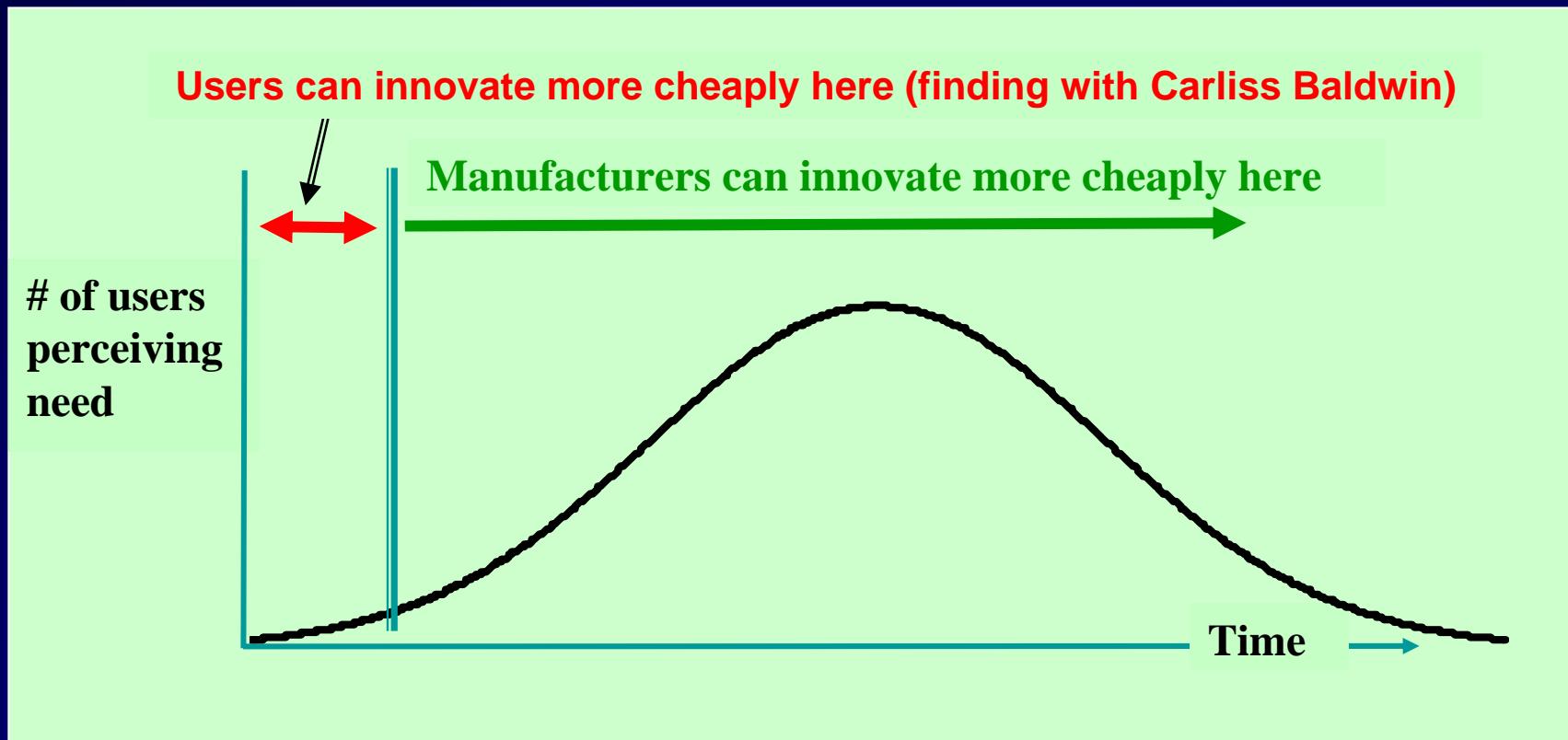| Category	Example
Health Products	Gatorade
Personal Care	Protein-base Shampoo
	Feminine Hygiene
Sports Equipment	Mountain Bike
	Skateboard
	Scuba gear
Apparel	Sports Bra
Food	Chocolate Milk
	Graham Cracker Crust
Office	White-out Liquid
Software	Electronic Mail,
	Desk Top Publishing

User-innovators in consumer fields are lead users too – sports equipment example

Sports equipment user Characteristics	Innovators	NON-innovators	Difference
Lead User Characteristic (1): Being Ahead of the Trend*			
"I improved or developed new techniques in my sport."	4.29	5.84	p<0.001
Lead User Characteristic (2): High Benefit from Innovation*			
"I have new needs which are not satisfied by existing products."	3.27	4.38	p<0.001
"I am not satisfied with existing equipment."	3.90	5.13	p<0.001

Data source: Sports equipment study: Franke and Shah (2003)
*7-point rating scale: 1 = very accurate; 7 = not accurate at all

Users tend to innovate at the leading edge of markets – where demand is small and uncertain. SO - lead user innovations can become the basis of commercially valuable products for manufacturers

Users can innovate more cheaply here (finding with Carliss Baldwin)

Manufacturers can innovate more cheaply here

# of users perceiving need

Time

In sum: Many users innovate because they have custom needs – the products they develop are valuable to manufacturers because innovators also tend to be "lead users:"

- Innovations developed by lead users have high commercial value – Morrison and several other authors

- Commercial value of innovations users develop goes up as "lead user" characteristics of innovators intensify – Franke & vH