

Open Innovation with Customers: **Principles** and **Success Factors of Customer Co-Design**

Frank T. Piller

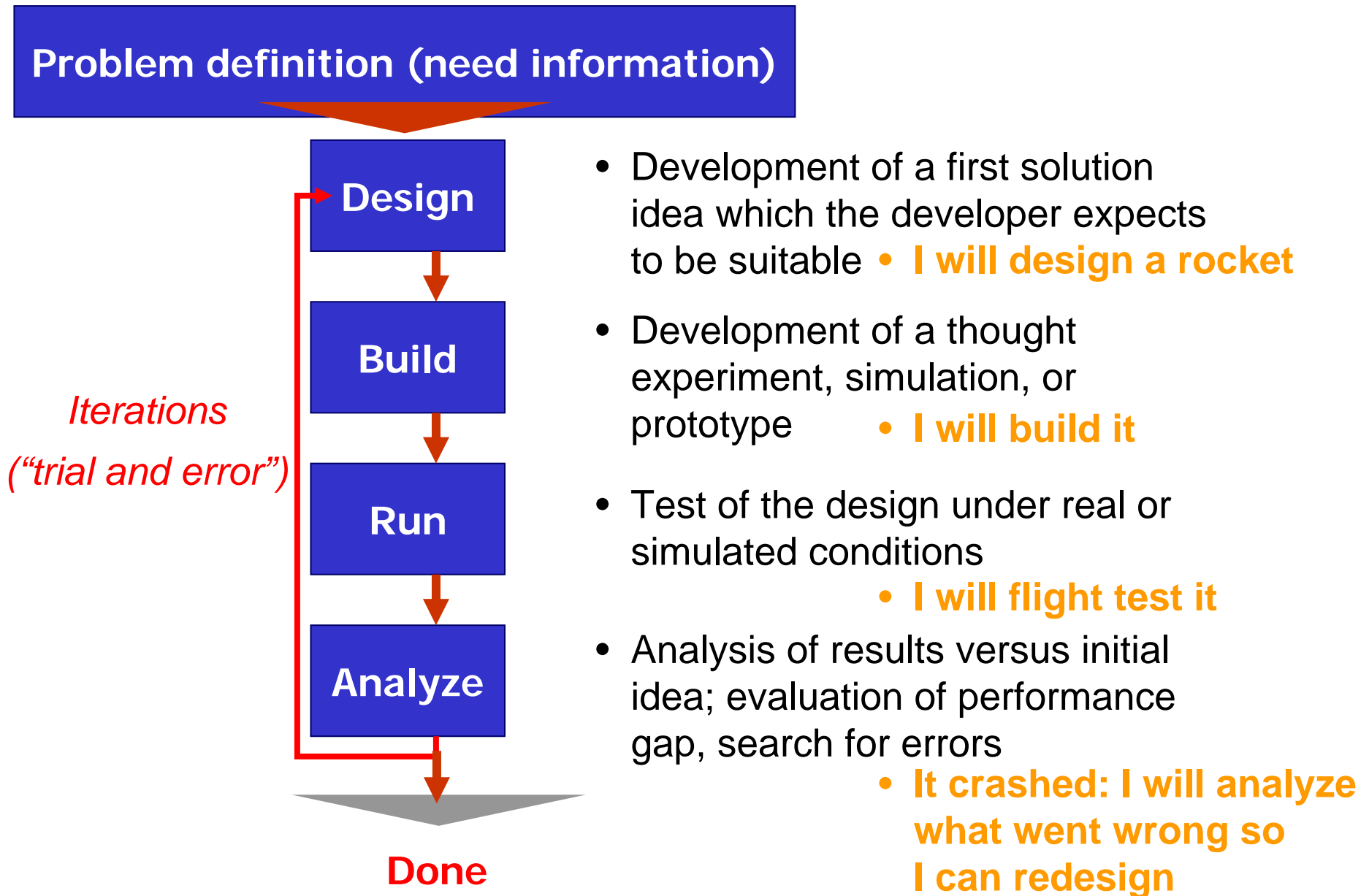
Chair, RWTH Technology & Innovation Management Group, Aachen
Co-Director, M.I.T. Smart Customization Group, Cambridge, MA

Topics of this talk

- The challenge to access need information in "long tail markets"
- Long tail strategy #1: **Mass Customization & Toolkits for User Co-Design**
- Long tail strategy #2: **Collective Customer Commitment**
- Long tail strategy #3: **Expanding the Lead User Method into (Lead) User Manufacturing**
- A competence based view on co-creating with customers
- Conclusion

**Two fundamental
problems that
make new product
development (NPD)
*(in long tail markets
very)* difficult**

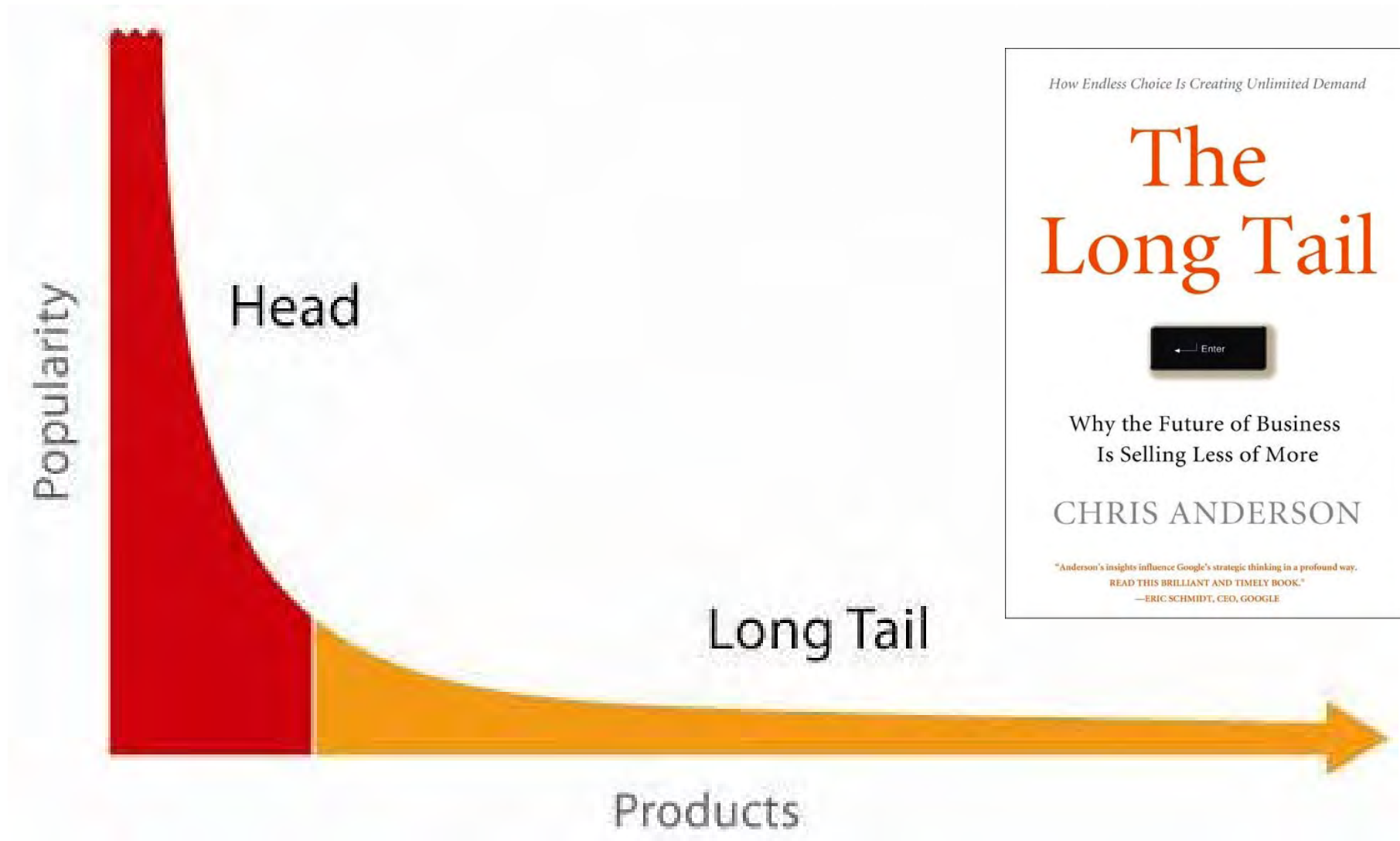
New product development is problem solving based upon directed trial-and-error (von Hippel 1995; Thomke 2003)



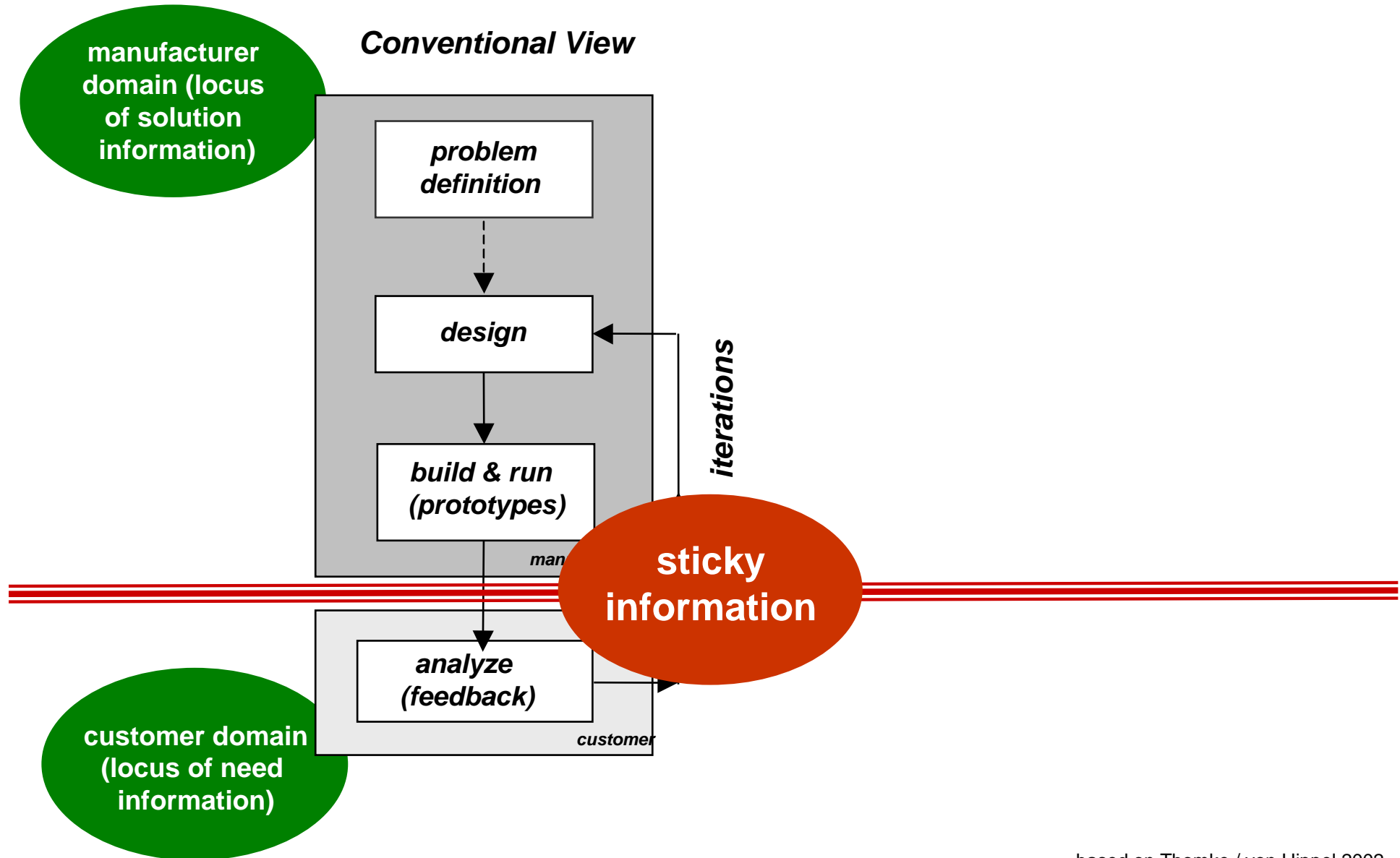
A critical task in NPD is to define a new product concept amidst customer & technology uncertainty

- Product definition critical to new product success (Cooper 1993; Krishnan & Bhattacharya 2002), but challenged by **customer and technology uncertainty**
- **Conventional approach:** Manufacturer tries to understand causal network with detailed information either acquired via **market research** or assumed via **professional knowledge** (Balachandra & Friar 1997; Urban & Hauser 1993; Poolton & Barclay 1998; Redmond 1995).
- Despite all of today's methodological knowledge in market research, many companies still fail to gather this required input in an efficient and effective way (Tollin 2002; Burke 1996), **NPD flop rates continue to rise** (Henkel & von Hippel 2005)
- **Systematic problem rooted in stickiness of information** and inherent difficulties of customers to articulate needs (von Hippel 1994, 1998; Szulanski, 2003, Krishnan & Bhattacharya 2002)

In long tail markets (high heterogeneity of needs), product definition becomes even more difficult



A fundamental problem of product development is to identify what customers (really) want



Sticky information

“The stickiness of a given unit of knowledge or information is defined as the **incremental expenditure required to transfer that unit from one place to another**, in a form that can be accessed by the recipient. When this expenditure is low, information stickiness is low; when it is high, stickiness is high. By implication, sticky information is harder to move.” (von Hippel 1994)

Some reasons:

- Information needed by developers may be ***tacit***
 - Can you tell your child how to ride a bike?
- A ***lot*** of information is often needed by developers
 - “You didn’t tell me you were going to use the product *that way!*”

Three modes of customer participation in NPD

(Piller 2004; Fredberg & Piller 2009, building on Dahan and Hauser 2002)

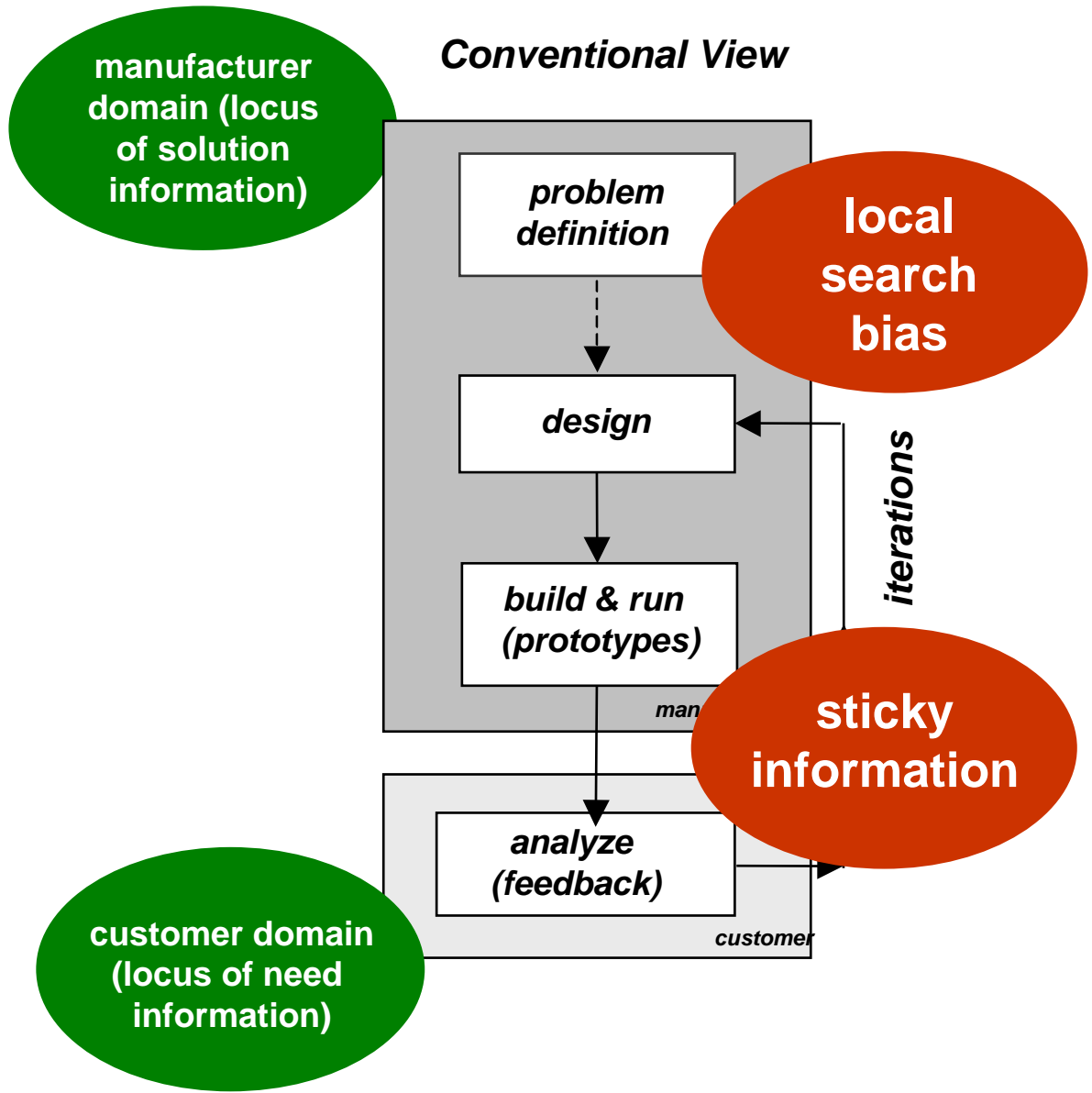
Mode 1 - Design for customers. Products are designed on behalf of customers. Firms use customer information from diverse input channels to explore needs: Listening into the customer domain by analyzing sales data, internet log files, or surveying sales personnel; Netnography; Quality Function Deployment.

Mode 2 - Design with customers. Display solutions or concepts to customers so they can react to proposed design solutions: Pilot customers or beta users. Concept testing, focus groups; Output-Driven Innovation method.

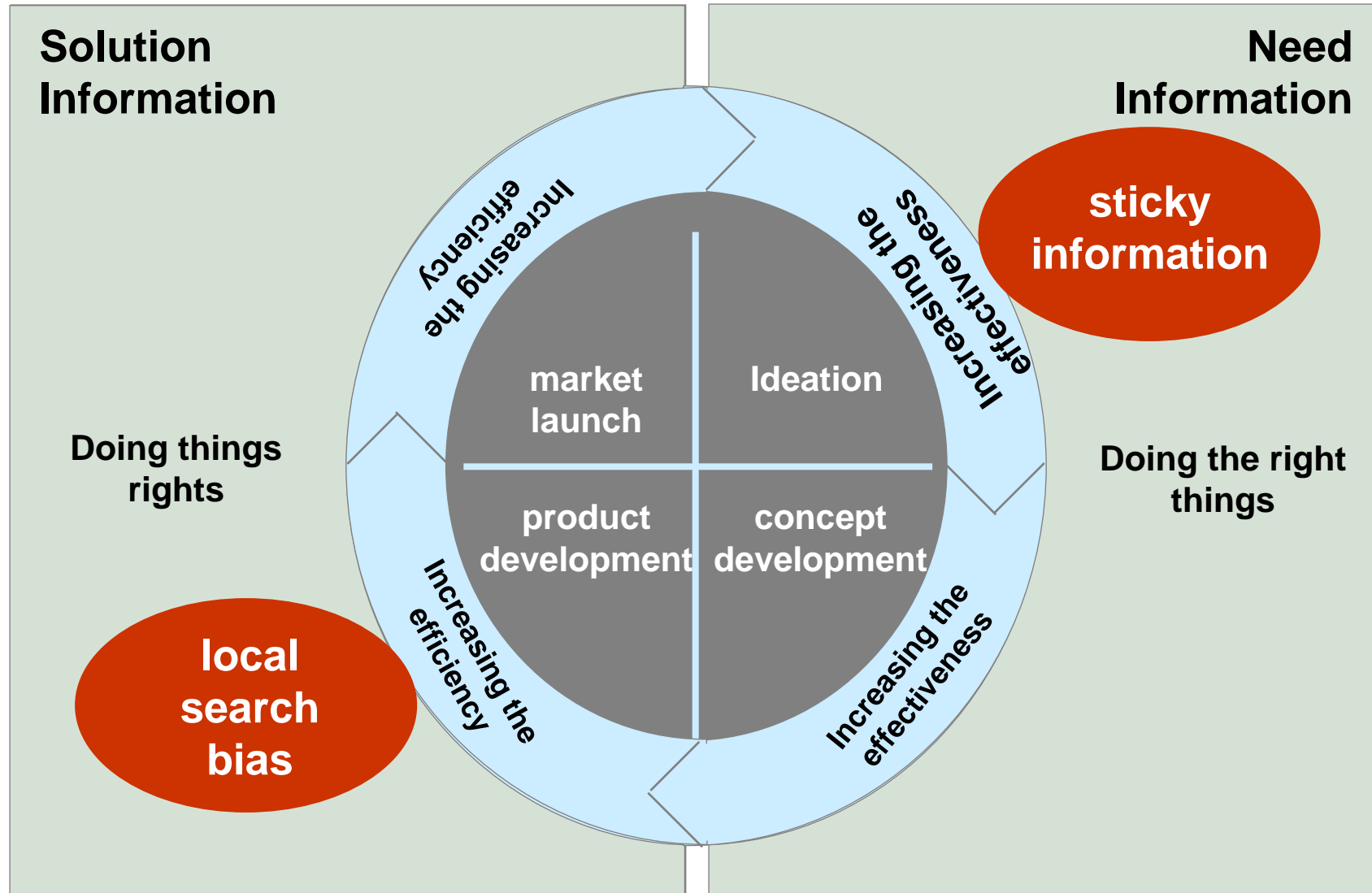
Mode 3 - Design by customers. Active integration of customer participation in NPD (Ramirez 1999; von Hippel 2005; Reichwald & Piller 2006), often with tools that are either provided by the firm or by customers themselves. The manufacturer is either empowering its customers to co-design a solution or is implementing methodologies to efficiently transfer an innovative solution from the customer into the company domain.

Mode	Method	Applied to	Selected references
1	<i>Conventional market research (focus groups etc.)</i>	Consumer goods	Griffin & Hauser 1992
	<i>Quality Function Deployment</i>	Mechanical engineering, software, construction, service engineering	Akao 1990
	<i>Kansei engineering</i>	Mechanical engineering, software, construction, service engineering	Nagamachi 1995
	<i>Conjoint analysis</i>	Consumer packaged goods, durables	Green, Carroll & Goldberg 1981
	<i>Feedback gathering / complaint management</i>	Consumer durables, consumer packaged goods	Brockhoff 2003; Kendall & Ross 1975; Fuller et al. 2008
2	<i>Concept testing (focus groups)</i>	Consumer packaged goods, durables and industrial products	Acito & Hustad 1981; Page & Rosenbaum 1992
	<i>Virtual concept testing</i>	Consumer durables	Dahan & Hauser 2002
	<i>Beta testing</i>	Computer systems, software and consumer goods	Dolan & Matthews 1993
	<i>Consumer idealized design</i>	Consumer durables	Ciccantelli & Magdison 1993
3	<i>Empathic design</i>	Consumer packaged goods, durables and industrial products	Leonard-Barton & Rayport 1997
	<i>Consumers opinion platforms</i>	Consumer goods	Herrig-Thurau et al. 2004; Sawhney, Verona & Prandelli 2005
	<i>User idea contests</i>	Process industry, (aesthetic) design competitions for consumer goods	Ebner et al. 2008; Piller & Walcher 2006; Sawhney, Verona & Prandelli 2005
	<i>Collaborative prototyping</i>	Consumer packaged goods, durables and industrial products	Terwiesch & Loch 2004
	<i>Generative model revision</i>	Consumer goods	Lemasson & Magnusson 2002
	<i>Lead user workshops</i>	Industrial goods, complex consumer goods	Lilien et al. 2002; Urban & von Hippel 1988
	<i>Mass Customization toolkits</i>	Consumer goods	Franke & Piller 2004
	<i>User Innovation toolkits</i>	Industrial goods, complex consumer goods	Franke, Keinz & Schreier 2008; Thomke & von Hippel 2002; von Hippel & Katz 2002
<i>Communities for co-creation</i>	Industrial goods, complex consumer goods	Franke & Shah 2003; Sawhney & Prandelli 2000	

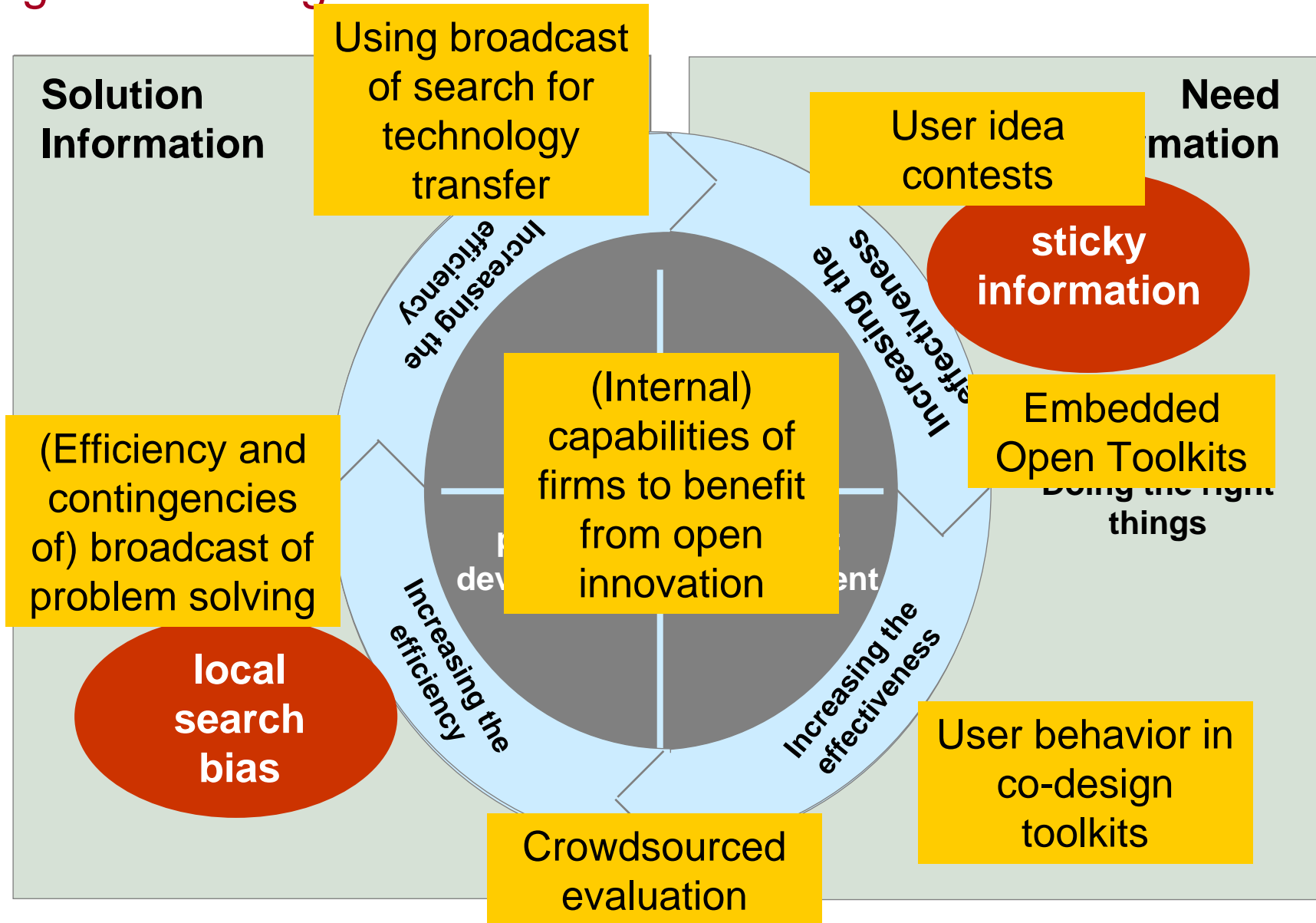
The second fundamental problem of NPD is to access solution information that can lead to "radical" innovation



Every innovation process requires two kinds of information, influencing the efficiency and effectiveness of the process.



My current research interests in open innovation can be organized along this structure



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A simple but useful mass customization site: Marks&Spencer, UK

YOUR M&S [Shop all Departments](#) [Your M&S](#) [My Account](#) [Please sign in](#)

Design your own shirt [My Shirts Basket](#) 0 items

STEP 1: FABRIC [STEP 2: FEATURES](#) [STEP 3: EXTRAS](#) [STEP 4: FIT](#) [REVIEW](#) **Shirt Price** £ 30.00


Choose a collection
Choose from our three collections each with its own range of quality fabrics

Easy to Iron £30.00 Autograph £35.00 Luxury £49.50


Choose a fabric
To see alternative fabrics, change the collection


Twill Twill Textured Stripe Wide Stripe


Fine Stripe Check Oxford Oxford Stripe




Pictorial representation is for guidance only

Fabric 

Inside back 

Monogram 

Fit 

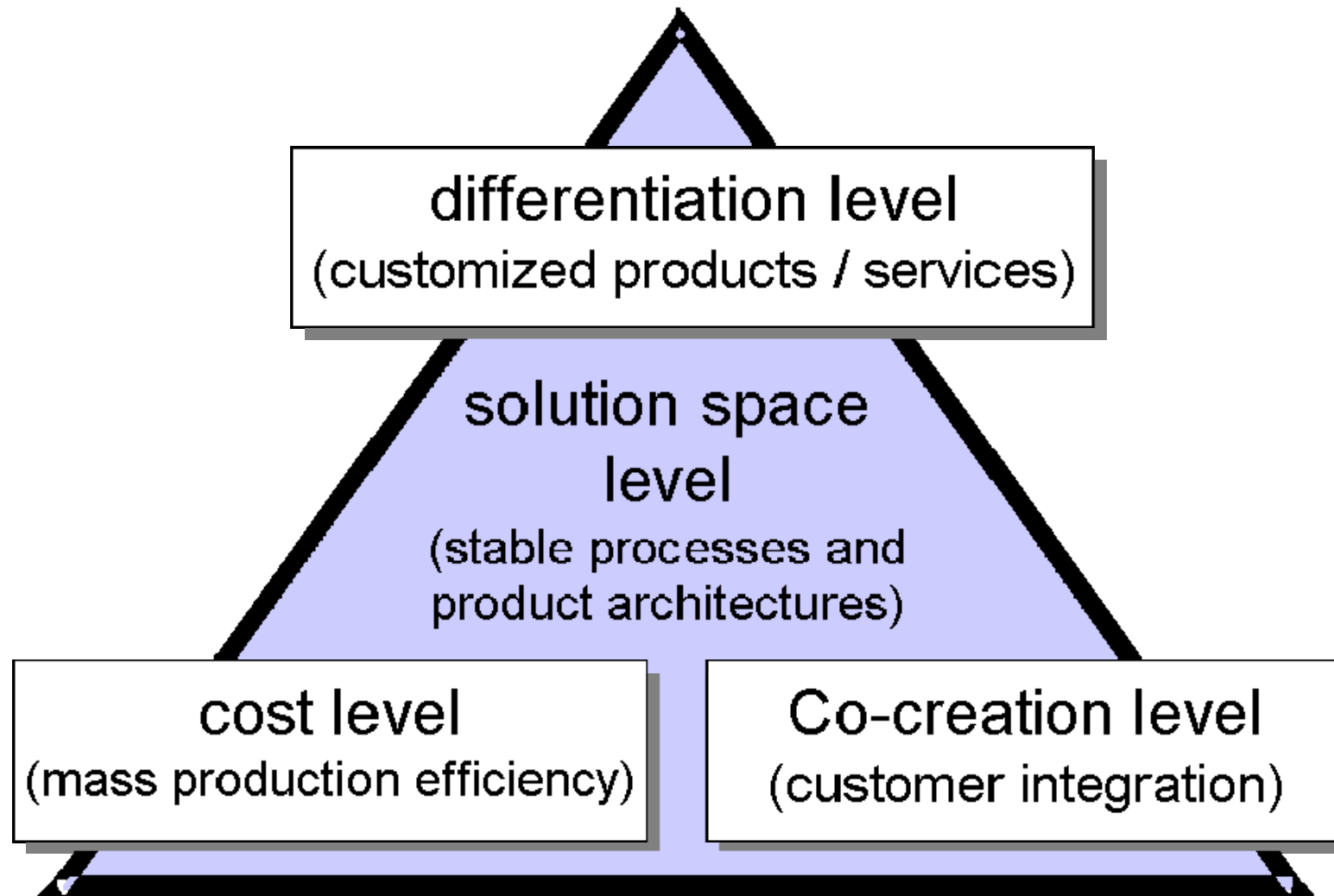
Don't have time right now? [SAVE YOUR DESIGN FOR LATER](#)

Looking for something else? [START A NEW DESIGN](#)

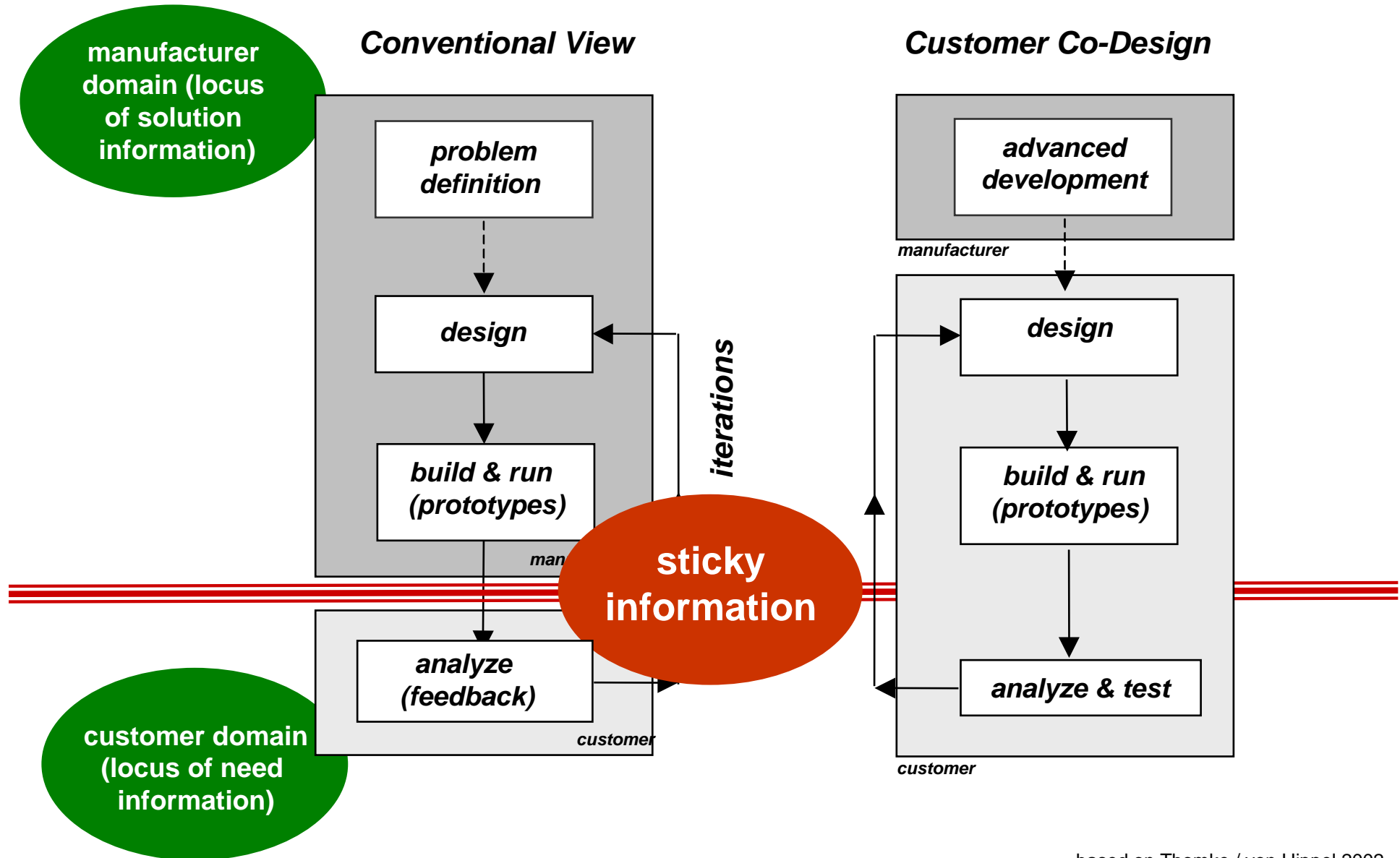
<http://www.marksandspencer-madetomeasure.com>

Mass Customization

"Producing goods and services to meet individual customer's needs with near mass production efficiency." (Tseng/Jiao 2001)



The idea of a customer co-design toolkit is to get access to an artifact representing the customers' needs



Choose your dial

COMPONENTS

- Case
- Bezel
- Dial
- Strap

Arabic
SFr. 27.00

Roman
SFr. 26.00

Index
SFr. 28.00

Dots
SFr. 32.00



OPTIONS

Color

Color selection area with various color swatches.

DESCRIPTION	TOTAL PRICE
DOTS: Sunray-polished or painted dial with luminescent hand-applied hour-markers and luminescent hands for optimal readability. Counters recessed with diamond cut circle lines.	SFr. 315.00

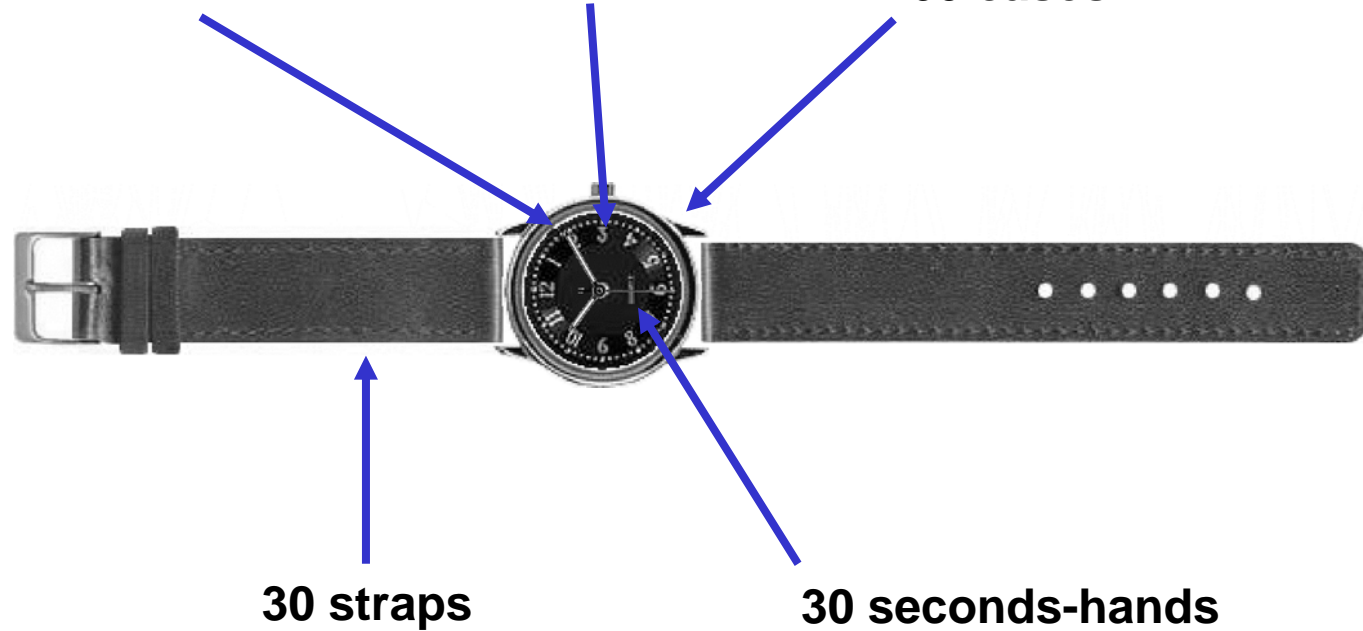
**An experiment on the benefit of customization for consumers
(expressed in their willingness to pay (WTP)) (Franke / Piller
2004, published in JPIM)**

The basic toolkit allows 648,000,000 design variants ...

30 hour / minutes hands

150 faces

60 cases

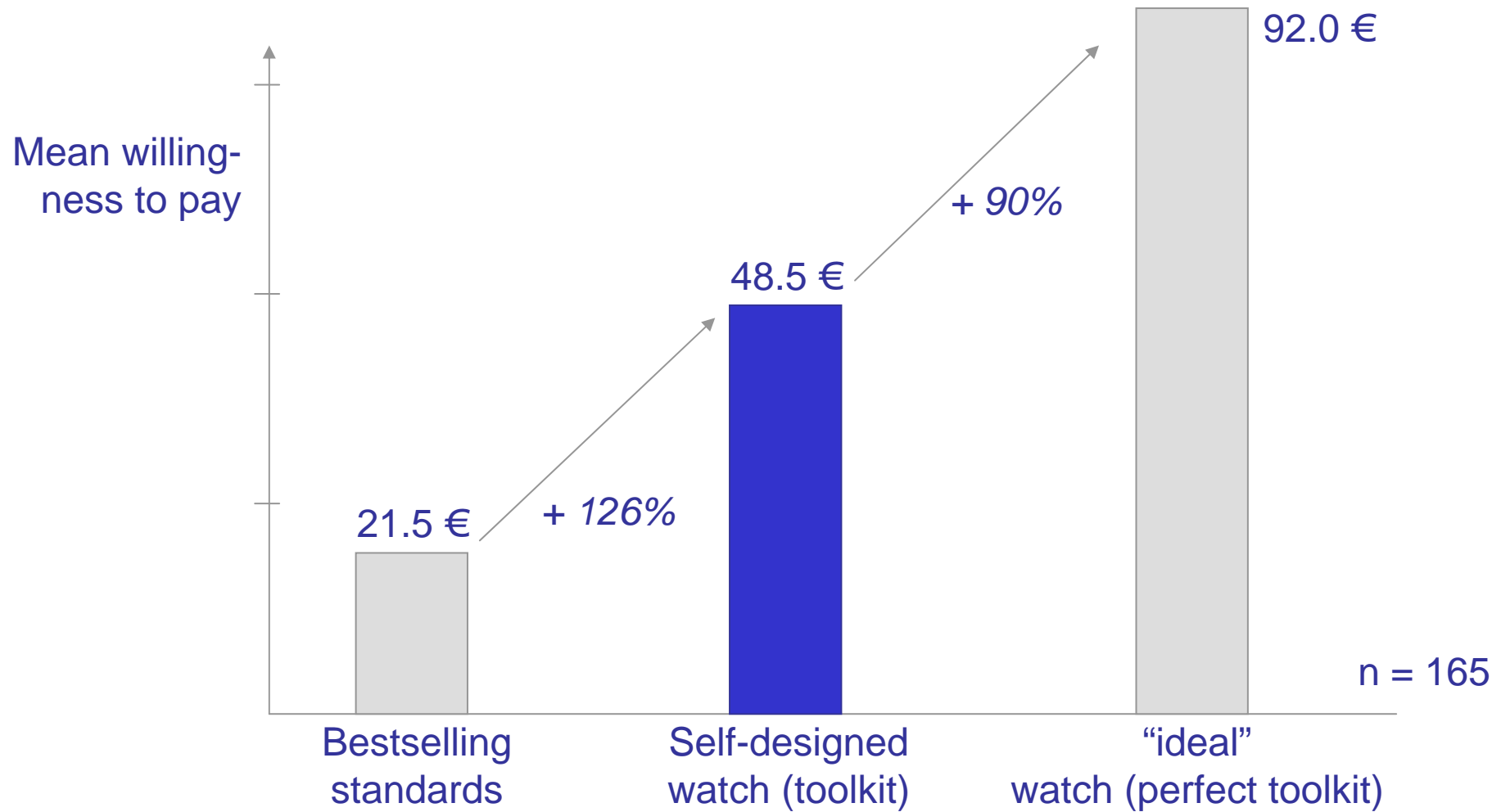


30 straps

30 seconds-hands

*... and our calculations show that customers use this huge solution
space extensively.*

Mass Customization yields an impressive value increment to users



Mass Customization yields an impressive value increment to users

Recent research explains 50% of additional willingness-to-pay in BtoC mass customization by process satisfaction and hedonistic benefits

Why this increase in WTP ?

Product satisfaction

Fit

Uniqueness

Process satisfaction

- "flow"

- pride of authorship

- peer recognition

- emotional factors

Bestselling standards

Self-designed watch (toolkit)

watch (perfect toolkit)

Customers' costs of mass customization

- **Premium (WTP)**
- **Effort and cognitive costs ("mass confusion")**
 - Considered as main reason why mass customization is not there yet (Broekhuizen & Alsem 2002; Dellaert & Stremersch 2005; De Meyer, Dutta & Srivastava 2002; Huffman & Kahn 1998; Piller et al. 2005; Zipkin 2001)
 - **Burden of choice** (Babin, Darden & Griffin 1994; Schwarz 2003; Simon 1976); **information overload** (Miller 1956; Neumann 1955); and **sticky information** (Huffman & Kahn 1998, von Hippel 1994).
 - **Principal-agent problem** with regard to behavior of provider (Kamali & Loker 2002; Terwiesch & Loch 2004).

Design of toolkits for customer co-design

- **Problem solving process, trial-and-error learning**
(Marples 1961; Allen 1966; von Hippel / Tyre 1995)
- **Design of co-design toolkits**
 - **Experimentation** (Thomke 2003; Thomke/von Hippel 2002)
 - **Need-based versus parameter-based configuration** (Dellaert & Stremersch 2005; Randall, Terwiesch & Ulrich 2005; Schreier 2008)
 - **Subtractive versus additive option-framing** (Park et al. 2000; Levin et al. 2002)
 - Value of **integration with additional planning and control systems** along the supply chain
 - Value of **integration with product architecture planning** ("design for mass customization") (Havm et al. 2008)

Mass Customization provides one vital strategy to navigate the "long tail" – but also comes at a cost

- Cost of implementing the system
- Complexity cost of running and managing the system
- Complexity cost from customer perspective
- Managing the new business model
- Establishing scalable and sustaining mass customization systems
- **Developing the capabilities for mass customization**
(Salvador, de Holan & Piller 2009 -> *Spring 2009 MIT SMR issue*)

A recent extension of mass customization is to integrate toolkits into the product itself 27

**EMOTIO: Embedded Open
Toolkits for User Innovation
and Co-Design – Exploration
of a New Research Area and
Feasibility Study**

RWTHAACHEN
UNIVERSITY
TECHNOLOGY
AND INNOVATION
MANAGEMENT GROUP

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Lehrstuhl für
Fertigungsmesstechnik
und Qualitätsmanagement

EXZELLENZ
RWTHAACHEN

Our idea: "Postponing into the user": A new paradigm to reduce the NPD risk and increase NPD efficiency

- **Project Objective:** To develop a method which enables customers to directly transfer their needs into an artifact that highly corresponds with their needs. This means to shift some specifications of the product into the domain of the user.
- This shall be done *not before* the product is manufactured (= engineer-to-order) but **after** the product has reached the user.
- The idea is to **isolate the source of uncertainty**, i.e. sticky information about user needs, and to place it entirely outside the boundary of the manufacturer.
- This "postponing into the user" (Piller & von Hippel, 2007) is a **fundamental break with the current understanding of the innovation process**.
- **Embedded toolkits** as a new concept to increase NPD success and overall product quality.

The example of open source hardware (Bug Labs)



"Postponing into the user" demands a new set of capabilities and resources

Create a product (concept) with

- **Flexible architecture** where values for design parameters are adaptable,
- **Set of rules** about possible combinations of values for parameters
- An **interface for individual users** to differentiate the product according to their preferences by manipulating the values:
 - Equip users with the possible solution capabilities to substitute the lack of professional training and experience
 - **Not just another user interface:** More than giving users control on a pre-defined functionality; allows to specify design space of a product module in an innovative way.
 - **Open but integrated part of a complex product**, allowing the real-time modification of this product during its usage stage.

Transferring principles of open source software (OSS) development into domain of complex physical products

- **Origin of project idea** came from previous work on OSS development principles (Schmitt et al. 2007; Piller 2003, 2004; Reichwald & Piller 2008).
- OSS projects are characterized by high development flexibility and good fit of the final software design with the users' requirements.
- OSS development is characterized by short, experimental and rapid product development with rich user feedback, allowing for **experimentation and trial-and-error learning in the user domain.**

Idea to create *open* toolkits and corresponding solution spaces, while remaining product may be closed (Henkel et al. 2007)

- Users can determine with higher confidence which options solves need best; encourages to investigating potential **choices outside current frame of reference.**
- **Feeding information back to manufacturer** can enhance its ability to access and process new (need) information
- **User communities for NPD**

A computer monitor with a silver frame and a black bezel. The screen is dark gray and displays white text. The monitor is centered on a white background.

Prototype:

**An embedded toolkit
in the auto industry**

[http://www.youtube.com/
watch?v=eZU39i1qliA](http://www.youtube.com/watch?v=eZU39i1qliA)

(or search for "WZL open toolkit")

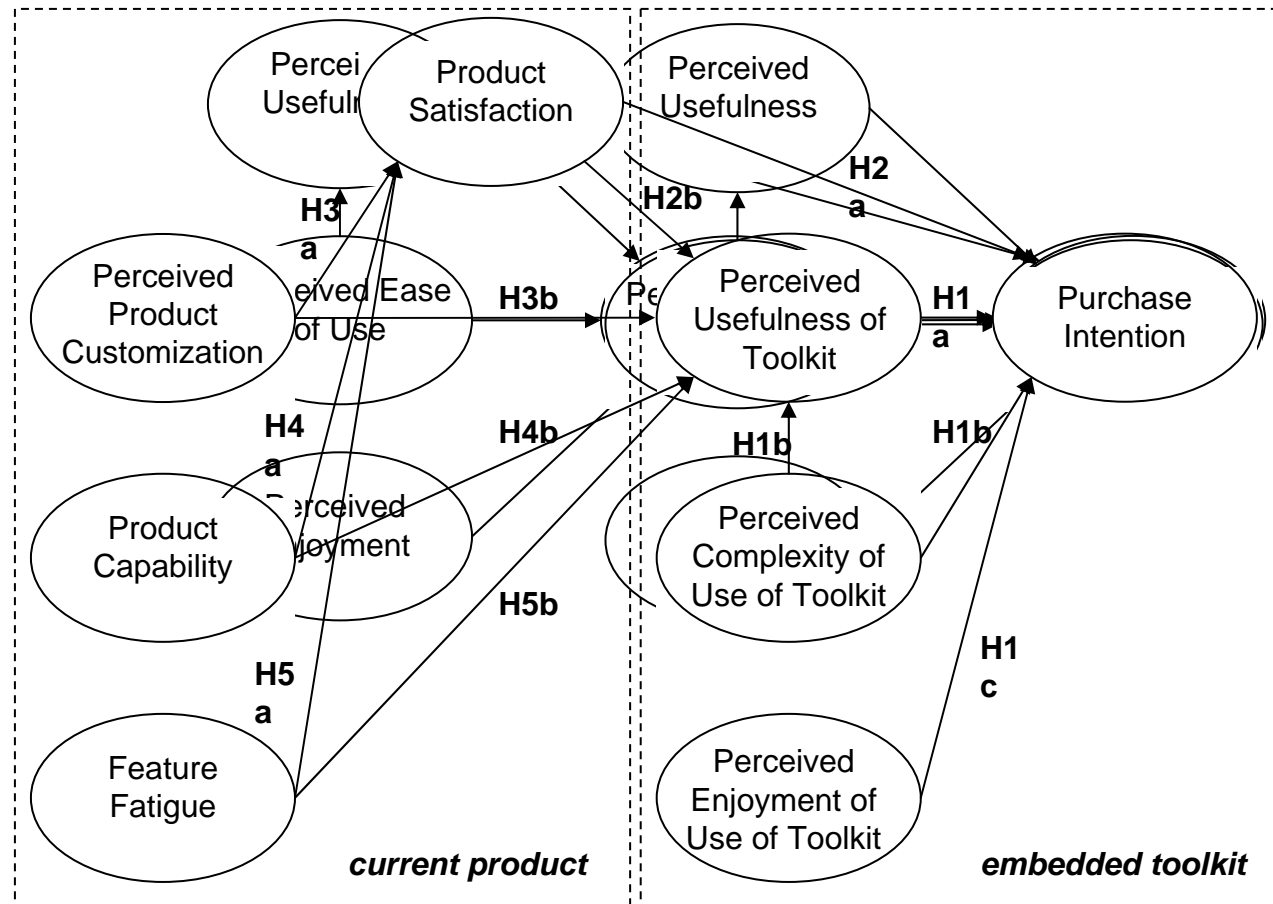
Major research questions within our RWTH group on embedded toolkits for user innovation

- Do users really become aware of or develop **new needs** during usage phase?
- Does the possibility to adapt a product to individual needs really **increase perceived value** for users?
- Do information through postponing some design decisions into customer domain **differ in kind and quality** from information you get through conventional concepts?
- Which **market environments** support the advantages of an embedded open toolkit in contrast to other product concepts from an economic perspective?

In a recent TAM study, we look on the acceptance of users of such an embedded toolkit (Steiner, Ihl & Piller 2009)

Our research model is based on the "Technology Acceptance Model (TAM)" (Bagozzi et al., 1992; Davis et al., 1989)

1. The conventional TAM
2. Adaption of model
3. Transfer to case example
4. Modifications to capture contingency factors and moderators



See the survey (and more examples) at www.embedded-toolkits.com/survey

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Threadless.com: Collective Customer Commitment

(Ogawa & Piller 2006 in SMR, Winter 2006 issue)



Japanese Panda
by -Martin-



Frustrated
chiken!
by label



Invisible Ice
Cream Man
(a.k.a.
Dreamsicle)
by Wheelso3



Goodbye, Tea!
by Klayr



Who Does Your
Hair?
by AladdinSane



rencontre
by icdefre



Mocking the
Crane
by Glennz



The Skies Are
Full Of Strange
Things
by Pook



3030 Love
by jublin



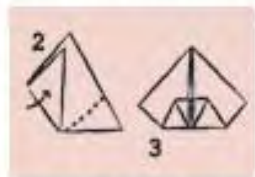
Summer Film
Enthusiast
by mmorales



Solar Flare
by carrion



Calamari
Compassion
by carrion



OCD Therapy
by jdrenard



A Quiet
Breakfast



Love and Booty...
by



Do No Evil
by Jaycee



Revolt of the
Plush



Larsen B
by ciano

Comparing Mass Customization and Threadless' Business Model

Mass Customization	Collective Customer Commitment Method
<p>development of product architecture and customization options by manufacturer</p> <p style="text-align: center;">▼</p>	<p>development of new product design by some (expert) customers</p> <p style="text-align: center;">▼</p>
<p>customer co-design process (elicitation)</p> <p style="text-align: center;">▼</p>	<p>evaluation and refinement of design by manufacturer <i>and</i> customer community</p> <p style="text-align: center;">▼</p>
<p>placing of order by each individual customer</p> <p style="text-align: center;">▼</p>	<p>presentation of selected design concepts and obtaining commitment of potential customers</p> <p style="text-align: center;">▼</p>
<p>custom (on-demand) manufacturing</p> <p style="text-align: center;">▼</p>	<p>only if minimum lot size is pre-sold, (mass) production of product starts</p> <p style="text-align: center;">▼</p>
<p>custom distribution</p>	<p>mass distribution</p>

Learning from Threadless

- Threadless business model **works** and is **highly profitable**
- 800 submissions/week; 4 new prints/week; 80,000-95,000 shirts sold/month (*30 Mio USD sales in 2007, 30% profit margin, less than 20 employees; 2000 \$ pay-off per design to designer*)
- Observation of 20% of sales allows exact forecasting in fashion industry (Fisher & Raman 2001)
- "Wisdom of crowds" (Surowiecki 2004)
- "custom mass production" in IS literature (Elofson & Robinson 1998)
- Observation of strong peer orientation (communities for co-design) in customization co-design toolkits (Piller et al. 2005)
- The "Long Tail" (Anderson 2006) may be returned to the "Head of the tail"
- **Threadless also overcomes "local evaluation bias"**

Learning from Threadless

- Exploratory analysis of customer database (ongoing work)
 - most design contributors (about 70 %) are **professional designers**
 - **low costs for participation, different participation levels**
 - **most customers also evaluate** (NPD process becomes a relationship marketing tool) (only 3% of customers never evaluated)
 - **expert evaluation** (exploratory) of designs indicates rather limited design space; **high similarity of designs** (“dominant design” of this community)

The Threadless model can be observed in other industries as well

無印良品

www.muji.net

ネットストア

ネットコミュニティ

店舗情報

企業情報

はじめての方へ

サイトマップ

お問い合わせ

モノづくり [家具・家電]

「こんなモノがあったらうれしいな」

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【プロジェクト no.5 壁の利用】 壁棚

わずか1日で300個に達し、
商品化が決定しました。

¥1,260 → ¥1,050 (税込)



【プロジェクト no.1 ベッドまわりの照明】 持ち運びできるあかり

モノづくりから、商品化第一号。

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【プロジェクト no.3 すわる生活】 体にフィットするソファ

ソファほどスペースを占めないで、
ソファのようにリラックスできる点に人気集中。

本体¥12,600+カバー¥4,200=¥16,800(税込)

 MANY WILL FOLLOW, BUT
OUR FIRST will always be special →

MEET THE
CREATIVE PANEL



THE CREEP
BY CAVEMAN



\$90.00
BUY NOW

**HERE TO
HELP YOU**

REFINE, PERFECT
AND RYZ TO
YOUR BEST!



MEET THEM NOW →

SHARE YOUR STYLE
DESIGN the chosen one →



HAVE YOUR SAY AND VOTE [VIEW ALL ENTRIES →](#)



LOG IN TO VOTE →

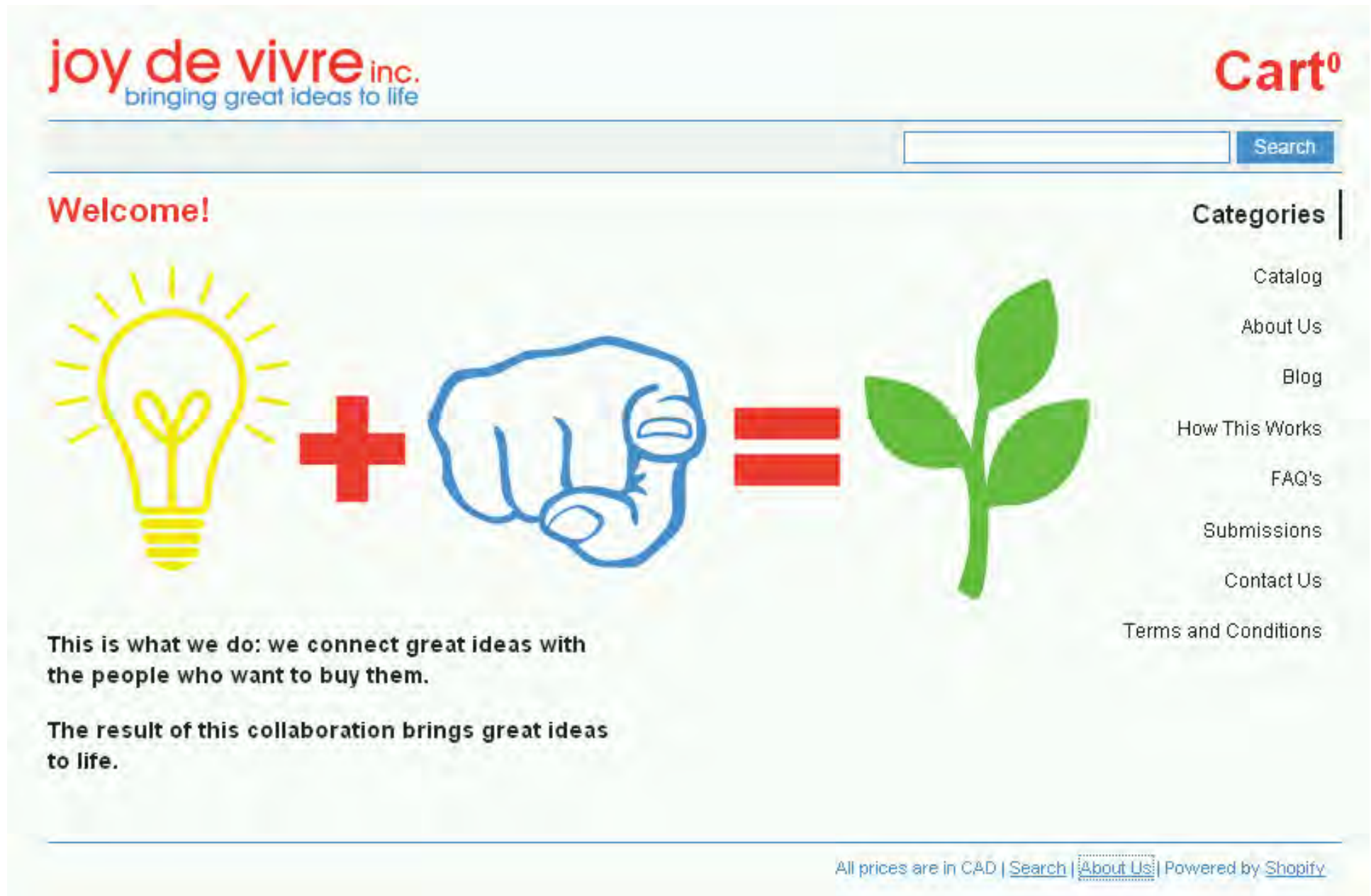


LOG IN TO VOTE →



LOG IN TO VOTE →

Joy De Vivre wants to democratize the design industry




The screenshot shows the homepage of Joy De Vivre Inc. The header features the company logo on the left and a 'Cart⁰' indicator on the right. Below the header is a search bar with a 'Search' button. The main content area is divided into two columns. The left column starts with a 'Welcome!' heading, followed by a large graphic illustrating the company's mission: a yellow lightbulb (representing an idea) plus a blue fist (representing people) equals a green plant (representing the result). Below this graphic, two paragraphs of text explain the company's goal to connect ideas with buyers and the resulting impact. The right column contains a 'Categories' section with a vertical line to its left, listing various navigation options.

joy de vivre inc.
bringing great ideas to life

Cart⁰

Search

Welcome!



This is what we do: we connect great ideas with the people who want to buy them.

The result of this collaboration brings great ideas to life.

Categories

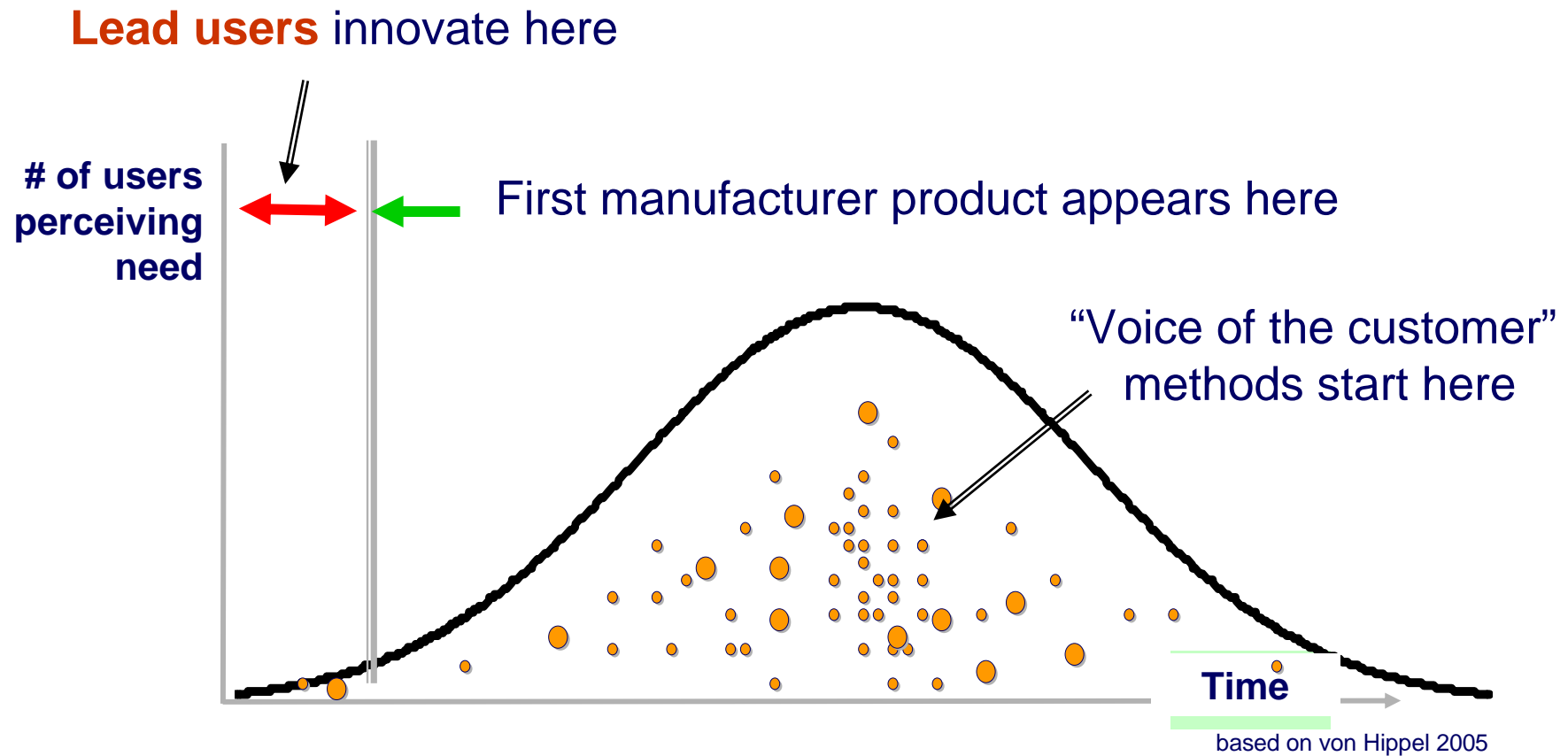
- Catalog
- About Us
- Blog
- How This Works
- FAQ's
- Submissions
- Contact Us
- Terms and Conditions

All prices are in CAD | [Search](#) | [About Us](#) | Powered by [Shopify](#)

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Users have the advantage of problem-solving in their *own use environments* as they “do” a desired activity – they are learning by doing.



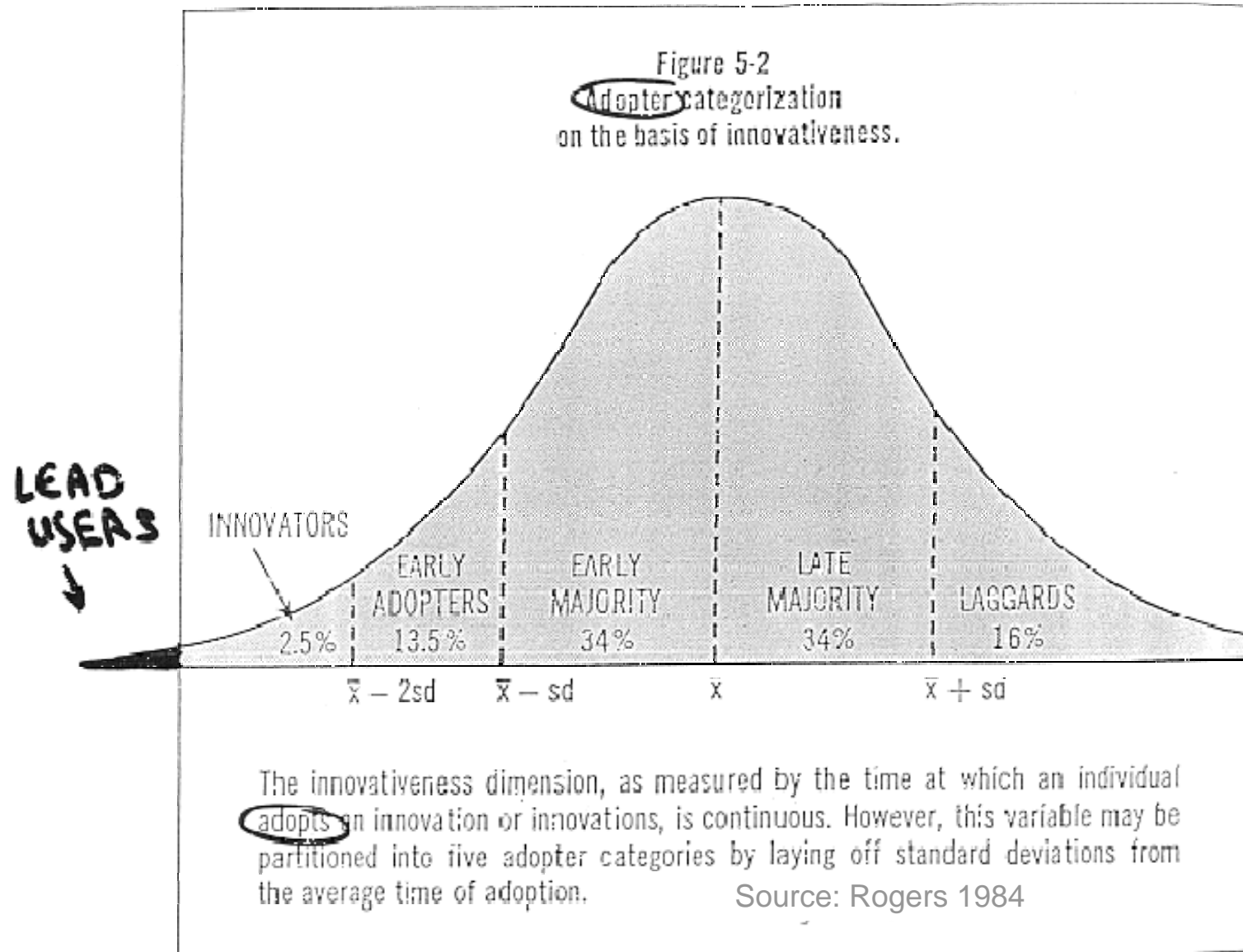
Lead users are... (von Hippel 1986; 1988)

“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 benefits** from a solution to their needs. (Such users are more likely to innovate – “Necessity is the mother of invention!”)
3. Have **solution skills** to transfer need into a feasible solution

An important differentiation: Lead user method is NO market research – and often lead users are NOT customers of the manufacturer



Profiting from lead user innovation

Screening for solutions based on lead user innovation developed autonomously

- Lead users develop innovation for own use
- Manufacturers search for lead user innovation and transfer them into commercial product

Screening for lead users for technological problem solving or discovery of unmet needs

- Lead user method (as described in case study)
- Co-development of innovation with lead users in workshop methods
- Often search in advanced analog markets

**The next generation
of lead users**

ikea

Search

Search for: Models 3D Collections

3D Warehouse Results

Results 1 - 12 of about 316 for ikea (0.0 seconds)



[ikea JONAS](#)

by [William Frasson](#)
table, desk

[Download to Google SketchUp](#)



[Ikea coffee table](#)

by [marmaduke](#)
a rough sketch of my LEKSVIK...

[Download to Google SketchUp 6](#)



[Móvel TV](#)

by [argpadao](#)
Móvel modular para tv **IKEA**.

[Download to Google SketchUp](#)



55cm x 55cm [Ikea](#) coffee table

by [odolphie](#)
Small cheap table from **Ikea**. ...

[Download to Google SketchUp 6](#)



[IKEA KLOFFSTA](#)

by [William Frasson](#)
this is the my kitchen table

[Download to Google SketchUp](#)



[ikea chimney](#)

by [medsol](#)

[Download to Google SketchUp 6](#)



[Ikea Expedit bookcase](#)

by [sCiEnT](#)
Width: 58 5/8 " Depth: 15...

[Download to Google SketchUp 6](#)



[Ikea Glasgow](#)

by [CC](#)
MASSIVE

[Download to Google SketchUp 6](#)



[IKEA Burlington](#)

by [Dave Jackson](#)
This is the **IKEA** store in...



[BESTA JAGRA - White](#)

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TV Desk

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3D content created by Google SketchUp users

Talk with other Users!

Find answers, ask questions, and share your expertise with other users in the [SketchUp Help Group](#).

What is Google SketchUp 6?

Google SketchUp is a deceptively simple, amazingly powerful tool for creating, viewing, and modifying 3D ideas quickly and easily. Google SketchUp was developed to combine the elegance and spontaneity of pencil sketching with the speed and flexibility of today's digital media.

Developed for the conceptual stages of design, this powerful yet easy-to-learn software allows for quick and easy 3D form creation, the result is an interface that supports a dynamic, creative exploration of 3D form, material and light.

Google SketchUp combines a compact yet robust tool-set with an intelligent guidance system that streamlines the 3D drawing process.

3D for Everyone

Design software has been around for decades and is clearly here to stay. But we think something has been missing—the freedom, flexibility and fun that should go hand-in-hand with the design process. It's our view that while traditional CAD software is necessary for developing detailed drawings, it's simply too complex for most conceptual design work.

Google SketchUp bridges the divide between design utility and fun. As designers ourselves, we created Google SketchUp as much to satisfy our own wishes as those of our users.

We know you've heard it all before: what company doesn't claim that its software is 'a piece of cake to use' or 'the best around?' We're guilty of saying this too. But you don't have to take our word for it—you can try it yourself. Just download [Google SketchUp 6](#) fire it up and give it a spin. Most people say they're off and running in a few hours.

But nevermind what we think, here's what customers have told us Google SketchUp is to them:

-  Communication tool
-  Problem-solving tool
-  Productivity tool
-  Creativity tool








[Download Google SketchUp 6](#)


Additional Resources

-  [Bonus Packs](#)
-  [SketchUp Online Documentation](#)
-  [Video Tutorials](#)
-  [Examples](#)
-  [Quick Reference Card](#)
-  [SketchUp Help Group](#)
-  [Google Sketchup Users Guide](#)

Common Questions

-  [How can I learn how to use SketchUp?](#)
-  [How do I place a SketchUp model in Google Earth?](#)
-  [How can I share models via the 3D Warehouse?](#)
-  [How can I download models from the 3D Warehouse into SketchUp?](#)
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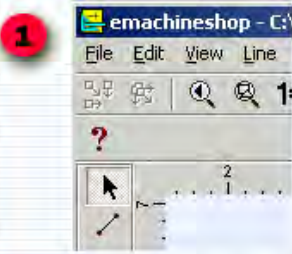
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User Manufacturing

- Users (customers) are becoming not only co-innovators, but also manufacturers, using a **new infrastructure** provided by some specialized companies.
 - (1) **Easy-to-operate design software** that allows users to transfer their ideas into a design without much experience in how to operate a CAD software.
 - (2) **(Open) Repositories of designs**, often under creative commons license.
 - (3) **Easy-to-access flexible manufacturing technology.**
- This also allows (expert) users to set up an **“instant company”** that designs, makes and globally sells physical products (as easy as starting a blog or creating an eBay store).

[More information: <http://tinyurl.com/yofu2y>]



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Rapid manufacturing technologies will reinforce this trend

- Prototyping technologies grow up.
- Laser sintering and similar additive fabrication techniques "for manufacturing solid objects by the sequential delivery of energy and/or material to specified points in space to produce that part."
- Rapid manufacturing done in parallel batch production can provide a large advantage in speed and cost compared to alternative manufacturing techniques such as plastic injection molding or die casting.
- Machine and material cost are dropping sharply, while the available design know-how is increasing.

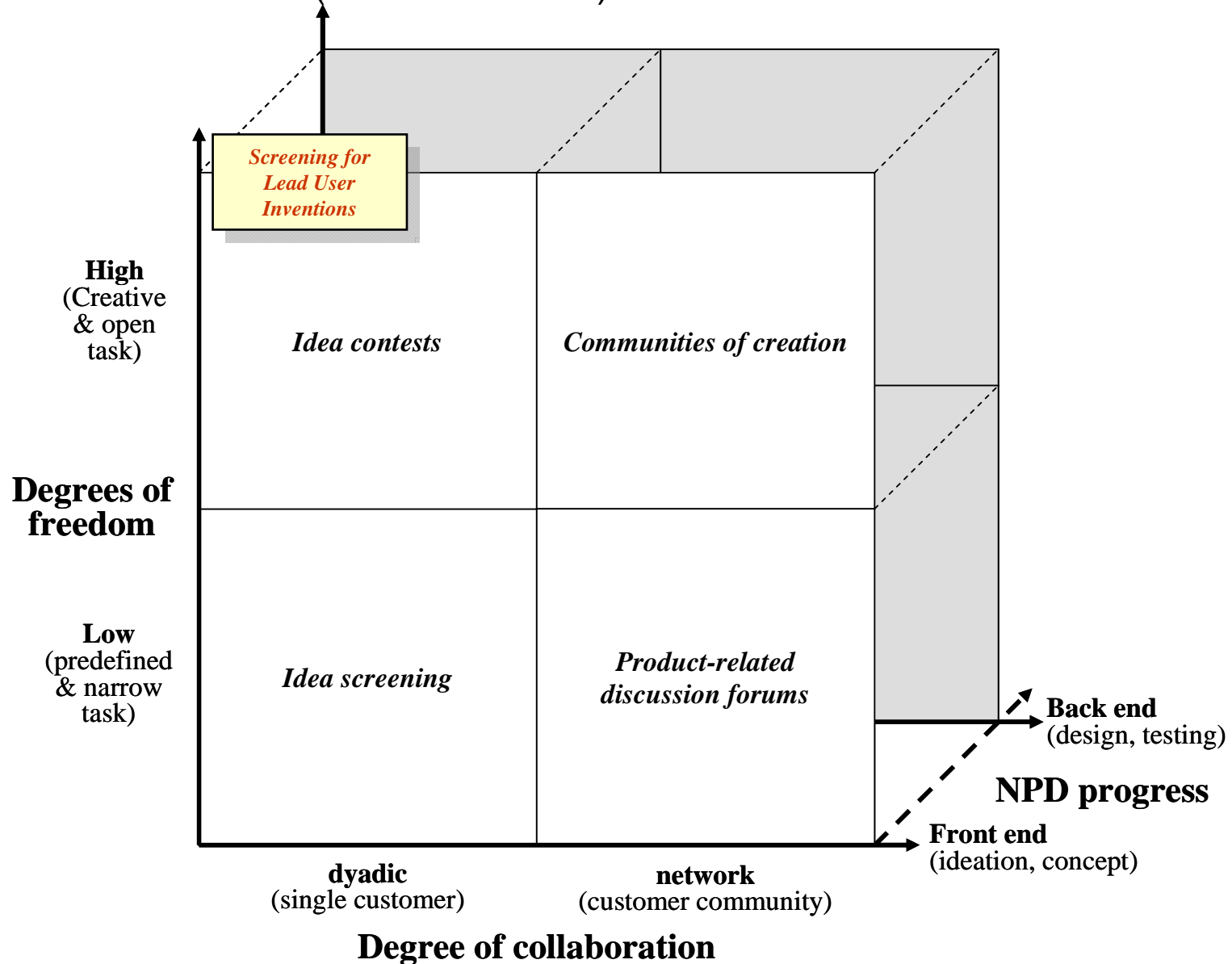
Companies like Spreadshirt, Cafepress, Zazzle, Ponoko, e-machineshop, etc. profit from the long tail – by providing capabilities for niches to create their own market and assortments

- Users can create their own assortments ...
- ... and their own market.
- **Manufacturers no longer have to understand what customers want** ... they are just producing what people tell them to do (and not "why they need it")
- **User manufacturing provides the missing link of user innovation:** Some innovative users create new products (often to profit from using them), but also get enabled to share their developments (at larger quality) with a larger group
- **A new infrastructure is enabling the development from lead users into "user entrepreneurs"**

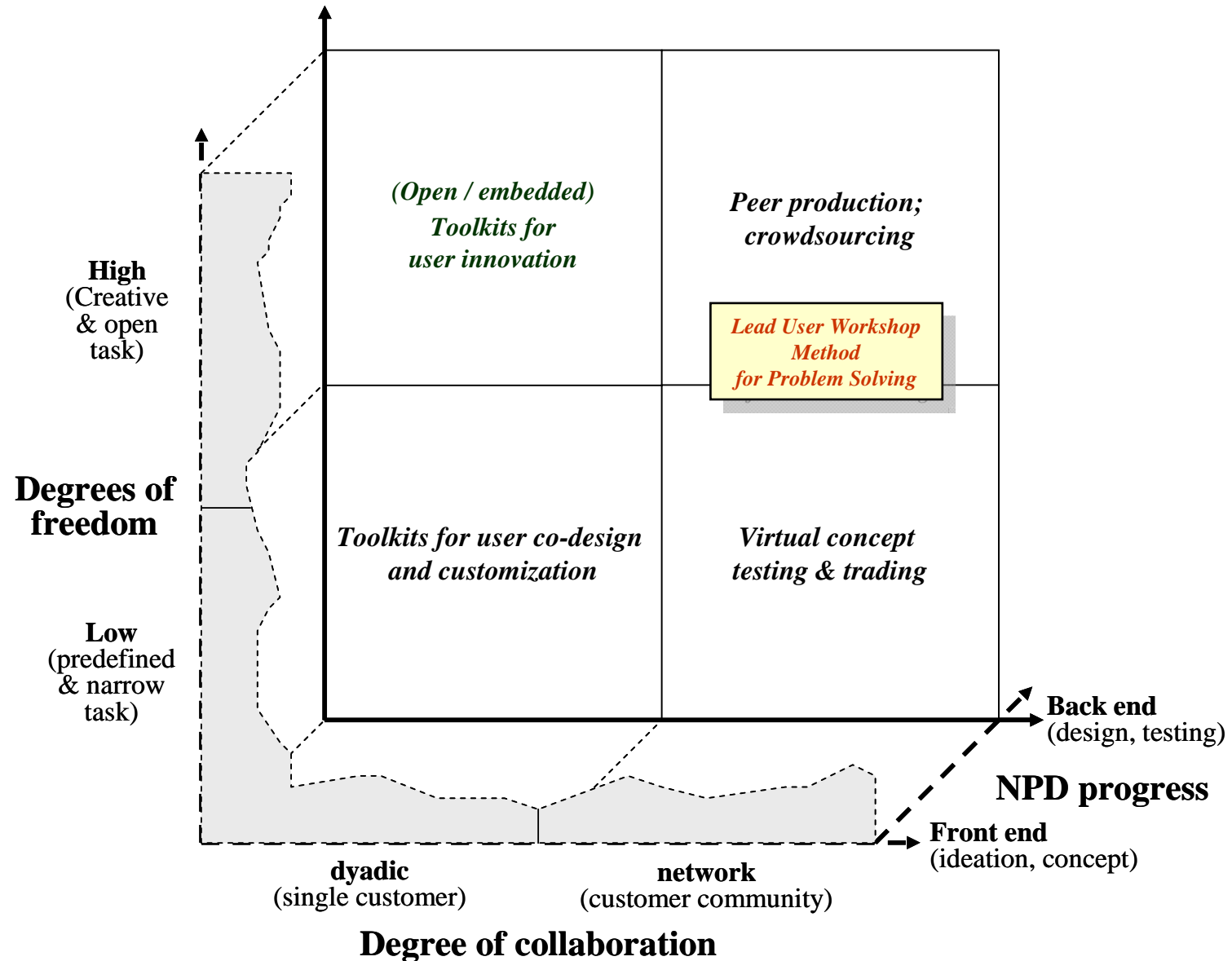
Topics of this talk

- The challenge to access need information in "long tail markets"
 - Long tail strategy #1: **Mass Customization & Toolkits for User Co-Design**
 - Long tail strategy #2: **Collective Customer Commitment**
 - Long tail strategy #3: **Expanding the Lead User Method into (Lead) User Manufacturing**
- **A competence based view on co-creating with customers**
- **Conclusion**

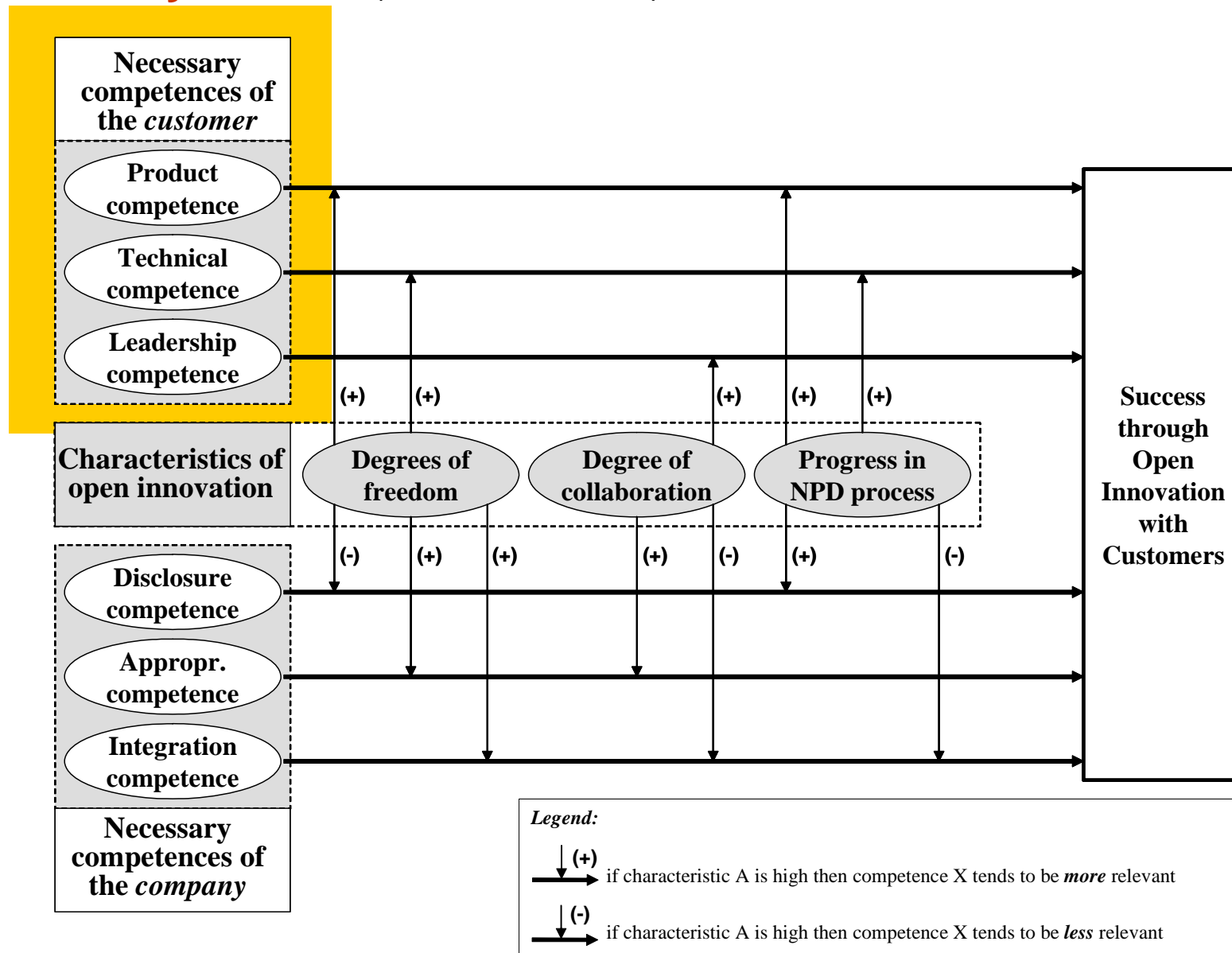
A typology of "mode 3" methods of collaborative customer participation in NPD (Piller & Ihl 2009)



A typology of "mode 3" methods of collaborative customer participation in NPD (Piller & Ihl 2009)



Competences of firms and customers to co-design successfully in NPD (Piller & Ihl 2009)



Competences of customers for open innovation

Product competence

Understanding of the product domain

(1) Product related knowledge: Know-how about the product architecture and the used materials and technologies (Lüthje 2004)

(2) Use experience: Emerges via the frequency of using products. Required to experience and systematically analyze existing problems that arise from using the products currently available in the market.

Franke et al. (2006): Extension, show that **being “ahead on an important marketplace trend”** is related to increase in commercial attractiveness of innovations developed by users. Focus on identifying “extreme” users in a given product domain.

Competences of customers for open innovation

Technical competence

Ability of customers to come up with solutions for a given NPD problem.

(1) Methodological knowledge: Methodologies, tools and activities that are employed and undertaken in new product development and manufacturing.

Customers have traditionally lacked technical skills and capabilities that NPD requires. But with the internet (solution) knowledge becomes more accessible and proximate. This helps consumers' ability to engage in activities where initial learning costs were traditionally perceived to be too high.

- **User-focused online tutorials** (e.g., makezine.com; evsupersite.org) (O'Hern and Rindfleisch 2008)
- **Toolkits for user innovation and co-design** (Thomke and von Hippel 2002; Franke and Piller 2003).

(2) Analogous market knowledge: Resembles target market with regards to customer needs and/or the technology used, but often belongs to another industry (Hienerth et al. 2007).

Competences of customers for open innovation

Leadership competence

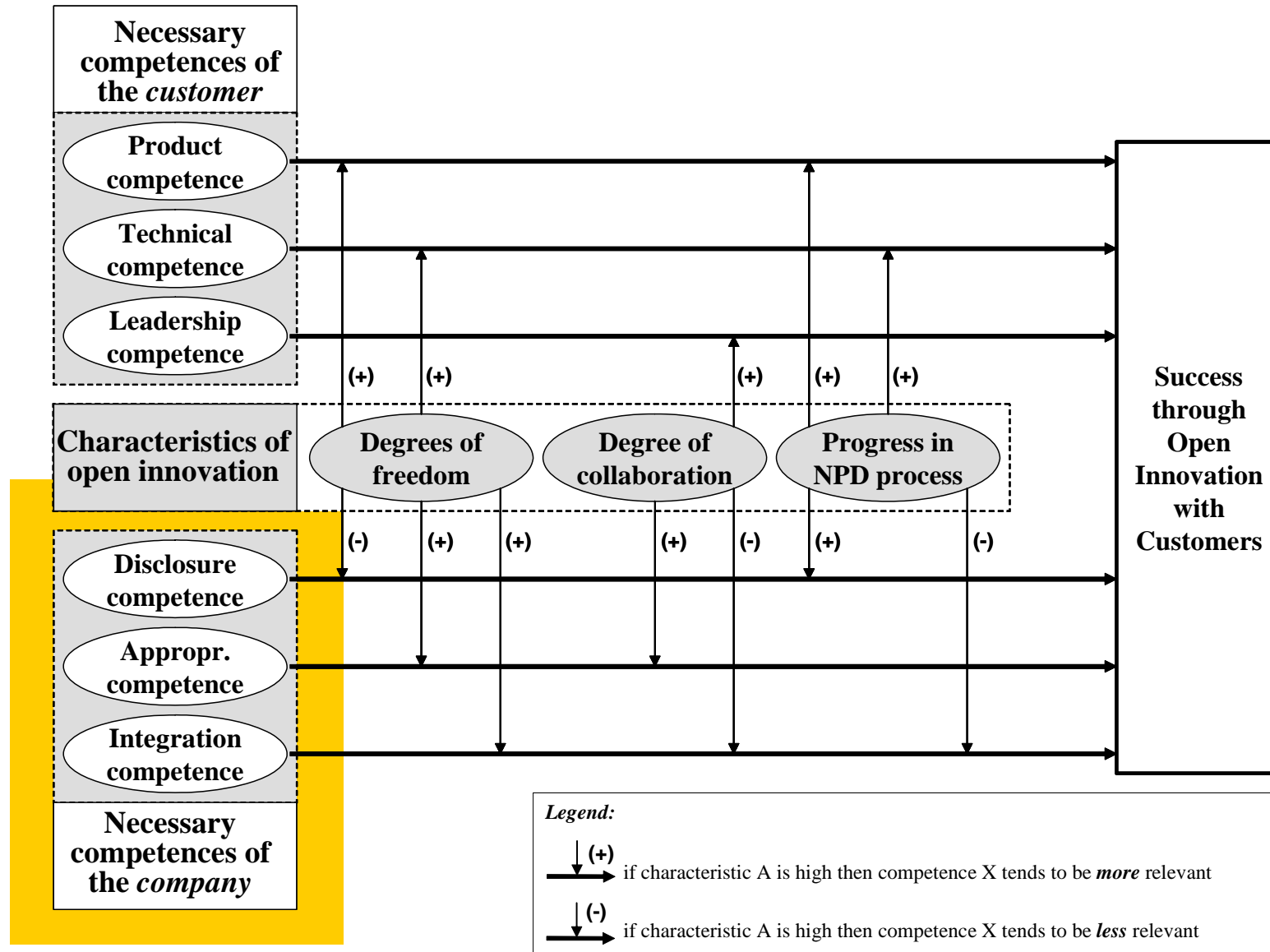
*Leadership competence (held by at least some customers) represent the demand for **locomotion**, i.e. ensuring goal achievement by coordinating the various subtasks; and **cohesion**, i.e. motivating group members in a coherent way towards the common goal. Especially relevant in open innovation settings with network collaborations in communities.*

Members on customer innovation communities **often innovate not anonymously**, but with reference to identity, reputation, technologically derived status, collegial networks, and physical interaction (Lakhani & von Hippel 2003). **But despite their self-organizing character, most open innovation communities also rely on strong leadership** to function effectively and to resist free-riding and under-investment of effort (von Hippel & von Krogh 2003).

Elements of leadership competence (Fleming and Waguespack 2007):

- (1) **Human capital:** related to strong technical contributions
- (2) **Social capital:** social brokerage and boundary spanning between individual contributions.

Competences of firms and customers to co-design successfully in NPD (Piller & Ihl 2009)



Competences of firms for open innovation

Disclosure competence

Firms' disclosure competence refers to the fact that NPD problems need to be communicated in order to establish an interaction with innovative customers.

Voluntary information disclosure may be an unthinkable practice in firms with management that traditionally oriented towards closed innovation, because such openness obviously entails the challenge of protecting one's intellectual property. Nevertheless, voluntary information disclosure is a core requirement of co-creation (Lhuillery 2006; Harhoff et al. 2003).

(1) Problem Broadcasting: Amount of disclosure is a strategic choice that firms' management needs to decide upon. This decision, whether it is made good or badly, has a considerable performance impact and thus requires a corresponding competence (Henkel 2006). In addition, technical competence to perform broadcasting task.

(2) Problem Formulating: Competence to formulate NPD problem in a way that a heterogeneous group of customers (external actors) can contribute to this task. Non-trivial task that strongly contributes to performance of open innovation (Lakhani et al 2008, Piller 2009).

Competences of firms for open innovation

Appropriation competence

Appropriation competence refers to a firm's need to be able to (1) capture the co-produced knowledge from customers and (2) protect it against outsiders and free-riders.

(1) Capturing knowledge implies that firm needs to provide special benefits for customers in order to compensate customers for the forgone property rights on their idea.

(2) Protecting knowledge co-produced with customers against outsiders and free-riders, often (especially in customer communities) with absence of effective legal means of appropriation like patents and contracts.

Competences of firms for open innovation

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(1) Capturing knowledge implies that firm needs to provide special benefits for customers in order to compensate customers for the forgone property rights on their idea. **Incentives (expected benefits) for customers include:**

(a) **Direct returns**

Other extrinsic benefits when customers transfer knowledge to manufacturing company without a direct return (Harhoff, Henkel and von Hippel 2003):

- (b) **Product use and improvements**
- (c) **Network effects and standards**
- (d) **Reputation**

Intrinsic benefits for customers:

- (e) **Enjoying an activity:** Feeling of fun, competence, exploration, and creativity (Schreiber 2007, 2008)
- (f) **Fulfillment of norms for the sake of itself:** (Generalized) reciprocity, altruism or fairness.

Strategic competence of firms to discover and serve these benefits in an efficient way.

Competences of firms for open innovation

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(2) Protecting knowledge co-produced with customers against outsiders and free-riders, often (especially in customer communities) with absence of effective legal means of appropriation like patents and contracts.

New competence required in the pursuit of alternative means of appropriation:

- (a) Organizational appropriation mechanisms
- (b) Strategic appropriation mechanisms

Competences of firms for open innovation

Integration competence

Firms need to integrate new knowledge co-produced with customers into their own NPD process.

(1) Integrating heterogeneous customer inputs: If innovations are progressively being created over networks operating under different organizational principles, then workflows for NPD have to be extended beyond the firm's internal organization.

How can different actors and their contributions be integrated smoothly?

Benkler (2002) distinguishes between three mechanisms:

- (a) Integration through **automated task processing** over dedicated information platforms
- (b) Integration through **peer production**
- (c) Integration through reintegration of **hierarchical coordination forms**

(2) Integrating external solutions into the firm's NPD process: Necessary precondition is to **overcome "not-invented-here" (NIH) syndrome** (Katz and Allen 1982). Resistance to external knowledge from customers may be even greater than towards input from colleagues.

Means: "Gatekeepers"; Absorptive capacity

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Conclusion

- The critical task in NPD is to discover and meet customer needs.
- Long tail markets are becoming norm in many industries. This asks for new strategies for efficient NPD and market creation (niche exploitation).
- A different understanding of accessing need information is required:
From design for customers to co-design with customers.
 - **Mass customization and customer co-design toolkits** are efficient strategies to serve heterogeneous customer needs.
 - Customers can take **different roles along the value chain**: Lead users, co-designers, decision makers (CCC) ...
- **User manufacturing** may overcome problems of traditional mass customization systems.
 - New manufacturing and design technologies are finally entering the stage of wider application.
 - This is, however, a supplemental approach – the challenge is to create a fit between standard production and customer co-design.
- **Firms (and users) require new capabilities and competences to perform open innovation with customers in NPD efficiently and effectively**

Mass Customization & Open Innovation News

Notes and ideas on mass customization, personalization, customer integration, and open innovation – strategies of value co-creation between suppliers and customers. This blog continues a long running newsletter, published and edited by Frank Piller, RWTH / MIT, since 1997.

EVENTS

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