CENTRE FOR SCIENCE AND TECHNOLOGY OF THE NON- ALIGNED AND OTHER DEVELOPING COUNTRIES (NAM S&T CENTRE)

"Market Entry for High Tech Innovative Products: Methods and Experience in B2B Markets"

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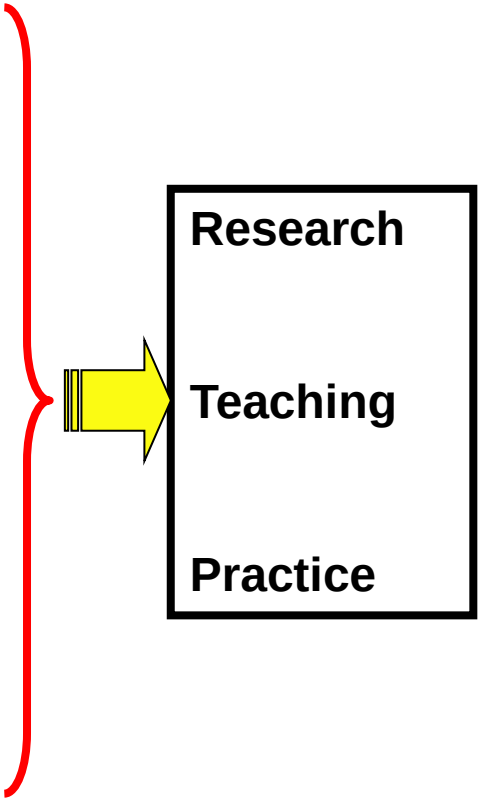
Teheran , 23rd May, 2016
PARDIS TECHNOLOGY PARK

Motivation

35 years experience with:

- High-tech business development
- Multidisciplinary research projects
- Creation & development of High Tech Companies
- Observation of
  - Dynamics of bottlenecks
  - Reaction to emergent Markets
  - Market entry strategies
  - Dynamics of financial demand
  - Human resource qualification
  - IPR and durability of innovation lead



AGENDA

1. Market Entry and Window of Opportunity (2)
2. Innovation: Readiness and Resistance (5)
3. The Challenges of Technology Push (7)
4. Technology acceptance and marketability (3)
5. High-Tech Innovation: Market Entry (5)
6. Marketing Management for High Tech Products (2)
7. Marketing Testbed (2)
8. Technology Push: 26 Market entry projects (5)
9. Discussion (1)

1. Market Entry and Window of Opportunity (1/2)

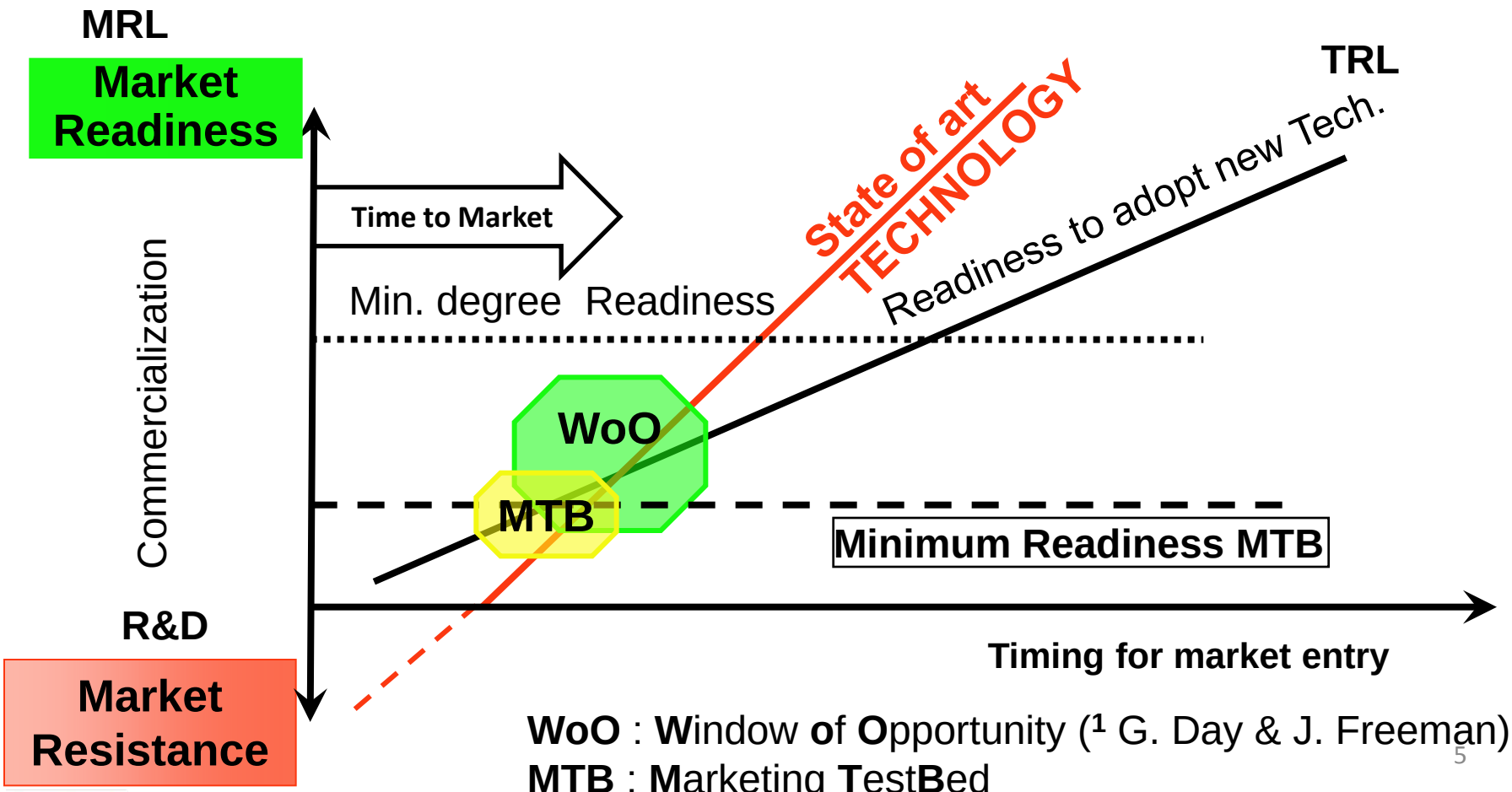
High Tech Innovation in B2B[1]) Markets

- **How** to select the target market?
- **When** to enter in **which** target market?
- **Why** should target customer buy?
- **How much** is customer willing to pay?

Commercialization is the transformation of a (scientific) invention into a sustainable, competitive and profitable innovation.

[1]) B2B = Business to Business

1. Market Entry & Window of Opportunity[1]) (2/2)



WoO : **W**indow **o**f **O**pportunity ([1] G. Day & J. Freeman)
MTB : **M**arketing **T**est**B**ed

2. Innovation: Readiness and Resistance (1/5)

Customers‘ aspect:

- **Readiness to innovate** is an entrepreneurial and behavioral feature.
- Acquisition and usage an offered innovation in the market might be advantageous, but also risky.
  MAKE or BUY ? **Risk tolerance?**
- **Resistance to innovate** is an entrepreneurial and behavioral feature to reject the offered innovation.
  Might be a wrong decision?
- **Q**: Do the communicated innovative features meet customer‘s demand for problem solution?

2. Innovation: Readiness and Resistance (2/5)

Customer's Dilemma: how to mitigate?

Solution:

a) Estimate coherence between **TRL** (Technology Readiness Level) and **MRL** (Market Readiness Level)

b) Check compliance to **M**arketability **C**riteria MC 1 to 6

c) Check **T**echnology **A**cceptance:
Perceived **U**sefulness and **P**erceived **E**ase **o**f **U**se

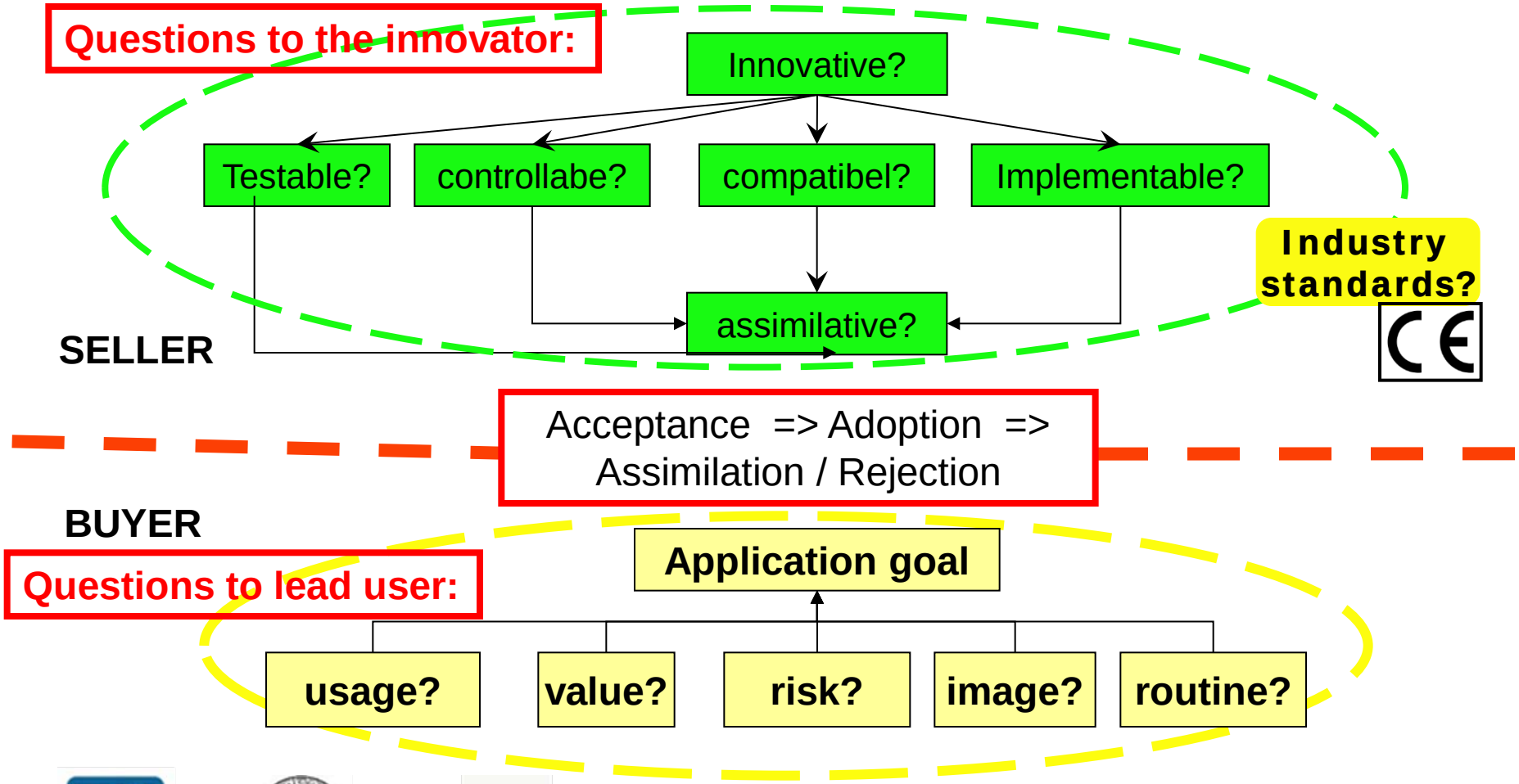
d) Check **W**illingness **t**o **P**ay

2. Innovation: Readiness and Resistance (3/5)

Stages of resistance:

- Immediate rejection
- After test: negative acceptance: resistance to adopt the innovation
- After Adoption (acquisition, leasing etc.): negative **Assimilation**
  („assimilation gap“ see: Fichman & Kemmerer) => implicit or explicit rejection

2. Innovation: Readiness and Resistance (4/5)



2 . Innovation: Readiness and Resistance (5/5)

Innovation Obstacles		-1 := low expected benefit, +1 high expected benefit. **Perceived Occurence of:**					
Innovation	**fictious example**	TEST-ABLE	CONTRO LLABLE	INNO-VATIVE	COMPA-TIBLE	IMPLEME NTABLE	ASSIMIL - ATIVE
low -1 high +1 expected benefit	USAGE						
	VALUE						
	RISK						
	IMAGE						
	ROUTINE						

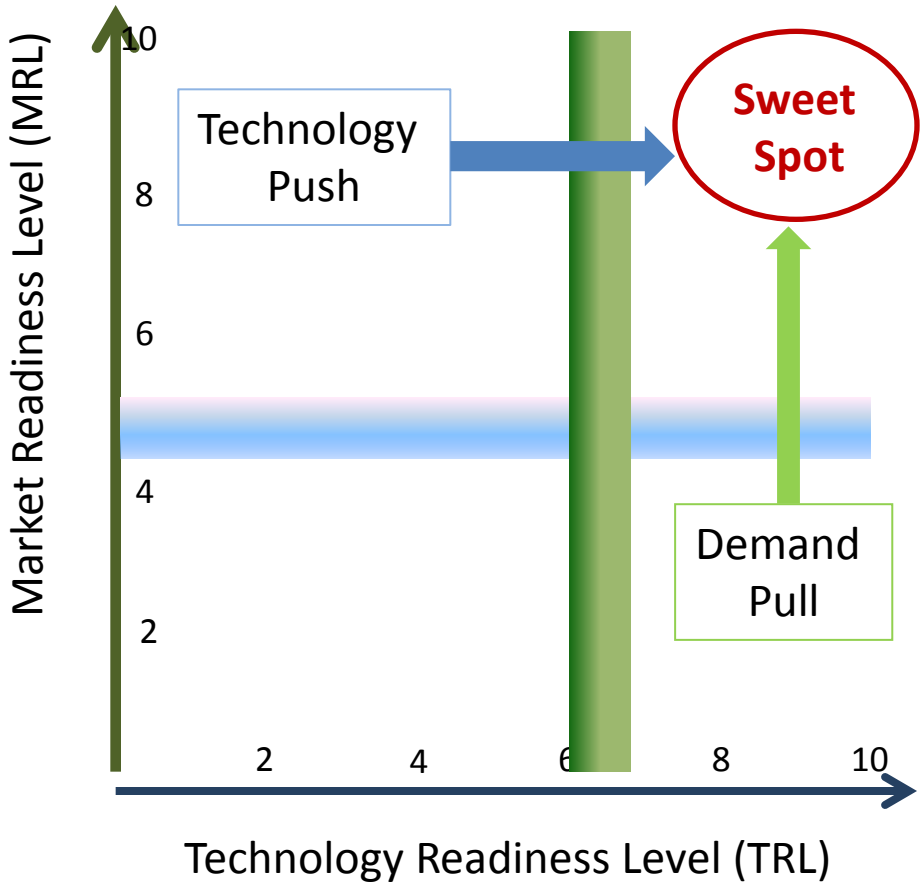
Methods: Problem Centered Interview (PCI), Analytical Hierarchy Process (AHP) MCDM (multi criteria decision making) esp. in B2B markets, Multivariate Statistics and MDS multidimensional scaling.

3. The Challenges of Technology Push [1])

- If we make it, will they really come?
- We have the technology! Will they really need it?
- For what could they use our technology?
- Who are 'they', anyway?
- *Significant market risk!*
  - Technology may miss its intended market window.
  - Anticipated market may no longer exist at time of release.

1) Rainer Hasenauer, Charles M. Weber, Peter Filo, Jozef Orgonas: "Managing Technology Push through Marketing Testbeds: The Case of the Hi-Tech Center in Vienna, Austria" in:" MANAGEMENT OF THE TECHNOLOGY AGE" Proceedings of PICMET 2015, IEEE Catalog Number: CFP15766-USB PICMET ISBN USB: 978-1-890843-32-8, edited by Dundar F. Kocaoglu, pp. 99 - 127

Key Questions

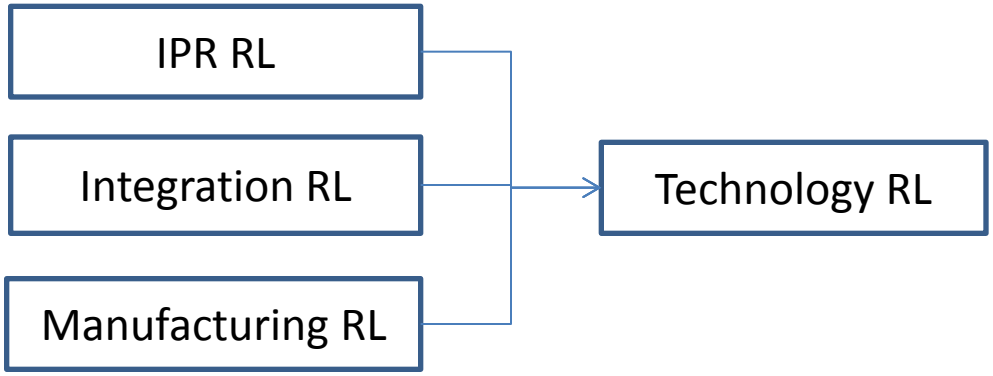


- Is the market ready for the technology?
- Is the technology ready for the market?

3.1.Readiness Levels

- **TRL – Technology Readiness Level**
  - expresses the degree of a technology
  - to be used safely
  - by intended and educated users
  - in the envisaged commercial (market)
  - or non-commercial user environment.
- **MRL – Market Readiness level**
  - measures the maturity of a given need
  - in the market considering
  - the potential obstacles.

3.2. Technology Readiness Level (TRL)

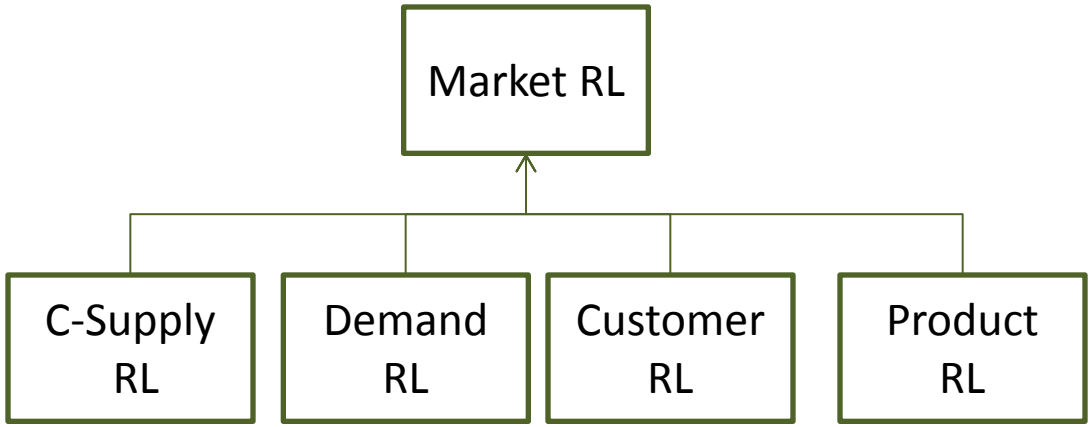


- Can be measured by degree of fulfillment
- Consists of three components (*see Appendix A & B*):
  - Intellectual property readiness (IPR)
    - Has IP been protected? **Freedom to operate?**
  - Integration readiness (INT)
    - Can technologies be integrated?
  - Manufacturing readiness (MAN)
    - Can product be manufactured?

Stages of Technology Readiness [19,20,21]

Level	***Technology Readiness***
1	Fundamental research
2	Applied research
3	Research to prove feasibility
4	Laboratory demonstration
5	Technology development
6	Whole system field demonstration
7	Industrial prototype
8	Product Industrialization
9	Market / sales certification

3.3. Market Readiness Level (MRL)



- Can be measured degree of fulfillment
- Consists of four components:
  - Competitive Supply readiness
    - To what degree is the competitive product available?
  - Demand readiness [17]
    - What is the demand for the product?
  - Customer readiness [25] (**Absorption Capacity!!**)
    - Is the customer ready to use and adopt the product?
  - Product readiness [15]
    - Is the product ready for widespread use?

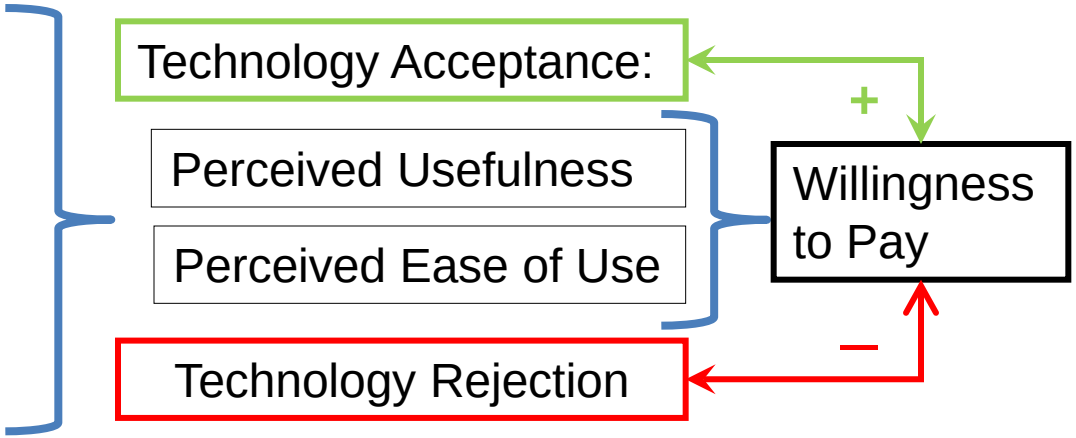
Stages of Market Readiness [17;22]

Level	***Market Readiness***
1	Unsatisfied needs have been identified
2	Identification of the potential business opportunities
3	System analysis and general environment analyzed
4	Market research
5	Target defined
6	Industry analysis
7	Competitors analysis and positioning
8	Value proposition defined
9	Product/service defined
10	Business model defined coherently

4. Technology acceptance and marketability (1/3)

Criteria 1 to 6 of High-Tech Innovation Marketability

(C 1.) Innovative?
(C 2.) Testable/correctable?
(C 3.) Controllable?
(C 4.) Compatible?
(C 5.) Implementable?
(C 6.) Assimilative?

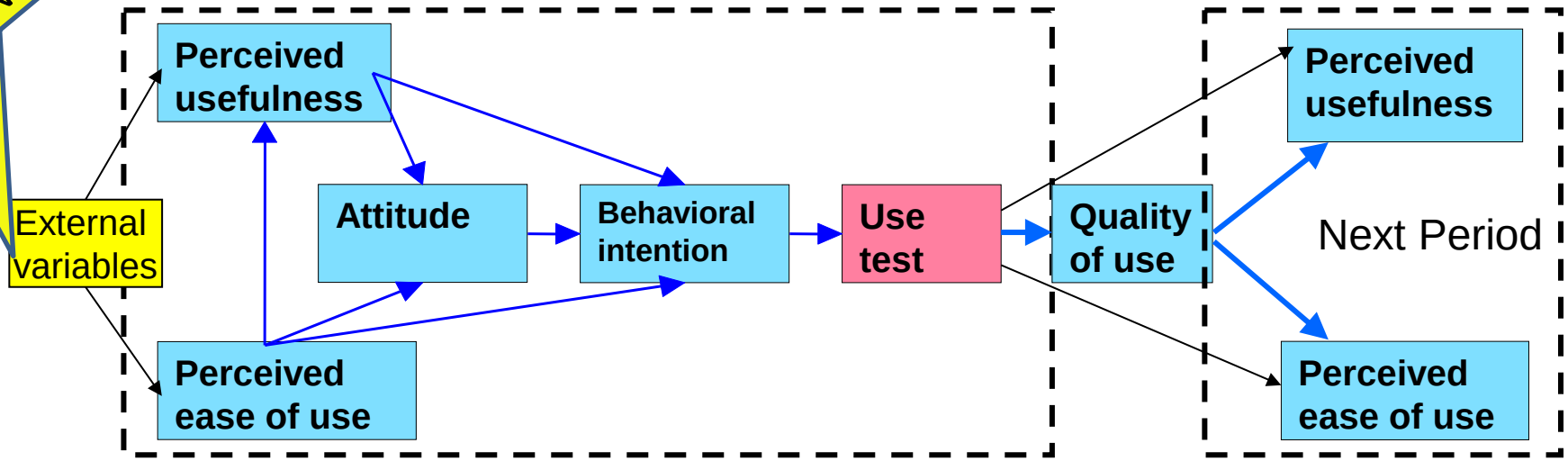


- Cross-functionality is a proven economic success factor in high-tech innovation and implies communication between multiple knowledge disciplines
- The buying / selling center is represented by a multidisciplinary buying / selling team

4.1.. Technology acceptance (2/3)

AL TRENDS IN
SOCIETY AND
TECHNOLOGY

TAM – Structural Equation Model
(Davis, 1989, Morris, u.a.m.)

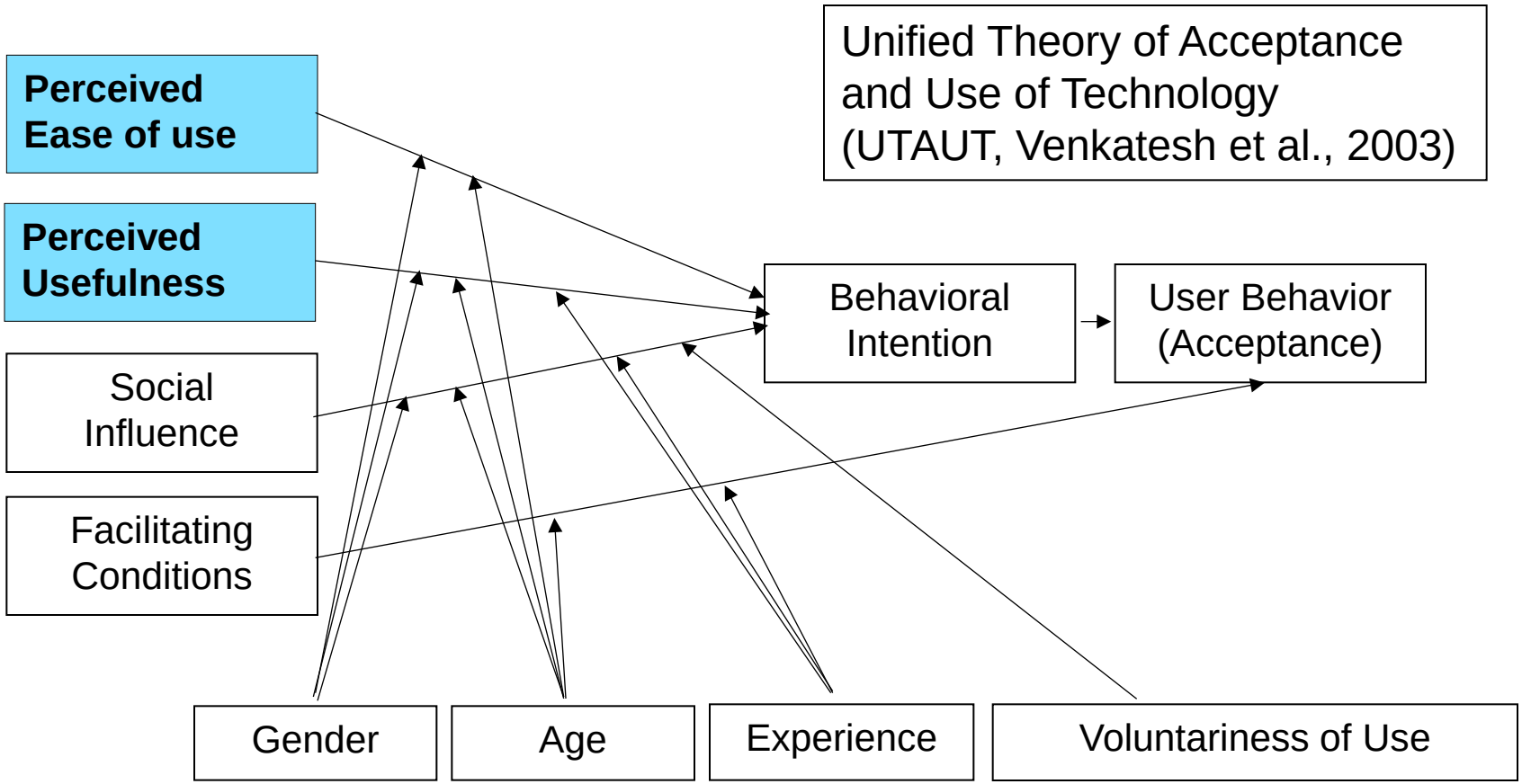


Current Period

Next period

MARKETING TESTBED

4.2.Technology acceptance (3/3)



5. High-Tech Innovation: Market Entry (1/5)

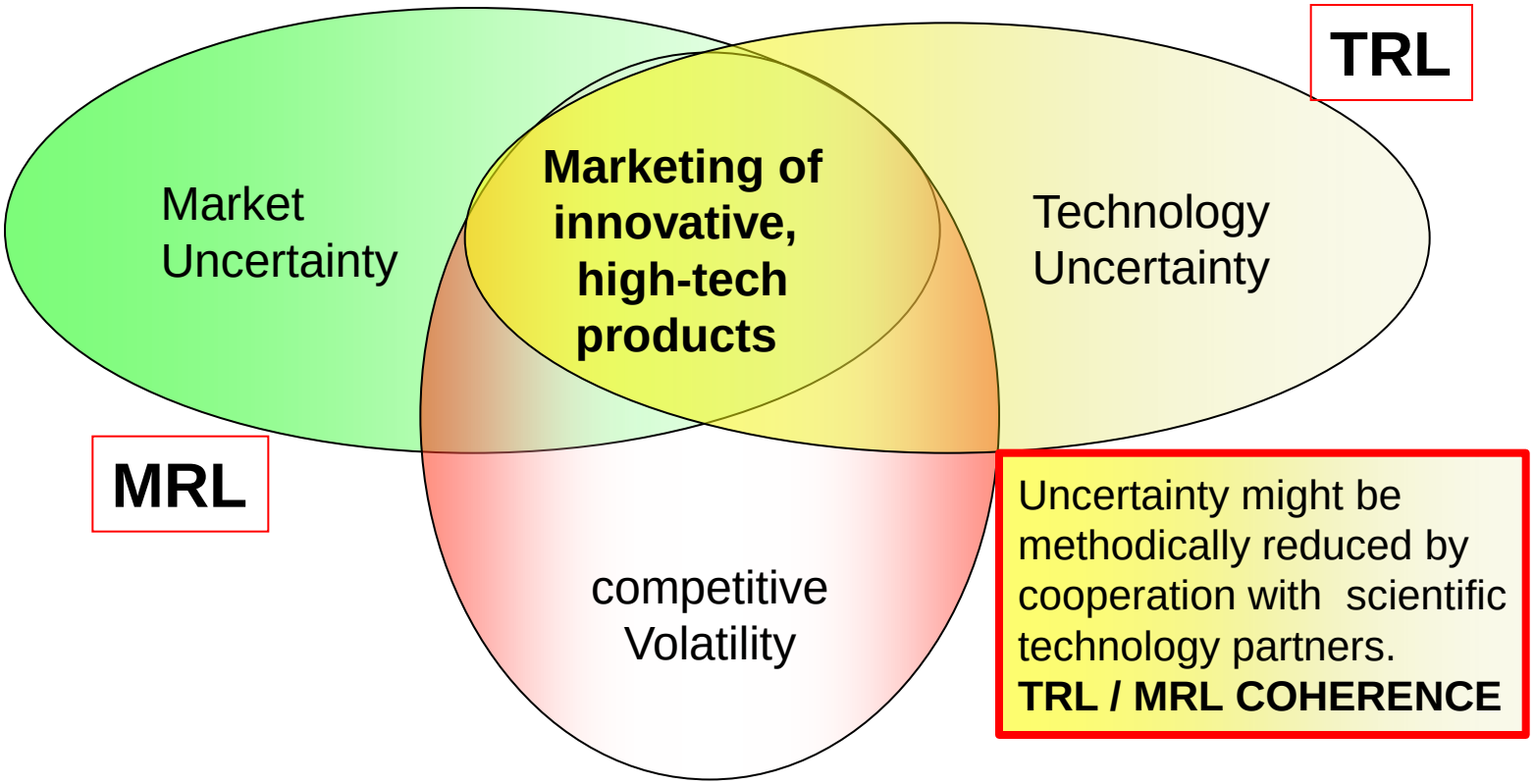
High-Tech Markets - Features

- **Close to research** (basic and/or applied)
- **Innovative** => high-profit, high-risk business
- **Dynamic** => accelerated behavioral changes of market => Dynamics of market segmentation
- **Fragmented** => numerous windows of opportunity, increasingly difficult to score.
- **Shorter product life cycles BUT**
- Longer **lasting technology life cycles**
- Long lasting **skill life cycles**

5. High-Tech Innovation: Market Entry (2/5)

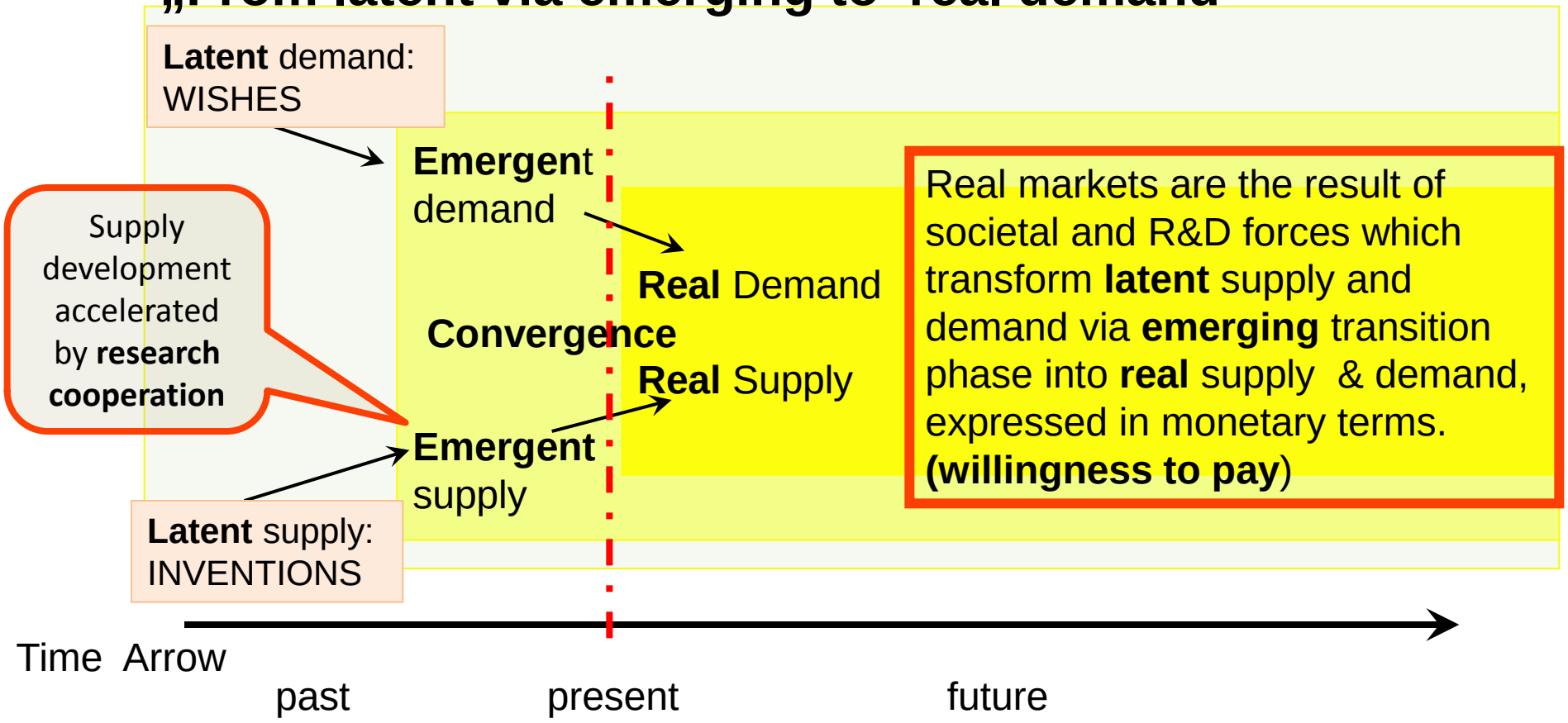
- Markets are generated by convergence of supply and demand.
- **Behind each bottleneck exists a new and innovative (?) market potential.**

5. High-Tech Innovation: Market Entry (3/5)

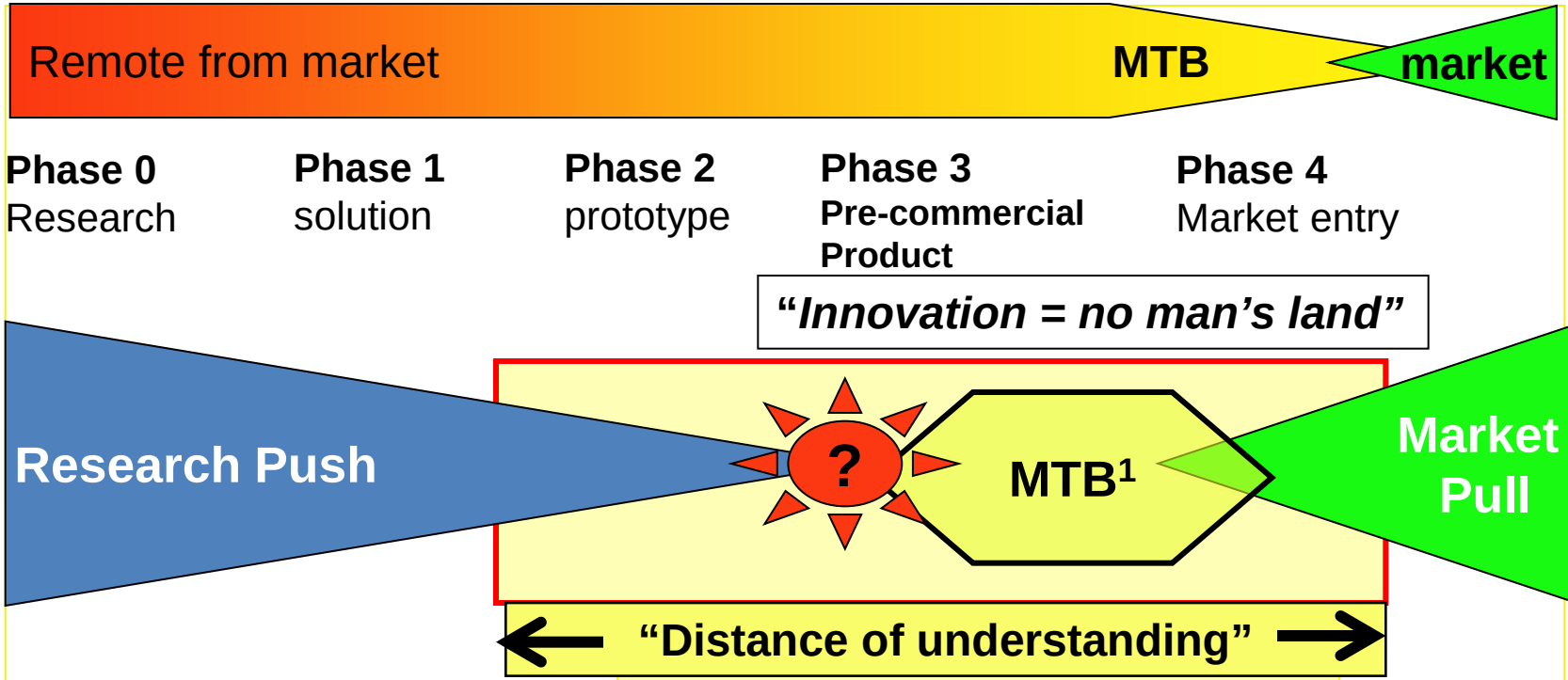


5. High-Tech Innovation: Market entry (4/5)

„From latent via emerging to real demand“



5. High-Tech Innovation: Market Entry (5/5)



[1] **MTB** = **M**arketing **T**est**B**ed

[2] **clue train Manifest**

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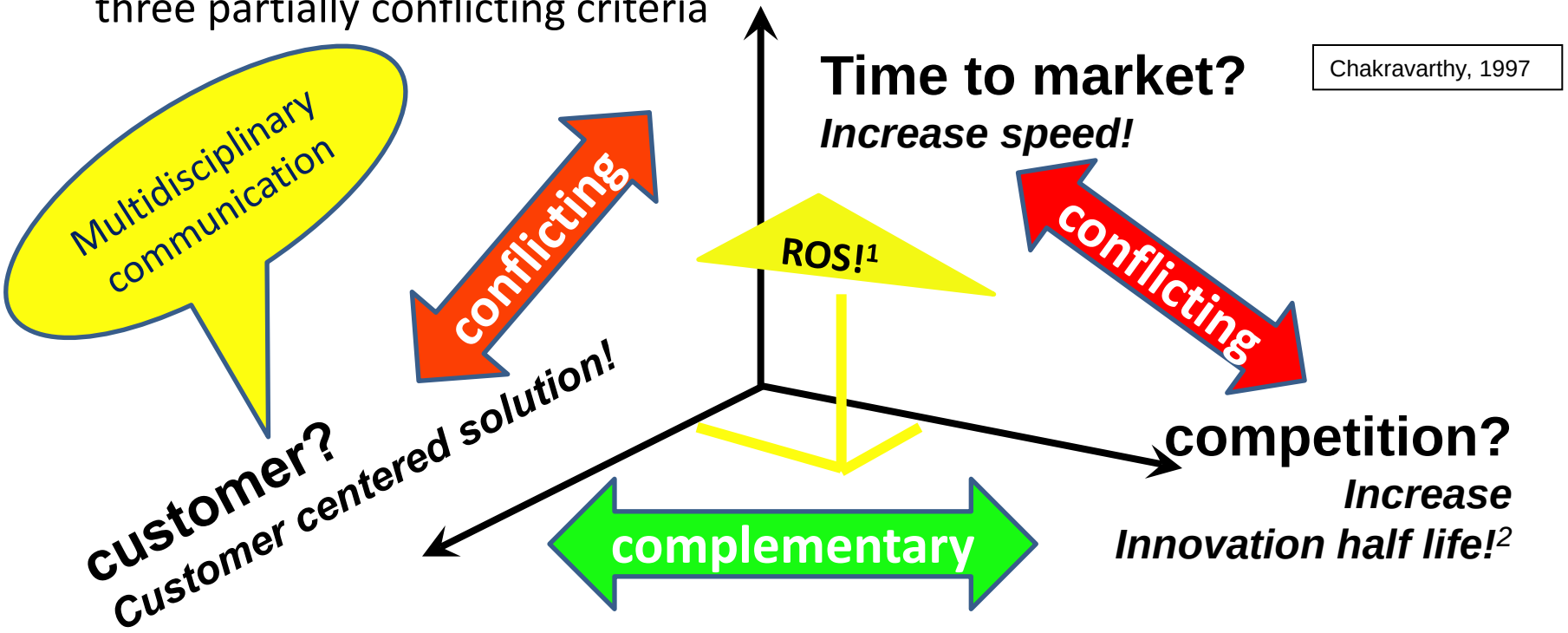
6. Marketing Management for High-Tech Products (1/2)

Marketing Management for innovative High-Tech Products deals with three partially conflicting criteria



[1] **ROS** Return on Sales

[2] Innovation half life = temporal stability of innovation lead compared with the best competitor, known to the innovator. (Hasenauer 1994)

6. Marketing Management for High-Tech Products (2/2)

Key ratios for stressors: KPI's (key performance indicators)

Time To Market Stress:
(**B**reak-**E**ven TTM) =

$$\frac{\text{Required time for BE}^2}{\text{Available time for BE}} > 1$$

Solution stress:
(**C-IHL**[1]) =

$$\frac{\text{R\&D time for required innovation lead}}{\text{R\&D time for achievable innovation lead}} > 1$$

Profitability stress:
(**ROS**) or **ROI** =

$$\frac{\text{Required ROS}}{\text{Achievable ROS}} > 1$$

[1]): **C-IHL**: competitive IHL

If > 1, then stress caused by short resources (qualitative and/or quantitative)

[2]) **BE**: Break Even

Research!

7. Marketing Testbed (1/2)

Marketing Testbed for Market Entry of innovative High Tech Products

Current research focused on development of marketing testbed platform which facilitates the execution of realistic tests of marketing mix measures.

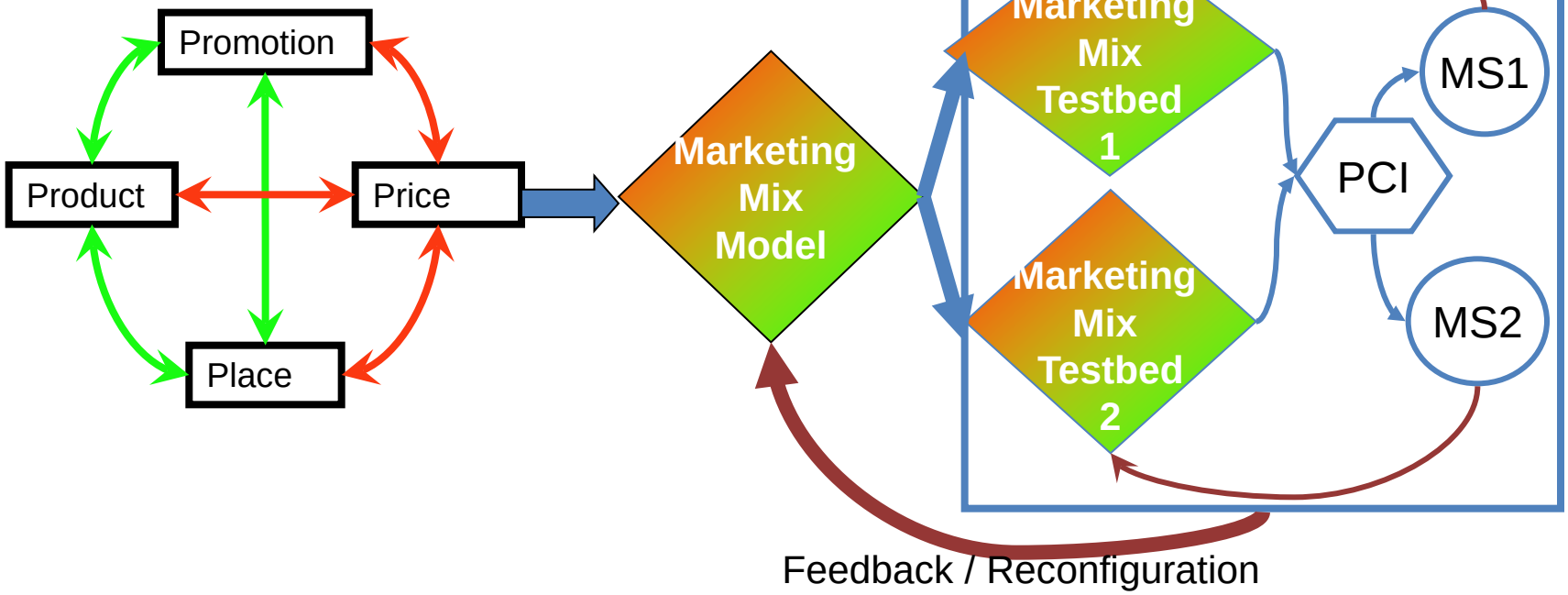
Marketing Testbed is different from usability testbed by focusing on the marketing tools: Marketing mix, technology- & product acceptance, Willingness to pay, understandability of communication content, effectiveness of distribution / selling system.

Another study that applies the marketing testbed method:

"This activity [establishing the marketing testbed] addresses the need of technology companies to validate the need for their product and its business case."

7. Marketing Testbed (2/2)

4Ps Marketing Mix and Marketing Testbeds for High-Tech Products



complementary compound effect?

substitutional compound effect? (cross elasticity)

PCI**: Problem Centered Interviews**
MS: **Market Segment**

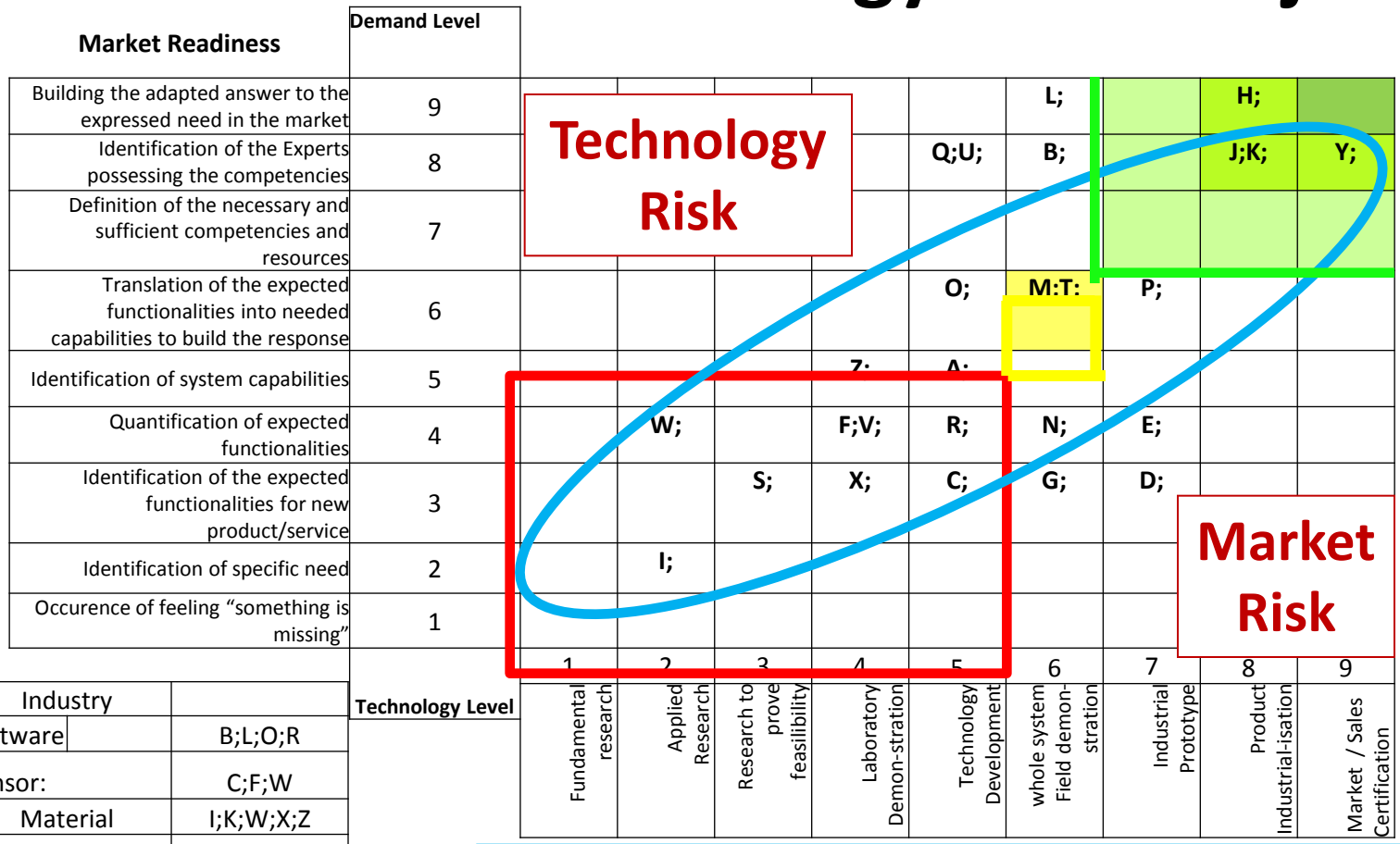
8. Technology Push/Market Entry Projects **(2013-2014)**

ID	*Innovation*	*Entry*	*Industry*
A	Gesture controlled mmi	2014	scanner
B	Technical simulation	2014	software
C	Atmospheric nitrogen deposition collector	2014	sensor
D	Aerosol jet-printing	2014	3d printing
E	Selective Laser Melting	2014	3d printing
F	Sensors for mobile robots	2014	sensor
G	Health CCPM	2013	robotics
H	Safety Robot	2013	robotics
I	Atmospheric plasma for wood surface energy	2013	material science
J	Phase change material	2013	building construction
K	Flame retardant rubber	2013	material science
L	Magic lens augmented reality	2013	software
M	Bone diagnostics	2013	medical diagnosis

8. Technology Push/Market Entry Projects **(2011-2012)**

ID	*Innovation*	*Entry*	*Industry*
N	Continuous Non-Invasive Blood-Pressure Measurement	2012	medical diagnosis
O	'Watch dog' for semiconductor	2012	software
P	Containment	2012	building construction
R	Lab on chip diagnostics	2012	software
S	Vibrational acoustic analysis	2012	medical diagnosis
T	Smart bottling plant	2011	machine construction
U	Bright red systems	2011	scanner
V	mmi pressure and temperature sensors	2011	sensor
W	Bionic surface	2011	material science
X	Cellular materials	2011	material science
Y	V-REDOX	2011	energy storage
Z	Diamond-like carbon	2011	material science

Readiness of 26 Technology Push Projects



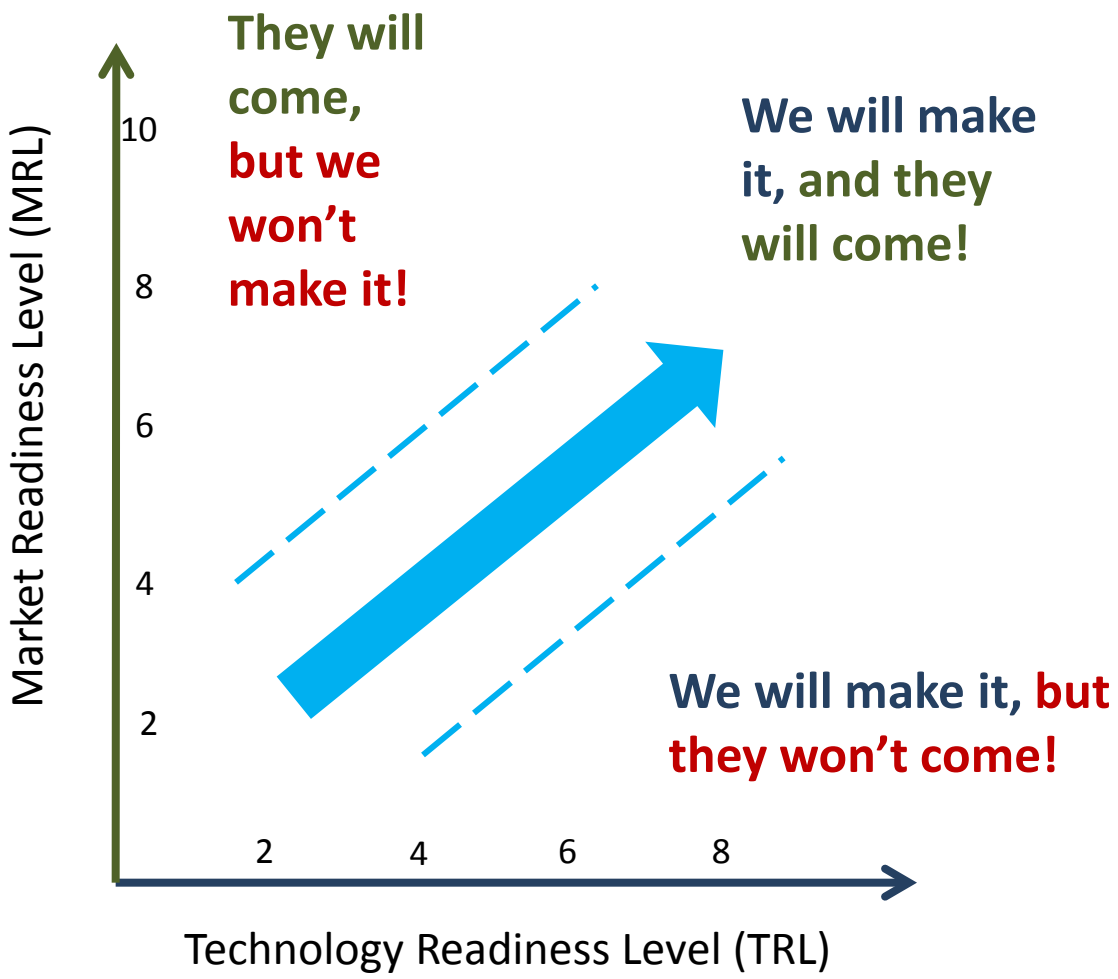
Industry	
Software	B;L;O;R
Sensor:	C;F;W
Material	I;K;W;X;Z
med. diagnosis	M;N;S
Scanner	A;U
Robotics	G;H
3D print	D;E
building constr.	J;P
wearables, location services	Q;Y
machine	T

Red-not ready for market
Yellow – Transition:
Green—Ready for market
Off diagonal = risk
Technology management = stay on diagonal

TRL / MRL COHERENCE

Lessons Learned:

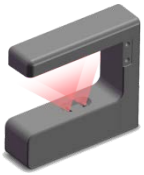
Stay on the Diagonal!

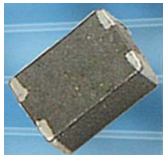


- Concurrent, step-by-step market and technology development places the right product into the right market window at the right time.

Selected Marketing Testbed Examples
Current Examples 2010/2011/2012/2013:

a) 2D Laser Scanner (2011)
b) Printed foil sensor for MMI[1]) (2010)
c) Cellular materials (2010)
d) Wireless strain gauge (2009)
e) Elastic PV- Li-Battery Sandwich (2007)
f) Phase change Material (2012, cont.)
g) Medical care robot for continuous, compliant passive motion (2011, cont.)
h) Atmospheric plasma on surfaces of functional material (2013, cont.)
i) High precision 3D printing (2013, cont.)
j) Spine response simulation (2013, cont.)
k) Peril detection robot (2012 cont.)
l) AAL robot (2013 con.)
m) DLC material




9. Summary & Discussion

- Market entry is a critical phase for economic success of innovative high tech products.
- Multidisciplinary, cross functional cooperation with research institutes are success factor.
- Marketing testbeds will systematically support successful market entry of innovative high tech products & services.

Thank you for your attention.

Questions?

Comments?

Ideas?

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