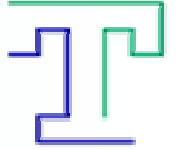


TT for Start-Ups: Radical Innovations versus Market Driven Demands, Contradiction or Synergy?

Karl Höhener
TEMAS AG



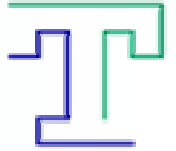
or:

(Young) Entrepreneur's vision

versus

(traditional) Customer needs?

Contradiction or synergy ?



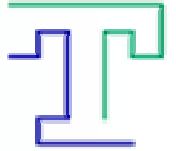
Incremental Innovation - Radical Innovation

Incremental innovation	Radical Innovation
Innovation close to the market (Market driven)	A specific defined market does not exist (New findings and visions are looking for a market)
Classical marketing can be applied	Innovation marketing with strategic objectives of the innovation to investigate market segments
The marketing organisation is mainly the driver for incremental innovations	Radical innovations are mainly technology driven



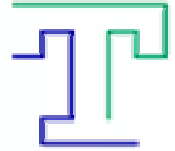
Innovation marketing

- Collection of application ideas (market segments) for the innovation or invention
- Evaluation of market segments
- Find lead customer groups

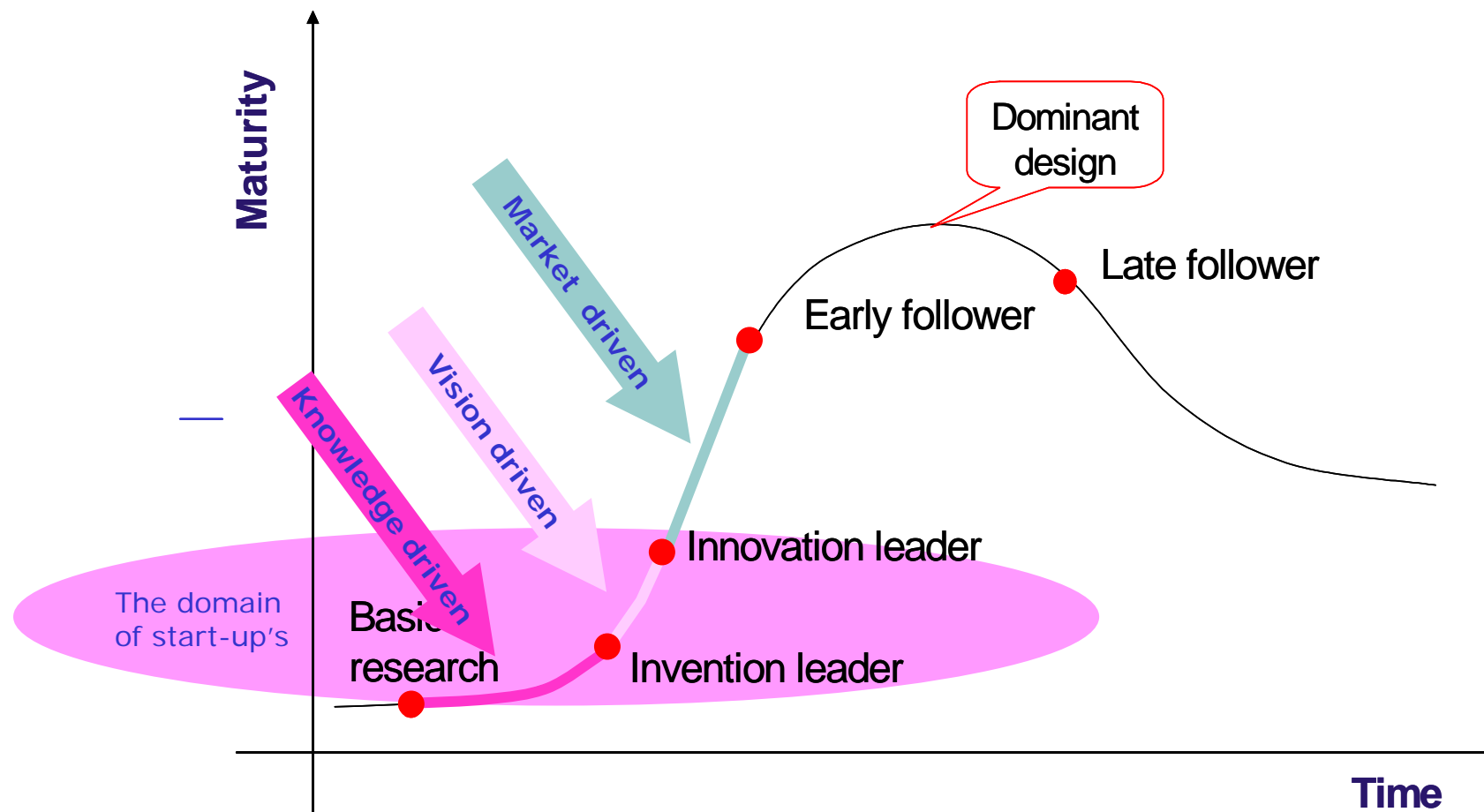


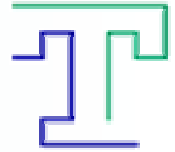
Driving Forces for Innovations

	Driving force	Result	Risks
Incremental innovations	Customer	Often too late	low
	Competitors	"Me too ?"	medium
Radical innovations	Entrepreneur's visions	New products on time	high
	Technology	Radical new products (often)	very high

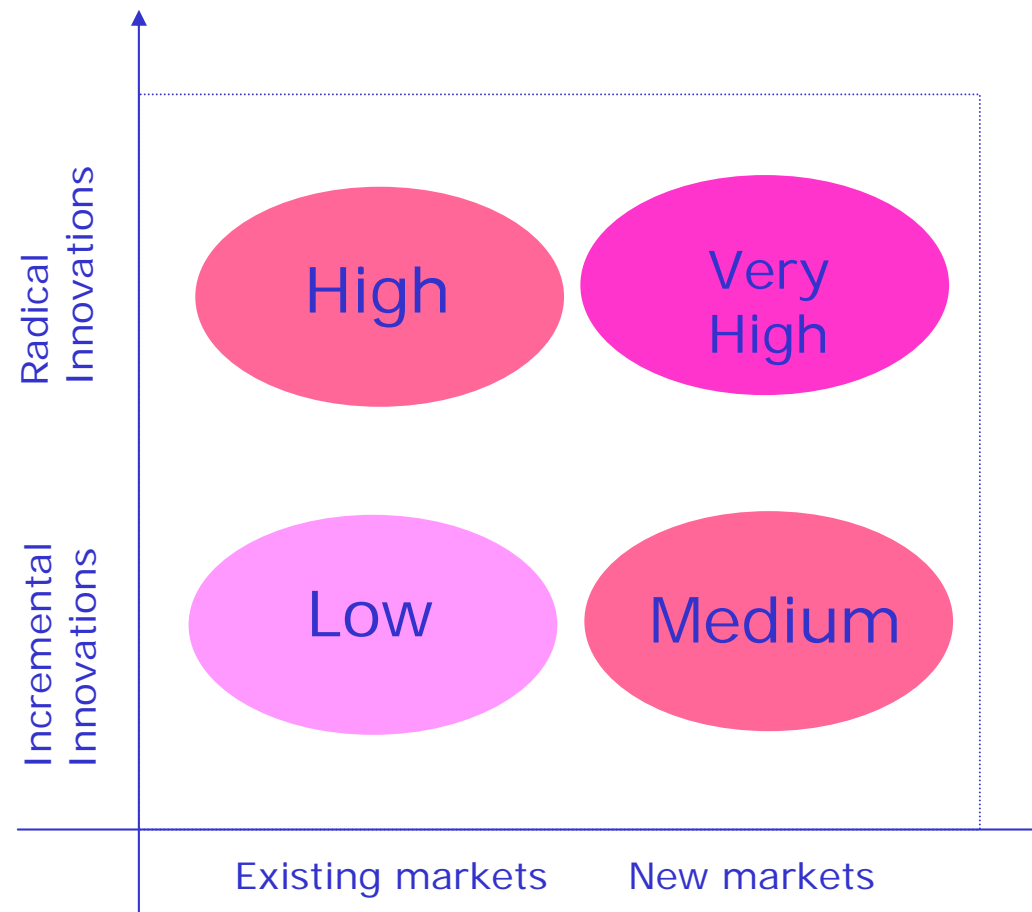


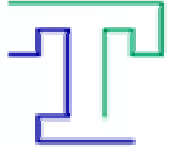
Maturity of Technologies and Innovations





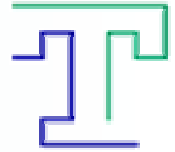
Radical Innovations and Risks





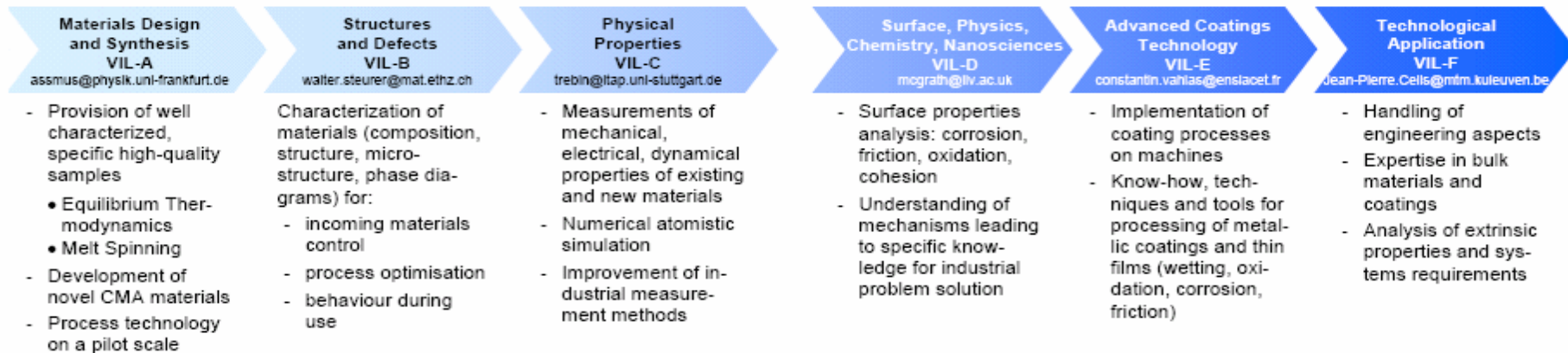
How to Reduce Risks

1. Do not forget early sales
 - Knowledge
 - Services
2. Concentrate on bottlenecks
 - Proof of principles
 - Feasibility studies
3. Balance your resources with your objectives



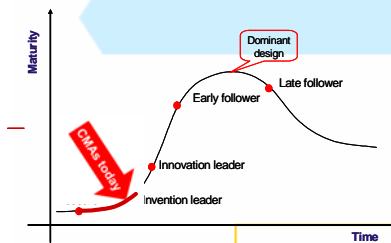
Example: How to sell knowledge

The combined expertise of the CMA Laboratories (VILs)



Summer school, continuous education, specific training for industry

Information: juergen.hoeck@temas.ch, Organisation: janl.dollnsek@jls.si



CMA Applications in Industry

Coating applications

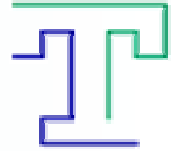
- ✓ Tribological applications
- ✓ Cold welding reduction
- ✓ Abrasion reduction
- ✓ Wetting adaptation
- ✓ Corrosion protection
- ✓ Nanostructured materials

Energy applications

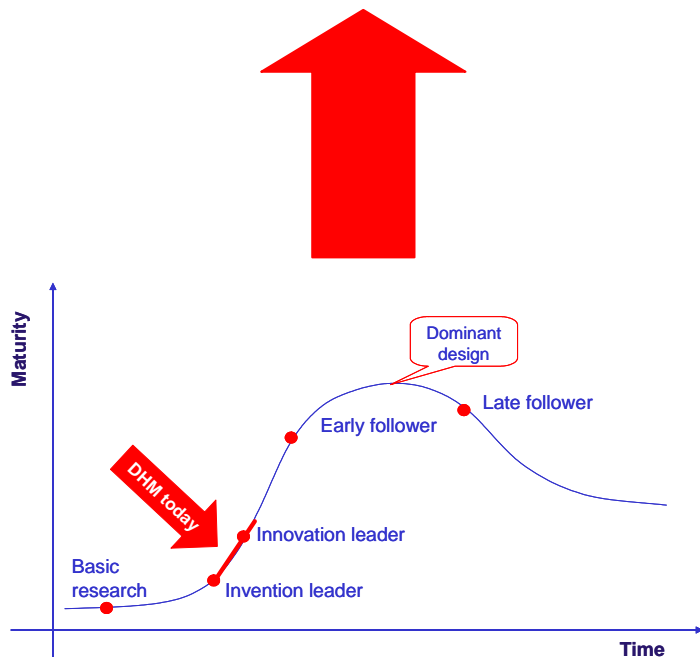
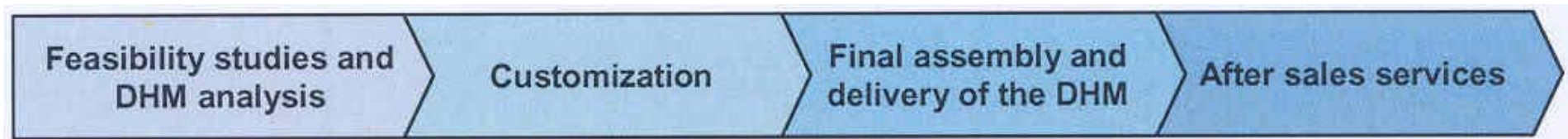
- ✓ Heat insulations
- ✓ Thermoelectric applications
- ✓ Hydrogen storage

Other applications

- ✓ Applications where high temperature stability is required
- ✓ Metallic and polymer-based materials reinforced by precipitates or dispersions of nanoparticles of the CMA family
- ✓ Catalysis
- ✓ Magnetic applications
- ✓ Optical applications

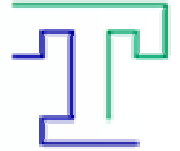


Example: How to sell services

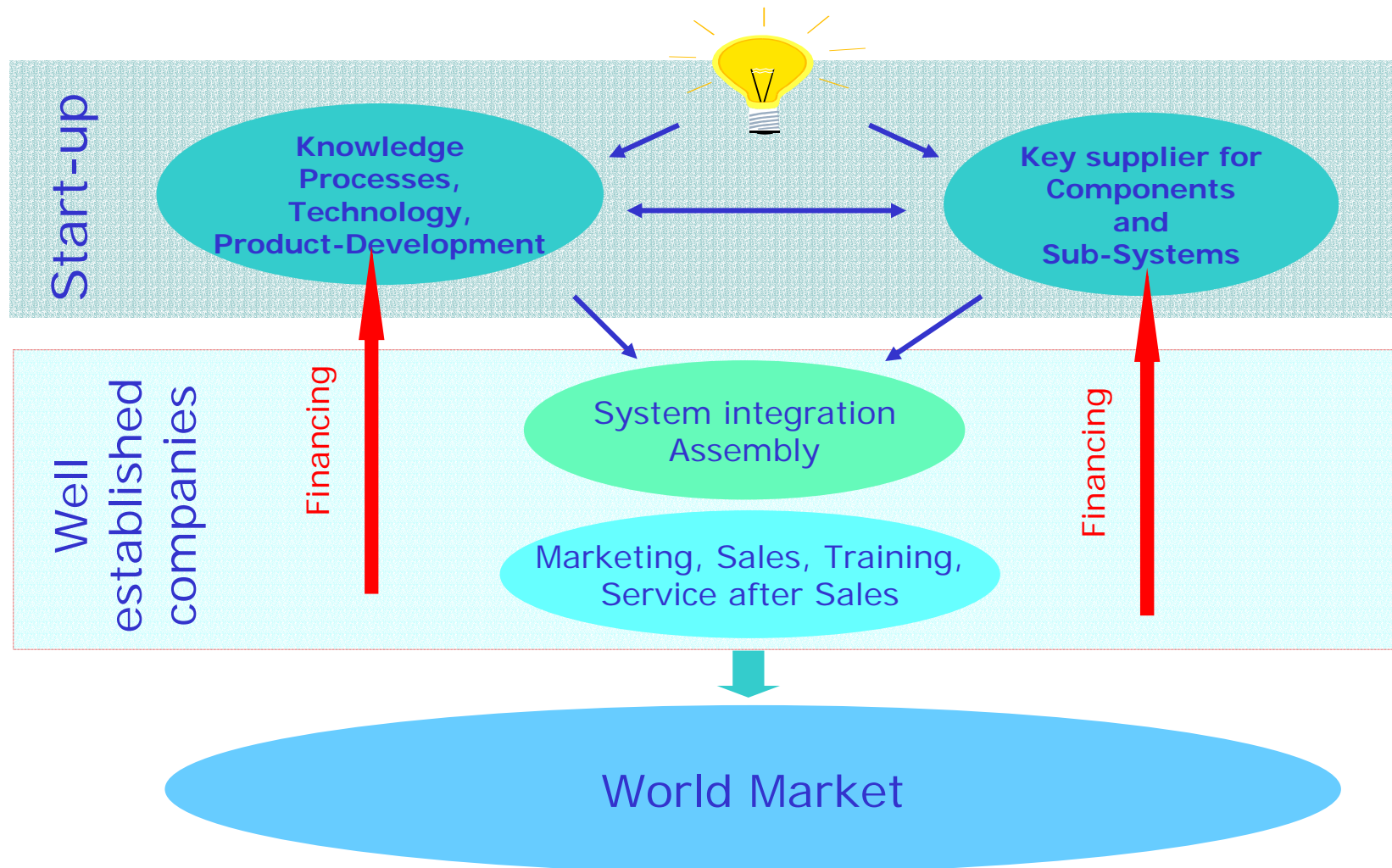


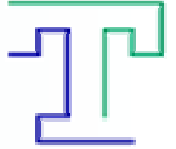
Target Price Ranges for Lyncée Tec's Value Activities

Value Activity	Target Price
Feasibility studies/engineering services (typically one day to one week):	CHF 1,500 to CHF 2,000 per day
Customization (depending on sample and degree of adaptation necessary)	CHF 50,000 to CHF 150,000
Final assembly and delivery/sale of the manufactured instrument (depending on options chosen)	CHF 150,000 for low-end products to CHF 250,000 for high-end products
After-sales services	CHF 1,500 to CHF 2,000 per day



Example: Looking for a fair partner with market access





How to Reduce Risks

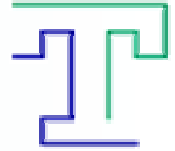
1. Do not forget early sales

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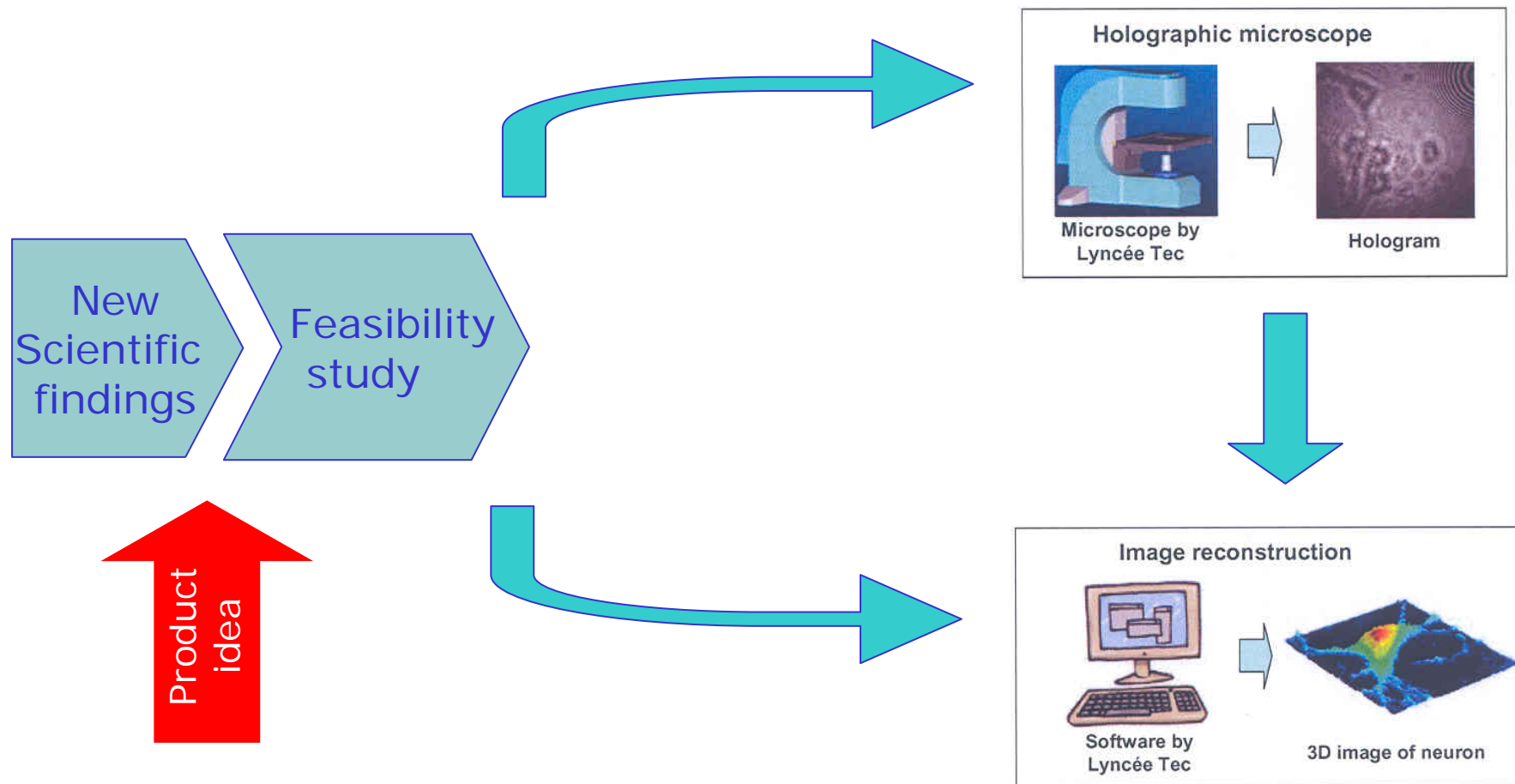
2. Concentrate on bottlenecks

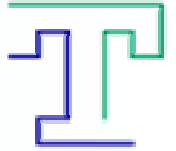
- Proof of principles
- Feasibility studies

3. Balance your resources with your objectives



Example: The LYNCEE TEC approach

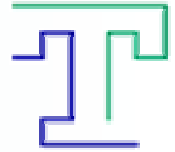




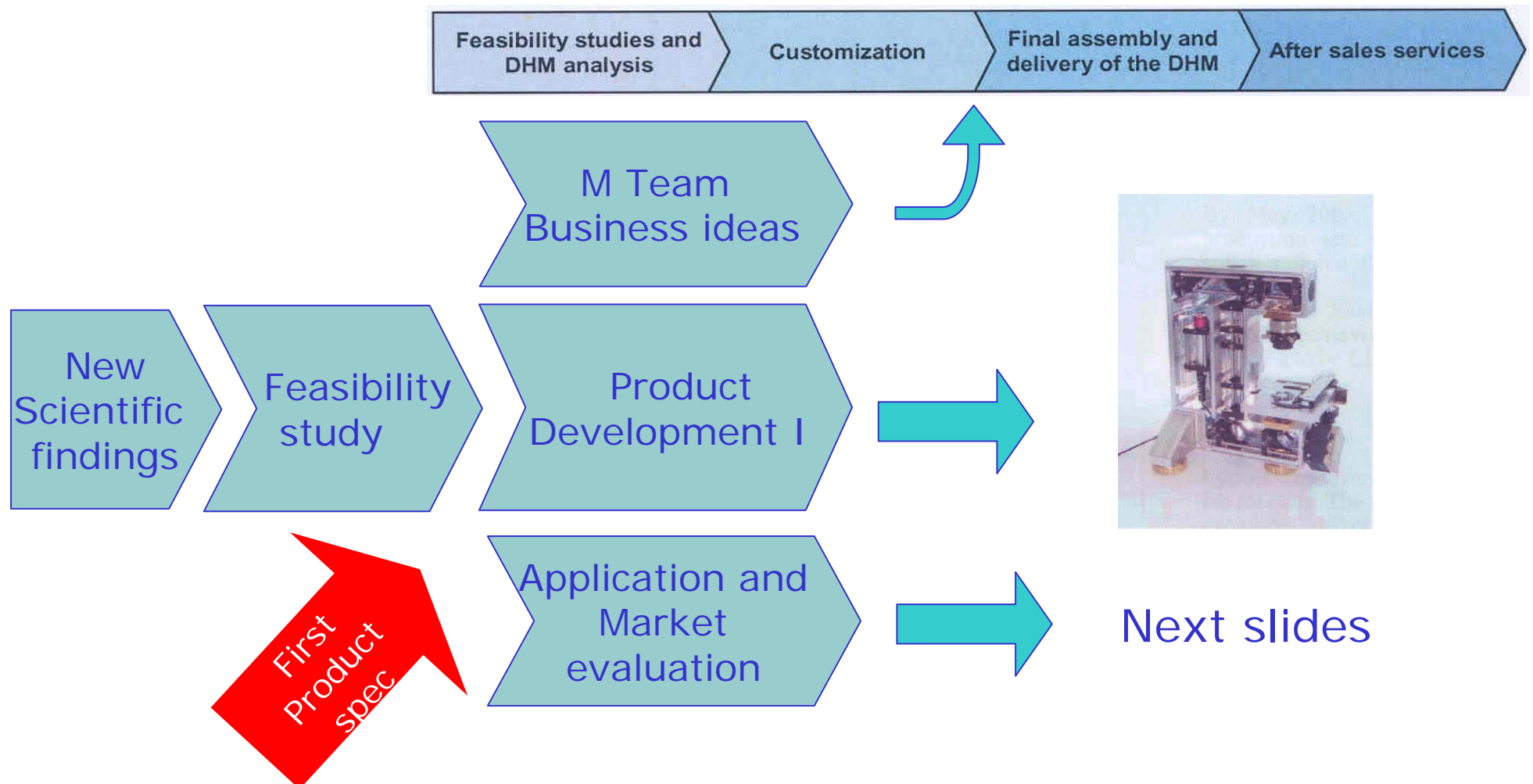
How to Find the Ideal Markets

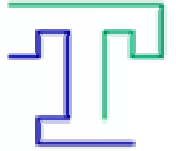
Radical innovations are looking for customers

- Specific markets do not exist
- Application fields are unknown
- Many opportunities
- Which has the highest potential and the lowest risk?



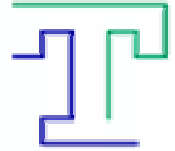
Example: The LYNCEE TEC approach





How to Find the Ideal Markets

1. Identify possible applications (markets)
2. Perform feasibility studies for the different applications
3. Evaluate the competing technologies and “friends” in the most promising markets
4. Concentrate on markets adequate to your resources

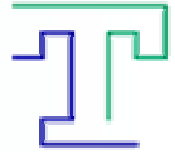


Example: Competition and Position

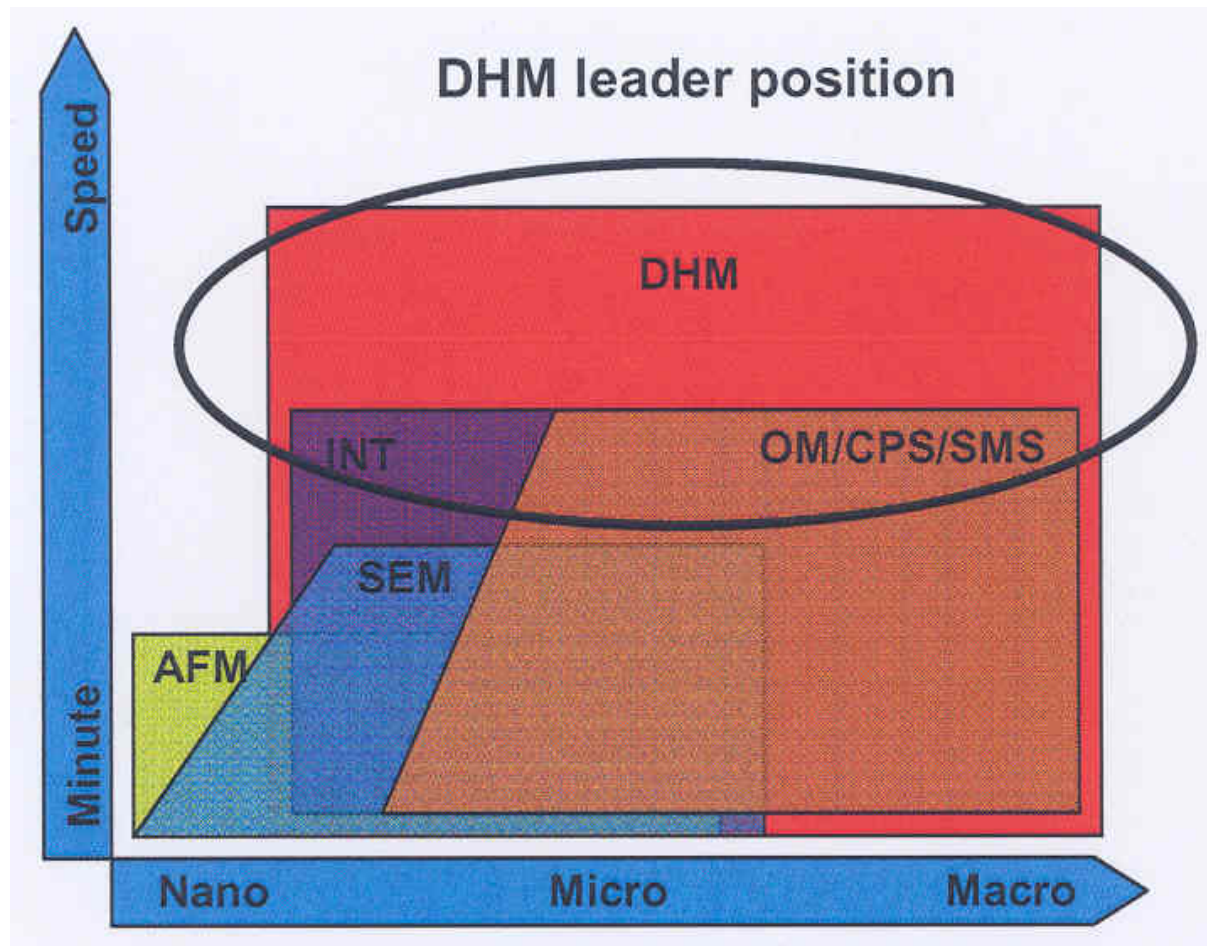
Major Competing Technologies and Firms

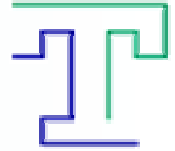
Competitive Technique	Imaging Description	Major Competitors	DHM in comparison to competitor (+)/(-) advantage/disadvantage of DHM
SEM (Scanning Electron Microscope)	Electron beam fired at sample and X-rays reflected back	Veeco (USA), JEOL (USA), LEO (USA), Hitachi (USA), KLA Tencor (USA)	(+) non-invasive, higher image acquisition rate, better axial resolution, larger measurement range, adapted to manufacturing processes, lower utilization costs and price (-) lateral resolution is limited to 300nm
AFM (Atomic Force)	Similar to SEM but use of micro fabricated probe	Veeco (50% of market), JEOL, NT-MDT (Russia), Omicron (Germany), Nanosurf (Switzerland)	(+) strictly non-invasive, faster, larger measurement range, adapted to manufacturing processes, lower utilization costs and price (-) lateral resolution is limited to 300nm
OM (Optical Microscopes)	Glass lens used for simple magnification	Leica, Nikon, Olympus, Zeiss	(+) strictly non-invasive, higher image acquisition rate, much better axial resolution, lower price than an LSCM (-) no morphological sectioning yet
Inferometers	Use light source and measure reflected phase change of source	Zygo (USA), Veeco, Toray Engineering (Japan), Fogale (France), Atos (Germany), Nanofocus (USA)	(+) higher image acquisition rate, easier to use, adapted to manufacturing processes, lower utilization costs and price (-) DHM is not at same technological maturity level
CPS (Contact Probe Systems)	Mechanical probe touches surface and records movements	Veeco, KLA Tencor, Zeiss	(+) non-invasive, better axial resolution, higher image acquisition rate, lighter and more compact, 3D surface measurement (-) DHM is not ready for macroscopic measurement
SMS (Specific Measurement Sensors)	Lasers scan a surface	Zeiss, Werth Messtechnik, KLA Tencor, Cotec, Nanofocus, Infinitesima	(+) less invasive, better axial resolution, higher image acquisition rate (-) DHM is not at the same technological maturity level as most of the sensors
Other holographic systems		Holo3, Tropel, nLine, Extreme diagnostic, lambda-x	(+) better resolution than usual holographic systems, higher image acquisition rate, adapted to manufacturing processes (-) DHM not at the same technological maturity level

Source: Company information



Example: Competition and Position

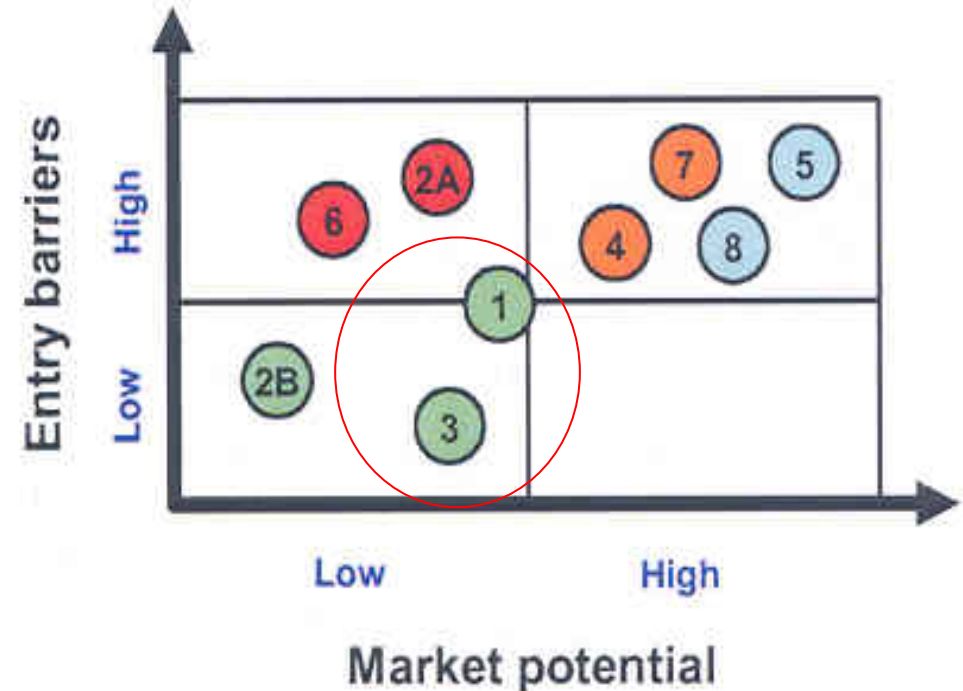
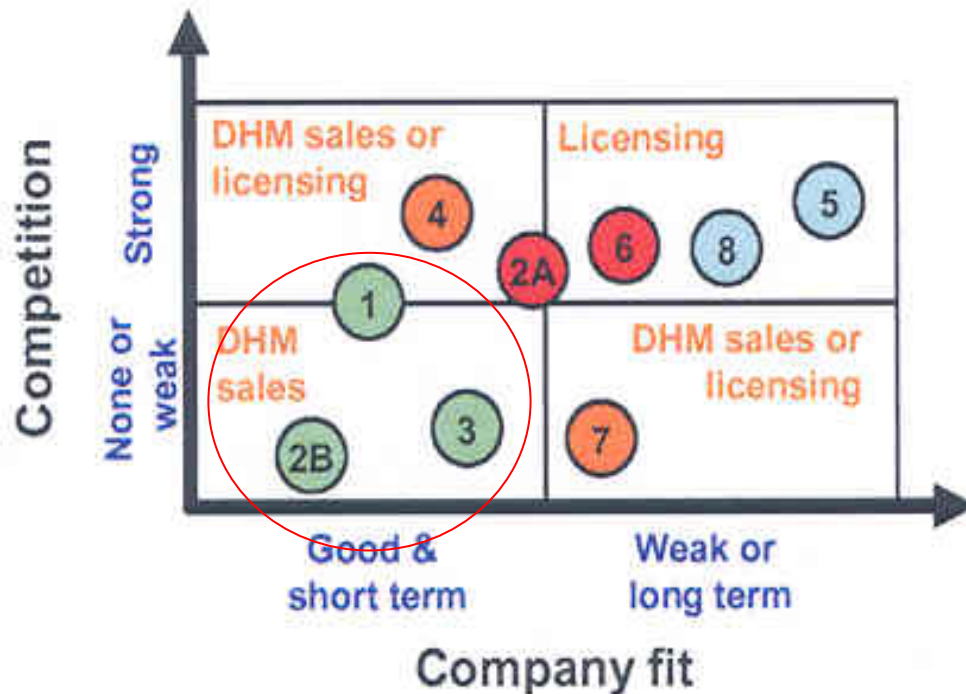


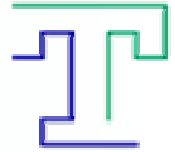


Example: Application and Markets

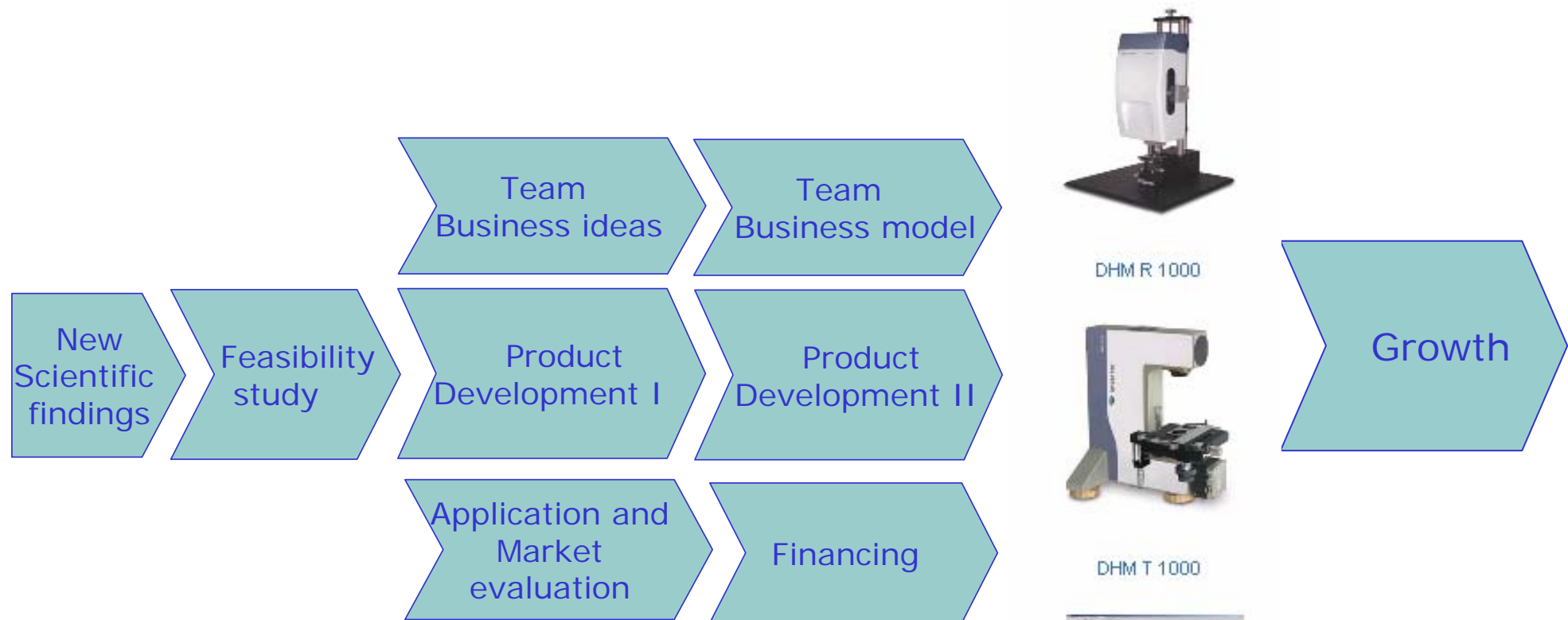
Selecting Target Markets

1. Microtechnique	3. MEMS/MOEMS	6. Food industry
2A. Optics	4. Surface analysis	7. Biochips
2B. Micor-optics	5. Semiconductor	8. Cellular biology & pharma





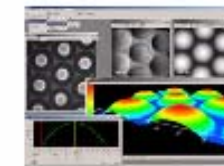
Example: The LYNCEE TEC approach, the result



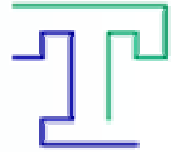
DHM R 1000



DHM T 1000

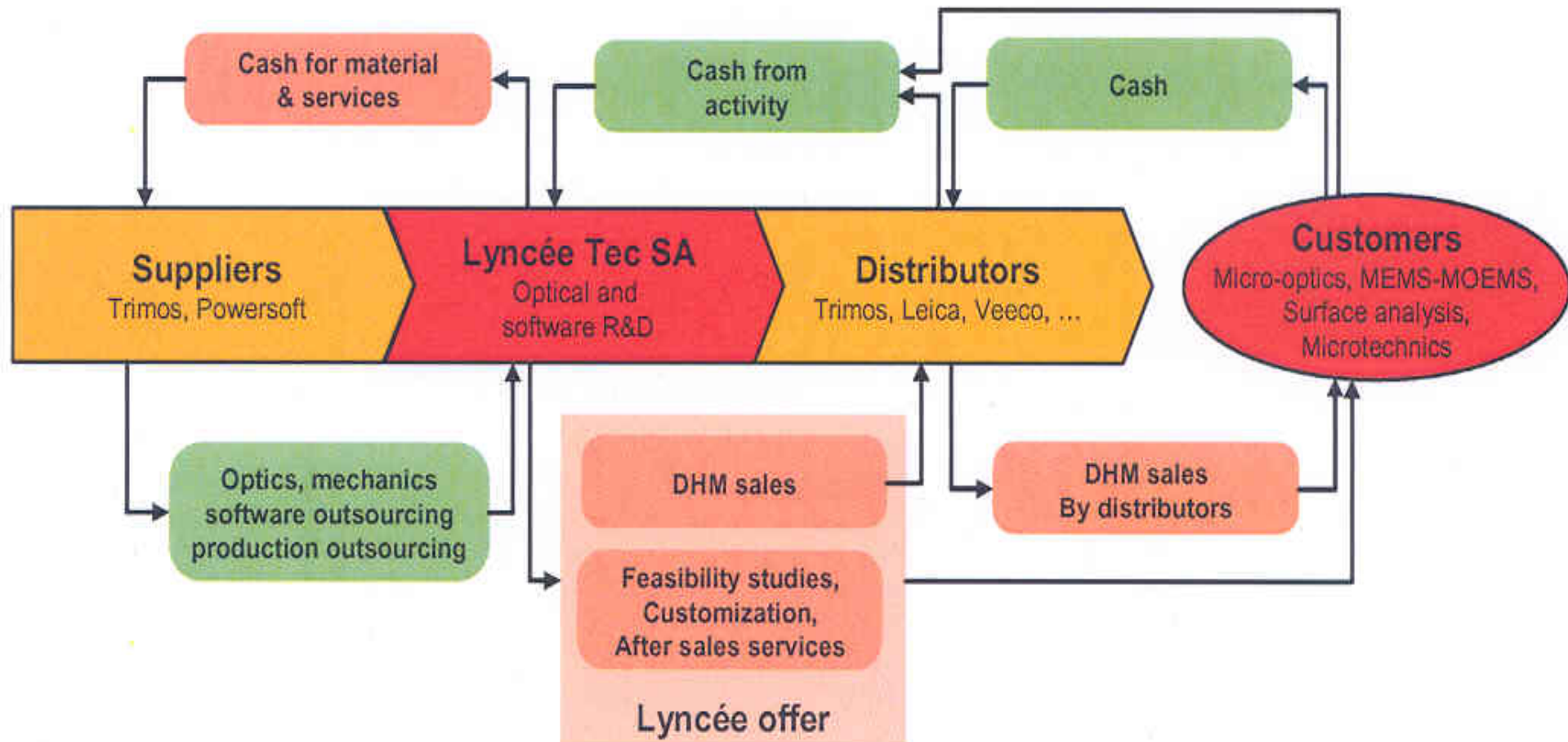


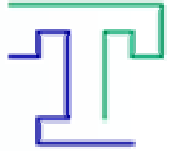
Koala Software interface



Example: The LYNCEE TEC approach, the result

The targeted business model



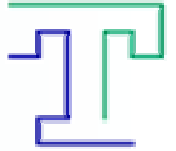


Radical Innovations versus Market Driven Demands, Contradiction or Synergy?



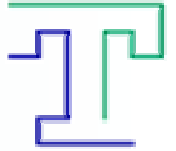
Synergy !

Go to



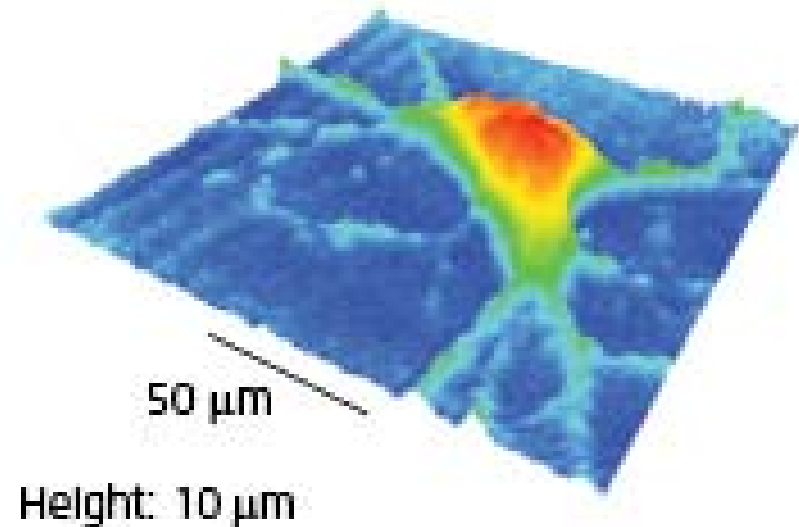
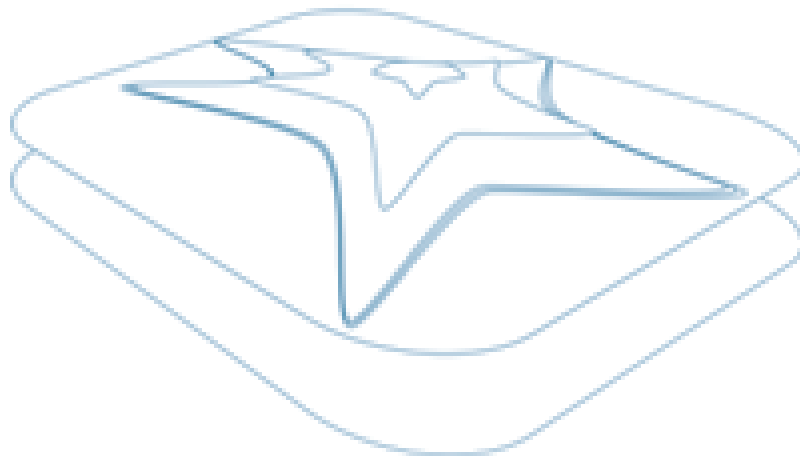
TEMAS Technologie Management

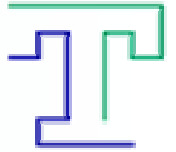
Branch oriented Platforms



Example: Application and Market, Life sciences, Living cells analysis

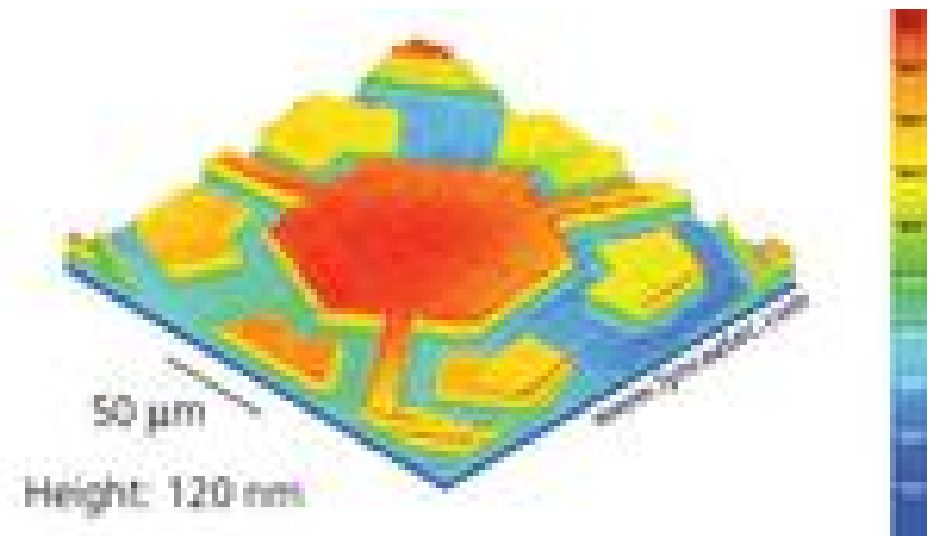
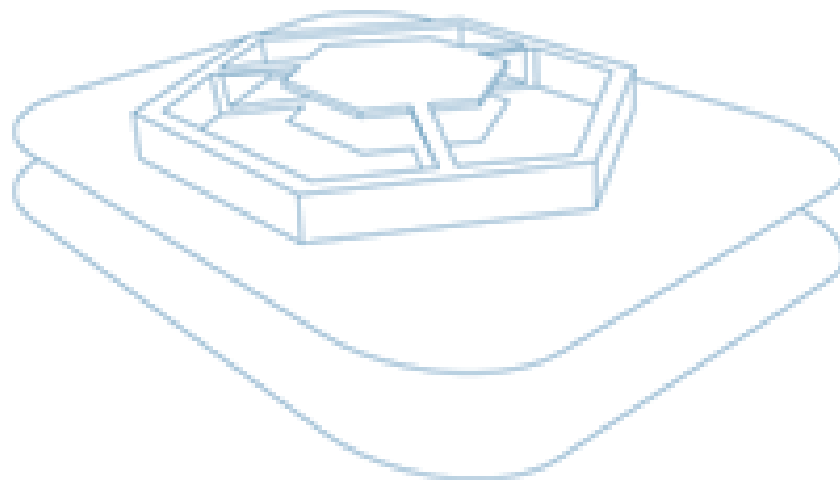
DHM brings unique possibilities for 3D real time and strictly non invasive observations. Stressless cells in their physiological medium without contrast agent, and with low light intensity can be investigated. The dynamics of any cell can be observed at a nanometric scale resolution. The fast image acquisition rate allows observation of physiological and pathophysiological processes related to cellular morphological changes. The robustness permits stable long time observations.

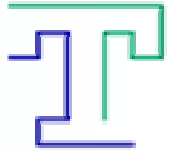




Example: Application and Markets, MEMS /MOEMS

DHM is an incomparable technique for real-time observation of MEMS and MOEMS, such as micro pumps, accelerometers, video projector micro mirrors. It allows the retrieval of the full three dimensional information with a nanometric vertical resolution for in plane and out of plane MEMS and MOEMS movements.

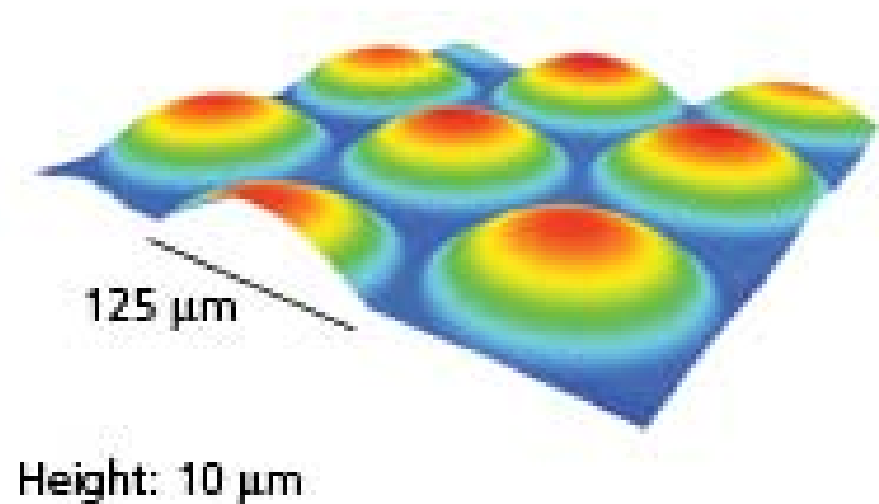
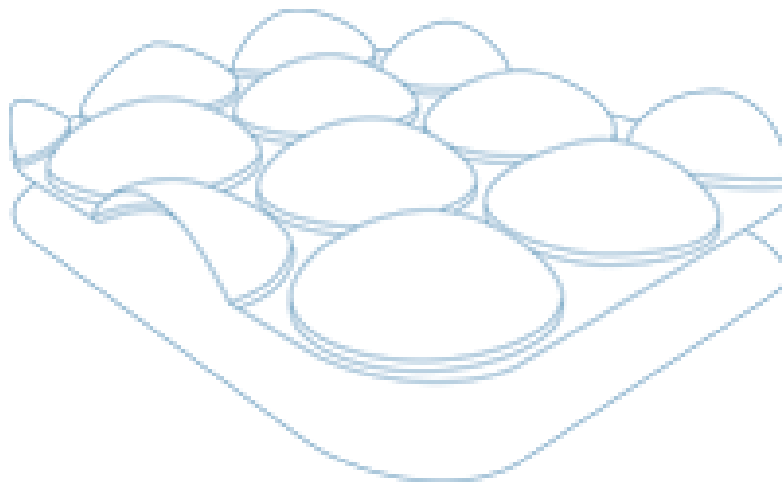


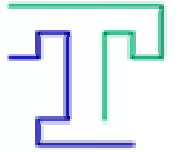


Example: Application and Markets, Micro optics applications

Microlenses

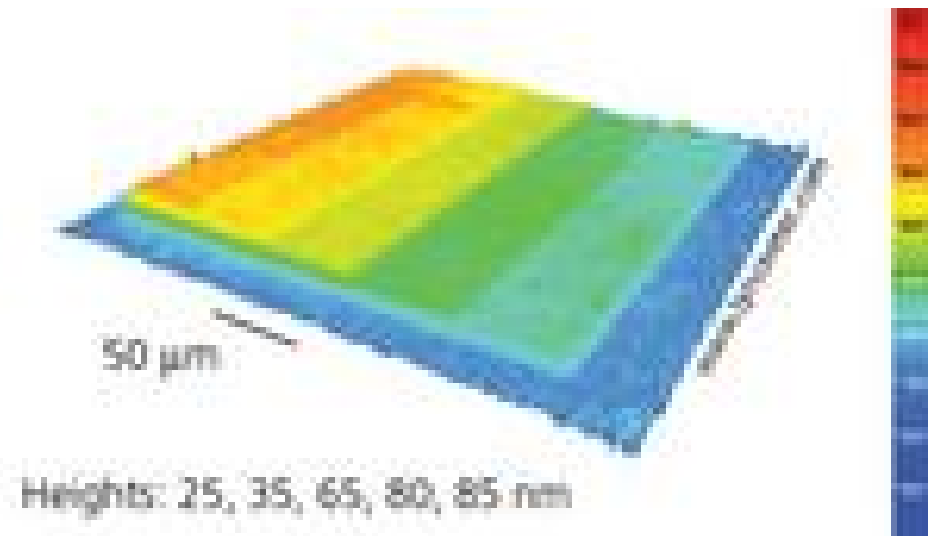
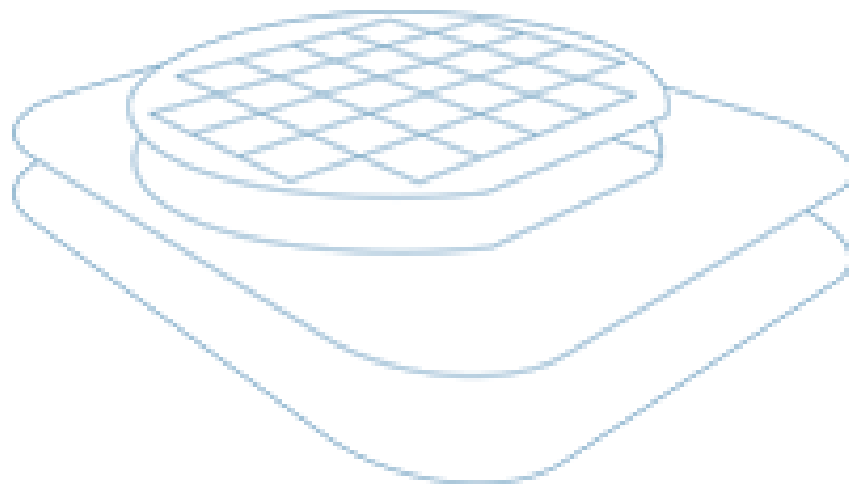
Microlenses characterization can be performed in reflection (DHM R1000) or transmission modes (DHM T1000).

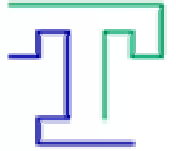




Example: Application and Markets, Semiconductors

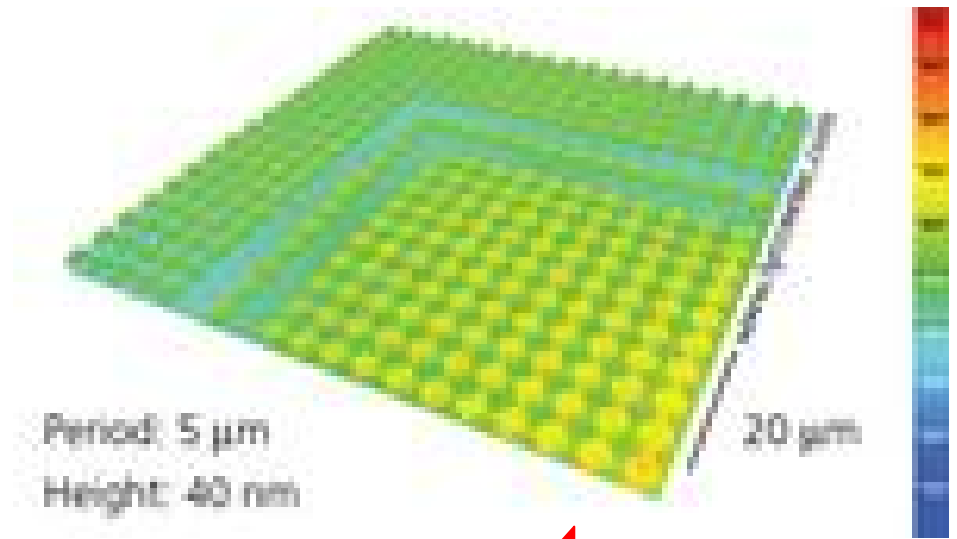
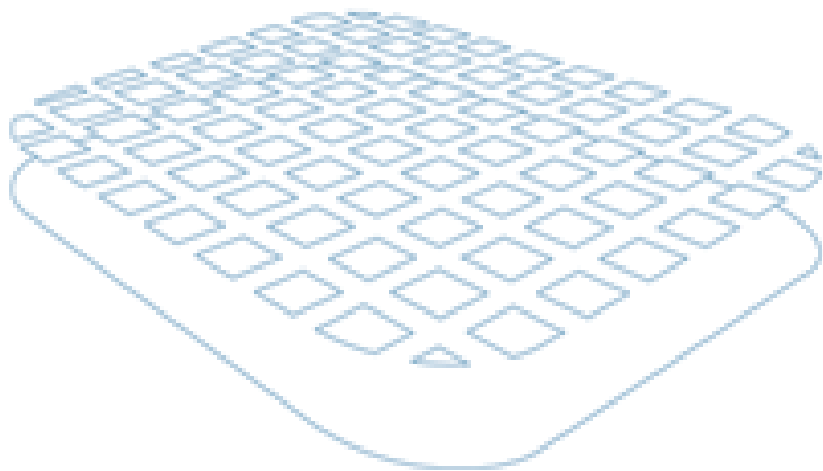
Contactless and thus non-destructive, DHM measures for example the flatness of a silicon wafer, finds scratches and other defects of the surface or controls the thickness of a layer deposition.

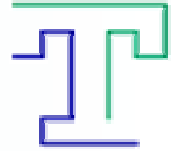




Example: Application and Markets, Nanotechnology

Thickness, roughness, flatness and generally topography of a surface can be investigated with nanometric precision by DHM and on large areas. Organic as well as non-organic samples can be investigated in a non-invasive way and without sample preparation.





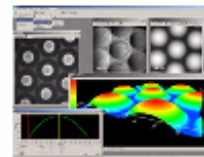
Lyncée Tec SA - Products



DHM R 1000



DHM T 1000



Koala Software interface

Microscopes for 3D real-time optical topography

Lyncée Tec SA combines for the first time in microscopy **nanometric resolution, real time** and **non-invasive 3D observations** in a revolutionary technology called "Digital Holographic Microscopy" (DHM). The characteristics of DHM make out of it a unique solution to follow up the whole development cycle of a product, from innovative R&D to quality control in production line, passing through the quantitative optimization of the manufacturing process.

Real-time imaging

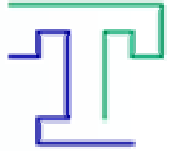
Robust & stable

Non-contact

Cost effective solution

User-friendly

Powerful 3D software



Lyncée Tec SA - Story

- 1994 Project launched at EPFL (Research)
- 1998 Researchers from UNIL have joined the team
- 2003 Lyncée Tec SA was incorporated
- 2004 Lyncée Tec has reached break even
- 2005 Lyncée Tec SA employed seven people working full time

Lyncée Tec SA, PSE-A, CH-1015 Lausanne

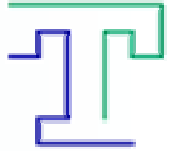
www.lynceetec.com

Tel.: +41 (0)21 693 02 20

Fax: +41 (0)21 693 02 29

info@lynceetec.com



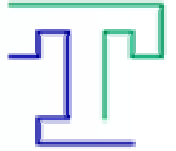


Lyncée Tec SA – Scaling up a Technology Venture

Lyncée Tec's product comprised two components

1. A **holographic microscope**, which recorded the information from the sample as a hologram by measuring both the amplitude and phase of the light and thus providing more detailed and complete information than other microscopes.
The instrument consisted of a rigid frame, a translation table for the sample, a microscope objective, various lenses and mirrors fixed to the frame, a laser source and a digital camera.
2. The **DHM software**, which enabled the "image reconstruction", i.e. the digital processing of the holograms in real time and representation of a 3D quantitative image of the observed object on a PC screen.

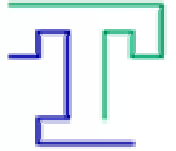




Lyncée Tec SA – Scaling up a Technology Venture

- ▶ **Real time imaging**, enabling people to analyze samples very quickly or to study object movements, vibrations or deformations of very small amplitude
- ▶ **Strictly non-invasive observation**, i.e. the measurements did not disturb or even destroy the sample
- ▶ **Easy to perform measurement**, which did not require any controlled environment or sample preparation.

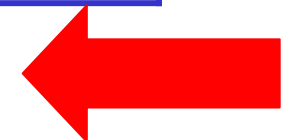


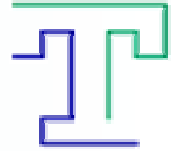


Lyncée Tec SA – Scaling up a Technology Venture

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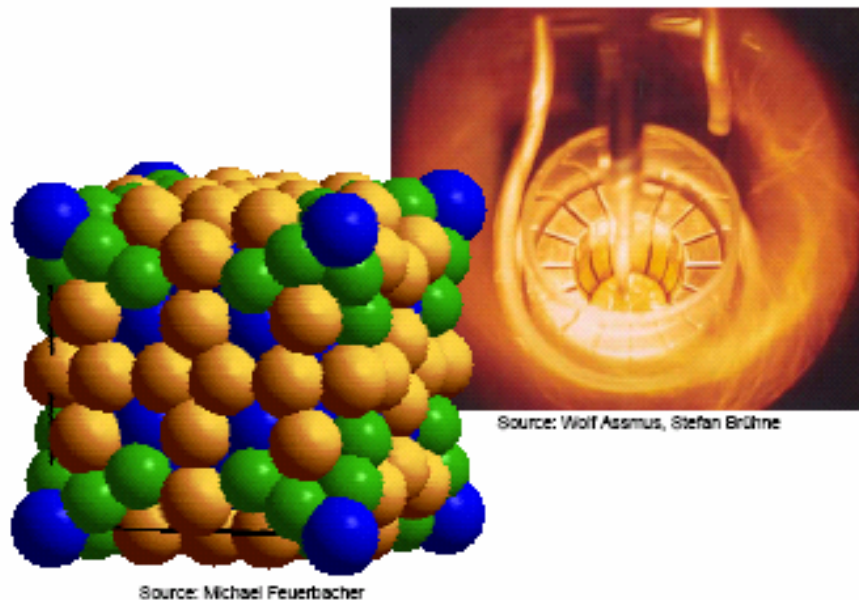
European Network of Excellence

New opportunities for industrial applications

Prof. Jean-Marie Dubois
Co-ordinator CMA
Institut Jean Lamour,
Ecole des Mines de Nancy

FR-54042 Nancy

dubois@mines.inpl-nancy.fr

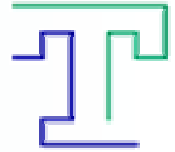


Karl Höhener
Director CMA VIU-IT
TEMAS AG

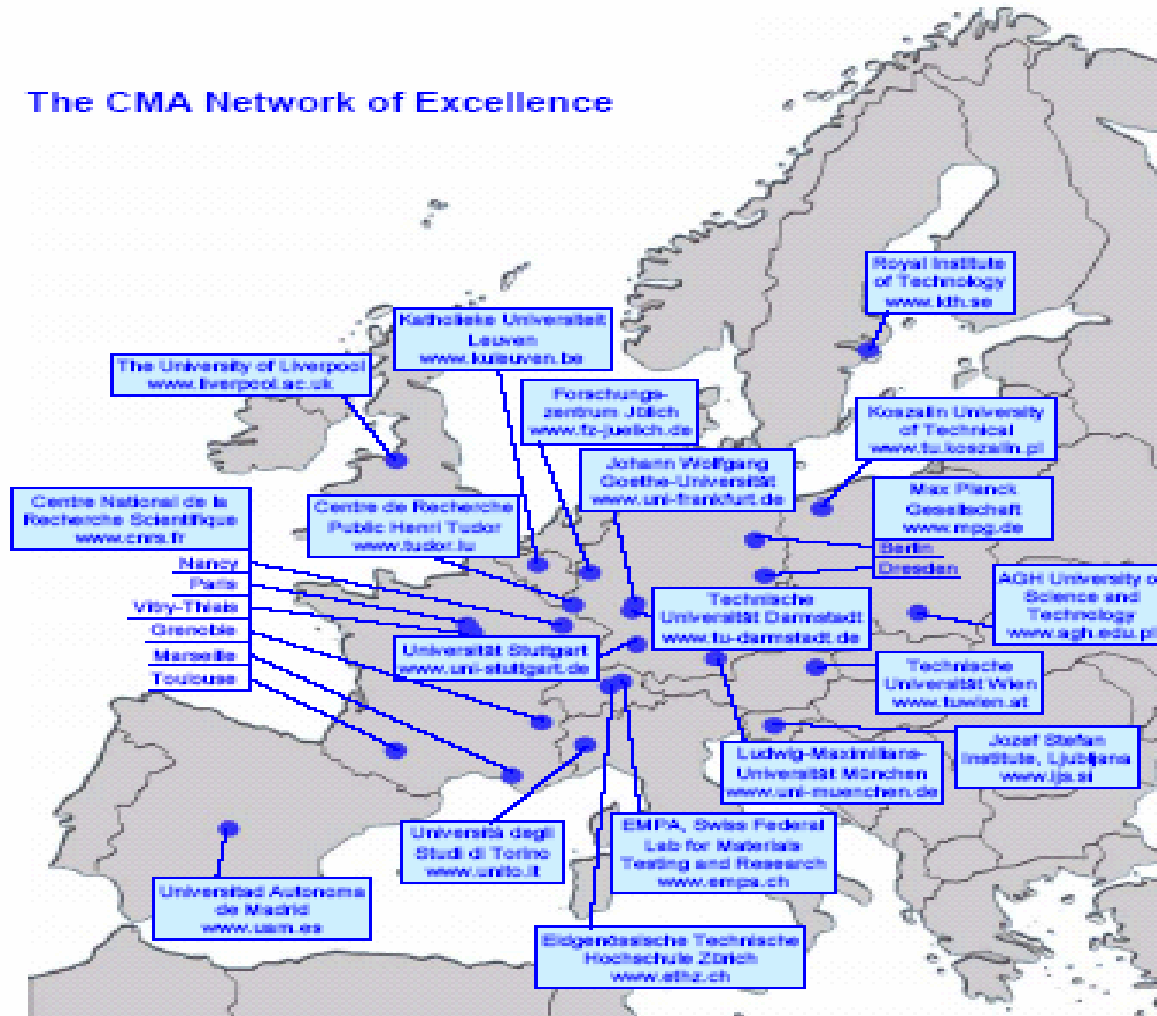
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Contract n°NMP3-CT-2005-500140



The CMA Network of Excellence



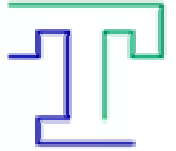
Contact

CMA, VIU-IT

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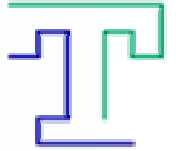
Issue: July 2006



CMA materials with unique *combinations* of functional properties

- ✓ Substantial electric conductivity combined with low thermal conductivity
- ✓ Combination of good infra-red light absorption properties with high-temperature stability
- ✓ Combination of high hardness with reduced solid-solid adhesion and wetting by polar liquids

- ✓ Electrical and thermal resistance tuneable by composition variation
- ✓ Heat-insulation properties can be obtained under suitable conditions
- ✓ Excellent high-temperature performance and low corrosion sensitivity have been shown
- ✓ Attractive thermoelectric properties
- ✓ High absorption of hydrogen (Ti-based CMAs)



CMA's potential application

Energy applications

- ✓ Heat insulations
- ✓ Thermoelectric applications
- ✓ Hydrogen storage

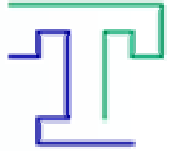
Coating applications

- ✓ Tribological applications
- ✓ Cold welding reduction
- ✓ Abrasion reduction
- ✓ Wetting adaptation
- ✓ Corrosion protection
- ✓ Nanostructured materials

Other applications

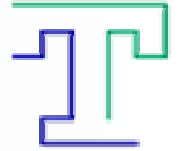
- ✓ Applications where high temperature stability is required
- ✓ Metallic and polymer-based materials reinforced by precipitates or dispersions of nanoparticles of the CMA family.
- ✓ Catalysis
- ✓ Magnetic applications
- ✓ Optical applications





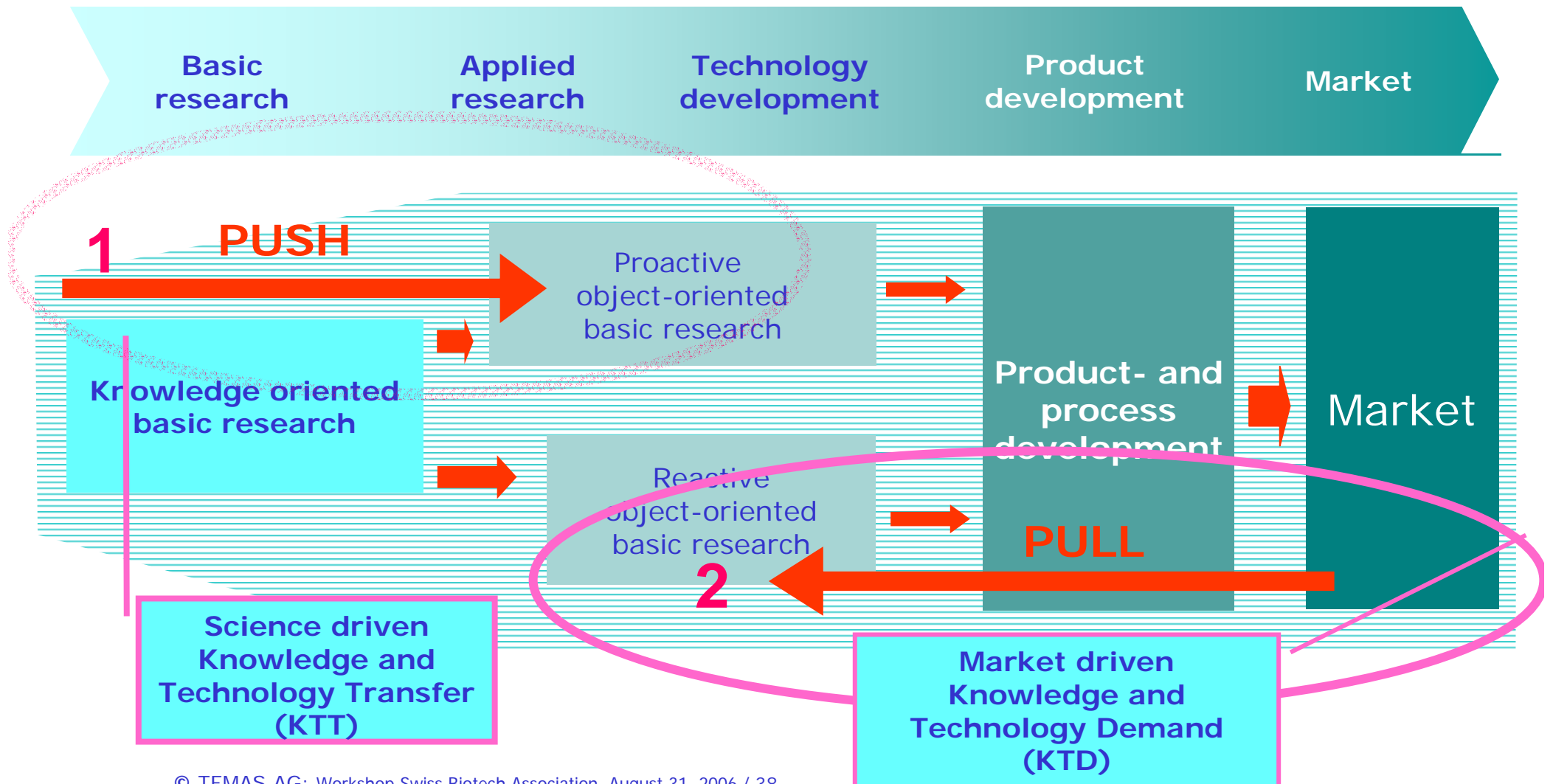
The critical mass
an approach to overcome the bottleneck
for specific branches

Today:

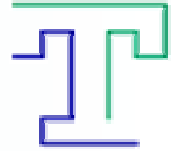


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The two-process approach "Push/Pull" for Information Exchange between Science and Economy



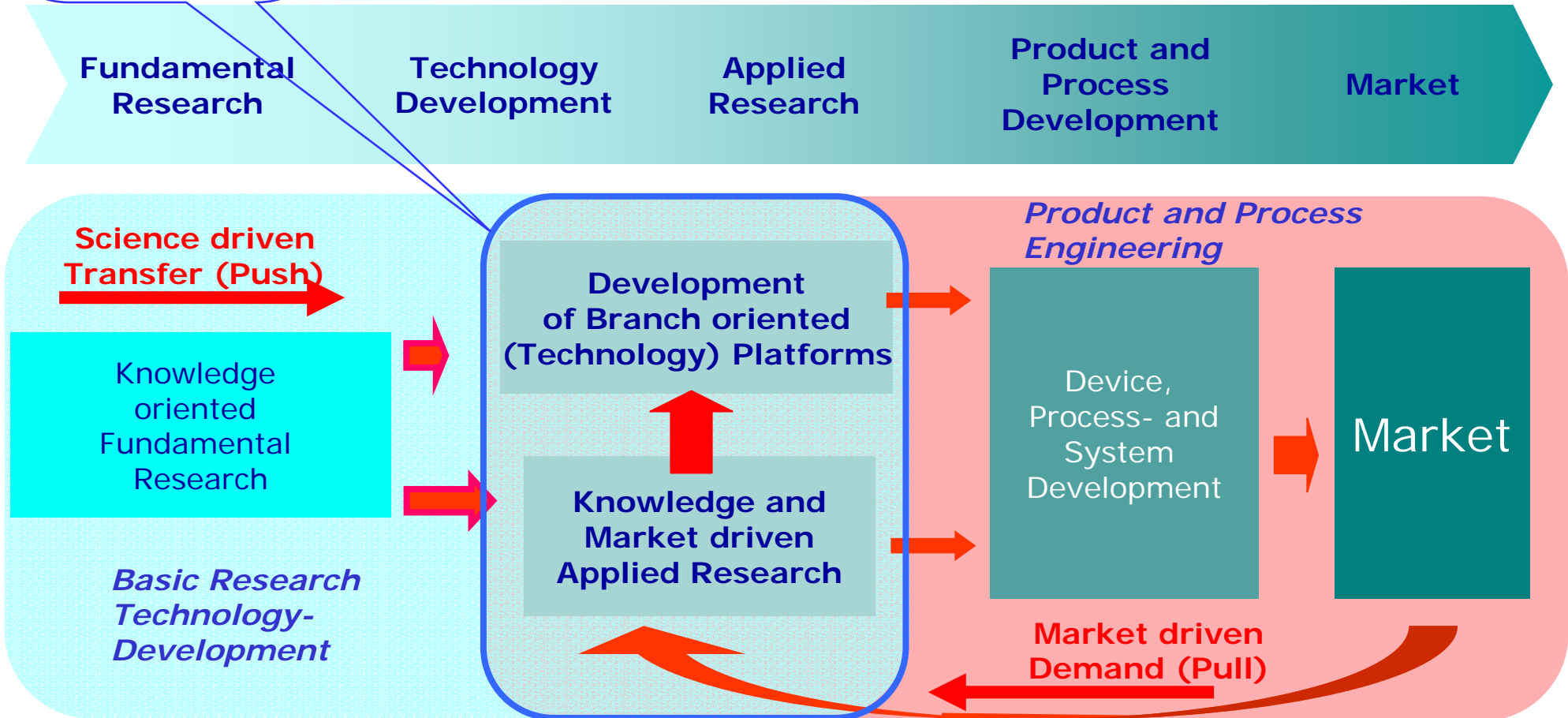
Migration:

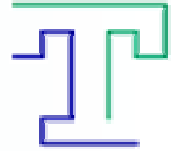


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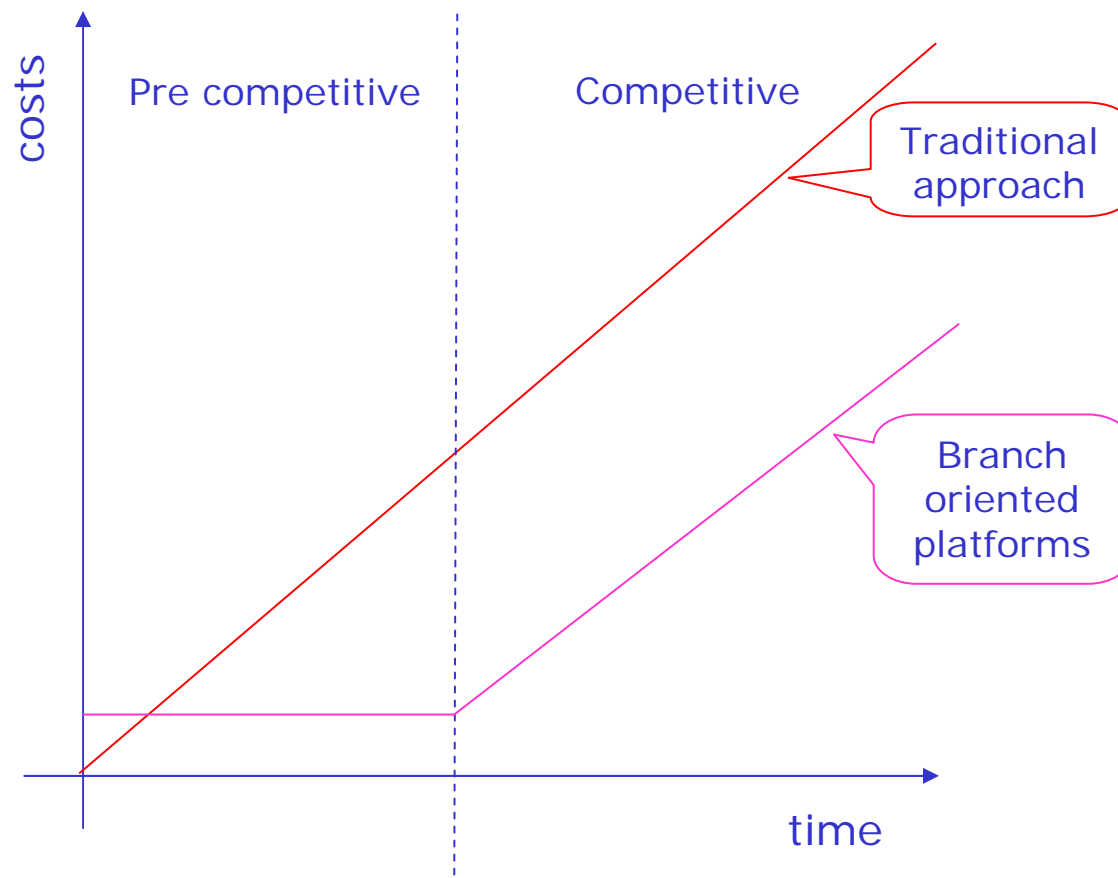
Private-Public-Partnership

From Knowledge Transfer to Technology Platforms

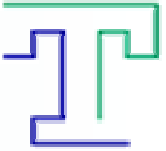




The advantages of Branch oriented Platforms (pre competitive)

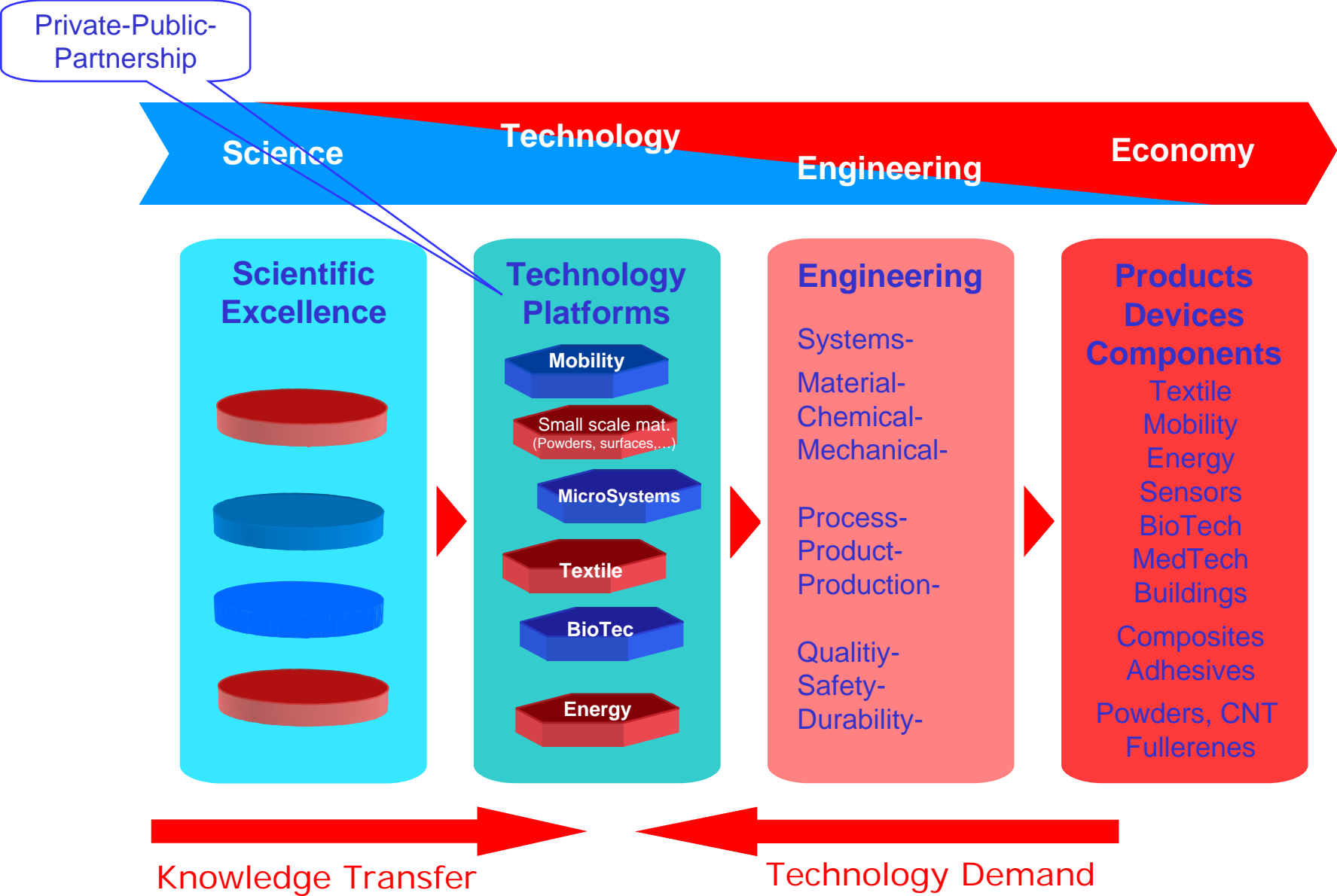


1. Shorter time to market
2. Lower cost (splitting the pre competitive part)
3. Lower risk (starting with an known technology at a "higher level")

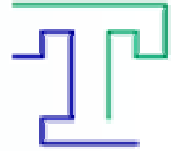


The R&D-Landscape with Branch oriented Platforms

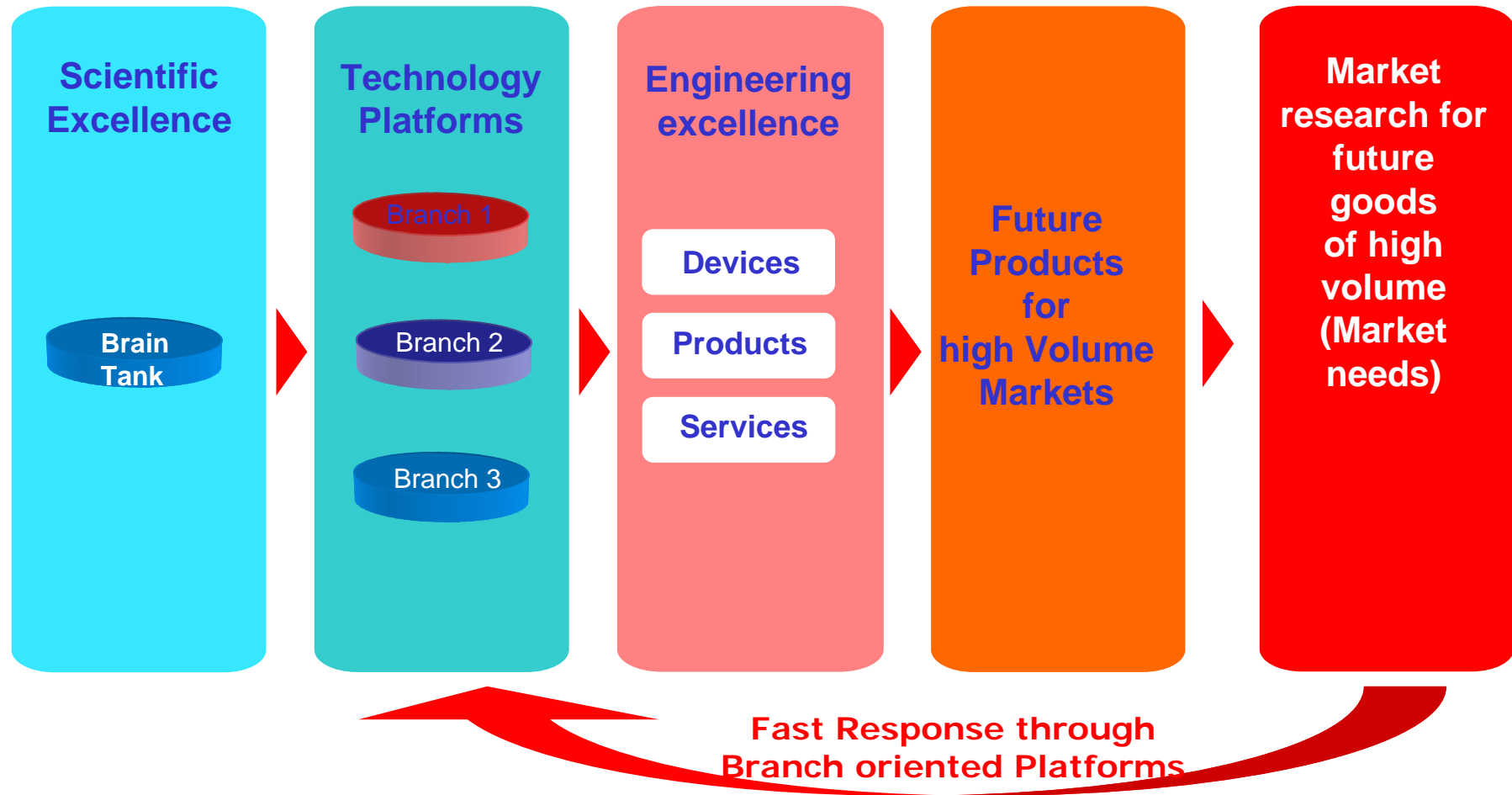
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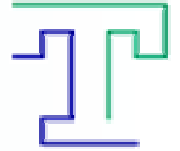
Concepts for Growth



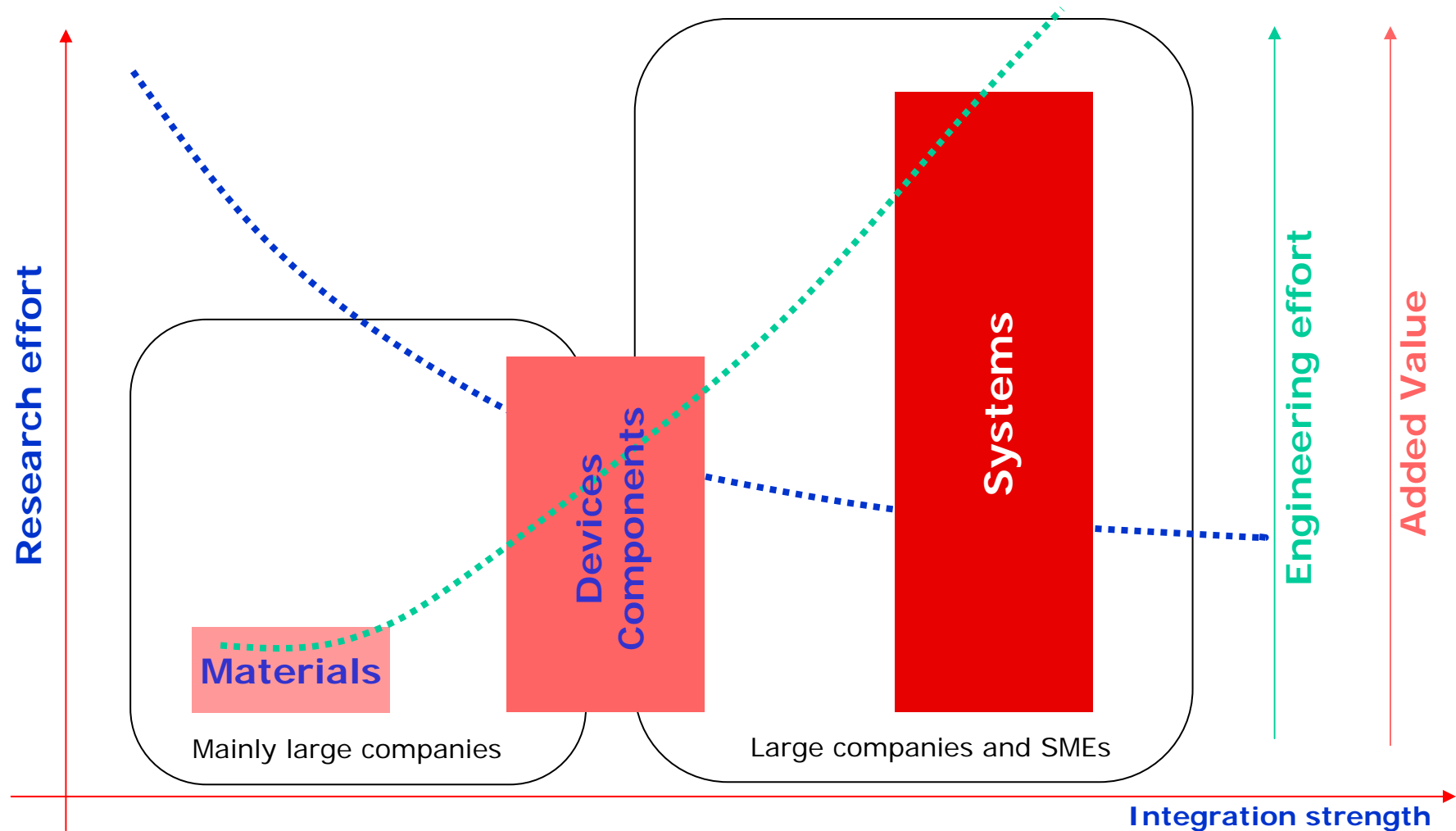
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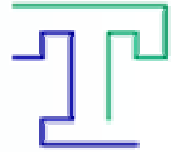
Concepts for Growth, added Value for Industry



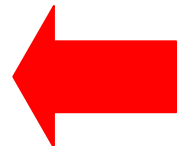
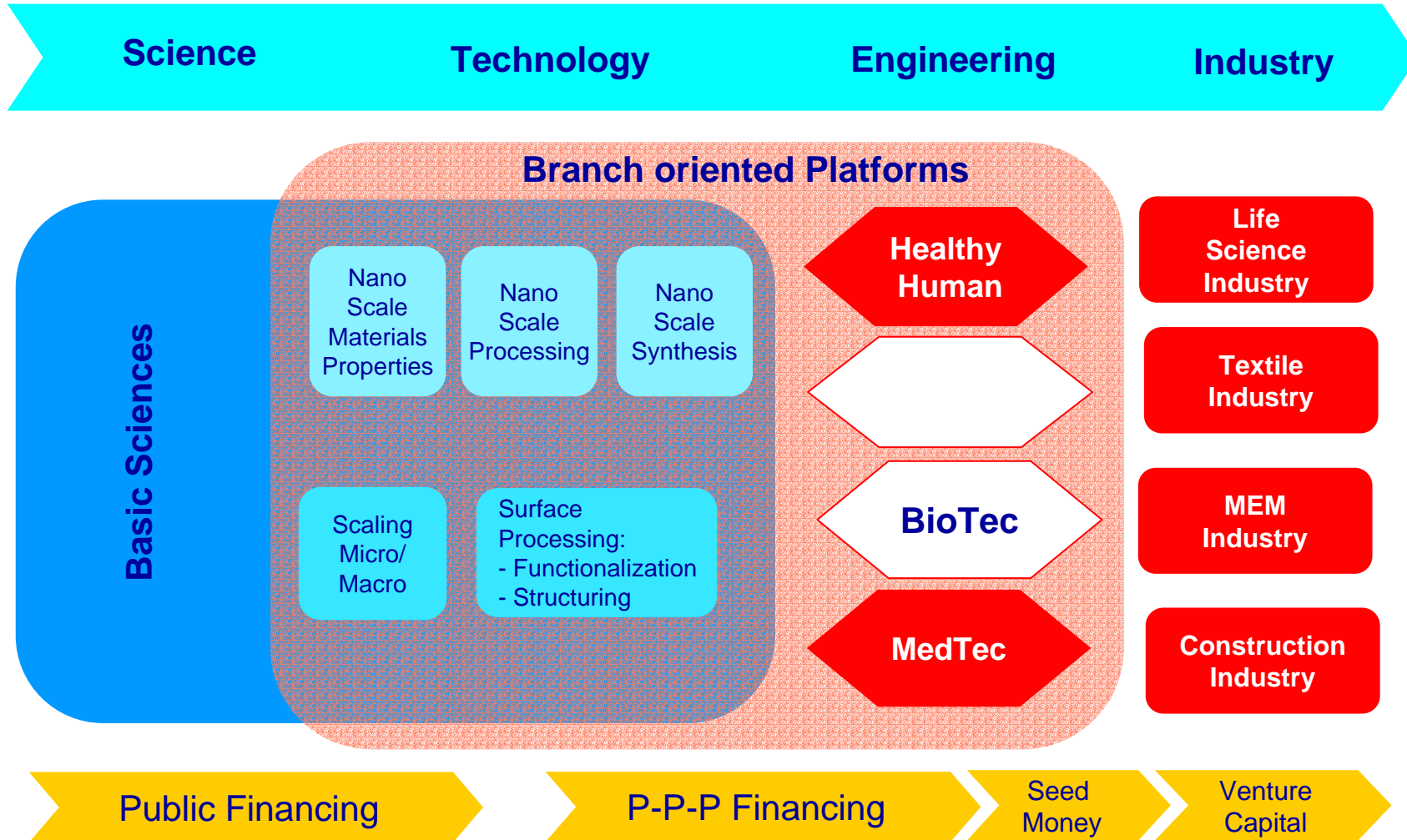
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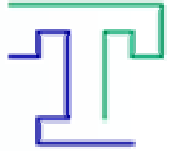


Concepts for Growth



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Innovation means seeing
what everybody sees and anticipating
what no one has anticipated

Thank you for your attention

You will find an actual copy of the presentation under
www.temas.ch