

Harnessing Innovation

June 5th , 2007 , Glasgow

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VP Materials Innovation

DSM Innovation Center

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- **Introduction to DSM**
- **Open Innovation in action**
- **Aviation, Aerospace & Defence**
- **Current & future applications**

- **Conclusions**

- **Facts:**
 - founded in 1902
 - highly integrated international group
 - 22,000 employees
 - > 270 sites world-wide
- **Major changes:**
 - from regional to global
 - from state-owned to publicly owned
 - from coal to base chemicals to specialty chemicals
- **International group active in:**
 - life science products
 - performance materials
 - industrial chemicals



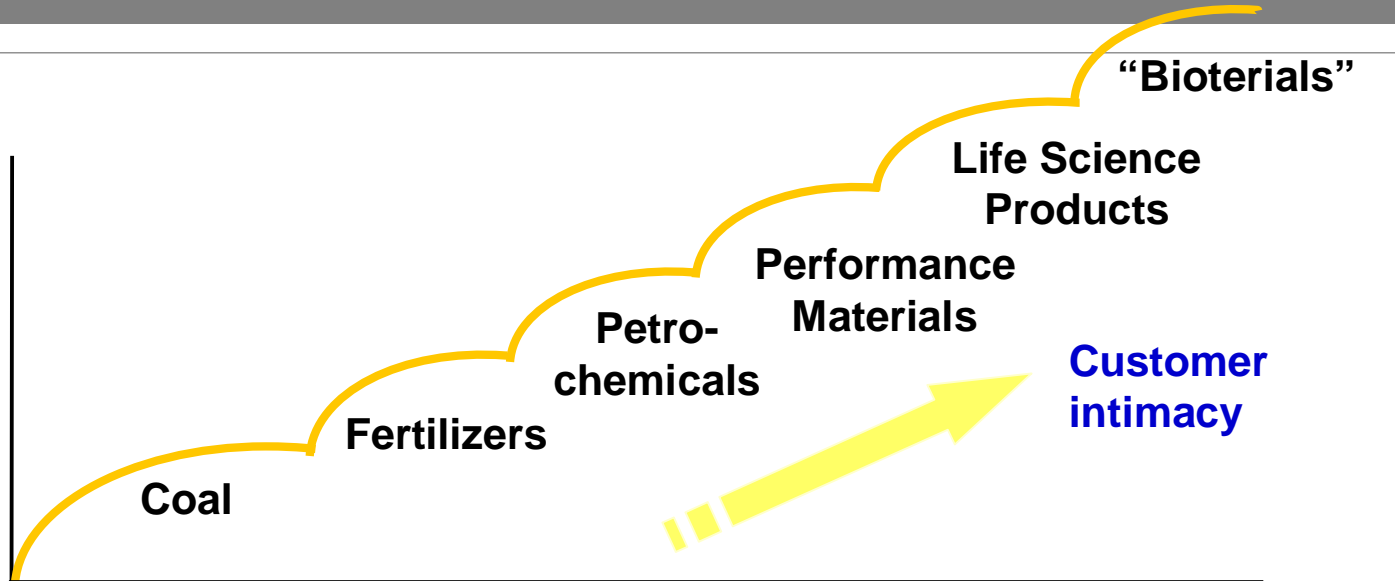
2005

~ € 8 bn sales

Focus on specialties

A century of successful transformations

Evolution



1902 1930 1950 1970 1990 2000 2010

- mechanical engineering
- chemical engineering
- chemistry
- polymer technology
- material science
- adv. organic chemistry
- nano-/ biotechnology

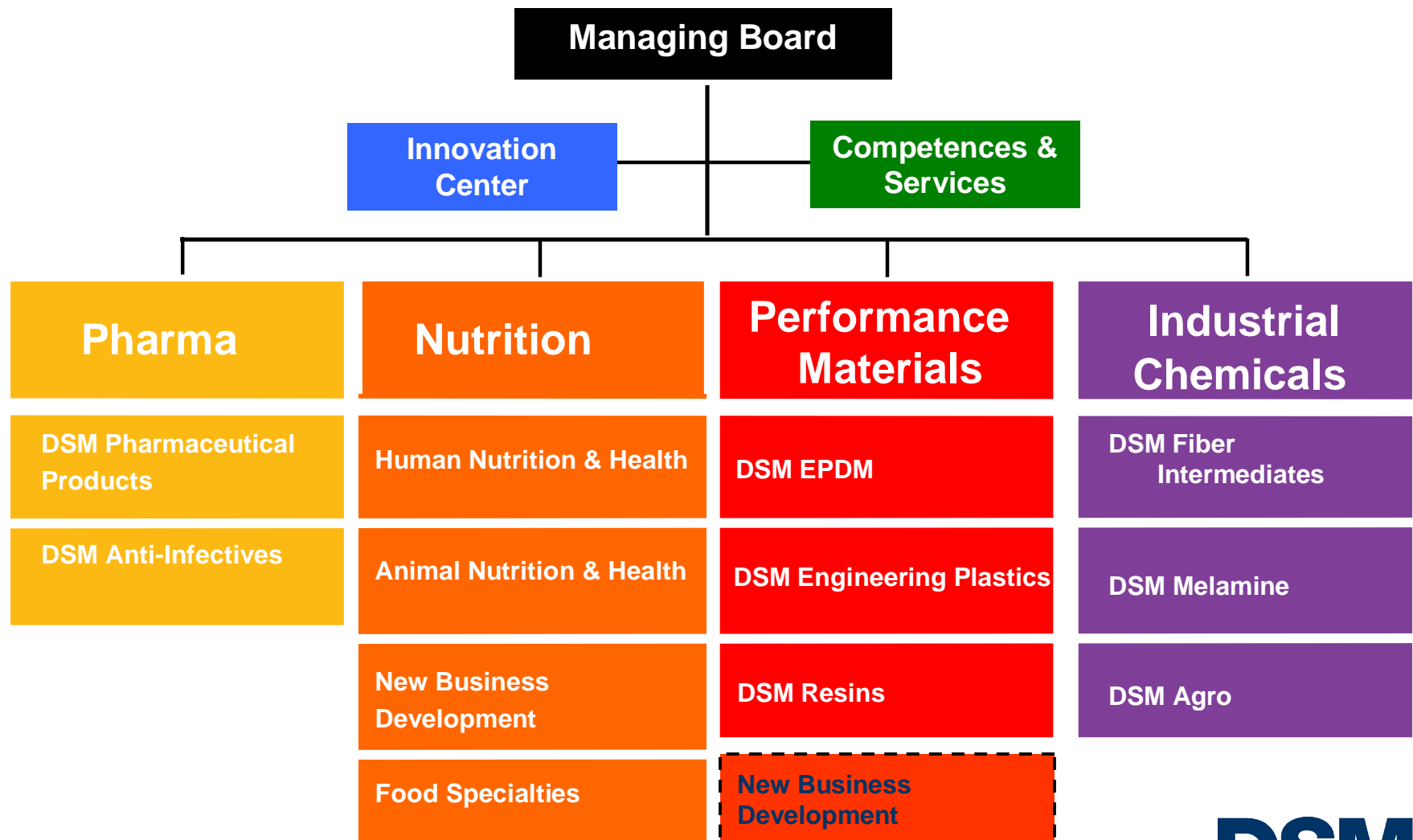
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DSM organization

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DSM 2006 : a company to be proud of !

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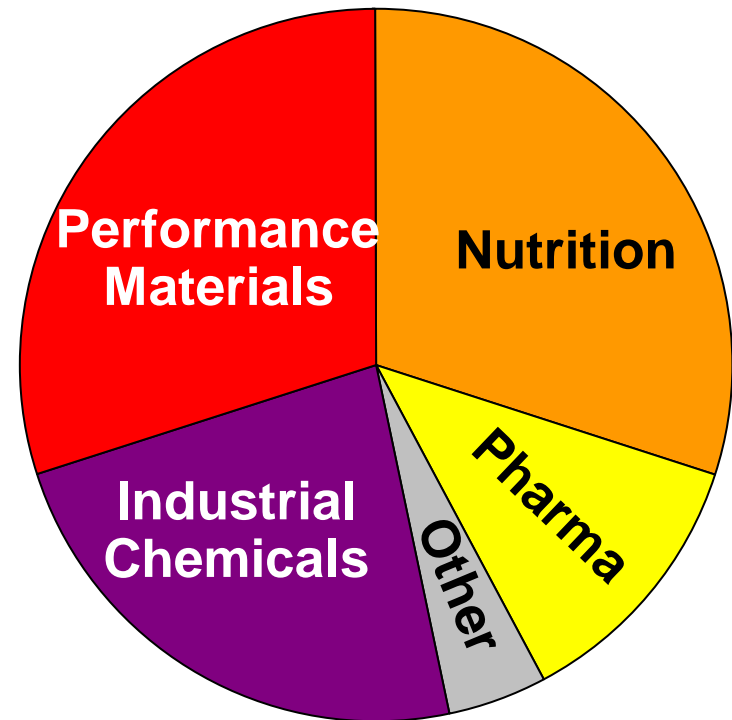
Annual Sales ~ €8.4 billion
EBITDA ~ €1.3 billion
EBIT €835 million
Net Profit €547 million

Capital employed ~ €6.3 billion
Net Debt ~ €0.9 billion

Single A Credit Rating

Strong Corporate Governance

Global #1 DJSI (Chemical sector)

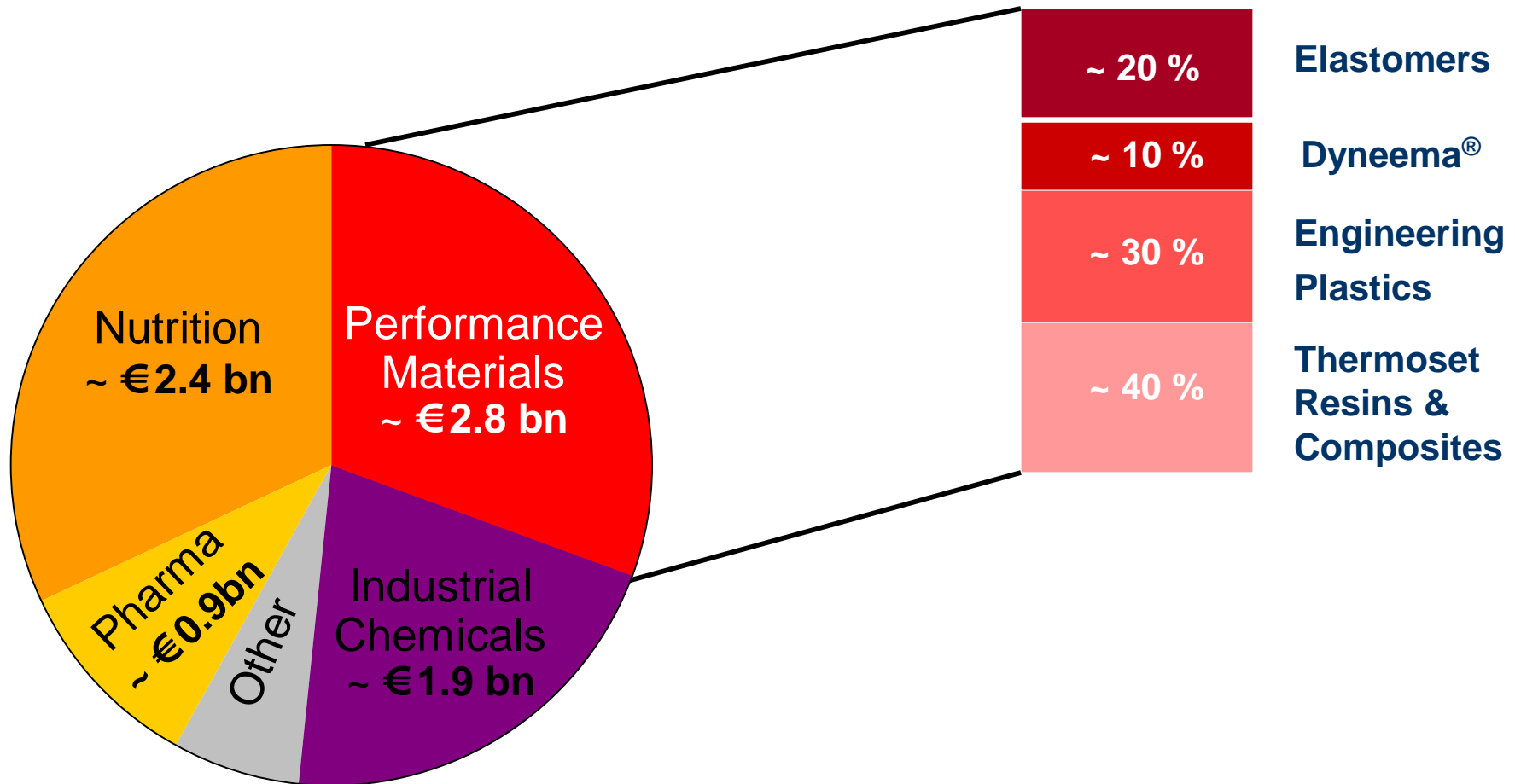


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DSM Performance Materials (2006)

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ThermoPlastics	ThermoSet Resins	Elastomers
<ul style="list-style-type: none"> • Nylon 6 • Nylon 66 • Nylon 46 • PET • PBT • TPE-E • PC • PC Blends • UHMw PE • Dyneema fiber • Dyneema laminates 	<ul style="list-style-type: none"> • Polyesters • Alkyds • Acrylics • Poly Urethanes • Epoxy-esters • Aminos • UV curable • Reinforced Composites 	<ul style="list-style-type: none"> • EPDM • EPM • TPE • Functionalised EPM
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Building on Strengths

**Market-driven growth
and innovation**

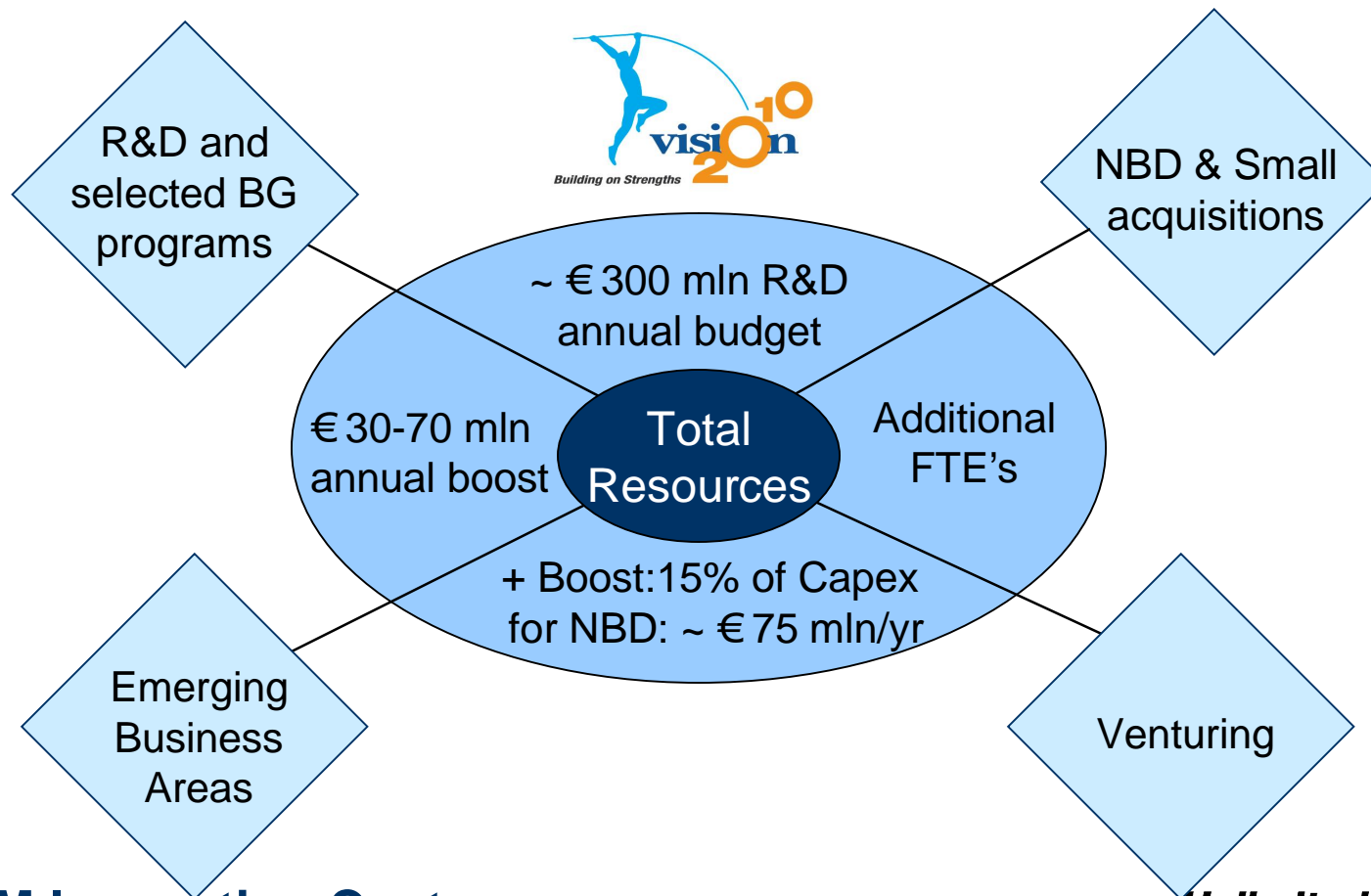
Increased Presence
Emerging Economies

Operational
Excellence



Value Creation

- € 1 bn new sales from innovation by 2010
- Securing future growth through “EBA’s” beyond 2010



“You either innovate or you are in just commodities”

“Channels to the market(s) determine pace of innovation”

“Invention is like a flower, innovation is the weeding”

“Innovation is about ‘breaking the rules’”

“To innovate, the most important question is :
who do you ask for help?”

“More innovation, more mistakes!”

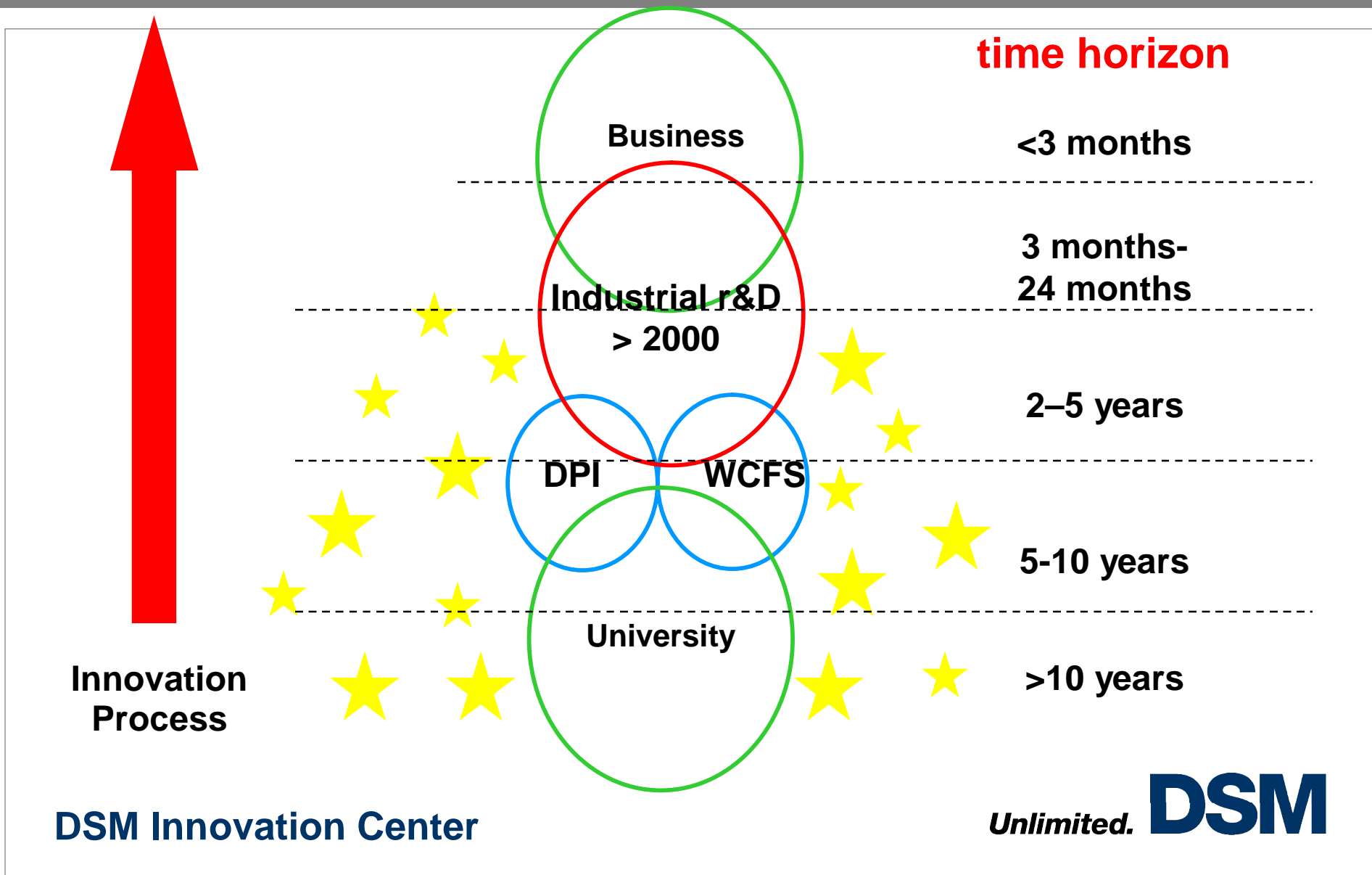
“Innovation requires out of the box thinking”

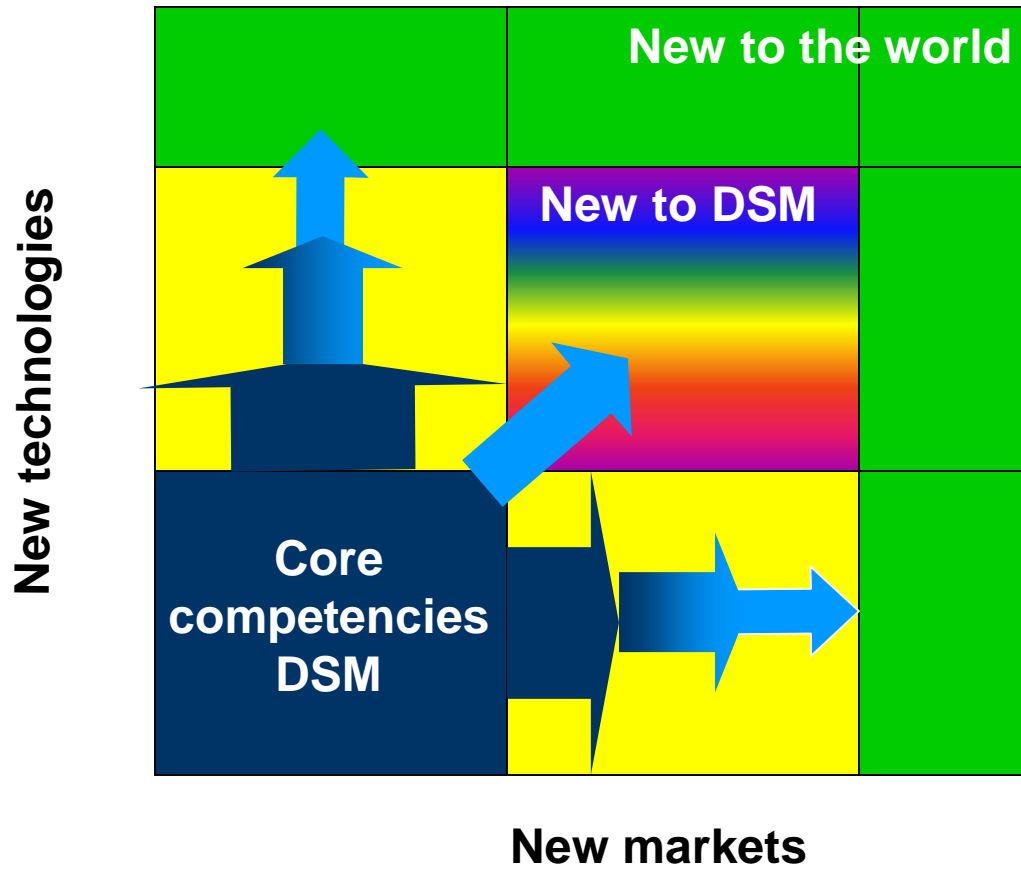
“Innovate or vegetate”

“Innovation should be in (y)our genes”

“Innovation is people-business”

Timehorizon differs strongly





Launching products to exploit unmet market needs

- **Business Groups:**

1-4 years.

- **Cluster NBD-pm:**

Extending business / technology into emerging spaces

3-7 years.

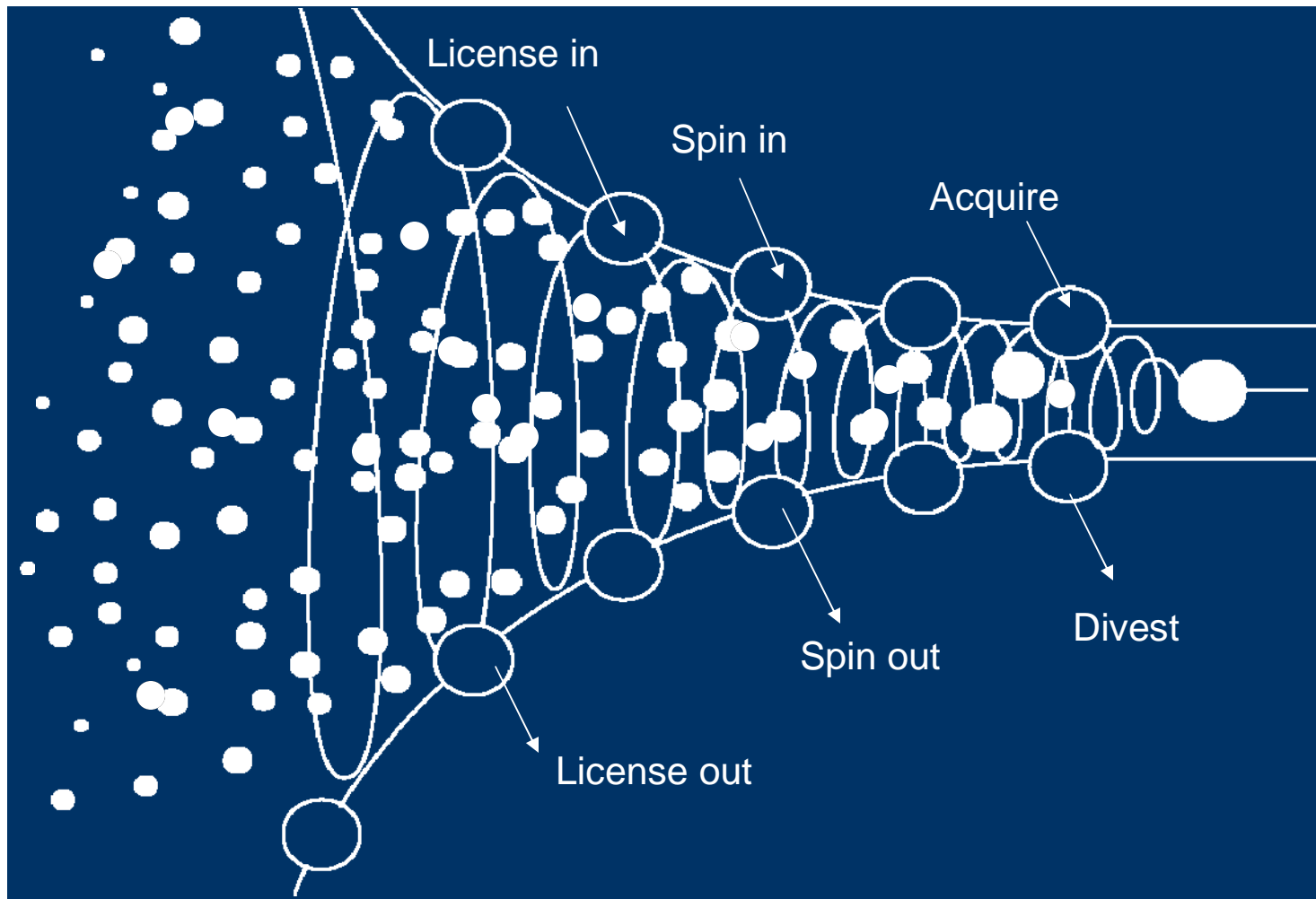
- **EBA's/Incubator:**

Exploring and developing options for the future

5-10 years.

The Open Innovation "Funnel"

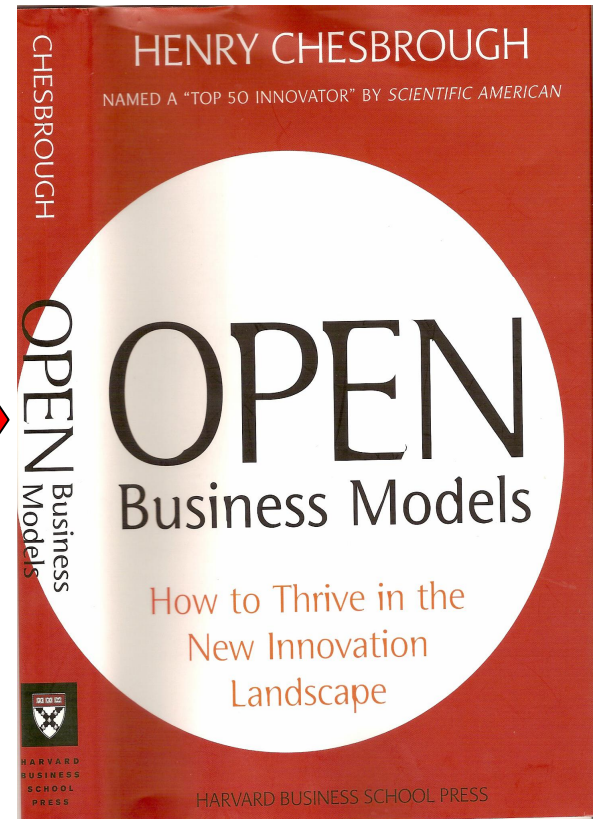
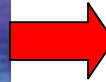
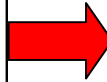
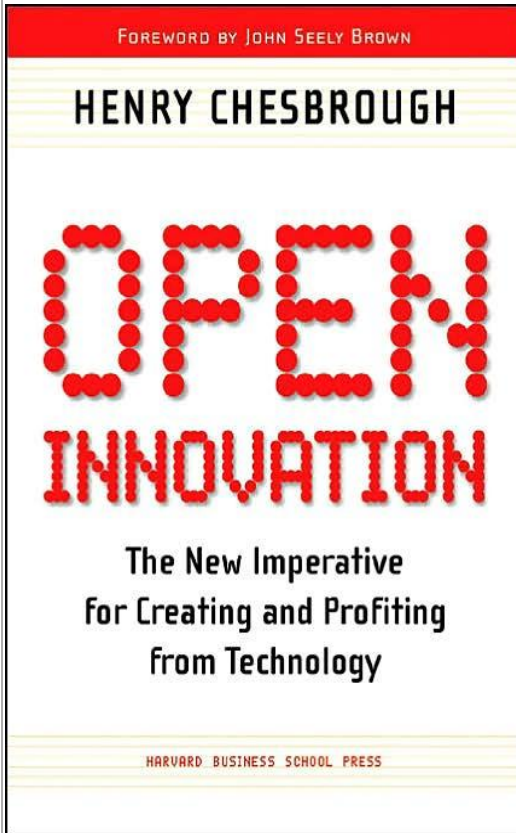
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Prof. Henry Chesbrough



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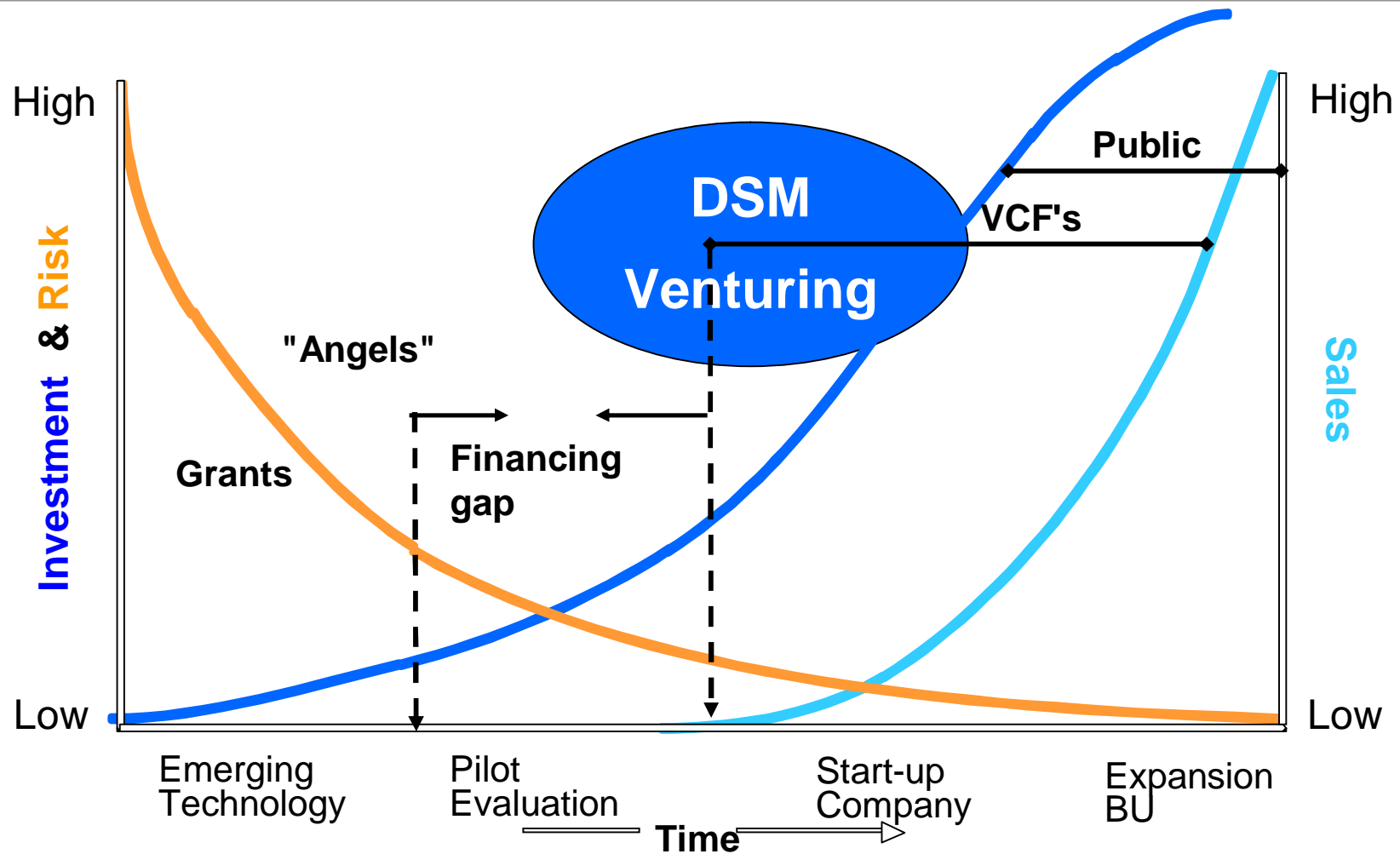
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DSM's competence centre for external (VC) participations aimed at boosting innovation & growth

- **Window to the world**
Explore new emerging markets, technologies and products in order to enhance DSM's product portfolio, technology toolbox and business model(s)
- **Strategic value**
Add value internally and externally through facilitating strategic co-operations with start-ups
- **Financial return**
Create value by investing in and divesting start-up companies

Stage focus of DSM Venturing

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Venture Capital Fund participations

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Boston, USA
Focus: IT, PM, LS
Funds: Amp '95, Amp '99



San Fransisco, USA
Focus: LS
Funds: Nutraceuticals
Life Sciences



Santa Barbara, USA
Focus: PM
Funds: NGen I, NGEN II



Life Science Partners

Amsterdam, Netherlands
Focus: LS
Funds: LSP II, LSP III

**Dealflow
Co-investment opportunities
Networks**



Tel Aviv, Israel
Focus: PM
Funds: MMT II



Boston, USA
Focus: Health & Wellness



Zurich, Switzerland
Focus: Cleantech

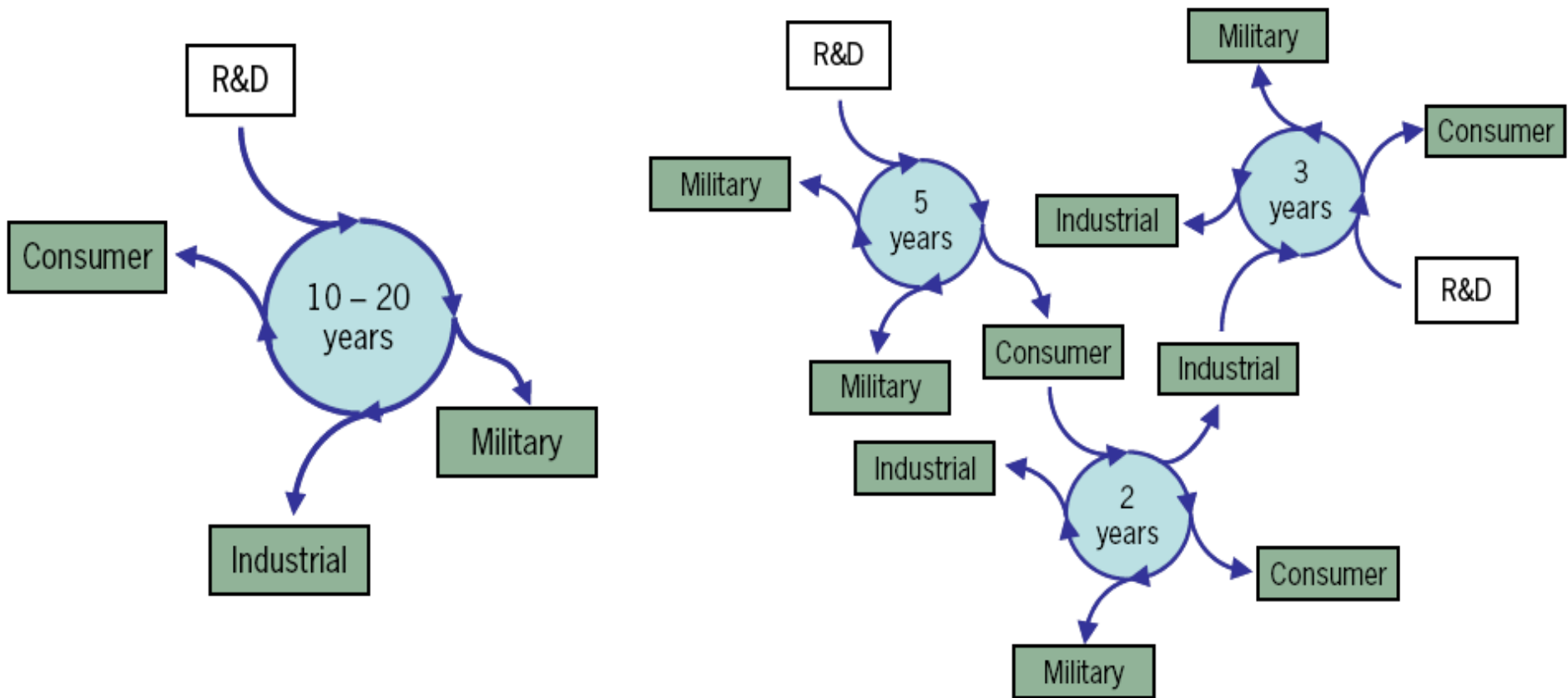
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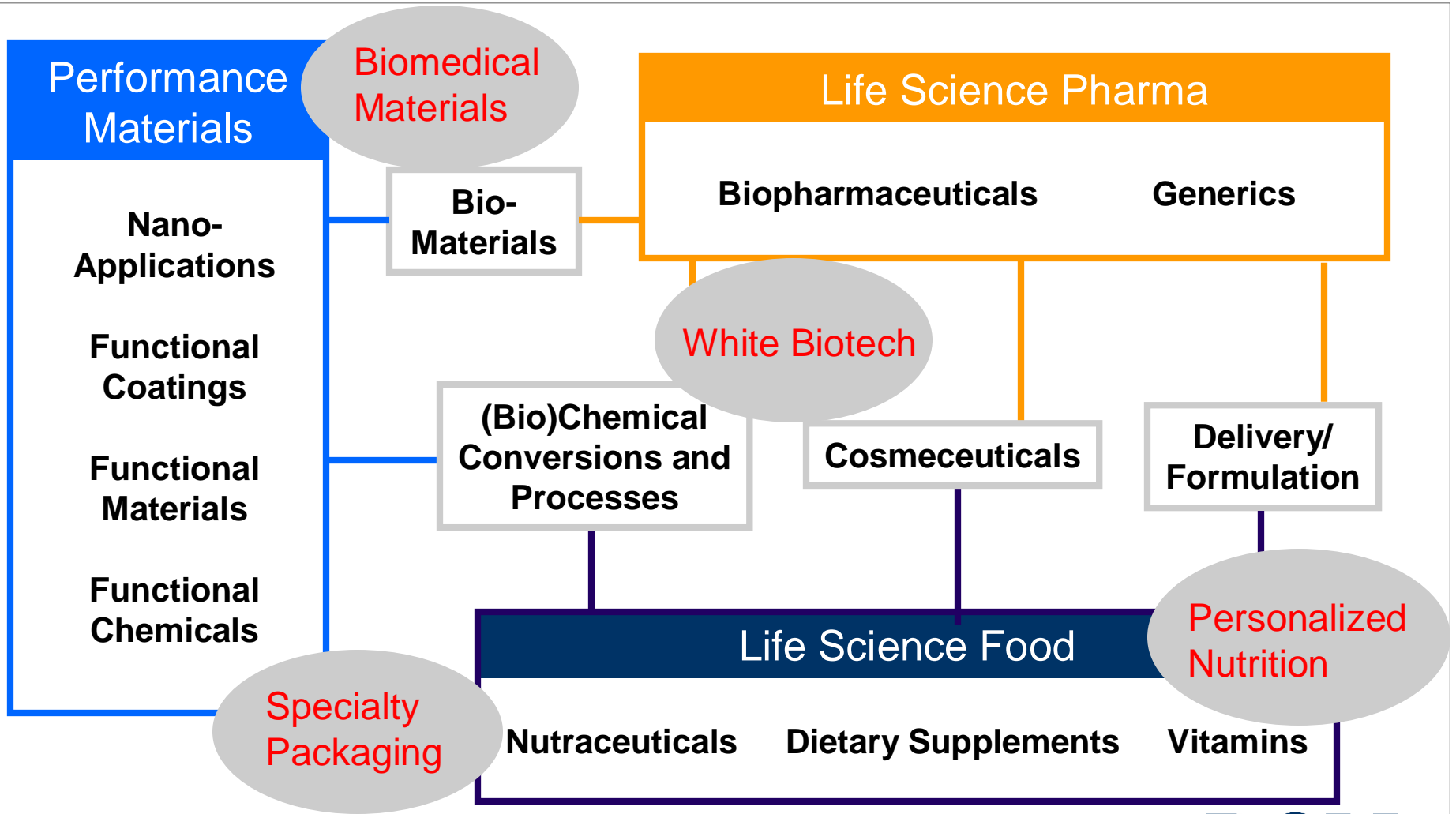
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The Military Technology Development Process Has Changed

In the **traditional development process** a single technology development cycle produced applications in a defined order...

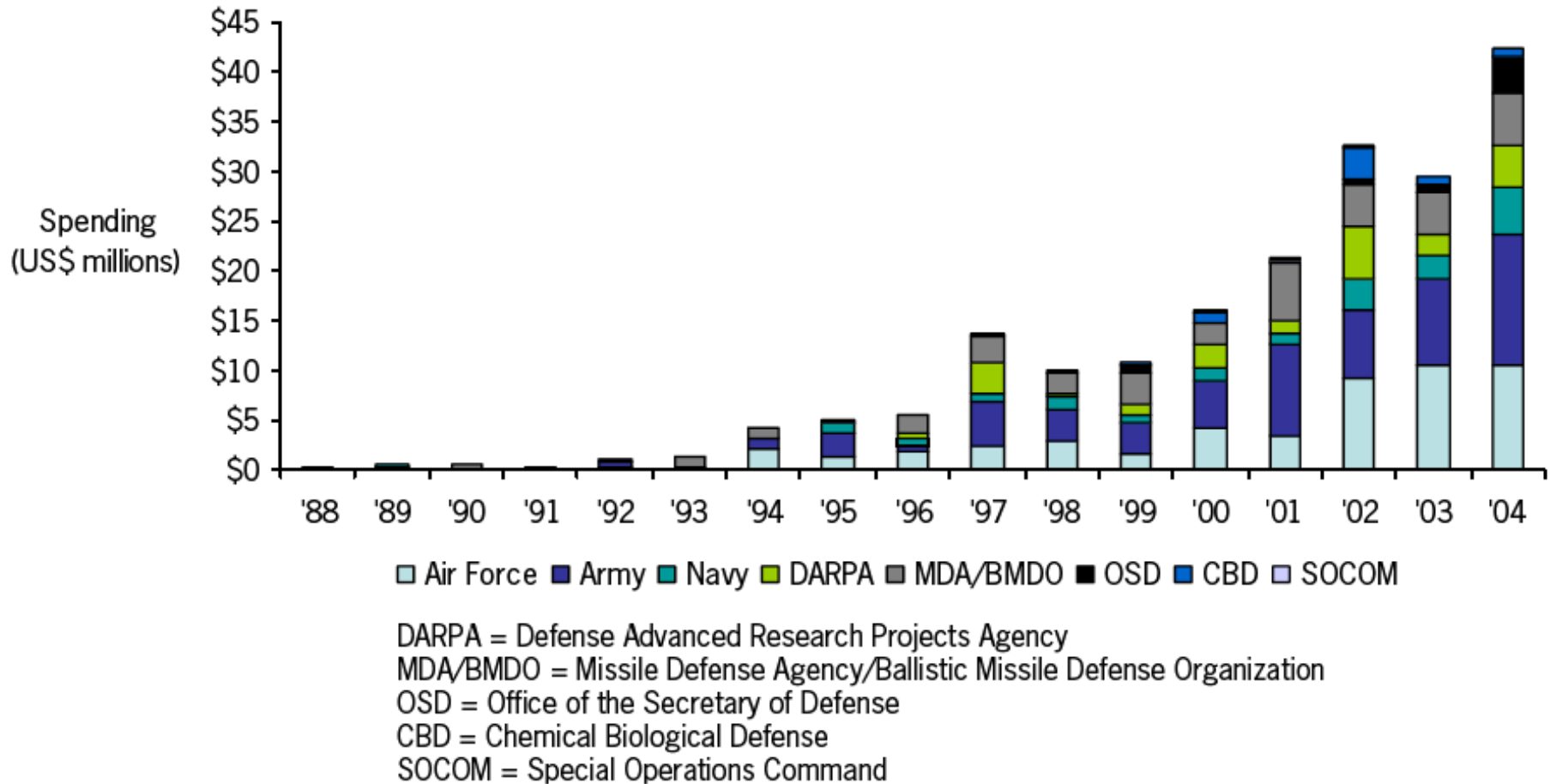
...but in **today's development process** the order may vary and spawn new development cycles





Nanotech as enabling technology for Materials

2-1: DOD SBIR/STTR spending for nanotechnology applications, by agency, 1988 to 2004



DSM Venturing Portfolio companies

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Realized “learnings” DSM Venturing

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IPO

Tradesale

Out of business



2005

(Swiss stock exchange)

2006

(to DSM Food Specialties)

2005

(Dissolved)

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Distribution partner



Mediterranean diet in a tablet:



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Joint Development



Polymer paradox – reversible moulds



Supplier



Cleaner-burning additives:



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- **Public Private Partnerships**
- Initiative by the Ministry of Economic Affairs
- Unique instrument for innovation
- Fills the gap in the Dutch knowledge infrastructure
- Operates at the interface of Universities and Industry



Example of Dutch “LTI’s” :

- Netherlands Institute for Metals Research (**NIMR**)
 - Dutch Polymer Institute (**DPI**)
 - Wageningen Centre for Food Sciences (**WCFS**)
 - Telematics Institute (**TI**)
- DSM acted as founder of DPI ; provides the Director

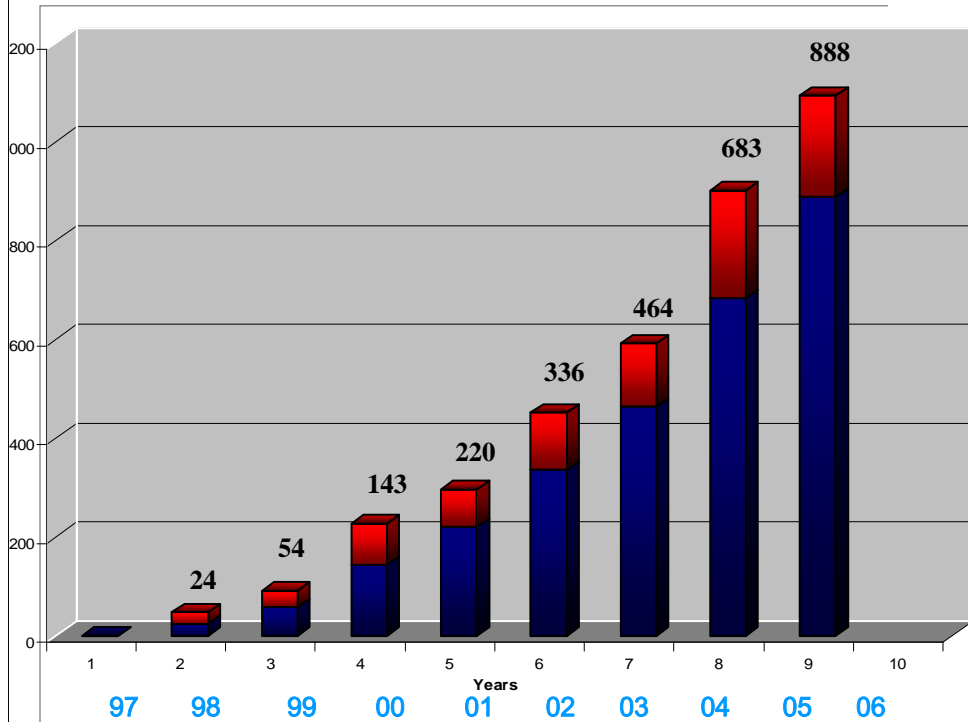
- Focuses on issues relevant to the polymer industry (science and engineering)
- Is characterised by a multi-disciplinary chain-of-knowledge approach
- Makes competitors working closely together
- Performs pre-competitive research
- Is rooted in the Dutch public knowledge infrastructure
- Started in 1997



- Partner companies: (ticket k€ 50 cash): 25% (k€ 4,500)
- Partner knowledge institutes: 25% (in kind) (k€ 4,500)
- Ministry of Economic Affairs: 50% (cash) (k€ 9,000)

- Current budget (approx.) (k€ 18,000)
 - DSM contribution = 10 tickets = k€ 500 (11% of industry contribution)
 - 35 of other companies contribute 80 tickets (approx.)

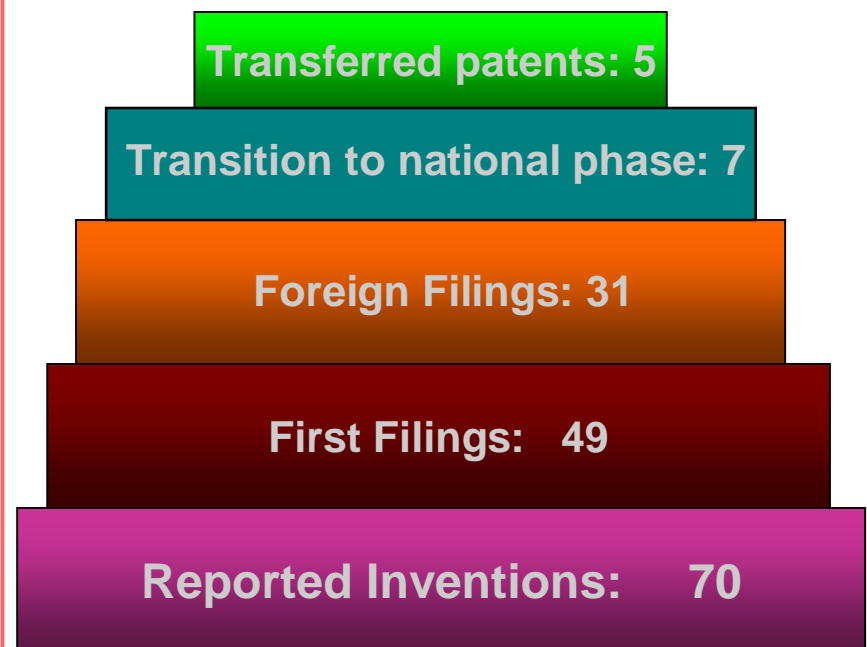
- Possible additional funding instruments:
International: EU (FP7), NRW (Germany)



Publications: 888 in total
2005: 205 (incl. 19 theses)

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Patent Portfolio



January 2006

Industrial partners of DPI

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Academic partners of DPI



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- Polyolefins **10%**
- Engineering Plastics / Rubber Technology **16%**
- Functional Polymer Systems **16%**
- Coatings Technology **11%**
- High Throughput Experimentation **16%**
- Corporate Research **10%**
- Plastic Electronics **5%**
- Bio-Inspired **6%**
- Organisation and support **10%**

Total budget € 17.6 million **100%**

More Functionalities

- Temperature , Impact , Strength , Stiffness
- Adhesion , Friction , Wear , Conductivity , Flammability.....
- Thinner , Lighter , “Smarter”

Societal drivers & Sustainability

- Renewable ; CO₂ neutral , low energy consumption.
- Eco friendly ; non halogen , no PCB's , low VOC , biodegradable.
- Fuel cells ; H₂ , MeOH , EtOH .

Nanotech + Biotech

- Mimicking nature
- Self assembly
- Self healing

Mostly at the same or lower cost !

Dyneema® in cockpit armoring

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**September 11th, 2001
has changed
aviation security !**



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The Energy Efficient Solution ...



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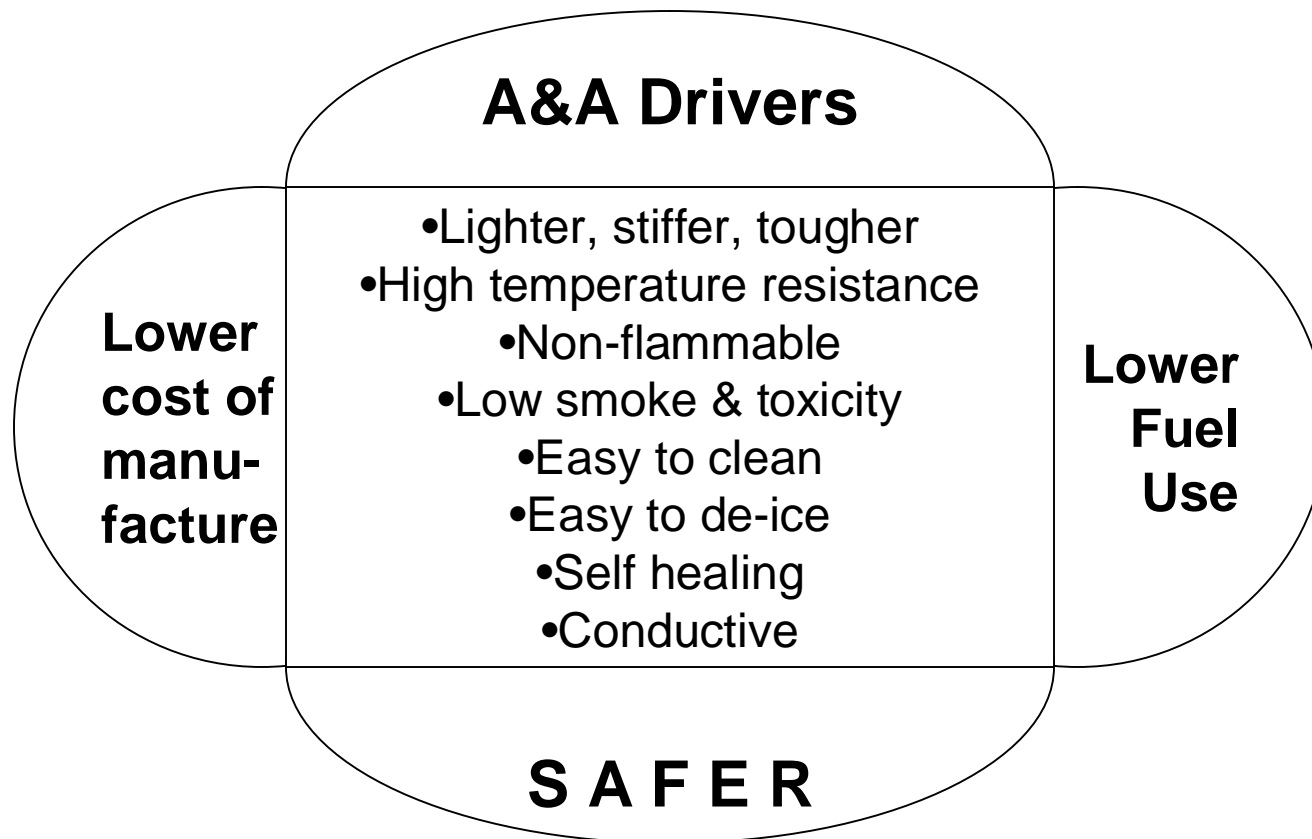


- **The Value Proposition :**
- Noise reduction
- Precision processing
- Ultimate flow behaviour
- **Weight reduction**
- **Temperature resistance**
- Life-time
- Cost reduction

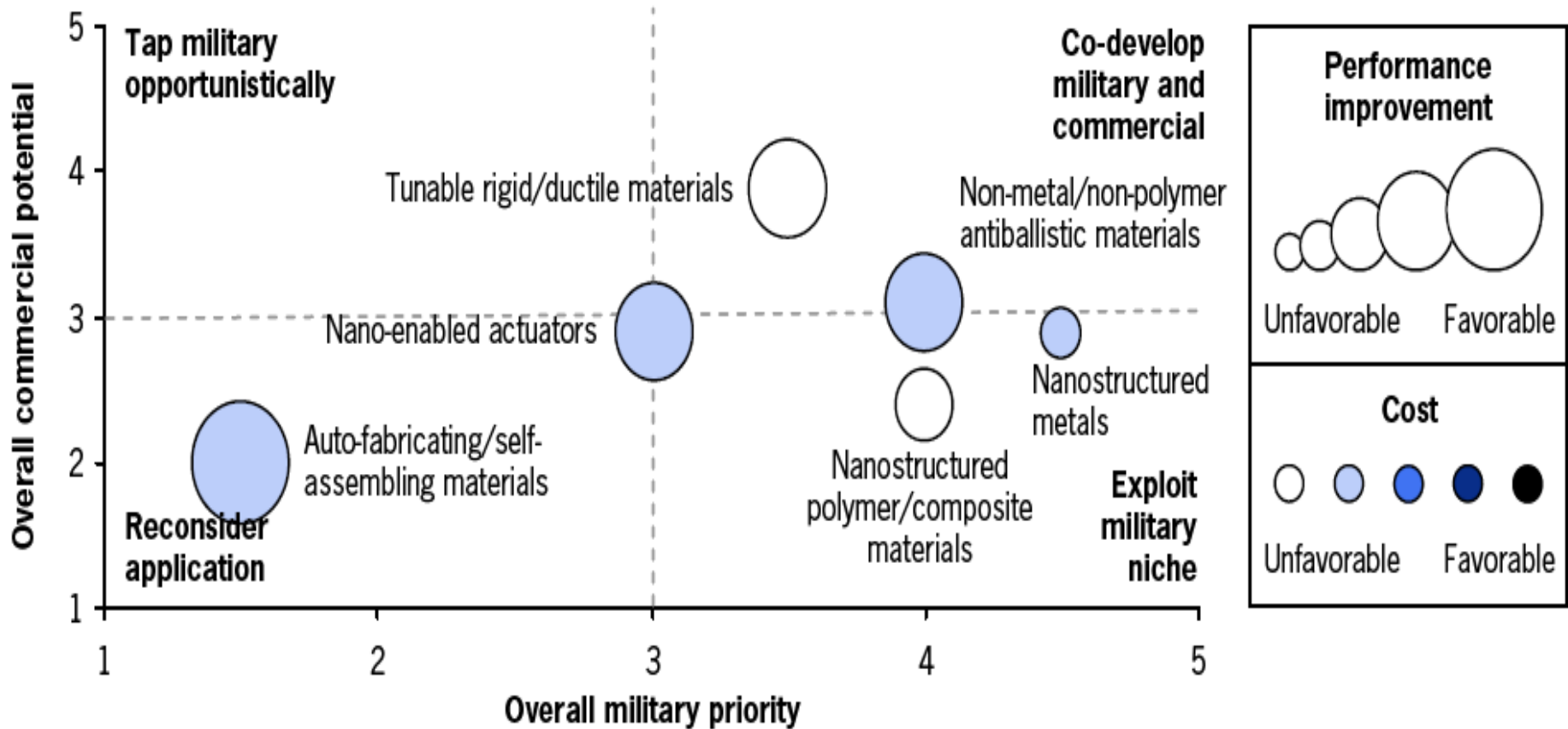
Astonishing **Stanyl®**

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What can DSM bring to the A&A materials scene? 36



14-1: Positioning military nanotech structural materials applications



- **DSM Resins** is currently studying the coatings of tomorrow's aircrafts.
- Supplier to 2 leading paint producers : **Akzo Nobel & PPG**
- Coatings for **Composite parts**:
totally different than coatings for aluminum parts !
 - Different stress/strain,
 - Other chemical paint strippers
 - No corrosion requirement
- **Water based** coatings
 - High chemical resistance combined with high flexibility
- **High scratch resistant** polymeric coatings for interiors
- DSM has all the basic chemistry in house for resins to be formulated into aerospace coatings.

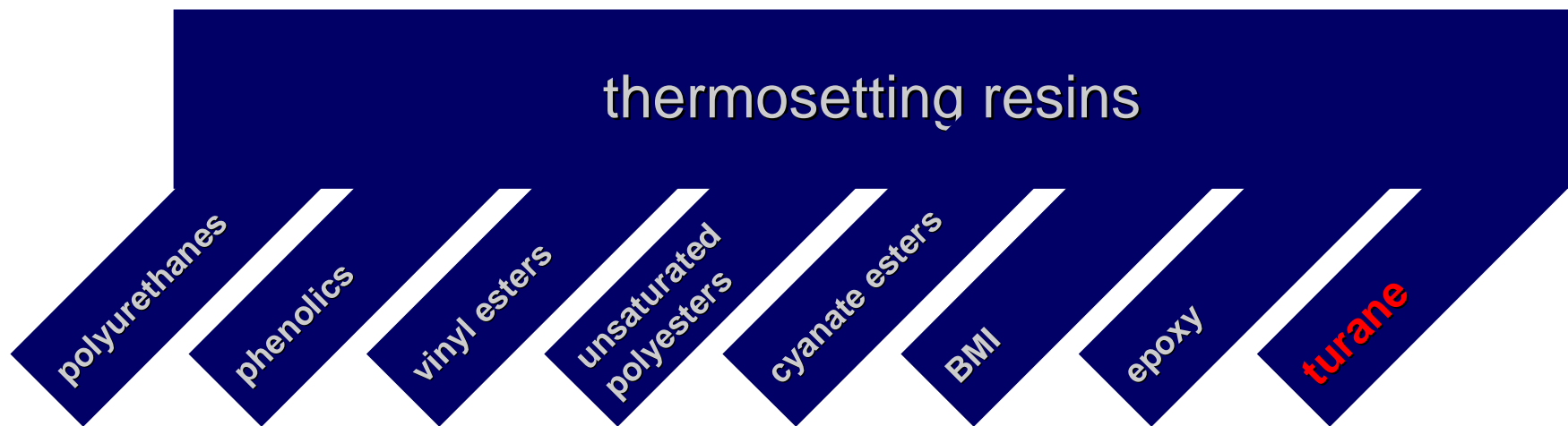
**DSM Composite Resins
proposes a new group of
thermosetting resins called**

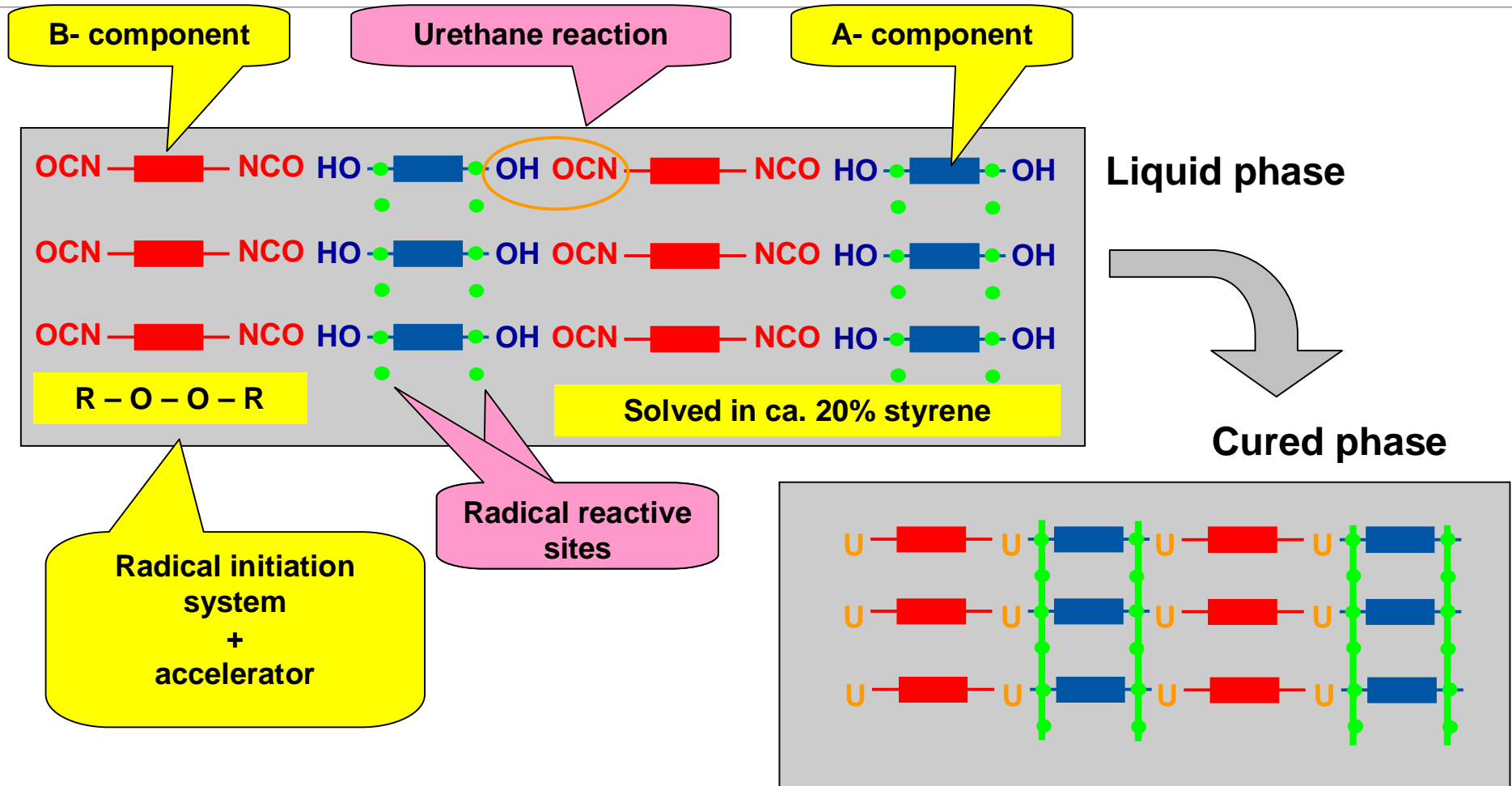
Turane resins

for thermosetting urethane resins

Turane is a new generation of thermosetting urethanes that combines 2 polymerisation mechanisms

1. A radical polymerisation with
2. An urethane extension (polyurethane chemistry)





Flexibility and toughness

of polyurethanes,

strength, stiffness and thermal resistance

of radical polymerisation, and

processing speed

of two curing reactions

.....by molecular engineering !

“Ultra light” application

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- Practicing **Open Innovation** means :
 - Understanding the Value Chain
 - Teaming up with Universities , Start-ups and “LTI’s”
 - Jointly explore opportunities ; tackle problems together
 - Decreasing the ‘time to market’ by partnerships
- DSM’s competences discriminate us from VCF’s
- Dyneema , Stanyl , Turane can act as ‘door openers’

Innovation leads to value creation !