



**NEXUS**



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# **NEXUS**

**Where Have We Come From ?  
&  
Where We Are Going?**

**Gaëtan Menozzi**  
Chairman of NEXUS

*mTech Café - Oslo 3-04-2003*



## NEXUS PRESENTATION OUTLINE

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- Origin & evolution
- **NEXUS Association: status & main activities**
- Task forces:
  - MST Market Analysis
  - Products/technology Roadmap
  - The International partnering
- **The place of NEXUS in the future European programs**
- **Conclusions**





## Objectives of the NEXUS Association

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- To promote the **uptake of microsystems** technology, and nanotechnology “MNT” in support of European industry
- To provide opportunities for **professional networking**
- To generate and disseminate **up-to-date** marketing, technical, and emerging technology **information.**
- To establish & consolidate the **MNT structure** for the ERA



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# NEXUS Association

Evolution in memberships  
Some key facts

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# Membership's evolution



## NEXUS - Evolution of Members

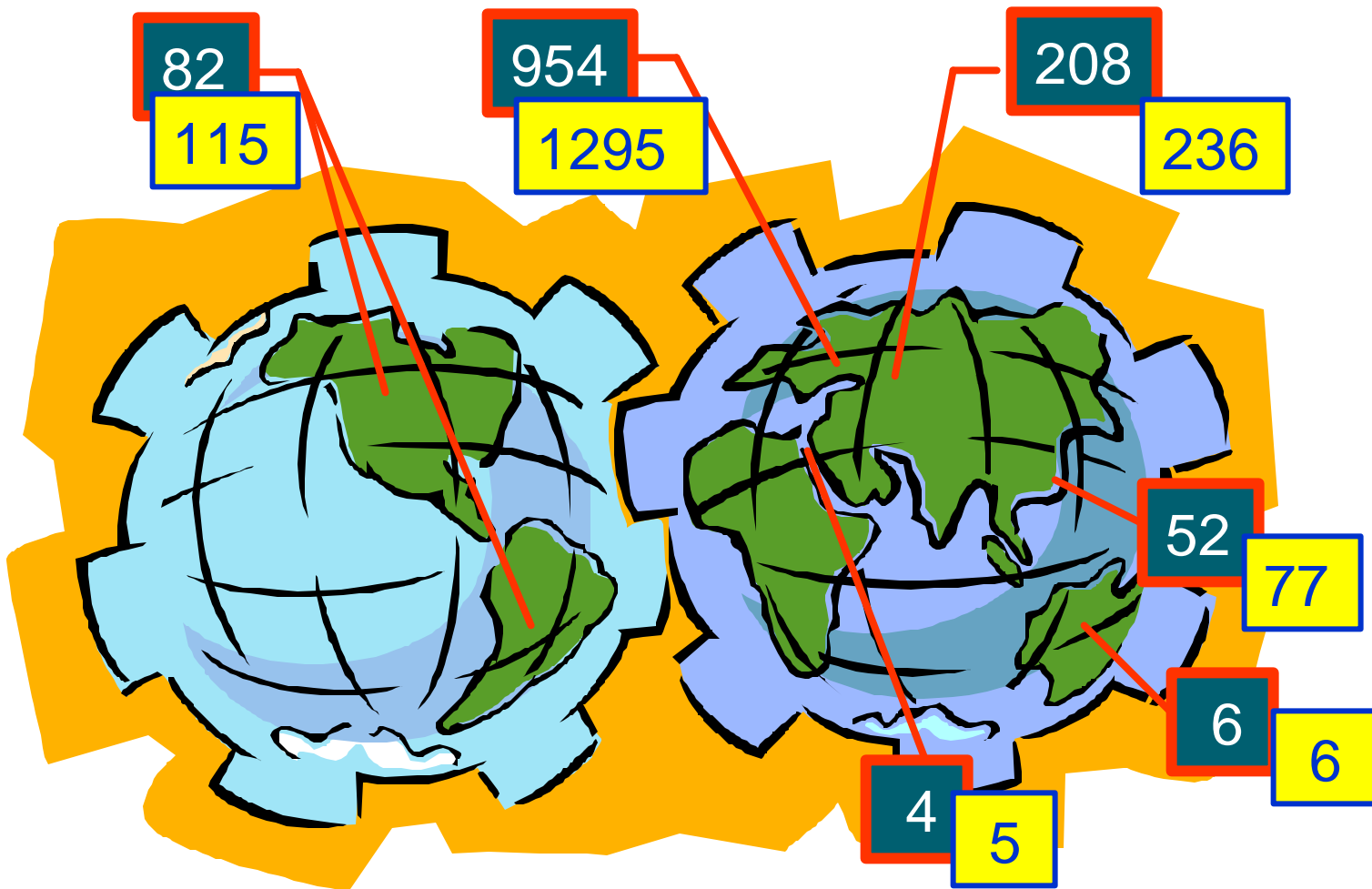


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# Worldwide membership

(Who's who and regular participants)



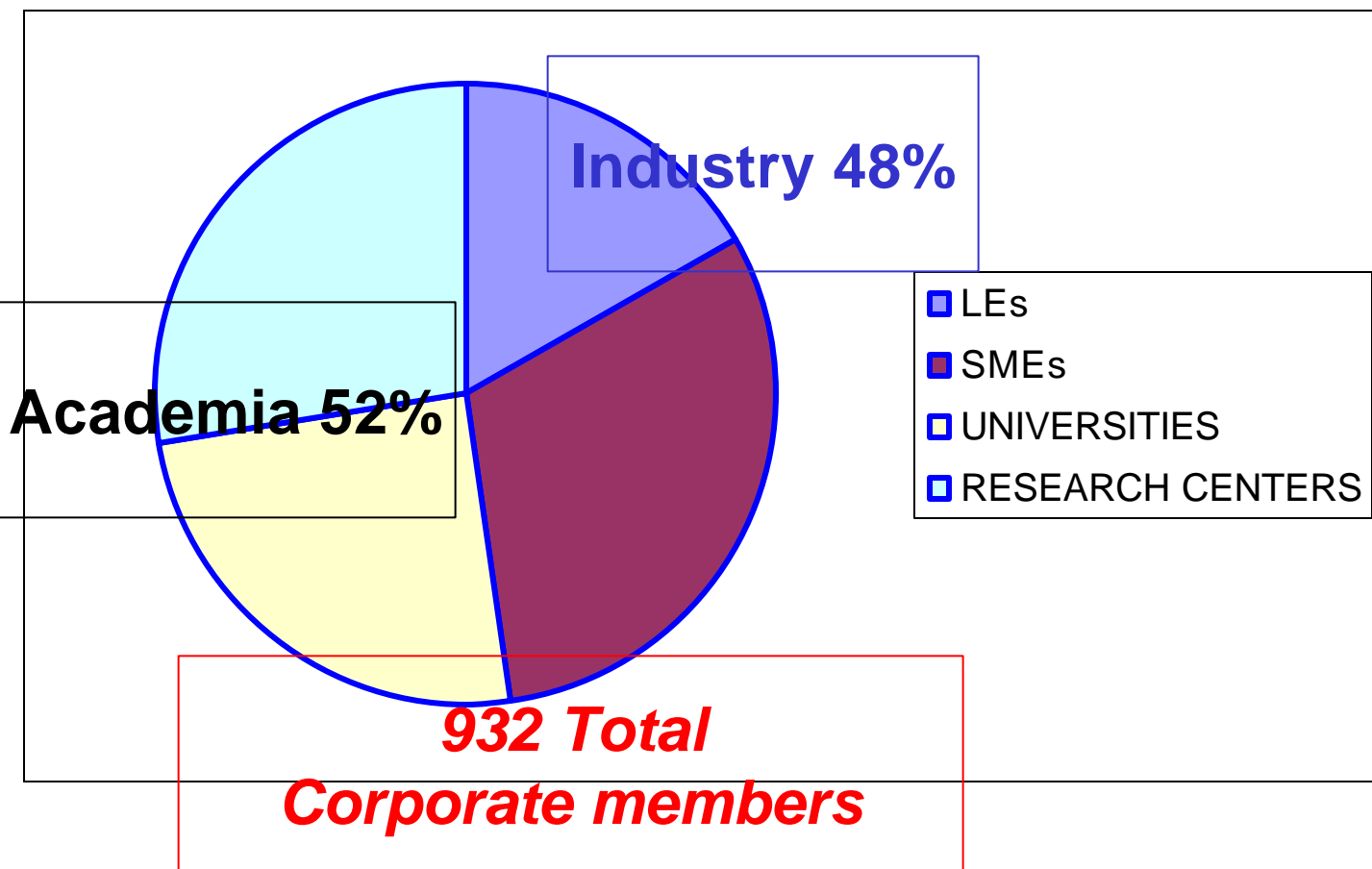
**Total in 12/2001 = 1306**

**Total in 11/2002 = 1734**



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## Industry & Academic in NEXUS 11/2002



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# NEXUS Association

The structure & organization  
Activities & tools

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## The new Steering Committee from **SC 16-01-03**



**Gaëtan Menozzi**  
MEMSCAP (F)  
**Chairman**  
*The future of Nexus  
&  
International relations*



**Ayman El Fatatry**  
BAE Systems (UK)  
**Vice Chairman**  
*General secretary  
Task forces  
coordination*



**Per Gloersen**  
SensoNor (N)  
**Treasurer**  
*Acting in automotive  
USC*



**Sean Neylon**  
Colibrys (CH)  
*MarkCom promotion  
&  
Sponsorship*



**Diana Hodgins**  
ETB (UK)  
*Coordinating USCs*



**Constant Axelrad**  
CEA- LETI (F)  
**Advisor to the SC**  
*Initiating proposals  
Initiate USC Nano*

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## The core activities

### USCs CLUBS

USC  
Pharmaceutical

USC  
Instrumentation  
&  
Process Control

USC  
Medical devices

USC  
Peripherals  
&  
Multimedia

USC  
Aerospace  
&  
Geophysics

USC  
Automotive

USC  
Telecom.

USC  
Household  
&  
Appliances

USC NEMS  
Nanotechnology

USC  
CAD Tools

USC  
Packaging  
Assembly &  
test

USC  
Reliability

### TASKS & CORE ACTIVITIES

- **Technology Road Map**
- **Market Investigations**
- **Benchmarking**
- **Strategic guidance**
- W/E Europe exchanges
- International relations
- Research & technology
- Thematic workshops
- Standardisation ? *Since 1996*

REPORTS  
&  
DISSEMINATION



## Benefits

- Network of peers
- Privileged place for starting bilateral projects
- Better understanding of the whole MST/MEMS field:
  - Market: who, where, evolution, requirements (volume, price, specifications)
  - Technology: capabilities, trends and needs
- Realistic common appreciation of:
  - Technology push and Market pull
  - Every thing is Small number of possible custom MEMS for just 1 Euro each



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## NEXUS TASK FORCES

Priority topics are dealt with by the following Task Forces.

### **Market Analysis**

Aimed at establishing and predicting market size for existing and new applications. Report published Q2 02  
“NEXUS MST Market Analysis 2000-2005”

### **Roadmap**

Aimed at predicting technological and application trends. Updated Roadmap will be published by Q2 03

### **Long-term view**

Aimed at predicting trends in the period 2010-2020

### **Standards**

Represented on CENELEC and IEC committees.  
Changing situation reported to membership.

### **Eastern Europe**

Candidates being sought for Eastern European Board

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# NEXUS new web page

Adresse  <http://www.nexus-mems.com/>

European Microsystems Network



who's who? | companies | sponsors | programmes | national organisations

## NEXUS SPONSORS



Microparts



ist

### Welcome to NEXUS, the largest MEMS/MST network in Europe

NEXUS is a non profit Association headquartered in Grenoble with the aims of providing microsystems professionals with

- access to strategic guidance through reports containing the most up-to-date analysis of markets, technologies, applications, and long-term trends.
- information through the web portal, regular e-mail bulletins, MST News pages, thematic workshops, and also conferences.
- high-level networking opportunities through the regular user/supplier club meetings, and other specialist events.

Although based in Europe we now have over 500 member organisations and 1000 personal members, many of whom are in the USA and the Far East.

This new site is being developed in stages during the period September to November 2001. When complete it will form the most comprehensive microsystems portal in the world.

For further information or suggestions for improvement  
please contact  
Laurence Chassagnant

<http://www.nexus-mems.com>

registration  
about NEXUS  
bookshop  
job vacancies  
conferences and workshops  
user supplier clubs  
task forces  
admin



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# TASK FORCES - I

## The NEXUS Market Analysis

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# NEXUS MST Market Analysis 2000-2005

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## Objectives

- provide **substantial information on the development** of MST/MEMS-markets for the years 2000-2005
- provide a **long term vision** for **MST/MEMS applications** (vision 2010)
- support MST stakeholders to **develop strategies** in the field of MST
- identify **opportunities** and **critical factors** of **success** for new micromachined devices and applications





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## THE NEXUS market analysis task force

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- **Dr. R. Wechsung**      **STEAG microParts**
- Dr. H. Wicht      WTC
- Dr. F. Götz      Fachhochschule Gelsenkirchen
- Dr. A. El Fatatry      BAE Systems, ATC
- Prof. R. A. Lawes      Rutherford Appleton Laboratory
- Dr. G. Tschulena      SGT Sensorberatung
- F. van de Weijer      Research Program Counseling
- H. Zinner      EADS-FT2ES
- Z. Stössel      H. Technik + Archi.
- Dr. Matthias Illing      Robert Bosch

***& The NEXUS User-Supplier-Club members***

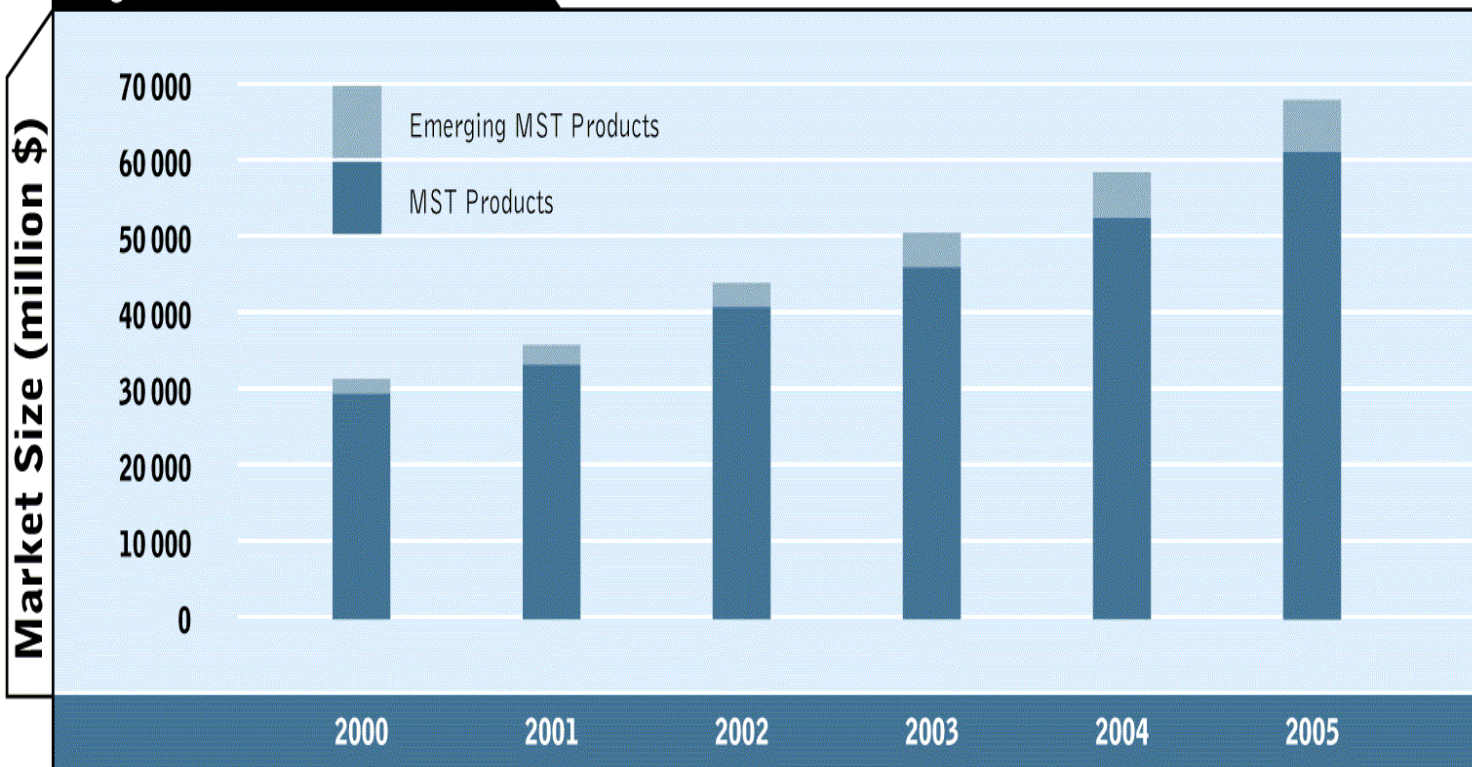
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## Total World Market for MST Products 2000-2005

Figure 2.3



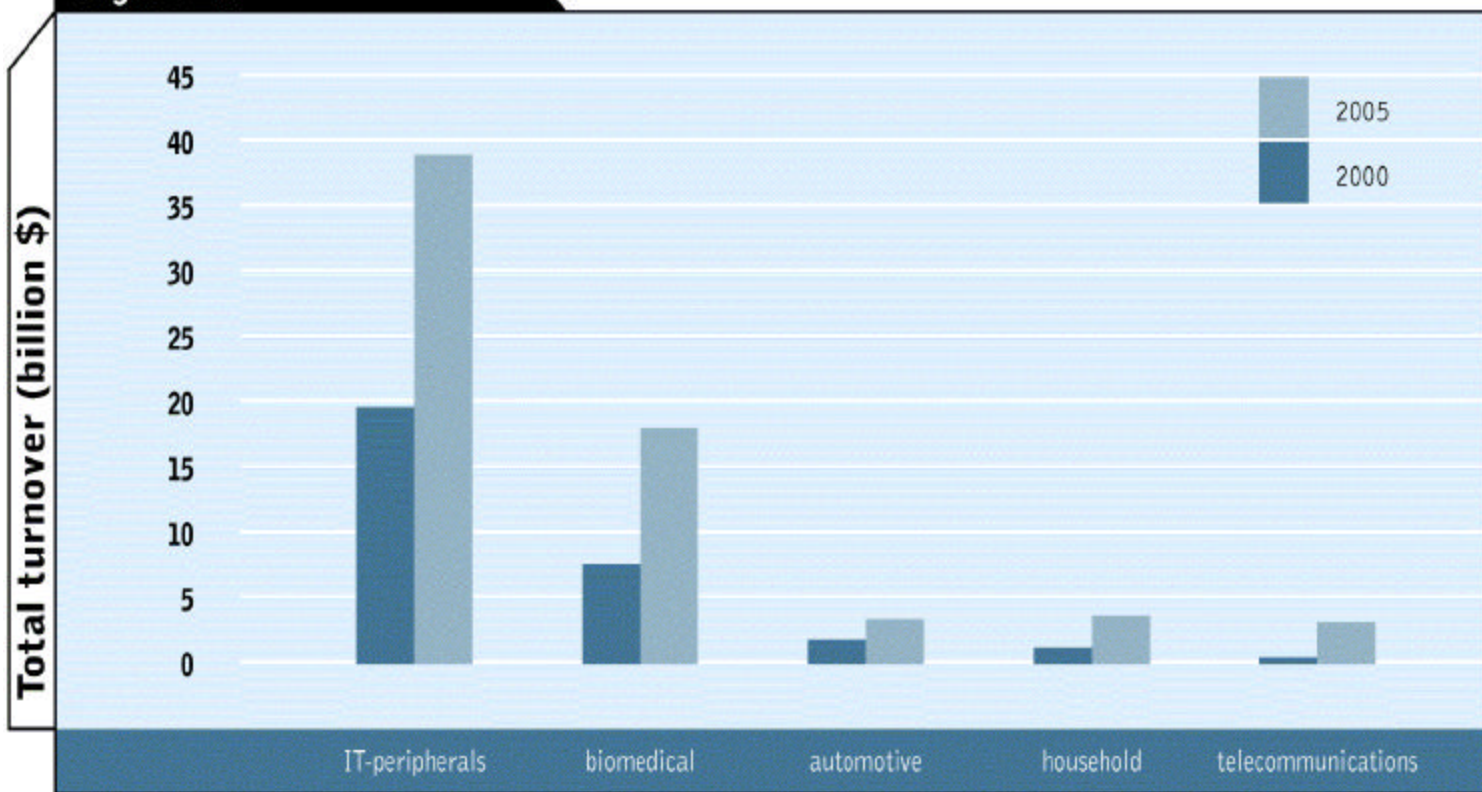
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## MST market by application fields

Figure 2.4







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# Sensors are the main application field for microsystems in the car

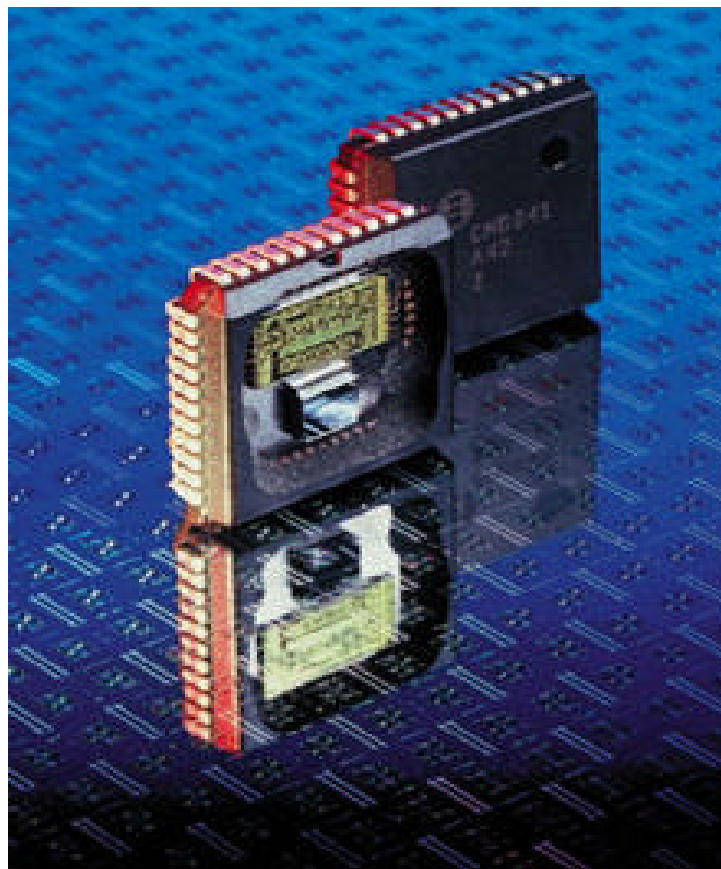




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# Silicon micromachined gyroscope for navigation and rollover-protection



*Courtesy of Bosch*

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# The pressure monitoring systems will become a major application for MST-based pressure sensors

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*Courtesy of SensoNor*

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## Conclusion

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- the mst market will rise from \$ 30 billion in year 2000 to \$ 68 billion in 2005 (+20% p.a.)
- the main fields of application are IT peripherals and biomedicine
- monolithical systems in Si and hybrid systems (mainly polymers) will grow together
- mst products have a large leverage effect on conventional products
- micro/ nanotechnologies will be the key technology of the 21. st century





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Vision 2010

***Disposable Bio-MEMS  
Lab-on-a-Chip  
Micro-capsule based displays  
Smart drugs and diagnostic pills  
Multi sensor biometry  
Optical based devices  
Advanced communications devices:  
mobile phones + localisation + PDA +  
remote control....***

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# TASK FORCES - II

## The NEXUS Products/Technology Roadmap

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## Task force contributors

### The Coordinators

**Helmut Zinner**

**Ayman El-Fatraty**

**Per Gloersen**

**Sigmund Manhart**

**Zeno Stossel**

**Guido Tschulena**

**Frans Van de Weijer**

**EADS**

**BAE SYSTEMS**

**SensoNor**

**Astrium**

**Hochschule Technik**

**sgt**

**RPC**

*Automotive & Space*

*Telecommunications*

*Automotive*

*Space*

*Industrial Process*

*Household Appliances*

*Peripherals & Multimedia*

### Other Contributors

**Sabine Hauck**

**Lou Hermans**

**Sven-P Heyn**

**Walter Lang**

**Coulton Legge**

**Gaetan Menozzi**

**Eric Mounier**

**J L Tissot**

**Henning Wicht**

**FhG-IMSM**

**IMEC**

**FhG-IBMT**

**HSG-IMIT**

**Glaxo-Wellcome**

**Memscap**

**Yole Development**

**CEA-Leti**

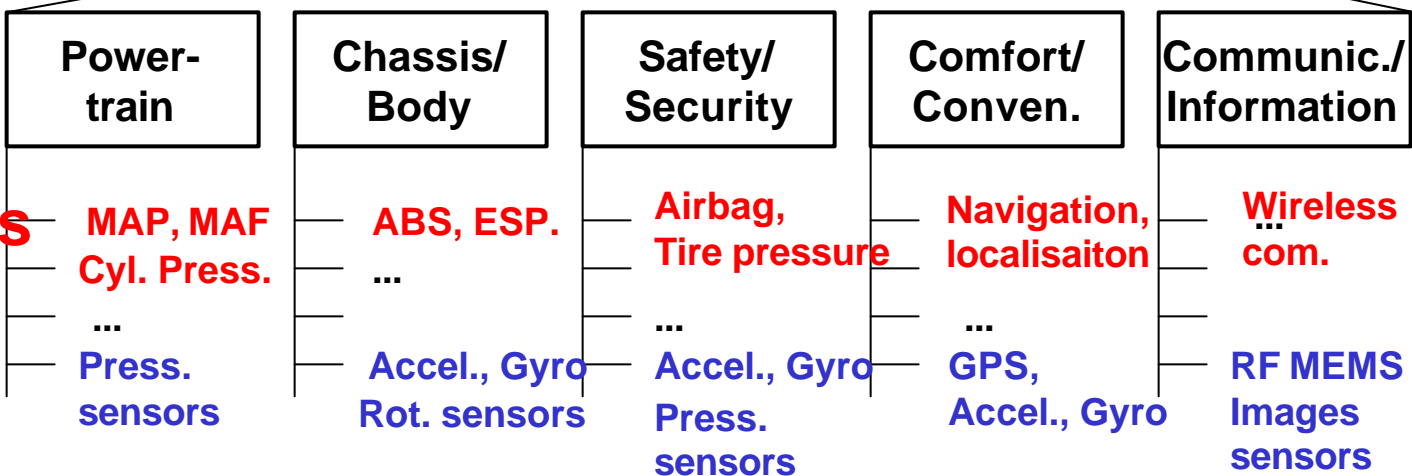
**WTC**

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# Roadmap content: an example the automotive

Approach: Application-oriented  
 Baseline: NEXUS Market analysis (1998)



**Generic Technologies: CAD, Simulation, Si- $\mu$ -Machining, LIGA, Thin Film, .....**



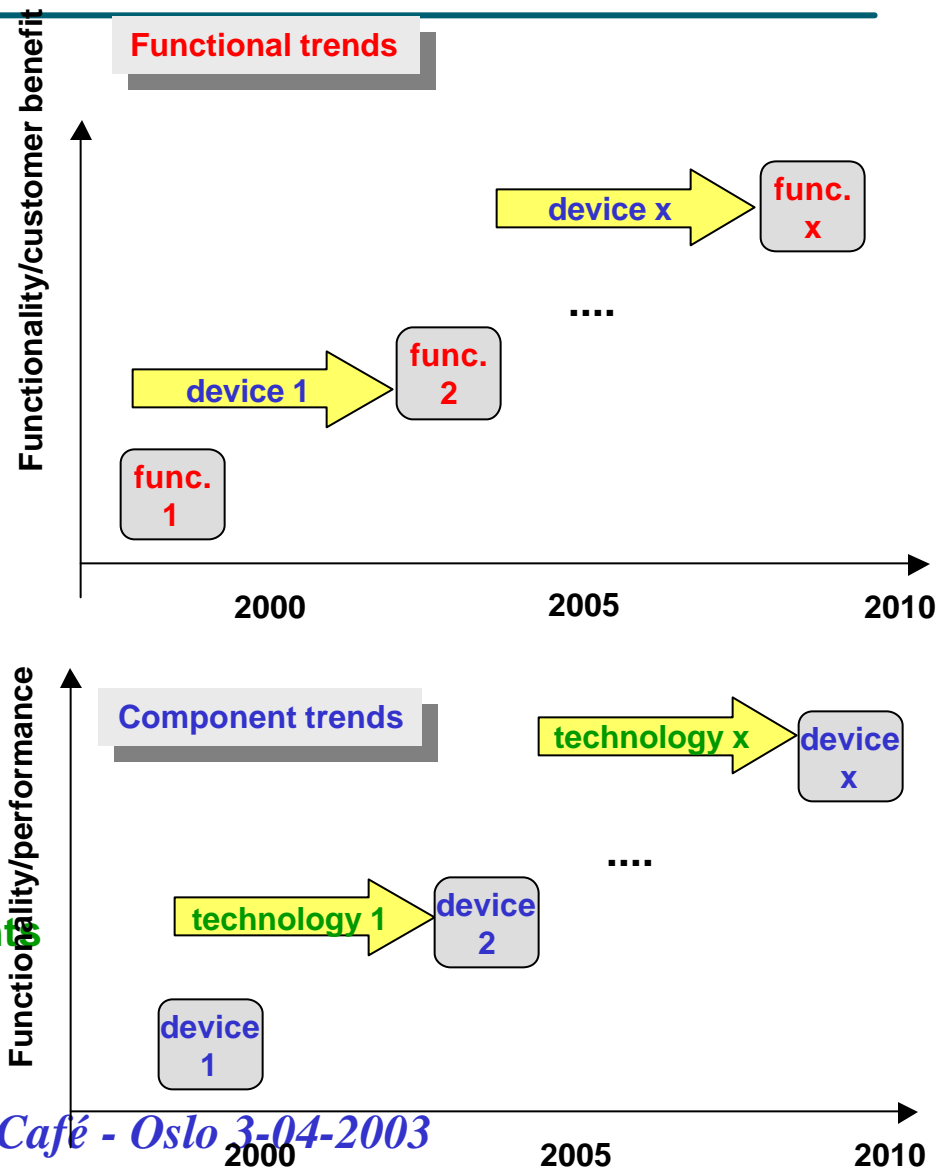


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1. Identification of functional trends and requirements by the User-Supplier Clubs (USCs)
2. Identification of relevant MST devices
3. Forecast of device development trends
4. Technological developments necessary to achieve the desired functionality

# Roadmap methodology



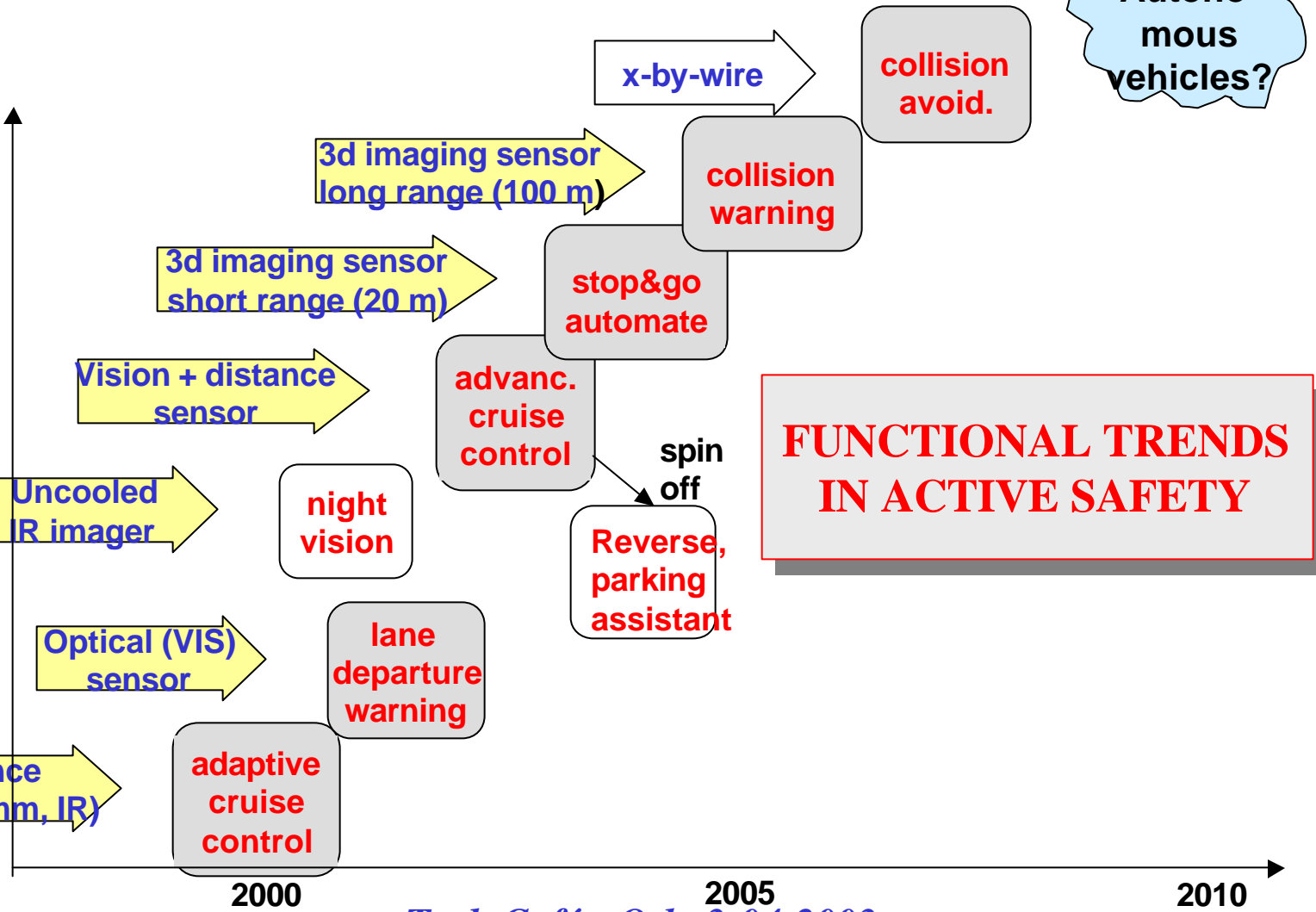


Functionality/customer benefit



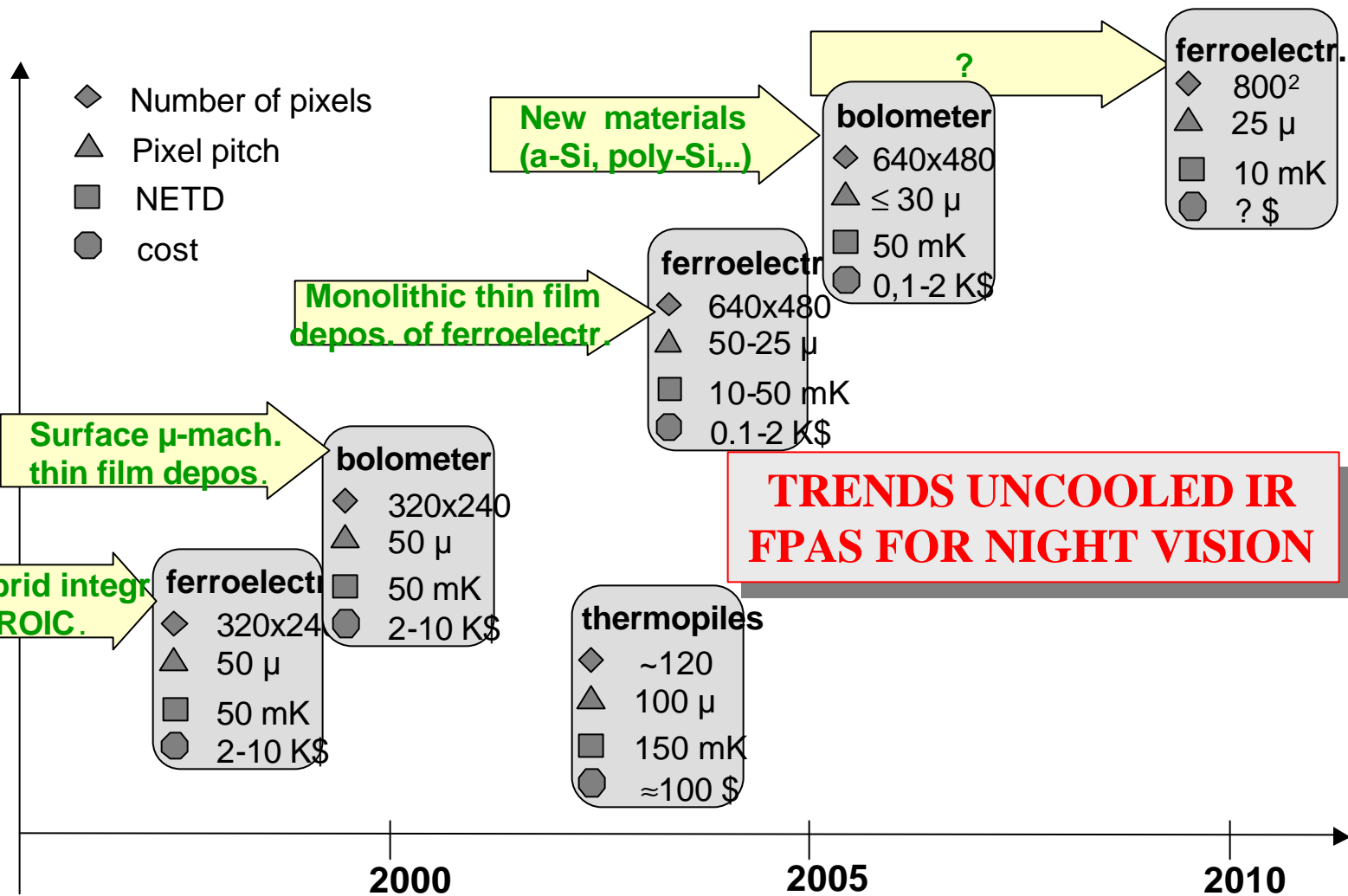
# Automotive example

Autonomous vehicles?





# Automotive example







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## Near-Eye applications



Woman seeking & sighting system?

Man seeking & sighting & firing ? system





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# NEXUS Association

TRANSNATIONAL

&

INTERNATIONAL  
COOPERATION

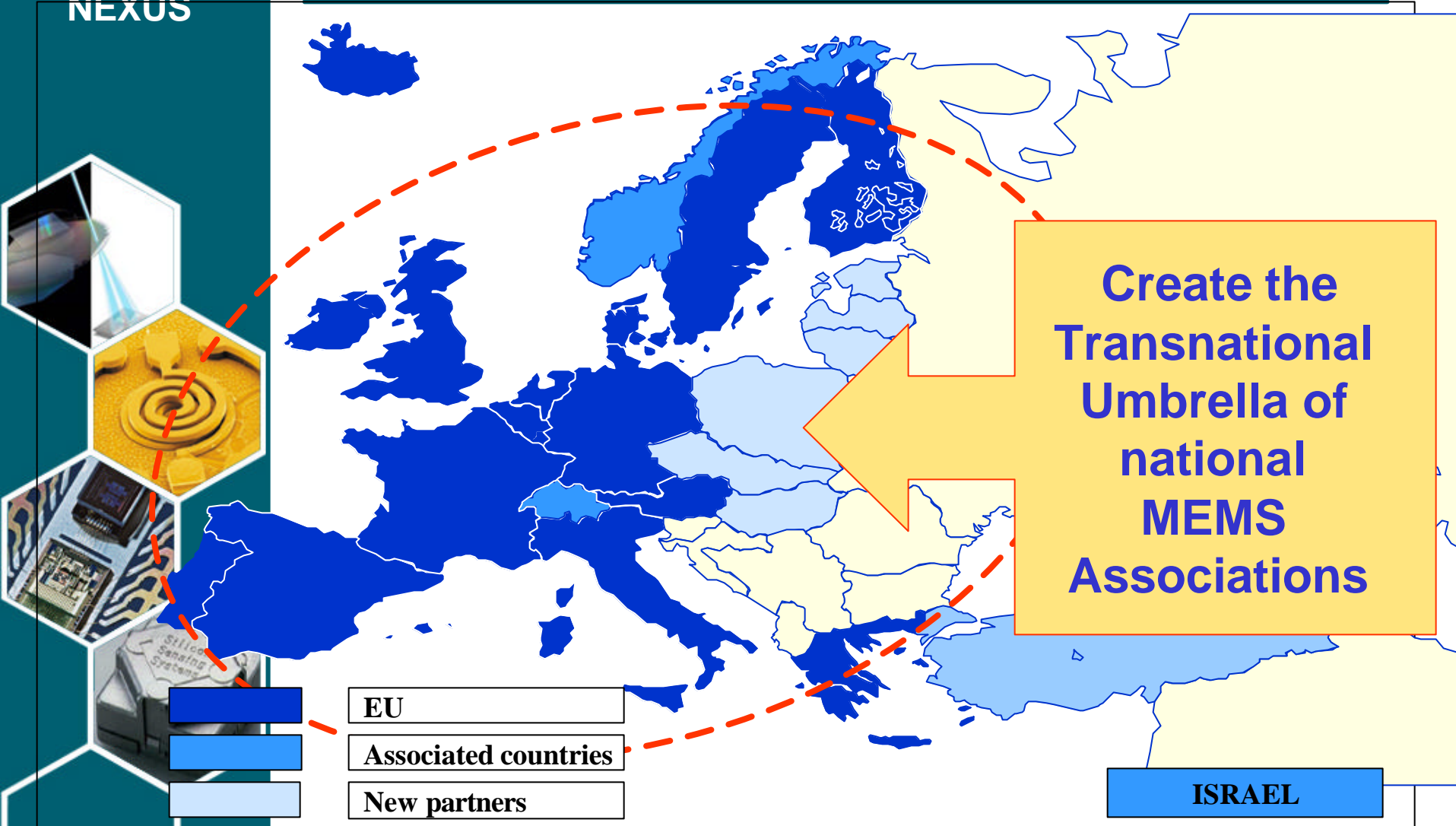
Setting up relationships for a world wide  
Network

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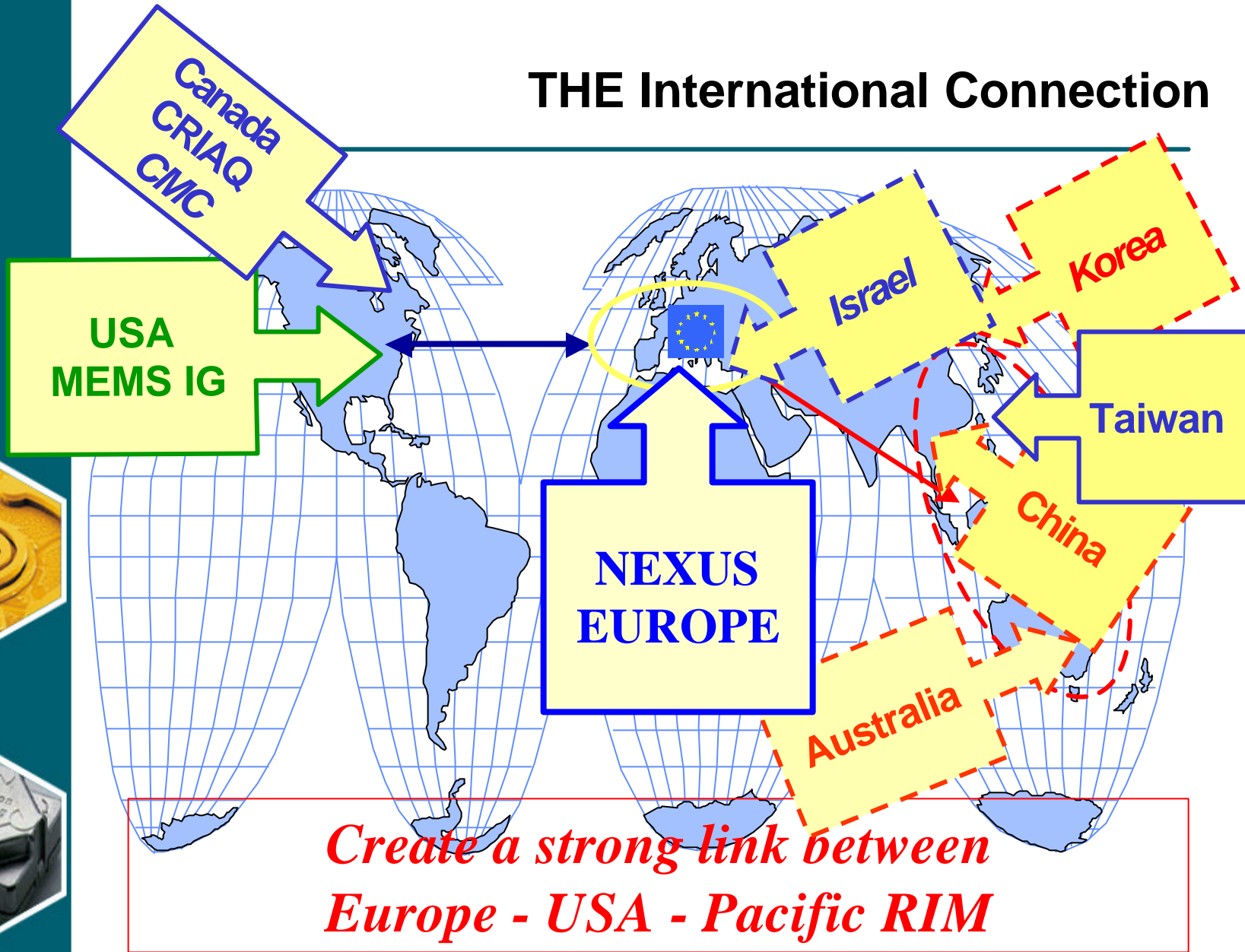
# Transnational links in European countries





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# THE International Connection





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The position of NEXUS in the  
future European Programs

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# 6th FWP Positioning EURIMUS & NEXUS / Integrated Projects/NoE



**FP 6**

**Integrated Projects**

**NoE**  
*Network of Excellence*

Medical, security  
Mobile communications  
Environmental, clean proc.  
Transport, Optical  
Product services  
Intelligent production  
Precision engineering

**From 2003 to 2010**

**NEXUS**  
*Thematic Network*

Roadmaps  
Market Ana.  
Strategic issues

**USCs**

**EURIMUS II**

- **Bottom-up,**
- **Industry-driven**
- **Large projects**
- **System projects**
- **Generic projects**



# 6th FWP: Positioning NEXUS with Integrated Projects & NoEs

**FP 6**

**Integrated Projects**

**NoE**  
*Network of Excellence*

Medical, security  
Mobile communications  
Environmental, clean proc.  
Transport, Optical  
Product services  
Intelligent production  
Precision engineering

**From 2003 to 2010**

**NEXUS**  
*Thematic Network*

Roadmaps  
Market Ana.  
Strategic issues

Benchmarking

**USCs**

NEXUS has the right platform USC's & tools for :

- improving Roadmaps
- making focus on key objectives of products
- having the support of the SAB
- **organizing dissemination through annual workshops 6<sup>th</sup> FWP & EURIMUS II**





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## Conclusions

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- NEXUS guides Europe towards achieving and maintaining a **world class lead** in the MST/MEMS & MNT
- NEXUS provides concise **strategic guidance** to EU, national authorities, and the MST/MEMS community by:
  - Its industrial USC activities
  - Strategic studies and long term view
  - Benchmarking missions
  - Market analyses & Roadmaps



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## Conclusions

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- NEXUS is the “**window-shop**” of European MEMS/MST – MNT industry & academia:
  - the basic platform for starting co-operation in Europe
  - now a good starting point for world-wide co-operation
- NEXUS is establishing the NEXUS Association as the Back-Bone for the European MNT Community:
  - as a thematic network within the 6th FWP for structuring the ERA
  - as the platform of building large projects between the 6th FWP and EURIMUS