



Roadmapping Methodologies

a. Traditional Technology Roadmapping:
ITRS roadmap – semiconductors, Moore’s law

b. Roadmaps (part of Strategic Research Agendas) of ETPs (European technology Platforms) and EC projects:
Simple, straight-forward roadmaps; they usually describe technology opportunities, technologies, challenges

c. Disruptive technology roadmaps:
NEXUS Microsystems Roadmap 2000 and 2003
Mancef Roadmaps, e.g MEMS for Pharmaceutical Roadmap
Others?

International Technology Roadmap for Semiconductors (ITRS), updated annually

Table 4: Packaging Challenges through 2007

Difficult Challenges (Through 2007)	Summary of Issues
Improved organic substrates	T _g (Glass Transition Temp.) compatible with lead-free solder processing Increased wireability at low cost, substrates are a barrier to flip chip adoption Improved impedance control and lower dielectric loss to support higher frequency applications Improved planarity and low warpage at higher process temperatures Low moisture absorption Low-cost embedded passives
Improved underfills for flip chip on organic substrates	Improve flow, fast dispense/cure, better interface adhesion Higher operating range for automotive and Pb free dispense underfills Improved adhesion, small filler size, and improved underfills
Coordinated design tools & simulators to address chip, package, and substrate co-design	Chip, package, and system level co-design tools Educational programs required to train engineers in faster analysis tools for integrated thermal/mechanical design Higher accuracy, faster electrical simulation capabilities
Impact of Cu/low κ (dielectric constant) on packaging	Direct wirebond and bump to Cu (Copper) Bump & underfill technology to assist low κ dielectrics Improved Mechanical strength of dielectrics Interfacial adhesion
Pb (lead), Sb (antimony), and Halogen free packaging material	Lower cost materials and processes to meet new req higher reflow temperatures.



Table 93a Single-chip Packaging Technology Requirements—Near-term

Chip Size (mm ²) [3]	100	100	100	100	100	100	100
Low-cost	140	140	140	140	140	140	140
Cost-performance	310	310	310	310	310	310	310
High-performance	100	100	100	100	100	100	100
Harsh							
Maximum Power (Watts/mm ²) [4]							
Low-cost (Watts) [1]	2.6	2.7	2.8	3	3	3	3
Cost-performance	0.67	0.6	0.65	0.7	0.74	0.78	0.83
High-performance	0.48	0.61	0.64	0.68	0.61	0.64	0.64
Harsh	0.14	0.18	0.18	0.18	0.18	0.2	0.2
Core Voltage (Volts)	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Low-cost							
Cost-performance							
High-performance							
Harsh							
Package Pinout							
Low-cost	112-408	122-600	134-650	144-800	160-880	180-720	180-800
Cost-performance	500-1462	600-1800	660-1780	660-1850	800-2140	800-2400	880-2800
High-performance	2400	3000	3400	3800	4000	4400	4800
Harsh	450	600	650	800	880	720	780

TECHNOLOGY DEVELOPMENTS NEEDED TO ADDRESS THESE CHALLENGES

HIGH-LEVEL CHALLENGES AND RELATED ISSUES

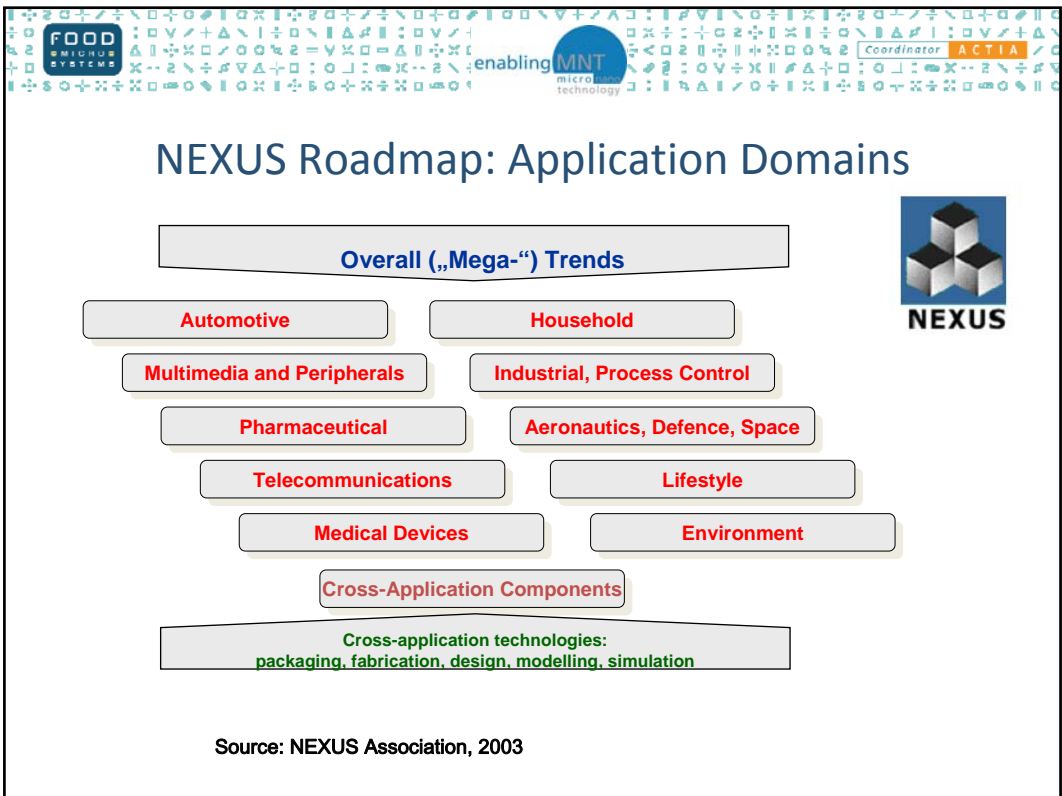
Small, high pad count	Array I/O pitches below 80 microns
High Frequency die	Substrate wiring density to support >20 lines/mm Lower loss dielectrics Skin effect above 10GHz

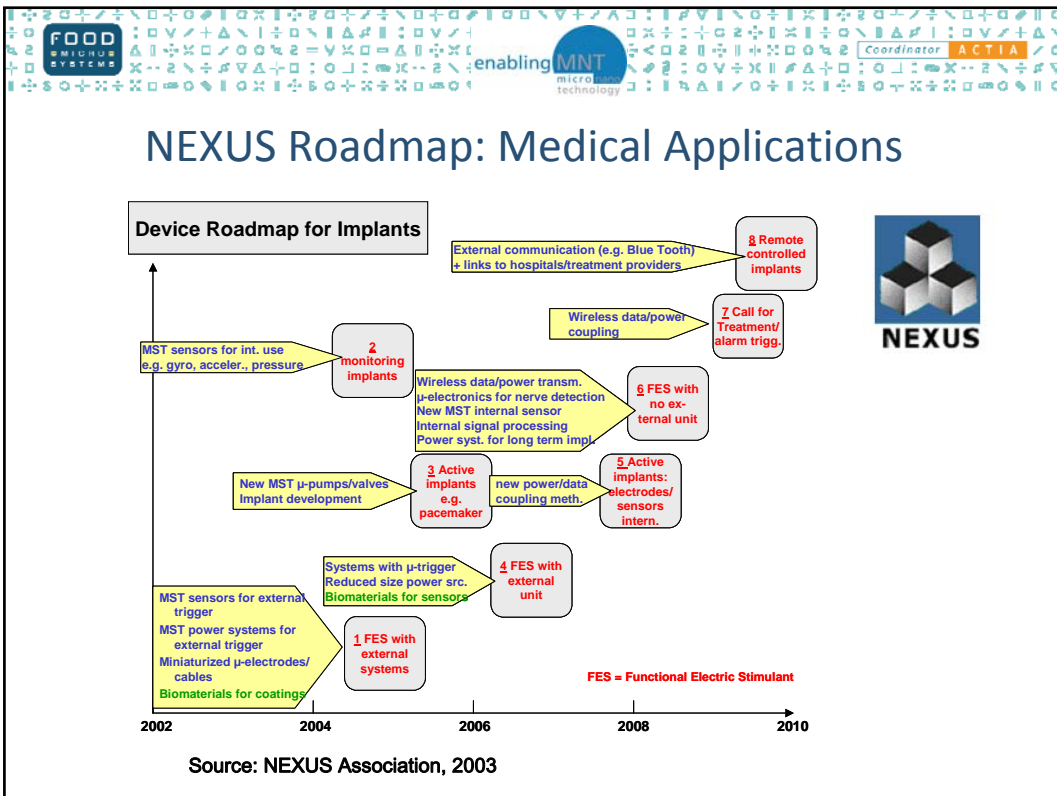
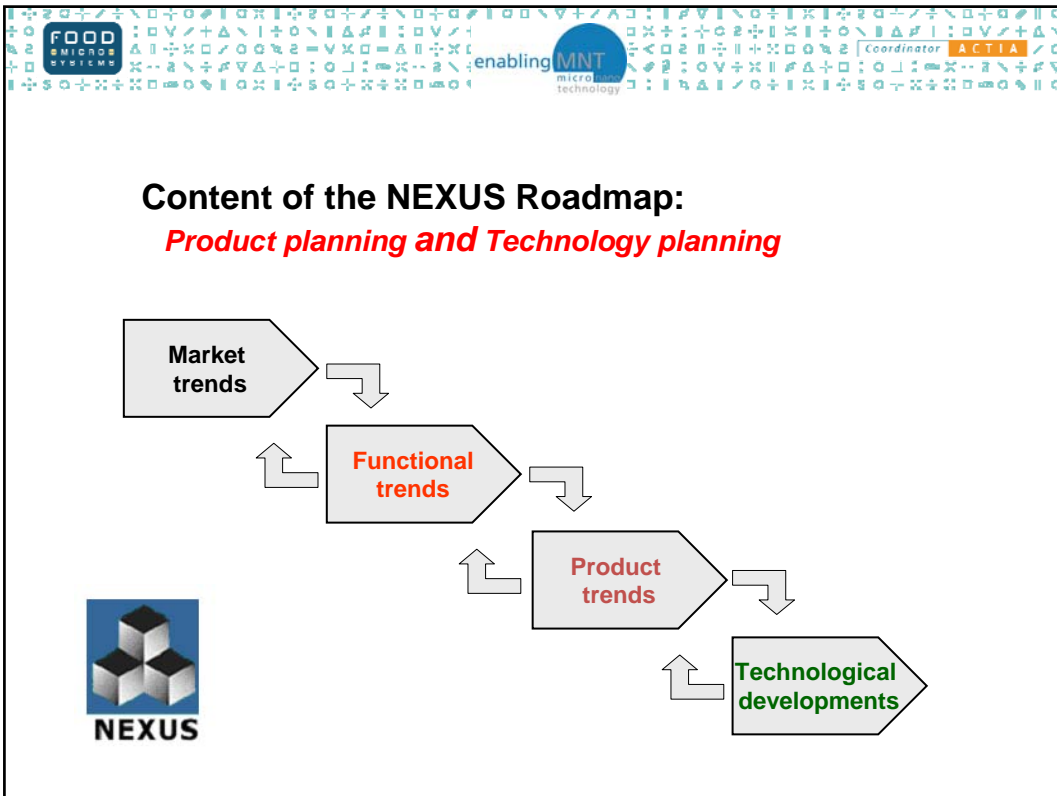
Source: www.itrs.net




The Minaced Food & Nutrition Roadmap

www.minaced.nl







Roadmapping Methodology

Analysis of the “Microsystems for Food” sector:

Existing (microsystems) products used in the food sector:
Areas where microsystem-based products (sensors, filters/membranes, etc) exist and are used already or could replace non-microsystems products that are used.

New (microsystems) products / processes for the food sector: Areas where no microsystem-based products or similar are used but could enhance a product or process once their technology is developed further.

New (microsystems) technologies for the food sector: Areas where no microsystem-based products or similar are used and and no technologies exist these days that could enhance a product or process. To include also **New Innovative Food Products** enabled my microsystems.


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How to get to a technology roadmap

- Define where we want to be
 - Define a list of key capabilities / functionalities: technical parameters relevant to assess the impact of the technology for each application
 - Define objectives in 3, 5 and 10 years with regard to key capabilities
- Define where we are today
 - Quantifying performance / key capabilities today of underlying technology as well as competing technologies
 - Identify limits of technologies, options for improvements
- Define how to get there
 - Define scenarios for evolution of the technology
 - Take (new) disruptive technologies into account
 - What are the barriers/constraints to get there?
 - How can we overcome these barriers?
 - Create single graphs roadmappings / key capability
 - Create scenarios for overall roadmap

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Roadmapping Workshops

2 workshops “Dairy”
2 workshops “Meat”
2 workshops “Beverages”

- Objective of first workshop in each area: discuss user needs and technology ideas
- Results of first workshop in each area will be captured into a report
- Report will be distributed to participants, with information from other work of the project added
- Second workshop will work further on developing a technology roadmap
- Final report to be submitted to the EC and published


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Workshop – „rules“

- We like YOU to discuss and get new ideas for R&D and collaborations
- We like to capture ideas for future research
- Our notes/reports will capture ideas, trends, etc but NOT identify the views of specific people or organisations!
- Do you agree if we distribute the presentations given today?
- Do you agree if we distribute the Participant list as signed today?


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The Dairy Supply Chain

raw milk
 processing
 dairy product
 packaging
 transport/tracking
 sale
 consumer


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Motivation for using new technologies

<i>Existing food product...</i>	<i>New food product...</i>
<p>Follow (new) regulations/laws</p> <p>Cost reduction in production, logistics, sales</p> <p>Improve food quality</p> <p>Strengthen consumer confidence</p> <p>Price increase of food product</p> <p>New food product enabled</p> <p>by new</p>	<p>technology</p>

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Break-out sessions

3 groups with different people along the supply chain (users, technology providers, research)

- 1 moderator each**
- 1 flipchart**
- 1 person to report**

Topics to be decided from areas presented

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Break-out sessions

Problems in the Dairy supply chain that might (possibly) be solved with new Micro technologies or Smart Systems

Problem to be solved or Parameter to be improved

Opportunities / benefits / drivers for user (food industry / consumer)

Challenges / problems / barriers in the realisation

- from user (dairy industry point of view):
- from Microsystems supplier / research point of view:

Urgency / expectations on availability (3,5,10 years)

Key parameters / specification range

Other issue / discussion items

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Break-out sessions

12:30 Lunch Break and Networking

13:30 Break-out session 1: to be defined during discussion

14:10 Break-out session 2: to be defined during discussion

14:50 Coffee Break and Networking

15:10 Summary from Break-out sessions;

discussion and questions;

what are the major opportunities and related challenges?

16:00 Summary and Conclusions: “R&D Project Needs”,

“Recommendations to the EU”,

“Challenging topics to be discussed further”.

16:30 End of Workshop

Thank you
for your attention!