Micro-Nanoelectronics Goals and Challenges

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Presentation Outline

- Micro-Nanoelectronics Technologies (MNT) drive the application-services industry,
- Addressing the future grand societal & technical challenges,
- European Commission initiatives
- Conclusions

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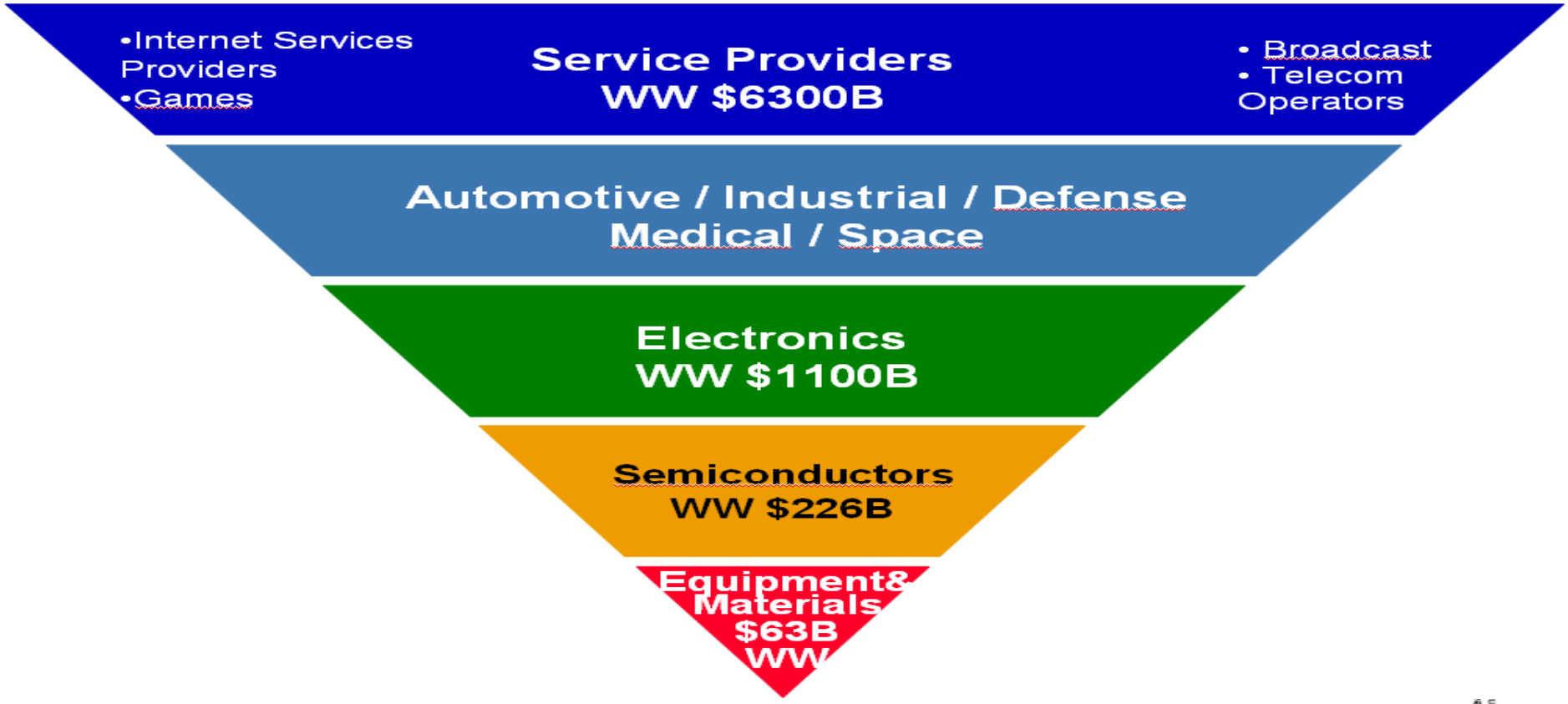
Micro-Nanoelectronics Technologies (MNT) drive the application-services industries



Source: ESIA & WSTS European Chapter - June 8th, 2010

Micro-Nanoelectronics Technologies vs grant societal challenges

MNT is addressing grand societal challenges, such as

- Globalisation,
- Climate and resource challenges,
- Health and ageing,
- Safety and security

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Micro-Nanoelectronics Technologies vs grant societal challenges

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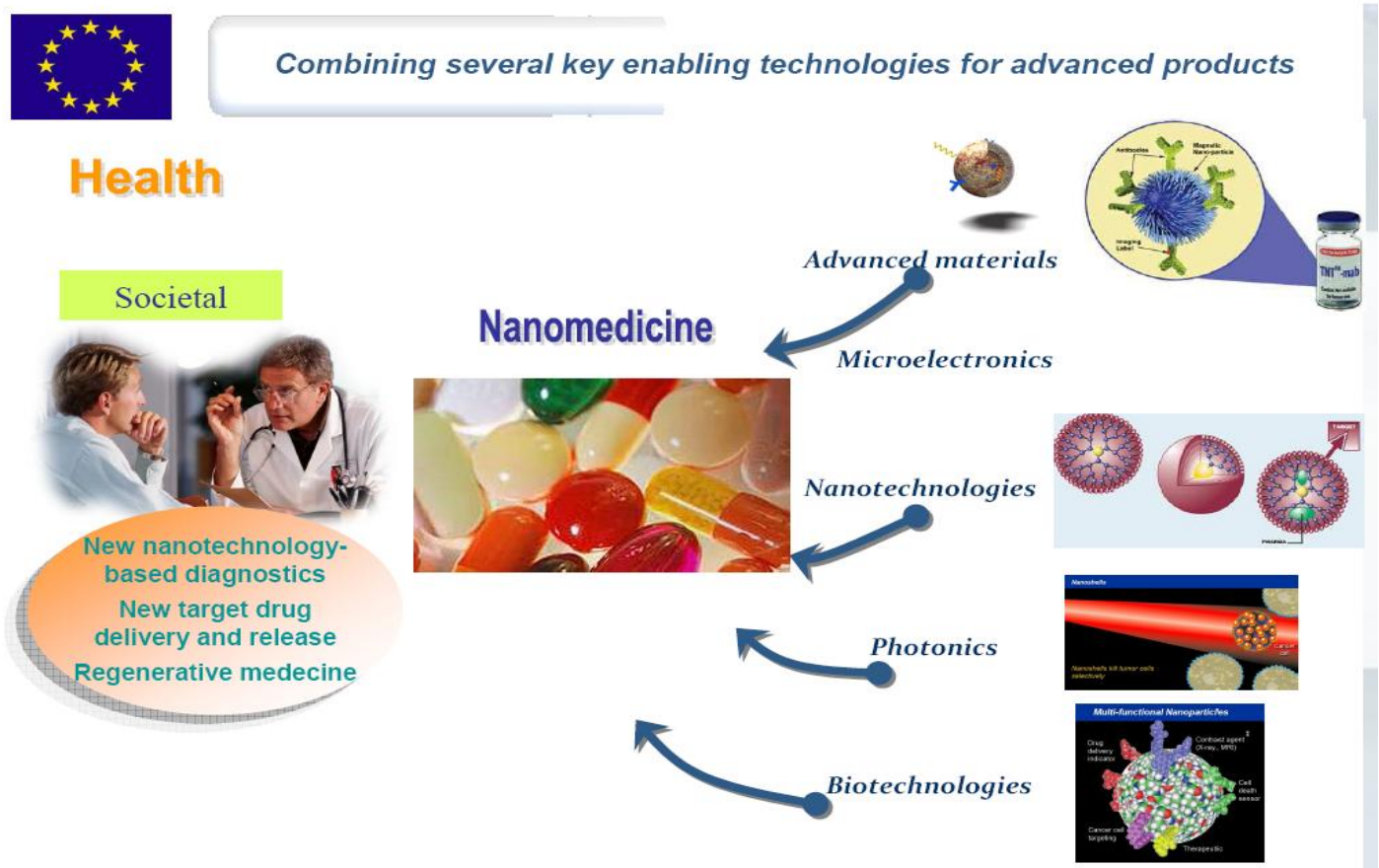
Micro-Nanoelectronics Technologies vs grant societal challenges



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MNT- Automotive & Transport

- Intelligent Electric Vehicle (*massive cost reductions, component standards, smart- grid*)
- Traffic Management & Safety (*moving from individual car safety to sustainable traffic solutions*)

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MNT- Communications & Digital Lifestyles

- Internet Multimedia Services, (*convergence of consumer, computer and communications needs advance electronic systems, i.e. memories, computers, photonics, etc)*
- Self Organising Network & Wireless networks, (*new communications chips up to 2GHz bandwidth, single chip systems to sense, communicate, reason & actuate)*

MNT- Energy Efficiency

- Sustainable & Efficient Energy Generation (*increased energy conversion efficiency and reliability from alternatives*)
- Energy Distribution-Smart Grid (*prerequisite for the mass deployment of Electric Vehicles*)
- Reduction of Energy Consumption (*Lighting, Industrial controls, long lifetime medical devices*)

MNT- Health & Aging Society

- Home Healthcare (*remote health monitoring, ICT-based therapies*)
- Hospital Healthcare (*medical imaging, robotics, bio-sensors*)

MNT- Safety & Security

- Consumer & Citizens Security
- Securing the European infrastructure and Applications

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MNT-Technical Challenges

Design Technologies *(from technologies to applications)*

Managing Complexity (miniaturization)

Managing Diversity (Diversification)

- *Address the whole design process in an integrated way, from system architecture to component/system manufacturing and testing,*
- *Design reliable complex systems / chips containing 100 Billions of unreliable and variable devices. Improve modelling and verifications*
- *Integrate in the design process, H/W & S/W, reliability, EMC, thermal effects, heterogeneous components,*
- *Handle packaging requirements and innovative architectures,*

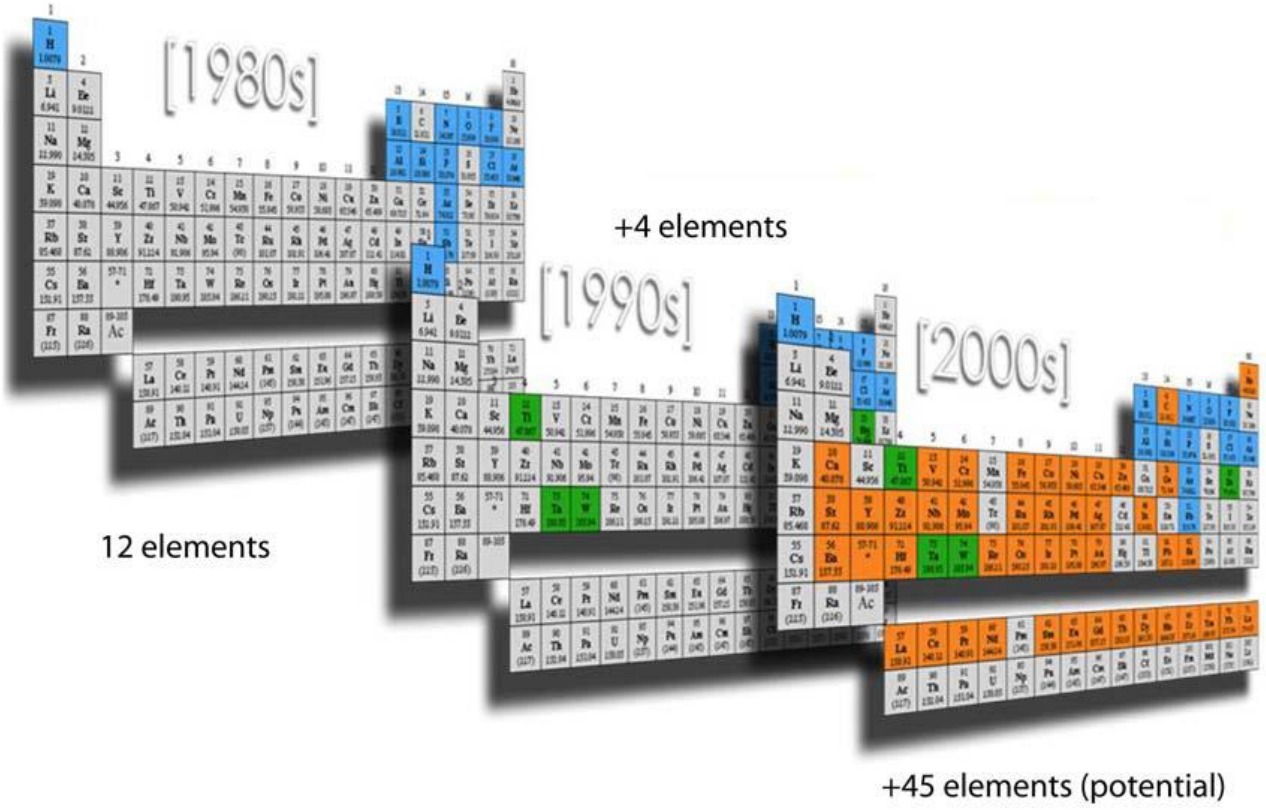
MNT- Technical Challenges

Semiconductor Process & Integration

- Emerging Semiconductor Processes, (*advanced & beyond CMOS*)
- Semiconductor Process Differentiation, (*actuators, sensors, analogue/mixed signal, power/RF devices*),
- Semiconductor Packaging, (*SoC, SiP, 3D integration, thermal management*)

MNT- Technical Challenges

Materials, Equipment & Manufacturing



MNT- Technical Challenges

Materials, Equipment & Manufacturing

- Advanced CMOS (*new materials, nano-structuring & 450mm*)
- More than Moore (*3D heterogeneous integration*, *electronic/biological systems*)
- Manufacturing (*low cost/green manufacturing, high yield*)

EU Tools supporting MNT as part of the Europe 2020 Strategy

EU monitoring and guidance

- Macro, thematic & fiscal surveillance
- Annual Growth Survey
- Annual policy guidance

EU flagship initiatives

- Digital Agenda *(May 2010)*
- Youth on the Move *(Sept. 2010)*
- Innovation Union *(Sept. 2010)*
- New Industrial Policy *(Oct. 2010)*
- New Skills and Jobs *(Nov. 2010)*
- Platform against Poverty *(Nov. 2010)*
- Resource Efficiency *(early 2011)*

EU levers for growth and jobs

- Single market relaunch
- Trade and external policies
- EU financial support

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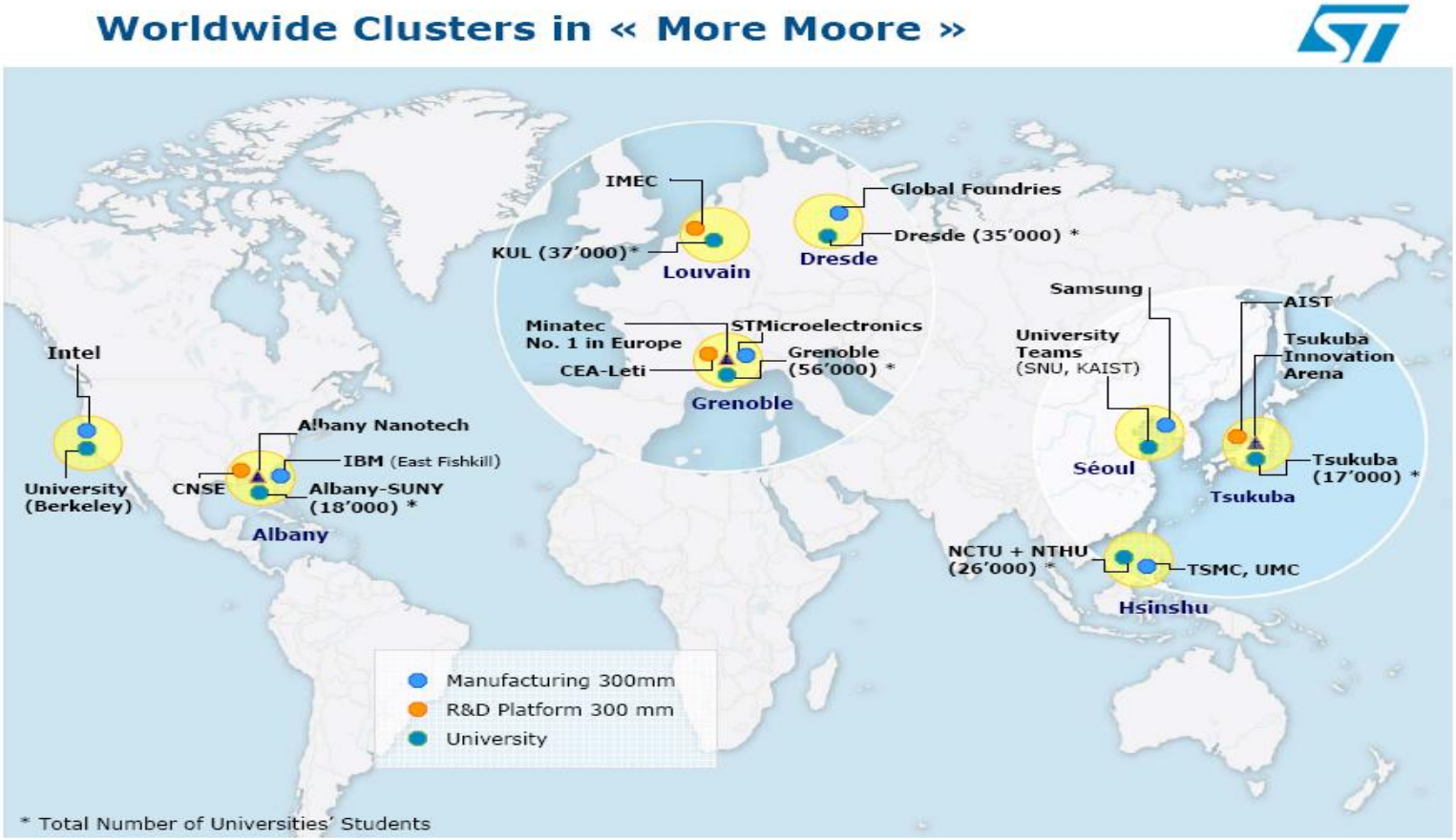
MNT- Is a Globalized Industry



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Nanoelectronic Challenges

Small-smaller-smarter

- **Miniaturisation :** *Progress is complex, expensive and global* ***(More Moore)***
- **Moore's law will come to an end:** ***(Beyond Moore)***
- **System Integration & adding Functionality:** *energy efficiency, system-technology interactions, design, 3D, novel architectures* ***(More than Moore)***
- **Globalisation of RTD and Manufacturing, changing business & research models, consolidation.**
- **Keep research, manufacturing, integration & system competence in Europe?** *IPR, lead markets, user-supplier relationships, regional innovation clusters.*
- **Our part of global value chain:** equipment, manufacturing (450mm), SMEs
- **R&D&I part of a holistic view to increase global competitiveness and address "Grand Challenges":** *European R&D infrastructure, equal global level playing, education, lead markets, VC*

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Nanoelectronics Dialogue Reaches Consensus

(Industry, Member States and Commission thanks to ESIA, SEMI, AENEAS, CATRENE)

- **No Knowledge Society or Digital Agenda without R&D&I in Nanoelectronics**
- **Semiconductor devices are driving innovation and modernisation in Europe's key industries, develop new goods, have systemic relevance**
- **SC technology addresses societal issues as climate change, renewable energy, security or health care.**
- **Nanoelectronics creates innovation ecosystems**

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Nanoelectronics Dialogue Reaches Consensus

(Industry, Member States and Commission thanks to ESIA, SEMI, AENEAS, CATRENE)

Actions at European level:

- **2008: Strategic Initiatives Eniac and Artemis launched**
- **2009: Communication on Key Enabling Technologies**
- **2009: 450 mm Initiative of E&M suppliers started**
- **2010: EU2020 - including Digital Agenda of Europe**
- **2010: Flagships & HLG on KET**

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Conclusions

- *Nanoelectronics research is the main enabler & driver of all current & future applications with demanding requirements (low cost/power, high frequencies etc).*
- *The European Commission has responded by initiating a number of policy and research initiatives and identifying nanoelectronics as a Key Enabling Technology.*
- *The goal is to support the existing clusters of excellence and maintain the advanced know-how in Europe.*

Thank you

European research on the web:

http://cordis.europa.eu

http://www.eniac.eu

Information Society and Media:

http://ec.europa.eu/information_society/

http://cordis.europa.eu/ist/

http://cordis.europa.eu/fp7/ict/programme/challenge3_en.html

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