
Common Development Topics for Semiconductor Manufacturers and their Suppliers in Germany

SEMICON Europa 2013 – TechARENA 1: Secondary Equipment Session

Contact:

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Agenda

- Motivation, Chosen Approach and Work Performed
- Results: Main Topics and Agreed Activities
- Starting Points towards “Industry 4.0”
- Complementary Aspect for Equipment Makers: “450 mm“
- Summary and Outlook

Motivation

- European semiconductor industry is quite heterogeneous:
 - Products: MM, MtM, automotive, power, sensors, ...
 - Production environment: 300 mm fabs, grown 150/200 mm fabs
- Challenge for all:
How to increase productivity to keep manufacturing in Europe?
- But given the different states, backgrounds and strategies: what are shared aims and common needs, what are potential paths that can be taken together?
- Step taken here:
 - Clarify needs and cross-cut activities at national level (Germany) by a study, carried out by Fraunhofer IISB
 - Focus on 200 mm MtM fabs

Chosen Approach

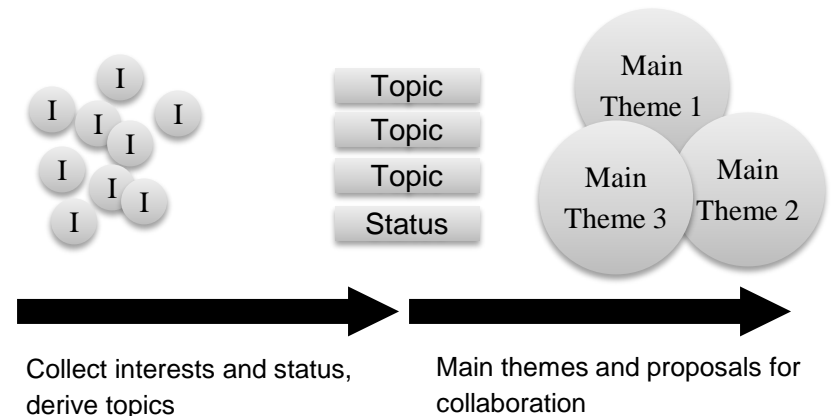
Objective:

Actively support **networking** between **business** and **science** on **3 levels**

- **IC makers and their suppliers:** Foster discussion and collaboration by identified cross-cut topics and concrete, agreed activities.
- **Fraunhofer IISB:** Update with regard to latest needs of IC-makers, equipment suppliers and software suppliers to align own R&D activities accordingly. Dissemination of results.
- German **BMBF** (funder of the study): Consolidated status of the German IC makers and their suppliers with focus on “More-than-Moore”.

Chosen Approach

- Start with topics and participants from a dedicated interest group
 - Semiconductor equipment and materials, production
 - Automation
 - Yield enhancement
 - Test equipment and methods
- 1st: Needs of the IC manufacturers
 - Workshops with experts at the manufacturers' sites
 - Collect interests and status
- 2nd: Discussion with suppliers
 - Joint workshops on selected main themes
 - Matching needs and competencies
- Screen outcome for commonalities and **concrete joint actions**



Work Performed

IC-Makers

Bosch	ELMOS
GlobalFoundries	Infineon
Siltronic	Texas Instruments
X-FAB	

Overview about the workshops carried out during the study

Topic

Participating Users & Suppliers

Equipment Forum	Applied Materials, CEA-Leti, FRT, HQD, IMEC, Jenoptik, Metryx, PVA TePla, ST Microelectronics, Süss Microtec, University at Albany
Automation (first meeting)	ACI ecoTec, AIS Automation, ASM, Bosch, ELMOS, HAP, Infineon, Peter Wolters, Roth & Rau, Siltronic, SÜSS MicroTec, VDI/VDE-IT, X-FAB
Automation (second meeting)	ASM, Bosch, ELMOS, HAP, Infineon, Roth & Rau, Schiller Automatisierungstechnik, Siltronic, X-FAB
Equipment	AIS Automation, ASM, Centrotherm, ELMOS, HAP, Infineon, Bosch, Roth & Rau, Siltronic, Solutions on Silicon, Texas Instruments, Vistec, X-FAB
Test	austriamicrosystems, Bosch, Elmos, Freescale, GlobalFoundries, Infineon, Micronas, NXP, Rood MicroTec, Texas Instruments

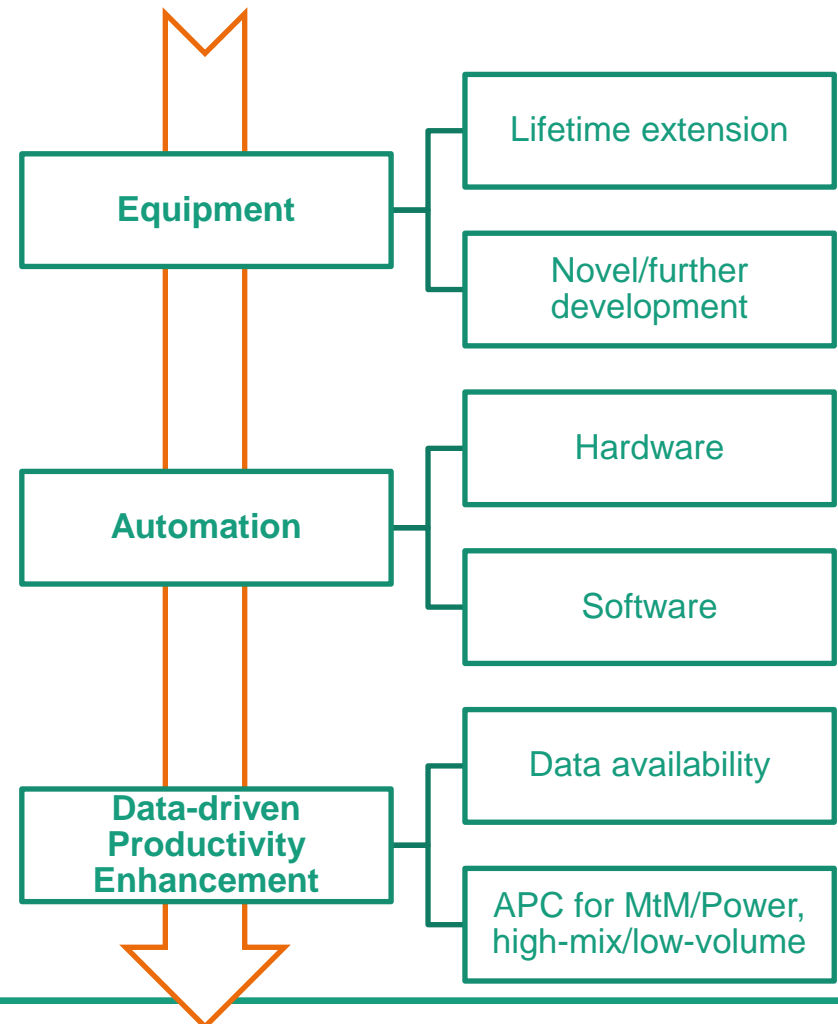
Results: Main Topics

Main Challenge

- How to enhance productivity in a MtM production environment!

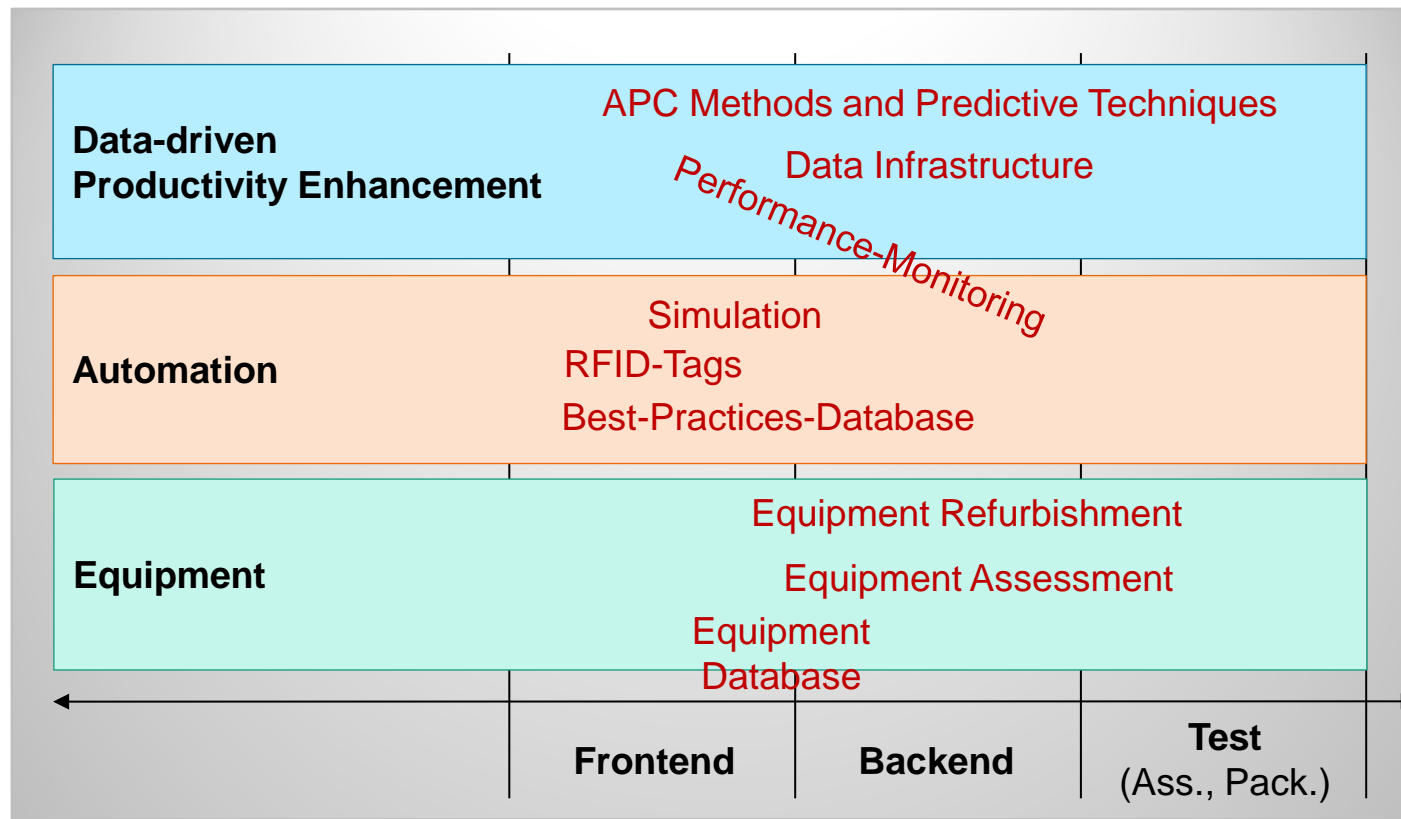
Results

- 3 main topics
- Collected themes summarized in 6 categories
- Important aspect:
Especially in the MtM area, “classical” front-end and backend processes merge increasingly



Results: Main Topics and Agreed Activities

Distribution of the three main topics across the entire production process

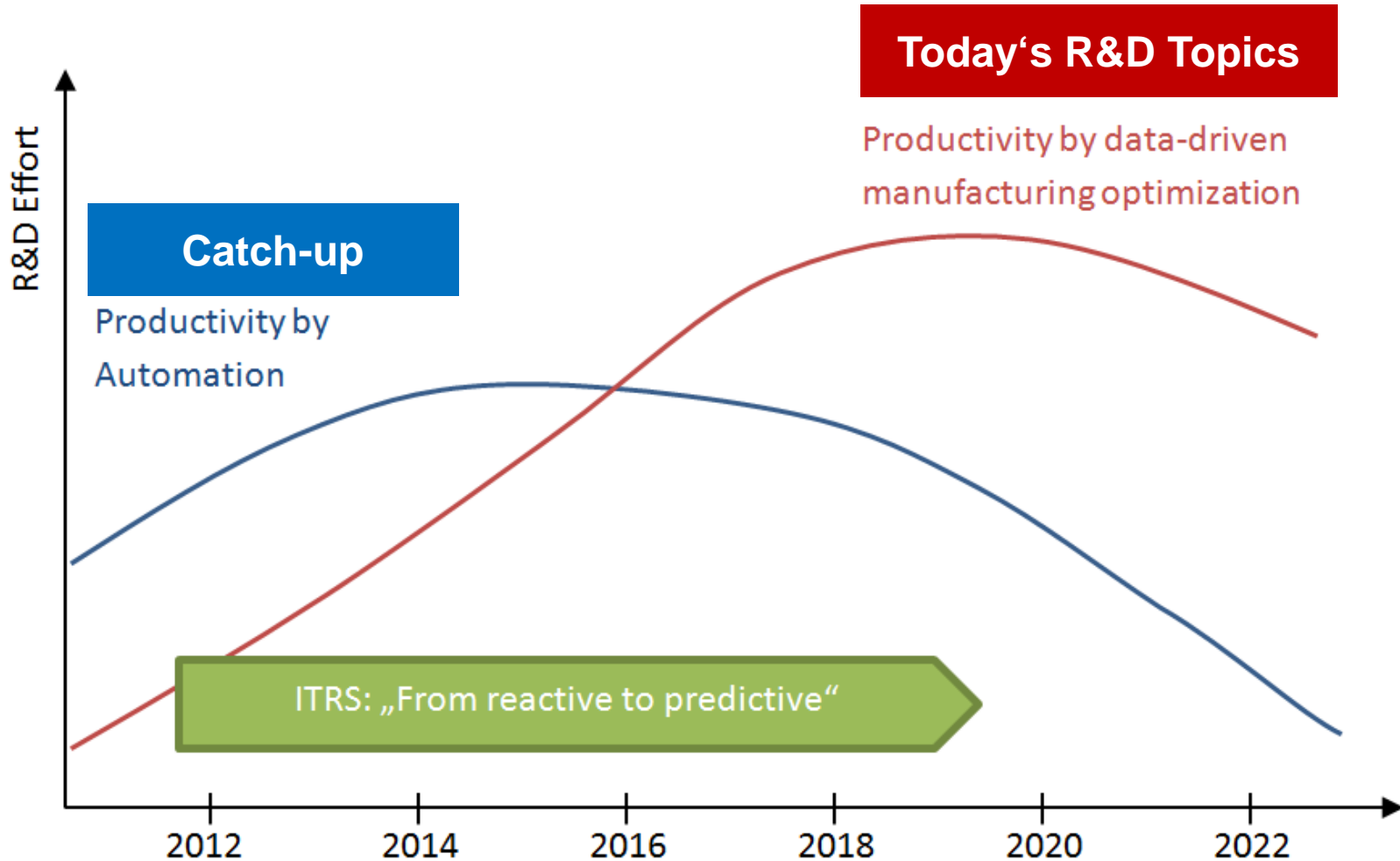


Results: Main Topics and Agreed Activities

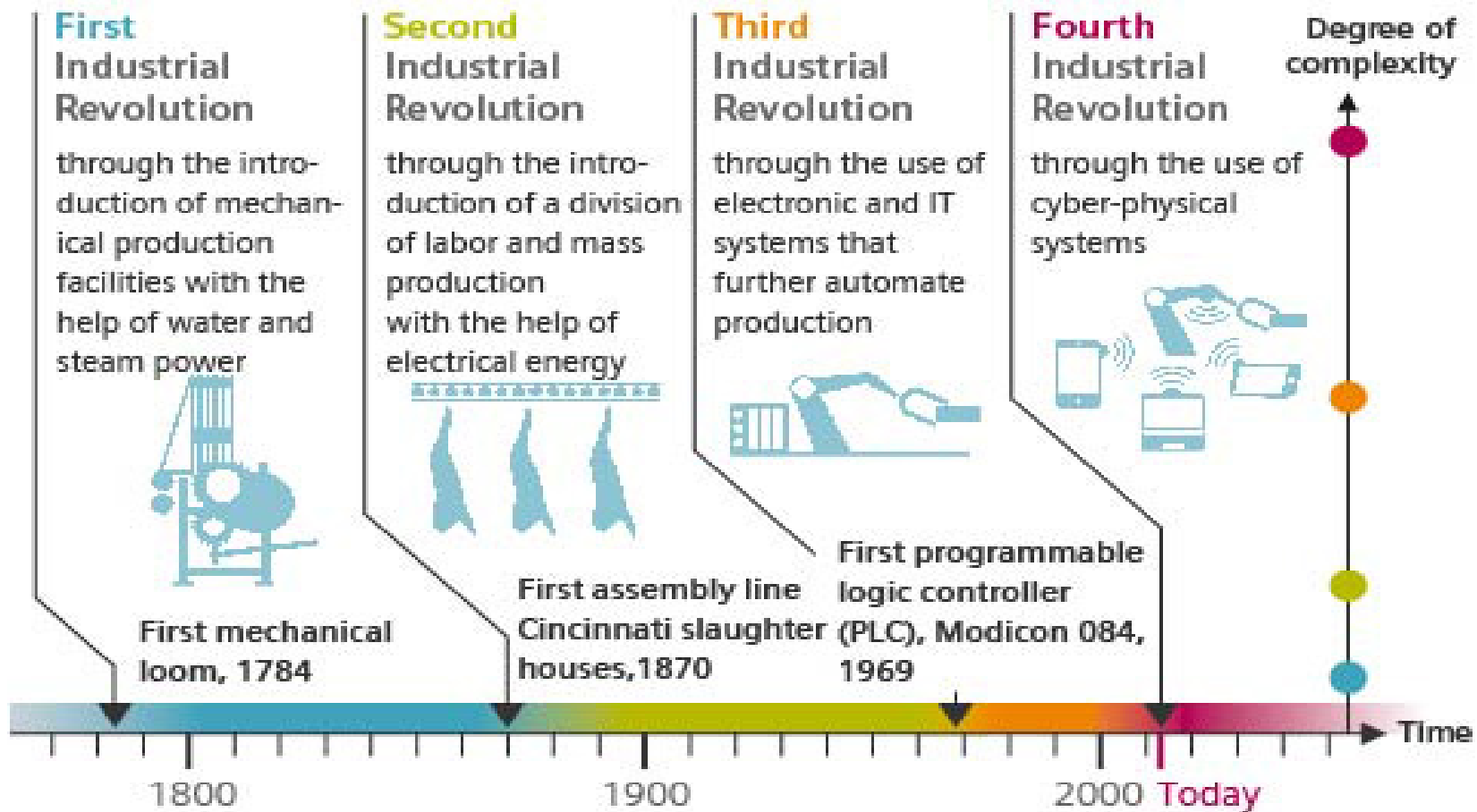
Main Topic	Agreed Activities
Equipment	<ul style="list-style-type: none">▪ Build a database for important equipment in terms of maintenance, spare parts and refurbishment.▪ Clarify requirements for a possible R & D project as cross-cut activity for equipment modernization (based on the above-mentioned database) with the involvement of resource and energy efficiency aspects.▪ Further networking of equipment users and suppliers, also at international levels, joint seminars and training, improve the support of "older" equipment by the manufacturer.▪ Establish a long-term funding framework for the ongoing evaluation of new equipment.
Automation	<ul style="list-style-type: none">▪ Conduct a workshop on "Simulation for automation."▪ Build a "best practices" database for equipment automation.▪ Implement automation solutions for thickness measurement and implantation.▪ Performance monitoring for automation systems, possibly as part of a joint research activity in the field of prediction and Equipment Health Factor (EHF).▪ Development of a "smart stocker".▪ Development of common approaches to RFID tags for 6"/ 8" cassettes.▪ Discussion on new solutions for transport systems for 150/200 mm cassettes.
Data-driven Productivity Enhancement	<ul style="list-style-type: none">▪ Develop common data formats and appropriate data converters for frontend and backend.▪ Concept study for a comprehensive data infrastructure (network) as the basis for gradual, specific and prioritized improvements to existing infrastructures.▪ Pre-competitive development of APC methods and predictive techniques across the overall production chain (frontend, backend, test).

Results

Two Trends

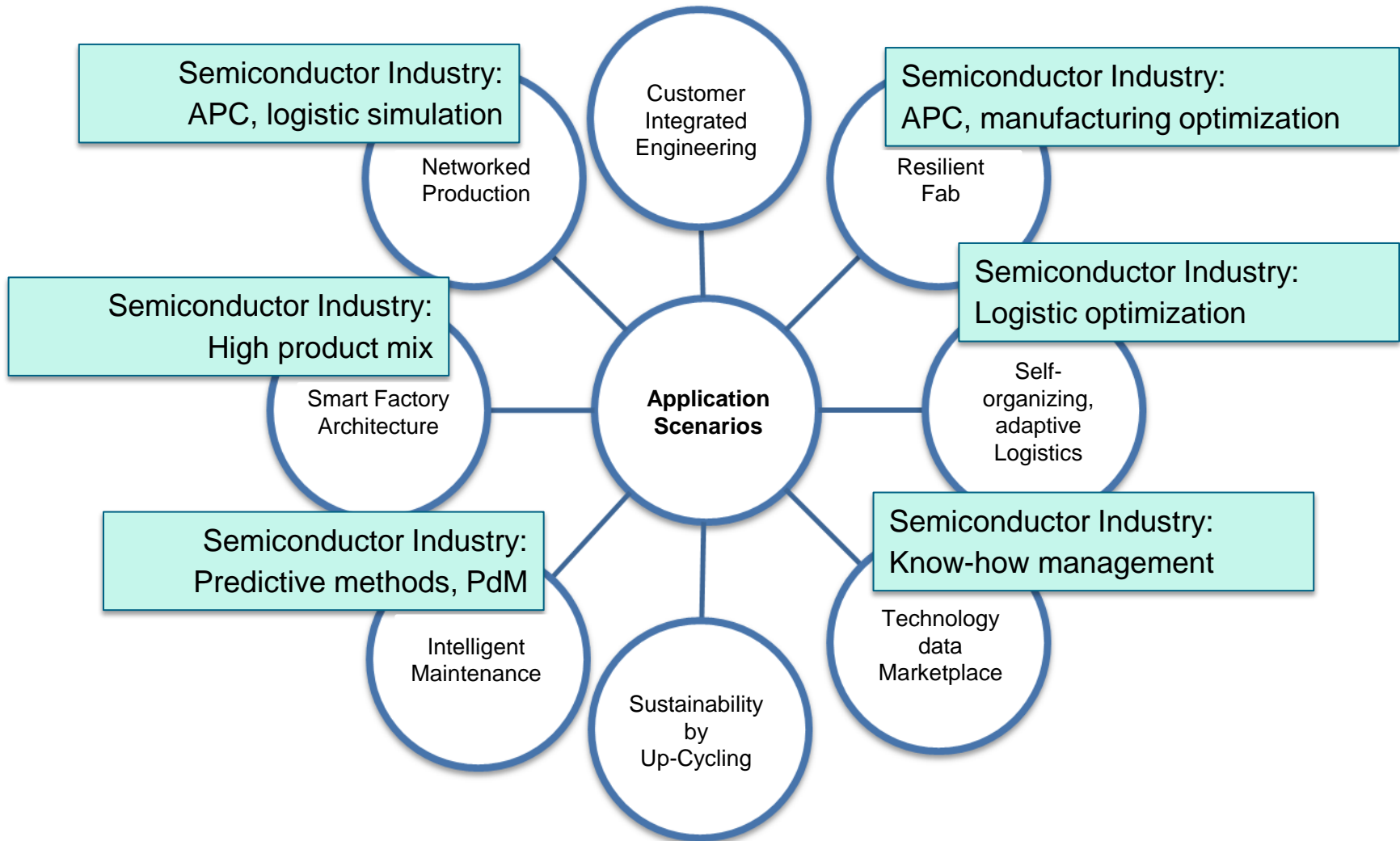


Starting Points towards “Industry 4.0”



Source: DFKI (2011), siemens.com

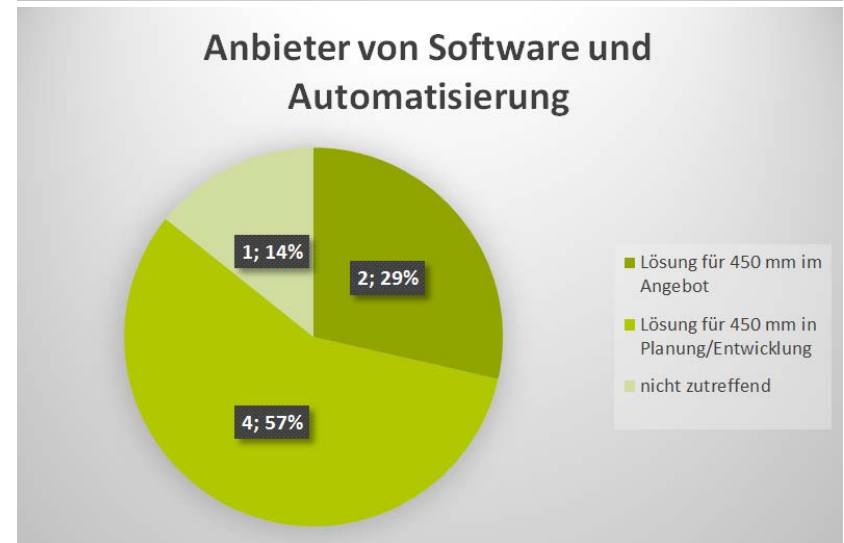
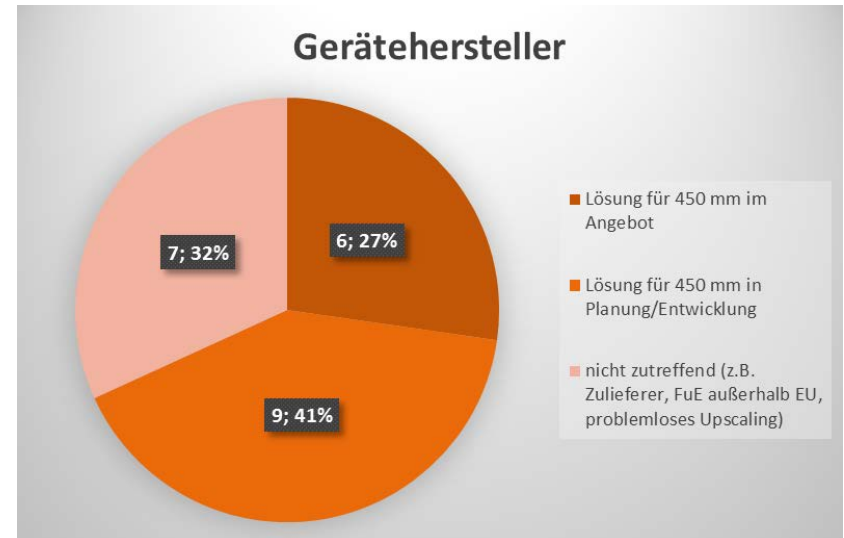
Starting Points towards “Industry 4.0”



Complementary Aspect for Equipment Makers: “450 mm“

mm“

- Feedback from 29 companies
 - 21 companies have solutions available for 450 mm, or in planning/development respectively
- Synergies with 200/300 mm-technology
 - Wafer handling
 - Interfaces for automation
 - Energy and media consumption
- Requests for funding support
 - Development, launch and marketing
 - on site at CNSE or imec
- Often, direct access to information and contacts in the area of 450 mm technology is missing (→ EEMI 450 initiative!)

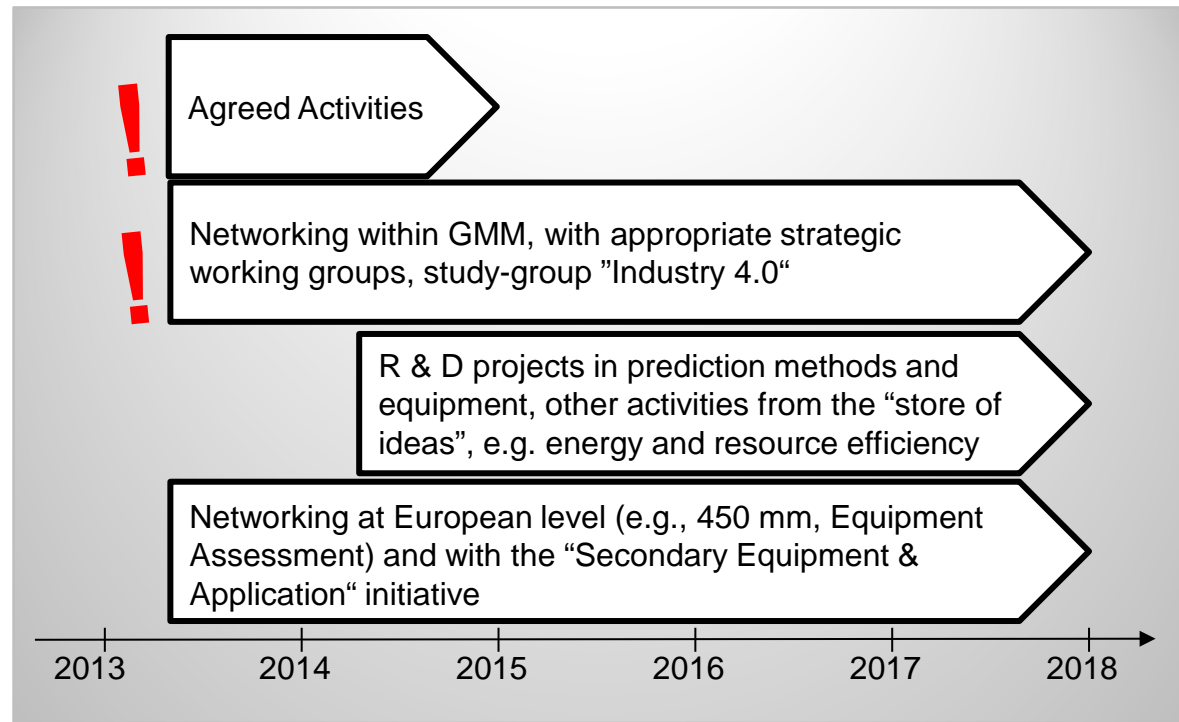


Summary

- 12 Workshops with **high level of openness**, and **willingness for cooperation** among each other and with other industries
- **3 main topics** identified:
Equipment, Automation, Data-driven Manufacturing Optimization
 - with more than 40 potential cross-cut topics
 - At least 3 agreed activities per main topic
 - **Backend/Test** as a (new?) core area: unique feature of EU? KET?
- Backlog in automation, but **chance in R&D for “data-driven productivity enhancement”**
- Starting points towards “**Industry 4.0**” identified
- Discussed “**450 mm**” as complementary aspect for equipment makers

Outlook

- Collaboration in the „agreed activities“
- Strategic Networking (GMM, strategic working groups, study-group “Industry 4.0“, ...)
- Clarify mid-term activities and R&D topics - and address them jointly:
 - Development of APC methods and predictive techniques across the overall production chain
 - Framework for equipment assessment at European level
 - Equipment refurbishment (“lift 200 mm equipment to the technical level of 300 mm tools”)
- Networking at EU/international level: 450 mm, SEA, ...
- How can the increasing importance of backend / test be met?



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GEFÖRDERT VOM



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■ Thanks for your attention!