

**FORSCHUNGSVEREINIGUNG
SMART ENGINEERING**



Smart solutions for digital product development and production processes

Dr. Marcus Krastel | :em AG

ProSTEP iViP Symposium 2017, 18th May 2017 | Essen

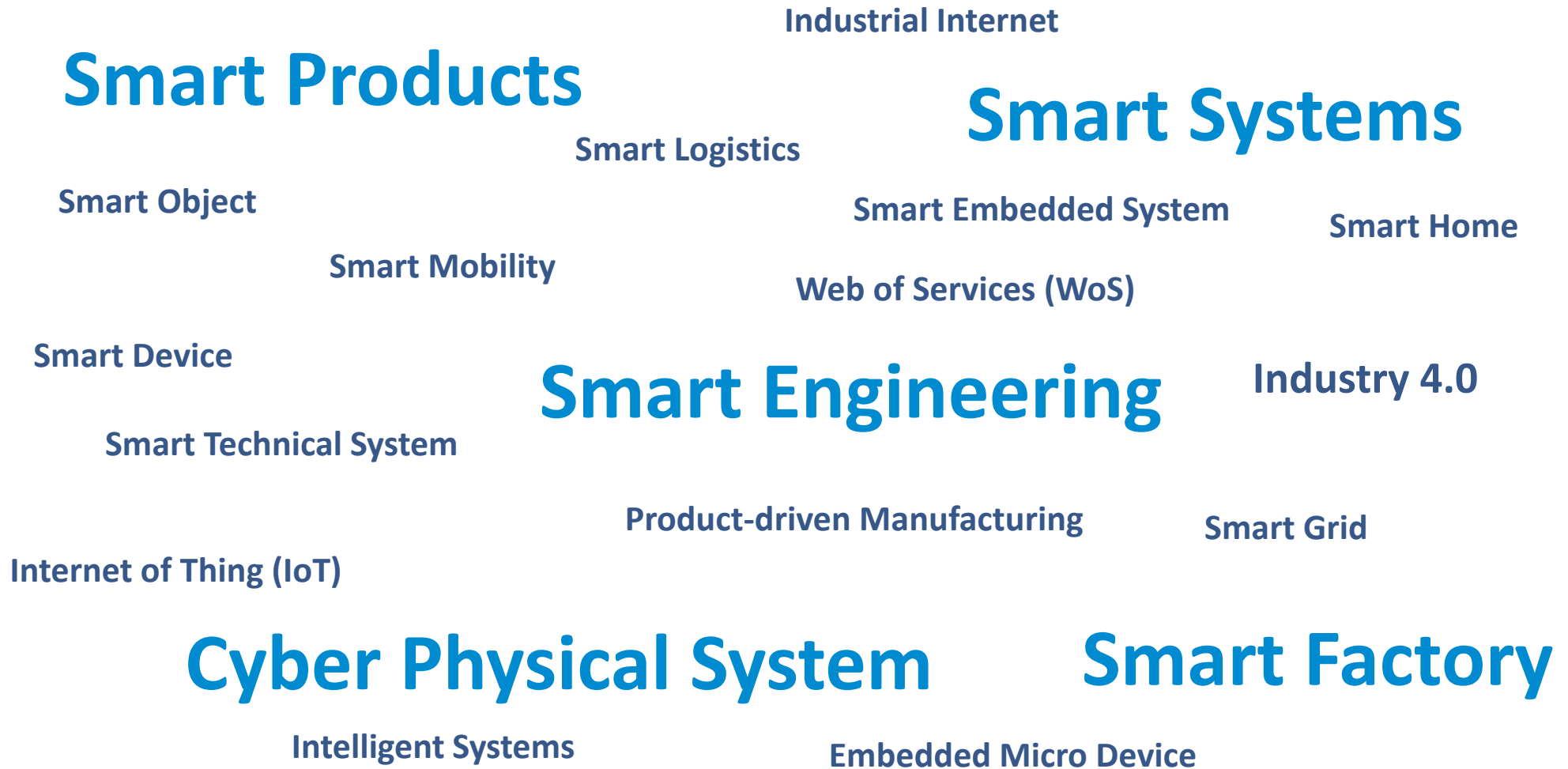




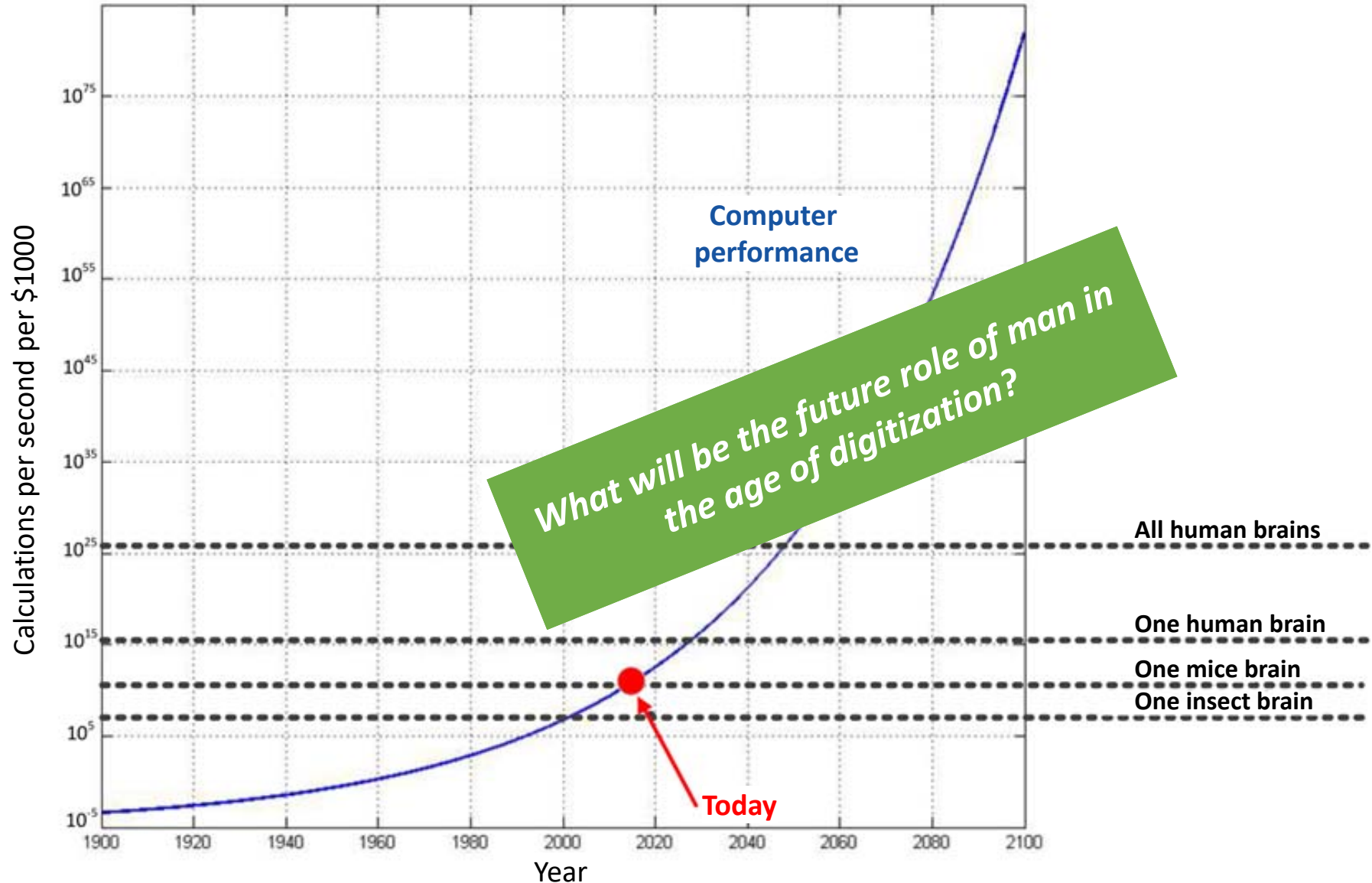
Agenda

- 1. Introduction and Research Needs**
- 2. Research Association Smart Engineering e.V.**
- 3. Organizational Structure and Procedures**
- 4. Membership**
- 5. Outlook**

Massive Change in Product Development

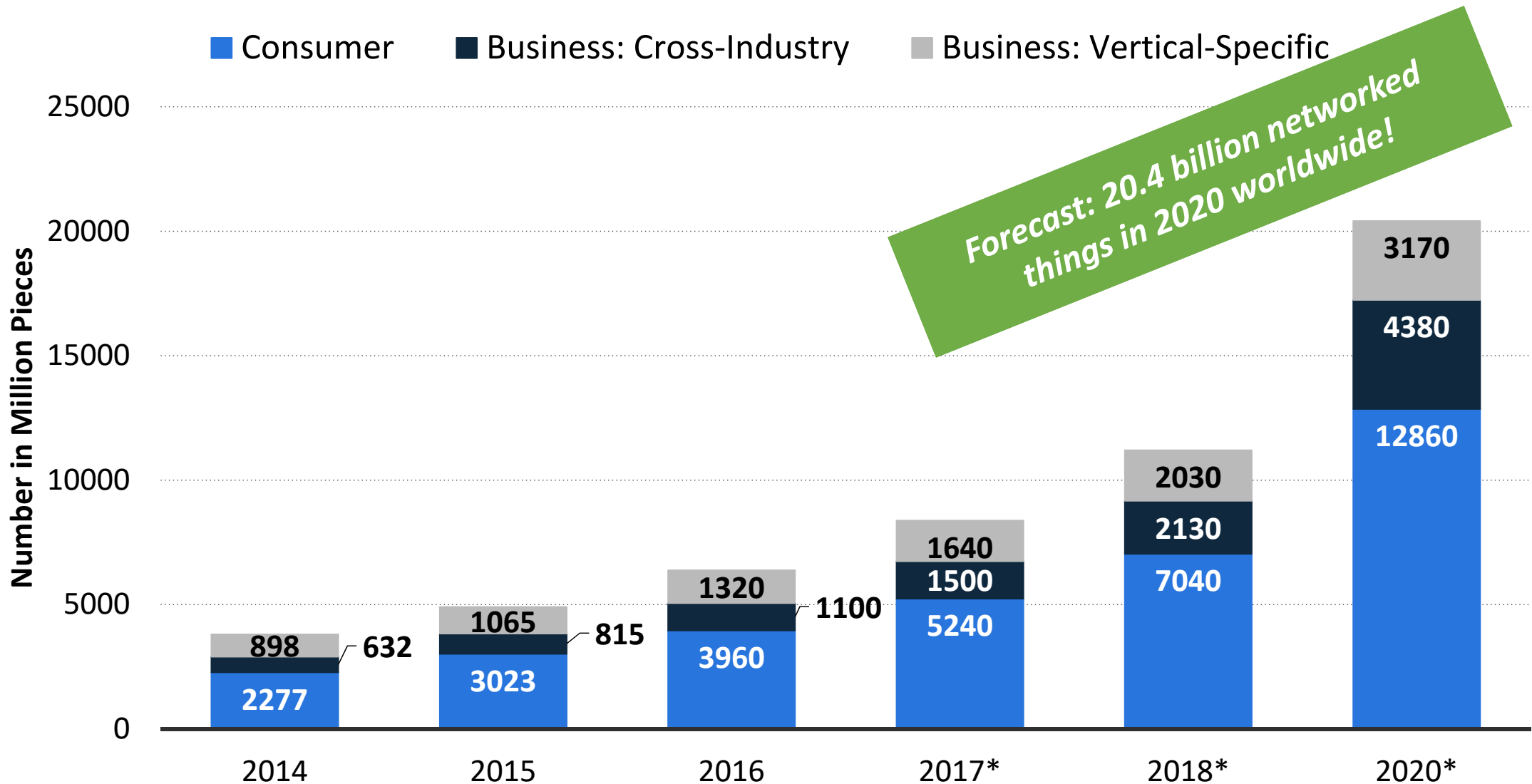


Computing Power vs. Human



See Daniel Batz: Entwicklung eines Statusmodells für das Model-Based Systems Engineering zur Unterstützung des Konfigurationsmanagements, Masterarbeit, betrieblich betreut durch Tim Schulte, 2015

Forecast of the Number of Networked Devices in the IoT

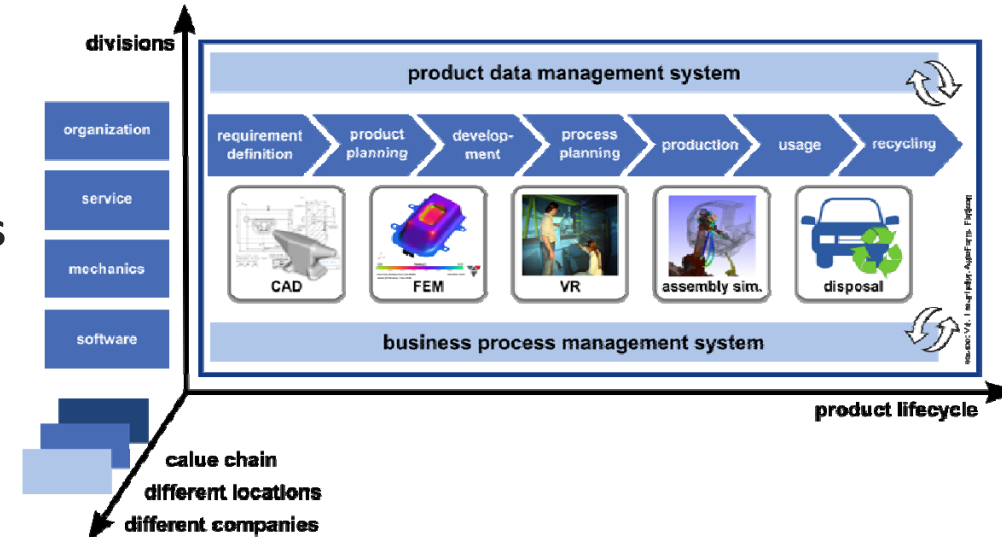


*Forecast

See Gartner. (n.d.). The Internet of Things (IoT)* units installed base by category from 2014 to 2020 (in billions) . In Statista - Das Statistik-Portal. Access at 9th May 2017, <https://www.statista.com/statistics/370350/internet-of-things-installed-base-by-category/>

Aims of Smart Engineering

- **“Smart engineering”** | **Interdisciplinary, networked, intelligent** approach in product development to enable **attractive innovations** to be successfully implemented in future intelligent, networked and smart products
- Smart engineering includes novel technologies, work methods, and human interactions for
 - A digitally integrated engineering
 - A collaborative and **model-based Systems Engineering**
 - New Industrial **Smart Product Service Systems**
 - An advanced **Smart Digital Factory**
- The **role of human** in the age of neuronal/hybrid AI-Networks “2030 Computing Power higher than Human Brain!”
- Support of a future **“Green Engineering”**



Problems in the Field of Smart Engineering

- **Lack of** innovative, intelligent and networked **methods/tools** throughout the entire lifecycle for the required redesign of products, production and production systems
 - Lack of holistic, efficient **data management**
 - Insufficient **network infrastructure**
 - Insufficient **security/safety concepts**
 - Lack of adaptation of the **work environment** to the new technologies
 - Lack of **interdisciplinary skilled** managers and specialists
- **High need for adjustment at the companies**
- **Major challenge especially for small and medium-sized enterprises (SME)**

Research Association Smart Engineering

Smart Engineering
Processes

Smart Engineering
Methods

Smart Engineering
Tools

Smart Engineering
Organization

Smart Engineering
Competences



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Aims of the Research Association Smart Engineering

To promote science and research in the field of smart engineering, with the aim of supporting the development of smart, networked products and services as well as the intelligent, networked production and its production systems over the entire product life cycle and to promote the continuous digital value creation.

Achieving these aims by:

- Supporting the application and implementation of research projects in the field of smart engineering
- Supporting the formation of project groups and establishing contacts
- Formation of interest groups and organization of workshops
- Providing current research results for the members
- Publication of contributions to current research projects at conferences, in journals etc.

Research Needs and Research Areas

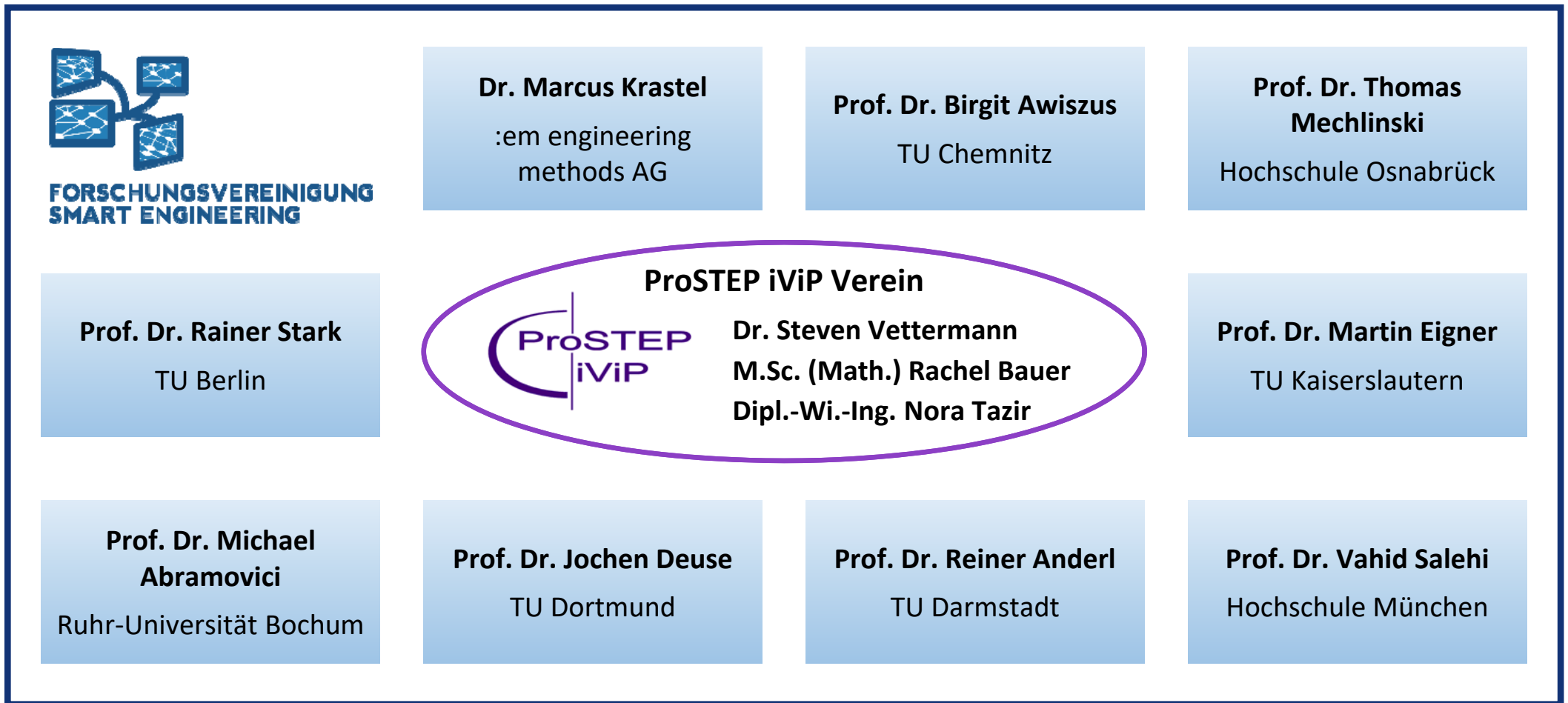
- **Designing the smart engineering business models of the future**
(Recommendation for SMEs to develop a Smart Enterprise, protection of personal data, legal framework and liability)
- **Application of new and smart methods in product development**
(Incubator Method, Constraint Method, Agile Methods, Design Thinking)
- **Prepare for "individualized" products**
(Digital Twin, Smart Modularization, Re-Configuration during use, use of data from customer use, Cloud, Integrated Data model (Digital Brain), interdisciplinary PLM-concept)
- **Establish a model-driven product development**
(Linking between models in the V-Model, automated processes for model transformation, new PLM-support, returning CAE-results into CAD, Smart Req. Management/Engineering)
- **People at the center of a workplace of the future**
(new foundation in education, new digital rooms, smart adaptive environment - Handicap)
- **Impact of smart engineering on process planning (production systems)**
(smart production & networking with smart engineering)



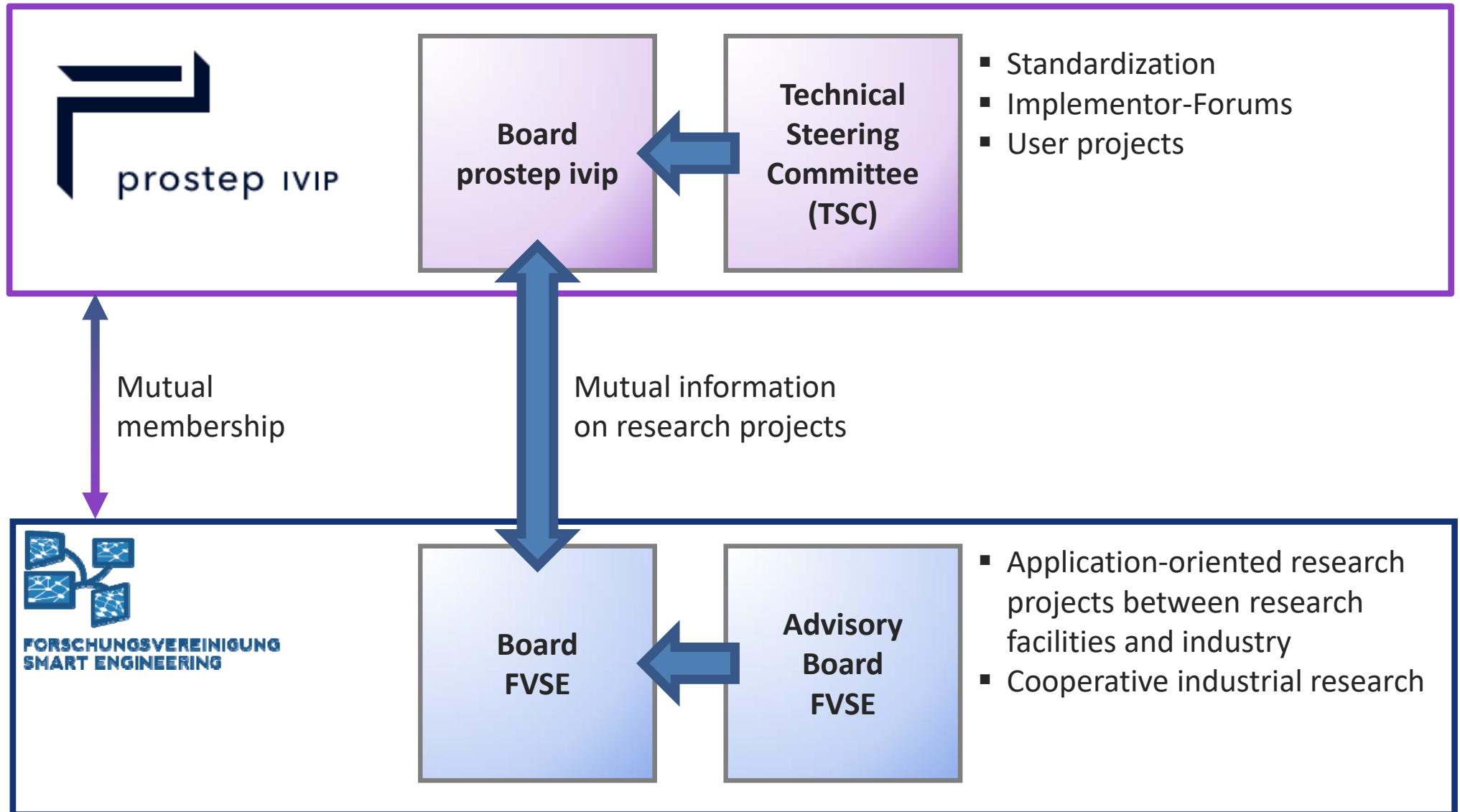
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Initiation Team of the Research Association



prostep ivip Cooperation



Structure of the Research association Smart Engineering

General Meeting

Board



Prof. Dr. Birgit Awiszus
Deputy
Technische Universität Chemnitz



Dr. Marcus Krastel
Presidency
sem engineering methods AG



Prof. Dr. Thomas Mechlinski
Hochschule Osnabrück

Management Office



Dr. Thoralf Gerstmann
TU Chemnitz



Jeannette Boll
TU Chemnitz

Advisory Board

(Candidates for election)



Dr. Roman Dumitrescu
it's OWL Clustermanagement GmbH



Prof. Alfred Katzenbach
Katzenbach Executive Consulting

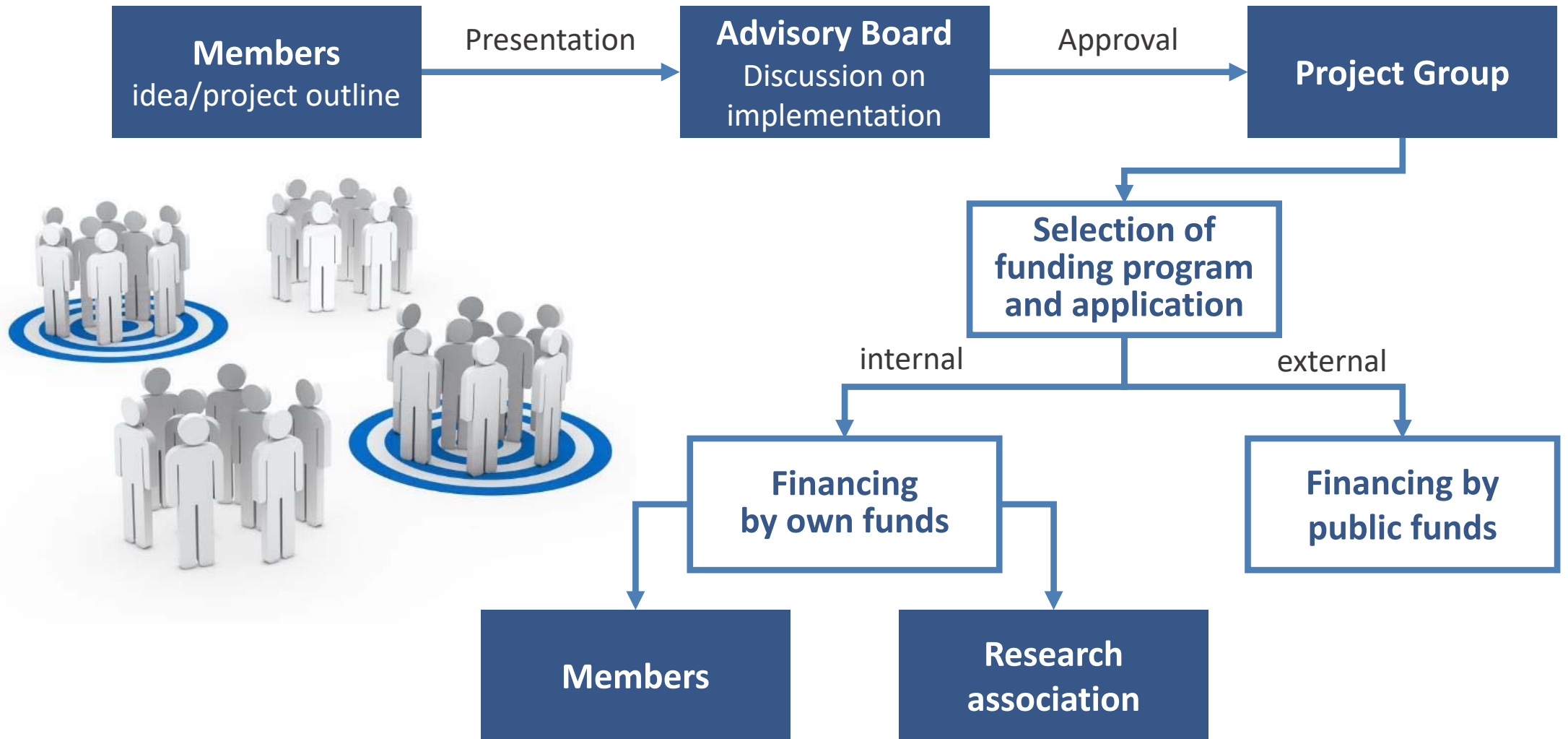


Dr.-Ing. Walter Koch
Leiter Advanced R&D Engineering



Dr. Steven Vettermann
ProSTEP iViP e.V.

Process for Initiation of Research Projects

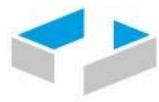




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Members (Status 08.05.2017)



Chemnitz University of Technology



Ruhr-Universität Bochum



CONWEAVER



Department of Mechanical Engineering and Energy Engineering



TU Dortmund University



Technische Universität Braunschweig



Benefits of a Membership

- Using the latest findings in the field of smart engineering for the further development of company-specific solutions
- Improving competitiveness
- Compensation for structural disadvantages in research and development
- Codetermination of research topics of the Research Association
- Initiation of own research projects
- Possibility of external (additional) funding (z. B. AiF*-IGF)
- Participation in project-accompanying committees and in the Advisory Board
- Regular exchange of experience in research groups and workshops
- Early knowledge transfer to the companies by access to the latest research results and publications

*AiF Arbeitsgemeinschaft industrieller Forschungsvereinigungen

Contact

Are you interested in learning more about the research foundation or do you have further questions? We are happy to help you!

Forschungsvereinigung Smart Engineering e.V.

c/o Technische Universität Chemnitz
Professur Virtuelle Fertigungstechnik
Reichenhainer Str. 70
09126 Chemnitz

Homepage

www.fv-smartengineering.org

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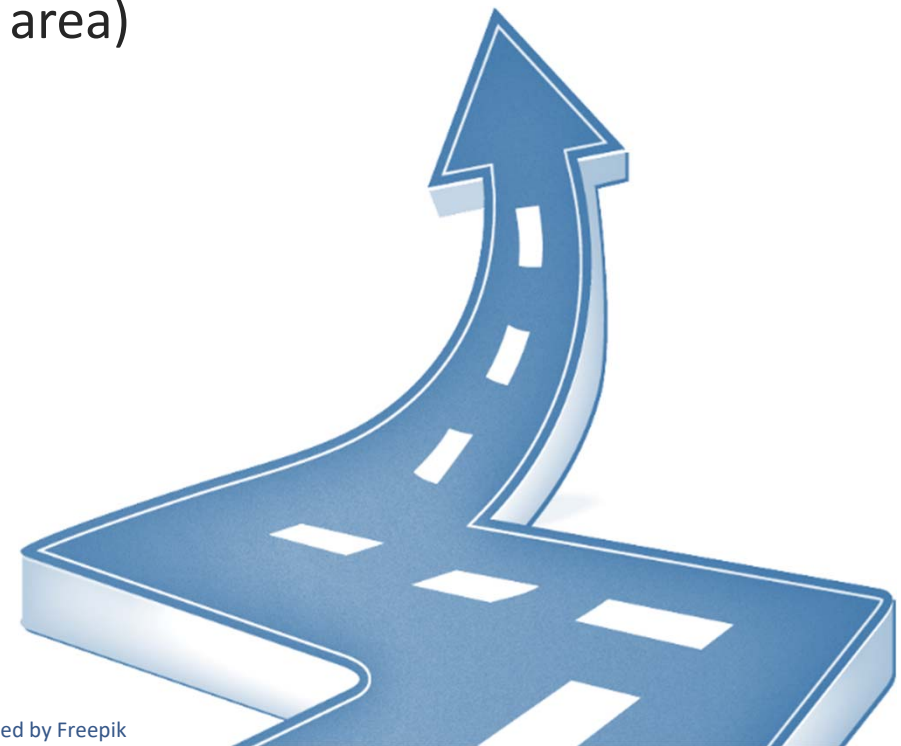
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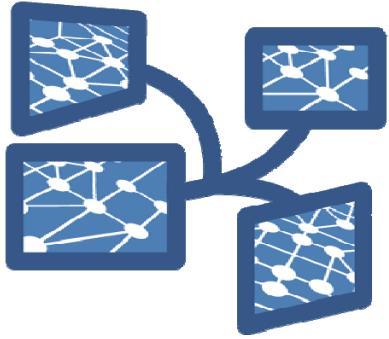
Outlook

- Orientation of the research association on the research interests of the members
 - Formation of research groups
 - Initiation of initial research projects
- Becoming a member of the AiF
- Launch new FVSE homepage (including members' area)
- Onboarding further members
- Next planned Workshop (Q4/2017):

**Agile Methods & Design Thinking
in Product Development**



Source: Designed by Freepik



**FORSCHUNGSVEREINIGUNG
SMART ENGINEERING**

**Questions
Wishes
Suggestions**

