

fimecc

— Finnish Metals and Engineering
Competence Cluster

Breakthrough Steels and Applications (FIMECC BSA)

Industry-driven public-private research programme
2014-2018

<http://www.fimecc.com/programs/bsa>

Executive summary

- ▶ FIMECC BSA aims at securing the leading position of the Finnish metals and engineering industry
 - The programme answers to major global challenges and end-user needs by taking metals research and design to a new level
- ▶ Essential elements:
 - FIMECC Breakthrough Materials Doctoral school
 - Extensive collaboration both nationally (joint knowledge platform with Hybrid Materials programme) and internationally
- ▶ **Impact:** Renewed and successful Finnish metals and engineering industry based on innovative and sustainable solutions
 - Applications of the programme results will benefit various fields of industry
 - New business opportunities will be opened in new areas
 - An extensive international steel competence network will be created
- ▶ **Vision:** Finnish metals and engineering companies are key players in global cleantech markets by 2030

FIMECC BSA builds on the existing strengths to secure the leading position of the Finnish metals and engineering industry

Finland has a unique cluster of world innovation leaders both in novel steel products and many fields of engineering

Previous technology programmes (Newpro, LIGHT, DEMAPP) have helped develop an exceptionally strong steel research infrastructure to Finnish Universities

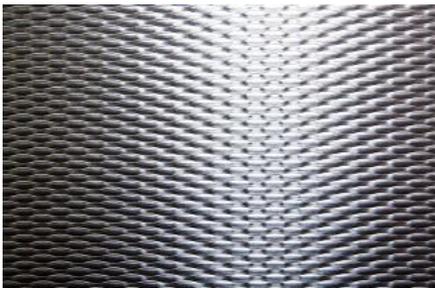
However, the rapidly changing global market and new megatrends call for renewal of the Finnish metals and engineering industry in order to remain competitive and in leading position

BSA programme takes full advantage of the existing networks and momentum created in previous R&D efforts to maintain and develop knowledge advantage in these key areas



The programme is driven by major global challenges and end-user needs

► Steels are the largest group of materials – their **superior qualities** should and can be further developed based on **end-user needs**



Reducing energy and material consumption

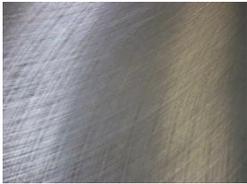
Solutions for new production processes and harsher application areas

More efficient use of latest high performance steel developments

Longer product lives, lighter-weight structures, increased life-cycle efficiency

The ambitious goals are tackled by modern materials science

Goals



Creating optimal material solutions for emerging processes and applications

Developing **specialised, life-cycle efficient breakthrough steels**

Promoting **efficient application of latest advanced (better performing) steel materials** by establishing new design rules and tools

Shortening the time to market by digitalization of the R&D process and material design

Methods



Simulation and analysis of production, fabrication and use of future advanced steel products and their applications to create optimized properties

Novel techniques, equipment and modeling tools for the development of advanced steels and for the evaluation of their performance

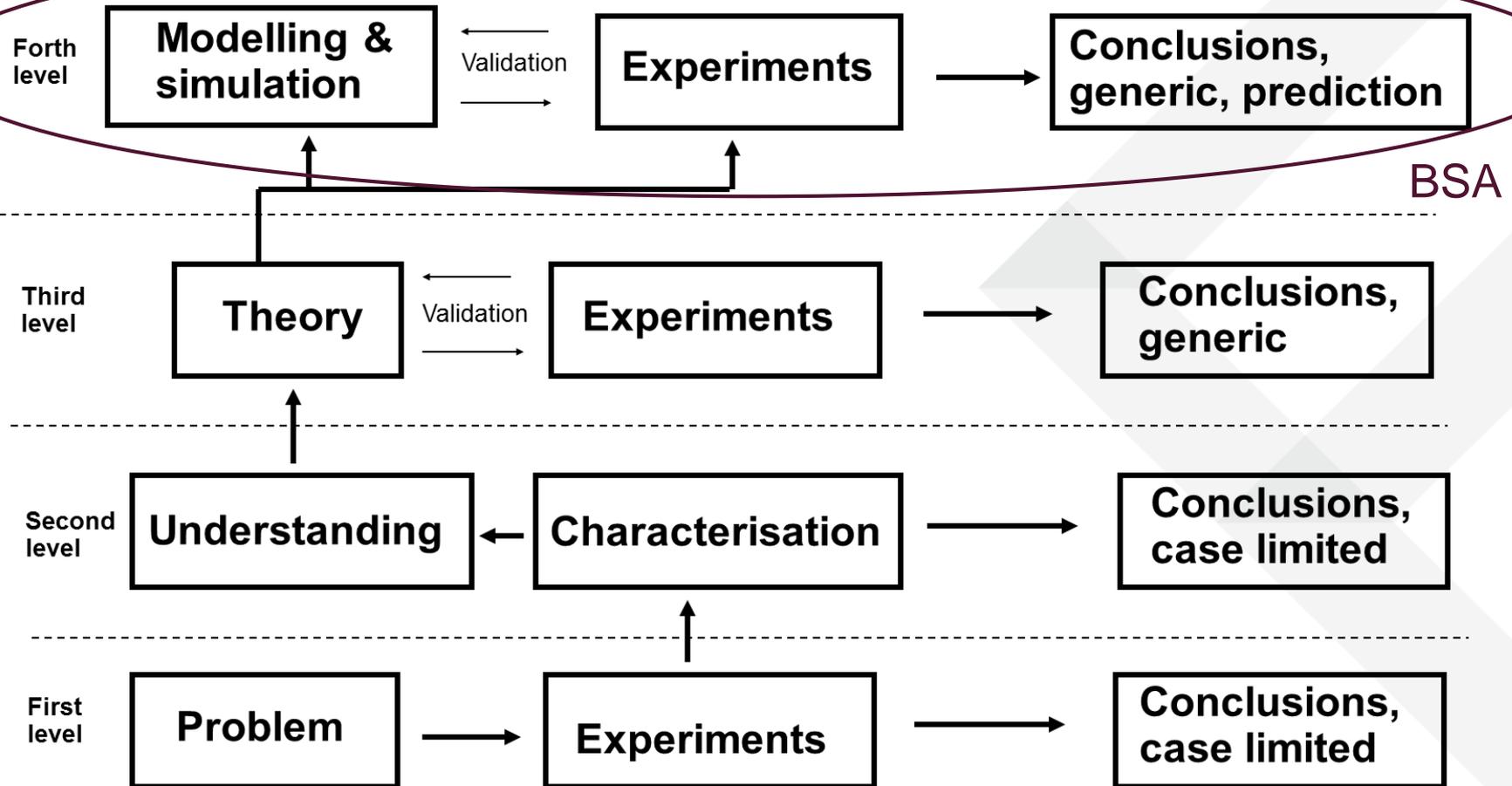
Fundamental research into the **relationships between the microstructure and properties of advanced steels** as affected by **production, manufacturing and fabrication**

Applications of Breakthrough Steels will benefit various fields of industry

- ▶ Building and construction
- ▶ Energy technologies
- ▶ Marine and offshore sectors
- ▶ Mining
- ▶ Automotive, transportation
- ▶ Lifting, handling
- ▶ Process and chemical industry
- ▶ Electronics industry
- ▶ Forest industry
- ▶ ...



FIMECC BSA brings materials research and design to a new level



The BSA R&D effort is driven by the need to be competitive and open up new business opportunities

Need

- Remove barriers to application of latest steel developments
- Develop economically and environmentally better steels
- Create new solutions for emerging application areas

Ambition

- Spearhead knowledge utilized by entire steel value chain and end-users in various application areas
- Novel design competence and tools to radically decrease the time to market and digitalize the development process

Outcome

- Novel applications and new business
- New specialised, life-cycle efficient steels
- Completely new breakthrough material solutions
- World-leading steel-competence network

Impact: Renewed and successful Finnish metals and engineering industry based on innovative and sustainable solutions

Major change in Finnish metal and engineering industry's structure and producing capability

New business opportunities in emerging and growing industry sectors like bioenergy, clean water, mining, transport and arctic technologies



BSA vision 2030:

Finnish metals and engineering companies are key players in global cleantech markets

Globally

- Shortage of clean water
- Shortage of raw materials
- Energy costs increased threefold
- 40% reduction in CO₂-equivalent footprints
- Advanced steels are recognized as the main building block of sustainable societies
- Steel products and structures using 30% less steel than today are in high demand

In Finland

- Companies provide sustainable technologies for energy production, water treatment and green technologies
- Engineering and metal companies have strengthened their world-leading position having invested in the application of advanced steels and design tools
- The above developments have opened completely new markets for advanced steels and fostered growth of SMEs
- Steel producers and foundries have differentiated from their global competitors by changing their offerings to knowledge-intensive products
- High number of engineers skilled in the use of world class design techniques and computer simulation tools needed for the efficient use of steel

BSA creates an extensive steel competence network, integrating complete value chains

Value chain

Material producers

Equipment
manufacturers

Equipment
users

Industry
challenges

New steels

More efficient use of new steels

Material solutions for emerging
applications

Key competence
areas and research
partners

Material and multiscale modeling

Physical
metallurgy

Structural design
of steel structures

Material
performance and
testing

Supplemented by:

- BSA international research partners
- Existing national and international R&D networks and initiatives of BSA participants (Academy of Finland, RFCS, EU projects, etc.)

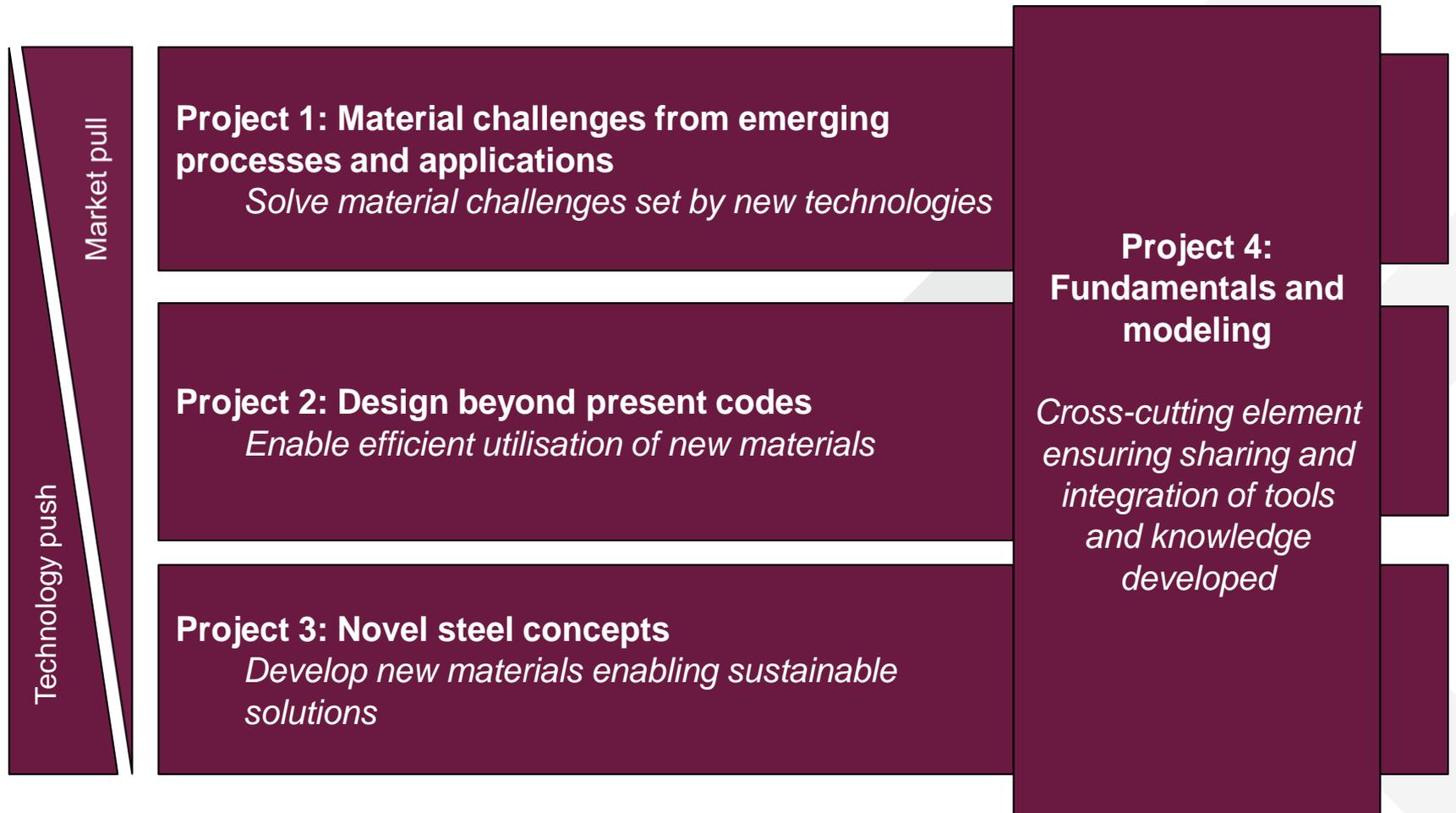
Facts sheet: BSA

- ▶ Timetable: 5 years, started 1.1.2014
- ▶ Volume: 46 M€ total (8 M€ first year)
- ▶ Participants:
 - **30 companies** including engineering and machinery industries with a wide range of applications, steel producers and foundries.
 - **7 research organisations** including several multidisciplinary research groups with high level international partners.

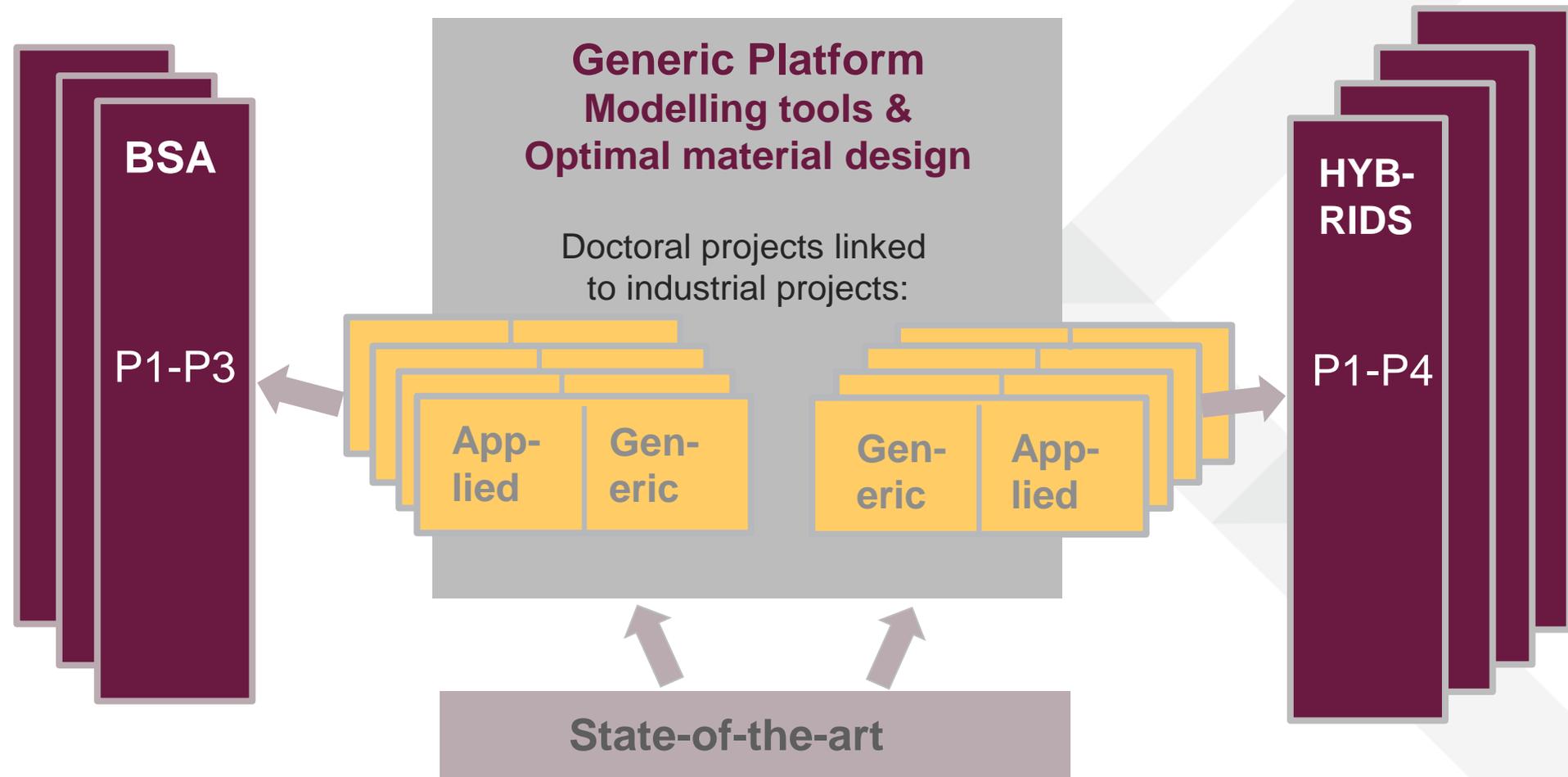
The BSA consortium involves 30 companies and 7 research organisations



BSA – optimum balance of market pull and technology push



A joint fundamentals and modelling project will create a solid knowledge platform



FIMECC Breakthrough Materials Doctoral School solves industrial challenges with deep science

- ▶ **Industry-led Doctoral School which has been built within FIMECC BSA & HYBRIDS programmes**
- ▶ Launched in the beginning of 2014
- ▶ Involves 22 doctoral students in its first phase
(extended already to 30; all working within BSA&HYBRIDS)
- ▶ Focusing on fundamental scientific challenges and modelling, a multi-disciplinary group of young scientists with their senior advisors and international partners will tackle critical research questions set by the involved companies to build new solutions and relevant competence for the industry
- ▶ Doctoral studies are carried out according to the principles of each university
- ▶ More information and Doctoral school in the media: [FIMECC's industry driven doctoral school brings materials research to new era](#)



FIMECC BSA&HYBRIDS together are a major boost to the materials & engineering sector

- ▶ Two systematically built parallel programmes linked to each other
- ▶ Strong co-operative R&D effort
 - 30 + 38 companies, all key universities + top-notch international partners; a total volume of 80 MEUR (46 + 34)
- ▶ Extensive expert networks
 - Gathering together wide, multi-disciplinary expert groups from different industries and academic branches
- ▶ Ambitious plans & crew to make it happen
 - Combining deep science and real industrial needs
 - New critical solutions and relevant competence for the industry
 - “FIMECC Breakthrough Materials Doctoral School” (see previous slide)

Contact: Programme management team and FIMECC



Dr. Markku Heino
Programme manager

Mobile: +358 40 719 1221
Email: markku.heino(at)spinverse.com



Vilja Vara
Programme
management team

Mobile: +358 40 744 2002
Email:
vilja.vara(at)spinverse.com



Kaisu Leppänen
Programme
management team

Mobile: +358 44 288 4824
Email:
kaisu.leppanen(at)spinverse.com



Dr. Kalle Kantola
CTO, FIMECC

Mobile: +358 40 840 6427
Email:
kalle.kantola(at)fimecc.com

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FIMECC and its programmes in brief

- ▶ FIMECC Ltd. (Finnish Metals and Engineering Competence Cluster) is an open innovation R&D company. The aim of FIMECC is to increase and deepen the cooperation between companies, universities and research institutes in R&D. FIMECC is the right cooperation partner for any organization willing to co-create knowledge through strategic pre-competitive research. All those who are willing to contribute significantly to our focus areas, are welcomed. Current list of shareholders can be widened through new shares issued for those willing to buy.
- ▶ FIMECC manages research in five strategic research themes through research programs that address specific issues and research questions mentioned in the [Strategic Research Agenda](#)

More information
about FIMECC Ltd.:

www.fimecc.com

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We boost strategic research - together

www.fimecc.com