

BigScience.dk network meeting 2023
Hans Priem, VDL ETG



VDL ETG: high-end contract manufacturing

Facts and figures

10 COMPANIES



SPREAD ACROSS
3 CONTINENTS



REVENUE
>€1,5 BILLION



5500 EMPLOYEES



50% EXPORT



COMPANY ACTIVITIES
DIVIDED AMONG **>4 MARKETS**



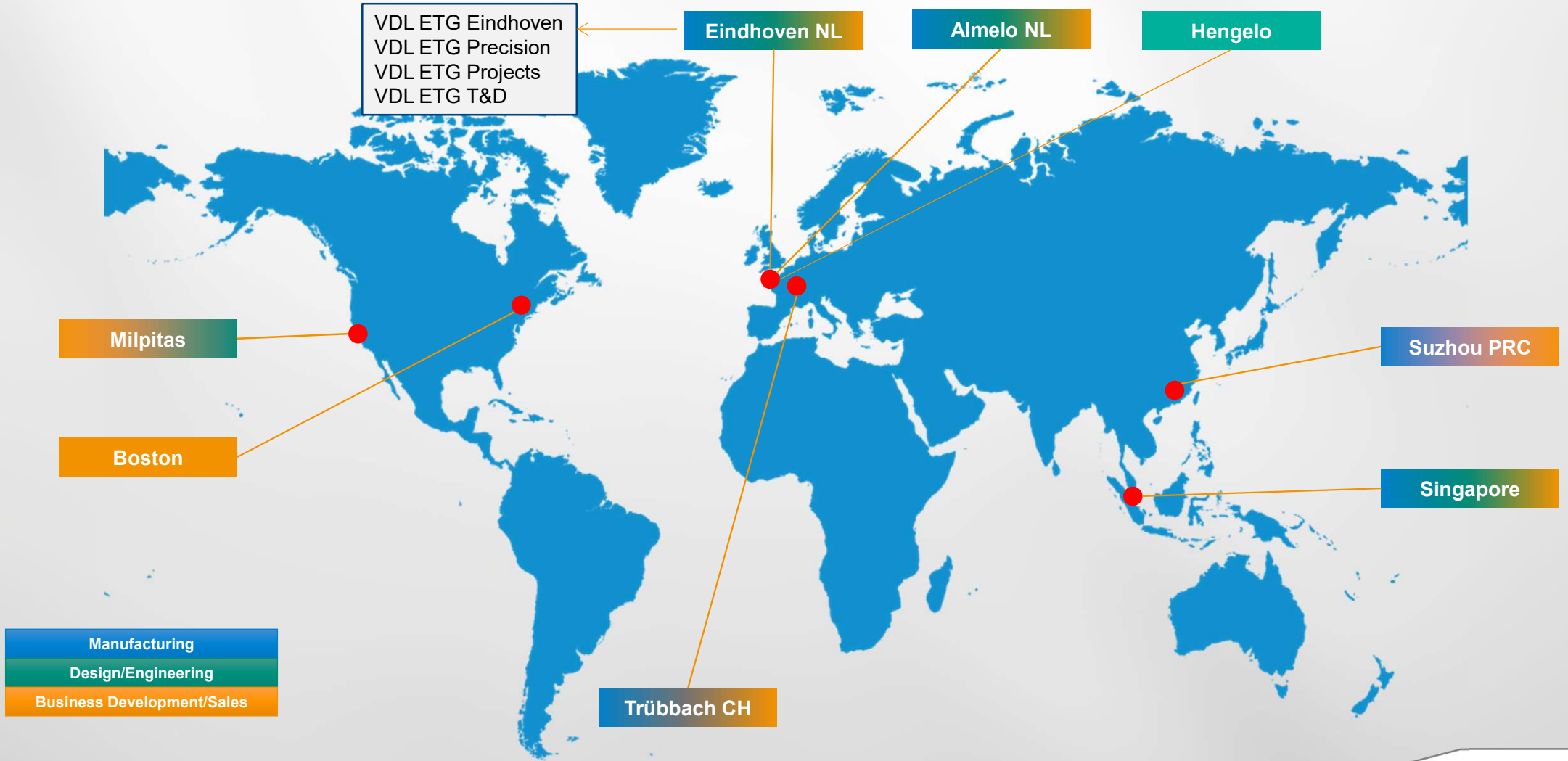
STRONG BALANCE SHEET POSITION
SOLVENCY **54%**



300,000 M²
PRODUCTION SURFACE AREA

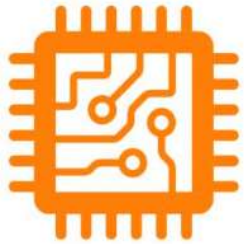


VDL ETG



VDL ETG – markets

Semiconductor
equipment



Modules for lithography,
metrology, inspection & others



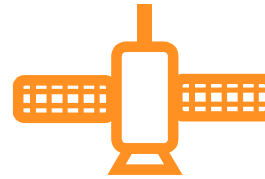
Medical equipment



Modules and parts for medical
diagnostics and treatment



Satellites



Modules and parts laser based
communication



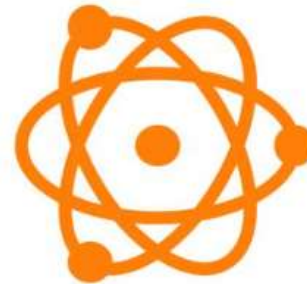
Analytical equipment



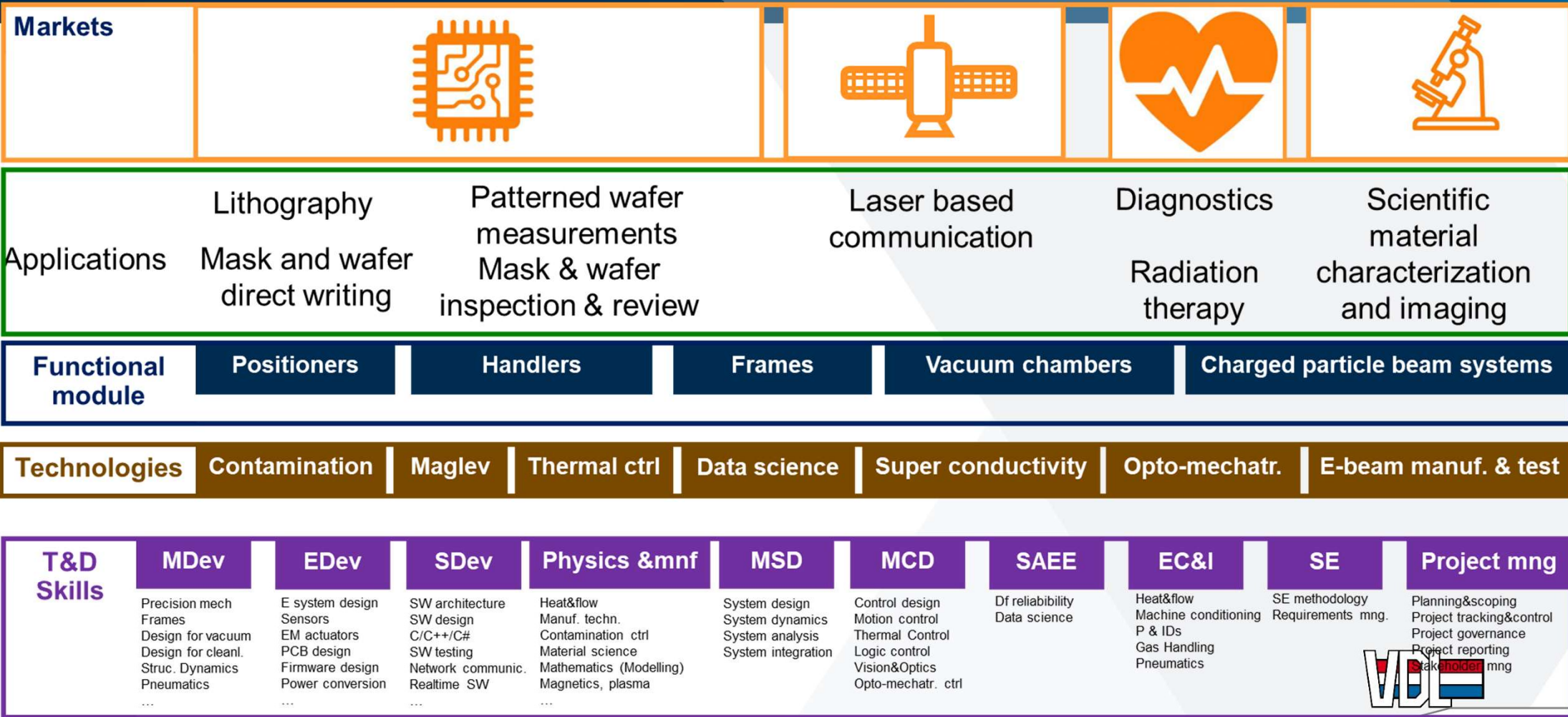
Modules and parts for
analytical equipment



Science and Technology



We manage via the technology axis



Technology Conference 2022
Manufacturing technologies to be included (welding, ultra high precision technology,...)

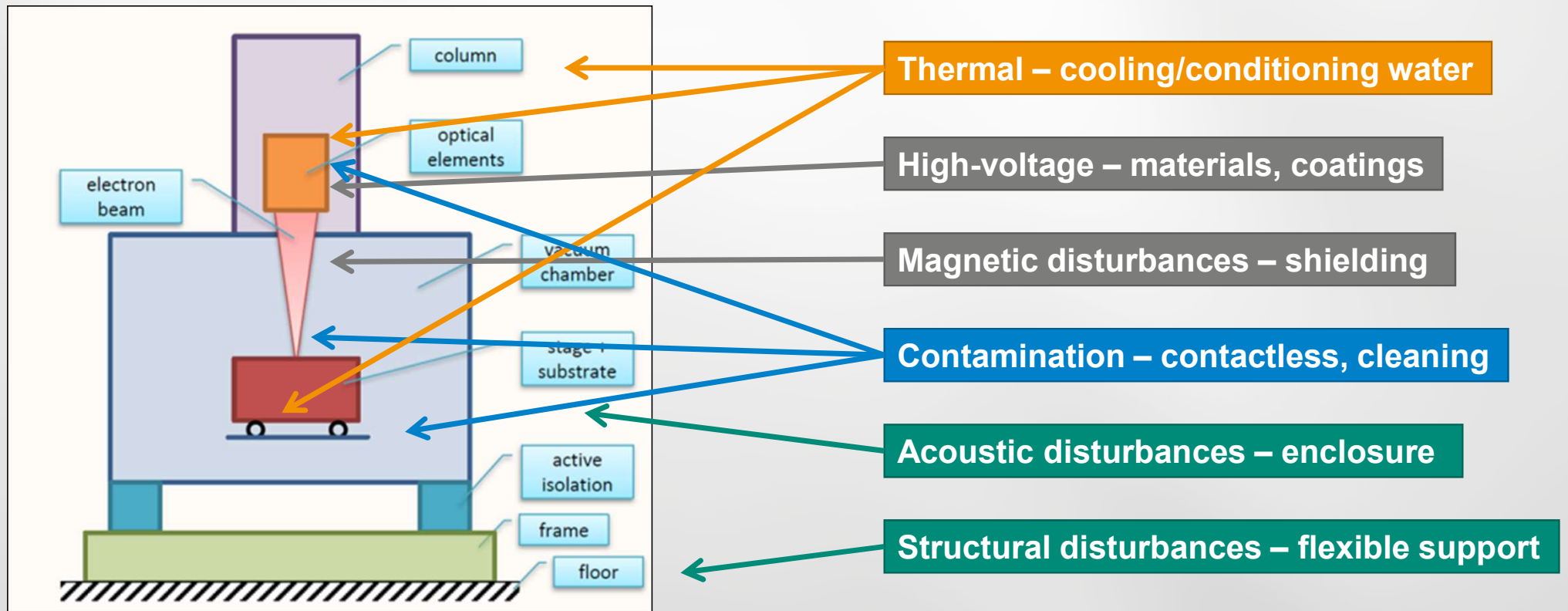


Our key technologies



System Thinking: designing a stable environment for your process

Eliminating impact of external and internal disturbances in design and manufacturing

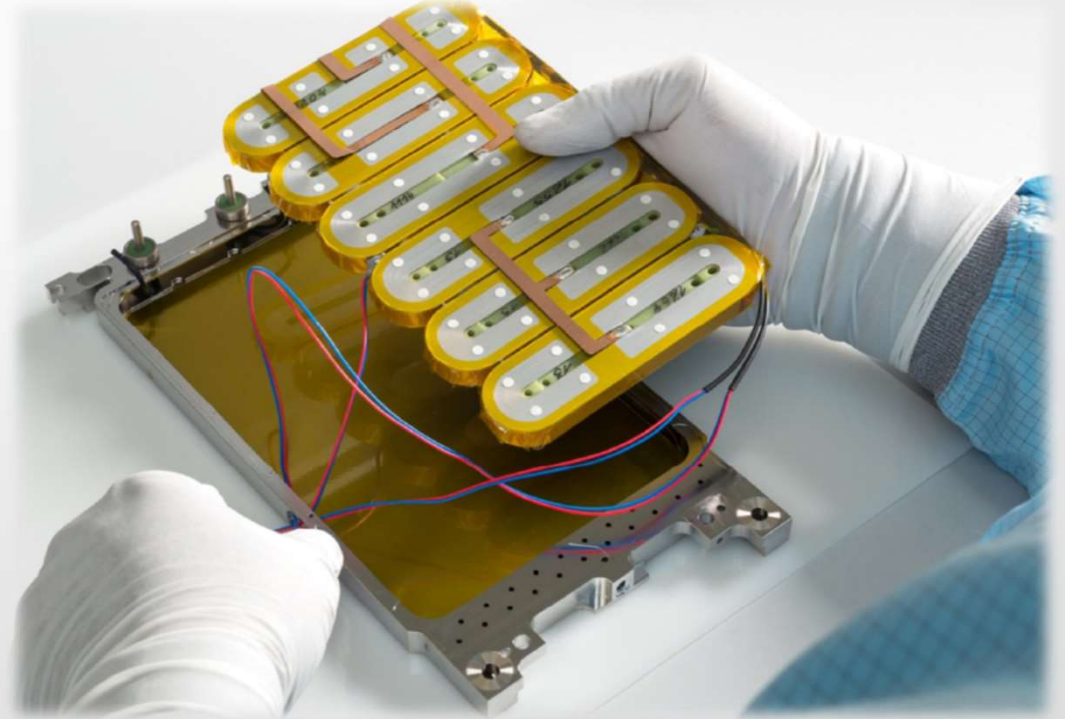
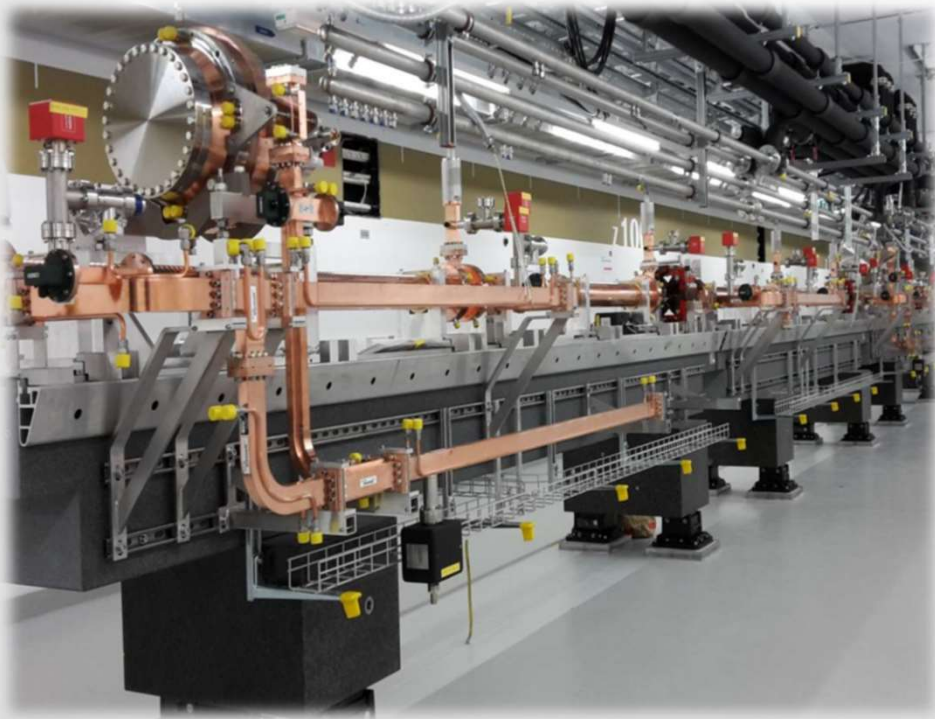


Science drives our long term innovation power



Mutual benefits

From research equipment to semiconductor equipment, and back



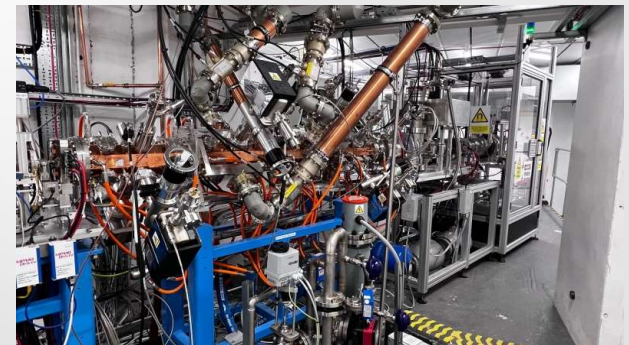
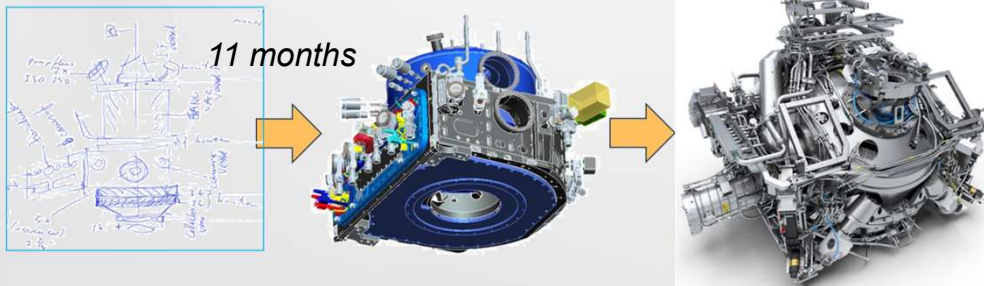
Why do we need each other?

Rationalizing a natural fit...

- **Development cycles are shortening – shorter time from new technologies to application**
- Equipment complexity is increasing – increased demand for new technologies to help address
- Process complexity is increasing – demand for improved technologies
- Requirements overlap
- Big science gets big – high-tech equipment does as well
- More fundamental understanding of materials and material science
- Where else does industry find the time to look into the fundamentals?

Right now..it takes too long

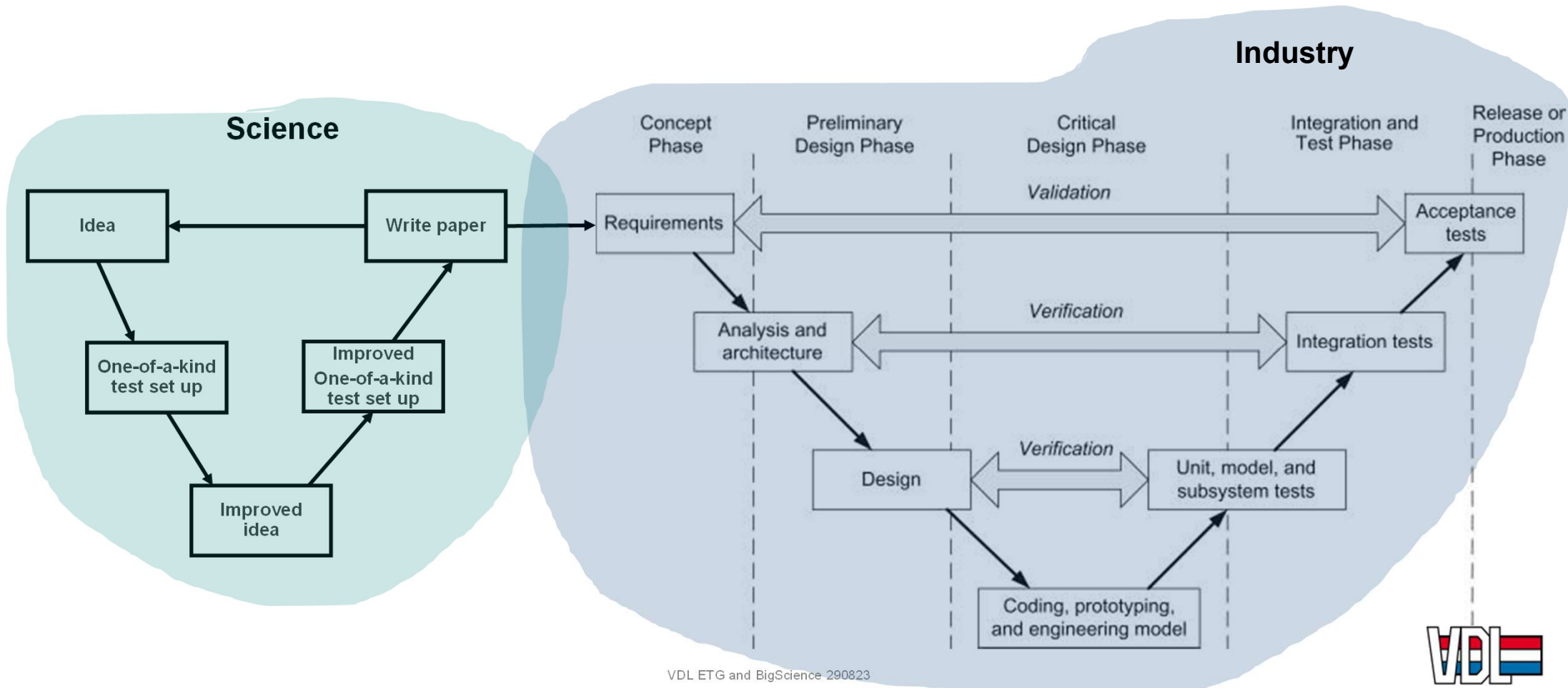
- ICS 5 years, no light
- Proton therapy 7 years, almost there
- Radio therapy technology from the 1960s



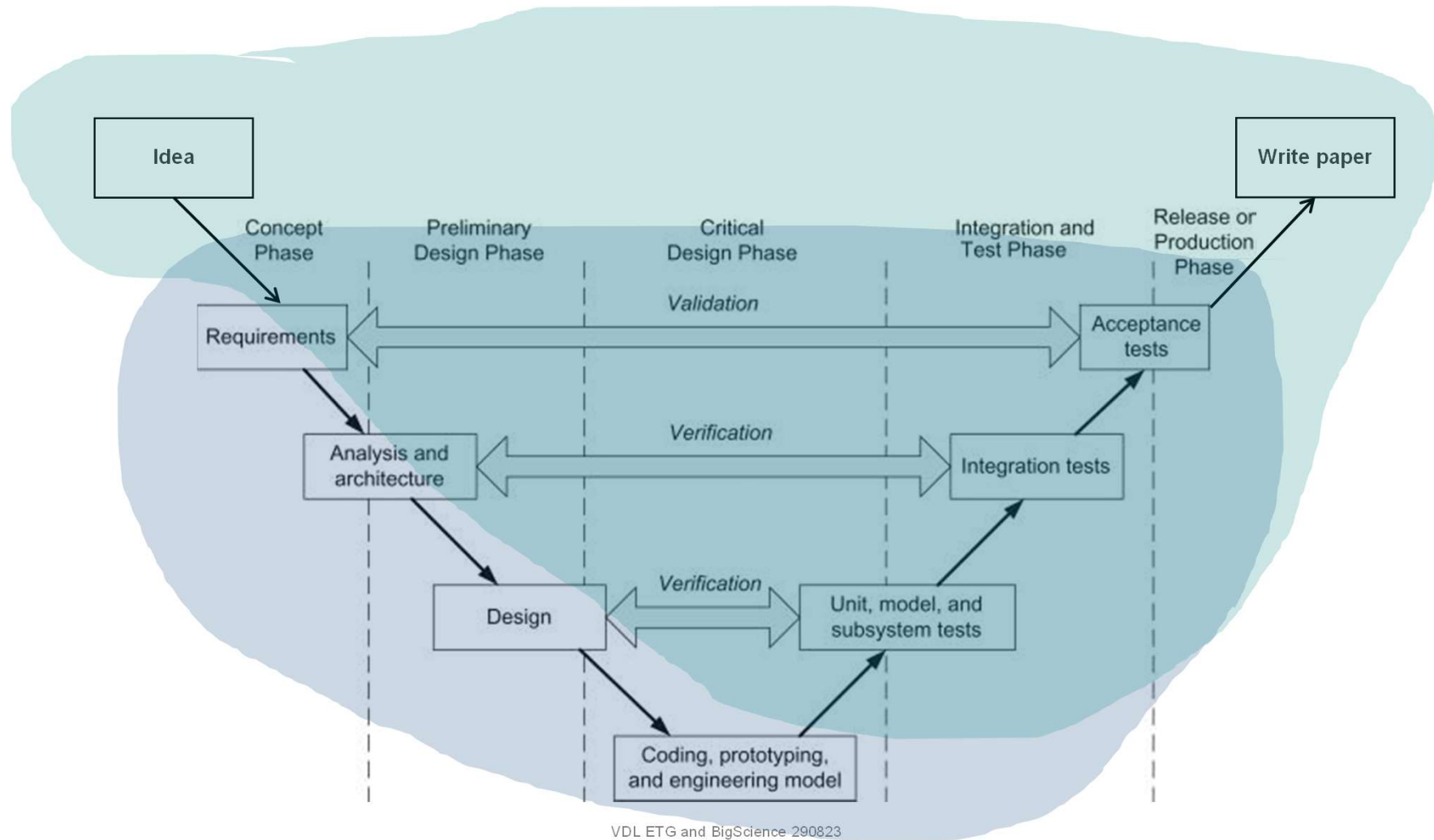
- The process from fundamental science to concept to product takes much too long, hampering innovation
- In fact, we see a gap in the process

Moving from a 'W' to a V

Old-fashioned way takes significant time & money



Leverage strong points of both; science and technology



We do not see the differences.....

There are many shared challenges in big science and high-tech (equipment)

Unidentified Falling Objects in the Large Hadron Collider:
Formation, Charging Mechanisms and Dynamics of Dust Particulates in
a High Energy Proton Accelerator

by

Philippe Belanger

B. Eng., Polytechnique Montréal, 2018



27 May 1996

**Contamination control in semiconductor
manufacturing and particle deposition on wafer
surfaces**

Benjamin Y.H. Liu

Author Affiliations +

Proceedings Volume 2714, 27th Annual Boulder Damage Symposium: Laser-Induced Damage in Optical
Materials: 1995; (1996) <https://doi.org/10.1117/12.240427>

Event: Laser-Induced Damage in Optical Materials: 1995, 1995, Boulder, CO, United States

Accelerate Materials Insights with Our New Cold Field
Emission Electron Gun for Atomic-Scale High-Resolution
TEM

By Yuri Rikers
01.20.2022



21 July 2000

**Double-shielded objective lens system for
electron-beam lithography system**

Hiroya Ohta, Yasuhiro Sameda, Yasunari Sohda, Norio Saitou, Shin-ichi Katoh, Hiroyuki Itoh

Author Affiliations +

Proceedings Volume 3997, Emerging Lithographic Technologies IV; (2000) <https://doi.org/10.1117/12.390106>

Event: Microlithography 2000, 2000, Santa Clara, CA, United States

Carbon Nanotubes as Cold Electron Field Emitters for Electron Cooling in the CERN Extra
Low Energy Antiproton (ELENA) Ring

Bruno Galante (CERN and Cockcroft Inst. Accel. Sci. Tech. and Liverpool U.), Ozgur Apsimon (Liverpool U. and Cockcroft Inst. Accel. Sci.
Tech.), Javier Resta-López (GACE-ICMUV), Gerard A. Tranquille (CERN), Carsten P. Welsch (Liverpool U. and Cockcroft Inst. Accel. Sci.
Tech.)

Aug 16, 2021

Magnetic characterization of Mumetal® for passive shielding of stray fields down to the nano-Tesla level

Arpaia, Pasquale (Naples U.) ; Burrows, Philip Nicholas (JAI, UK) ; Buzio, Marco (CERN) ; Gohil, Chetan (JAI, UK ; CERN) ; Pentella, Mariano (CERN ; Turin Polytechnic) ; Schulte, Daniel (CERN)
7 p.

Nucl. Instrum. Methods Phys. Res., A 988 (2021) 164904

[10.1016/j.nima.2020.164904](https://doi.org/10.1016/j.nima.2020.164904)

Accelerators and Storage Rings

CLIC



How can high-tech industry benefit from big science?

Let's take a suggestion from ChatGPT

In summary, the high-tech industry can benefit from big science through

- collaborations,
- access to data and knowledge,
- technology transfer,
- commercialization opportunities, and
- talent development.

The partnership between big science and the high-tech industry can drive innovation, create new business opportunities, and contribute to technological advancements with wide-ranging societal and economic impacts.

And now....more specific...how can high-tech industry can benefit from the research at (for example) CERN (or ESS or ESRF)?

Additional suggestions from ChatGPT

The high-tech industry can benefit from research conducted at CERN (European Organization for Nuclear Research) in several specific areas:

- Computing and Big Data
- High-Energy Physics Instrumentation
- Accelerator Technology
- Radiation Monitoring and Protection
- Superconducting Technologies
- Grid Computing and Network Infrastructure

These are just a few specific areas where the high-tech industry can benefit from research conducted at CERN. The interdisciplinary nature of CERN's research and the cutting-edge technologies it employs open up opportunities for collaboration and technological advancements across various sectors.

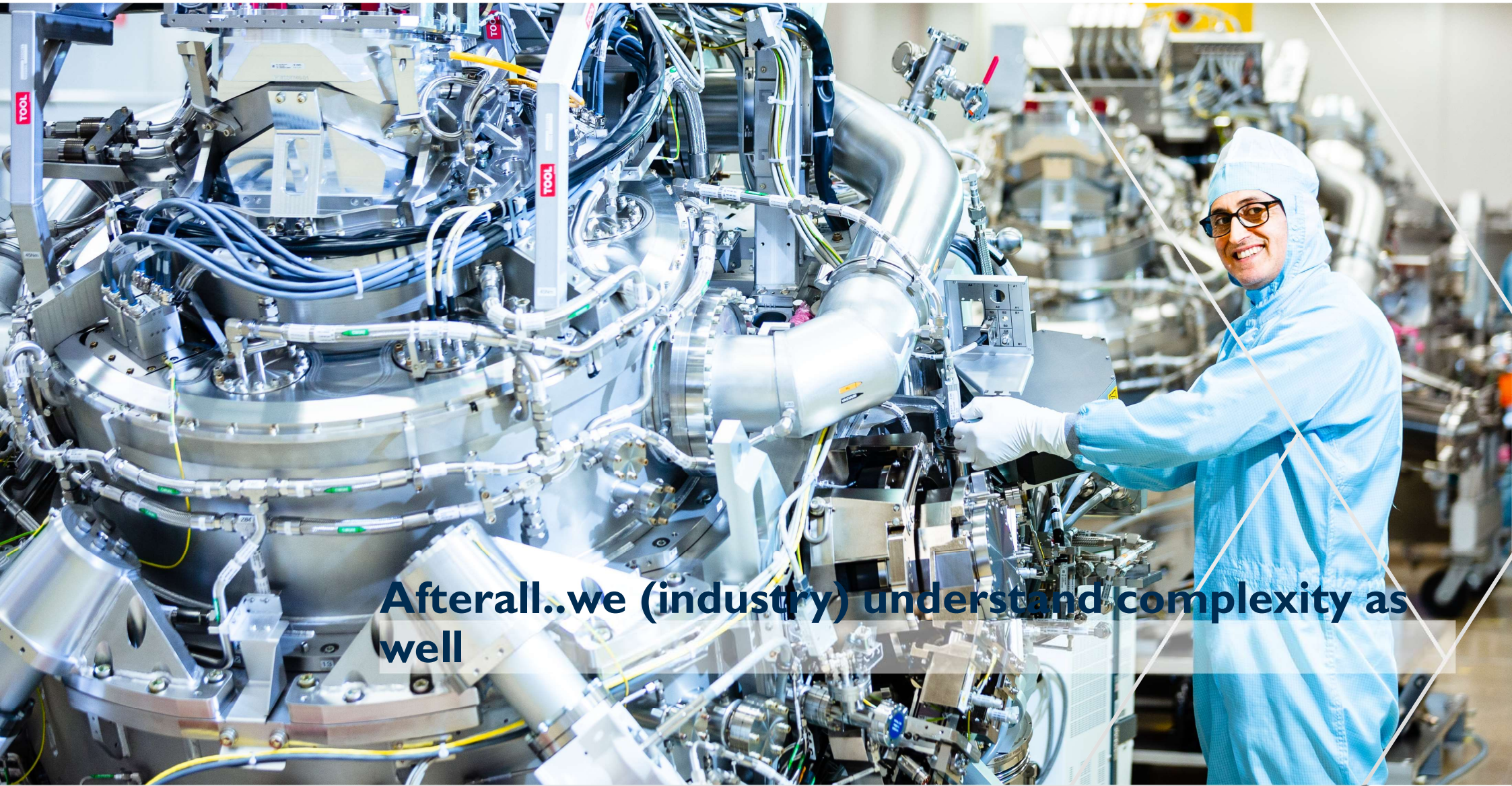
Industry beneficial to Science...? Not only a political or funding “yes”

Still more from ChatGPT

Big science can benefit from the high-tech industry in several ways:

- Technological Innovation
- Scalability and Efficiency
- Data Management and Analytics
- Computing and Simulation
- Instrumentation and Sensors
- Industry-Academia Collaboration

Overall, the collaboration between big science and the high-tech industry leads to technological advancements, improved capabilities, and increased efficiency in scientific research. It enables big science projects to leverage the expertise and resources of the high-tech industry to tackle complex challenges, accelerate discoveries, and drive innovation.



After all..we (industry) understand complexity as well

So..Let's go!

There is a lot to be gained from collaboration with big science projects

Collaboration with big science projects offers numerous benefits to the European high-tech ecosystem, including enhanced R&D capabilities, technology transfer, talent development, international recognition, collaboration networks, and societal impact. By **leveraging** the opportunities presented by big science projects, the European high-tech ecosystem can further strengthen its position as a leading global hub for innovation and technological advancements.



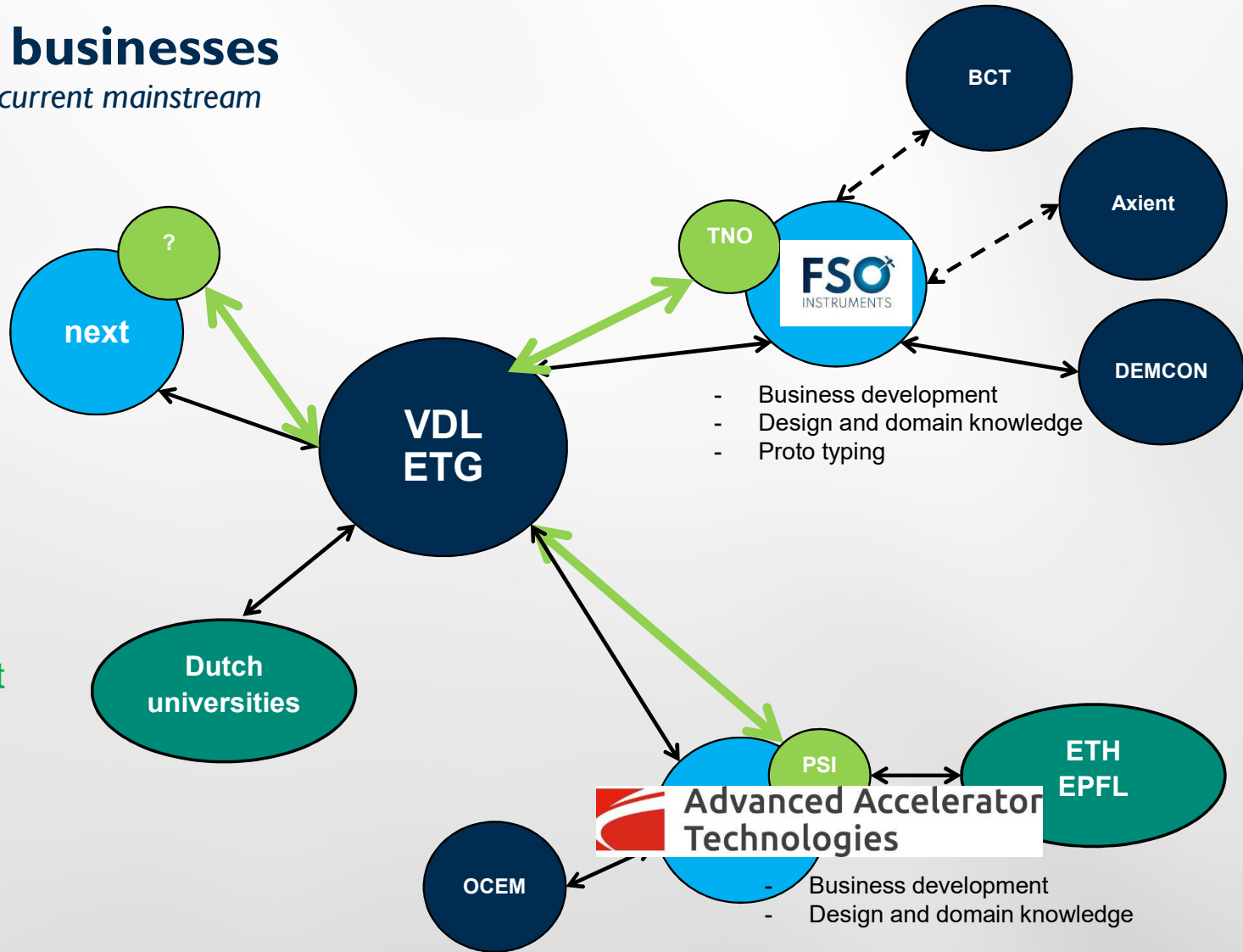
Leverage

Not from ChatGPT

- We build semiconductor equipment, medical and analytical equipment
- Big Science, large scale projects, are not in the core of our sales plans
- So..no opportunistic behavior
- We focus on partnerships with relevant science; eg accelerator technology, astronomy, fusion
 - Positioning, magnets, engineering, cryo technology, joining, coatings, high(est) vacuum,..
- We focus at building international networks of partners to address science challenges, which in the long term benefit our current of future mainstream business
- Large scale projects / big science cooperation is at the core of our strategy

Building new businesses

..while strengthening our current mainstream



- Technology benefitting current mainstream
- Manufacturing
- Business

So....

- Lets identify relevant projects together ticking all boxes
 - PSI, CERN, DESY, ESO
 - ESS, ESA, ITER..?
- Lets match VDLs challenges in the mainstream markets with your strengths: win-win