

# Science and Technology

You can't have one, without the other



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VDL ETG @ ILO event  
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A high tech ecosystem is key,  
which will not evolve without science

# What is VDL?

- 3<sup>rd</sup> Generation to chair the management team
- Head quarters in Eindhoven, spread to 19 countries with 15 000 employees
- Founded in 1953 as a metal working manufacturer
- Mission: to develop, produce and sell competitive and innovative products.





# VDL - divisions



VDL Enabling Technologies Group (VDL ETG)



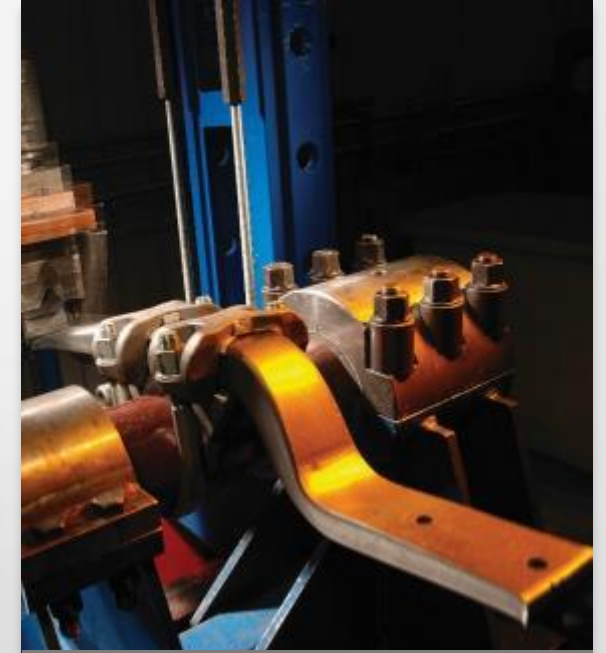
**Subcontracting**



**Car assembly**



**Buses & coaches**



**Finished products**

# VDL ETG - history



1900 Philips Machine Fabrieken



1980 Also Non-Philips Customers



1990 Integrated Systems



2000 New name: Philips Enabling Technologies Group



2006 ETG part of VDL Group

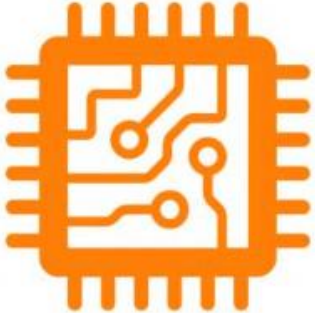


# VDL ETG is a turn-key supplier with design capability



# VDL ETG Markets

Semiconductor equipment market



Modules for lithography tools  
Modules for metrology tools

Medical equipment market



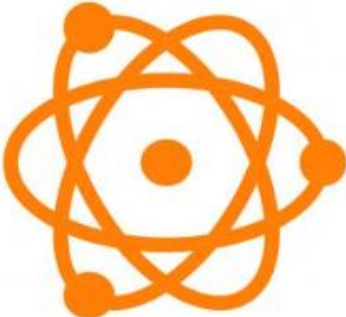
Modules and parts for medical treatment equipment

Analytical equipment market



Modules and parts for analytical equipment

Science and Technology developments





**A high tech ecosystem is key,  
which will not evolve without science**

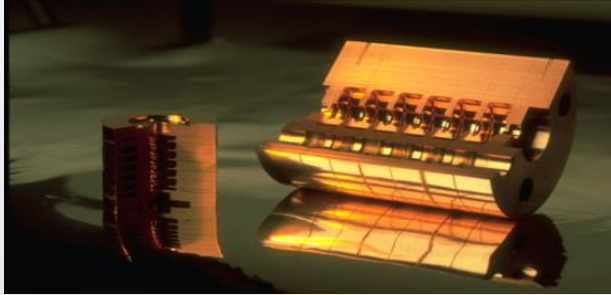




# VDL and CERN



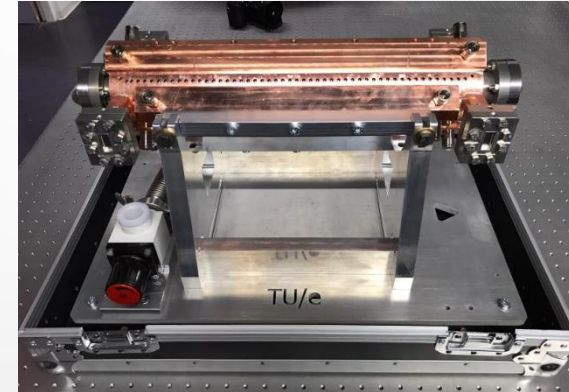
- ✓ Long standing supplier of CLIC prototype parts (since 1989)



circa 1994

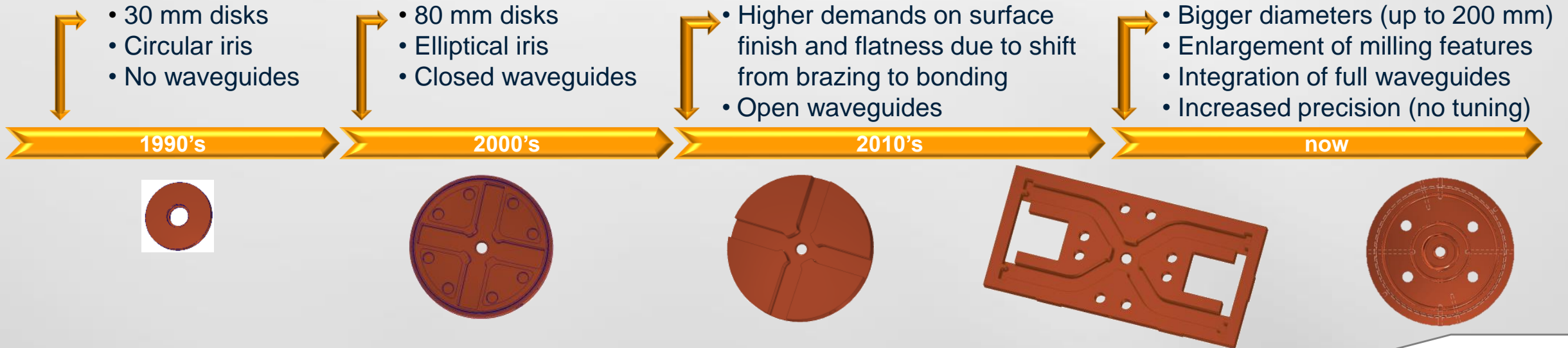


2010



Courtesy of TU/e  
2020

## ✓ Evolution of requirements

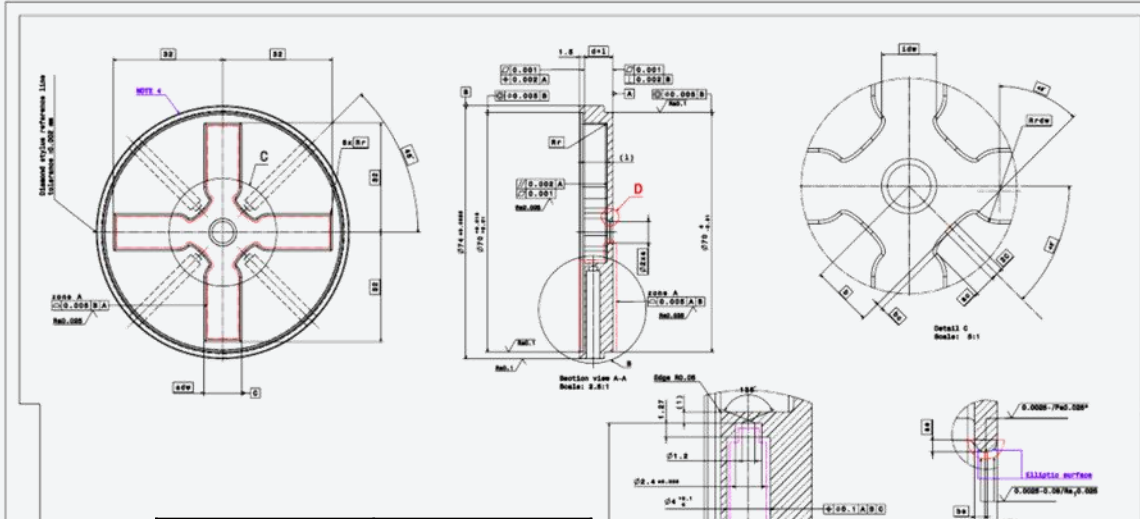


# Accelerator structures for CLIC

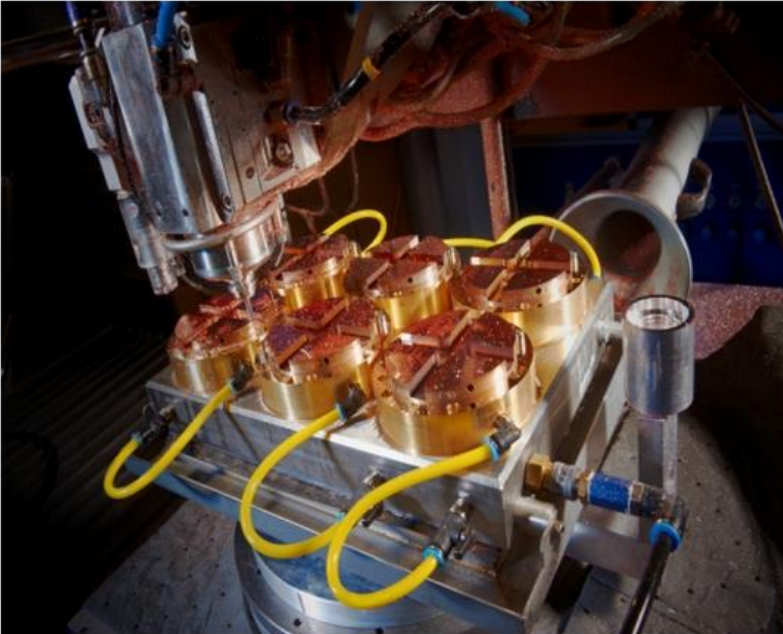


## Gained competences:

- Ultra precision machining (UPT)
- Metrology
- Manufacturing strategies
- Part handling and cleaning
- Sub-module assembly



Results	Specified	Achieved
Form	5 μm	2 μm
Ra Iris	25 nm	5 nm
Ra Cross	50 nm	25 nm



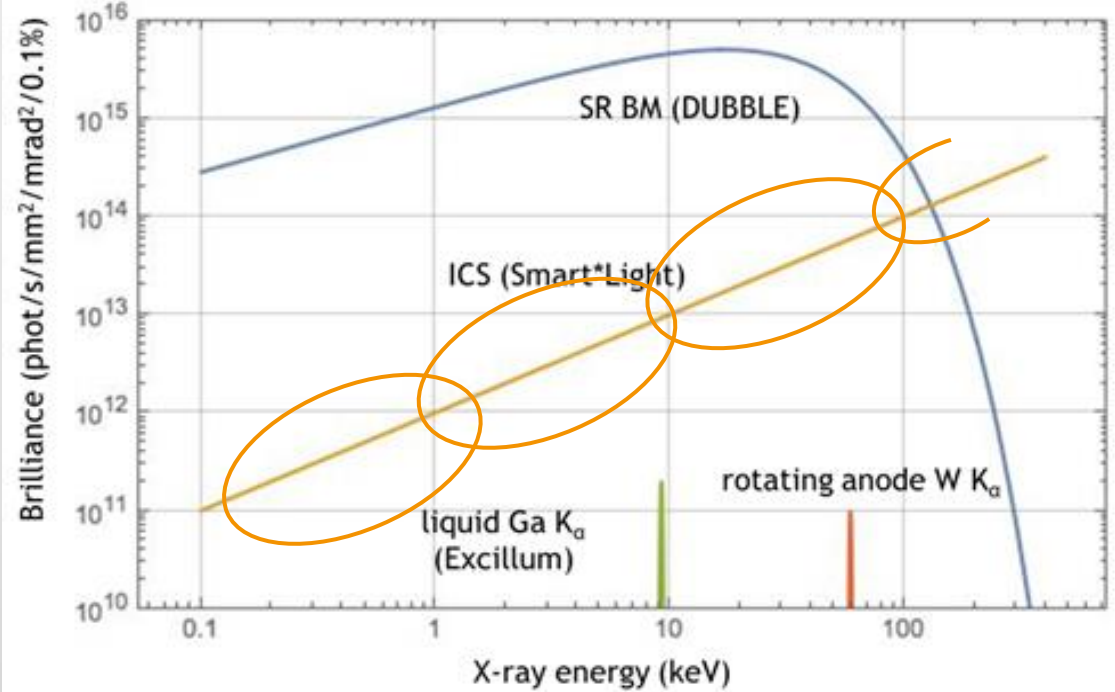


# Spin-off collaboration project: Smart Light

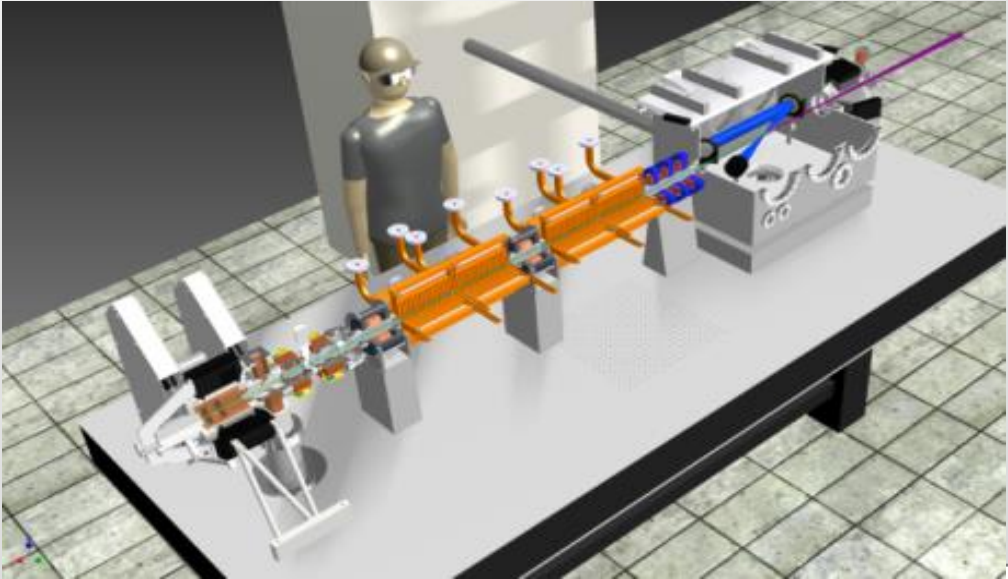


Synchrotrons are the most powerful non-destructive diagnostic tool for industry, health, environment and heritage studies

→ Need for more beam time / accessibility and on site measurements

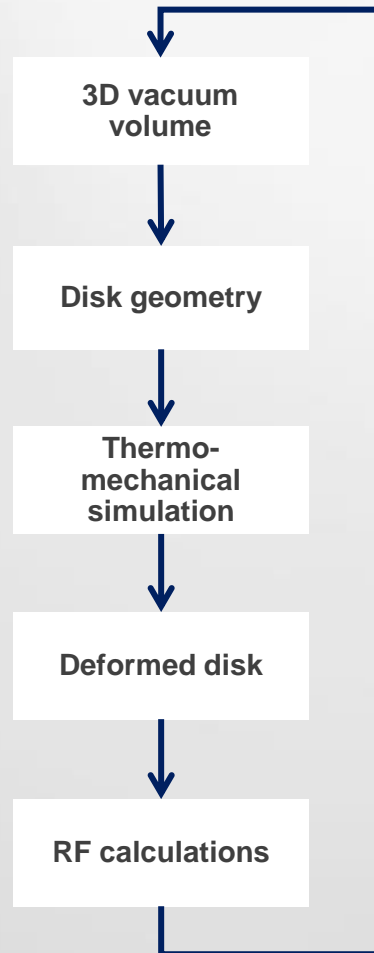


Smart\*Light: a table-top alternative

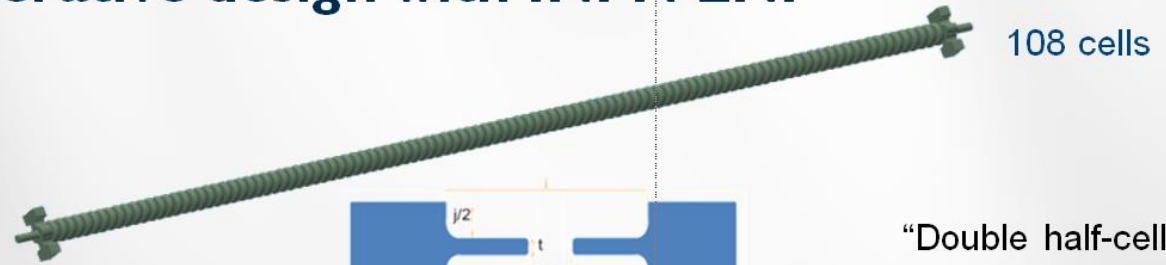




EU funded design study, successful in early involving industry, topic of invited talk at the BSBF 2022

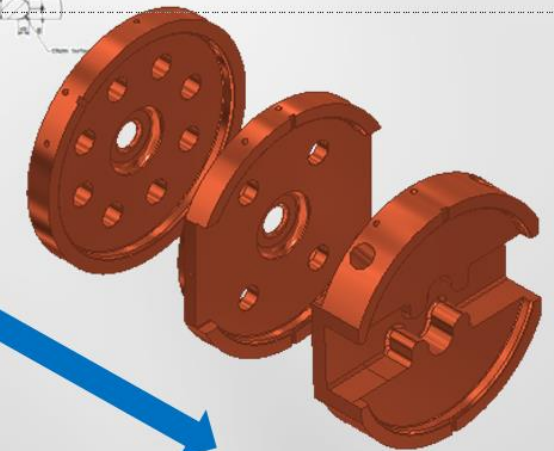
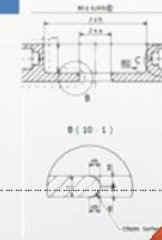
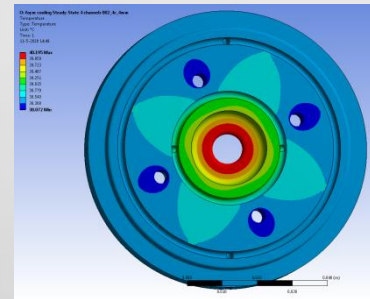


## Iterative design with INFN LNF



“Double half-cell design”

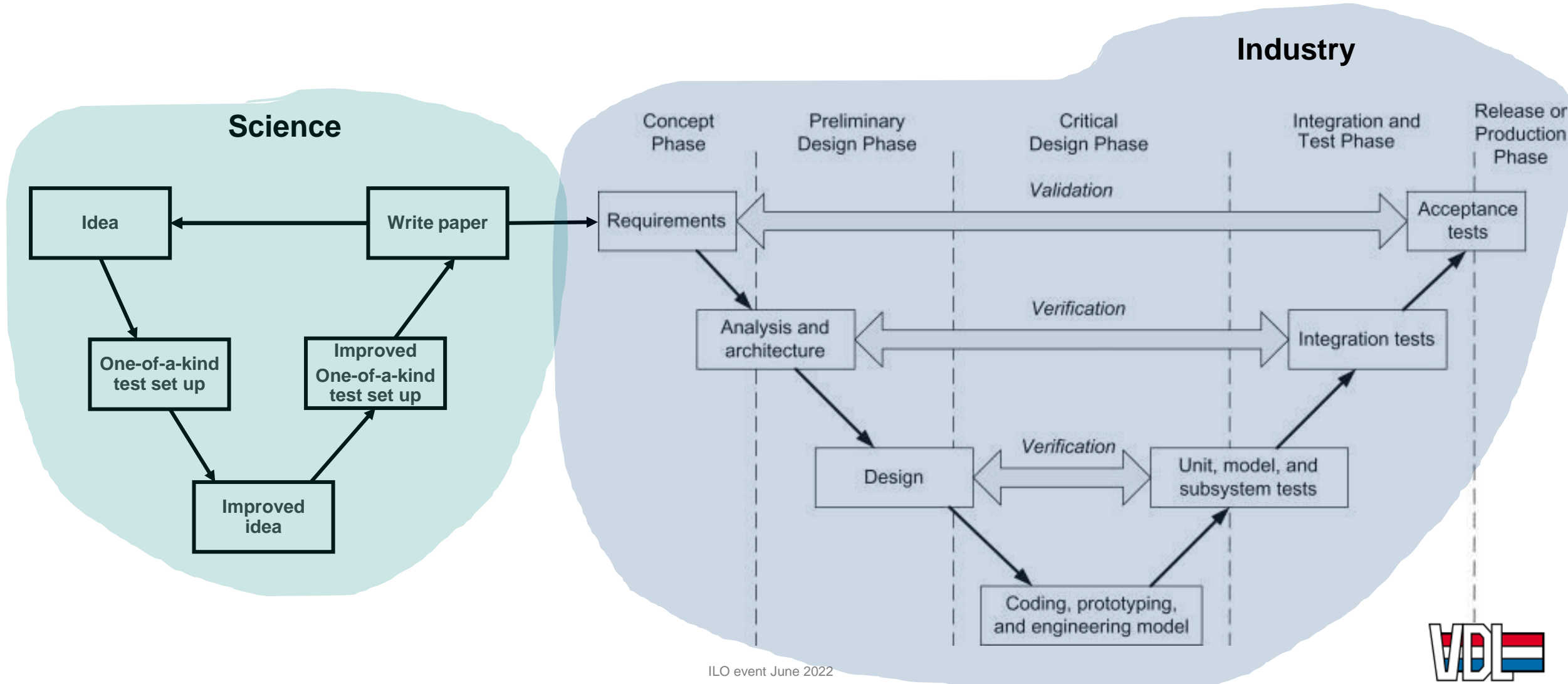
- Iris radius (a)
- Cavity radius (b)
- Cavity depth (j)?
- Iris thickness (t)?
- Iris elliptical shape (ea and eb)?





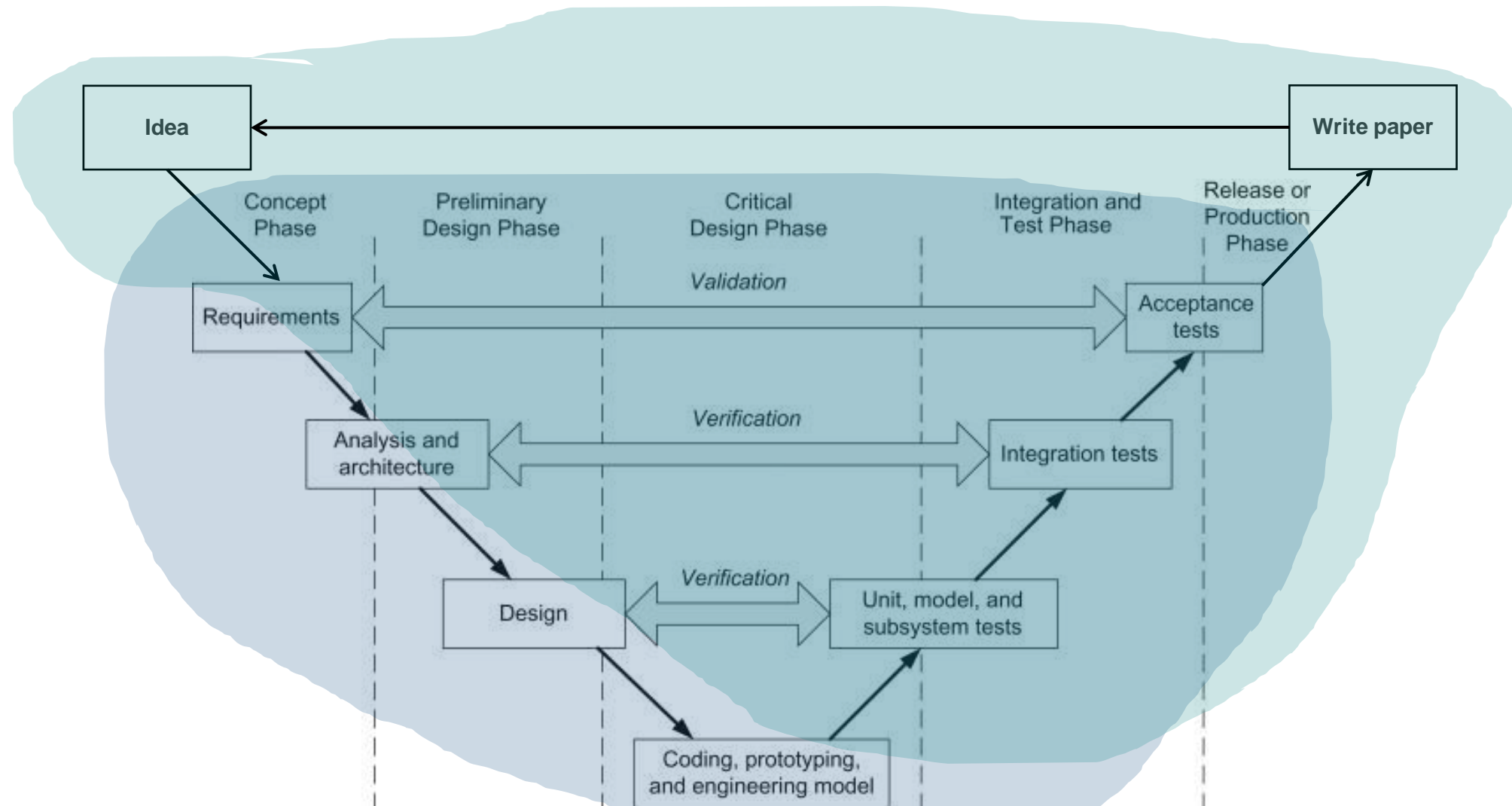
# Opportunity to improve; early involvement. Moving from a 'W' to a V

Normal way takes significant time & money



# Leverage strong points of both; Science & Technology

Don't build bridges, try to find 'common ground' and build from there.

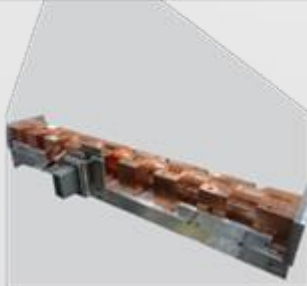


# Accelerator projects: Proton therapy ADAM AVO

- LIGHT (Linac for Image Guided Hadron Therapy) developed by ADAM
- First modules delivered for high power test (Low power RF and bead pull test done @ VDL)
- Second device in production



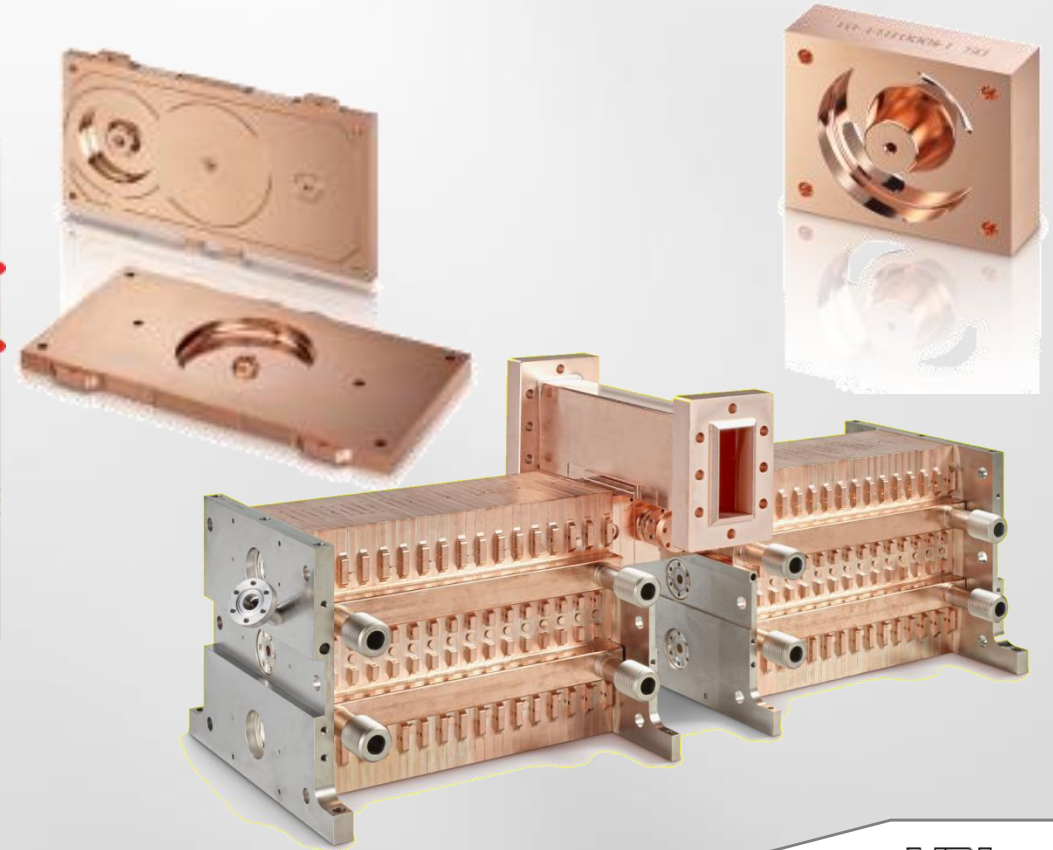
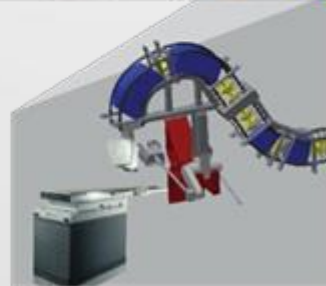
RFQ



SCDTL



CCL

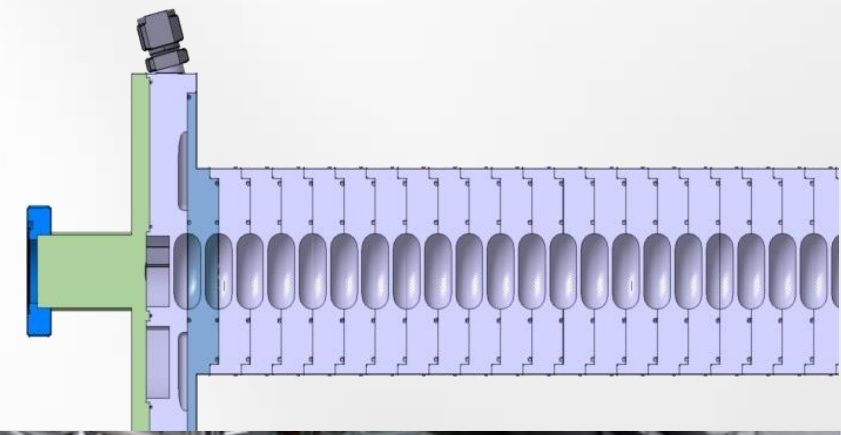




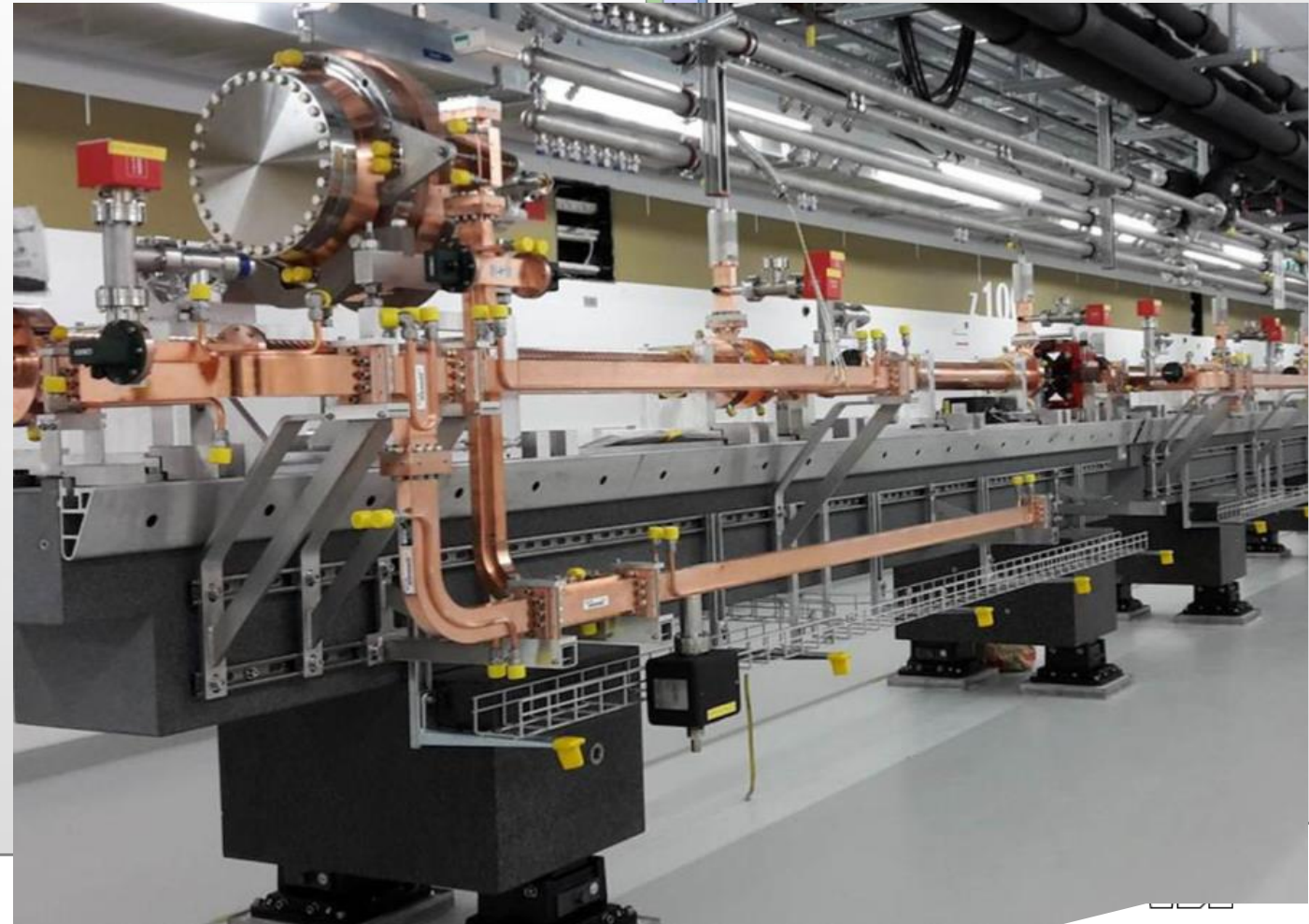
# Accelerator projects: SwissFEL

Series manufacturing of 112 structures \* 108 cups per structure

= 12 096 discs without polishing within +/- 5 micron



PSI SwissFEL  
cavity coupled  
linac accelerator





# Conclusions

- If industry gets involved in science collaboration program's, you can;
  - gain competences, (also valuable in other markets)
  - brand awareness → invites for other collaborations
  - open up new (disruptive) markets
- Science can be a predictor for future technology, in which you have the chance to enter early; knowledge/competence which are hard to gain in a later stage
- Time to market and costs can be reduced by early involvement from industry

Science and technology, you can't have one, without the other.

Thank you for your attention!

Questions or discussion?