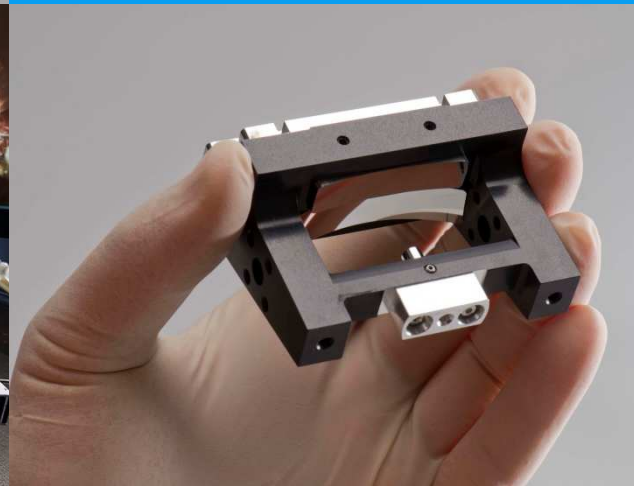


VDL Science and Technology



VDL & big science relevance

Hans Priem



Outline

- Introduction VDL science & technology
- Why a science & technology segment
- So many big science initiatives – making choices
- Our Focus
- Big Science and SME – not an obvious marriage

VDL Groep



- Established in 19 countries
- > 90 operating companies
- > 13,000 employees, privately owned
- Turnover €3,0 billion (2016)

Sub contracting

- mechatronic systems
- module assembly
- part and sheet metal
- surface treatments
- plastic processing
- other specialties

→ *VDL Science and Technology*

Bus group

- touring cars
- public transport bus
- mini and midi busses
- chassis modules
- second hand trade

Finished products

- medical equipment
- process installations
- consumer products
- production automation
- various products
- packaging equipment

Car assembly

- NedCar



High-end sub contracting: market segments



Semiconductor Capital Equipment



Mechanization Projects

- VDL ETG taking full responsibility
- From idea to operation



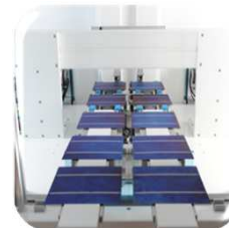
Analytical Equipment



Led Manufacturing Equipment



Medical Equipment



Solar Production Equipment



Science & Technology

- Accelerators & FELs
- Instruments for astronomy
- Small satellites (assemblies & optics)

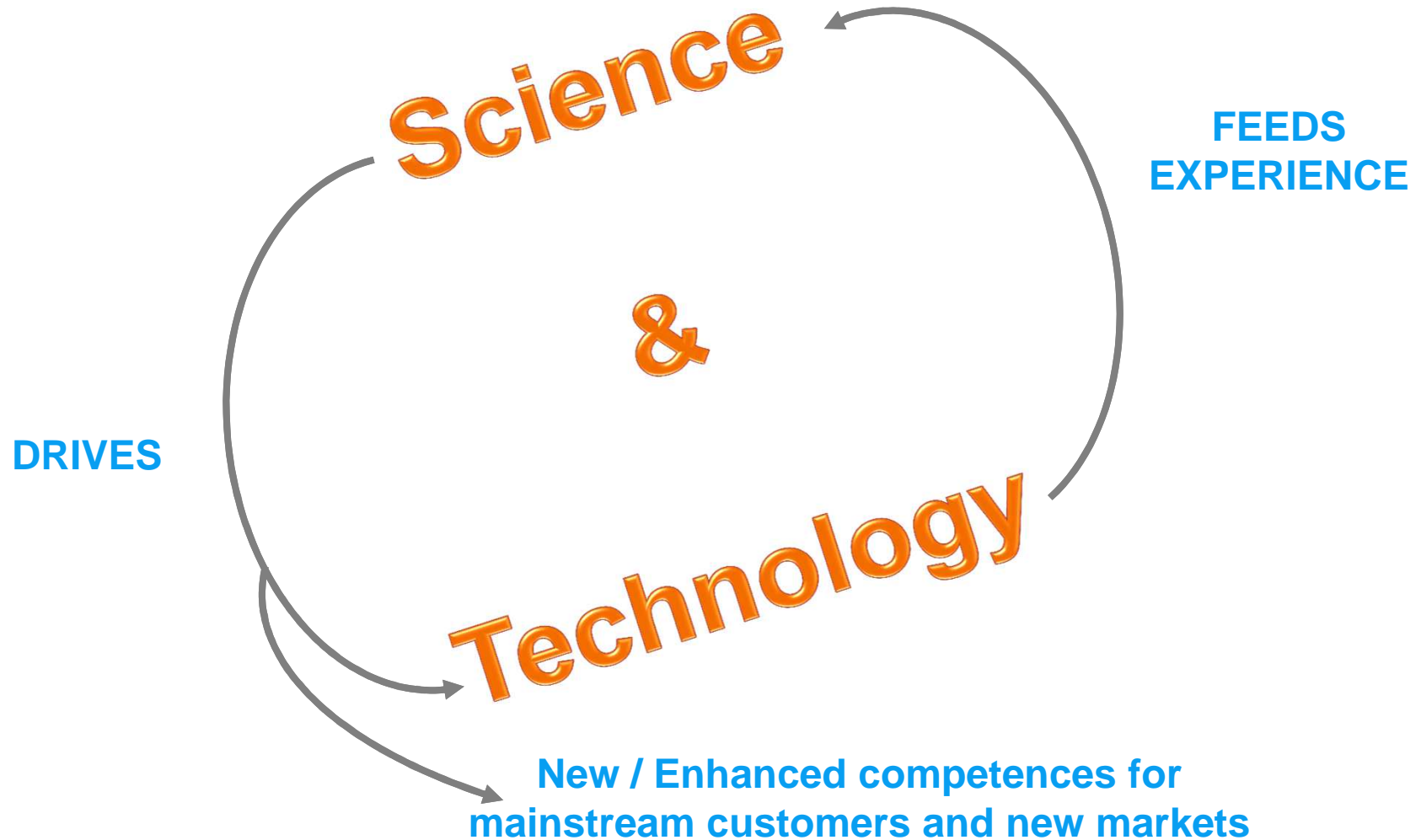


Aerospace

VDL Science & Technology

- VDL S&T addresses a cluster of (potential) customers with similar requirements and networks in the science-based community
- It is a cooperation between a number of VDL companies:
 - VDL ETG Projects
 - VDL GL Precision
 - VDL ETG Switzerland
 - VDL ETG Almelo
 - VDL Fibertech

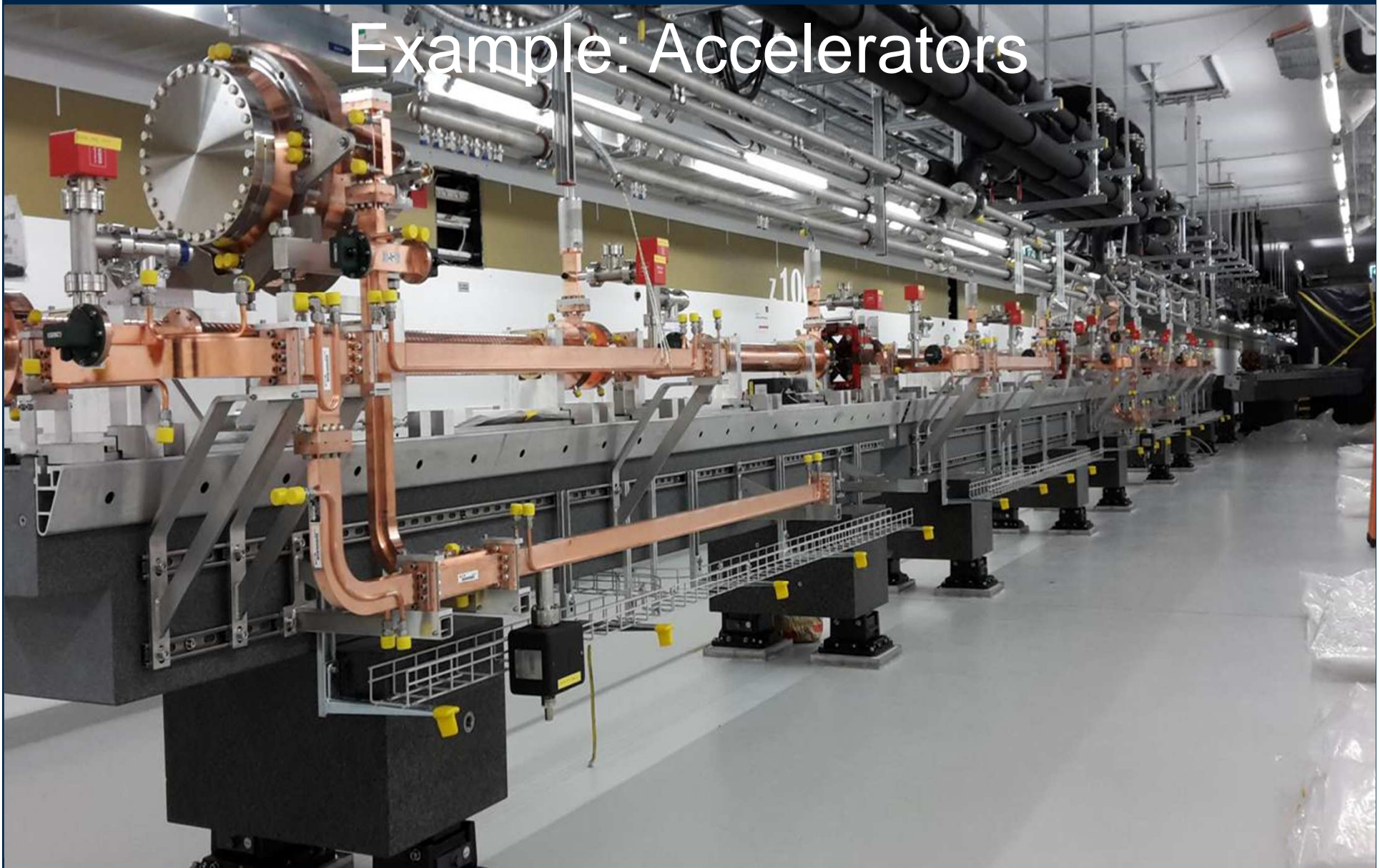
Science drives our competences and leads to new markets



So many big science projects...priority setting

- High spin-off potential (new / disruptive)
- Strengthening the technology roadmap
- Interesting business opportunity / good fit
- Good cultural fit (incl specific NWO)

Example: Accelerators





X-band structures for CLIC

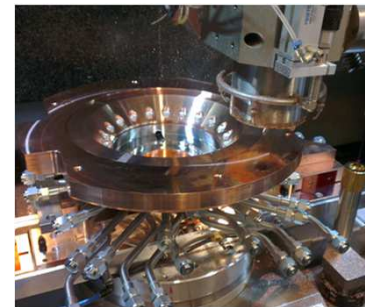
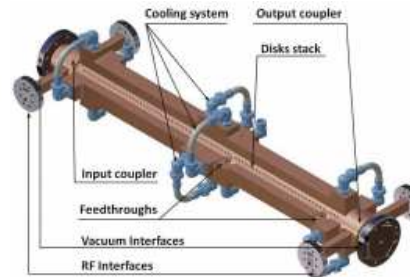
- Manufacturing strategies
- Part handling and cleaning
- Part qualification
- Next step : sub-module assembly

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

Technical drawing showing various views of the X-band structure, including a top view, a side view, and a detailed view of the iris. The drawing includes dimensions and specifications such as $0.0025 - /Pa0.025^*$ and $0.0025 - 0.08 / Ra_0.025$. A note indicates:
* - Evaluation length is equal to $(d-2*be)$ mm
Roughness is according to ISO 1302

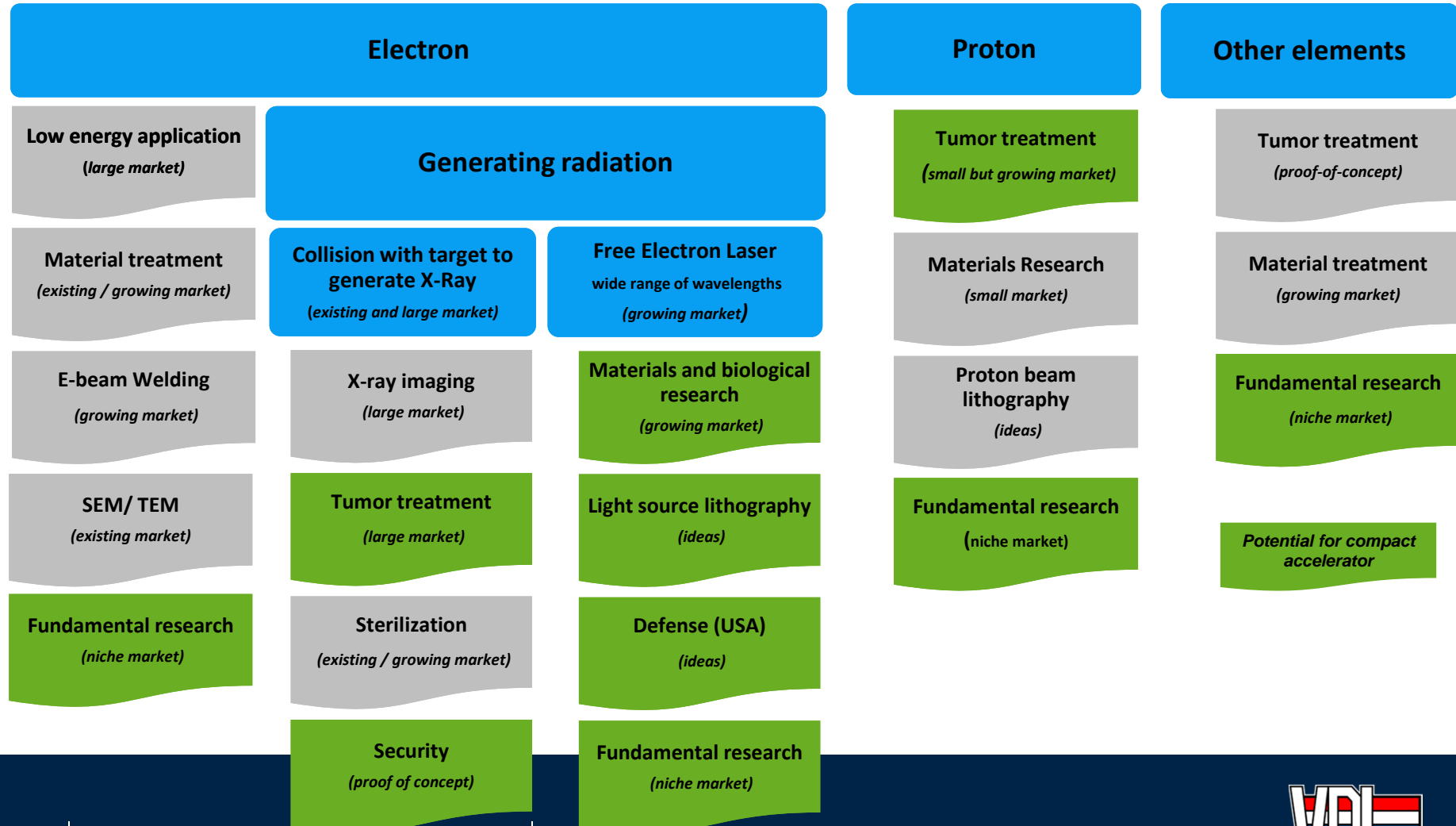


- X-band structures
- C-band structures
- J-couplers
- BOC Pulse compressor
- RF-Gun



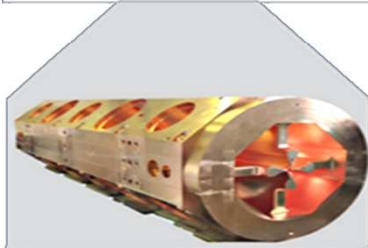
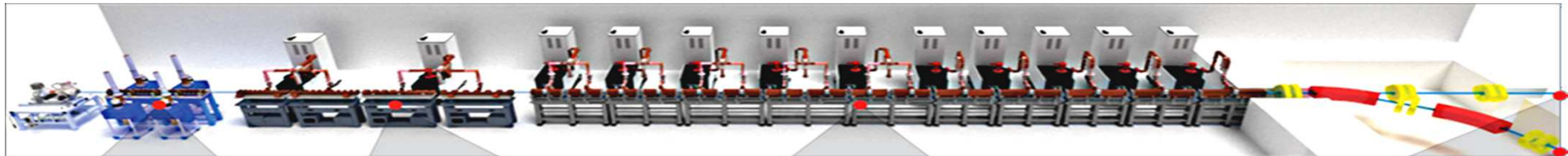
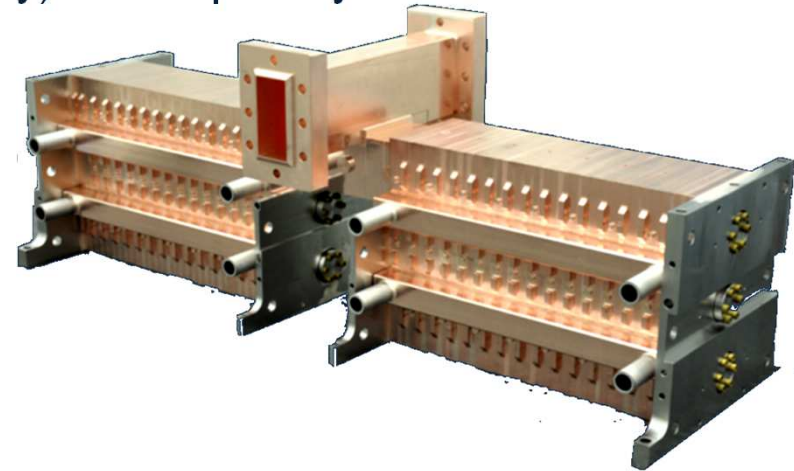
Targeting new markets for normal conducting accelerators

Applications divided into particle type

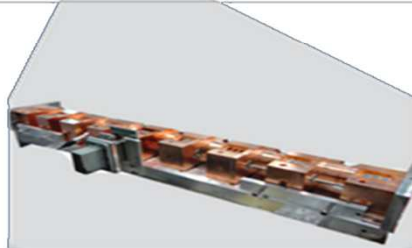


Accelerator spinoff: Proton therapy

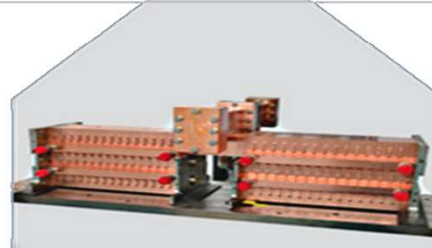
- LIGHT (Linac for Image Guided Hadron Therapy) developed by ADAM
- VDL ETG manufactures, builds and tests the accelerating modules
- VDL ETG is responsible for
 - Manufacturing redesign
 - Parts manufacturing
 - Assembly and brazing



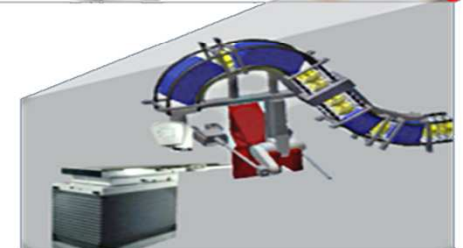
RFQ



SCDTL



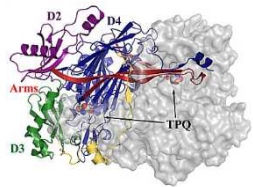
CCL



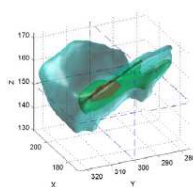
Gantry and Patient couch

Accelerator spinoff: SMART*LIGHT

- Synchrotrons are the most powerful non-destructive diagnostic tool
 - High energy X-rays
 - High brilliance
 - Coherent
 - Variable energy
- But issues with **Accessibility** / **Beam time** / **Available space**
- Need for more beam time / accessibility and on site measurements
- Synchrotron research needed in industry, health, environment and heritage studies



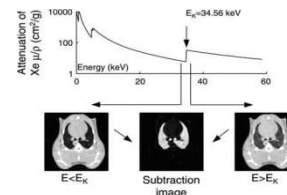
Protein crystallography



Metallurgy



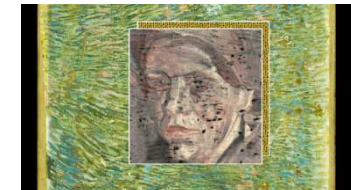
Dichromatic
coronary
angiography



K-edge subtraction
imaging

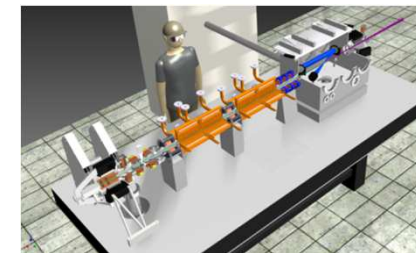


Archival research

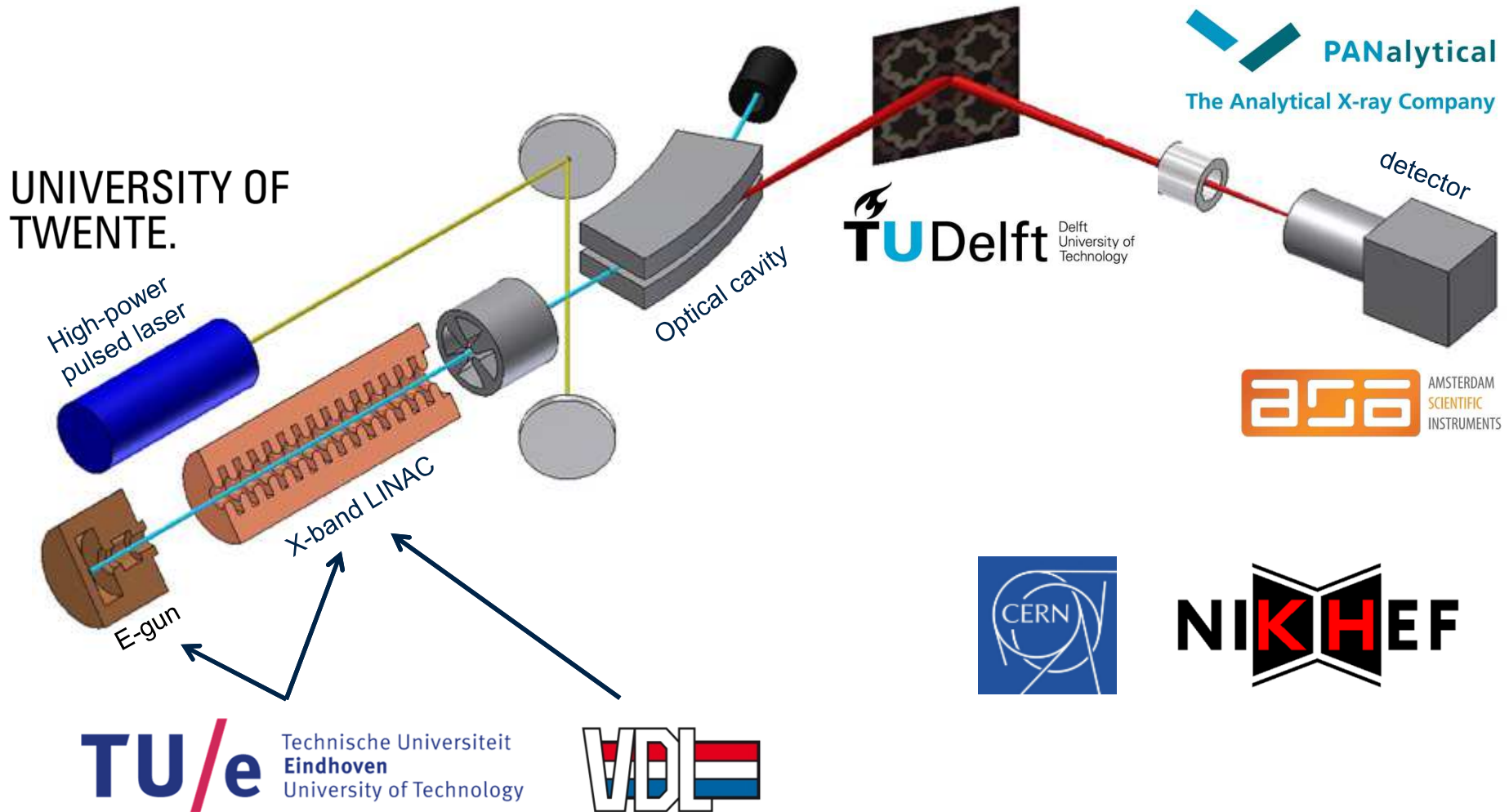


Hidden paintings

⇒ SMART*LIGHT :
A table-top alternative for synchrotron light sources



The SMART*LIGHT network



AT Advanced Accelerator Technologies AG

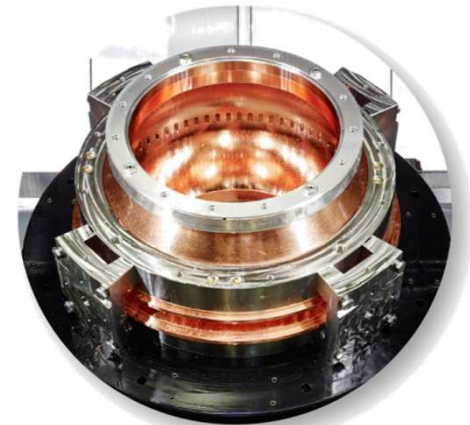
A collaborative PSI-Industry initiative for commercializing PSI's Know How in accelerator technologies, photonics and large science installations.



Components, subassemblies or complete systems based on SwissFEL technology



Precision mechanics & mechatronics, RF amps & systems, instrumentation & beam line solutions



Novel compact synchrotron radiation source

Partners :



<http://www.aa-t.ch/>



Big science & SME – how to make it work?

- For an SME, doing business with big science is very challenging:
 - Large, not transparent
 - European tendering, informal network required
 - Contradicting policies regarding SMEs
- Furthermore...typically...
 - SMEs do not have technology roadmaps
 - Focused at short term business generation, investments do NOT justify the opportunities
 - No interest in generating spin-off business