What can a particle accelerator do for industry?

Consulting Academia as a Business Model.

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Datzmann interact & innovate GmbH

Hidden topic:

“Technology Transfer”

DATZMANN interact & innovate

My Passion	My Expertise	My Mission
Particle accelerators and their applications in industry and society	Unique material characterization Proton therapy Radiation hardness testing	Bridging the gap between science and industry and enforcing technology transfer & innovation

Agenda

- Entrepreneurship as a career path
- What can a particle accelerator do for us?
- Selling Products vs. Selling Service
- My personal story
- How to start your business?

Entrepreneurship as a Career Path

Career path for a Scientist

~~1900's~~ 2020's

Academic career

Career in industry

You have a 3. option

Start-up
Spin-off

Start-up versus Spin-off

Everybody can launch a start-up!

You just need:
- Business idea
- Start a venture

Spin-off is a subcategory

You develop an idea at a university / institute

Based on this, you start a venture outside of academia

Both considered to be Technology Transfer Activities

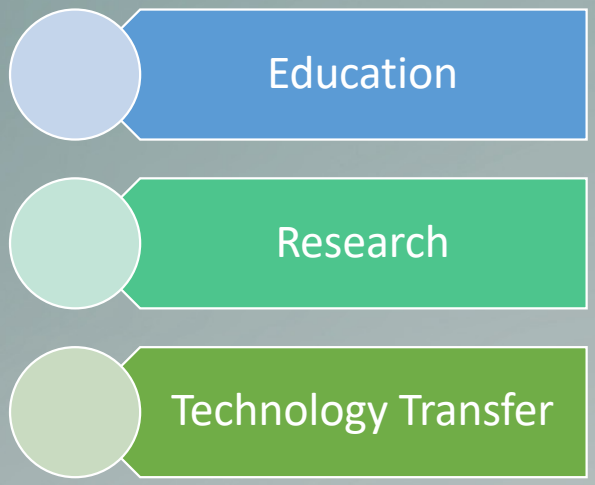
Technology transfer activities

Study on University – Business Cooperation:

Area	Activity
Education	1. curriculum co-design 2. curriculum co-delivery *(e.g. guest lectures)* 3. mobility of students *(i.e. student internships/placements)* 4. dual education programmes *(i.e. part theory, part practical)* 5. lifelong learning for people from business *(e.g. executive education, industry training and professional courses)*
Research	6. joint R&D *(incl. joint funded research)* 7. consulting to business *(incl. contract research)* 8. mobility of professionals *(i.e. temporary mobility of academics to business and vice versa)*
Valorisation	9. commercialisation of R&D results *(e.g. licencing/patenting)* 10. academic entrepreneurship *(e.g. spin offs)* 11. student entrepreneurship *(e.g. start-ups)*
Management	12. governance *(e.g. participation of academics on business boards and businesspeople participation in university board)* 13. shared resources *(e.g. infrastructure, personnel, equipment)* 14. industry support *(e.g. endowments, sponsorship and scholarships)*

Quelle: Galan-Muros et al.

Pillars of Academia



3. pillars of Academia

Pushed by governmental and academic institutions → Funding programs and support activities

Products for Research

50 years ago:
Scientists built everything on their own

Hard- and Software:

- Magnets
- Power supplies
- Vacuum components
- Electronics
- Detectors
- Software (simulation, control systems etc.)
- …

Today:
Academia buys from commercial suppliers
- Outsourcing -

Motivation for Outsourcing

Not inventing the wheel again

Lack of own resources and time

Speeding up your research

Using the expertise and the workforce of professional suppliers

Potential benefits:

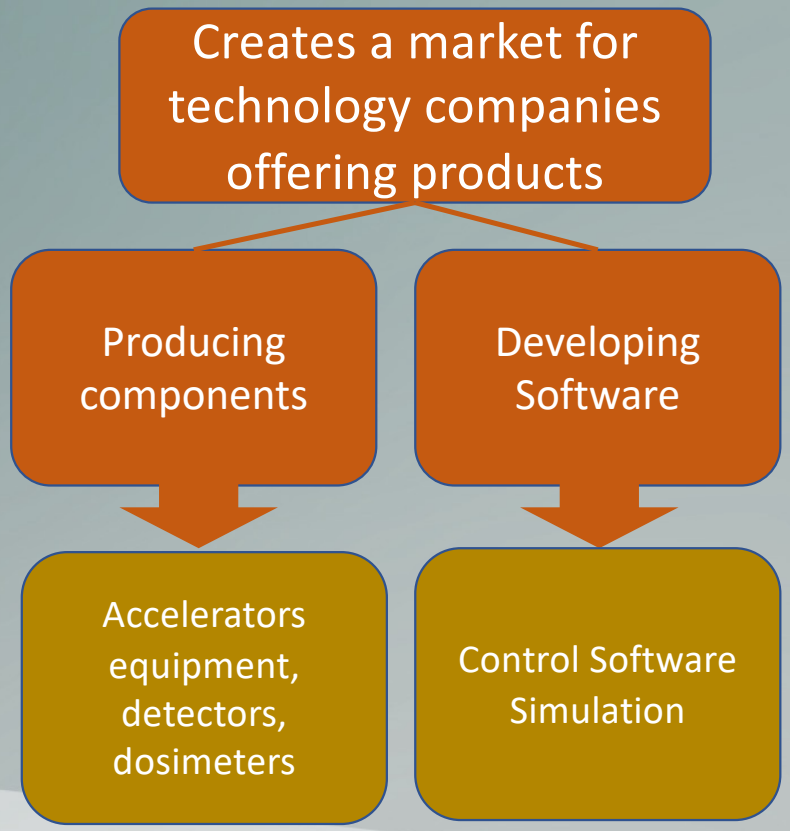
- Companies can be faster
- Products off-the-shelf (cheaper?)
- Custom-tailored products
- Companies are a reliable
- Documentation
- Maintenance
- Lifelong support
- Warranty

Selling Products to Academia

Europe's Big Science organisations' future investments and procurements worth **37 billion euros** (2022 – 2026)

→ Hardware
Software

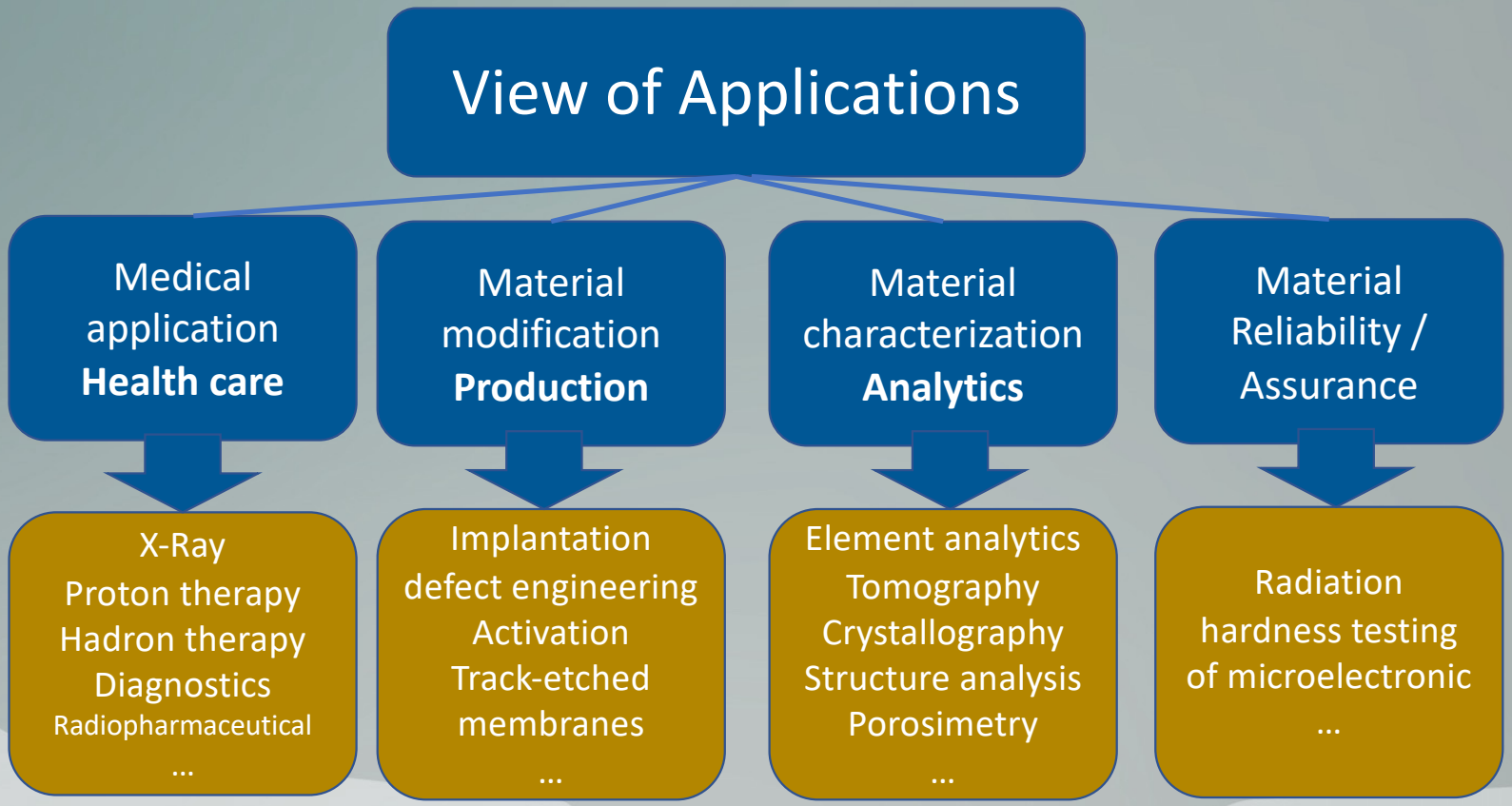
What can a Particle Accelerator do for Industry and Society?



Many of these companies are spin-offs from Academia

List is not exhaustive

What can a Particle Accelerator do for Industry and Society?



List is not exhaustive

Selling services not products?

-

Consulting Academia

Barriers for offering Products

- Challenge to transfer from prototype to “mass”-production
- Is the demand from the market large enough (niche product)
- Potentially high investments costs

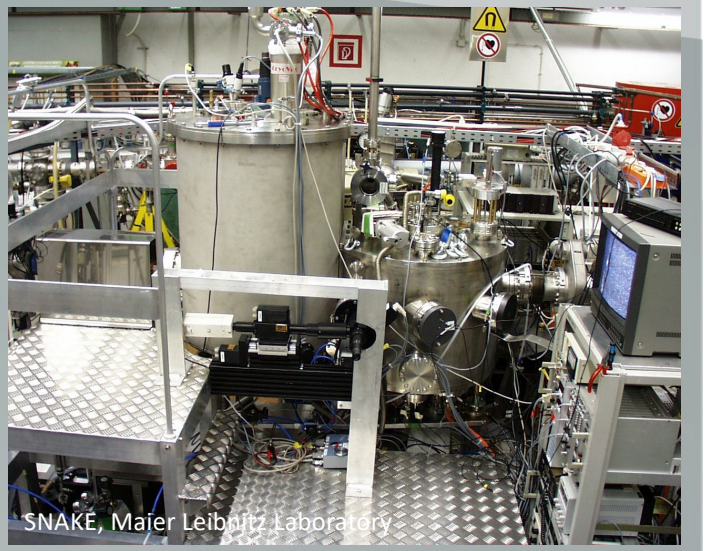
My Personal Story

How did I become a Consultant for Academia?

By chance!

"Standard" career path:

- PhD in physics
  - Building an ion microprobe for material analysis and radiobiology
- Left university
- Worked at company building a Proton Therapy Center



SNAKE, Maier Leibnitz Laboratory

My Personal Story

How did I become a Consultant for Academia?

University professor approached me

(supervisor of my PhD)

The Project:
Built new experimental setup for novel research capabilities

Motivation to outsource:

- Did not have the specific knowledge
- He knew, my PT expertise was a fit

Not inventing the wheel again

- No personal resources in his team
- Not suited for a student
- Lack of time

Lack of own resources and time

Speeding up research

Selling Services to Academia

Why did it work?

The Rationale:

- Low financial risk
- First customer
- Topic was interesting
- My expertise was a good fit
- Trustful relationship
- Large project

2016: I founded within one month

Most time consuming:
Select name of company

Selling Services to Academia

Feasibility study
- Technical project study for a proton booster at an existing particle accelerator
- To be used for research in the field of radiobiology

Cost estimation study
- What does it cost to build up a new Accelerator laboratory dedicated for materials research and medicine, from scratch?

It is a collaboration

My tasks:
- Discuss with stakeholder / experts (scientist, industry, constr. engineers…)
- Read papers
- Travel to accelerator facilities, companies
- Organize workshops
- Produce CAD drawings
- Co-supervise PhD candidate
- Write Reports


Courtesy: ENEA, Frascati

My Engagement in Technology Transfer Activities
BMBF study

Technology Transfer
BMBF Study

Research on matter at large-scale facilities. Focus on material characterization with ion beam and nuclear probes

BMBF funded study in the framework of ErUM, (2019-2022) in cooperation with Universität der Bundeswehr München

Bundesministerium für Bildung und Forschung

der Bundeswehr Universität München

Funding for Technology transfer activity

Phase 1:

- Study on status of cooperation between university groups (KFSI) and industrial users

Phase 2:

- Identifying the relevance of services for industry

Phase 3:

- Trial of proactive measures to attract potential industrial customers

Accelerator physicist
MBA degree

Phase 2 and 3

Selecting on characterization method:

Potential interest for industry

Service: Porosimetry for Membranes with Positrons

Developing a business plan

Advertising at EuroMembrane conference

- Scientific conference with **industry engagement**
- 4-day conference Nov. 2021
- Talk by Marcel Dickmann on the method

Booth for 4 days:

- **20+** people showed interest in the method
- Thereof, 9 companies

Outcome and Impact

- 2022 Chair of the 1. Technology transfer session at KFSI Ionenstrahltreffen
- 2022 Chair of the technology transfer session at SNI conference (Berlin)

INDUSTRY, INNOVATION AND TRANSFER			
Time	**Place**	**Presenter**	**Title**
Tue 10:45-11:00	Hörsaal 2	Thomas SHEPPARD	New Horizons for Catalyst Characterisation using Hard X-ray Tomography
Tue 11:00-11:15	Hörsaal 2	Arnold MÜLLER	The Ionplus AG – An example of commercializing new innovations in ion beam technologies
Tue 11:15-11:30	Hörsaal 2	Sophie BOUAT	What do large-scale facilities bring to industry?
Tue 11:30-11:45	Hörsaal 2	Simon JACQUES	Lubricating Industrial Science
Tue 11:45-12:00	Hörsaal 2	Alberto DEGIOVANNI	High frequency linacs for proton therapy: the journey from conception to industrialization
Tue 12:00-12:15	Hörsaal 2	Ralph GILLES	Neutrons are a perfect tool to study in-situ and/or operando industrially relevant topics for innovation and transfer, e.g. electromobility and gas turbines

My motivation:
- Report on the TT Study
- Show technology transfer activities with accelerators
- Highlight Spin-off companies
- Motivate young scientist for this career path

Manufacturer (company)

Intermediary (company)

Technology Transfer office

Outcome and Impact

A lot of technology transfer discussions with the “Projekträger DESY”

- Actionplan: BMBF-Transfer (2023)

- 2021: I was mentor and lecturer at

CAROTS STARTUP SCHOOL
SCIENTIFIC SERVICES BROUGHT TO LIFE

My Engagement in Technology Transfer Activities

Radiation hardness testing

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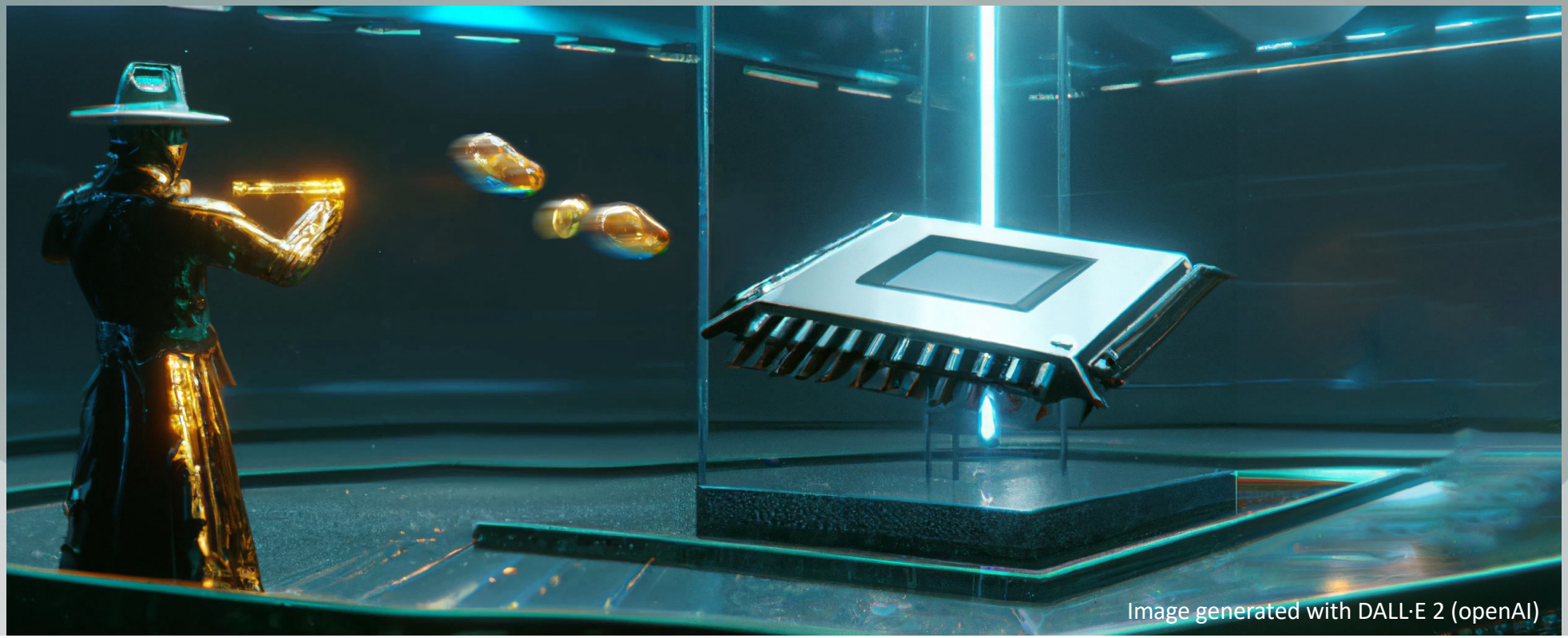
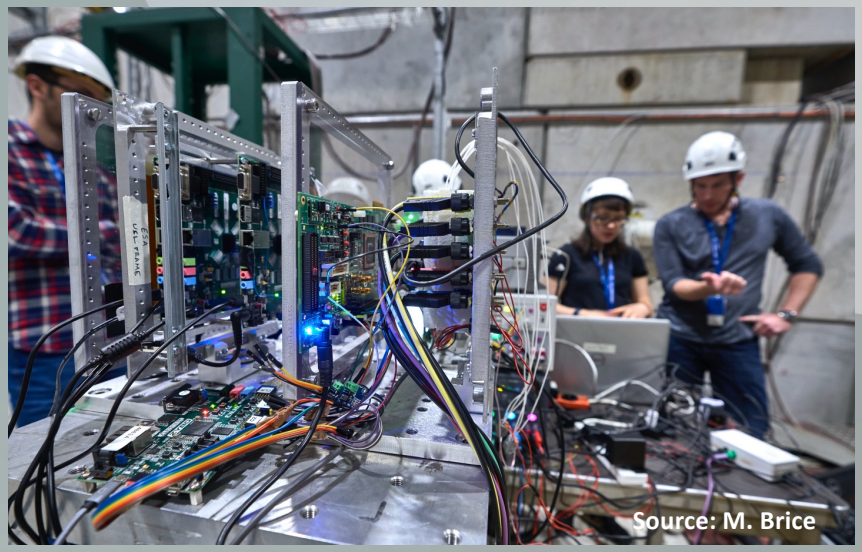


Image generated with DALL·E 2 (openAI)

Radiation Hardness Testing

- EMBA study program
- Need a Master Thesis
- Approach ESRF
- Big survey

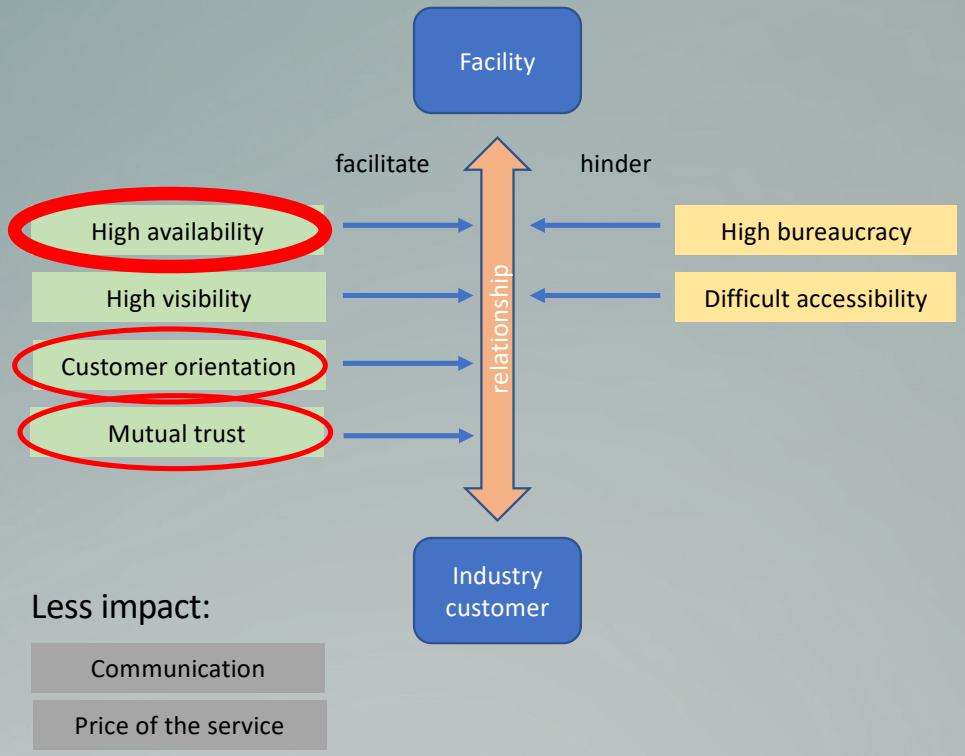


Expert-Interviews with stakeholders from	facilities	customers
Facilities / customers interviewed	15	9
Interviews conducted	22	11
Average length of recorded interviews	50 min.	50 min.

Success factors and barriers in university-industry cooperation:

Case study of radiation hardness testing services for microelectronic devices

Influencing factors for successful relationship



In a Nutshell

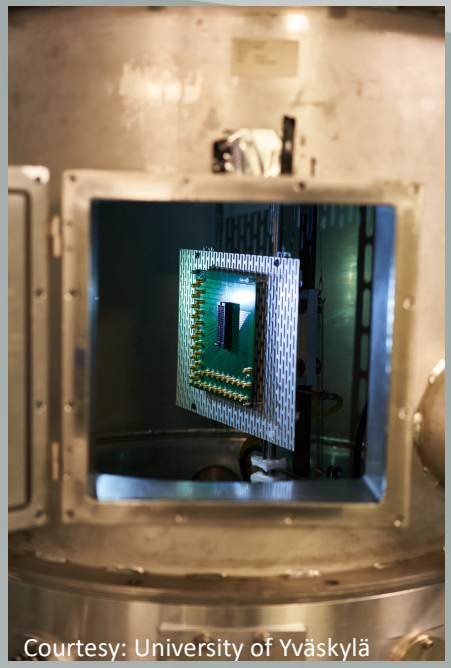
The key to successful relationship facility – customer

Creating availability for the service
Willingness to fill it with industry customers

Facility needs an intrinsic motivation

Challenges:

- The demand for tests is growing (New space, functional safety, etc.)
- The supply for beamtime is not a free market


Courtesy: University of Yväskylä

RADNEXT

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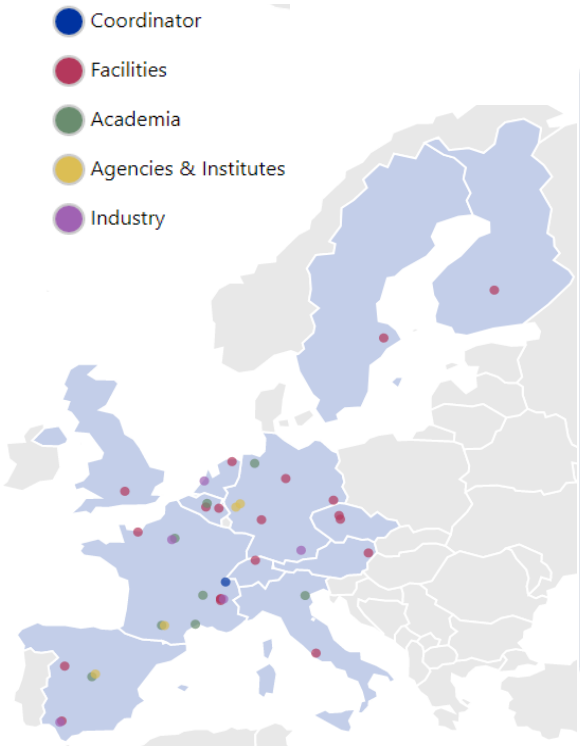
EU-facility infrastructure project

- Master Thesis was my “passkey”
- Jan. 2020 contribute to proposal preparation
- Nov. 2020 RADNEXT approved
- RANDEXT Start June 2021



Coordinator: CERN

- 21 **irradiation facilities**
- 8 **academic partners** and 9 academic supporters
- 4 **agencies and research institutes**
- 5 **industrial partners** and over 20 industry supporters

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No **101008126**

My engagement in RADNEXT

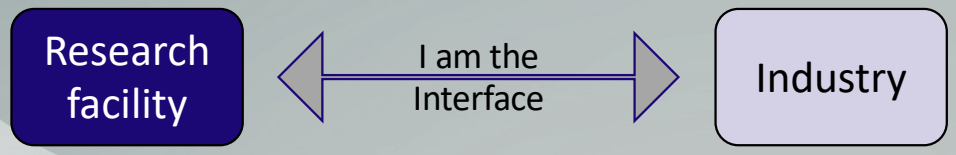
Study on best practices:
- Goal to improve the service
- Develop a training program

- Build the link to industry
- Organize workshops dedicated for industry
- Represent / Promote RADNEXT at Conferences (Booths, talks)
- Facility survey and database
- General outreach and dissemination

Outcome and Impact

With regards to the program:

- Matching needs from industry with facility offer
- Create more availability for testing services
- Beamtime at facilities for free (funded by EU)
- Support newcomers (Start-ups) from industry
- Connect the community (facilities, users, academics, agencies)
- European non-dependance and competitiveness



My company

- I gained a lot of visibility
- Met stakeholders in the field (conf.)
- Learned a lot about the field

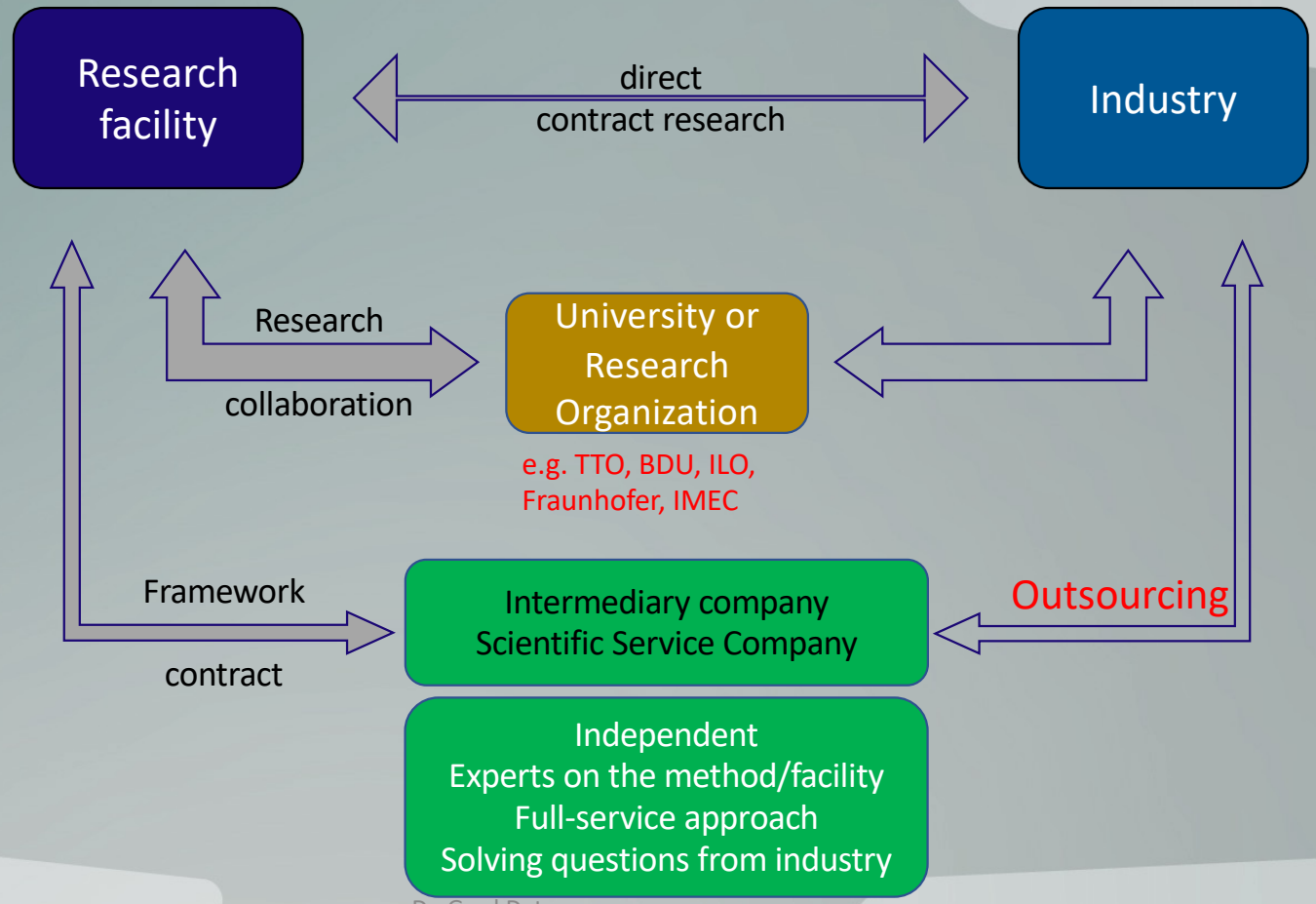
New **customers**

Topics

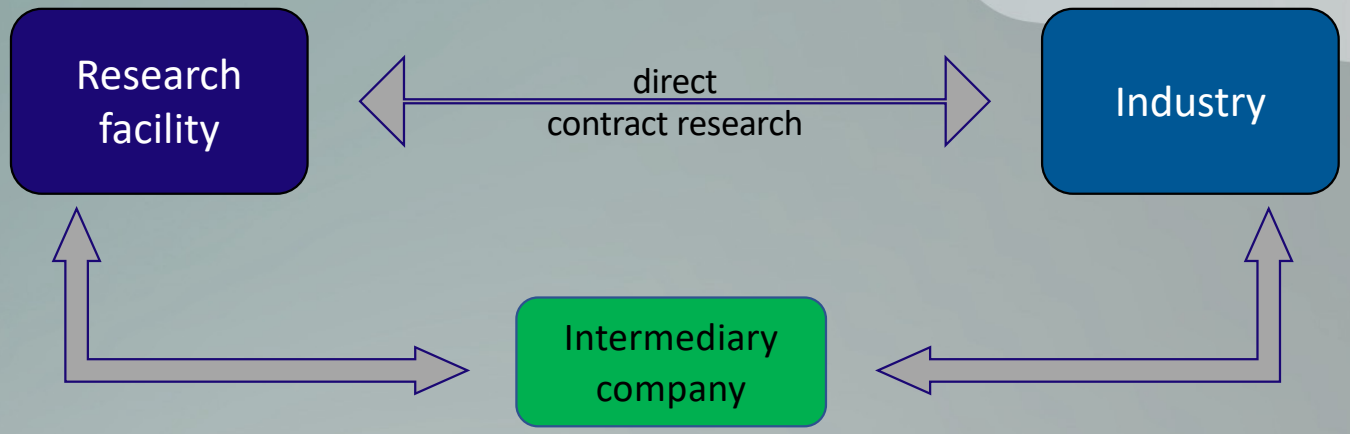
- Consulting facilities
- Developing business models

Intermediary Companies
Scientific Service Companies

Material Characterization as a Service



Material Characterization as a Service



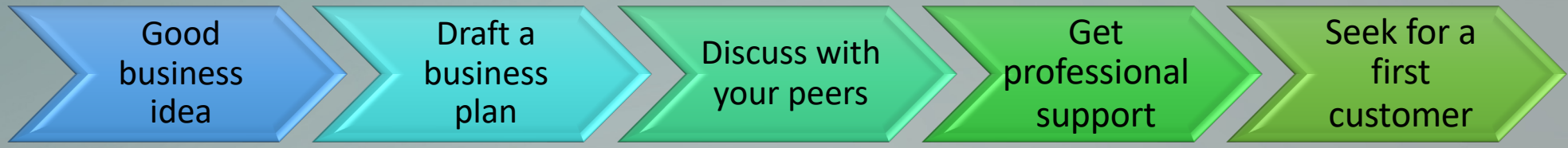
Intermediary Companies in the framework of

Synchrotron X-rays facilities

Radiation hardness testing

How to start your business?

The First Steps



4 P´s in Marketing

Product / Service

Price

Place

Promotion

Develop your Business Plan

Shaping your business idea

- What is your expertise?
- What is you Unique Selling Proposition (USP)?
- What is your Intellectual Property?
- What resources do you need?
- How to you acquire your customers?
- What kind competition do you have?
- Why should your client contract you?
- How can you position yourself as expert?
- …

Start with a business model canvas

Perform a SWOT Analysis

Discuss with your peers

Pitch your ideas (Sell yourself)

Do interviews with stakeholders

The Business Model Canvas

Designed for:	Designed by:	Date:	Version:

Key Partners	Key Activities	Value Propositions	Customer Relationships	Customer Segments
	Key Resources		**Channels**	

Cost Structure	Revenue Streams

DESIGNED BY: Strategyzer AG
The makers of Business Model Generation and Strategyzer

Strategyzer
strategyzer.com

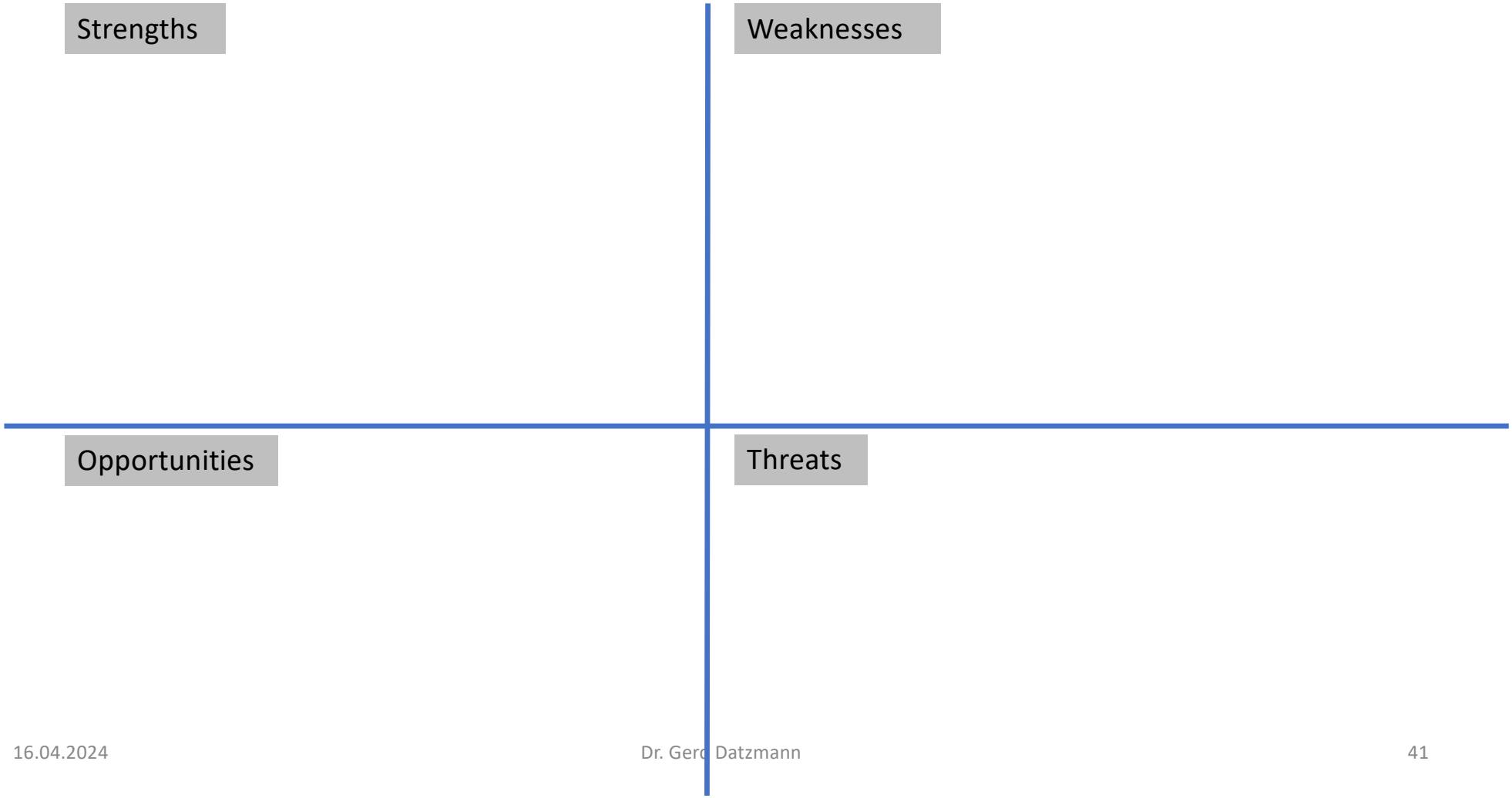
Focus your Offer

- In case you have more than one value proposition
- Fill a canvas for each proposition
- Evaluate the best option
- Focus on this option

Don’t try to be a
“general store”
“Gemischtwarenladen”

Start with a simple and easy service provision

SWOT analysis



Support for You

- Attend Start-up schools
- Look for mentors
- Get support from your university / institution
  - Start-up consultancy
  - Technology Transfer Offices (TTOs),
  - Business Development Units (BDUs)
  - Industry Liaison Offices (ILOs)

Schools dedicated for scientists:

- HEPTrepreneurs Training School @GSI/FAIR
- DESY Start-up school
- CERN

4 P´s in Marketing

Product / Service

Price

Place

Promotion / Sales

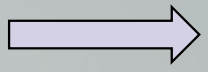
Sales in the academic environment

Channels:

- Scientific conferences / workshops (select)
  - Oral presentations / Posters
  - Moderate or chair sessions
  - booth
  - Networking
  - Contacting (renowned) speakers
  - Conducting interviews or surveys (questionnaire)
- Social Media (**LinkedIn**, Research gate)
- Webinars
- Website (a colorful business card)
- Scientific publications
- Be part of associations, committees, platforms

Visibility is key

Thought leadership



Engage in the community (for free)

Dare to START - UP

There is a huge potential!

There is lots of support!

There is plenty of funding options!

Black	White
0% start-up	100% start-up

There might be options to stay part-time at academia while starting a business


Thanks for your attention
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