Cooperation Between Industry And Research Institutes

a personal experience
Note: I was on both sides....

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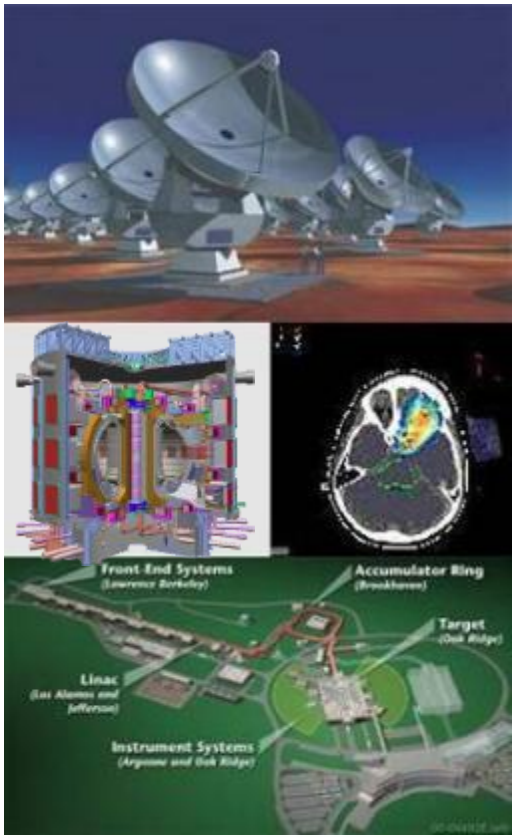
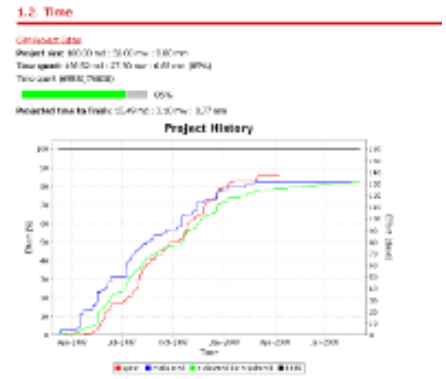
The Company Cosylab

- **Worldwide leader** for control system integration of nuclear accelerators and large physics facilities, **chosen by the majority of large accelerator projects**

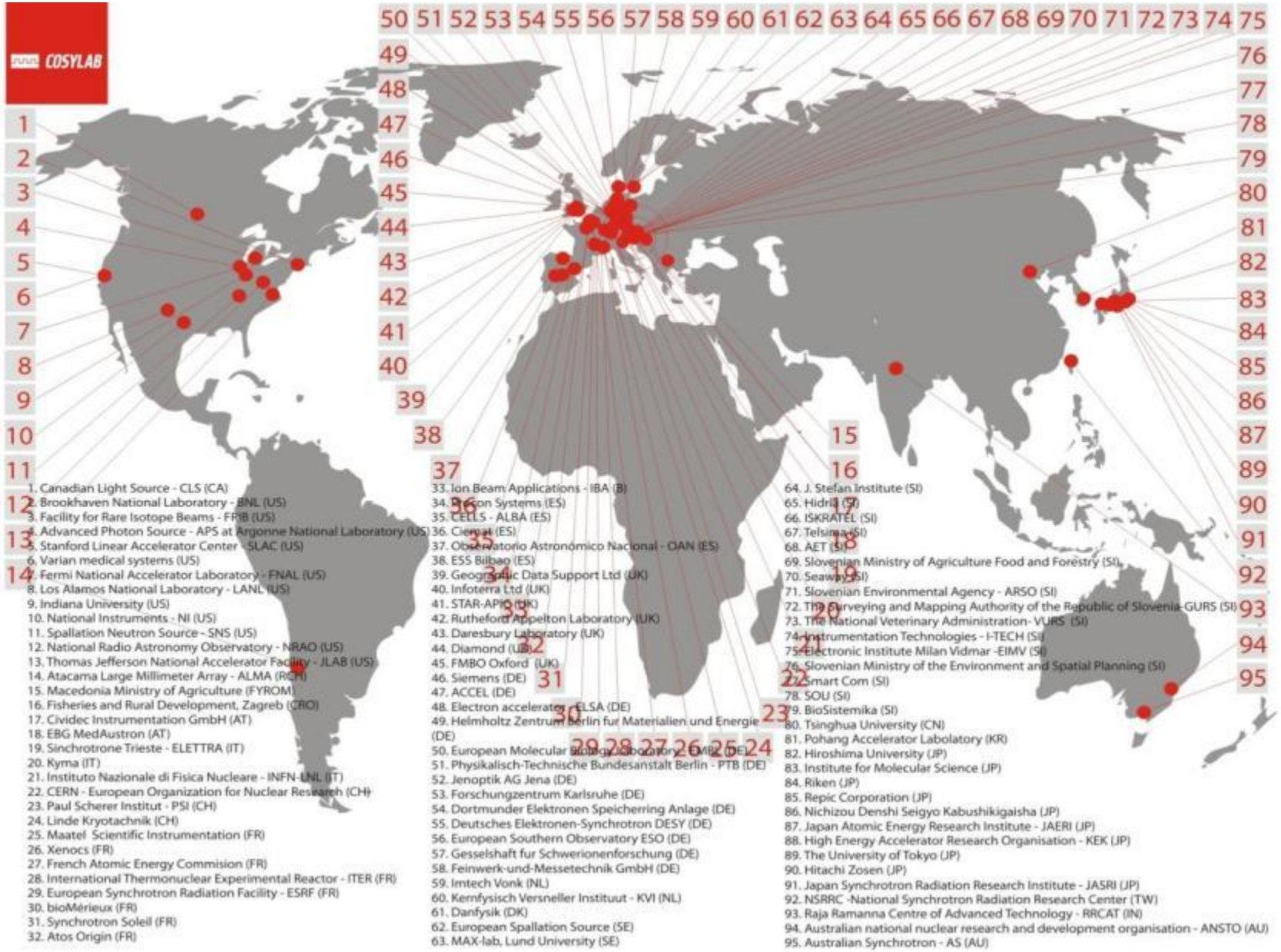


- We develop **state-of-the-art electronics and software**.
- We **integrate** them into mankind‘s **most complex systems**.



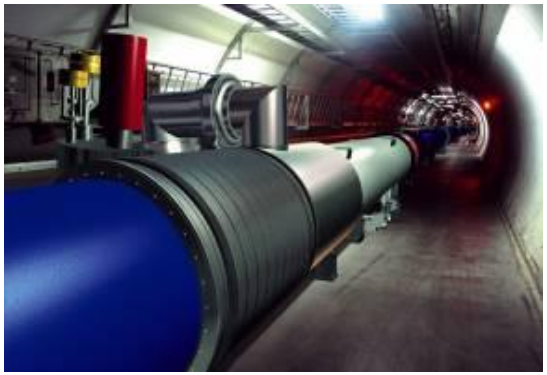
Customers From Nearly All Major Labs Worldwide

COSYLAB



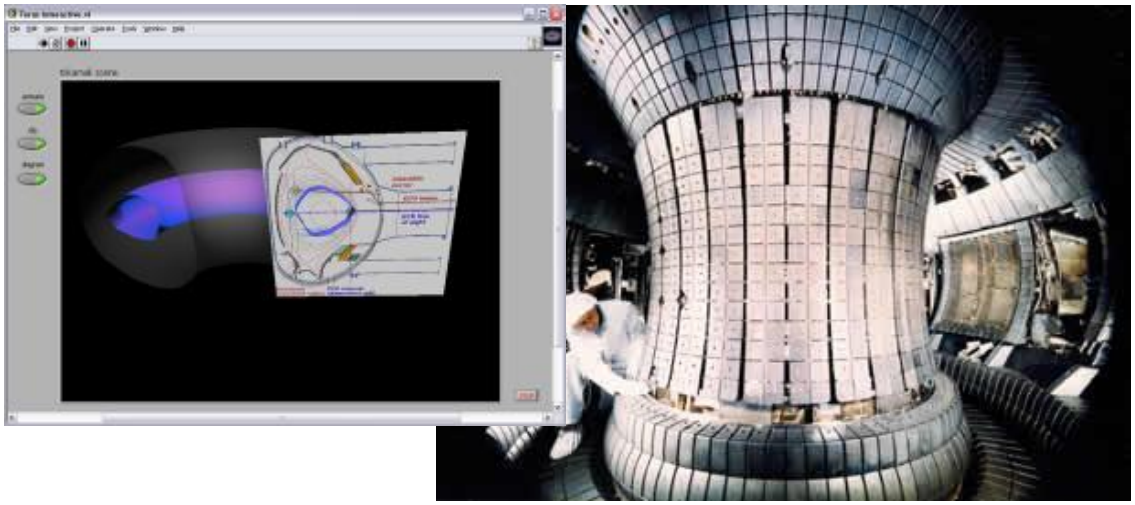
We Participate at 6 of the 10 Largest Big Physics International Projects

- Radiotelescope: ALMA (Munich, Atacama Desert)
- Neutron source: SNS (Oak Ridge), ESS (Lund)
- Nuclear physics: FAIR (Darmstadt), LHC (CERN)
- Fusion: ITER (Cadarache)



CERN Large Hadron Collider

"the most powerful instrument on earth"



ITER

"one of the most challenging and innovative scientific projects in the world today"

Who are we?

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- 60 FTE engineers, developers and system architects
  - additional ~30 students in the pipeline
- Branches in the USA and Japan

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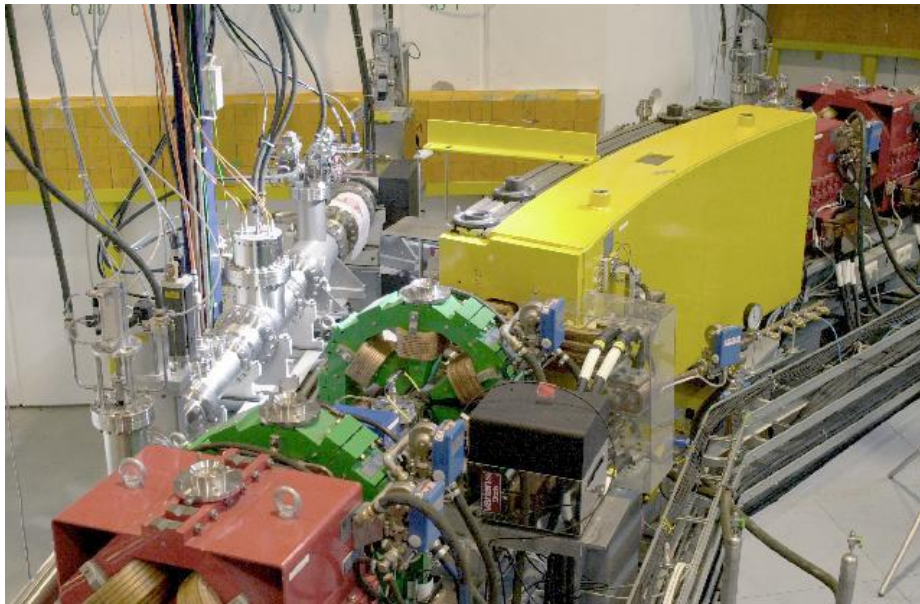
Where is Slovenia?

Cooperation On A Project

- ANKA light source, Karlsruhe Germany
  - Construction phase 1997-2000
- Cooperation: Danfysik – J. Stefan Institute for Forschungszentrum Karlsruhe
  - Danfysik built turn-key booster
  - JSI was developing control system for whole ANKA
  - Tight cooperation to use ANKA control system directly for booster
    - No contractual relation!
    - Just good spirit



But Where To Get All The People?

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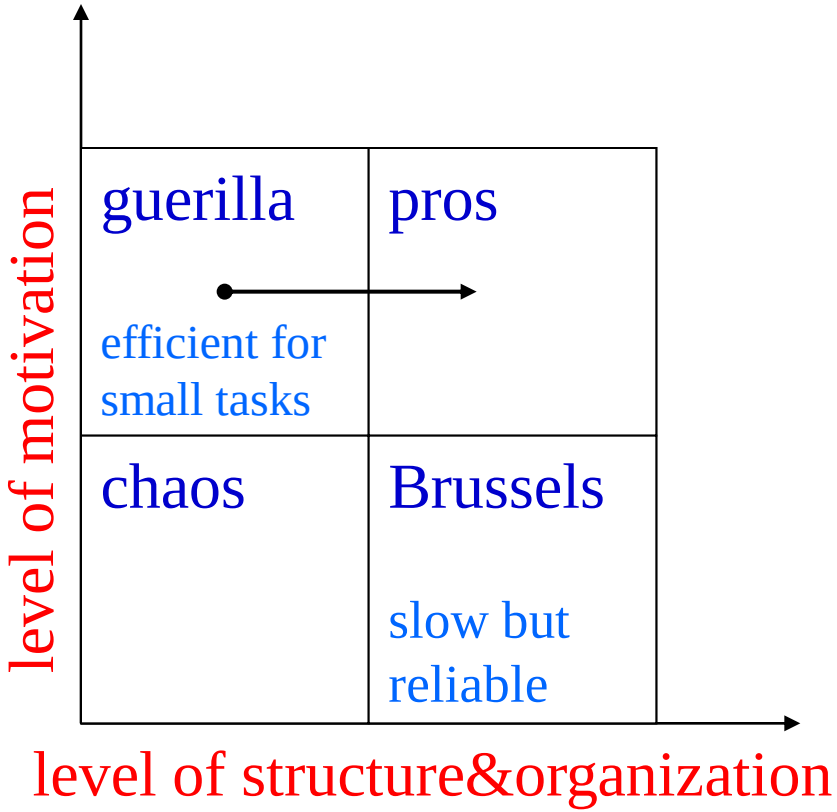
- Undergraduate Students !

- Fun to work with
  - can be motivated
  - learn quickly
- modern technologies allow almost any reasonable solution to work properly
  - who cares about project management anyway?



Next step: Spin-Off

- Money ?
  - Time = Money
  - Knowledge = Power
  - Power = Work / Time
  - ….
  - **Money = Work / Knowledge**
- Start spin-off company
  - keep existing way of work and life
    - team members are co-owners
    - tightly connected to institute
    - continue to recruit new students as before

Not How, But Who Does It

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- **A real "Spin-off"**
  - 1 researcher and 5 graduates must earn their living
  - Research competence and business culture
- **Getting the best people**
  - Recruit the most talented undergraduate students
  - Add culture and loyalty (also through shares)
  - Money is less important than one thinks
    - it's a negative motivator
    - Must find positive motivators, too!
  - Now over 50 students in the pipeline, from simple exercises to production work

Cooperation: In-house or Industry?

- For in-house: maintenance, upgrades
- Wrong!
- In-house people are smart: but get N different solutions
- Nobody is writing documentation unless forced
  - "Outsourcer" is forced, because of payment
  - In-house person will just tell you, until she/he is gone
- In-house knowhow rests with people, not the lab
- Outsourced knowhow from competent suppliers is like an escrow vault:
  - You pay, but it is well kept for you
  - Over the whole lifetime of the project

Framework Agreements

ESS

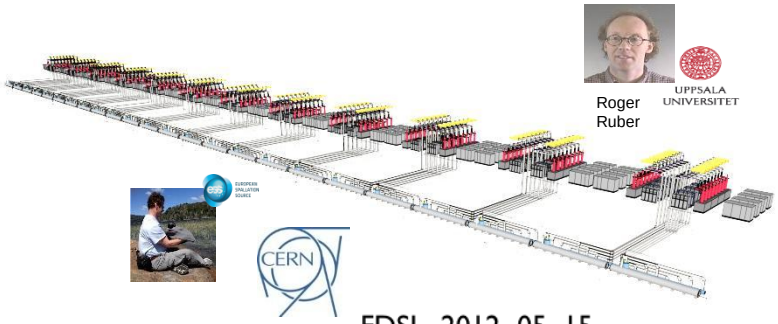
17 Partners today

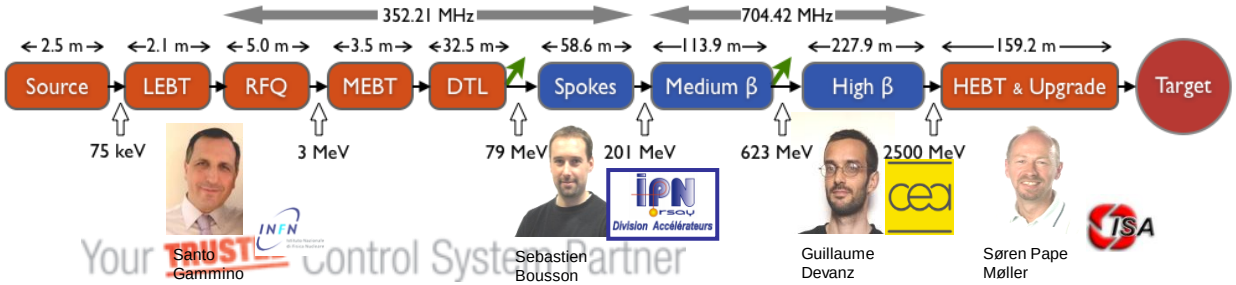
Investment: 1478 M€ / ~10y
Operations: 106 M€ / y
Decomm. : 346 M€
(Prices per 2008-01-01)

Facility for the search of new states of matter (ie new materials)

Proposals for nEDM, muons, neutrino physics are being studied

5 MW long pulse source:
- -2.86 ms, 50 mA pulse current, 14 Hz
- -Protons (H+)
- -High availability, >95%
- -First neutrons 2019 with 7 instruments and completion 2025 with 22 instruments at 5 MW operation





The Three Phases of Non-cooperation

1. We will cooperate, but we don't know yet what
2. We have some specs, but we can handle them ourselves
3. We should have cooperated with you, but now we have already invested so much of our work that we can not justify throwing it all away

- Reminds me of unsuccessful dating ☺

Real Problems

- It's faster to do it yourself than to write specs
  - True, but if you don't write specs for yourself, you'll be in trouble later
- Specs, targets are not clear, can't control cost
  - True, but then also your own cost wouldn't be under control
  - Let's make a fixed price contract, if the effort deviates more than by 10-20%, we renegotiate the contract.
- In-house people can fix problems overnight
  - True: keep one person permanently at lab to collect requests and make quick fixes

The Right Way to Outsourcing: Rightsourcing (you name it!)

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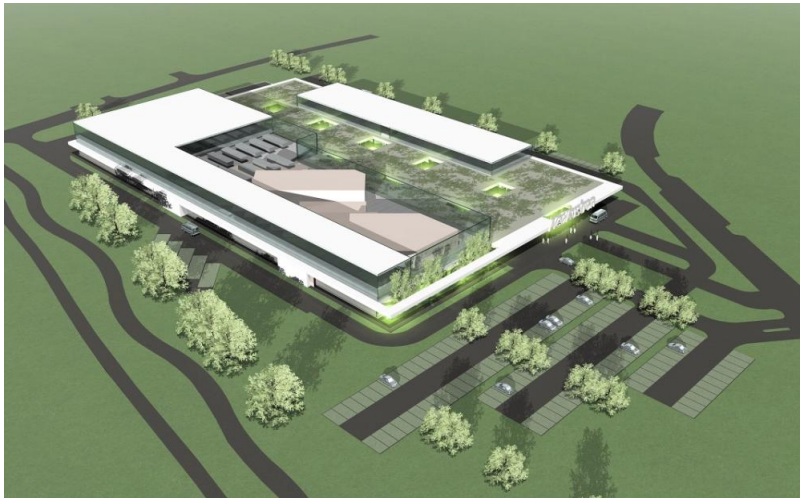
- start with smaller projects (2-4 man-weeks)
- regular visits or work on-site
- Get benefits from both “in-sourcing” and “out-sourcing”:
  - 1 person on-site (gather requirements, communicate with customers, organize, support, service…)
  - expert team at home, professionally organized and managed
  - Benefits for the lab:
    - pay only one person, get an expert in every area
    - scientists retain the established work practice: (almost) no specs, creative academic environment, ask and get (almost) next day
    - value for money (efficiently managed, optimized procedures, no cure no pay!)
    - Lifetime support (see what happened at CERN PS)

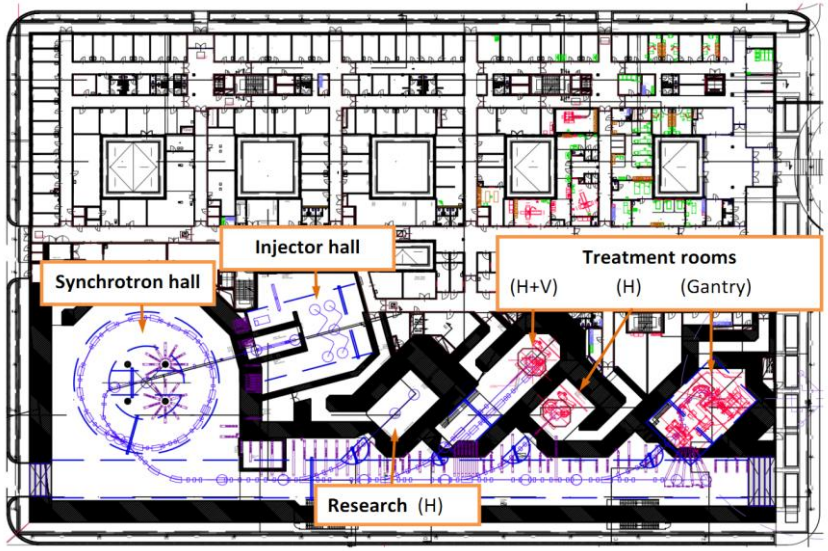
Licensing MedAustron Controls

- Proton and carbon ion therapy
- Clinical and non-clinical research
- 3 medical irradiation rooms
- 2015 – medical operation

- **We are the core team for the control system:**
  - Ion source integration
  - iLLRF integration
  - sLLRF integration
  - Power converter controller
  - Timing system (synchronization)
  - Front end control system (FECOS)
  - Signal acquisition distribution system (100+ nodes)



Wiener Neustadt, Austria



Joint Venture with Sincrotrone Trieste (Italy)

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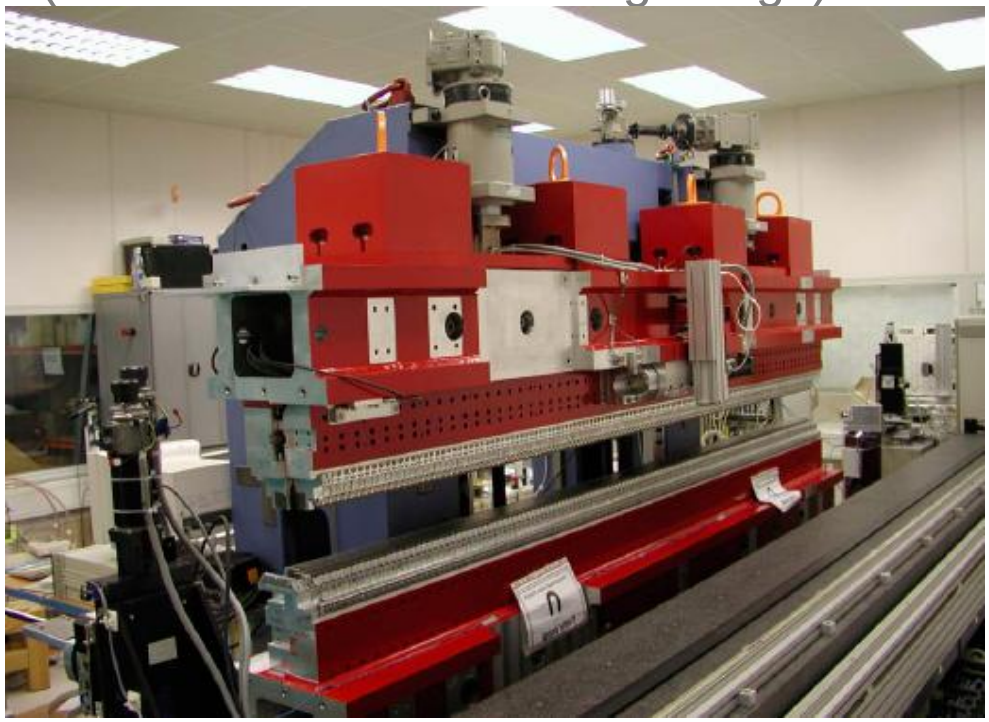
- Kyma, a company to produce undulators for synchrotron radiation light sources (FELs and electron storage rings)



- Buzzword compliant: Public-private partnership, Technology transfer, Cross-border cooperation
- Need to master both the research and business cultures, join them effectively and get them to cooperate

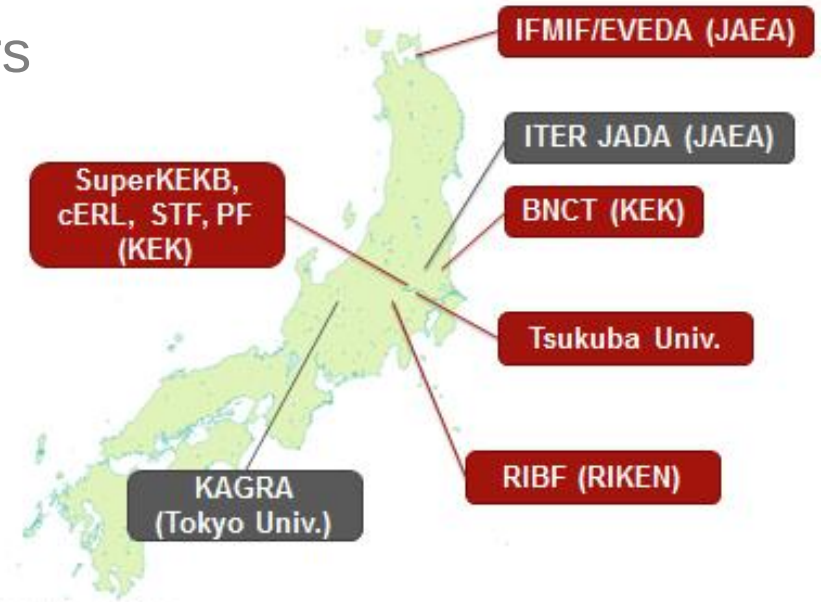
A Different Kind Of Cooperation

- to gain market knowhow and find new employees

- Branch in Japan
- Led by prof. emeritus Shin-Ichi Kurokawa, retired head of all accelerators at KEK (Tsukuba)
  - First work for KEK ☺
  - Identified other potential customers

- Still lost first 2 tenders

Map of Major Potential Customers



Your TRUSTED Control System Partner

So is Cooperation with Industry Possible?

- yes, but...
  - you must first choose the right company, one with good understanding of your field and with proven competence
- Even if not, it is wise to write specifications anyway
- We believe Industry can **deliver extra value** to in-house development of control systems:

"Do what you do best
and let others do the rest"

Summary: Types of cooperation

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- Joint R&D
  - And how great this is (I didn‘t talk about that)
- Work together on projects
- Spin-off
  - Get really rich, but risky
    - I still don‘t have a Porsche ☺
- Framework agreement: industrial suppliers to institute during build-up of project (write specs together)
- Licensing
- Joint-ventures between institutes and industry
  - Buzzword compliant
- Industry gets lab people and market know-how
  - Nice job if you‘re experienced and a networker