

MAXIV



A national user laboratory operated by
Lund University



MAX IV – Facility, organization and some challenges

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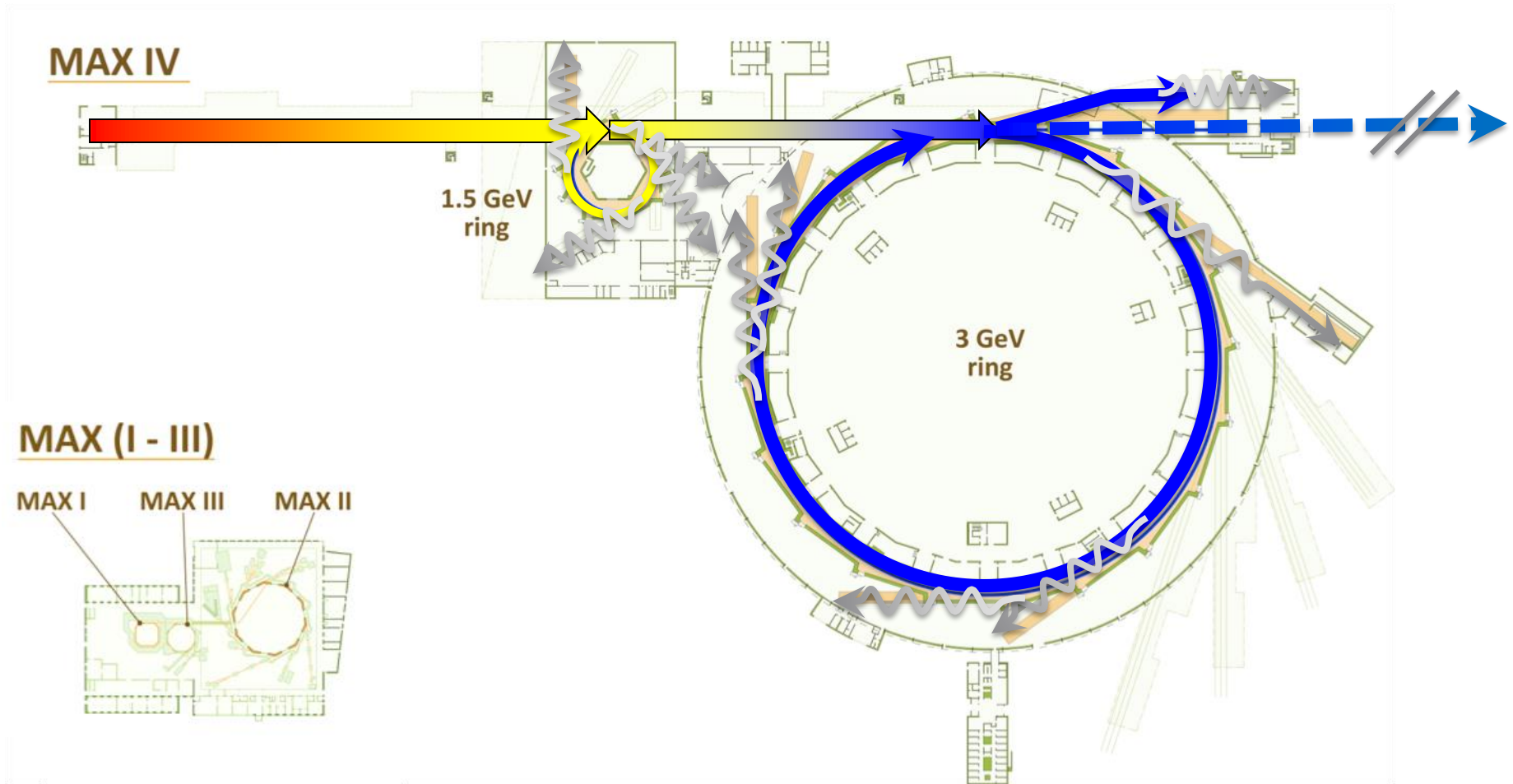
The MAX IV facility



FOJAB arkitekter SNØHETTA

MAXIV

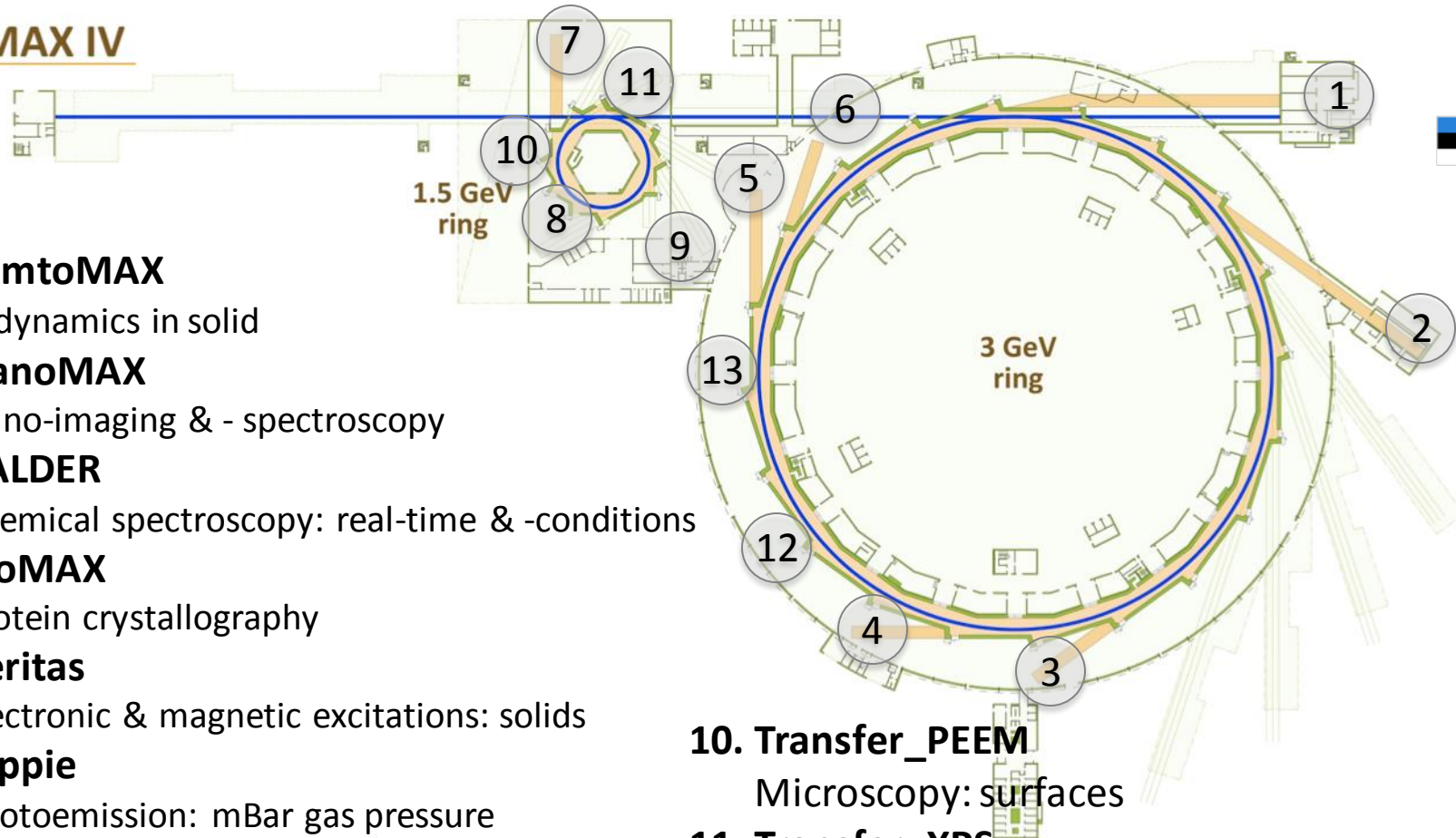
MAX IV – an overview



Linac	1.5 / 3 GeV
Length (m)	300
Bunch charge	100 pC @ 10 Hz
Pulse (FWHM)	30 fs – 5 ps
Full energy injector	1.5 / 3 GeV

Rings	3 GeV	1.5 GeV
Circumference (m)	528	96
Cells / ID's	20 / 19	12 / 11
Lattice	7BA	DBA
Emittance (nm rad)	< 0.3	6
Beam (σ in μm) [H x V]	50 x 6	184 x 13

MAX IV



1. FemtoMAX

fs dynamics in solid

2. NanoMAX

Nano-imaging & -spectroscopy

3. BALDER

Chemical spectroscopy: real-time & -conditions

4. BioMAX

Protein crystallography

5. Veritas

Electronic & magnetic excitations: solids

6. Hippie

Photoemission: mBar gas pressure

7. ARPES

Electronic structure: solids

8. FinEstBeaMS

Electronic structure: gases, aerosols

9. SPECIES

Electronic & magnetic excitations: surfaces

10. Transfer_PEEM

Microscopy: surfaces

11. Transfer_XPS

Electronic structure: surfaces & gases

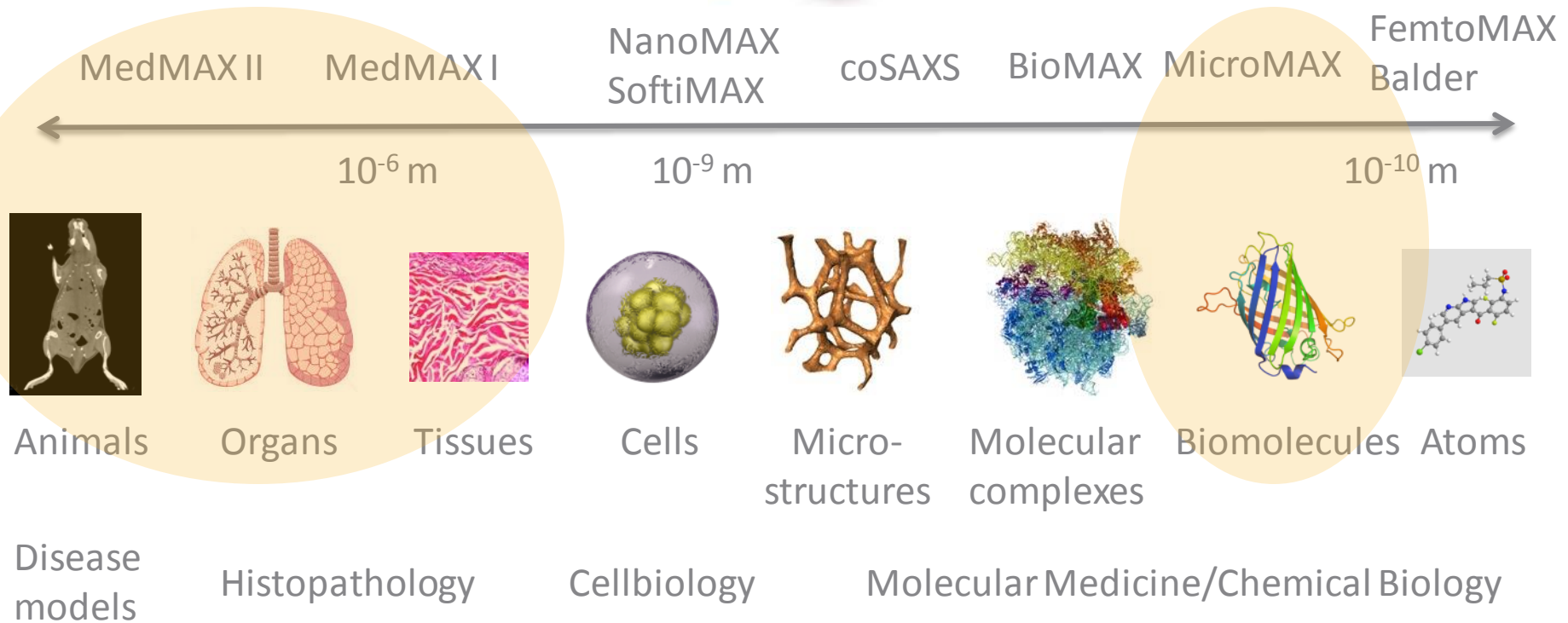
12. CoSAXS

Geometric structure & correlation: (bio) liquids

13. SoftiMAX

Microscopy & method development

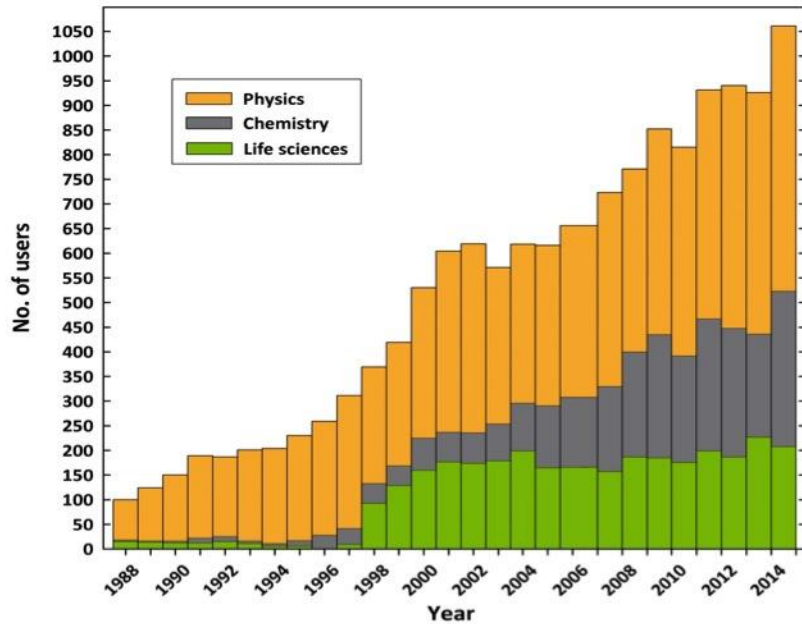
Biology – from atomic to anatomic



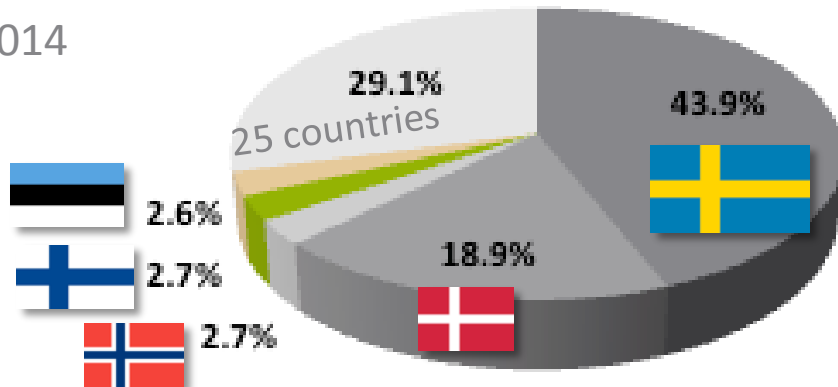
MAX IV a National User Laboratory

Academic [Peer review]

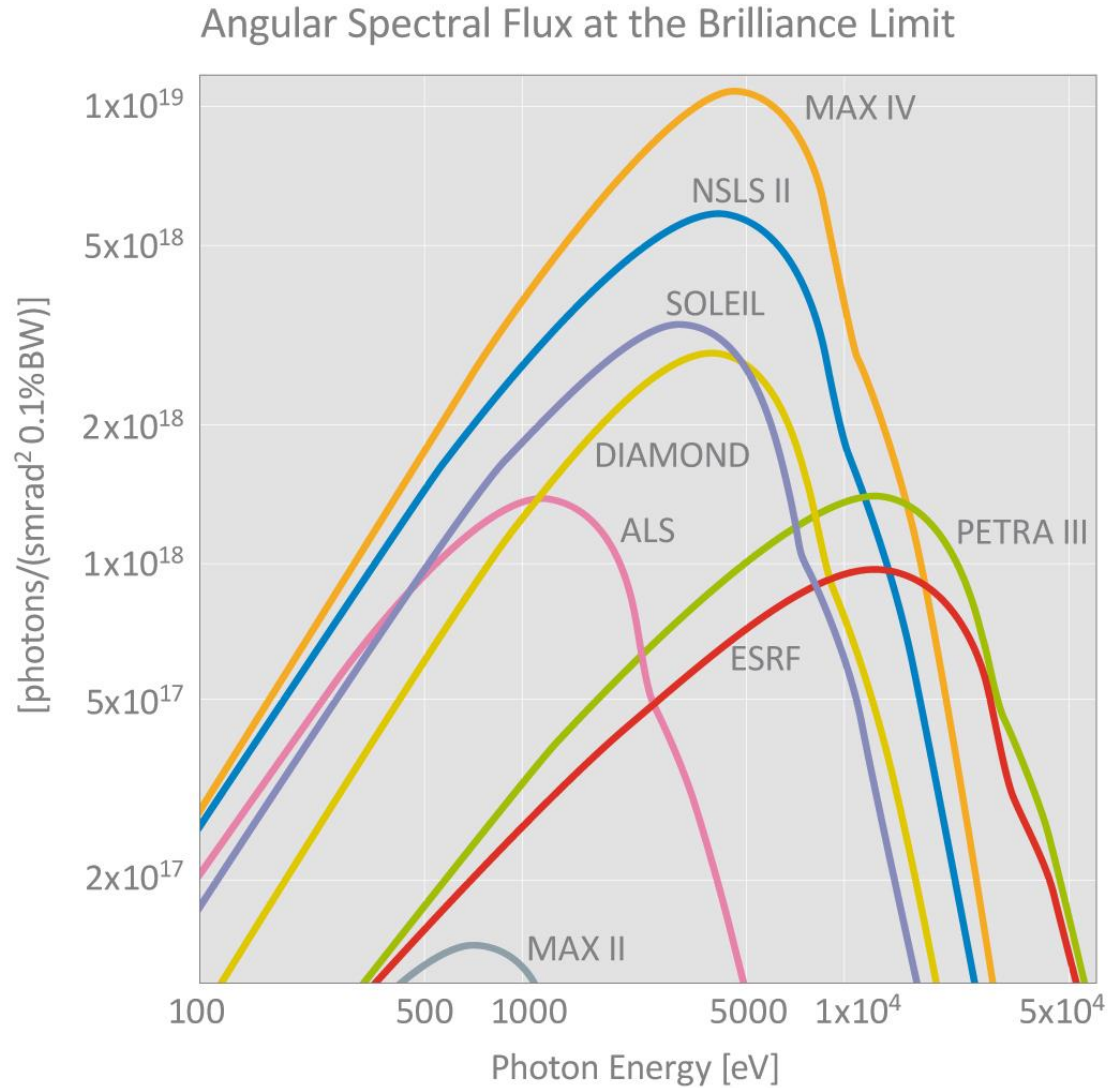
Commercial [Paid, proprietary]



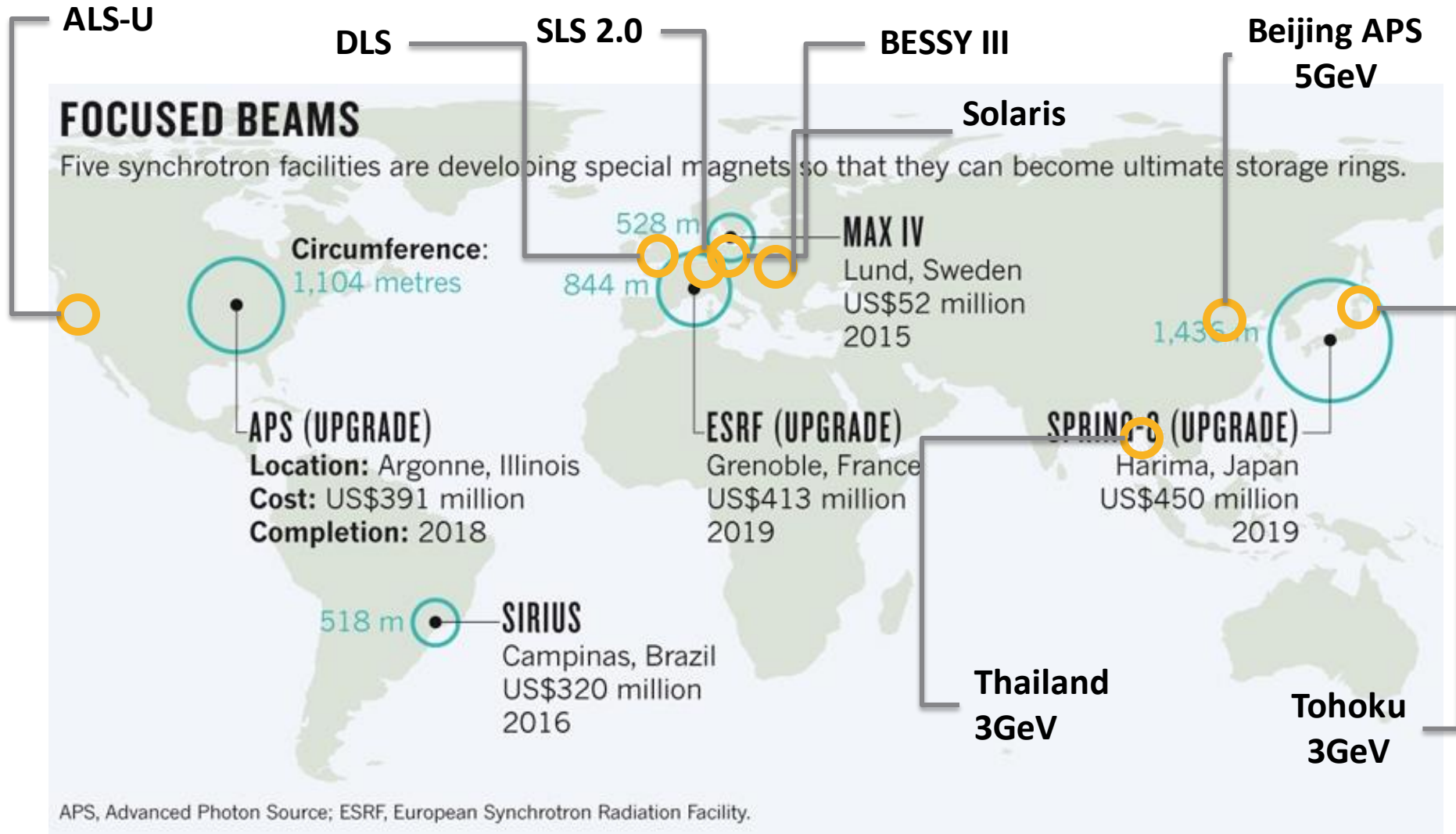
2014



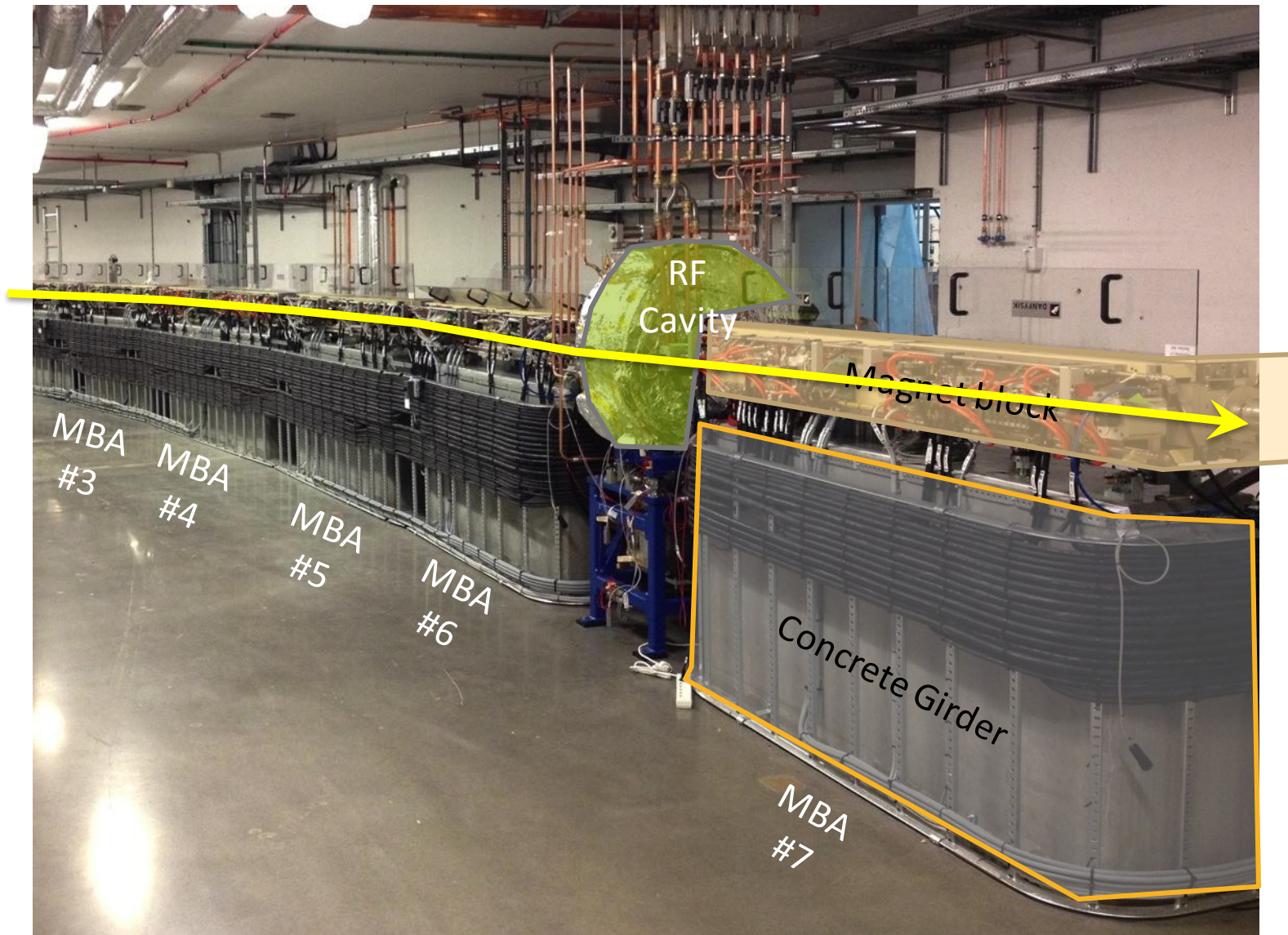
Brilliance - A Comparison



The competition is following us...



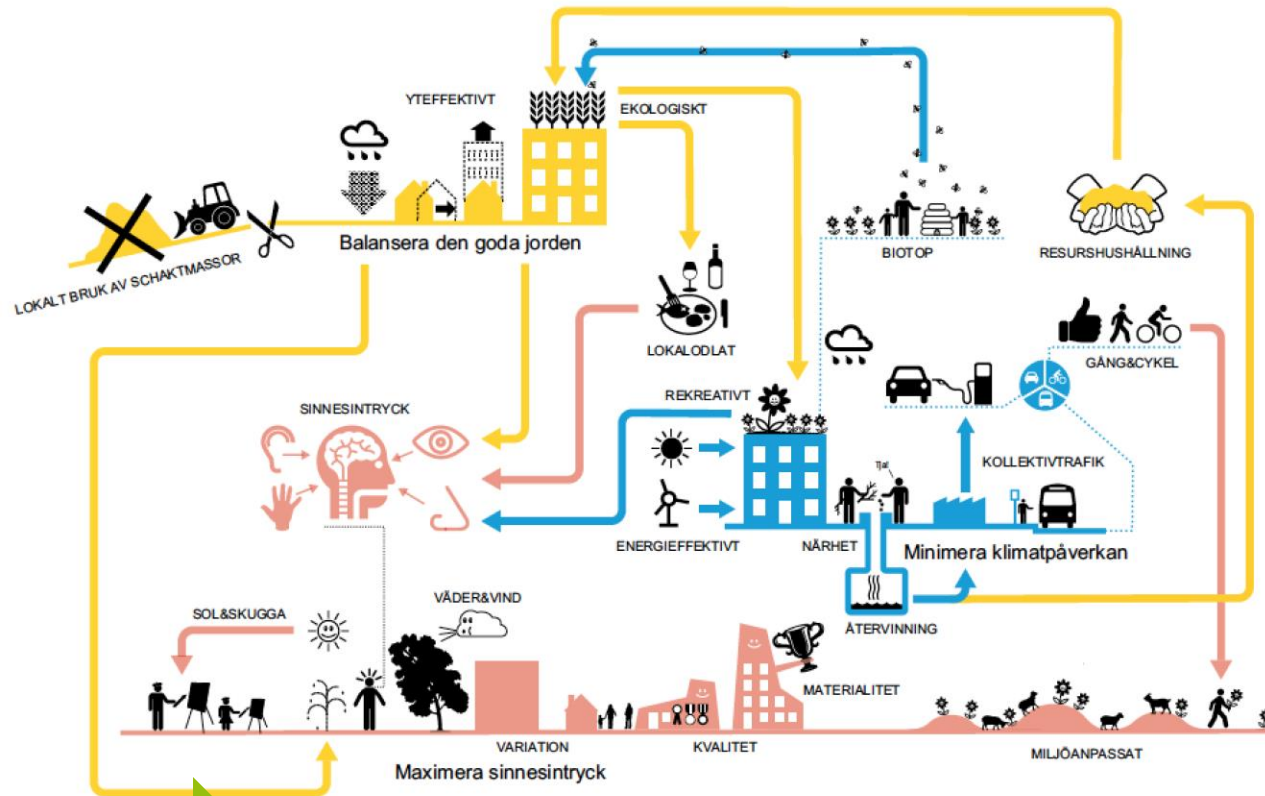
The MAX IV 3 GeV Ring



The Visionary



More for less!



1.) REDUCE!

2.) Reuse

3.) Recycle

- Elec. Power [W/m] = 1/10 of MAX II ring!
- Soil:
Radiation Safety
Vibration damping
- Local district heating



The future context



ESS

MAX IV

Science Village Scandinavia

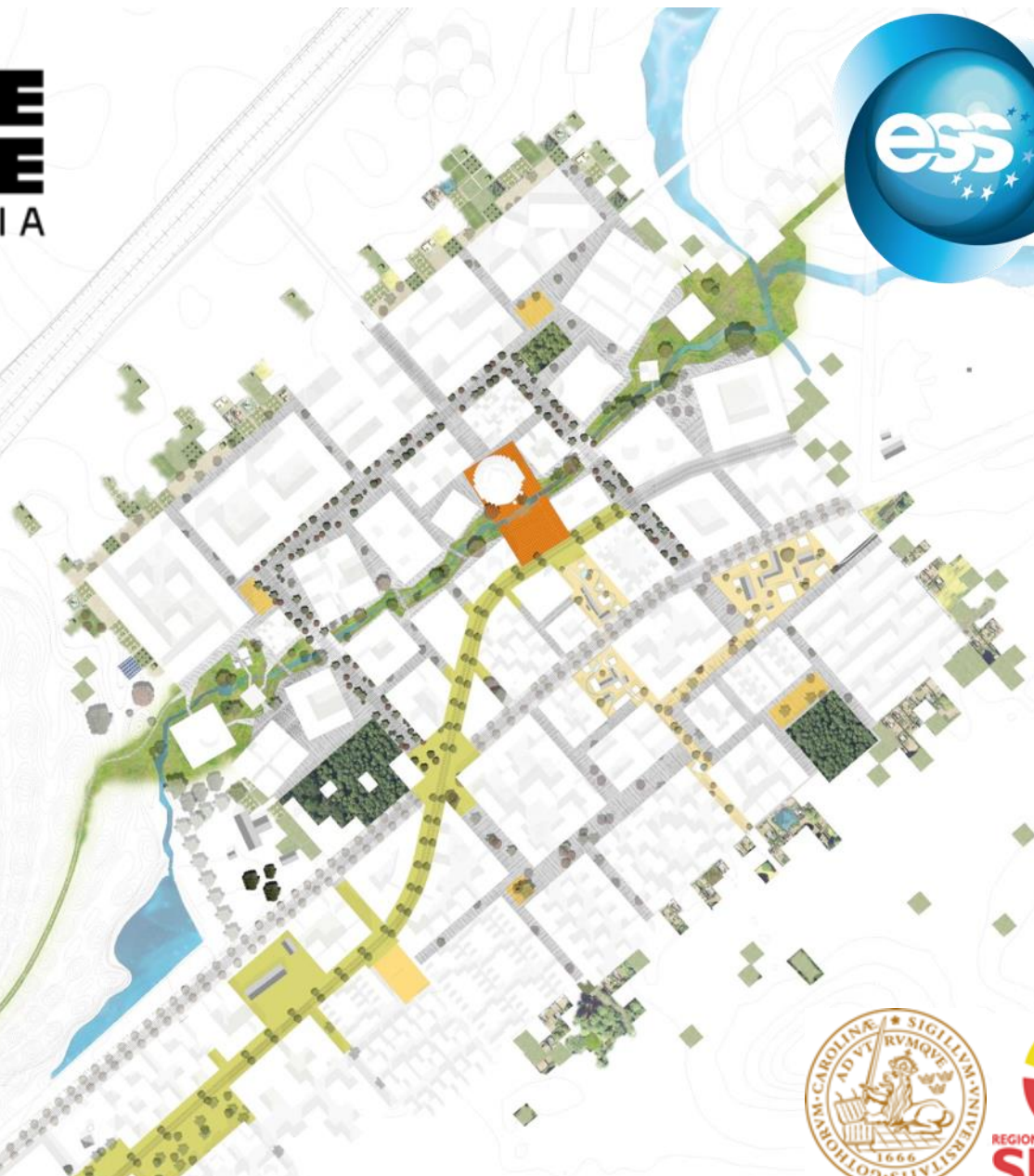
LU

IDEON

MAX IV


A world class Science & Innovation Environment

**SCIENCE
VILLAGE**
SCANDINAVIA

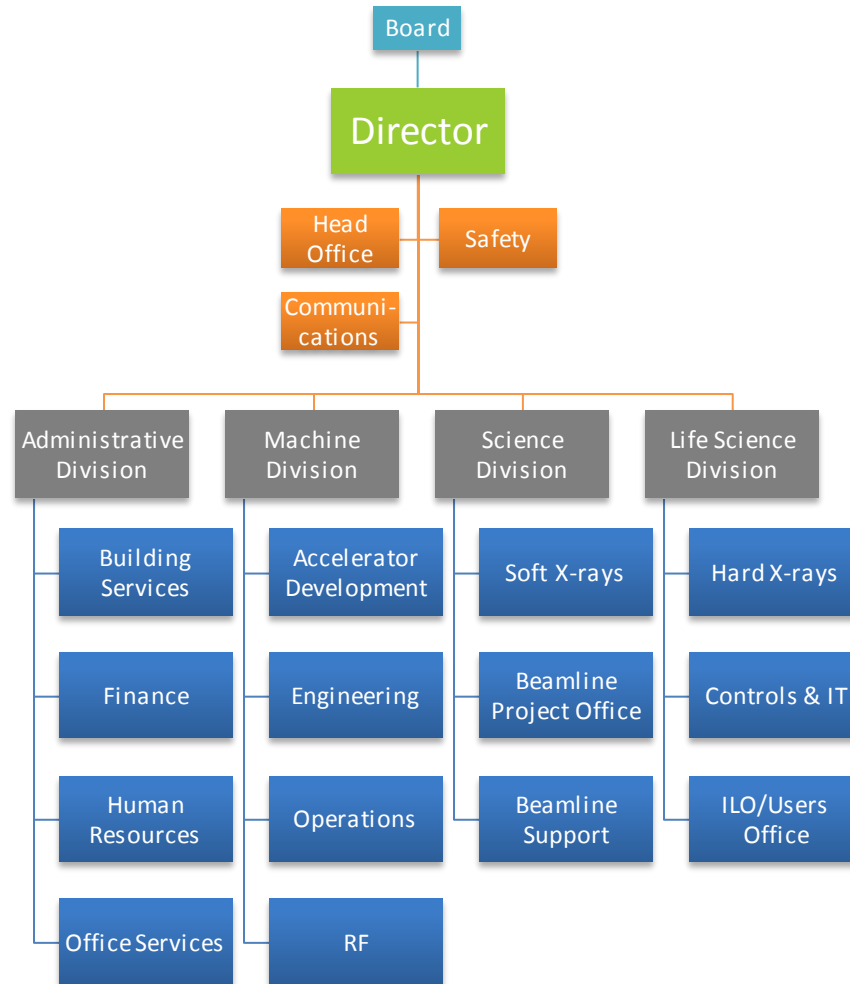




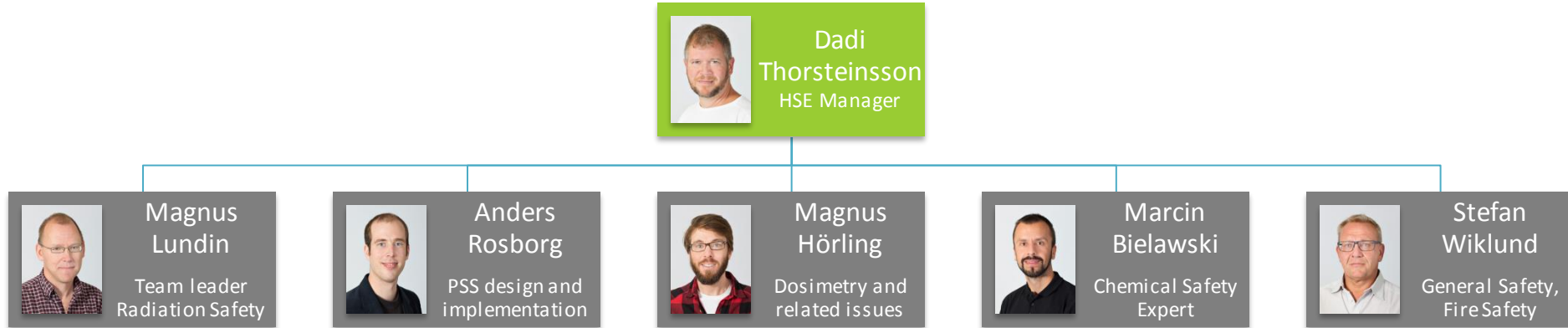
- Light (X-rays)
- Swedish 
- MAX-lab since 1987
MAX IV from 2016
- ..., microscopy, chemical bonds, ...

- Neutrons
(from atomic nucleus)
- 17 member states 
(SWE, DK, NOR, ...)
- Construction started Sep 2nd 2014
Science starts ≈2023
- ..., large & thick samples,
H/D-substitution, ...

MAX IV Organization



MAX IV Safety group



Radiation Safety Engineers:

Patrik Åkesson
Ünal Ören
Robin Svärd
Ola Nilsson

Radiation Safety Operations:

Jimmy Malmqvist
Johanna Paulson
Sara Thorberg

PSS Testing:

Anders Marshal
Heydy Ledezma

Some User Safety challenges

1. We need to provide efficient and sufficient training on-line before their visit. On site training will always be necessary but must be optimized.
2. We need to prevent the users from performing foreseeable risky maneuvers (when feasible).
3. We need to visualize the remaining risks as well as possible, without clutter.
4. We need to make the surroundings as forgiving as possible.
5. We need to provide as good a service as our budget will allow.

User Risk Matrix example

Probability	Often	Minor damage from tools and equipment	Burns from oven			
	Likely		Regulator failure	Small scale fire		
	Possible		Liquid nitrogen leak		Get electrified	Toxic gas leak inside the exp. hutch
	Unlikely			Overhead crane accident	Passing out in the exp. hutch	
	Very unlikely	Synchrotron radiation accident in the exp. hutch				Full scale fire Gas explosion
		Trivial	Minor	Significant	Major	Severe
Consequence						

Probability	Event occurring interval (years)	Consequence	Description
Very unlikely	>50	Trivial	No treatment required
Unlikely	31 - 50	Minor	Minor injury requiring First Aid treatment
Possible	16 - 30	Significant	Injury requiring medical treatment
Likely	6 - 15	Major	Serious injury requiring special medical treatment
Often	≤5	Severe	Loss of life or permanent disability

The MAX IV facility



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