



IBA 30TH

Our future
is reflected
in our present



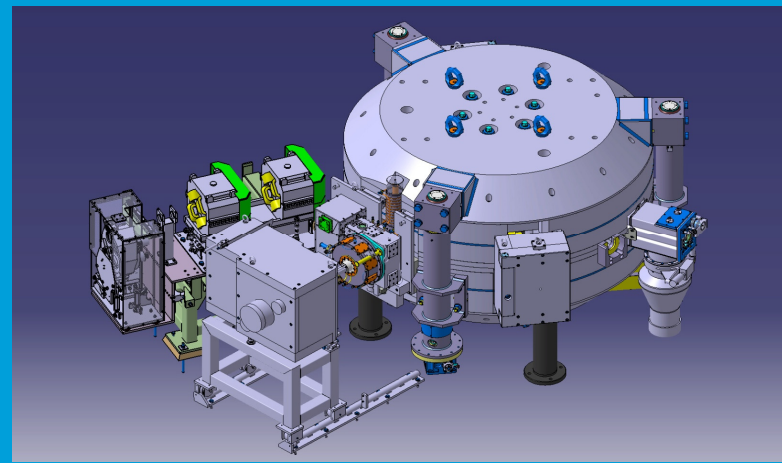
Industrialization of the IBA Synchrocyclotron



Th. Colmant, E. Forton, S. Henrotin, W. Kleeven, Y. Paradis, S. Quets, I. Scheppers, J. Van de Walle,
P. Verbruggen



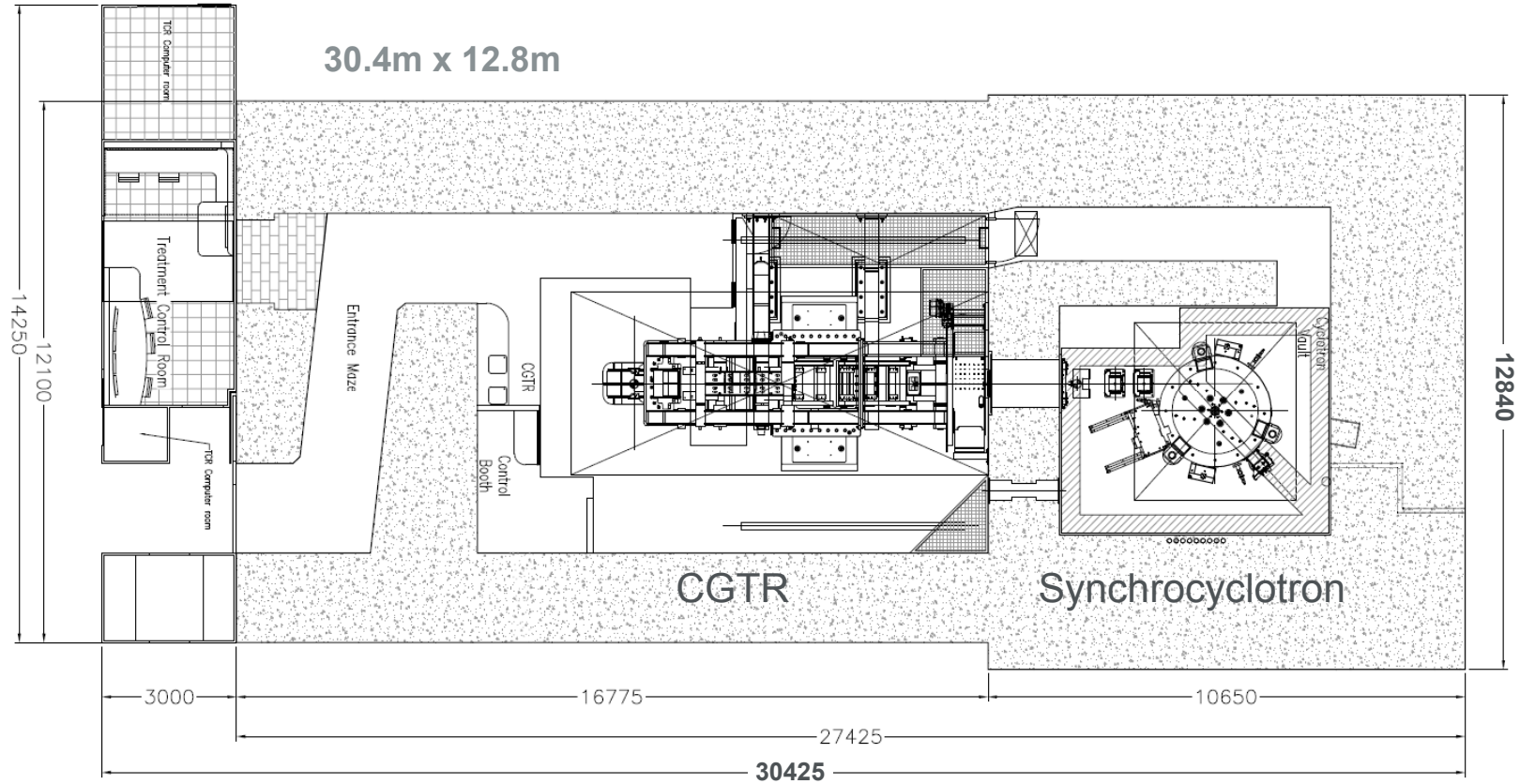
- Timeline and properties
- Current production status
- IBA gate process and deliverables for industrialization
- Update on facilities



Timeline and Properties

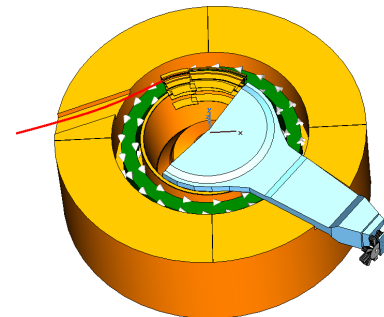
A quick reminder

Proteus One®



Timeline

Early 2008	Preliminary studies
May 2009	Workshop to define the accelerator
Sept 2009	M0, official kick-off of the dev. project
Dec 2009	SCC manufacturer selection
Aug 2011	Delivery of magnet yoke at IBA
Feb 2012	Delivery of superconducting coil at IBA
May 2012	Superconducting coil at nominal current
Dec 2012	RF System running
Mar 2013	Magnetic field mapping
Aug 2013	Extracted beam
Apr 2014	Rigging in Nice
July 2015	FDA approval
Sep 2016	1st patient treated in Nice (on Wednesday)



The IBA Synchrocyclotron in a few numbers

Overall weight	~50 T (41.5 T iron weight)
Overall diameter	2.5 m
Magnetic field	5.7 T (inj.) 5.1 T (extr.)
Operating current	~650 A
SC Coils	NbTi, Dry-cooled (4 RDK415) Designed for 61 A/mm² @6.1T

Nominal beam energy	230 MeV
Pulse repetition rate	1000 Hz
Pulse duration	~10 μs
RF frequency range	60–90 MHz

NB: refer also to P. Verbruggen's talk at ECPM 2012 "Development of the new IBA S2C2" for beam properties, refer also to J. Van de Walle's talk, this conference



In the production pipe today

R&D and Manuf. working together

Production status – updated

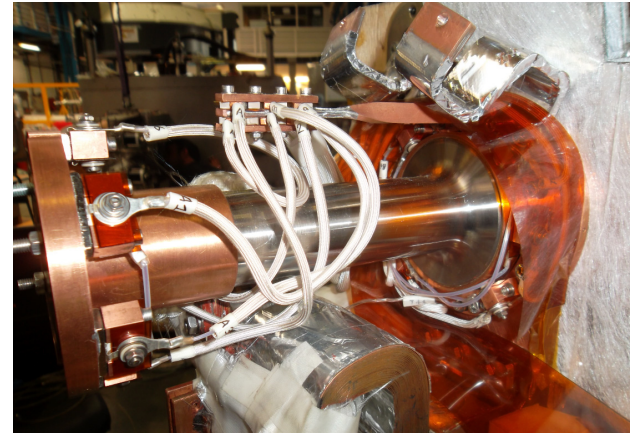
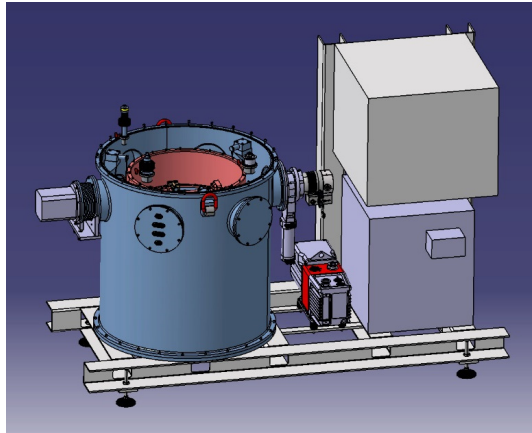
- Beta unit treating first patient in Nice
 - #2 being installed in Beaumont, beam on degrader
 - #3 beam-tested
 - #4-5-6 assembled, some moved to vault for beam tests
 - #7 being assembled in LLN
 - Production plans/rough planning up to #36
- R&D leads
MSC helps
- MSC leads
R&D helps
- Indus (MKI)

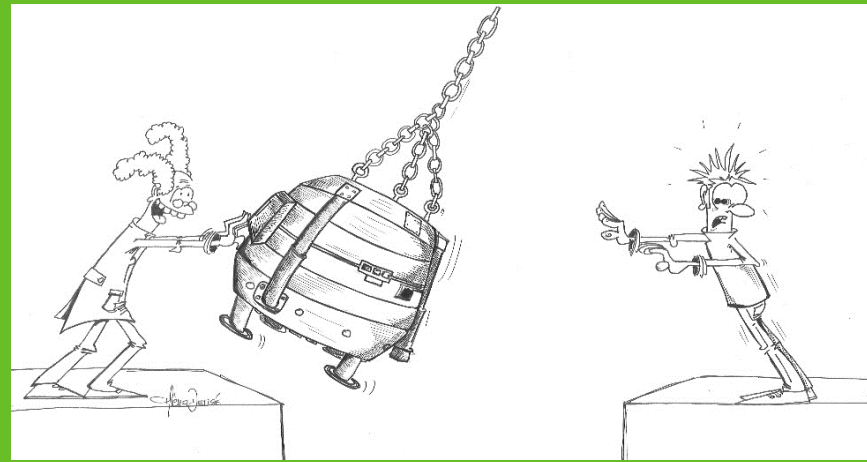
Huge challenge in production and installation ramp-up



A few facets of the remaining challenge

- Staffing (400 persons WW this year)
- Training (and safety)
- « industrialization »
 - Work instructions
 - standardization





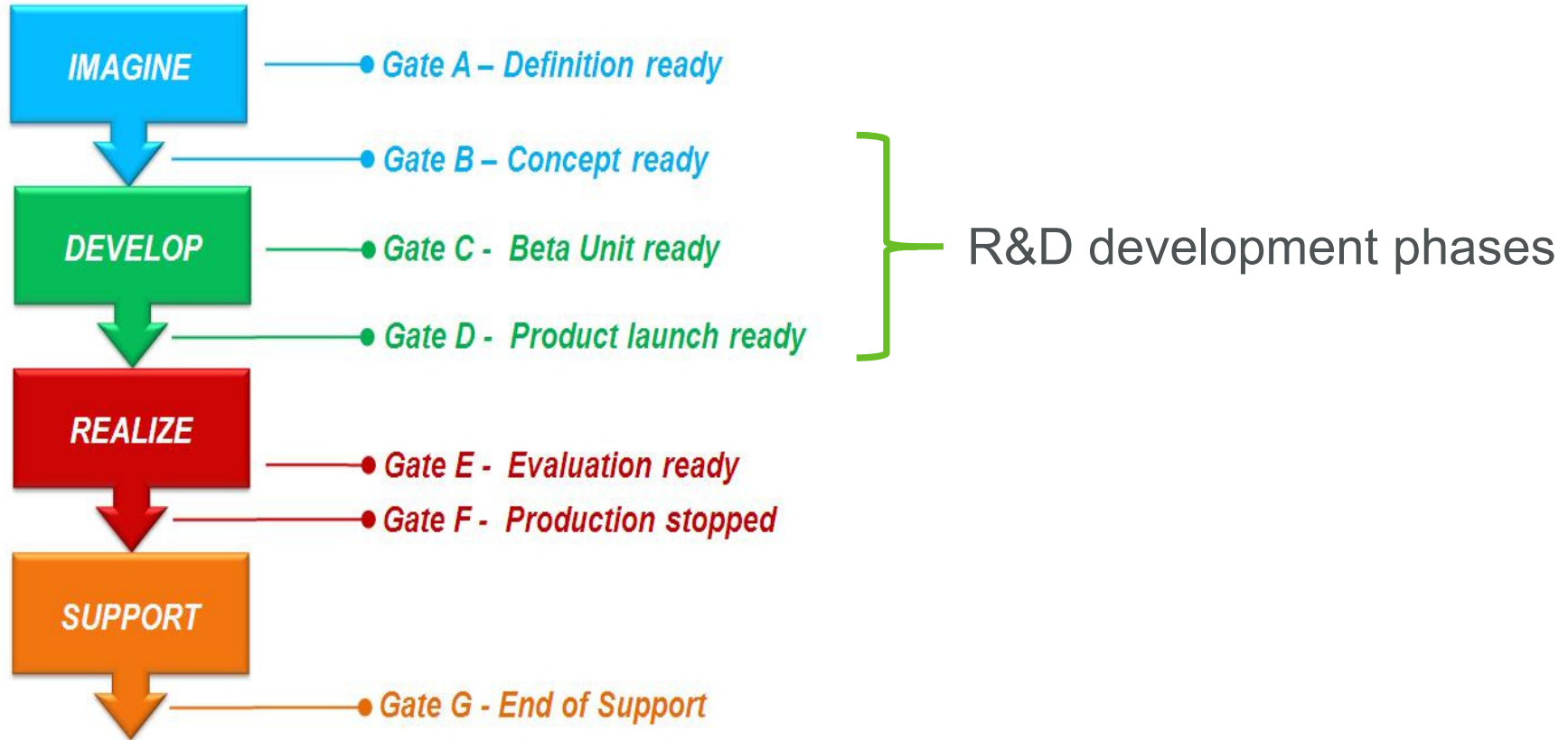
Industrialization

Program approach and Gate process

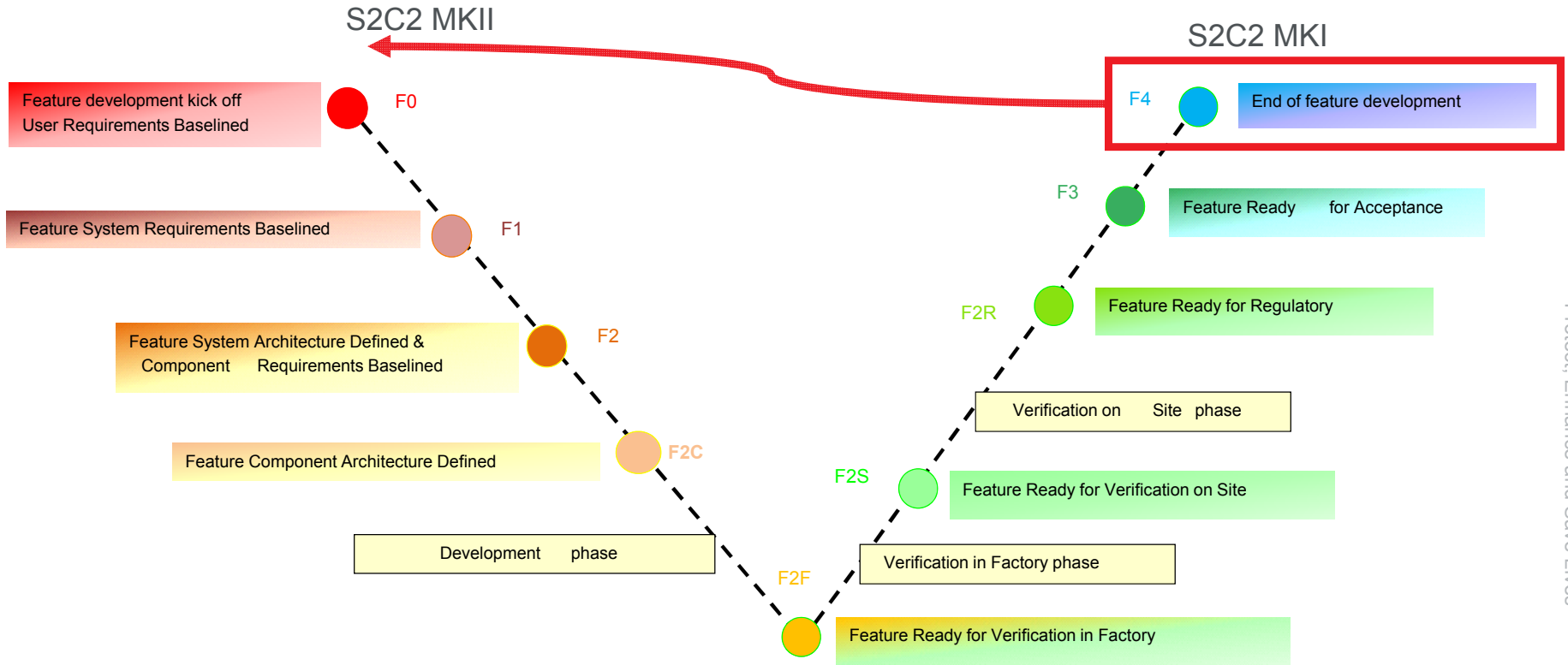
Consolidated approach, not only accelerator



Product lifecycle at IBA



R&D specific cycle



What does it mean in practice?

- S2C2 roadmap in coordination with product roadmap



- Machines produced so far are real MSC-R&D collaboration
- Deliverables for industrialization



So, where are we now?

As far as gate process and other initiatives are concerned

« F4 » gate will take place this September

- R&D-lead collaboration with PT Services and MSC
- Several categories: product definition, knowledge transfer...

Bill of Material	✓	Impact analysis	✓	« Get technology » training	⊘	Operation and installation teams feedbacks	⊘
Architecture doc.	✓	FMECA	✓	SW maintenance training	✗	Monitoring interfaces	✗
Interfaces doc.	✓			FSE training plan	✓	REX on planning, costs and risks	✓
Field replacement units tagged in BOM + procedures	✓ ✗	Risk analysis	✓	L1 theoretical training	✓		
Change Configurable Items - tagged in BOM + procedures	✓ ✗	Test plan and protocols (TPO/FAT/SAT)	✓	L2 theoretical training	✗		
		Validation Matrix	✓	Hands-on training	⊘		
				Maintenances procedures			

Small steps: optimizing current scheme

- Production ramp up is ambitious, so we're gearing up...
- Work organization in the assembly hall
 - « 5S » project to standardize the work areas, vault equipment



- Going faster in production: MOP & TUP sessions
 - Extraction test benches, commissioning studies



... And where are we going to?

Big steps:

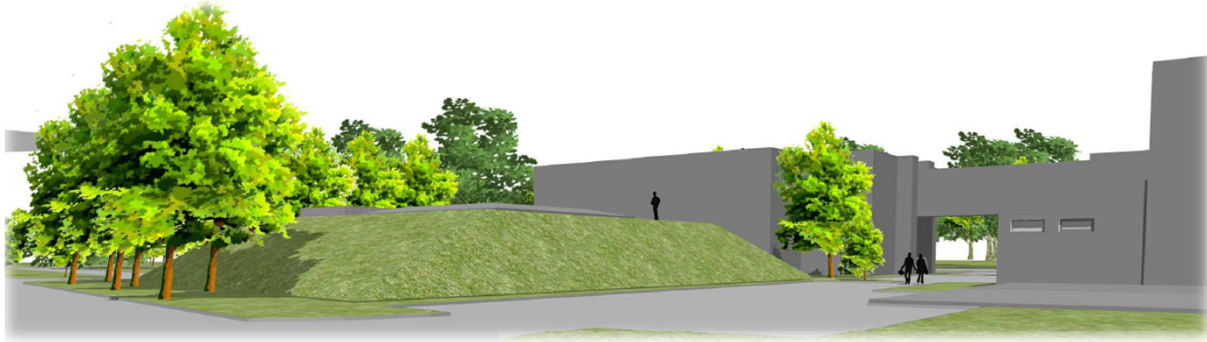
Even more capacity, digitizing the factory...

The IBA « Campus » in Louvain-la-Neuve, Belgium...

... Is getting bigger
and bigger...



With a new vault...

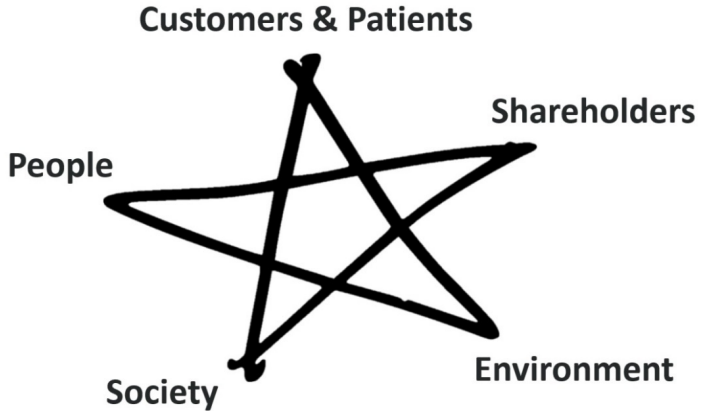


Breaking ground: this Monday



...And an additional Facility

- New warehouse and new assembly hall dedicated to S2C2
- Designed bearing IBA's sustainability program in mind



- Breaking ground in 2017 - Operational in 2018

New Factory: 6000+ m²



The IBA « Campus » in Louvain-la-Neuve, Belgium...

... And even bigger...



- First patient treated in Nice this week
- Synchrocyclotron will pass « F4 » gate this september
 - Program, integrated approach
- R&D - MSC – PT services working together on ramp-up
 - New vault
 - New factory

NB: same approach is being adapted and applied to the Cyclone Kiube

- IBA is also implementing new CSR policy to keep its DNA and find the best equilibrium possible between its profitability, its employee well-being, the society and the environment



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Thank You