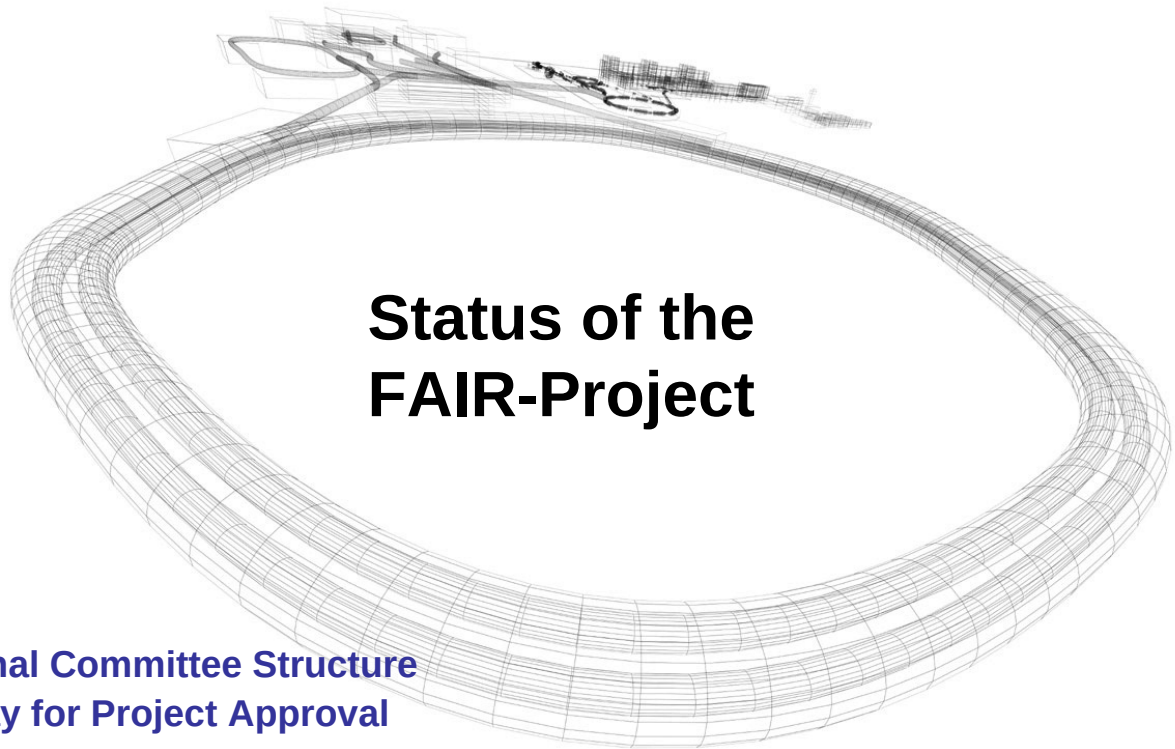


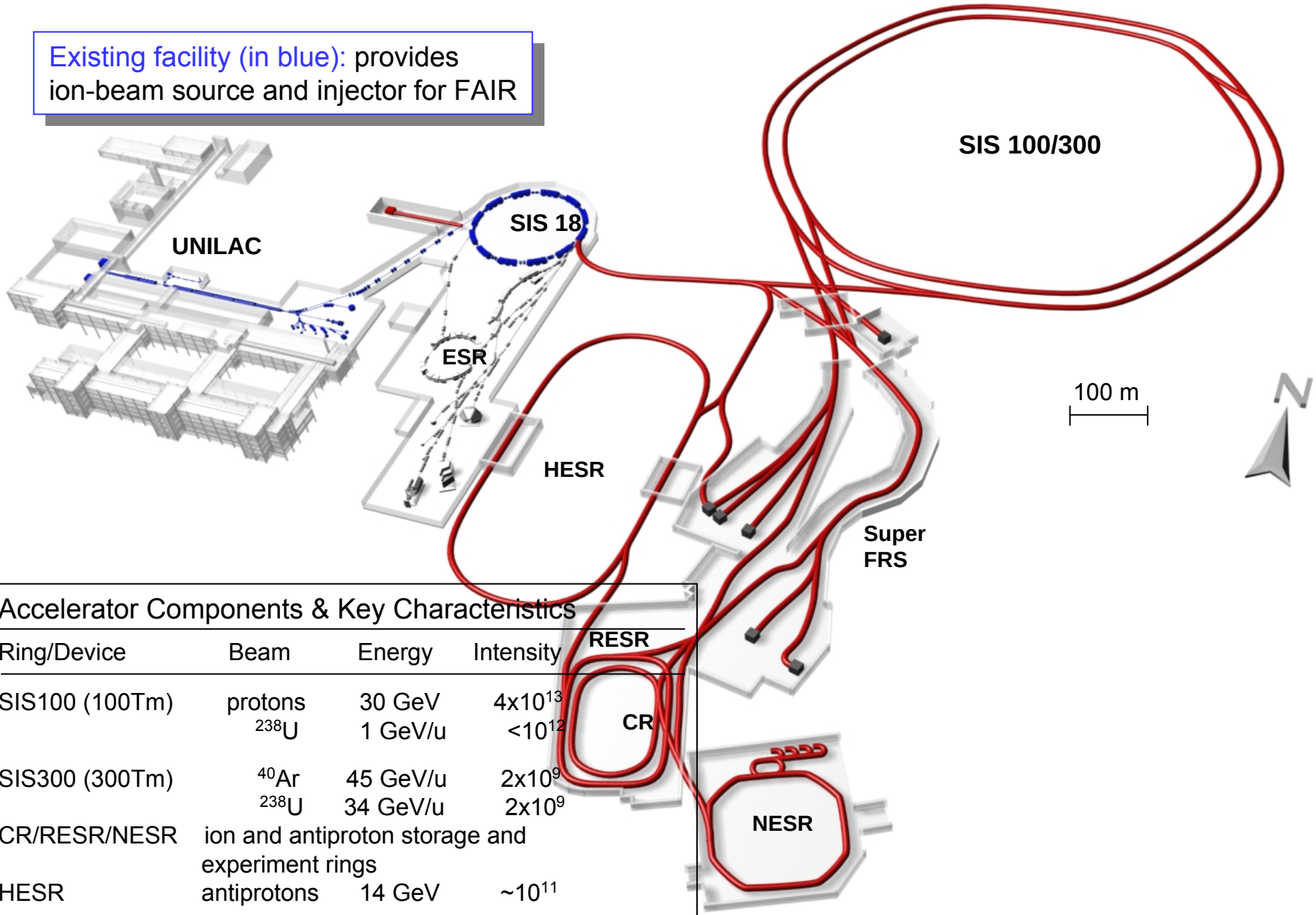
Status of the FAIR-Project

- International Committee Structure
- On the Way for Project Approval
- R&D for FAIR
- Status of Civil Construction Preparations

The FAIR Facility

New future facility (in red): provides ion and anti-matter beams of highest-intensity and up to high energies

Existing facility (in blue): provides ion-beam source and injector for FAIR



Accelerator Components & Key Characteristics

Ring/Device	Beam	Energy	Intensity
SIS100 (100Tm)	protons	30 GeV	$4x10^{13}$
	^{238}U	1 GeV/u	$<10^{12}$
SIS300 (300Tm)	^{40}Ar	45 GeV/u	$2x10^{9}$
	^{238}U	34 GeV/u	$2x10^{9}$
CR/RESR/NESR	ion and antiproton storage and experiment rings		
HESR	antiprotons	14 GeV	$\sim10^{11}$

Unprecedented System Parameters at FAIR

Beam Intensity:

- primary heavy-ion beam intensity increases by x 100 – x 1000
- secondary beam intensity increases by up to x 10000

Beam Energy:

- heavy-ion energy : x 30

Beam Variety:

- antiprotons
- protons to uranium & radioactive ion beams

Beam Precision:

- cooled antiproton beams
- intense cooled radioactive ion beams

Beam Pulse structure:

- highly optimized for experiments: from dc to ultra-high bunch compression

Parallel Operation:

- full accelerator performance for up to four different and independent experiments and experimental programs

The International Committee Structure

China Finnland France Germany Greece India Italy Poland Spain Sweden Russia Great Britain Romania

ISC
International Steering Committee
H. Schunck

STI Working Group

- Baseline Technical Report
  - accelerator TR's
  - experiment proposals
  - civil construction plans
  (~ 3500 pages)
- PAC & TAC Review Reports
- Cost Book
- Cost Review Reports
  - accelerator & civil construction (CORE-A)
  - experiments (CORE-E)

FAIR Project

AFI Working Group

- Convention
- Articles of Association
- By-Laws
- Final Act Document
- Legal Framework Report (LFI)
- Full Cost Structure Report (FCI)

Observer:

The FAIR Baseline Technical Report

More than 3500 pages
ca. 2400 authors

Handed over to ISC on April 11th 2006

plus 2 volumes of civil construction drawings, and the FAIR Baseline Costbook

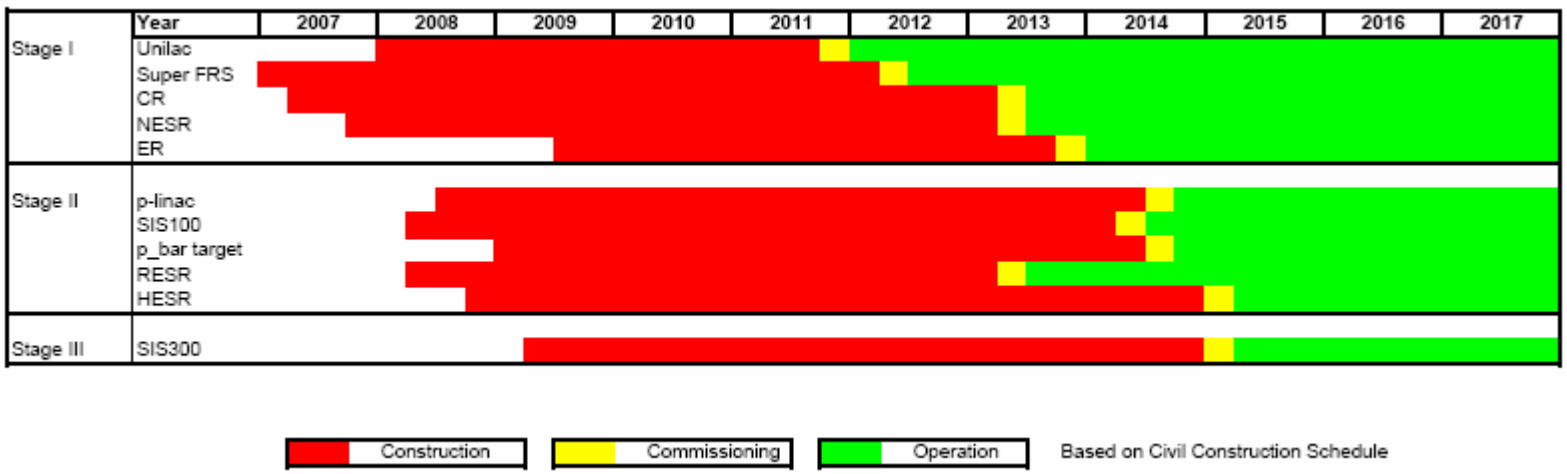
Project Status cont‘d

The International Steering Committee confirmed all this joint preparatory work as

" the Project“.

Consequence: all conditions to finalize negotiations on governmental level are met.

Time Schedule



First experiments scheduled for beginning of 2012 (Super-FRS) – Phase I
End of project scheduled for beginning of 2015

Schedule determined by civil construction progress

Project Costs

All input generated by GSI personnel (from GSI Acc. Division, 'GA', Bung, experiments) with the help of collaboration partners & industy.

Costs scrutinized by CORE-A/E, TAC, STI and 7 mini-TACs, documented in Costbook

25% of cost have to come from external partners

Accelerator investment	**33.0 M€**
Civil constr	**288.7 M€**
R ental facilities	
Super-FRS)	**180.0 M€**
Investment budget	**1001,7 M€**
Manpower (2400 person-years)	**184,8 M€**
Total Construction Costs	**1186,5 M€**
Commissioning Costs	**26,5 M€**
Operation Costs until 2025	**1485,6 M€**
Sum	**2697,6 M€**

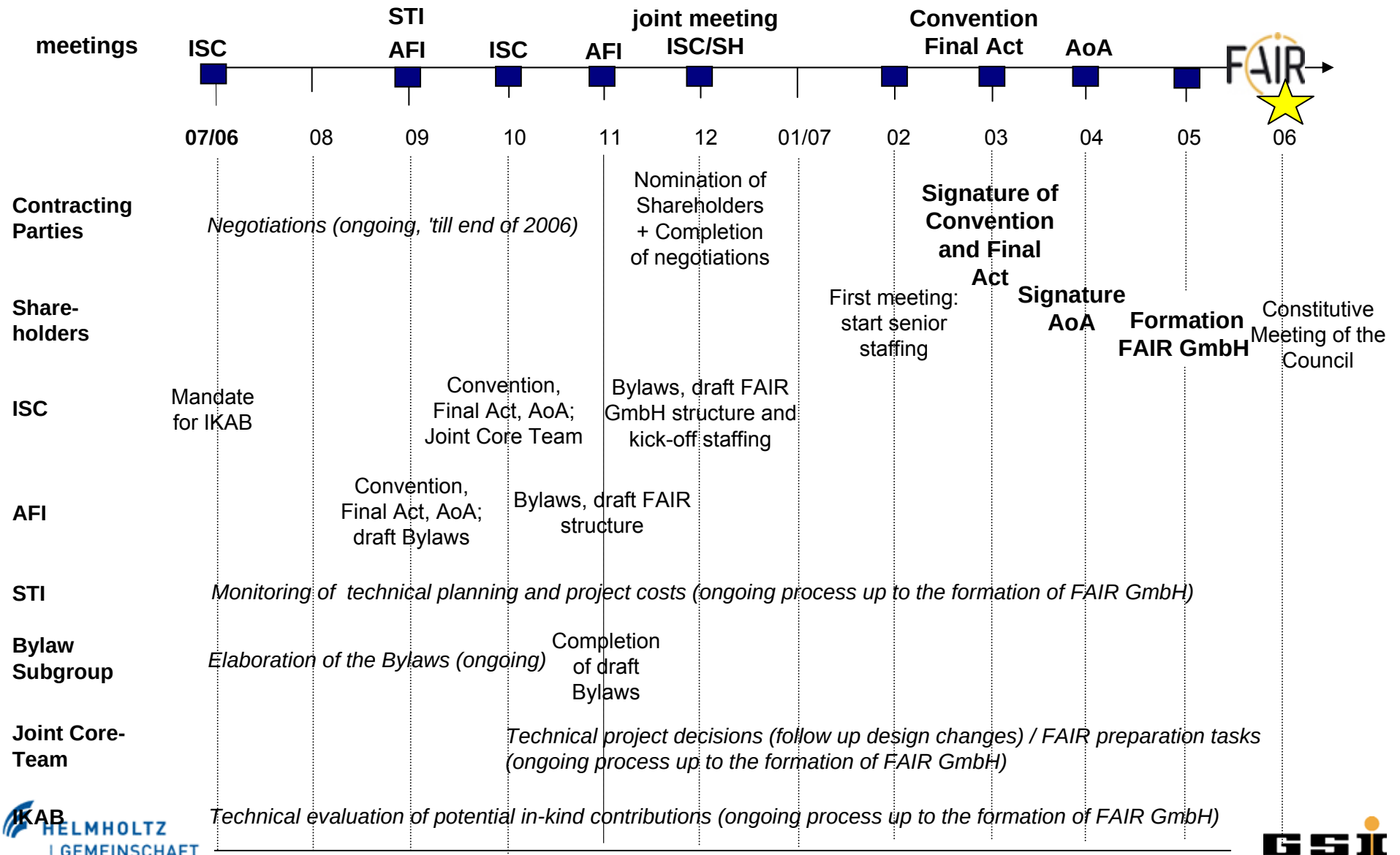
Project Status

- ✓ Regional Development plan (Bebauungsplan) legally settled
- ✓ All environmental impact studies are accepted
- ✓ Call for Construction Steering and Planning Offices
- ✓Controlling report for the preparatory phase accepted by GSI Supervisory Board

  (60 M€ available for the preparatory phase 2001 – 2008)
- ✓ Prototyping has started
- ✓ Core facility defined
- ✓ Layout defined
- ✓Scientific base program defined
- ✓ Project cost estimates (cost book, WBS) scrutinized and validated by expert groups
- ✓Legal documents and Governance structure (two-company model) finalized and agreed upon by the ISC (by-laws to be completed)

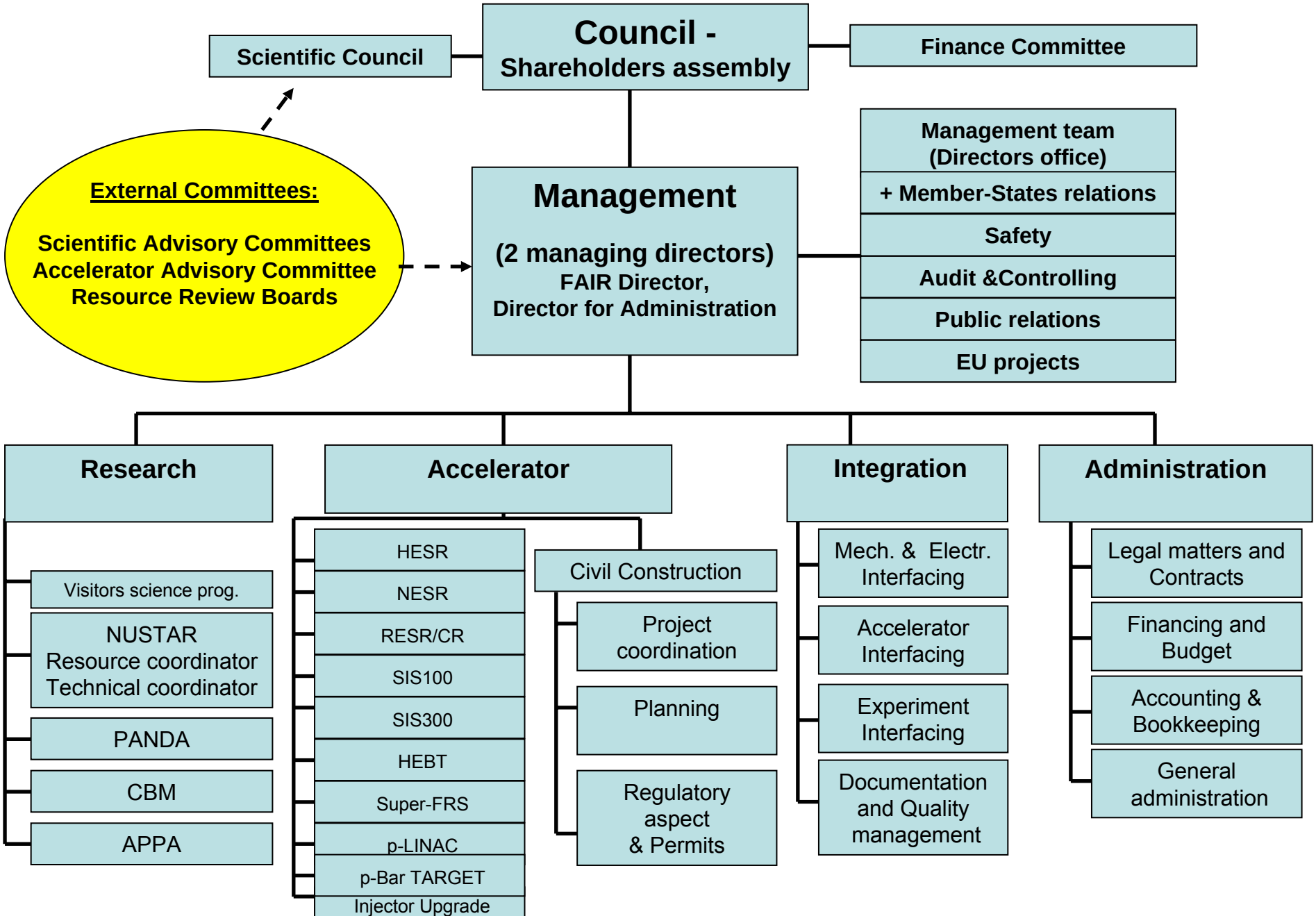
Goal: foundation of FAIR GmbH in May/June 2007

Proposed FAIR – Roadmap: Establishment of FAIR GmbH

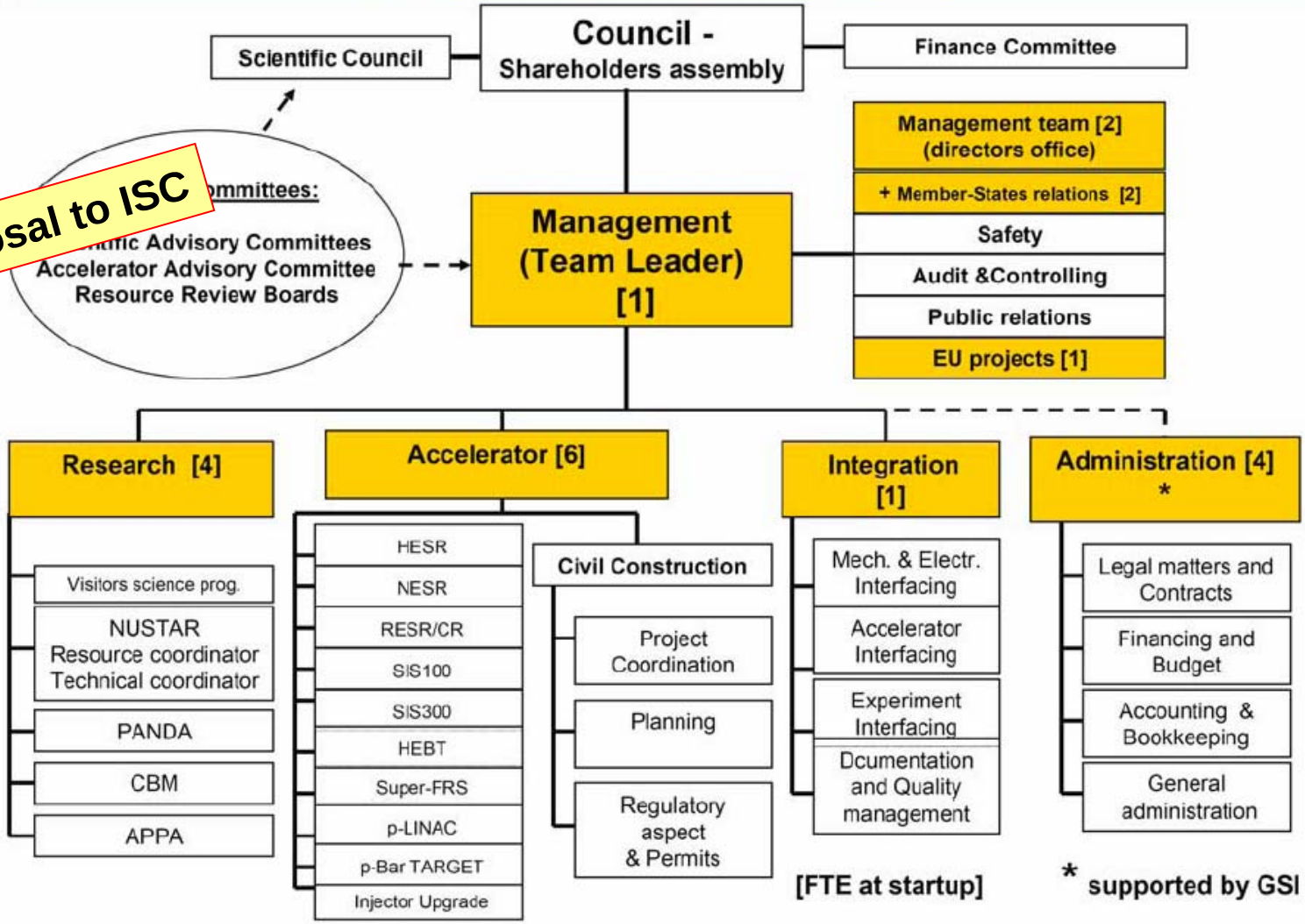


HELMHOLTZ GEMEINSCHAFT

Proposed Organization Chart of the FAIR GmbH



DRAFT: FAIR Joint Core Team



Functions to be taken over by the Core Team are marked in orange. Numbers in brackets

will work until die Council nominates the positions in FAIR GmbH

leading box is indicated in orange (e.g. Accelerator).
The dashed line to the Administration indicates that the Administration branch is not intended to belong to the proper Core Team in the sense of line management (cf. text).

R&D on Key-Components during Preparatory Phase

by GSI & Partner Institutes

INFN Istituto Nazionale di Fisica Nucleare

BROOKHAVEN NATIONAL LABORATORY

IHEP ИФВЭ

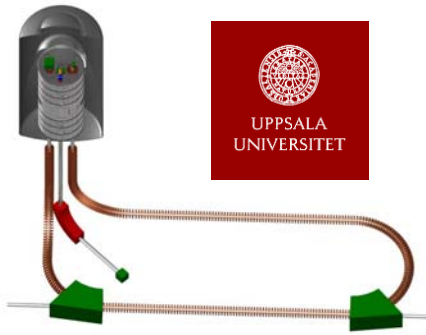
IHEP Protvino

CNA / CNRS

BINP Novosibirsk

SIS300 sc magnets

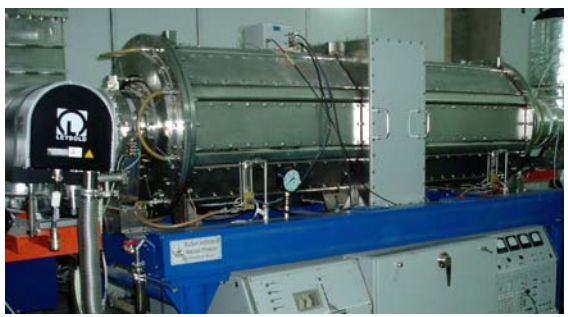
NESR Electron Cooling



UPPSALA UNIVERSITET

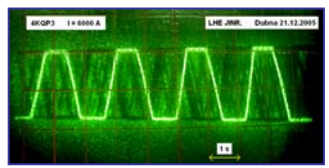
Forschungszentrum Jülich
in der Helmholtz-Gemeinschaft

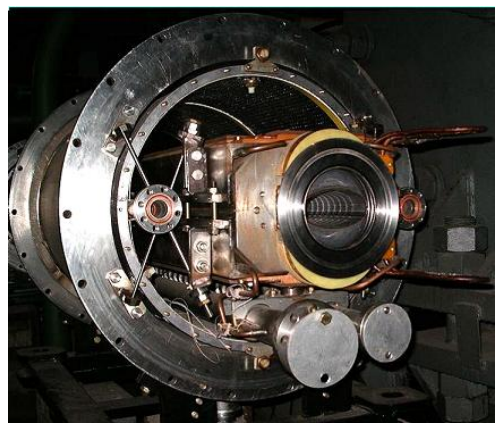
Variable frequency ferrit loaded cavities



SIS100 rapidly cycling sc magnets

Joint Institute for Nuclear Research





R&D Collaboration Partners cont‘d

on large aperture superferric bending magnets

Institute of Electric
Beijing, C

Institute of Modern Physics
Lanzhou ,CAS

Institute for Plasma Physics
Hefei, CAS

on NESR magnets, vacuum system, power converters

Medioambientales y Tecnológicas
Madrid, Spain

Raja Ram **Technology**

Bhaba Atomic Reaearch Centre
Mumbai, India

on Super-FRS energy buncher, high power beam dumps

HESR Consortium FZ Jülich, TSL Sweden and the

Forschungszentrum Jülich
in der Helmholtz-Gemeinschaft

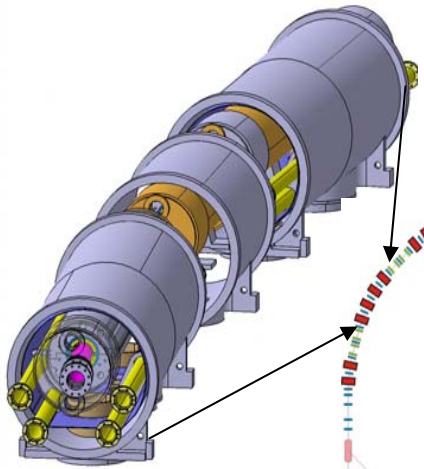
UPPSALA UNIVERSITET

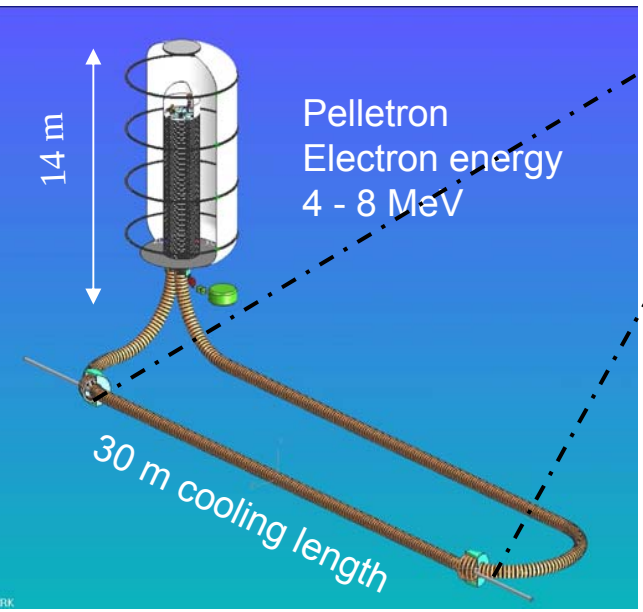
TSL

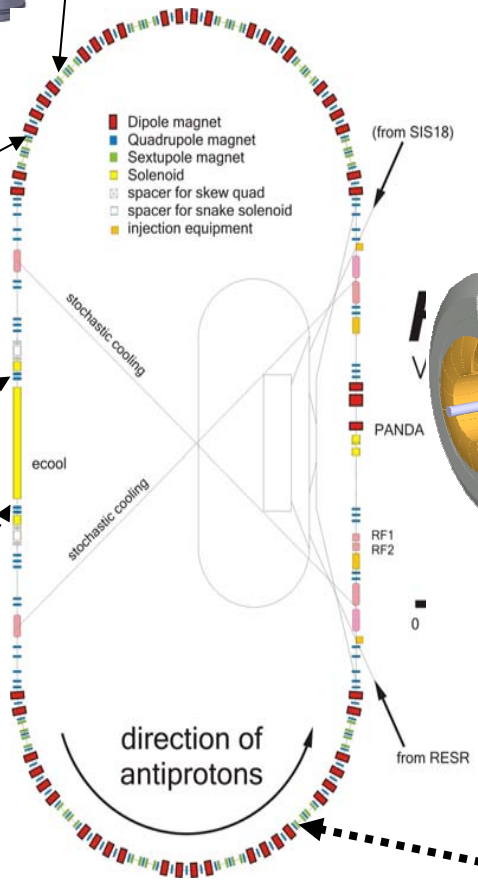
PANDA experiment collaboration

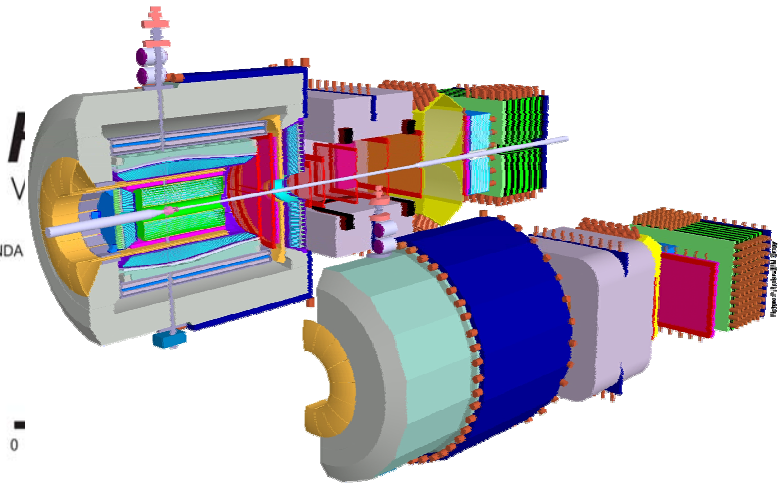
panda

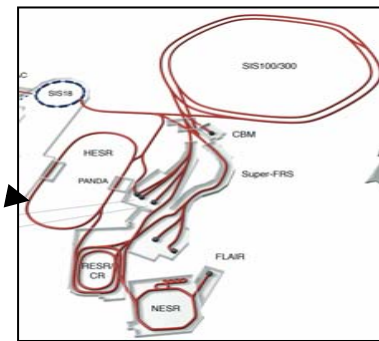
Collaboration











Status of Technical Negotiations

FAIR China: *prototype of CR and Super FRS dipole magnets R&D*
Finland:*looking into appropriate Polish contributions*
France: *Technical discussions on proton source and SIS300 dipole magnets*
Germany: *Continuous* work on HESR, GSI active on all fields
Greece – no contacts
India: production of 4 sc dipoles for energy buncher, discussions on p-linac components
Italy: *R&D work on SIS300 has started* (INFN)
Poland: *looking into appropriate Polish contributions*
Russia: *R&D contracts with **BINP (Novosibirsk)** on*
radiation resistant nc dipoles & quadrupoles (SFRS target area)
design of ER ring
antiproton target
sc septum magnets
production of components for SIS18 upgrade (chambers, collimator)
design of ferrit loaded cavities (and prototype)
*with **JINP (Dubna)***
development of low loss rapid cycling dipoles and quadrupoles for SIS100
*with **IHEP (Protvino)***
study on SIS300 dipoles
Romania: *looking into appropriate Polish contributions*
Spain: NESR magnets, power supplies, vacuum
Sweden: Cryring for FLAIR experiments
UK: involved in various experiments (NuSTAR, PANDA), plans for active participation of accelerator experts

FAIR: Work Packages

FAIR WPs

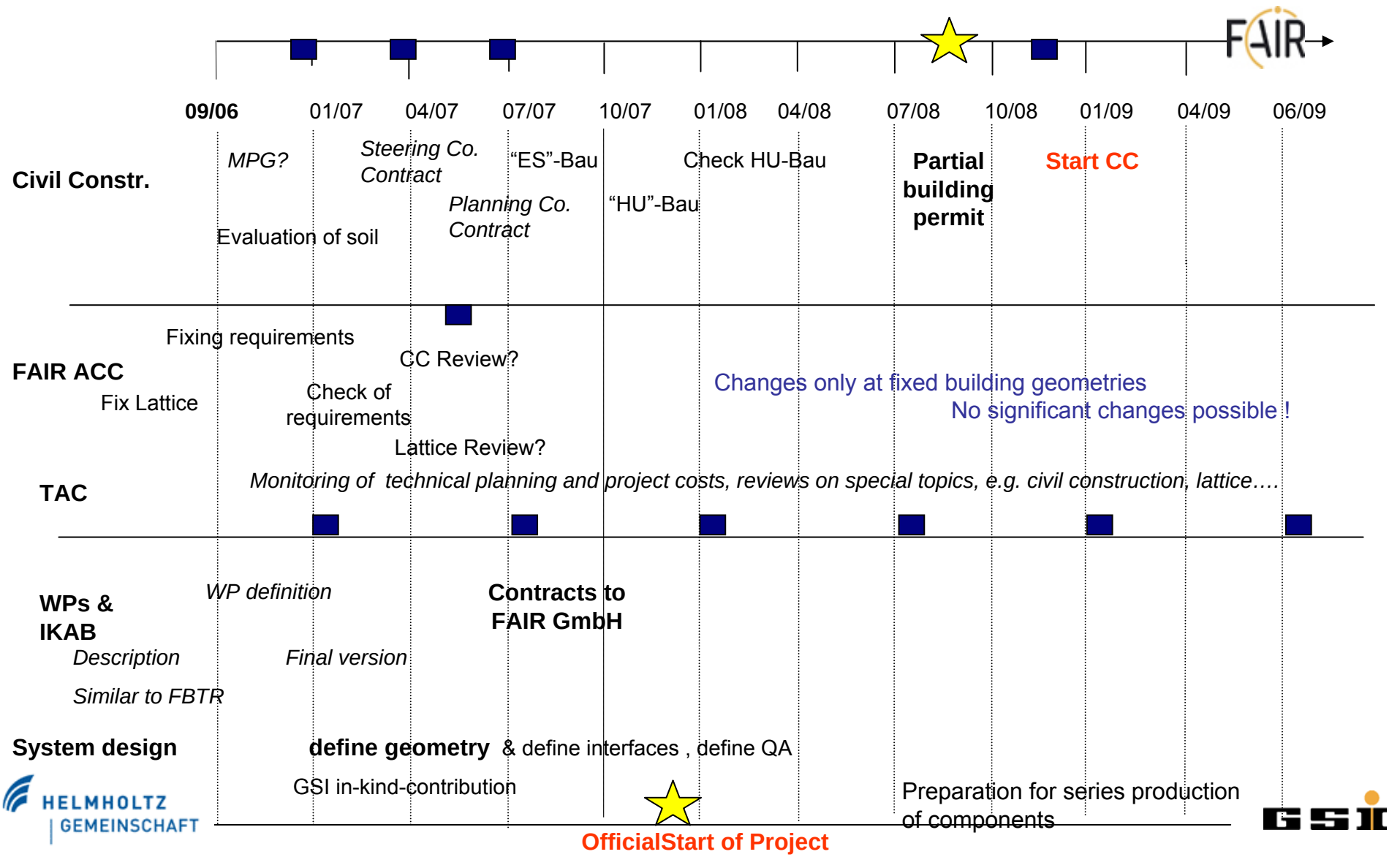
		WBS 2.3 **HEBT**	2.4 **Supere FRS**	2.5 **CR**	2.6 **NESR**	2.7 **p-lianc**	2.8 **SIS100**	2.9 **pbar-target**	2.10 **RESR**	2.11 **HESR**	2.12 **SIS300**	2.13 **ER**	2.14 Com. Sys.	3.0 Civ. Constr.	1.0 Experiments	**Sum**
	CostBook 3.0 (MÜ)	79,2	72,9	37,8	23,4	13,5	81,9	4,5	20,7	59,4	95,4	11,7	104,4	289,8	108	**1002,6**
TS-2	**Magnets** Cost Who	Bend 12,2	Bend 15 China	Bend 9 China	Bend 4 Es	Bend 0,22	Bend 7 Rus	Bend 0,7	Bend 4	Bend S & G	Bend 24 RUS & I	Bend		GSI		
		Quad 14	Quad 23	Quad 2,2	Quad 2,7 Es	Quad 0,7	Quad 8 Rus	Quad 0,7	Quad 2,6	Quad	Quad 19 Rus & F	Quad				
			Sextupoles 8	Sextupoles 0,5	Sextupoles 0,4 Es		Sextupoles 1,1 Rus			Sextupoles	Multipoles 7 RUS & I	Sextupoles				
		Other 3	Other 3,3	Other 1,5	Other 0,4		Other 1,3 Rus		0,4	Other	Other 0,6 Rus	other				
TS-3	**Power Converter**	Power Conver 16	Power Conve 3	Power Conve 2,4	ower Convert 2,3 Es	ower Converte 2,3	ower Converte 5	ower Converte 1,1	ower Converte 2,4	ower Converte	ower Converte 5,2	ower Converter				
TS-4	**RF-System**			RF 4,4	RF 3,8	RF 7 Ind./Rus/G	RF 31 Rus		RF 0,1 GSI	RF	RF 6,8 Rus	RF				
TS-5	**Inj/Extraction**			Inj/Extr. 3,5	Inj/Extr. 2		Inj/Extr. 6 Rus		Inj/Extr. 3	Inj/Extr.	Inj/Extr. 7 Rus	Inj/Extr.				
TS-6	**Diagnostics**	Diagnostics 10	Diagnostics 4,5	Diagnostics 2	Diagnostics 1,8	Diagnostics 1,3	Diagnostics 5,5	Diagnostics 0,3	Diagnostics 1,8	Diagnostics	Diagnostics 5,4	Diagnostics				
TS-7	**Vacuum**	Vacuum 12	Vacuum 5,4	Vacuum 3,4	Vacuum 3,4 Es	Vacuum 0,7	Vacuum 8	Vacuum 0,7	Vacuum 2,9	Vacuum	Vacuum 8	Vacuum				
TS-8	**Part. Sources**					EZR 0,7 F						Linac				
TS-9	**ECOOL**				ECOOL 2,7 Ru					ECOOL						
TS-10	**St. Cooling**			St. Cool					St. Cool 3,8 GSI	St. Cool						
TS-11	**Special inst.**	Spec				Special 0,3	Special 2	Special 0,8								
TS-12	**Local Cryo**		ocal Cryo 6,3	Local Cryo 3,1			Local Cryo 6,8				Local Cryo 12					
TS-14	**Common System**												Refrigerator 49 GSI Controls/Interfaces 24 GSI Quench Detection 2,1 Magnet QC 7,2 GSI Alignment 5,5 GSI El. Power 16 GSI			

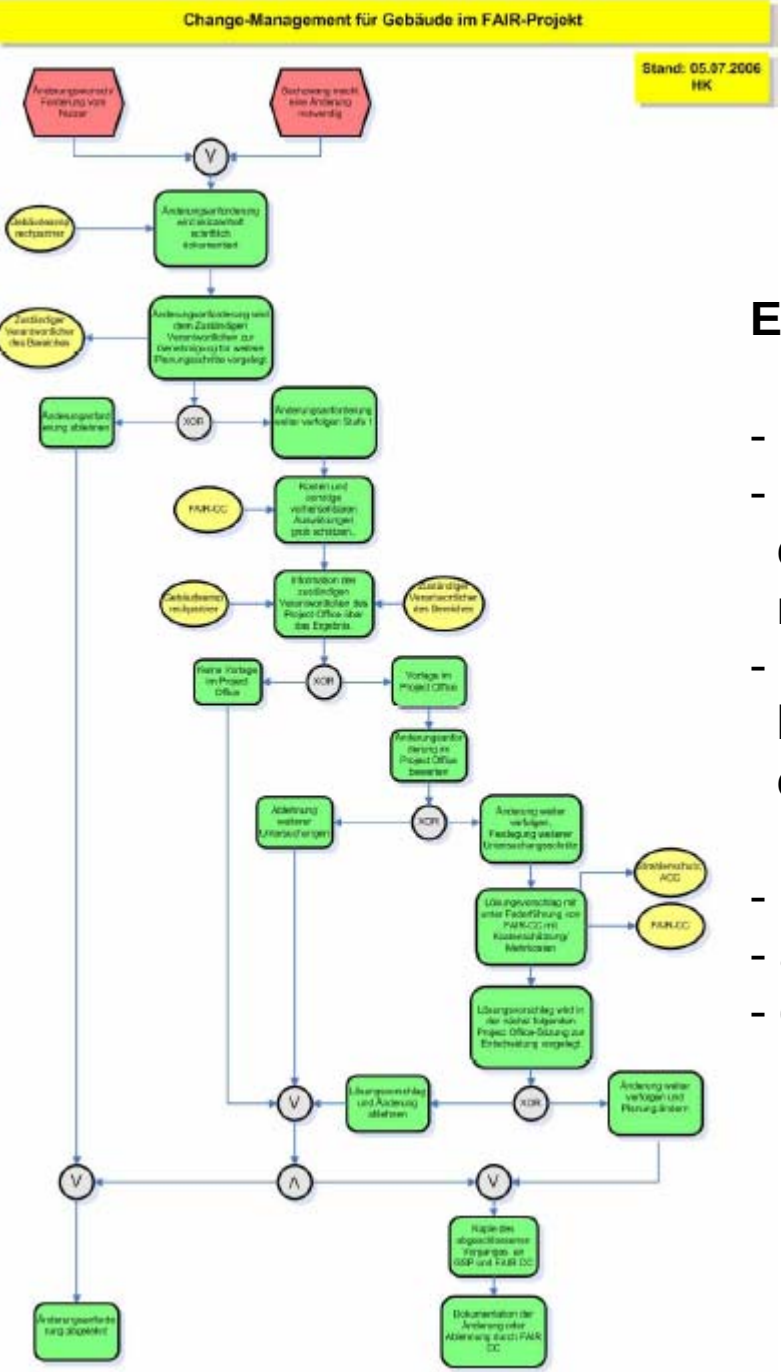
Noting decided – just interest indicated !!

WP for discussion

Intension to take WP

Roadmap: Civil Construction and Accelerators





Change Parameter Proceedure

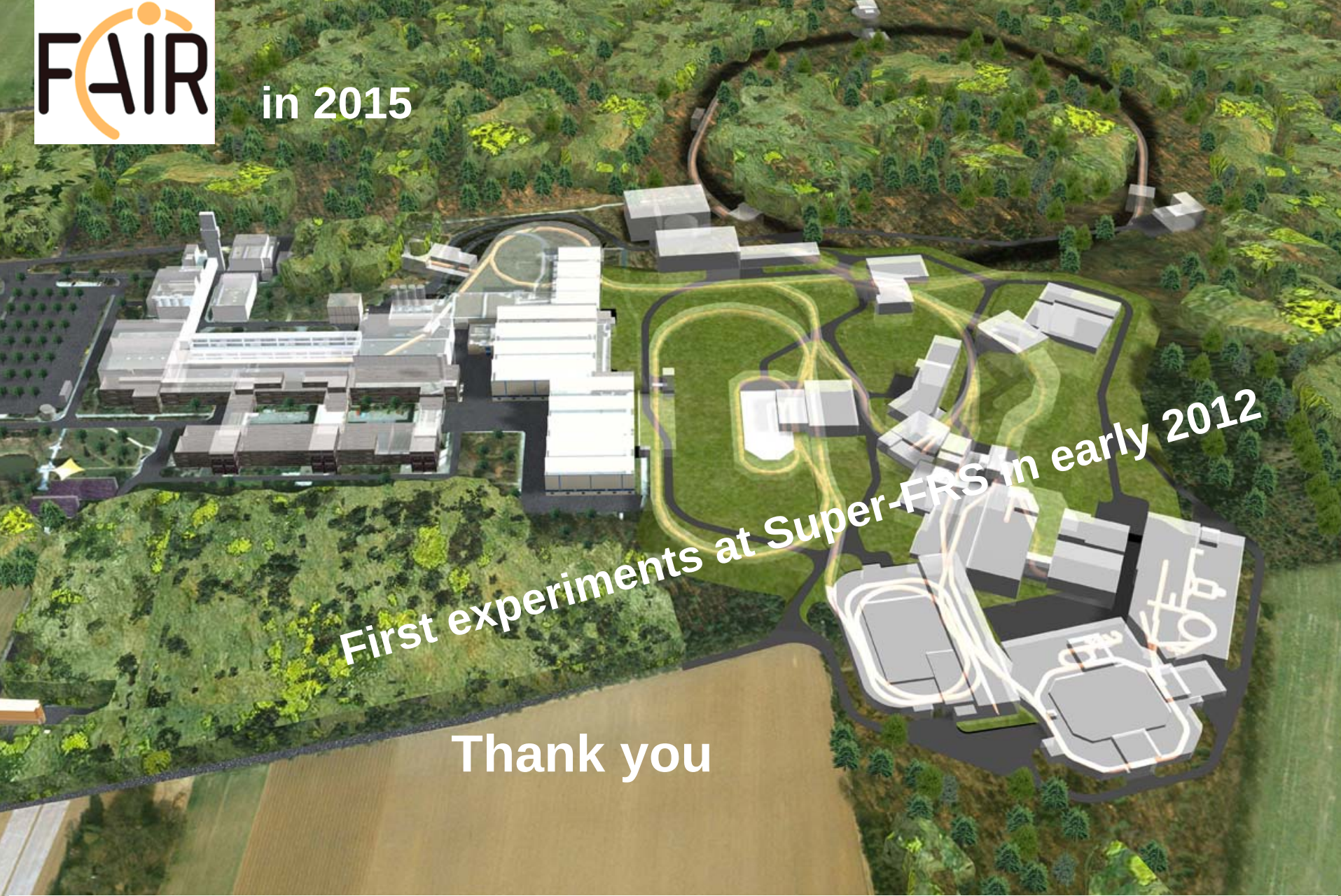
- not only for Civil Construction

Expectation to experiments:

- Fix definition of buildings now
- End of 2006/beginning of 2007 letzte last iteration changes to loadlistsо FAIR CC until mid November requirmenets on LHe, LN2, energie, …cooling water.
- Definition of interfaces accelerator- experiment location/beam parameters (Spiller/Ratschow) until end Oct.

- Change management:
- aiming to safe 10% in costs
- document changes to Bung-drawings/study

Here we need your input



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