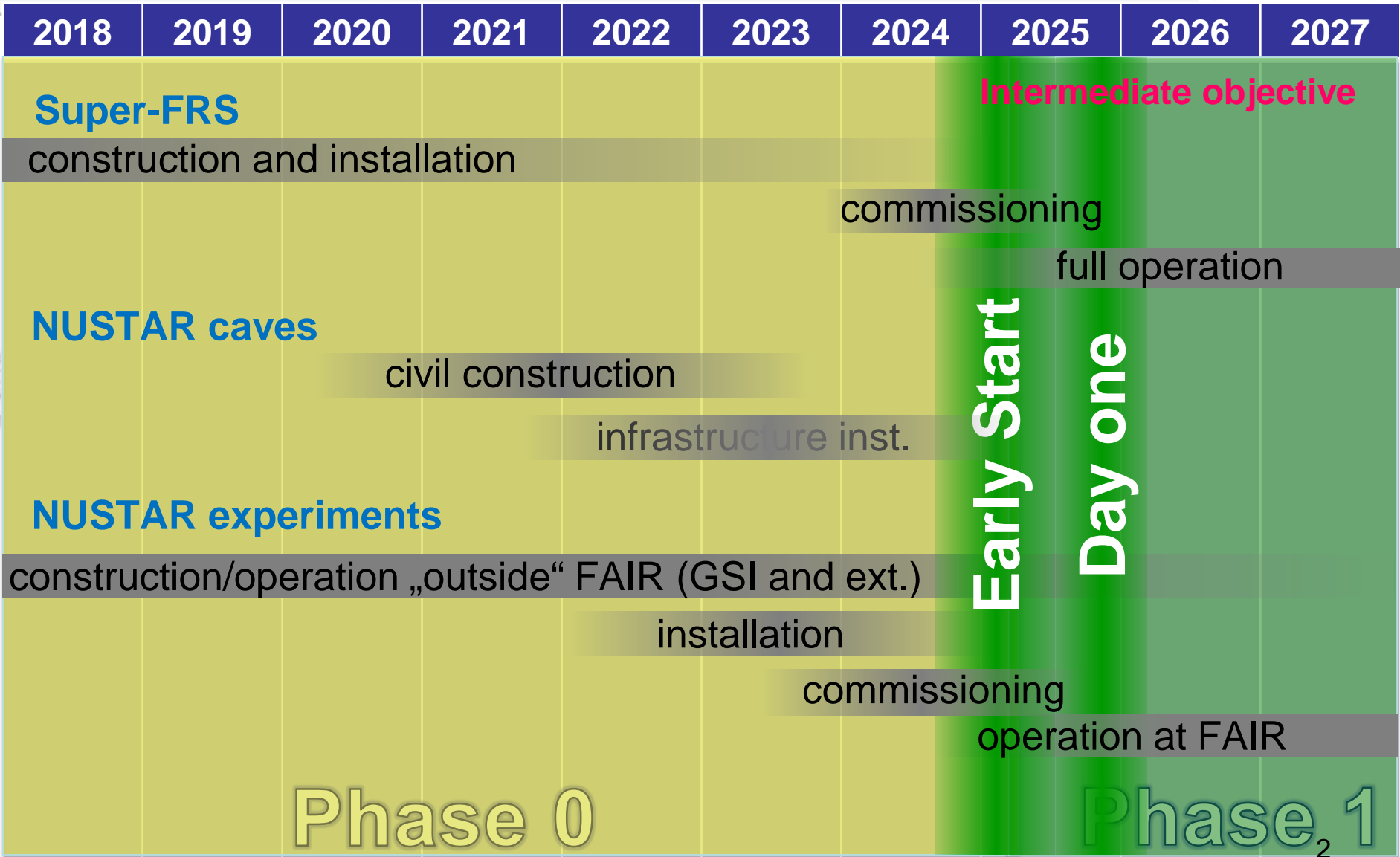




NUSTAR Meeting
30. September 2020
GSI virtual

J. Gerl

NUSTAR Overall Schedule



TDR Status



No.	Title	Status	Submission	Approval
2_01	LEB Super-FRS Infrastructure	In preparation		
2_02	Stopping cell	Approved	01.08.2018	05.11.2019
2_04	HISPEC/DESPEC Infrastructure	Submitted	01.11.2018	
2_05	NUSTAR DAQ	Approved	01.11.2016	04.06.2018
2_05	NUSTAR DAQ	Approved	01.11.2016	04.06.2018
2_07	Active target (India)	In preparation	01.11.2022	
2_08	HYDE charged particle detectors for reaction studies	In preparation	01.11.2022	
2_09	LYCCA charged particle detector (50-200 MeV/u)	Approved	01.06.2008	01.09.2008
2_10	Plunger (HISPEC)	Approved	01.04.2014	11.06.2014
2_11	DSSD implantation and decay detector (AIDA)	Approved	01.08.2008	01.03.2013
2_12	DESPEC high resolution g-detector (DEGAS)	Approved	01.08.2014	24.07.2015
2_13	Fast timing (FATIMA)	Approved	01.03.2015	24.07.2015
2_14	BELEN (DESPEC)	Approved	01.01.2014	01.08.2014
2_15	MONSTER	Approved	01.02.2013	01.08.2014
2_16	NEDA	Approved	01.09.2014	22.01.2016
2_17	Total absorption spectrometer (DTAS)	Approved	01.04.2012	18.01.2013
2_18	Isomeric moments (DESPEC)	In preparation	01.11.2021	
2_19	MATS and LaSpec TDR	Approved	01.09.2009	01.05.2010
2_19	MATS and LaSpec TDR	Approved	01.09.2009	01.05.2010
2_20	Quadrupole triplet	Approved	01.12.2008	01.05.2011
2_21	Large-acceptance dipole (GLAD)	Approved	01.06.2006	01.07.2008
2_22	Tracking detectors	Approved	01.11.2014	24.07.2015
2_24	Gamma spectrometer - barrel (CALIFA)	Approved	01.11.2011	15.01.2013
2_25	Gamma spectrometer - forward endcap (CALIFA)	Approved	01.11.2014	24.07.2015
2_26	Si tracker	In preparation	15.03.2020	
2_27	Neutron ToF spectrometer (NeuLAND)	Approved	01.11.2011	15.01.2013
2_28	Vacuum systems	In preparation	01.11.2019	
2_29	Infrastructure	In preparation	01.11.2019	
2_30	Spectrometer	In preparation	01.11.2021	
2_32	Active target	Approved	01.09.2015	01.06.2017
2_33	Schottky pick-ups	Approved	01.12.2017	14.12.2018
2_34	Time-of-flight detectors	Approved	01.12.2017	10.10.2018
2_35	ILIMA Heavy Ion Detector	Approved	01.11.2017	10.10.2018
2_37	Slowed down beam setup	In preparation	01.11.2021	
2_38	EXPERT	Approved	01.09.2016	01.07.2017
2_39	SEC Infrastructure	Approved	01.05.2019	05.11.2019
	Liquid Hydrogen Target	In preparation	01.07.2021	
	(Ice target and tensor force)	In preparation	01.07.2021	
	(future WASA)	In preparation	01.07.2024	

approved 5.20

24 approved

1 under evaluation by ECE

3 needed for Day-one and are still expected in the next months

8 more expected, but not time critical

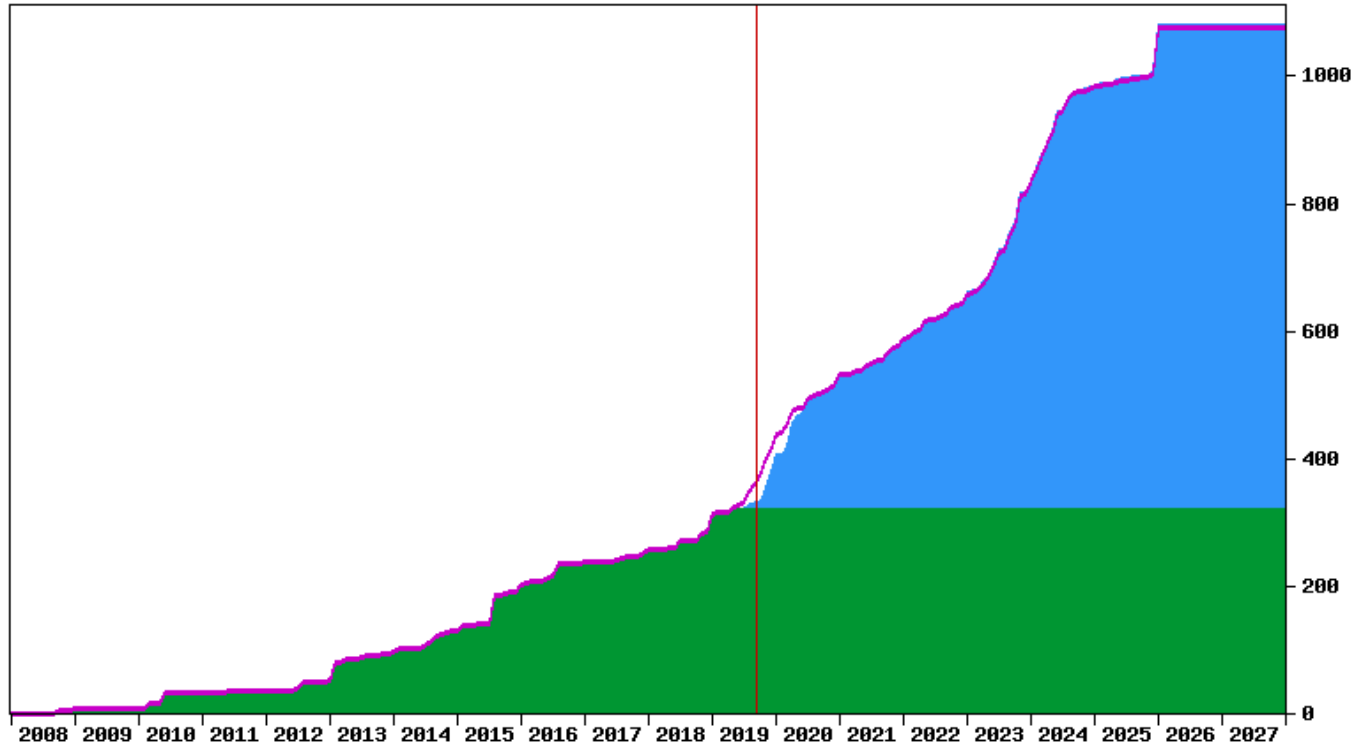
submitted

In-kind and Collaboration Contracts



Country	Experiment	Description	in-kind value	Council?	specs?	contract?	signed?
Finland	HISPEC/DESPEC	DEGAS stage 2	268	yes	no	no	no
	HISPEC/DESPEC	MONSTER	119.9	yes	yes	yes	yes
	MATS	RFQ	215.2	yes	Draft	no	no
	LaSpec	Laser-based beam preparation	106.4	yes	Draft	no	no
France	R3B	GLAD	2530	yes	yes	yes	no
Germany	LEB infrastructure	Cryogenic stopping cell (CSC)	885	yes	no	no	no
	HISPEC/DESPEC	DEGAS stage 1	390	yes	no	no	no
	HISPEC/DESPEC	DEGAS stage 2	100	yes	no	no	no
	R3B	GLAD	2530	yes	yes	yes	yes
	R3B	NeuLAND stage 1	390	yes	no	no	no
	ILIMA	Heavy Ion Detector	65.7	update	no	no	no
	ILIMA	Schottky pick-ups	341.3	yes	Draft	no	no
	ILIMA	Time-of-flight detectors	333	yes	yes	yes	yes
India	HISPEC/DESPEC	DEGAS	1410	yes	yes	yes	yes
	HISPEC/DESPEC	MONSTER	560	yes	yes	yes	yes
	MATS	Preparation Penning Trap	40	yes	Draft	no	no
Poland	HISPEC/DESPEC	Finger detectors	227.9	yes	no	no	no
Romania	HISPEC/DESPEC	FATIMA	100	yes	no	no	no
	HISPEC/DESPEC	Plunger	122.5	yes	no	no	no
Russia	R3B	ACTAF – Small chamber ACTAF 2	174.7	yes	yes	yes	yes
	R3B	NeuLAND - HV distribution system	415	yes	yes	yes	yes
	R3B	CALIFA endcap – iPhos detection modules	300	yes	yes	yes	yes
	R3B	Proton arm spectrometer	489.3	yes	yes	yes	yes
Sweden	HISPEC/DESPEC	DEGAS stage 2	450	yes	no	no	no
	HISPEC/DESPEC	LYCCA	150	yes	yes	yes	yes
	R3B	CALIFA barrel stage 1	399.2	yes	yes	yes	yes
	R3B	CALIFA forward endcap	575.8	yes	no	no	no
United Kingdom	HISPEC/DESPEC	AIDA	975	yes	no	no	no
	HISPEC/DESPEC	DTAS	84	yes	no	no	no
	HISPEC/DESPEC	FATIMA	464.6	yes	no	no	no
	HISPEC/DESPEC	LYCCA	705.4	yes	Draft	no	40

“Day one” project plan (September 2019)



S-curve: 1.2 NUSTAR

Phase 1 / Day one

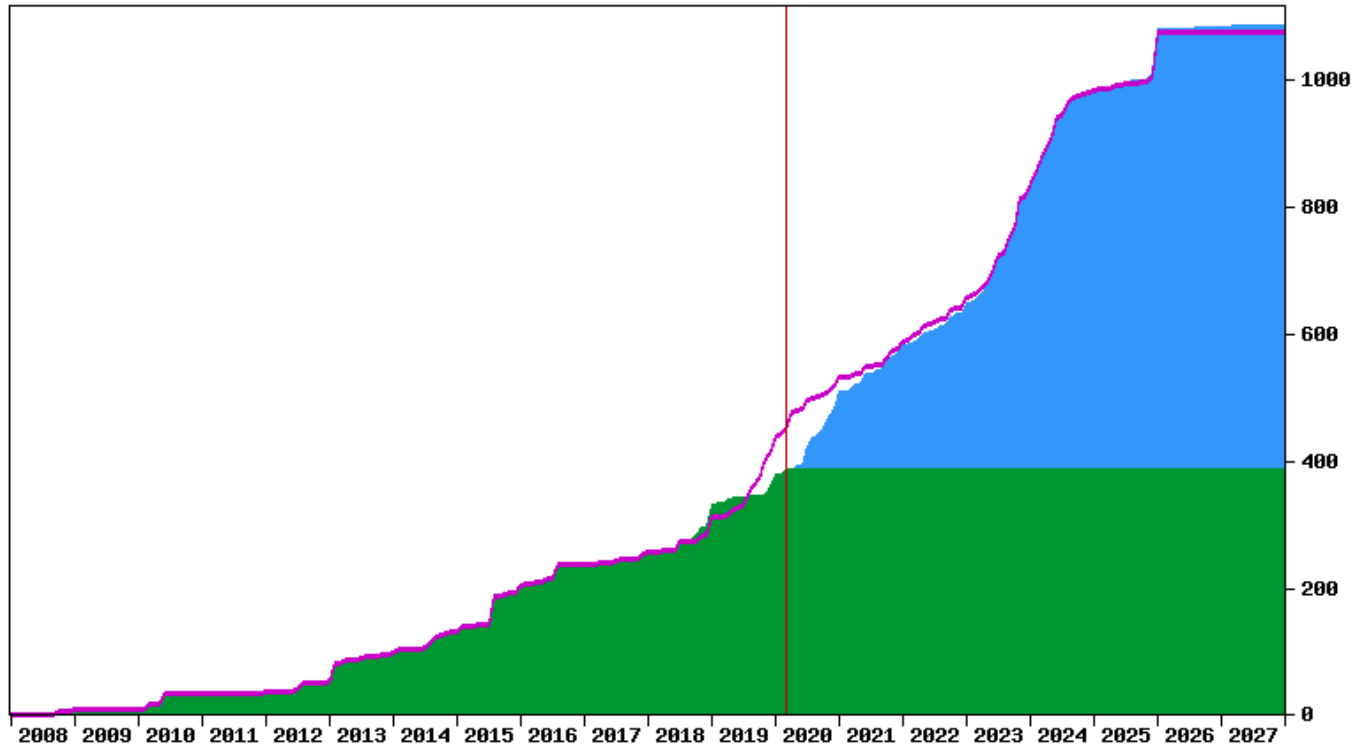
Step size: 1 month

Total milestones: 1080

Baseline 3

- all milestones
- milestones achieved
- baseline

“Day one” project plan (February 2020)






S-curve: 1.2 NUSTAR

Phase 1 / Day one

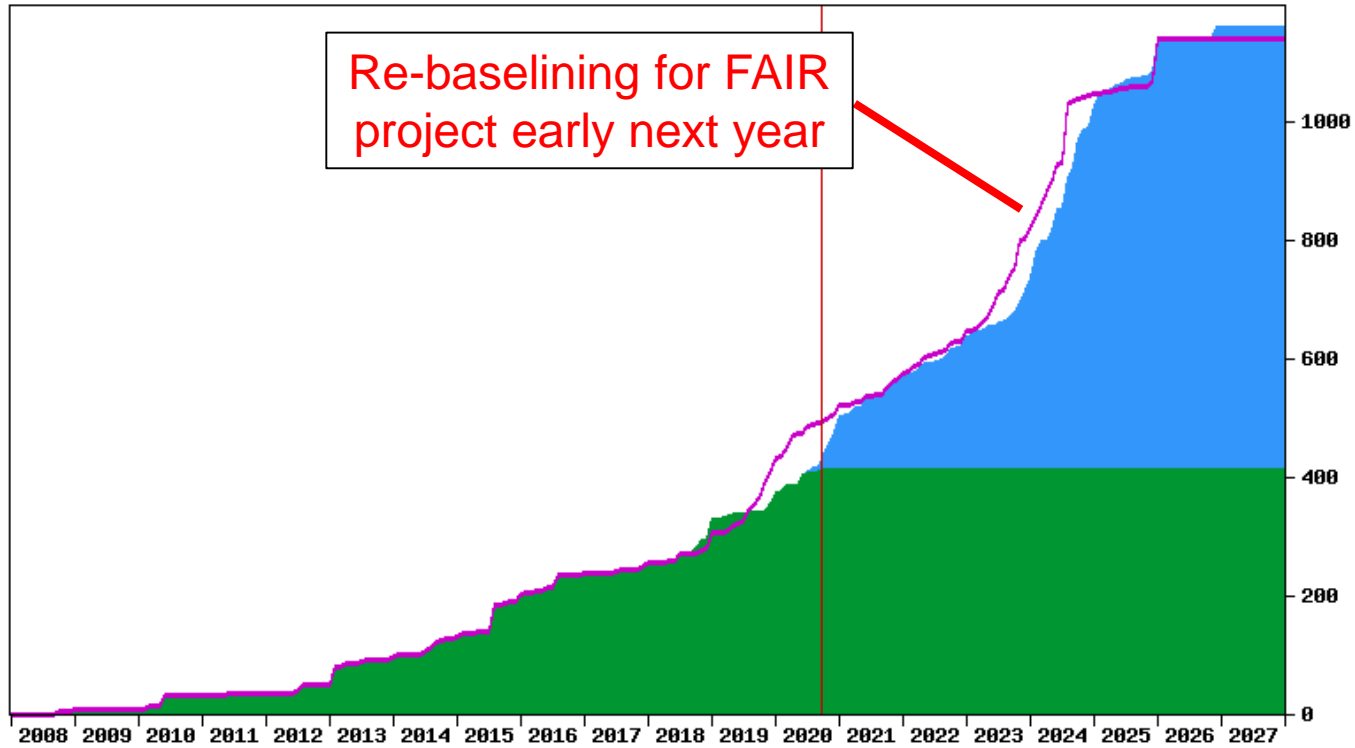
Step size: 1 month

Total milestones: 1084

Baseline 3

-  milestones to be completed
-  milestones achieved
-  baseline

“Day one” project plan (September 2020)



S-curve: 1.2 NUSTAR

Phase 1 / Day one

Step size: 1 month

Total milestones: 1164

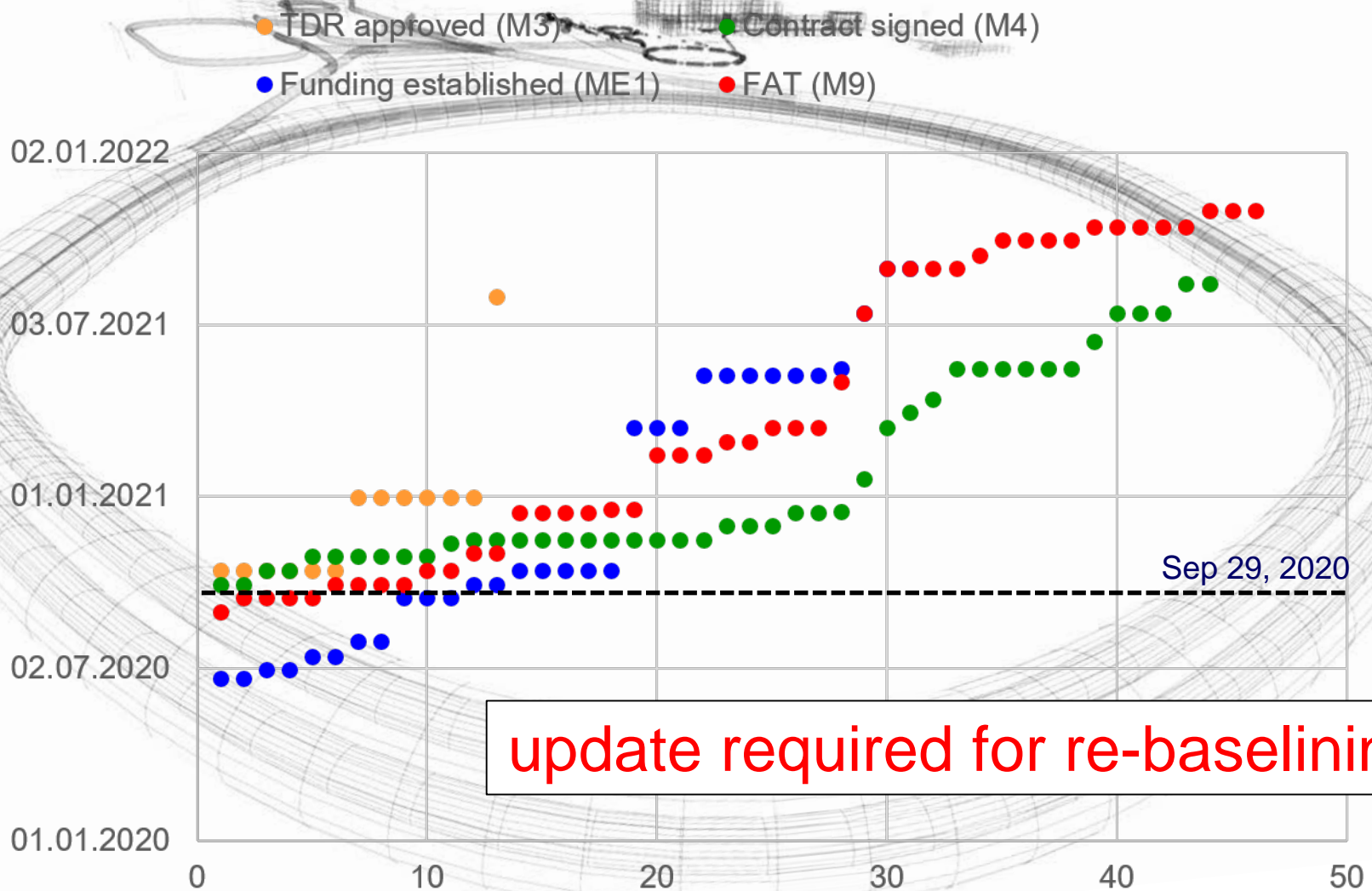
Baseline 3

■ milestones to be completed

■ milestones achieved

■ baseline

Milestones until end of 2021



update required for re-baselining

Score Card



	NUSTAR sub-system	TDR	Cost [k€ 2005]	Funding	Construction	Date completion	Test/Commissioning
Day 1	LEB infrastr.		1,806			06/2023	
	HISPEC/DESPEC		10,886			03/2024	
	MATS		1,173			08/2024	
	LaSpec		253			05/2021	
	R3B		17,788			03/2023	
	ILIMA		1,099			12/2023	
			92% <i>value weighted</i>	33,004	94% <i>secured</i>	59% <i>value weighted</i>	
Change since report 2020-I	+4%	--	--	--			

progressing steadily...

Infrastructure items for Common Fund

- Several components **required for the Day-one configurations** have been identified by the NUSTAR Collaboration as common infrastructure items.
- These items cannot be taken over by partner institutes.
- **Update of this list is in progress**

PSP	Name	cost (2005) [k€]
1.2.1.2.4	Detectors and slit system in front CSC	135.7
1.2.1.2.5	Beam line to MATS-LaSpec hall	154.0
1.2.1.7	Beam line to MATS RFQ	200.0
1.2.2.3.5	HISPEC/DESPEC Mechanics	10.4
1.2.2.5.1	Safety measures	96.4
1.2.5.1.1.3.3	Valve box GLAD	128.1
1.2.5.1.1.3.4	Infrastructure magnets	200.0
NUSTAR Common Fund		924.6

Risk Register



Risk ID	Status	Risk title	Risk description	Probability	Performance impact	Risk Score	Strategy	Risk Response	Residual Risk	Approval status
173	Mitigation proposed	No budget available to order NUSTAR infrastructure.	<p>Cause: The budget for infrastructure is not approved yet. It is supposed to come from common fund that requires a signed or at least agreed MoU</p> <p>Event: No budget available to order infrastructure</p> <p>Impact: Installation of experiment cannot start.</p>	25%	severe	14	mitigate	<p>Preventive mitigation: Request for additional funds, collaborations (1 Mio € @2005), establishing common fund to cover these costs.</p> <p>mean mitigation cost (€):</p> <p>Contingency plan: Other money source have to be made available.</p>	0	
			<p style="color: magenta; font-size: 1.2em;">Waiting for decision on Common Funds</p>							
357	Mitigation ongoing	The time schedule for production of the DEGAS cooling is in danger.	<p>Cause: The allocated supplier of the cooling component for DEGAS detectors is not able to supply the required Quality. Current R&D of the supplier is considerably delayed.</p> <p>Event: The time schedule for production is in jeopardized. Additionally there is an uncertainty whether the reworked prototype will be in sufficient quality.</p> <p>Impact: Phase 0 experiments cannot be performed without these detectors. Worst case would be an overall delay of DESPEC by several years.</p>	50%	major	13	mitigate	<p>Preventive mitigation: Improvement of the power consumption of the cryostat enabling conventional LN2 cooling.</p> <p style="text-align: center; color: magenta; font-size: 1.5em;">Done </p>	1	decided
358	Mitigation proposed	Detection threshold of Si Tracker modules far too high.	<p>Cause: First Si tracker modules have been delivered and show reduced performance caused by an ASIC.</p> <p>Event: Detection threshold far too high.</p> <p>Impact: Reduced efficiency to about 30%.</p>	50%	major	13	mitigate	<p>Preventive mitigation: Replace the tracker modules by other types of modules (complicated, new design required). 04.02.20: analysis is carried out before mitigation is planned</p>	1	to be decided @ NUSTAR (R3B)
			<p style="color: magenta; font-size: 1.2em;">Technical investigation ongoing</p>							

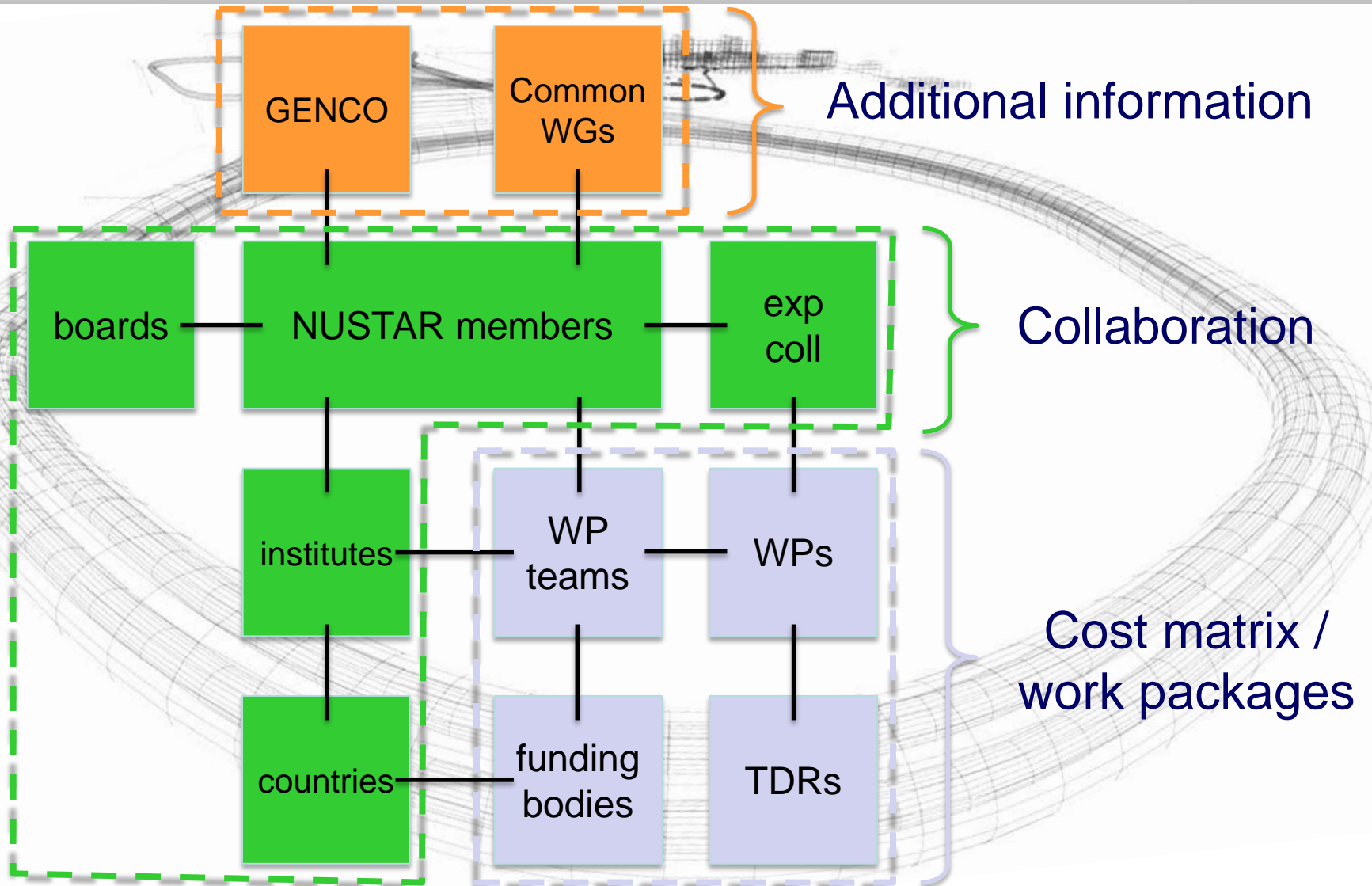
New risk: CALIFA forward endcap phos which inhomogeneous light yield

General ideas for an information data base



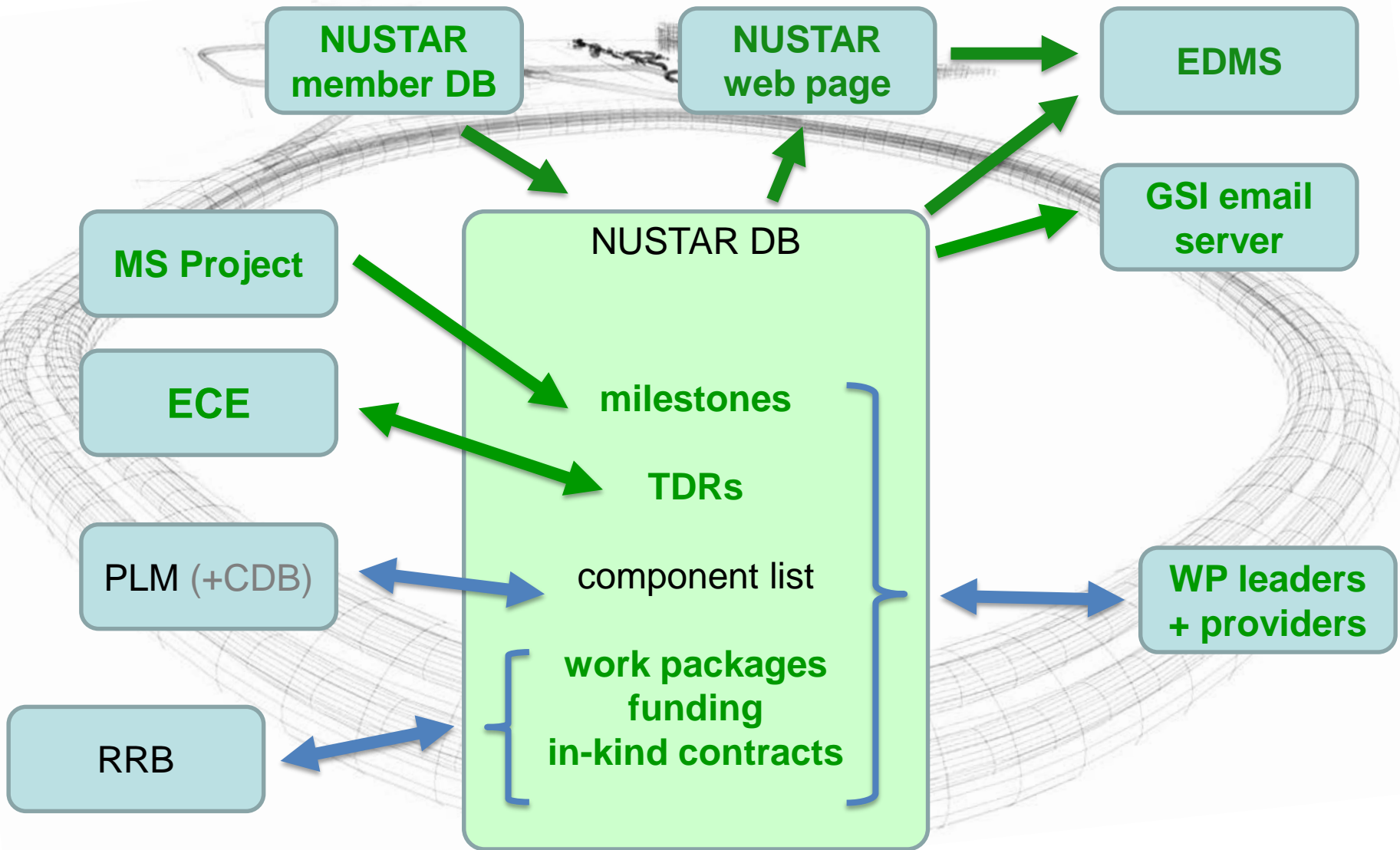
- web access and shared access
 - global project -> **global access**
 - no local files -> **data up-to-date** (if maintained in database)
 - **distribution of work** -> different aspects/data maintained by different users
- simple front-end and database
 - html with standard PHP, no javascript, PostgreSQL database
- modular system
 - flexible, tailored add-ons possible (reporting!)
 - access to modules and data can be adapted (per user)
- automatic reminders/reports
 - cron-jobs for reporting, open action items, etc.
- connect different systems/databases
 - links to EDMS documents
 - direct access to MS Project (via interface database)
 - interface to external member database(s) (CSV)
 - data exchange (via CSV) with PLM system
 - updating GSI-ListServ email lists

Initial idea for NUSTAR database

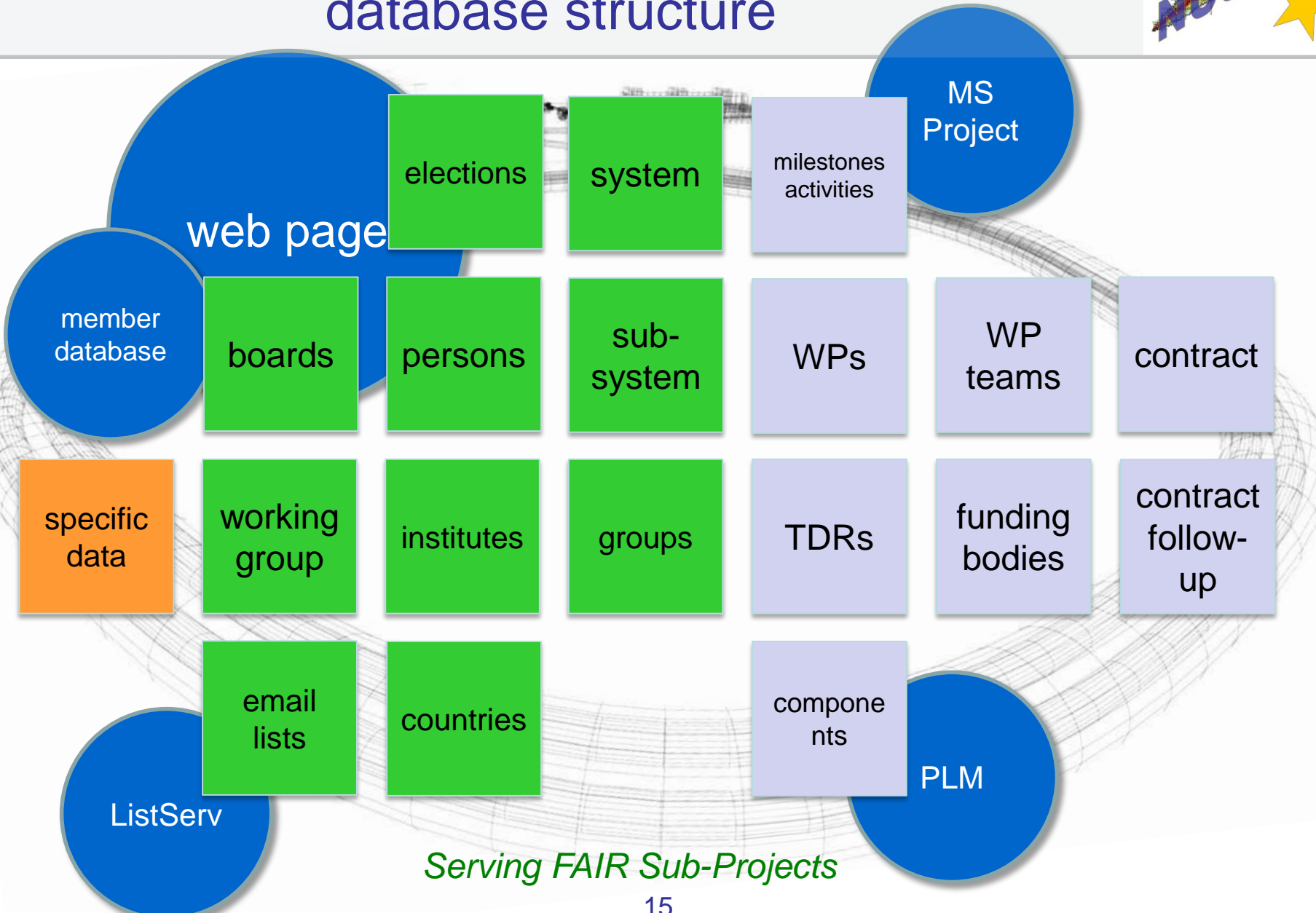


realized by Alex Herlert

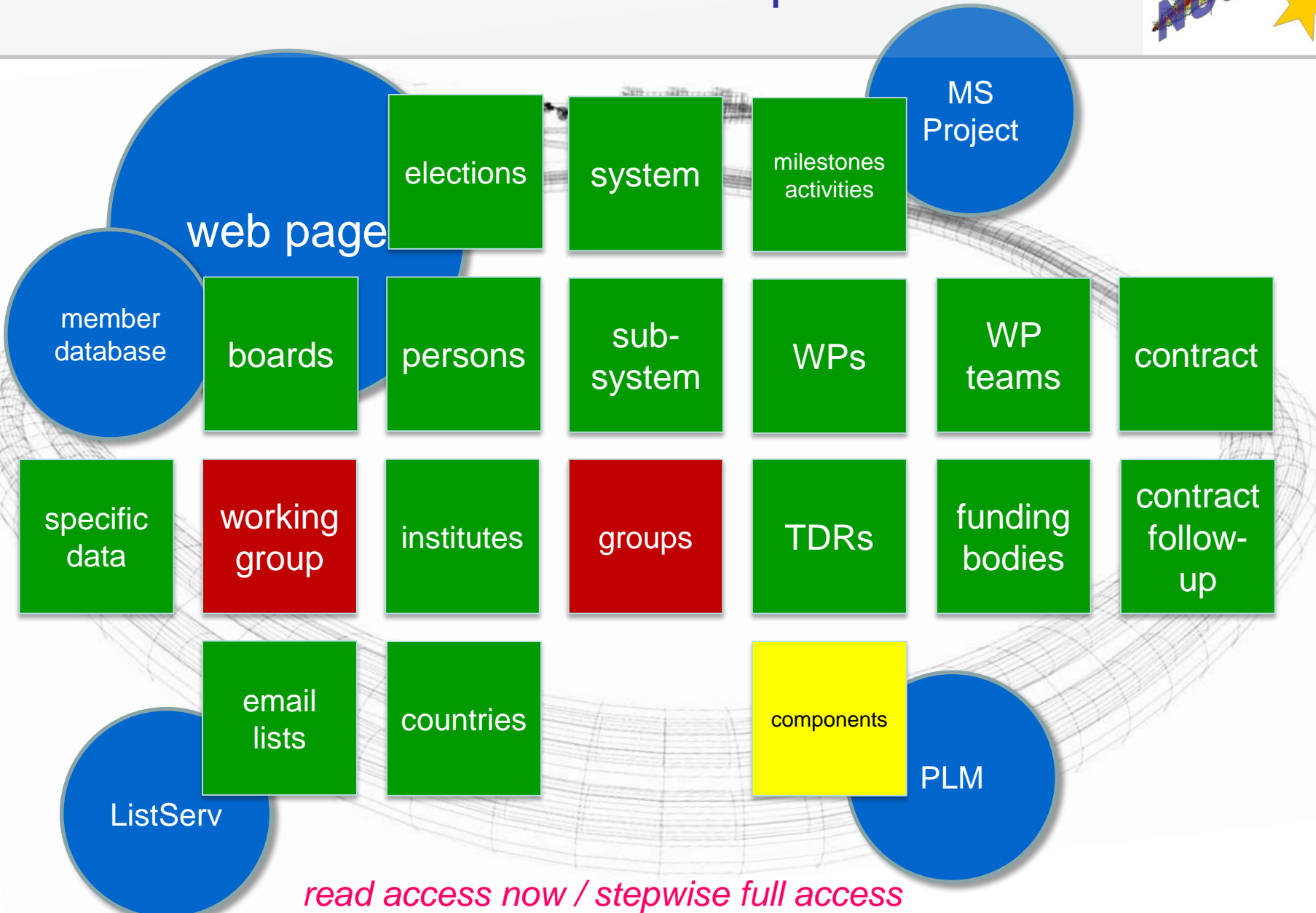
... and connect to other systems



Transition to Project Administration Web – PAW database structure



PAW – basic modules in operation



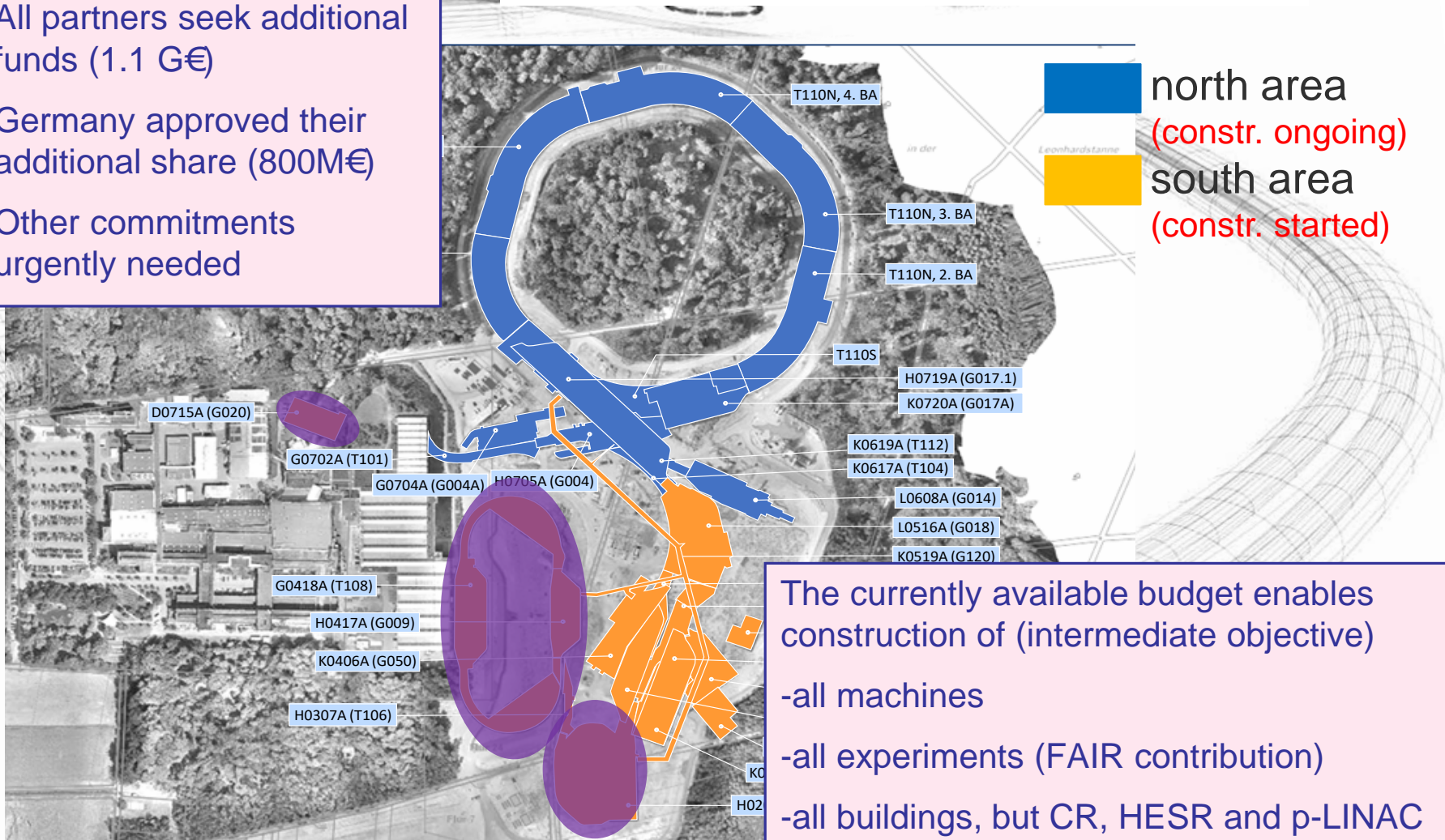
read access now / stepwise full access

FAIR Funding



- Council confirmed MSV
- All partners seek additional funds (1.1 G€)
- Germany approved their additional share (800M€)
- Other commitments urgently needed

... Realization along the beam line



The currently available budget enables construction of (intermediate objective)

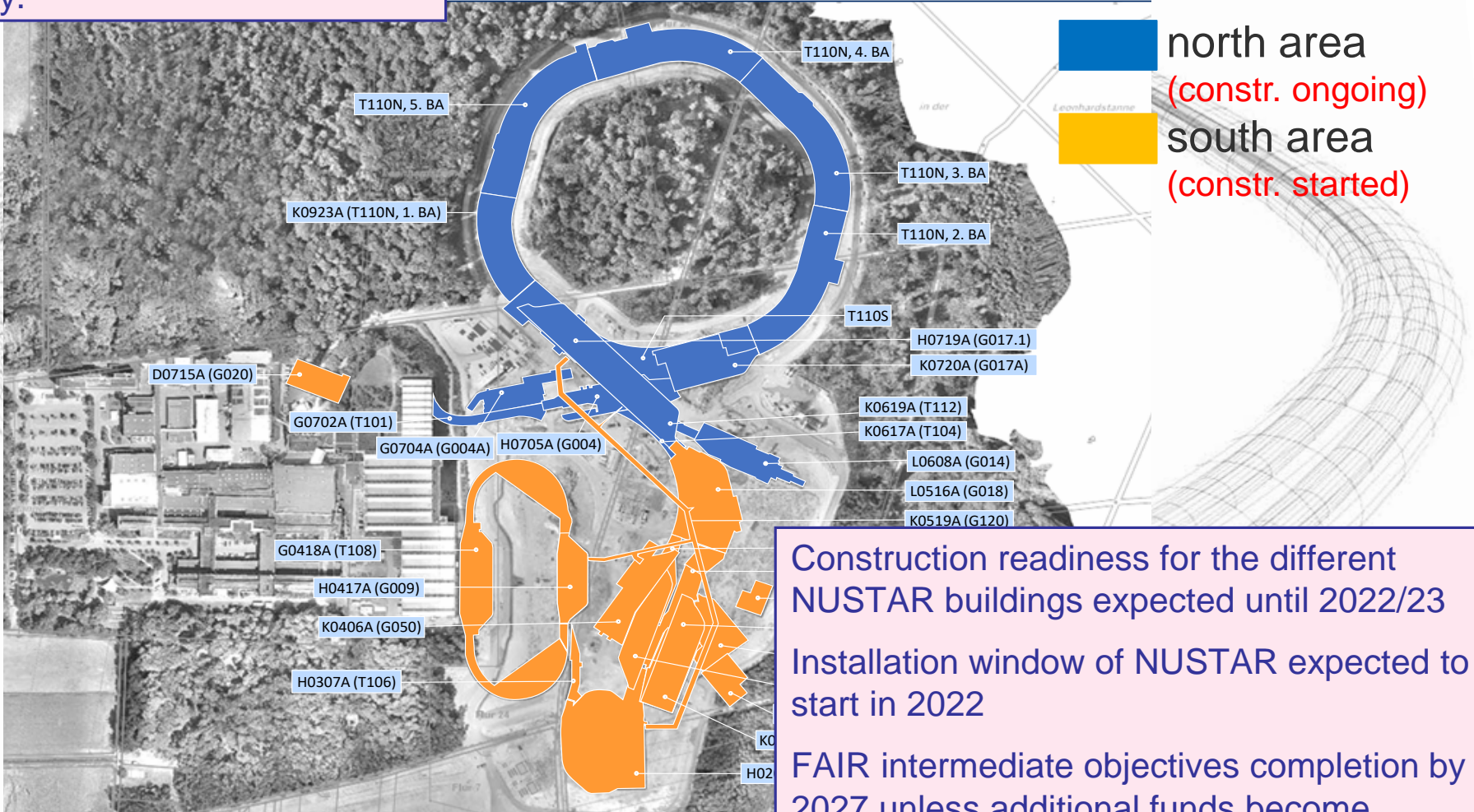
- all machines
- all experiments (FAIR contribution)
- all buildings, but CR, HESR and p-LINAC

FAIR Civil Construction



Concrete shell SIS100 and switchyard building 6 months delay.

... Realization along the beam line



Construction readiness for the different NUSTAR buildings expected until 2022/23

Installation window of NUSTAR expected to start in 2022

FAIR intermediate objectives completion by 2027 unless additional funds become available in early 2021

Super-FRS and NUSTAR Caves



- All NUSTAR experiments are planned to move into the FAIR buildings in 2022-2024.
- Construction just started!

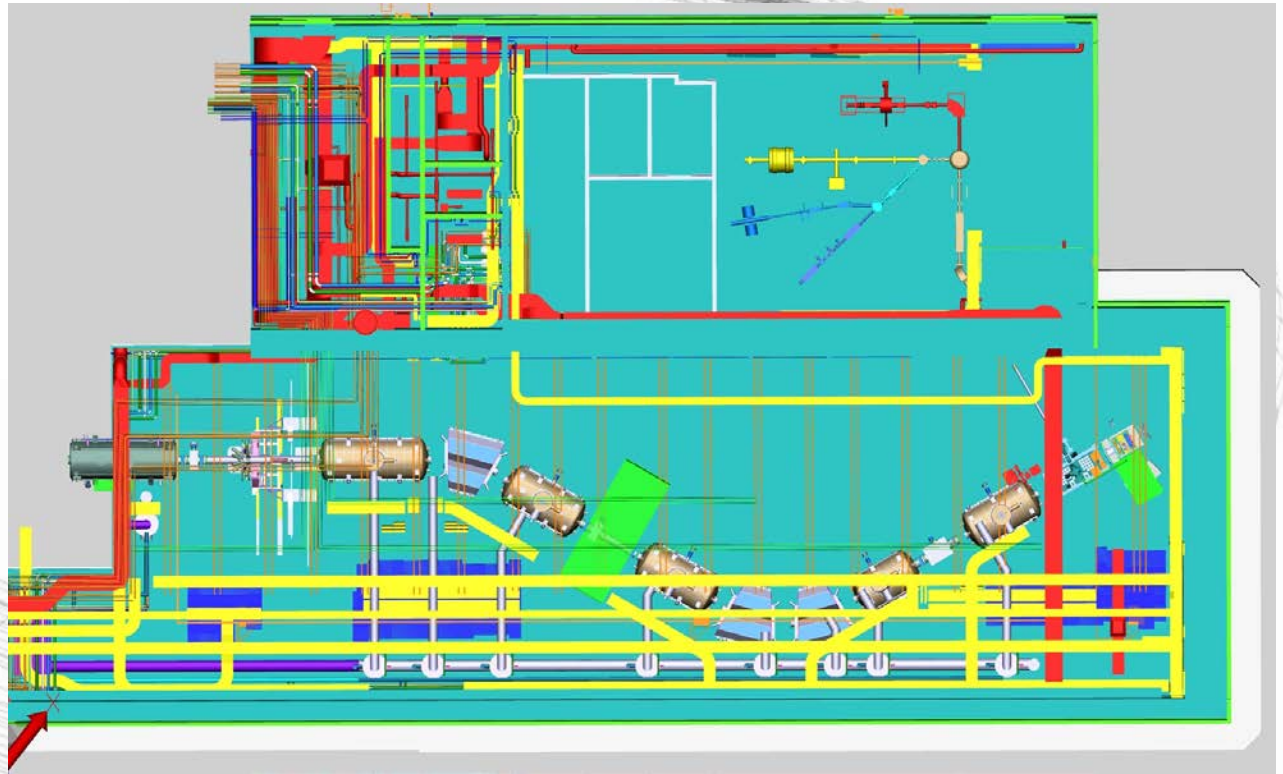


Infrastructure preparations

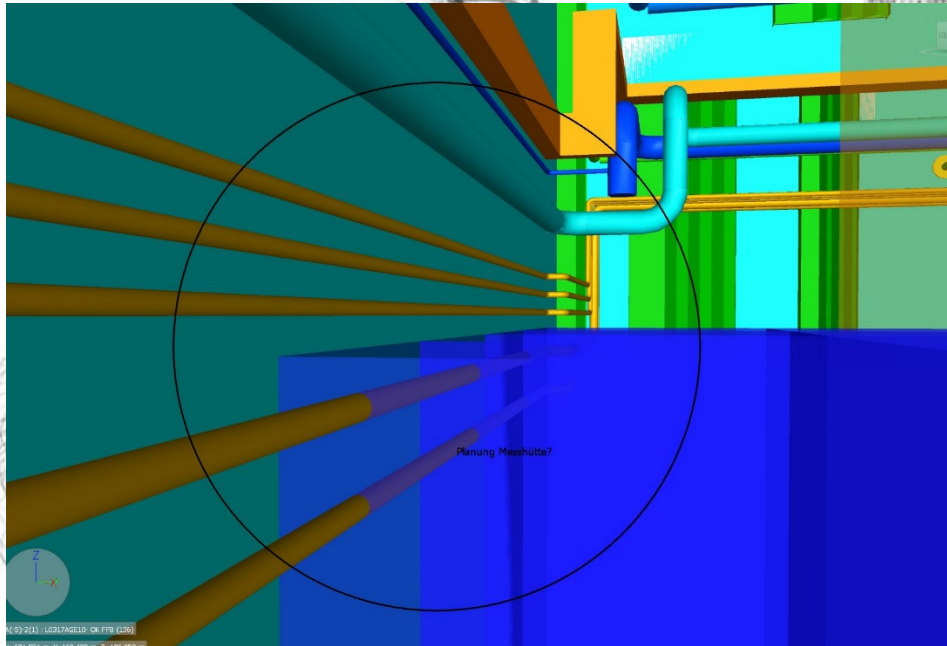


Many activities are going on

- cable lists
- door lists
- emergency switches
- cryo-line optimization
- collision checks
- LEB Cabin
- installation planning
-

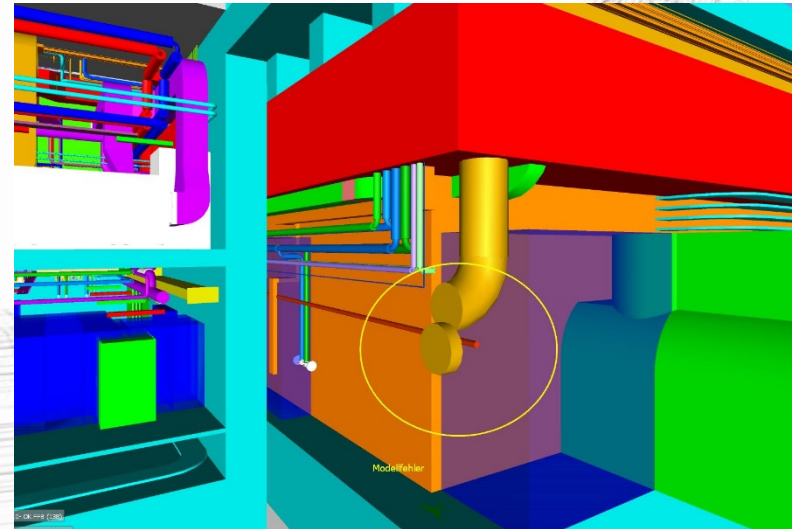


Collision Review L0317A

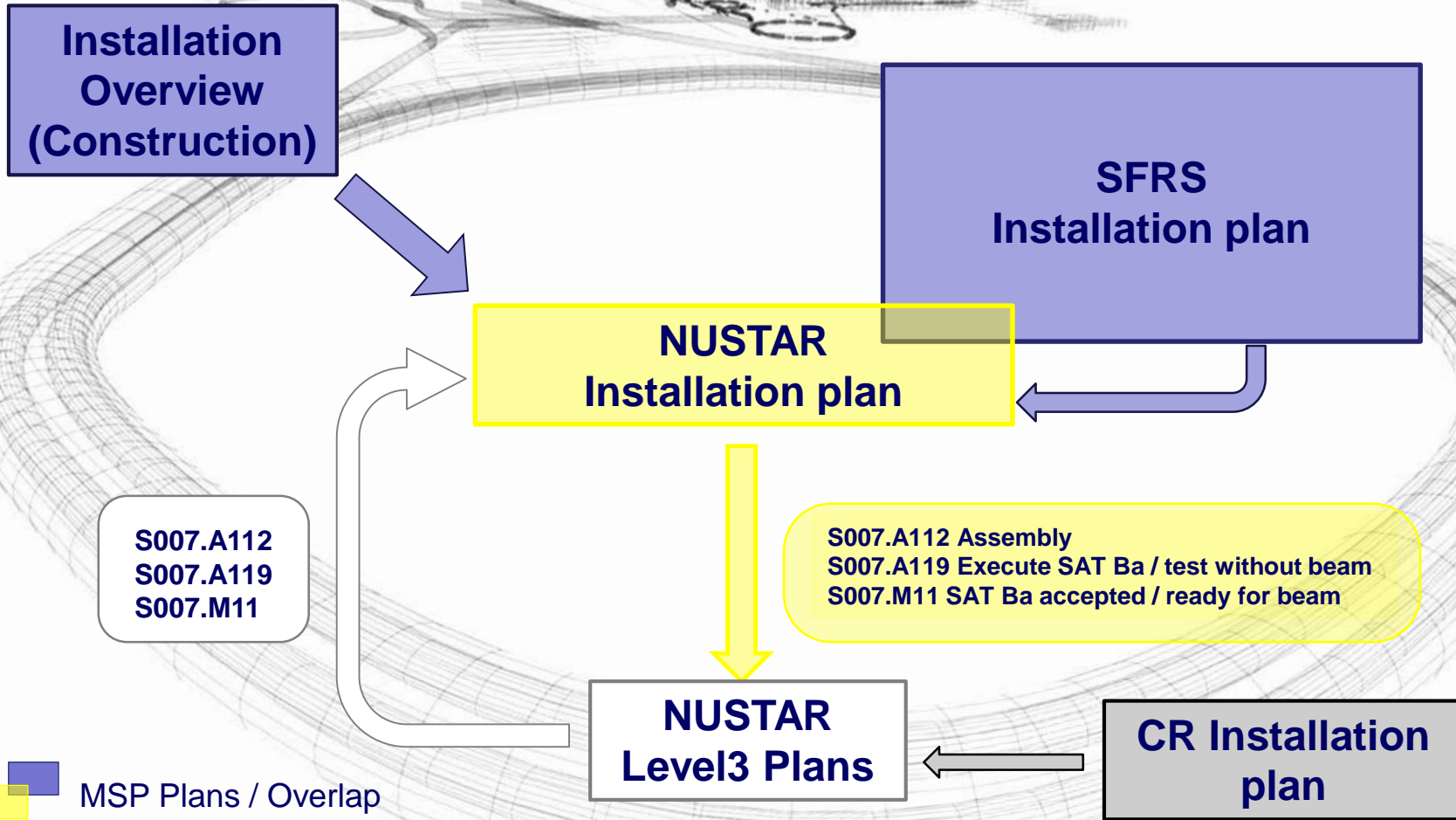


Piping through Racks

..or sometimes just a mistake in the model data...






Installation Planning - Structure



S007.A112
S007.A119
S007.M11

S007.A112 Assembly
S007.A119 Execute SAT Ba / test without beam
S007.M11 SAT Ba accepted / ready for beam

-  MSP Plans / Overlap
-  Input / Influence
-  Outcoming Activities / Milestones

Installation Planning ... in the making

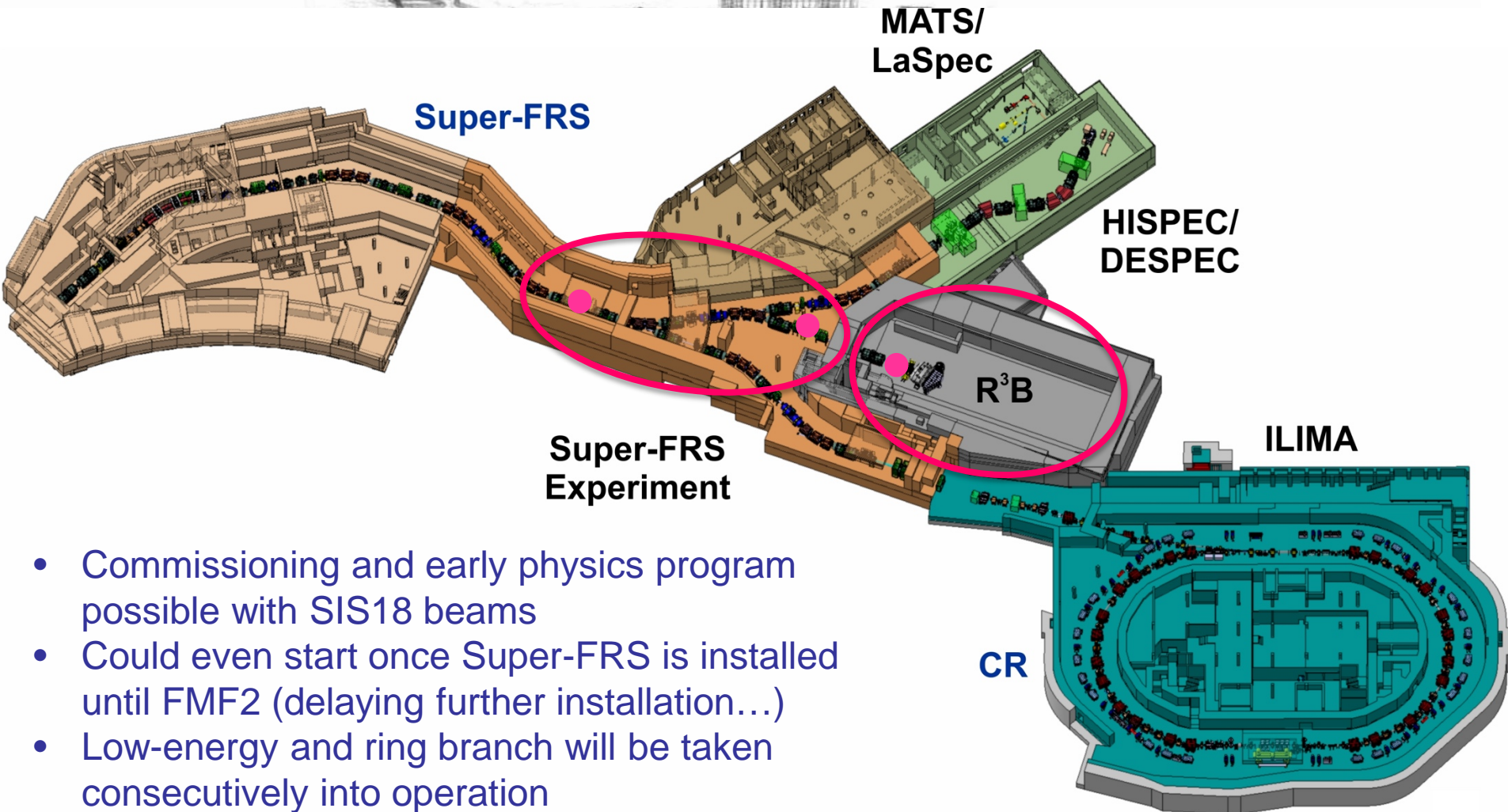


f Vorgangsname	Anfang	Ende	2020		2021		2022		2023		2024		2025		2026		2027		2028	
			H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2	H1	H2
▾ 02_15_01_NUSTAR	Mon 08.11.21	Don 15.06.28																		
▾ FAIR civil construction	Don 09.12.21	Fre 24.05.24																		
▾ LEB Cave (G006B)	Don 09.12.21	Fre 24.05.24																		
G006B Building ready for installation	Don 09.12.21	Don 09.12.21																		
G006B Time frame for installation	Fre 10.12.21	Mit 31.08.22																		
Completion of testing and commissioning Building	Don 19.01.23	Fre 24.05.24																		
G006B Acceptance by HBO	Mit 18.01.23	Mit 18.01.23																		
▾ HEB cave (G006)	Fre 05.08.22	Die 19.03.24																		
G006 Building ready for installation	Fre 05.08.22	Fre 05.08.22																		
G006 Time frame for installation	Fre 05.08.22	Don 03.08.23																		
Completion of testing and commissioning Building	Die 19.03.24	Die 19.03.24																		
G006 Acceptance by HBO	Die 19.03.24	Die 19.03.24																		
▾ Installation NUSTAR - LEB, HEB, (CR)	Mon 08.11.21	Don 15.06.28																		
▾ LEB cave (G006B) up to FLF3 - Installation and Commissioning without Beam	Don 09.12.21	Mit 04.09.24																		
▾ HEB cave (G006) - Installation and Commissioning without Beam	Mon 03.01.22	Mit 06.08.25																		
▾ Ring branch CR (manually set - link later)	Don 01.09.22	Mon 02.06.25																		
▾ LEB cave (G006B) up to FLF6 - Installation and Commissioning without Beam	Don 31.10.24	Don 15.06.28																		
▾ LEB - optional or external installation and commissioning without beam	Don 30.05.24	Fre 25.07.25																		

work in progress

managed by Petra Hofmann

NUSTAR Early Implementation



- Commissioning and early physics program possible with SIS18 beams
- Could even start once Super-FRS is installed until FMF2 (delaying further installation...)
- Low-energy and ring branch will be taken consecutively into operation

Critical to Success



- Acquiring funding for NUSTAR infrastructure through MoU
- Fulfilling all formal safety requirements to be able to operate the planned set-ups
- Getting sufficient beam time at GSI for i) testing FAIR/NUSTAR equipment, ii) re-gaining operating experience and iii) training scientists and technicians

Safety requirements at GSI/FAIR



For each component, subsystem or set-up to be operated at the GSI/FAIR campus it is mandatory to have a

Risk assessment (list of possible dangers)

and a

Safety concept (list of measures to reduce and manage the risks)

There needs to be a written document which could be in the simplest case a manual, but depending on the complexity it may require special documents. Obviously for trivial items no written document is requested. One needs to demonstrate that one has carefully thought about risks.

...we will approach you soon

Conclusion



- NUSTAR progressing well
- Components and systems realized in time
- Planning and infrastructure preparation advanced
- New Project Administration Web PAW available
- Early physics already possible in 2024
- MoU needed soon to enable infrastructure funding
- Safety requirements need to be tackled