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European Science Cluster of Astronomy &
Particle physics ESFRI research Infrastructures

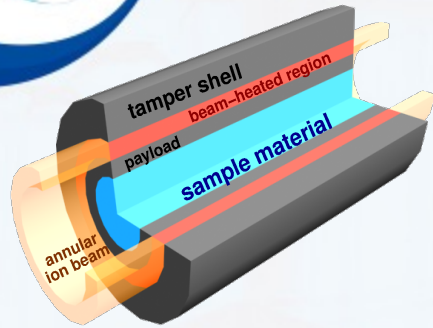
ESCAPE to the Future
25-26 October 2022
Brussels, Belgium

ESCAPE to the Future: OSSR @ GSI/FAIR

Mohammad Al-Turany

GSI Helmholtzzentrum für Schwerionenforschung

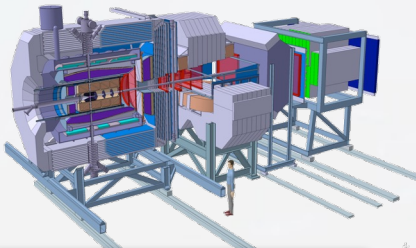




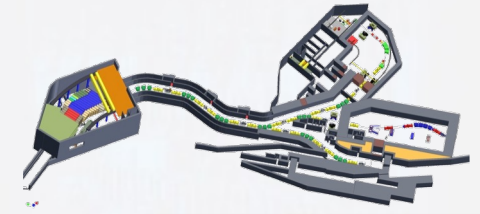
Atomic, applied and plasma physics - APPA



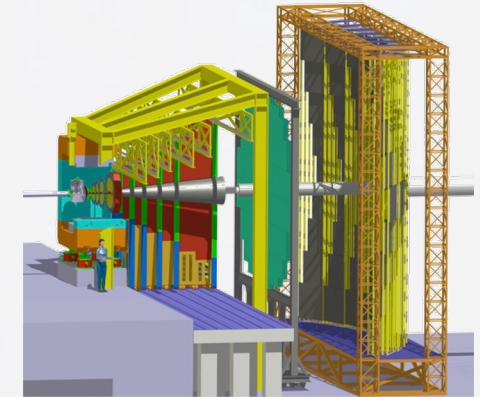
1 TByte/s into online farms
35 PByte/year on disk



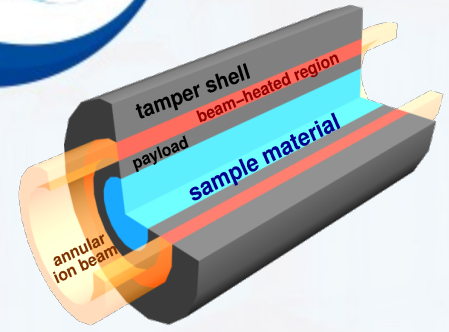
Hadron structure - PANDA



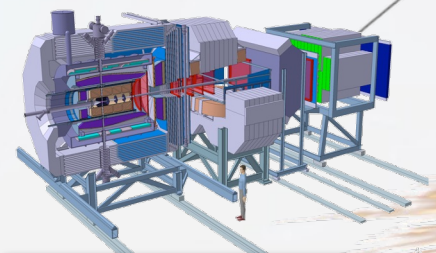
Astrophysics and nuclear structure - NUSTAR



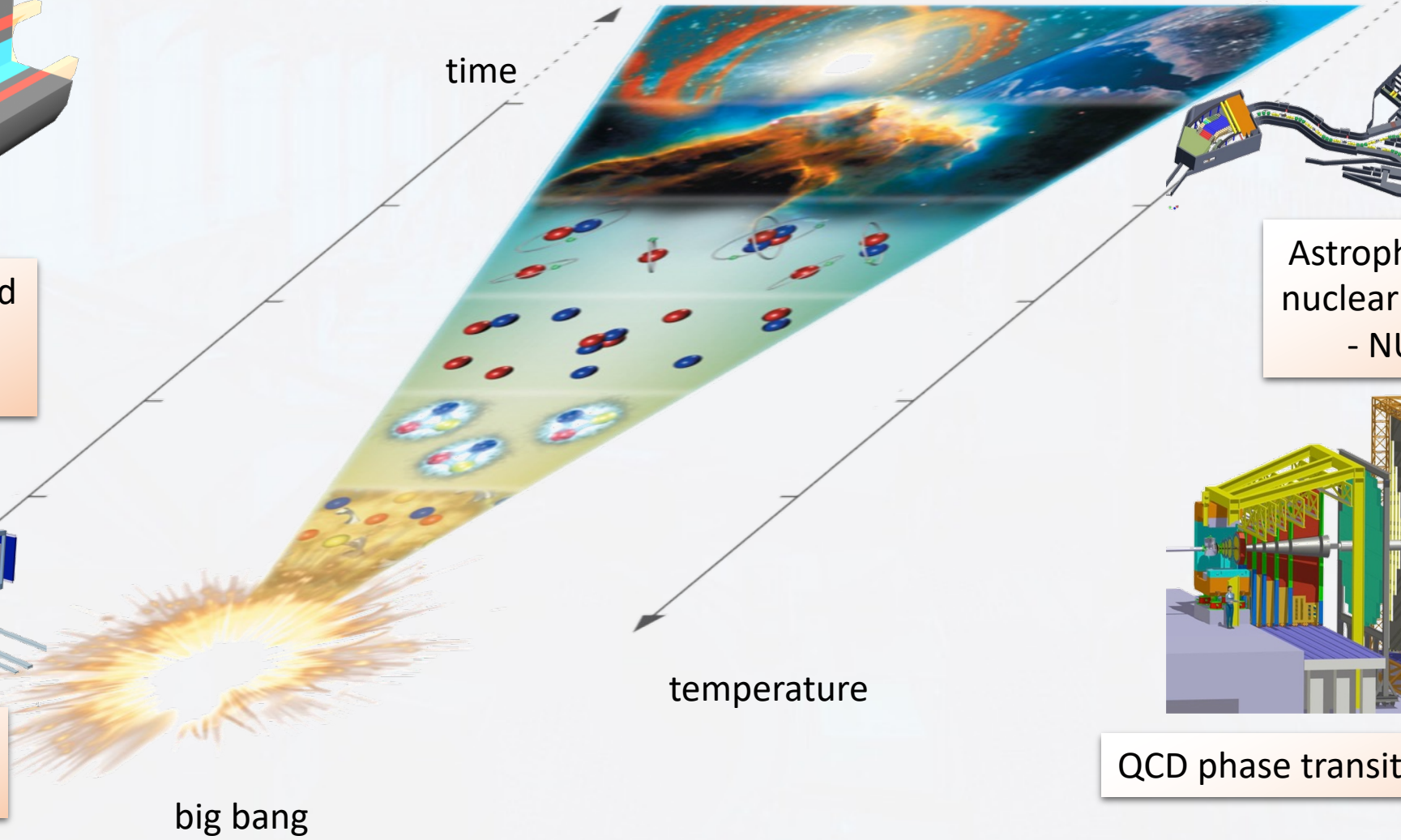
QCD phase transition - CBM



Atomic, applied and plasma physics - APPA



Hadron structure - PANDA



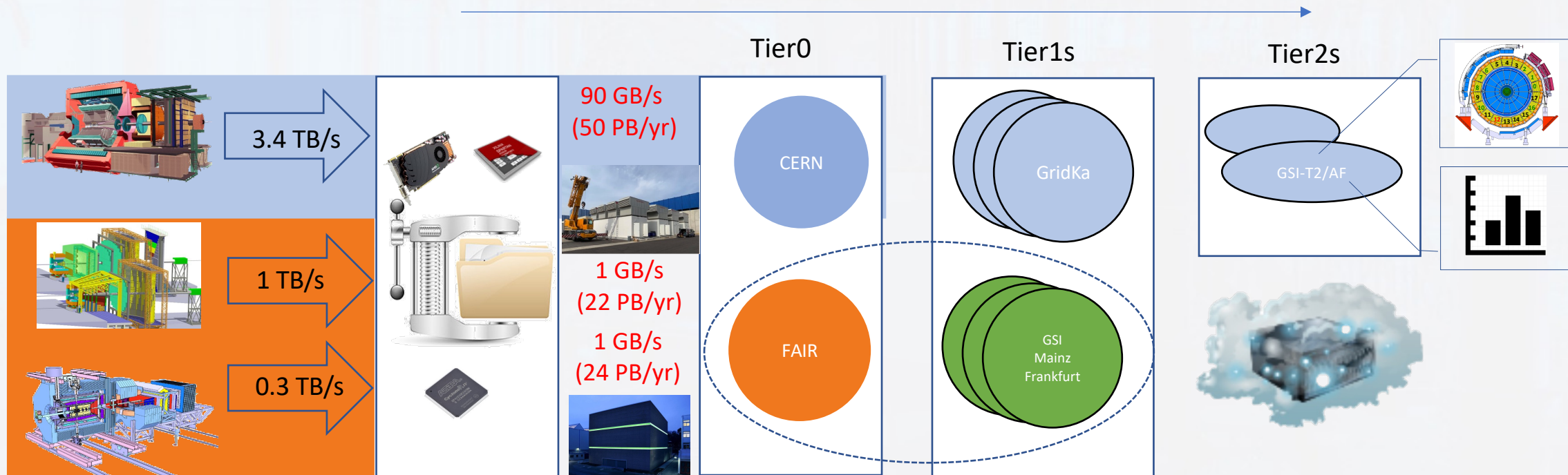
Astrophysics and nuclear structure - NUSTAR

QCD phase transition - CBM

big bang

Bring the computing experts from experiments and the IT together to solve common problems

Title Here



Ultrafast Data Ingest

High Rate Data Transport

High Throughput Data Processing

Data Selection & Quality Assur.

Complex Data Analysis

Modelling



Research Field Matter

GSI is member of the Helmholtz association

Fit to Here

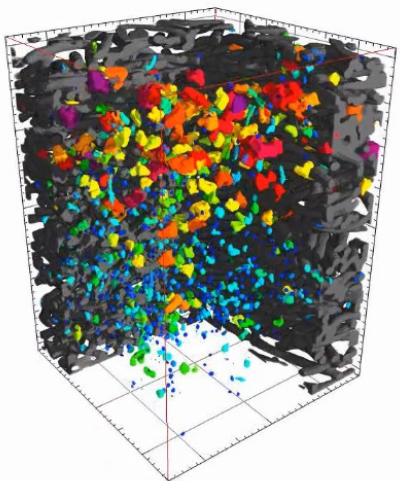


	LK II (User facilities)	International Research Infrastructures	National Research Institutes/ Infrastructures
DESY	FLASH PETRA III IDAF	LHC Belle II CTA (<i>under construction</i>) IceCube European XFEL ESRF	CFEL CSSB NanoLab DESY Test Beams DAF HIB@European XFEL PITZ
FZJ	JCNS (in MLZ)	ESS (<i>under construction</i>) ILL	(FRM-II)
GSI	UNILAC SIS18 ESR	FAIR (<i>under construction</i>) ALICE@LHC	HI Jena HI Mainz
Hereon	GEMS	ESS (<i>under construction</i>)	EMSC
HZB	BESSY II		SupraLab EMIL
HZDR	ELBE HLD IBC	European XFEL EMFL ESRF	HIB@European XFEL DRESDYN
KIT	GridKa	KATRIN Auger IceCube	ATP FLUTE TLK SR Beamlines

- Unique Research Facilities
- Many scientific domains and a diverse user community from university, research institutes and industry
- Digitalisation is important for
 - Efficient and sustainable operation
 - Optimum use of research infrastructures
 - Knowledge extraction from research data
 - Frontier science as a driver of innovation
- Topic DMA established in POF IV



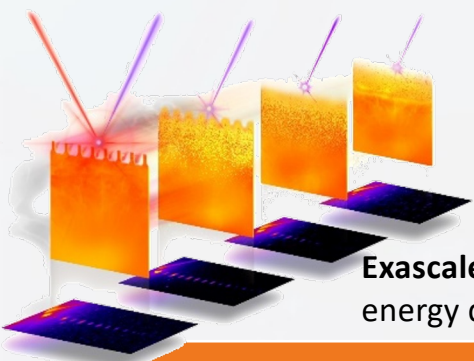
GSI is leading the Digital Scientific Method topic in Matter/Data Management and Analysis (DMA)



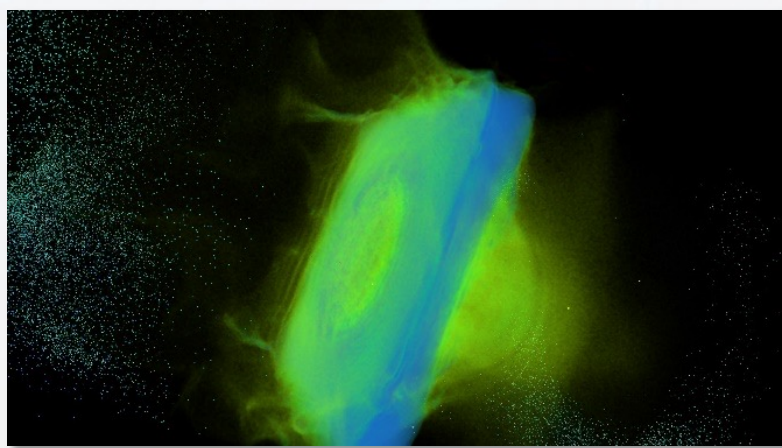
Near real-time **segmentation** of battery electrode data by AI



Near real-time **segmentation** of bone implant data by AI



Exascale simulations of high energy density plasmas



Exascale simulations of laser-driven ion acceleration

Develop, apply and share **cutting edge digital methods and frontier technologies** for research in Matter.

- Artificial Intelligence
- Exascale Computing
- High Throughput Computing
- Quantum Computing
- Near real-time analysis

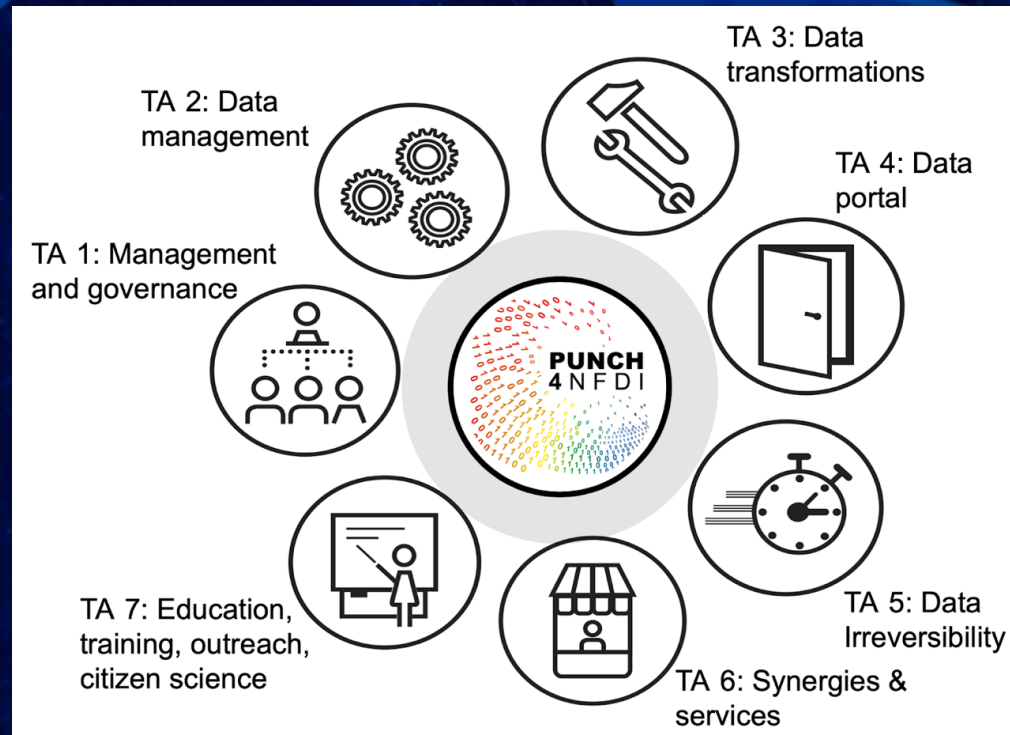


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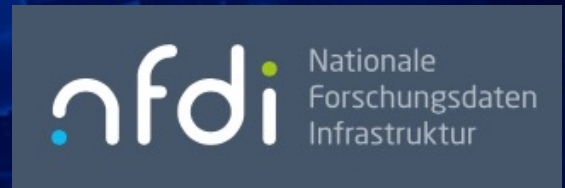
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GSI is member of Punch4NFDI

DFG

 Deutsche
Forschungsgemeinschaft

Particles, Universe, NuClei and Hadrons for the NFDI



See also [DFG.de/nfdi](https://www.dfg.de/nfdi) and [nfdi.de](https://www.nfdi.de)



What do we gain from OSSR?

- Establish modern collection-/link-site with one entry point for *software*
- Find solutions and environments for workflows rather than services
- Not only the software itself but also the environment that enables the scientific community to use/test the software, e.g. documentation, continuous integration and deployment services and evaluation data sets.



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What have been done up to now?



What have we done up to now?

● Few Packages are already onboarded:

● FairRoot:

A simulation, reconstruction and analysis framework that is based on the ROOT system. The user can create simulated data and/or perform analysis with the same framework.

● FairMQ:

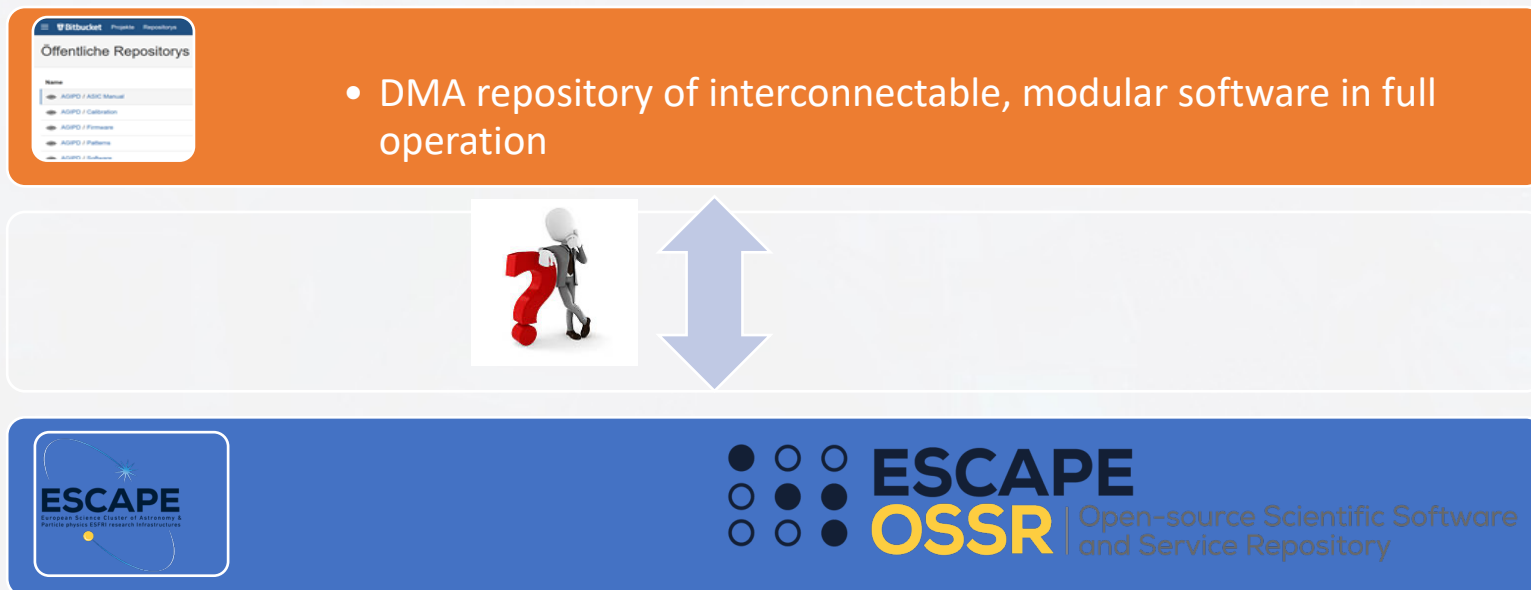
C++ Message Queuing Library and Framework

● DDS:

The Dynamic Deployment System (DDS) - is a tool-set that automates and significantly simplifies a deployment of user defined processes and their dependencies on any resource management system using a given topology.

What have we done up to now?

- The E-OSSR Implements an **open, inclusive repository** (catalogue) for the Astrophysics, Astroparticle Physics, Particle Physics community
- With DMA we add the Nuclear structural physics and Photon physics in HGF to the club



What have we done up to now?

- Onboarding DMA software to OSSR:
 - GSI take over the organization of the onboarding process for DMA software
 - First DMA project already onboarded and will serve as an example for the DMA community
 - R3BRoot:
Software for simulations and data analysis of Reactions with Relativistic Radioactive Beams experiment at FAIR



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What is next?



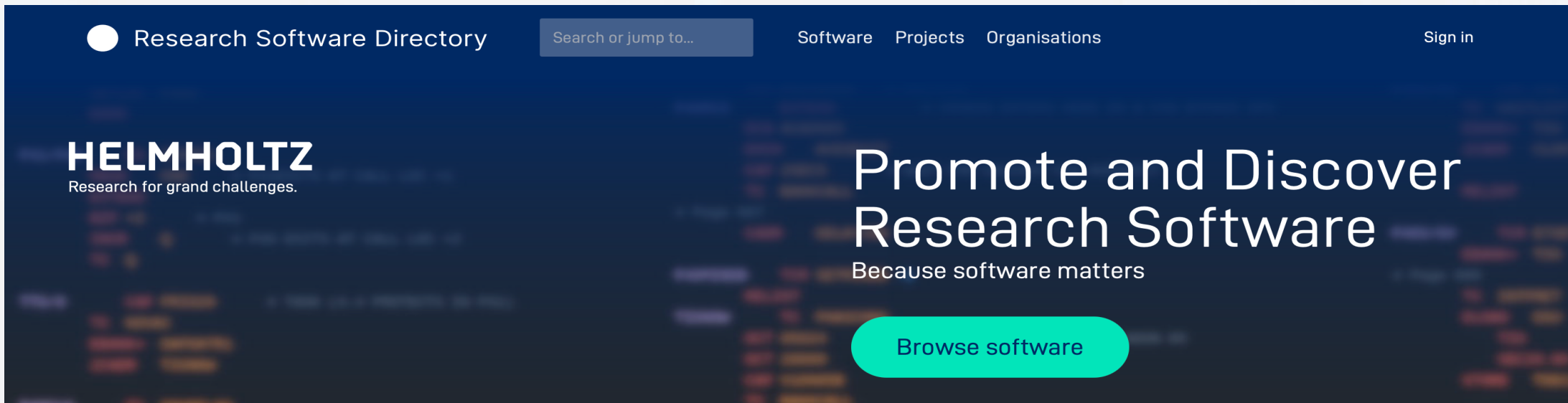
What is next:

- Within the DMA community, a list of projects is being prepared for onboarding
- Requirement to OSSR:
 - Data should only be part of the repository if supporting to software (e.g: Training data sets for ML algorithms)

What is next:



- HIFIS Research Software Directory: highly flexible software directory, but no curation
- Bring together the Helmholtz Research Software Directory and the OSSR. (<https://helmholtz.software/>)





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 projectescape.eu

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