Helmholtz Artificial Intelligence Cooperation Unit (HAICU)

HAICU LOCAL UNIT @ FORSCHUNGSZENTRUM JÜLICH

Prof. Dr. Ing. Morris Riedel, Jülich Supercomputing Centre (JSC) & HAICU Steering Board Member
Prof. Dr. Med. Katrin Amunts, Director of Institute of Neuroscience and Medicine (INM-1)
Prof. Dr. Sebastian M. Schmidt, Member of the Board of Directors of Forschungszentrum Jülich

2019-06-19 Artificial Intelligence Collaboration Meeting, Heinrich Heine University Duesseldorf, Germany

HAICU HELMHOLTZ ARTIFICIAL INTELLIGENCE COOPERATION UNIT

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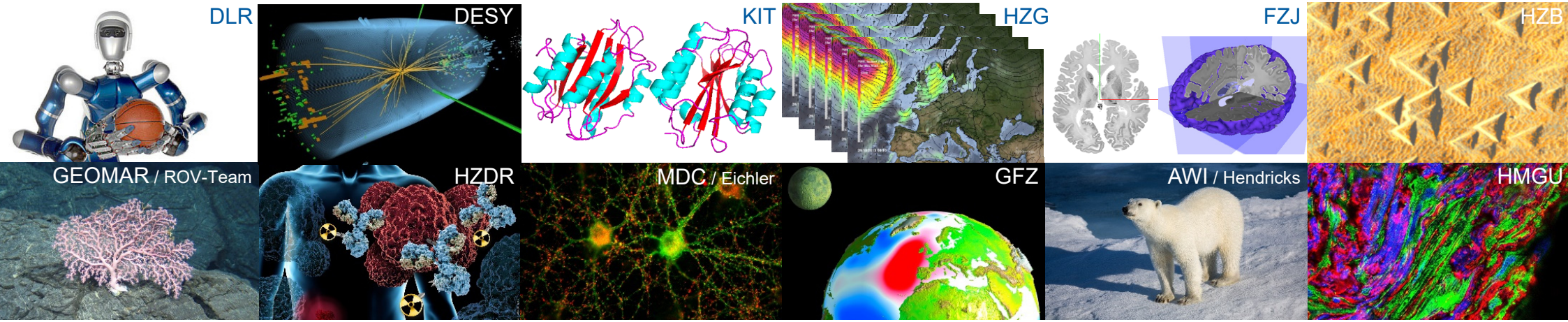
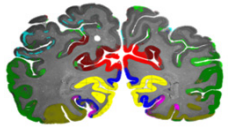
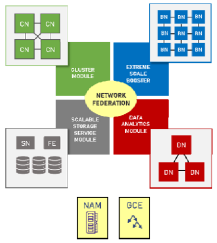
One Important aspect of AI, and a major justification to build a coordination unit in Helmholtz is that we can apply the same methods to several scientific questions, and hence benefit from interdisciplinary work.



Multiple Units across Helmholtz





HEINRICH HEINE
UNIVERSITÄT DÜSSELDORF

JÜLICH
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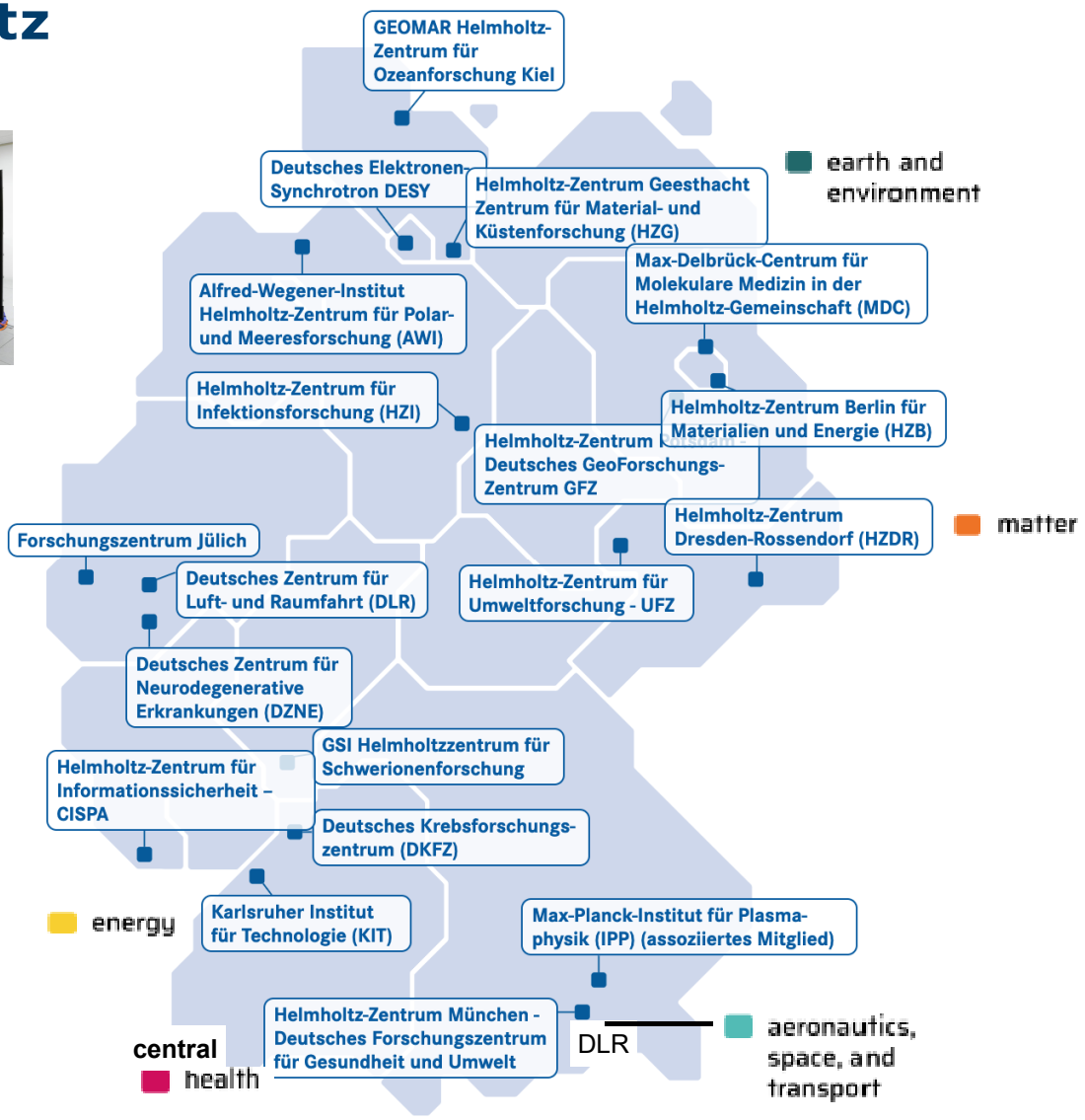
HAICU Steering Board

Frank Jenko (IPP)
Guido Juckeland (HZDR)
Judith Katzy (DESY)
Ralf Mikut (KIT)
Morris Riedel (FZJ)
Corinna Schrum (HZG)
Oliver Stegle (DKFZ)
Fabian Theis (HMGU)
Frederik Tilmann (GFZ)
Xiaoxiang Zhu (DLR)

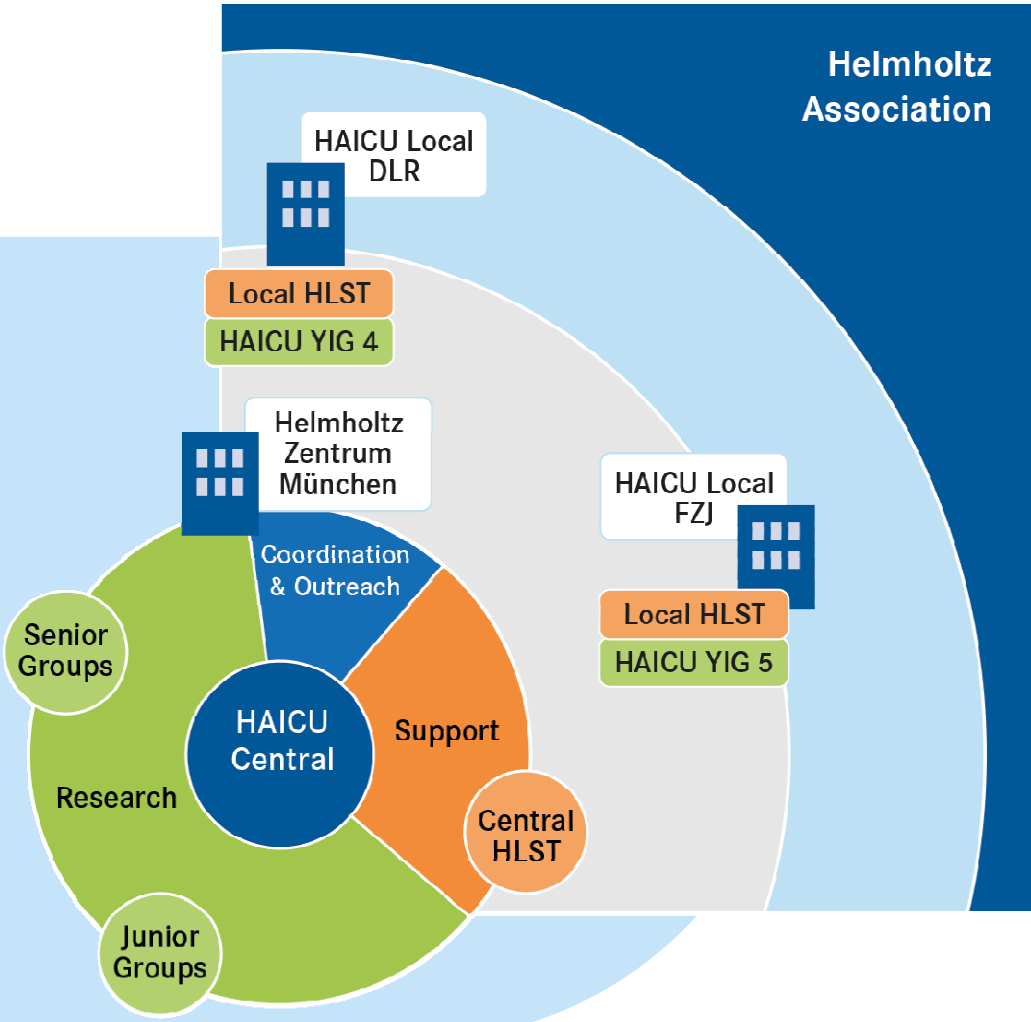


Vision & Goals

HAICU

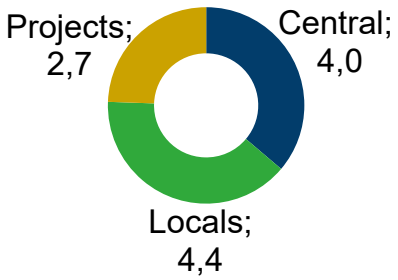
(1) develop and implement novel AI methods and apply them in use cases across multiple Helmholtz Centers

(2) provide support for applied AI and disseminate and educate emerging methods

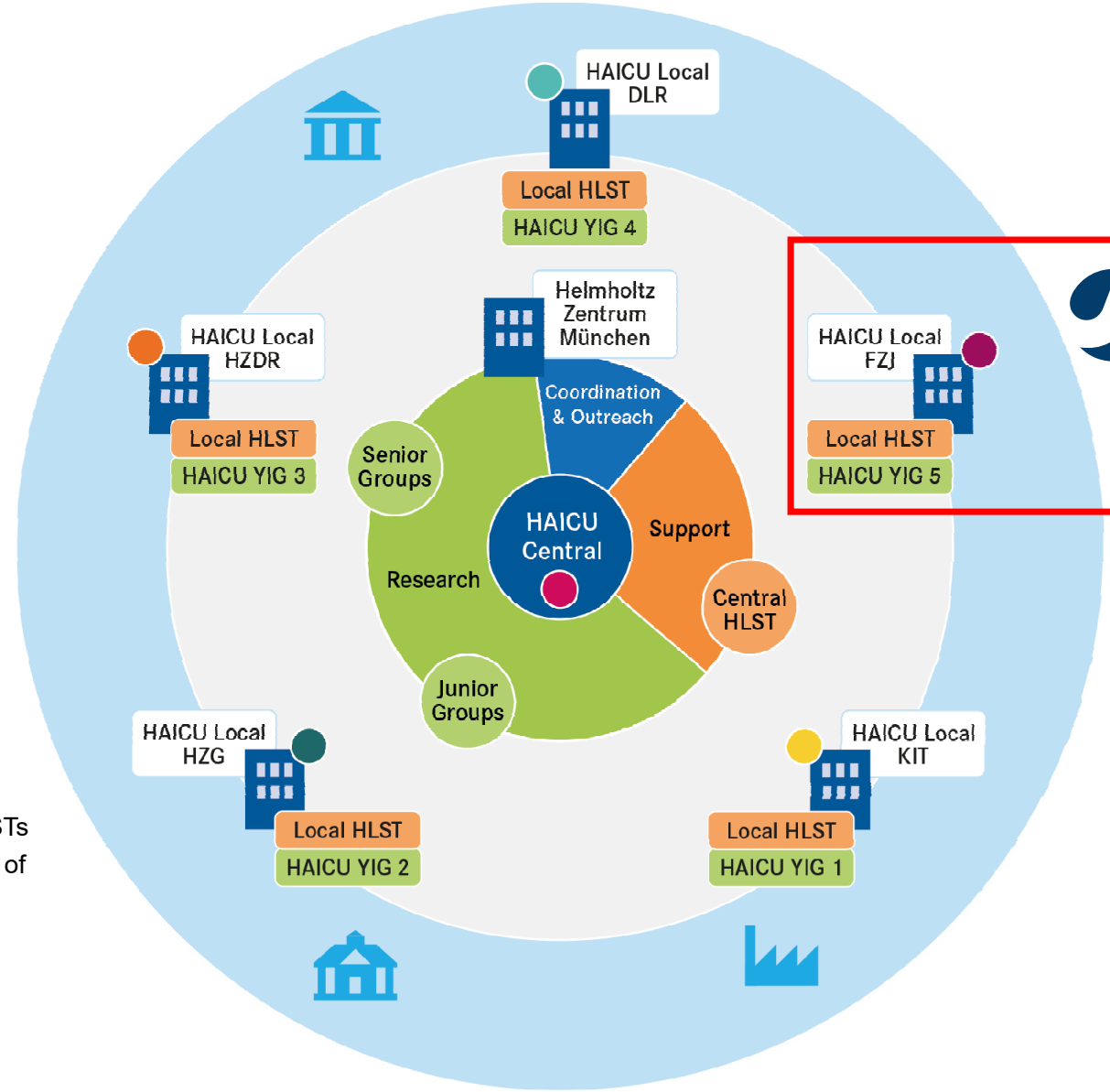


General Setup

Overall HAICU funding (M€/year)



- **HAICU Central**
  - 5 research groups for applied fundamental research
  - Knowledge transfer through High Level Support Team (HLST)
  - Reach a critical mass and international visibility
- **HAICU Locals at 5 Helmholtz Centers**
  - HAICU Young Investigator Groups + HLSTs
  - Domain specific research and translation of expertise into the domain
- **Collaborative Projects of different size**

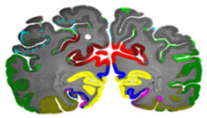


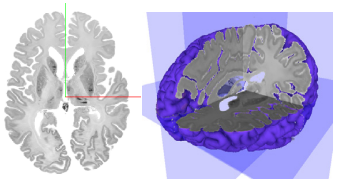
The HAICU-Information/Key Technologies Local Unit

Young Investigator Group @ INM-1

AI for ultrahigh resolution brain models fertilizing brain-inspired architectures (working title)

- Deep learning for analysis and 3D reconstruction of large biomedical images
- Learning with limited training data
  - Incorporating physical rules into learning
  - domain adaptation methods
  - Sim2real: learning from simulated data
- Use multiscale brain models to fertilize brain-inspired AI research
- Close cooperation with McGill, CIFAR

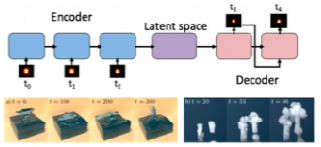




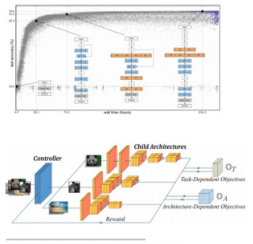
High Level Support Team @ JSC

Continual Learning - a common "light house" direction with long-term perspective

- Coupling rule / physics based simulations and learning
- Large-scale distributed neural architecture search
- Exploiting and drive research on modular supercomputing



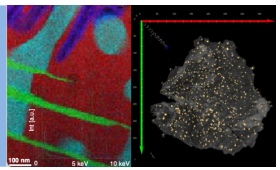
Humbird et al, 2018; Wiewel et al, 2018;Eckert et al, 2018; Xie et al, 2018



Real et al, 2017; Cheng et al, 2019

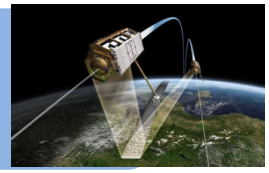
HAICU Local Units

HAICU Local KIT (Energy):
- YIG: AI for Energy Research
- AI Consultant Team

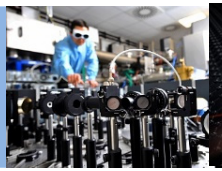


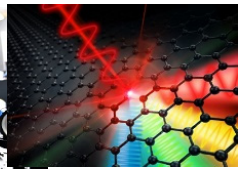
HAICU Local HZG (Earth & Environment):
- YIG: AIM-Artificial Intelligence in Earth System Analytics and Modelling
- AI Consultant Team

HAICU Local DLR (Aeronautics, Space and Transport):
- YIG: Large-scale Data Mining in Earth Observation
- AI Consultant Team

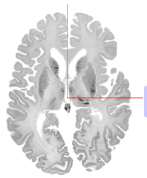


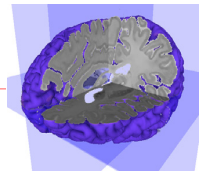
HAICU Local HZDR (Matter):
- YIG: AI for Future Photon Sources
- AI Consultant Team





HAICU Local FZJ (Key Technologies & Information):
- YIG: AI for ultrahigh resolution brain models fertilizing brain-inspired architectures
- AI Consultant Team





HAICU Central Activities

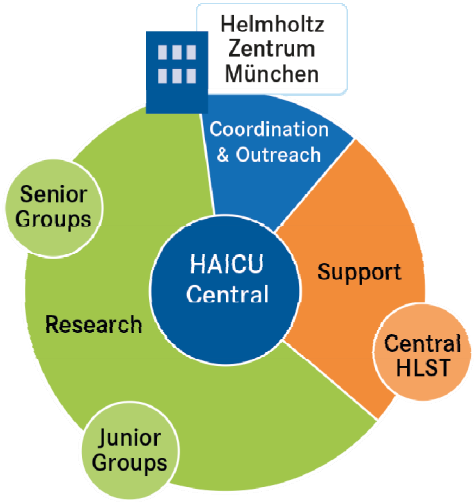
- Coordinate HAICU activities and projects
  - Regular meetings of boards
  - Review process of proposals
  - Public relations
- Coordinate and implement HAICU voucher system
- Calls for HAICU projects
- Strategic development & evaluation
- Calls for central research groups / cooperation projects / visiting researchers
- Knowledge transfer

HelmholtzZentrum münchen
German Research Center for Environmental Health

Institute of Computational Biology

Our Mission

Data-based analysis and modeling of biological systems



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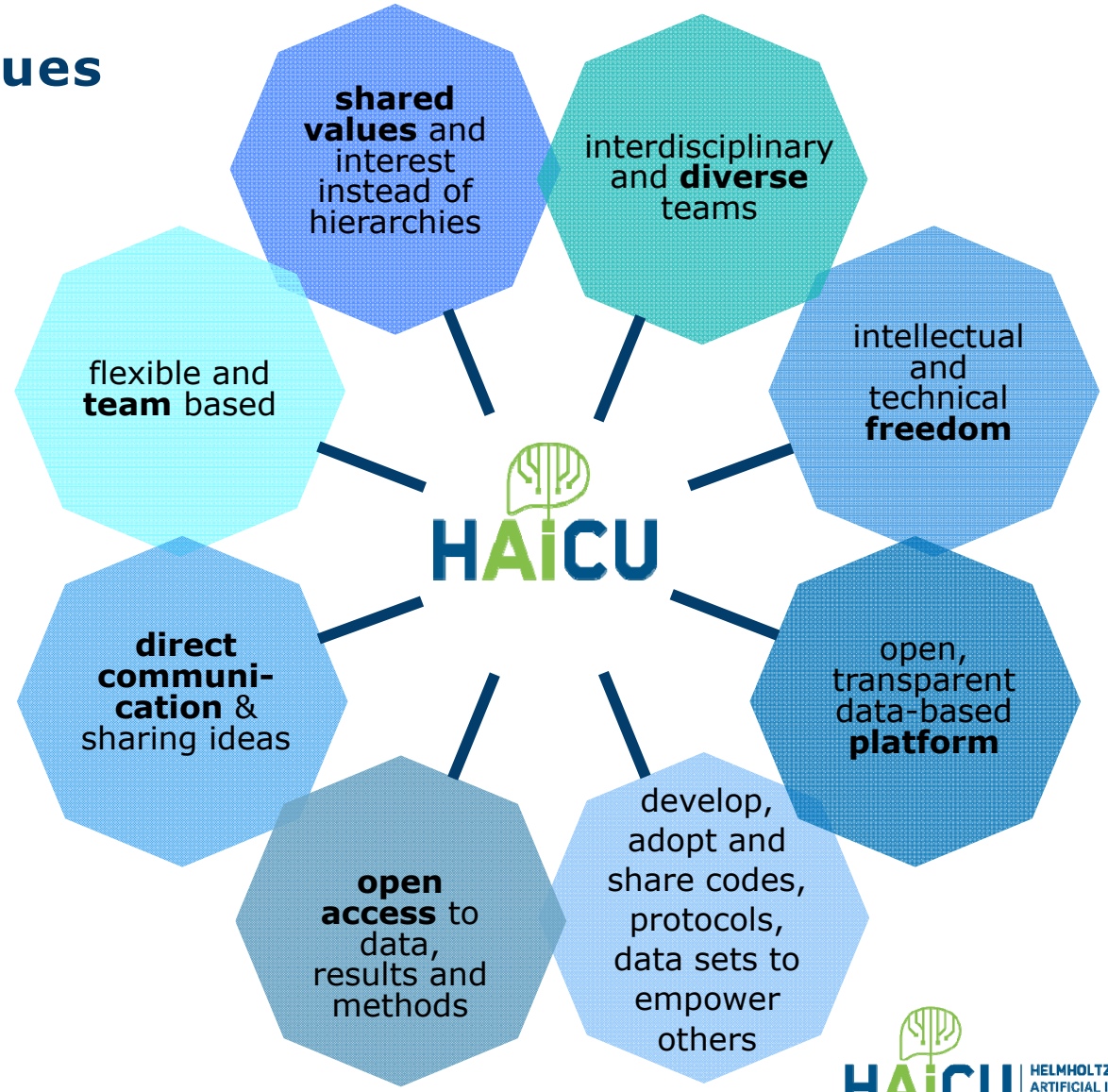
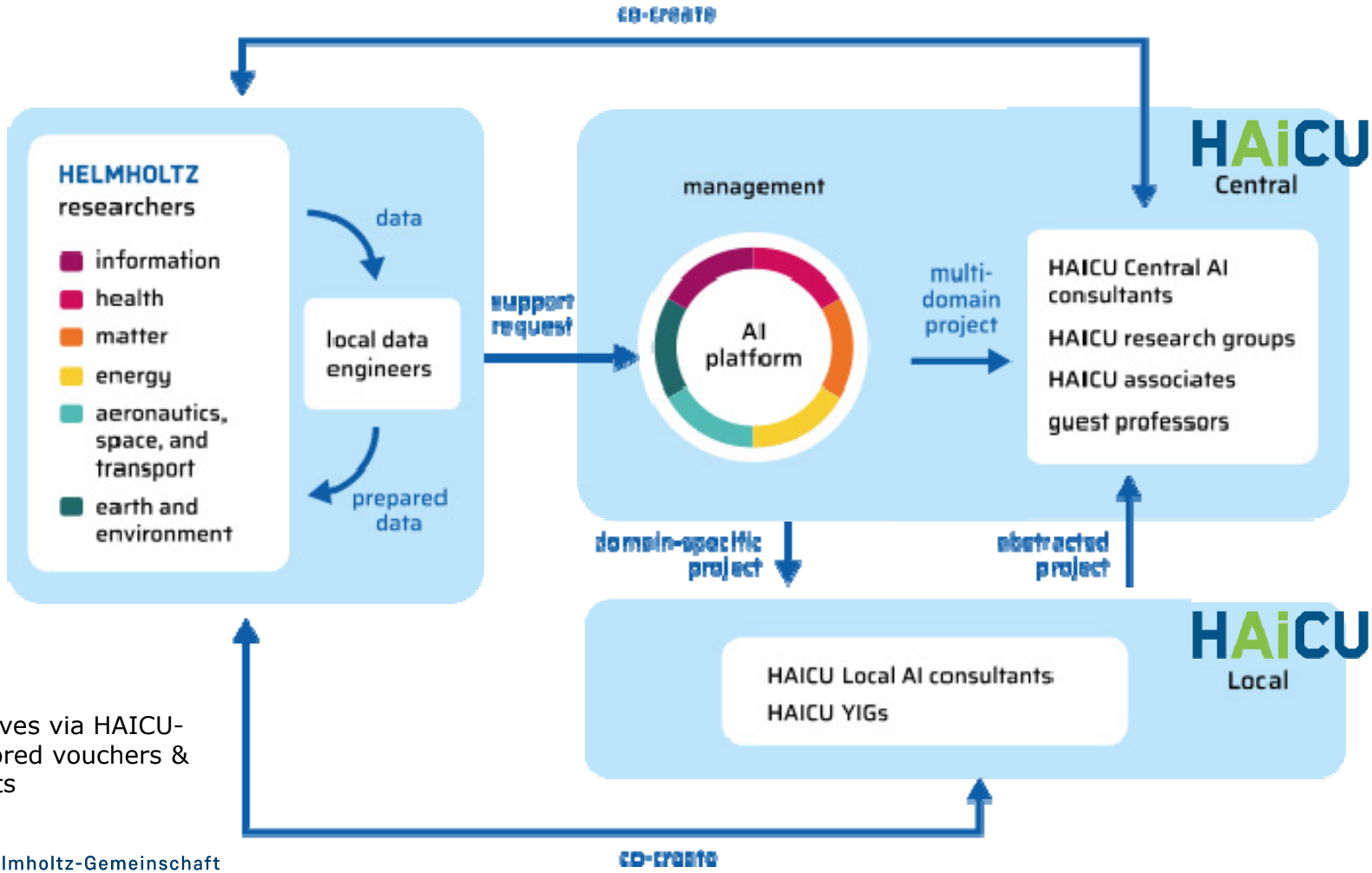
HAICU NEWSLETTER: 16.05.2019

Culture & Values



Workflow



incentives via HAICU-sponsored vouchers & projects

Interaction & Collaborative Projects

HAICU Vouchers:

- Smaller projects
- Fast and easy allocation
- Tool for managing AI Consultant capacity

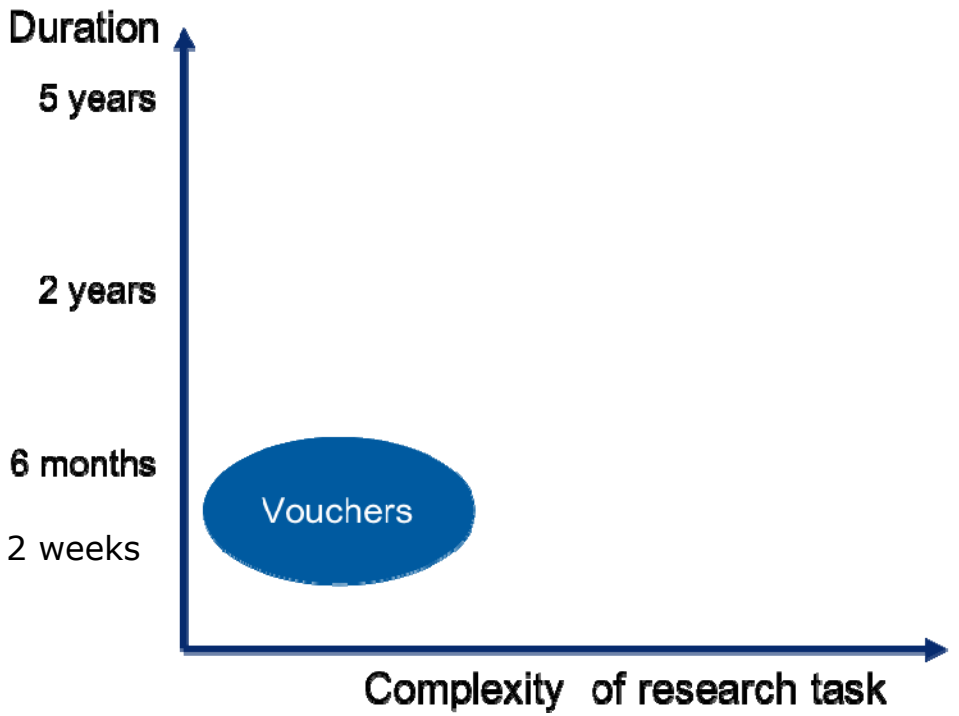
HAICU Projects:

- Complex research questions that require own researchers
- Review process

call coming next month

HAICU Research Groups:

- Long-term scientific directions
- both in HAICU Local and Central



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Timeline

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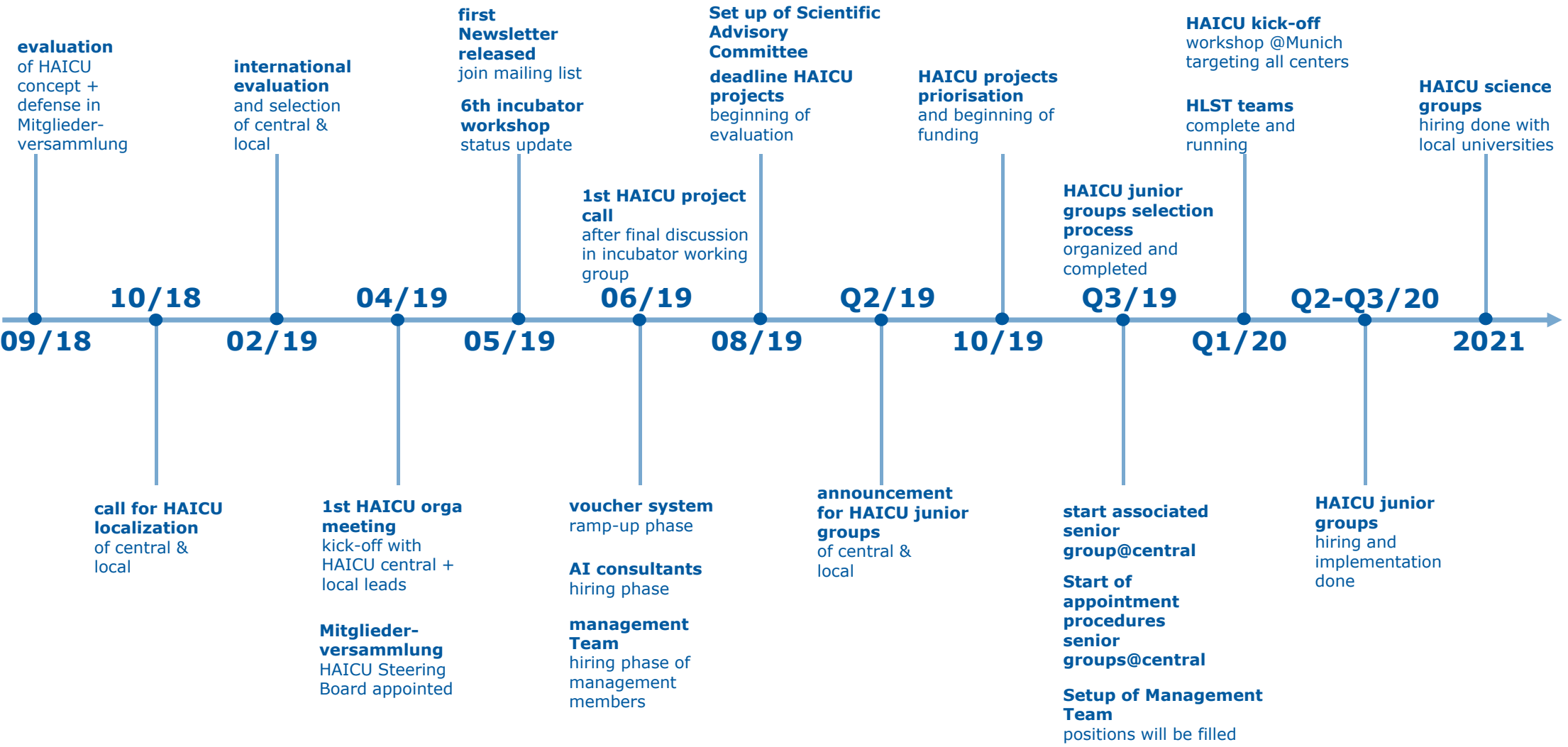

Contact

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