AIDA-TI

AI-aided Data Analysis and
Data Transport Infrastructures
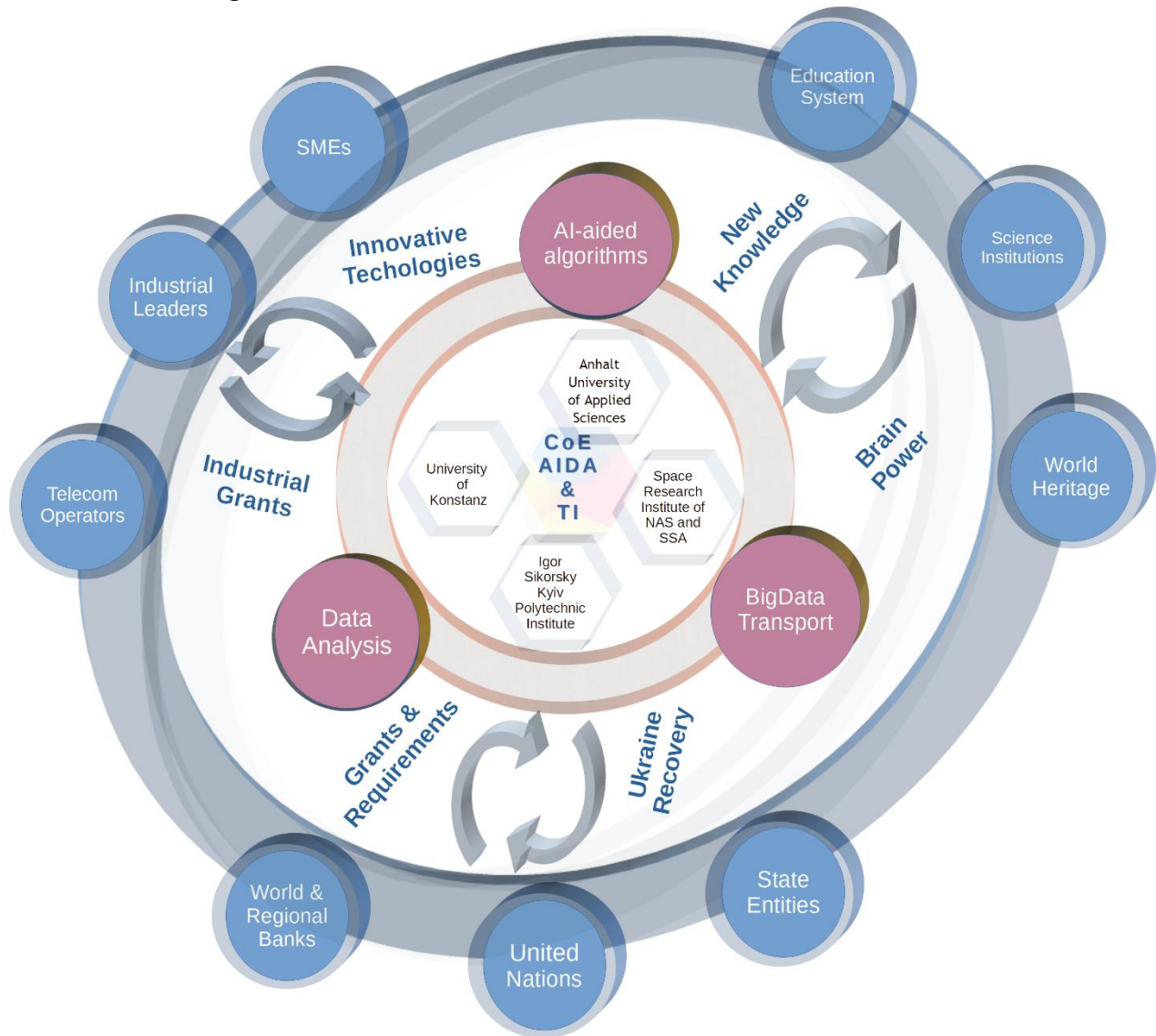
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Founding a German-Ukrainian
Center of Excellence (CoE)

Concept Proposal

Founding a German-Ukrainian Center of Excellence

Objective

To prepare an **implementation concept** for **establishing a German-Ukrainian Center of Excellence** (CoE) conducting research on *Data Analysis methods as well as on BigData transport infrastructures based on AI-aided algorithms.*

This Center of Excellence targets expanding German-Ukrainian research cooperation and solving the scientific and applied problems of the recovery of Ukraine from the war by:

- **establishing** a sustainable trans-national **research group** of highly skilled personnel
- active use of modern technologies to solve the priority tasks of the recovery of **Ukraine from the war**;
- strengthening German-Ukrainian **development of innovations**
- increasing knowledge and **technology transfer** in the AI and Big Data technologies between Germany and East Europe region in basis research and applied
- implementation of **win-win cooperation strategy**, including **opening of high-tech markets** and the mutual exchange of researchers and policy makers
- establishing a sustainable international **knowledge and innovation network**

Financial sustainability of the CoE will be achieved through planned participation in leading research programs of the EU, in national and transnational funding calls in Germany and Ukraine, including grant programs for the recovery of Ukraine from the war, and in acquiring industrial money for applied research and advanced development in direct industrial contracting. Besides this, *possibilities for governmental financing in the Ukraine shall be negotiated with the ministries, including in the context of the projects of the National Council for the Recovery of Ukraine from the War.*

Research Topics and Vision

Short term vision (1-3 years)

- **Explainability** of the **AI algorithms and systems** through **Visual Analytics** techniques
- **Transparent AI** to **inspect**, **reproduce**, and **control**, and **monitor** decisions making process
- **Data Transport protocols** for trans-continental **P2P** and **P2MP** data distribution
- **Protocols** for **high-efficient data delivery** via **mobile** and **wireless** networks
- **Development** of efficient and interactive **Big Data Visualization** methods
- **Energy efficient** big data processing in compute nodes of distributed data centers
- **Methodology** and applications of **geospatial analysis** and **deep learning** on **satellite data**

Long term vision based on trends in the relevant scientific areas (4-20 years)

- Novel **AI-aided algorithms and systems** for **high-speed data transmission** for servicing large amounts of data.
- **AI** for data **distribution** in **edge**- and **fog computing** environments.
- **Trusted human-centric AI systems** that provide **safe**, **transparent**, **reliable**, **understandable** big data processing in the different spheres of human life, including **e-health**, **e-learning**, **e-agriculture** etc.
- Models for describing semi-structured data and **complex non-stationary processes**, including algorithms for **recognizing hidden patterns** in Big Data of different nature for analysis and **forecasting** of the behavior of **complex systems.**
- New types of AI models based on **hybrid neural networks**, **fuzzy logic**, **genetic algorithms**.
- Smart **communication infrastructure** control for the **telecom industry 5.0** built on fuzzy knowledge bases.

Strategic Impact (Mid- and Long-Term)

The center's activities will help to respond to the following global challenges of innovative development:

- **Extending the influence of Germany and the EU** and its research teams to East Europe in a mutually beneficial way while avoiding classical brain-drain paradigms.
- Strengthening the **equalized integration of Ukraine** into the **European** Research environment
- Promoting the recovery of the scientific personnel potential of Ukraine from the war
- Contribution to sustainable economic environment of the **region's development**
- Continuation of **digitalization and intellectualization** of the **economies** of Europe and the Eastern Partnership countries

- Contribution to **algorithms and applications** aimed at supporting **big data handling** in **strategic areas** such as **health**, **climate change**, **geology**, **energy**, **financial**, and **business analytics.**
- Provision of prediction **algorithms for socio-economic environmental changes** under the influence of anthropogenic activity
- Enhanced **Big Data Infrastructure** using artificial intelligence fosters **rapid distribution** of huge amounts of data, making processes **decentralized** and increase **attack resilience**.

Initial Project Partners

Germany:
- Anhalt University of Applied Sciences (coordinator): Big Data Transport technologies
- University of Konstanz: AI technologies and Big Data Visualization

Ukraine:
- National Technical University of Ukraine Kyiv Polytechnic Institute: coordination in Ukraine, Data Transport and Data Analysis
- Space Research Institute: AI technologies in satellite imaging data processing

Planned Project Phases

Nov. 2021 – Apr. 2023 **Granted (BMBF)**	**Preparation of a concept** for implementing the center in Ukraine: - Concept of operations of the center - Fine-grained definition of research areas - Risk assessment and determination of scenarios of the center's operation in different conditions - Activation of supporters and stakeholders Decision on the center's **legal structure** and its **management structures**: - Preparation of a finance and personnel plan
Est. 2023 – 2026 *Funding-Dependent*	**Implementation phase**: - Based on co-financing of local government in Germany, central government of Ukraine and industrial companies - Legal entity setup - Technical and organizational set up of the center - Hiring management and research staff - Conducting of research in selected use cases - Work on international grant programs - Work with Stakeholders
Est. 2026 and beyond *Self-sustained*	**Operational phase**: - Based on base financing, governmental and international grants as well as on industrial research funding