Computing Science in Transdisciplinary Education

Prof. Yike Guo

Provost-designate
Hong Kong University of Science and Technology

Vice President of Research
**Hong Kong Baptist University**

Transdisciplinary: Making a unity of disciplinary

Multidisciplinary: people from different disciplines working together, each drawing on their disciplinary knowledge
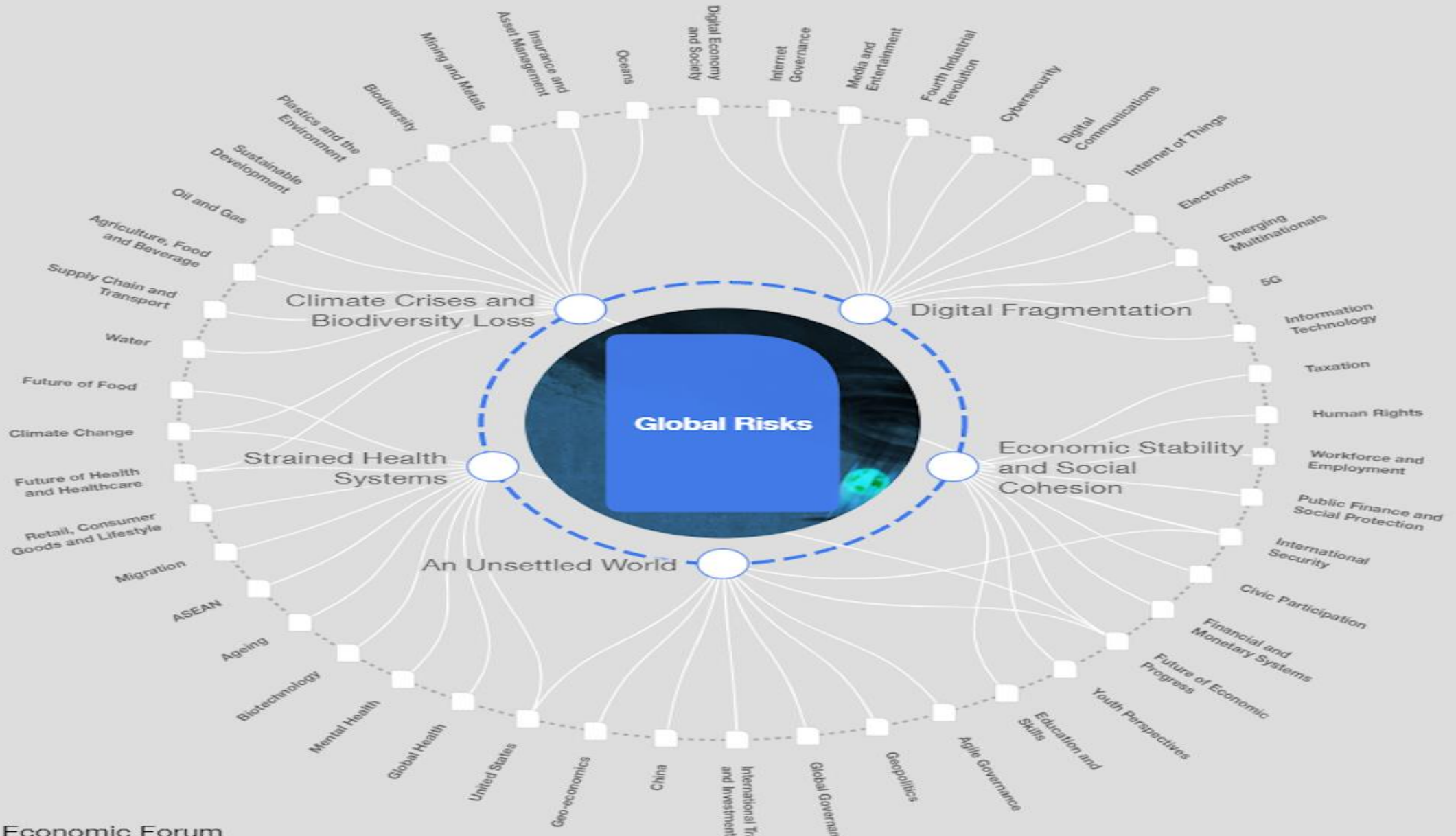
Interdisciplinary: integrating knowledge and methods from different disciplines, using a real synthesis of approaches

Transdisciplinary: creating a unity of intellectual frameworks beyond the disciplinary perspectives
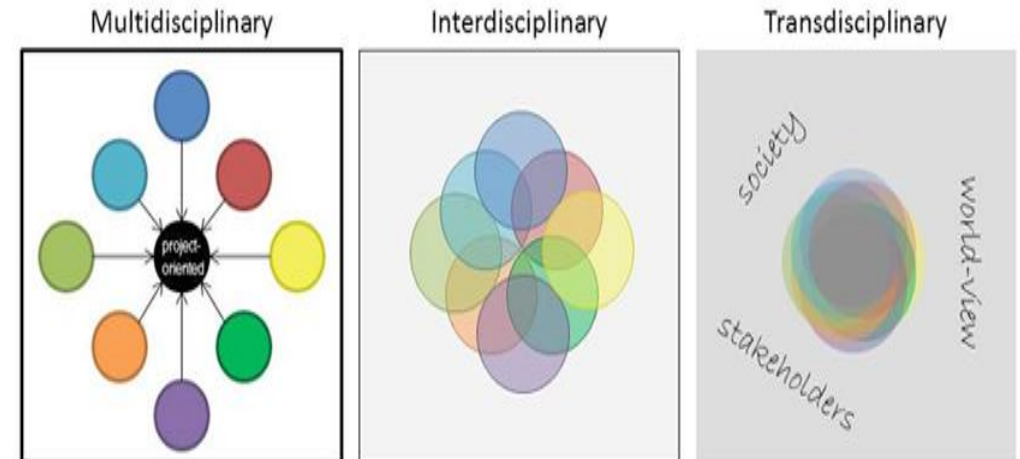
Transdisciplinary Education& Research : Mission Oriented

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Mission for the Future : the HKUST View

Living

- Sustainability: Carbon Neutral by 2050
- Resilience: Post pandemic smart world

Working

- Intelligence: AI-powered engineering
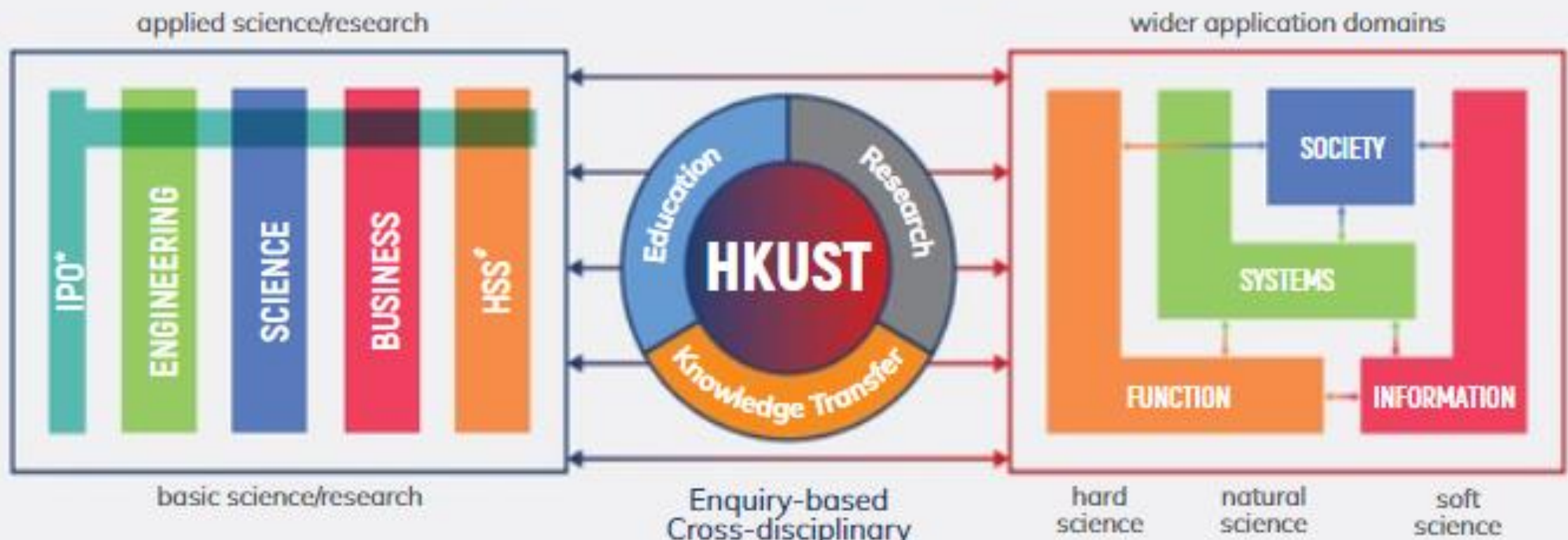- Symbiotic: Human-machine co-creation

People

- Personalisation: From medicine to service
- Connected: Human capital in 0-distance society

HKUST Development : Enabling Transdisciplinary Education

HKUST (GZ) : An Adventure for Transdisciplinary Education
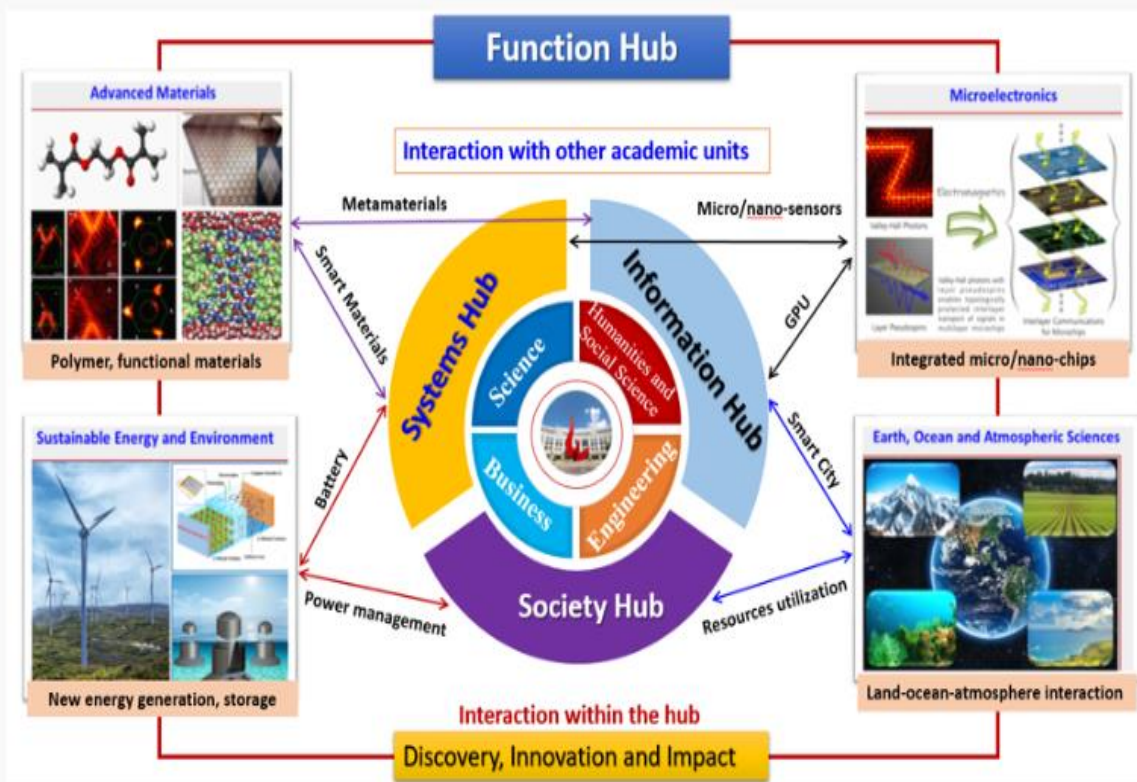
Function Hub	Information Hub	Systems Hub	Society Hub
Advanced Materials	Artificial Intelligence	Bioscience and Biomedical Engineering	Financial Technology
Earth, Ocean and Atmospheric Sciences	Computational Media and Arts	Intelligent Transportation	Innovation, Policy and Entrepreneurship
Microelectronics	Data Science and Analytics	Robotics and Autonomous Systems	MBA+
Sustainable Energy and Environment	Internet of Things	Smart Manufacturing	Urban Governance and Design

HKUST (CWB): Capacity Building for Transdisciplinary Education
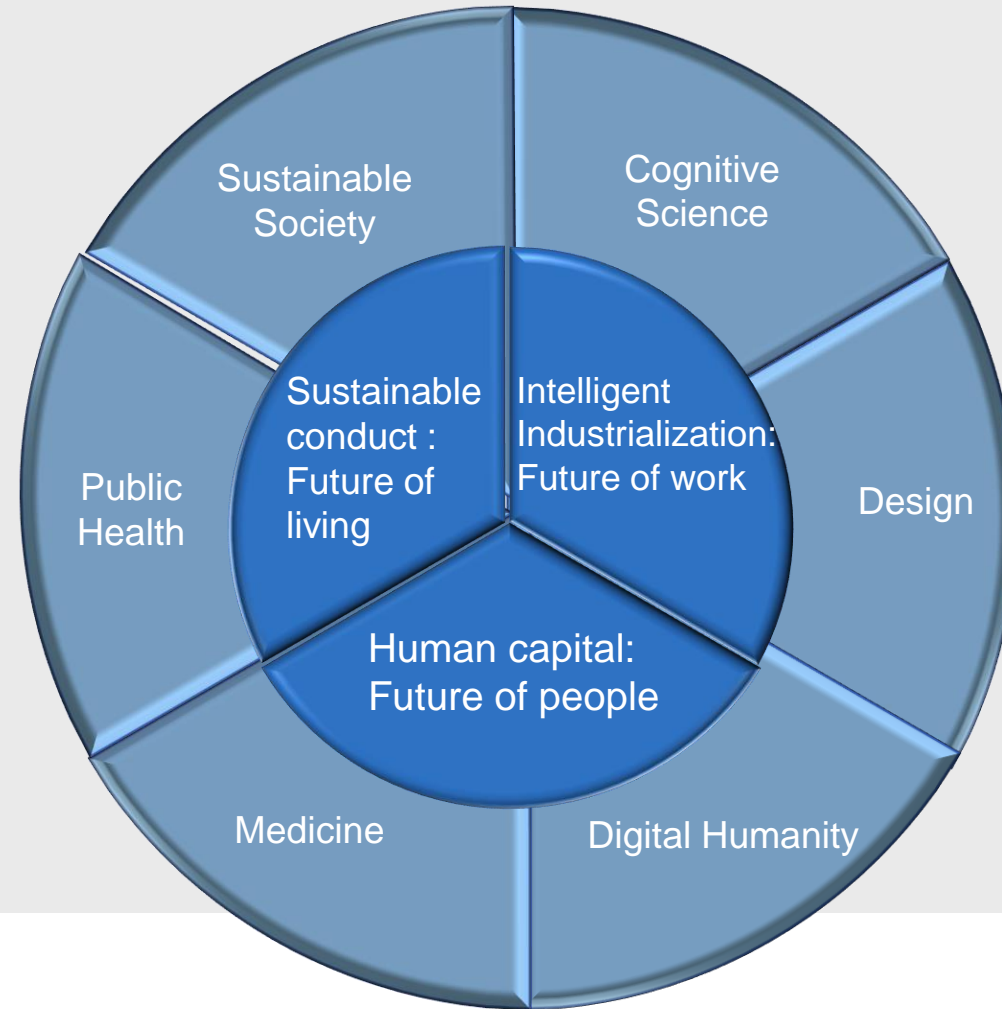
Datafication: Big Data and AI as the Transdisciplinary Base

工业

System oncology
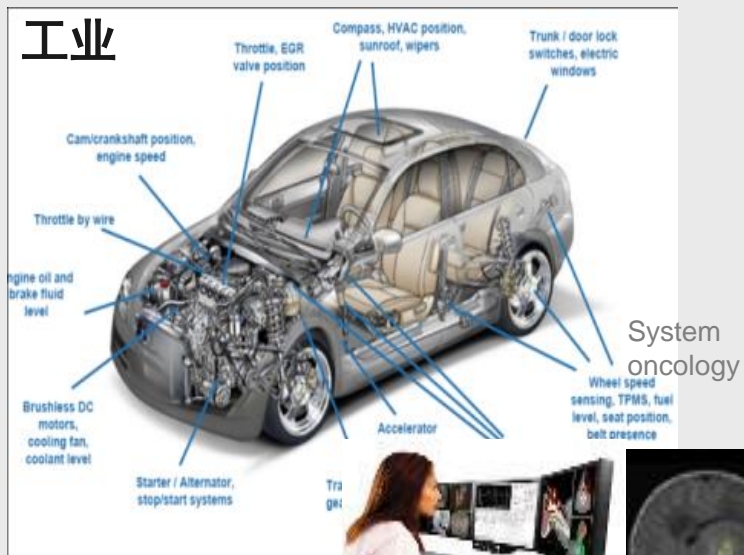
Cardio-vascular Science

医疗

Public Health management
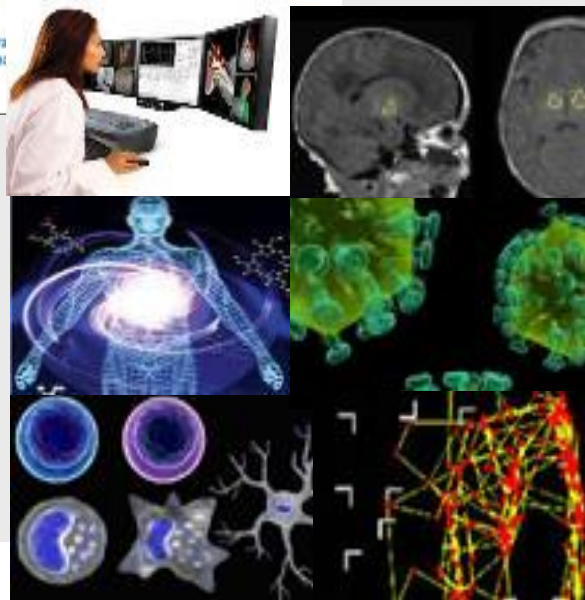
Infection/Epidemiology

Imaging

real-time metabolic profiling

Digital City and Urban Life

Social Media and New Data Business

商业

Algorithmic Trading

Neuroscience

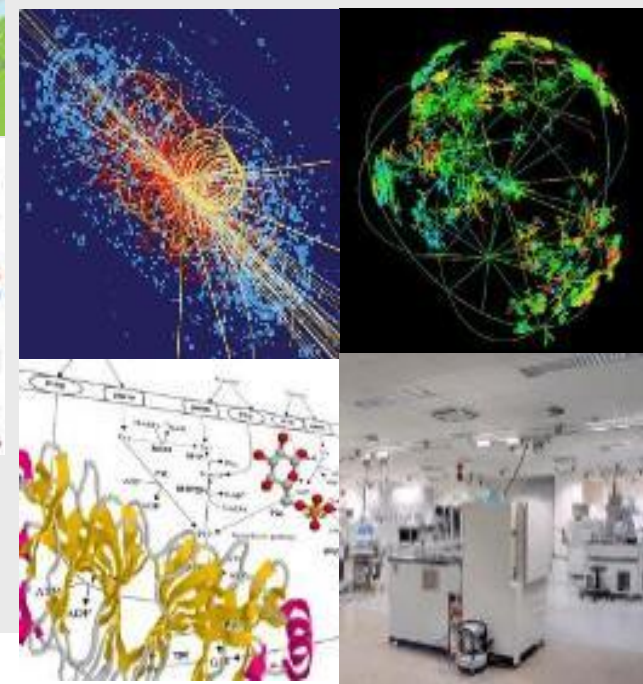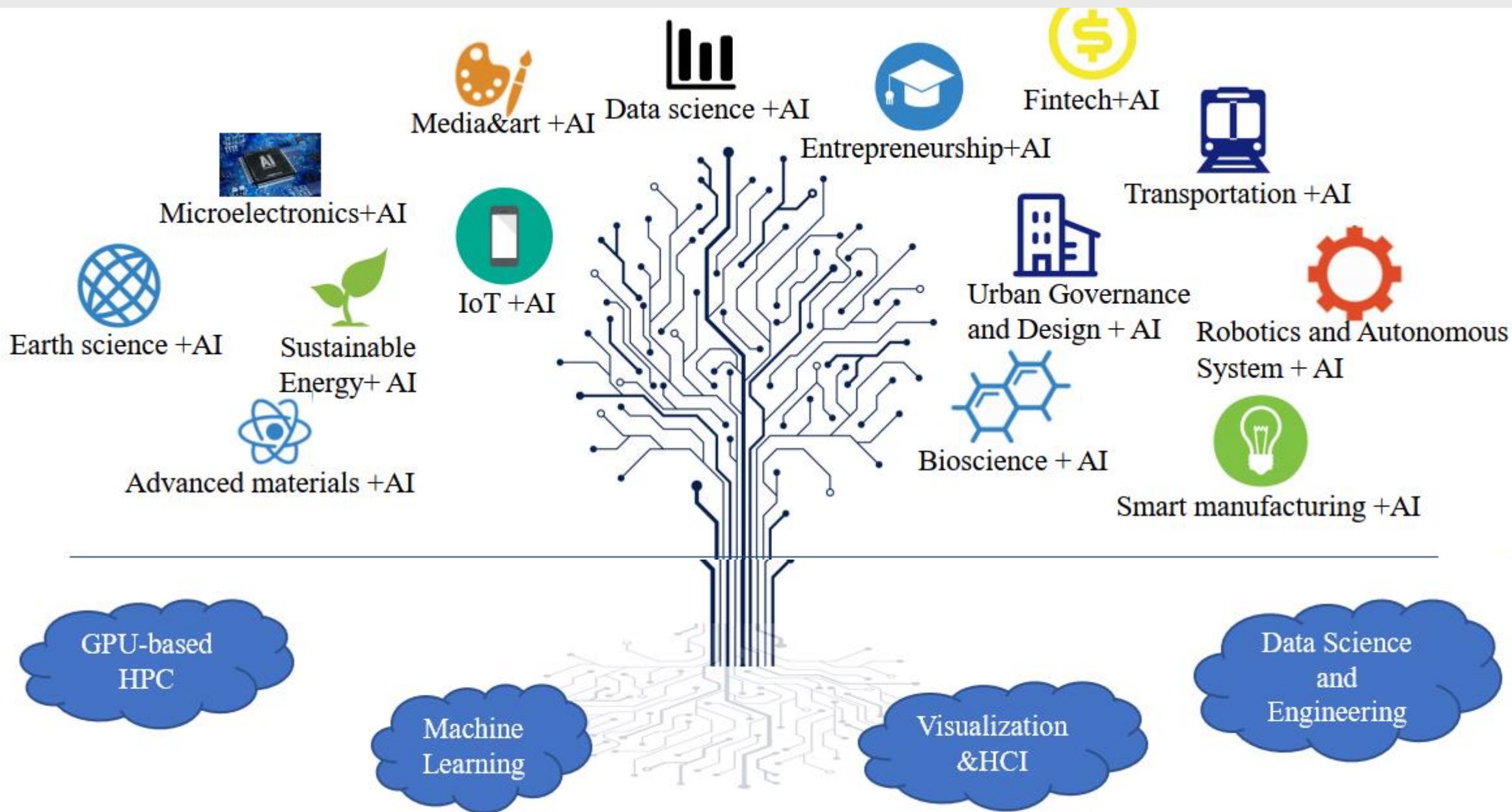System Biology

Particle Physics

High throughput screening

自然科学

Complex system and Network

AI Centric Computing Science Becomes the Core of ALL

Example : AI-based Art-tech and Creative Media

⚑ **AI Art:** Creating artwork using artificial intelligence tools, e.g., deep generative model, GAN, etc.
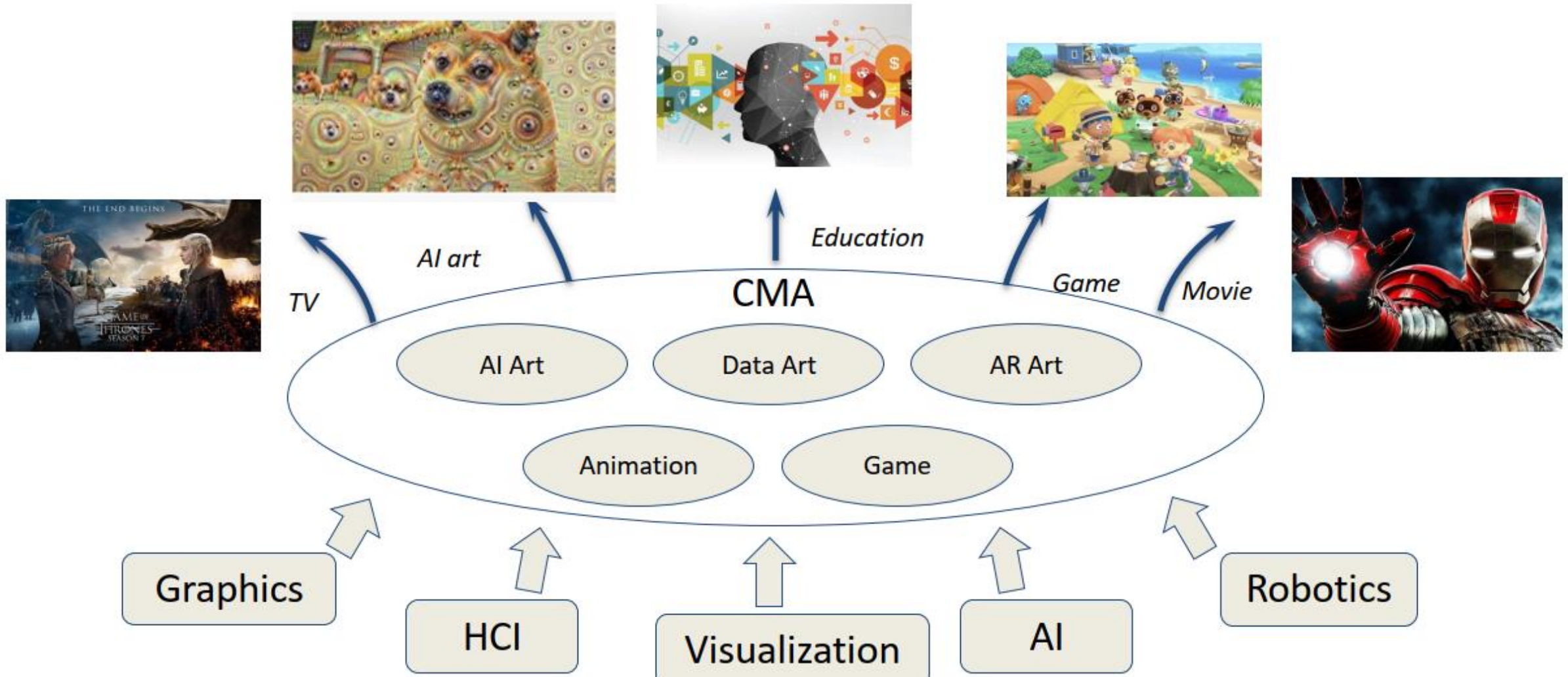
Example： Smart Transportation

🏳 **Objective:** Apply advanced technologies of artificial intelligence to enhance the efficiency, safety, and sustainability of transport systems for both people and goods

⛰ **Key applications:** Shared mobility, operations and management of urban rail transit, safety and security of Unmanned Aerial Vehicle (UAV), green aviation, etc.

| 5G Communication | Big Data | Cloud Computing | Blockchain | Mobile Internet | Machine Learning |

aviation

Safe, efficient, convenient, accurate, reliable

Autonomous vehicle　　**High speed rail**　　**Unmanned aircraft**　　**Smart port**
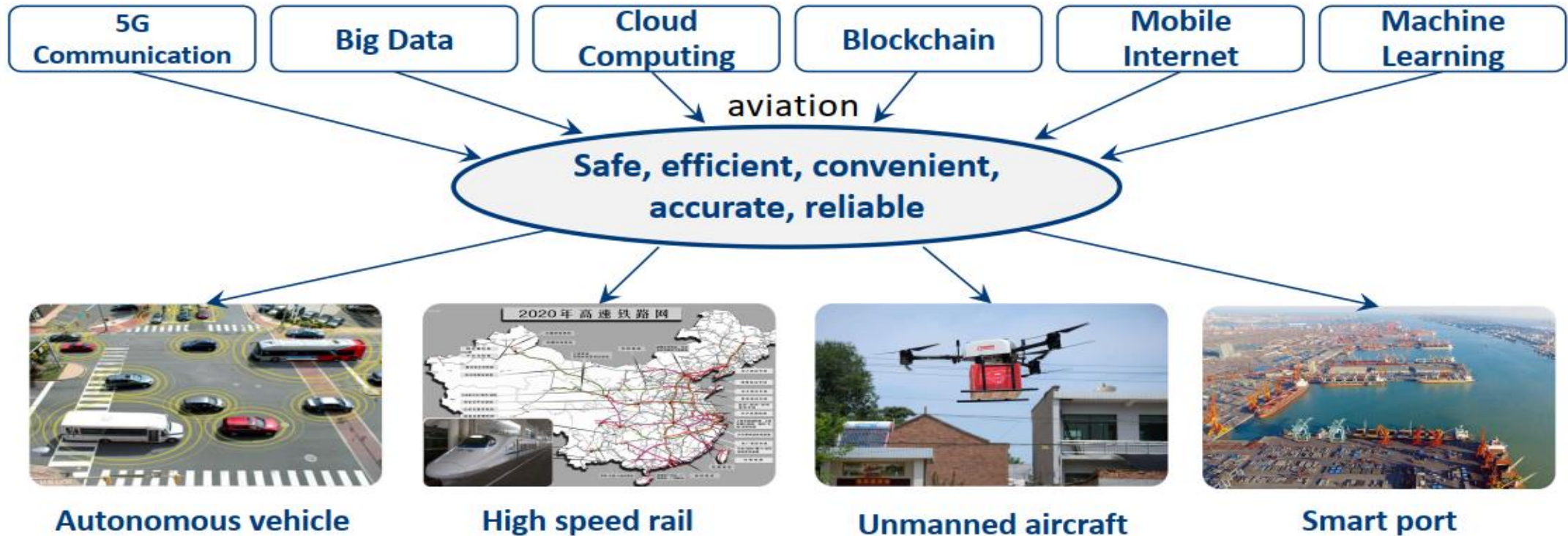
New Role of Computing Science in Universities

New Common Core

Cross Faculty Institutes with CS Base

Innovative Pedagogies

New Common Core Programs

Common core programs on basic knowledge and skill of Data Science and AI should be acquired by ALL studentsb

Transdisciplinary Research Labs

Break the disciplinary boundaries and bridge diverse knowledge from multiple disciplines for research and graduate education

Empower research hubs for vibrant intellectual interactions with CS as the glue and the base

Enquired-based active learning

Mission driven and task-oriented learning and collaboration

Integrating research with education

Example: Six Transdisciplinary Research Labs @HKBU

Augmented Creativity Lab
創造性智能實驗室

- Augmenting human creativity with artificial intelligence and human-machine collaboration

Smart Society Lab
智能社會實驗室

- Behavioural and wellbeing functioning mechanisms of complex systems including life, environment, human society and web media

Data Economy Lab
數據經濟實驗室

- New theories, business practices and new technologies in today's networked economy with data assets

Computational Medicine Lab
計算醫藥學實驗室

- Data driven innovation on therapeutics and new drug discovery

System Health Lab
系統健康研究實驗室

- Smart decision making in social policies and organization

Ethical And Theoretical AI Lab
人工智能的倫理與理論實驗室

- Basic theories of ethical artificial intelligence, with a particular emphasis on machine behaviour studies, as well as central issues in AI verifiability and AI interpretability

Matrix-based Research and Education

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創造性智能實驗室

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系統健康研究實驗室

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Ethical and Theoretical AI Lab
人工智能的倫理與理論實驗室

School of Creative Arts
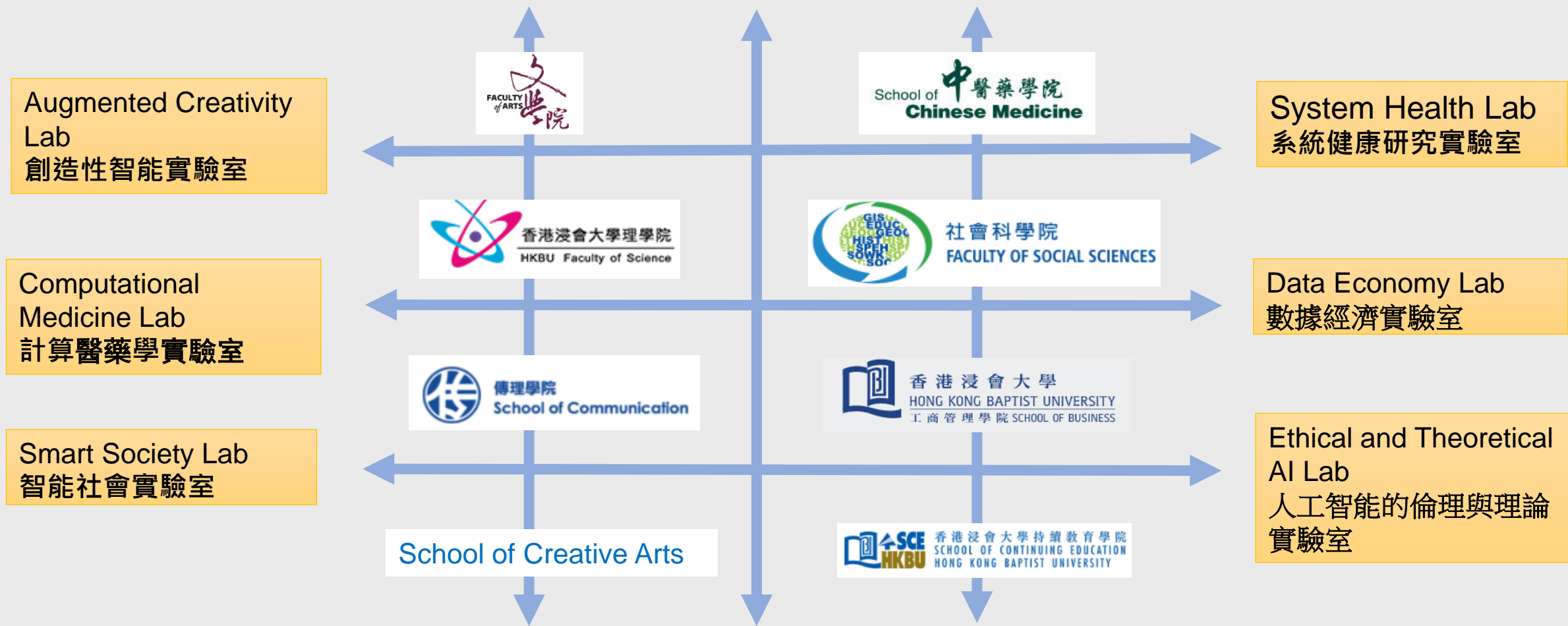
Central Facility Enables Transdisciplinary Labs

Task-Oriented Education: Art-Tech Transdisciplinary Degree

Based on the Augmented Creativity Lab to educate next generation artist with AI skill to create and to perform, to stimulate cutting-edge research in generative AI technology

HKBU Symphony Orchestra Annual Gala Concert "A Lovers' Reunion" in July 2022

香港故事|人机交互音乐会：唱响不一样的《东方之珠》

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Marked the first time in the world that an AI choir and AI virtual dancers to perform interactively with a conductor and an orchestra

Conclusion

- **Transdisciplinary education is the trend of future university development**

- **HKUST is pioneering in this development**

- **Computing science plays the key role**

- **It is the time to rethink the position of CS education and research in a university**

- **We have challenges and great opportunities**