

Responsible AI for Sustainable Development and Innovation

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How the SDGs are related to each other: A view based on analysis of UN SDGs portal articles



Connections of SDGs among each other:

(A quantitative study based on English pages on UNSDG)

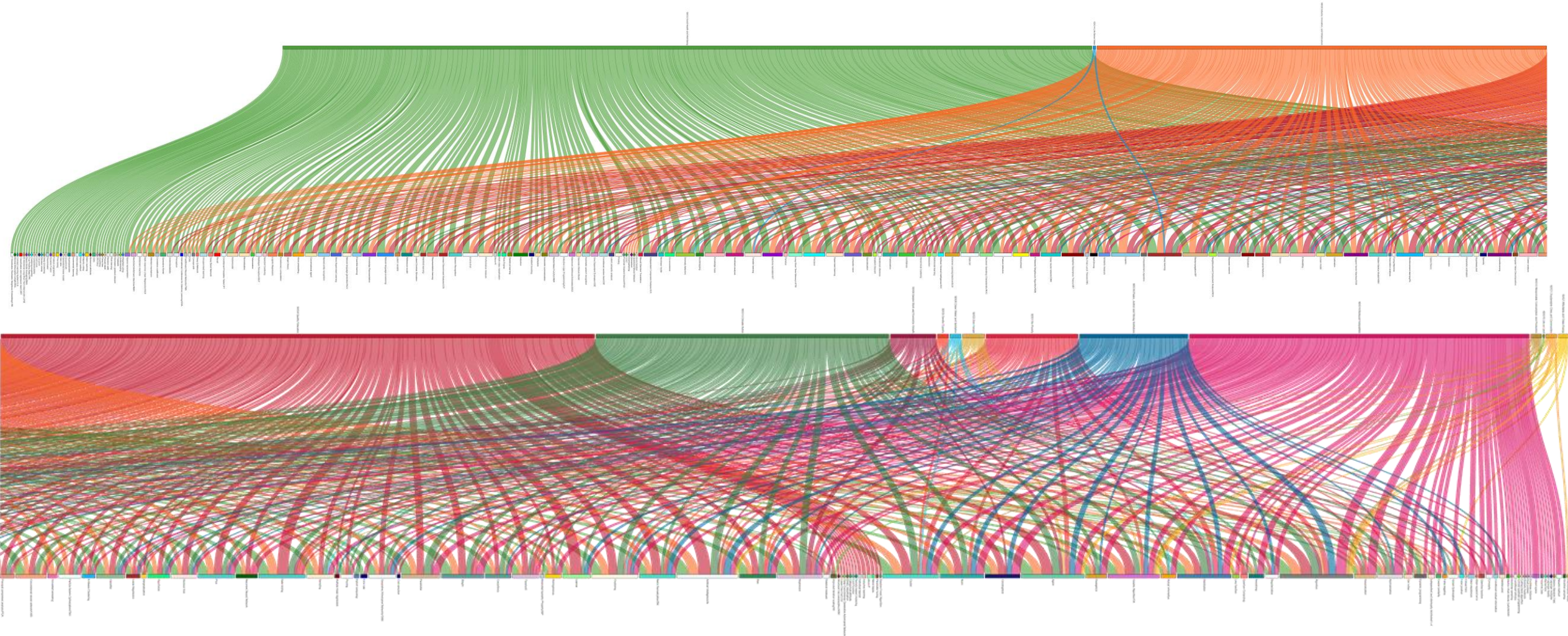
134 direct connections among each other.

- No Poverty <-> Decent Work and Economic Growth
- Sustainable Cities and Communities <-> Industry, Innovation and Infrastructure
- Climate Actions <-> Affordable and Clean Energy
- Climate Actions <-> Sustainable Cities and Communities
- Climate Actions <-> Decent Work and Economic Growth
- Climate Actions <-> Life on Land
- Climate Actions <-> Life on Below Water
- Climate Actions <-> Zero Hunger

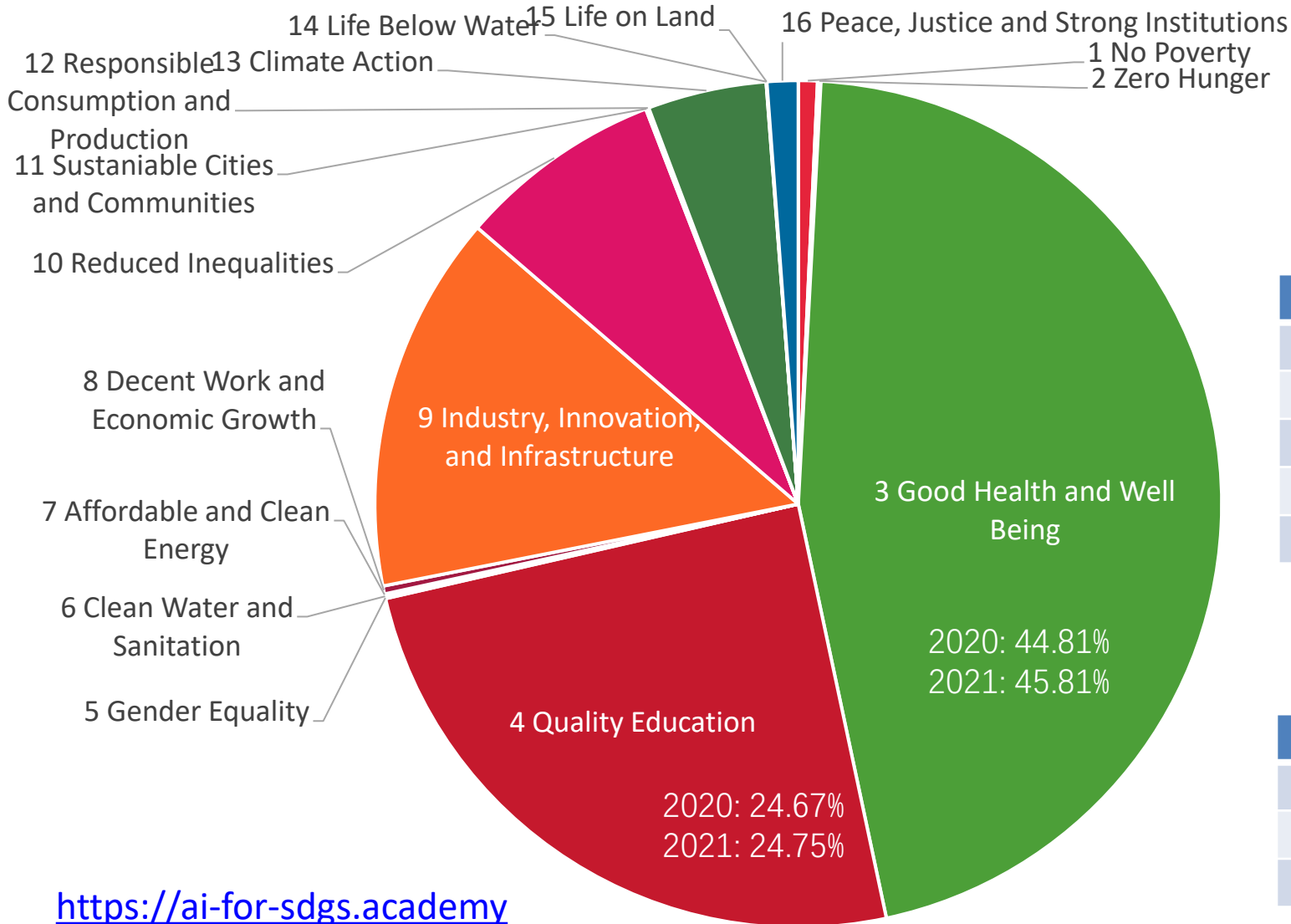
...

Sustainable Development Goals with Artificial Intelligence and Information Technology related Papers and Books in DBLP computer science publication database (A Preliminary Analysis)

| Year | No. of SDGs Papers | Total No. of Papers | Ratio |
|-------------|--------------------|---------------------|----------|
| <=2020.12.1 | 7,998 | 8,027,733 | 0.0996 % |
| <=2021.12.1 | 9,691 | 8,757,765 | 0.111 % |



Status and Trends on AI for SDGs



<https://ai-for-sdgs.academy>

Major Observations

- Good Health and Well Being, Quality Education are the two most “popular” pillars.
- One can make financial profit from “popular topics” more directly.
- What about the rest of the pillars!

Higher Growth Rate: (Where we are getting better)

| Pillar | Area | Growth Rate |
|--------|--|-------------|
| SDG 5 | Gender Equality | 133% |
| SDG 6 | Clean Water and Sanitation | 40% |
| SDG 7 | Affordable and Clean Energy | 40% |
| SDG 11 | Sustainable Cities and Communities | 40% |
| SDG 16 | Peace, Justice and Strong Institutions | 40% |

Lower Growth Rate: (We are too Human-Centric!)

| Pillar | Area |
|--------|---|
| SDG 14 | Life Below Water |
| SDG 15 | Life On Land |
| SDG 17 | partnership for sustainable development |

ICT and AI for the Society: Costs?



Digital technologies are crucial for the EU to become climate neutral by 2050, the goal set in the European Green Deal.



Reducing the carbon footprint of the ICT sector

Today the ICT sector accounts for:

5-9% of electricity use
more than 2% of global greenhouse gas emissions (as much as all air traffic).

If unchecked, the ICT footprint could increase to 14% of global emissions by 2040.



2040



But at the same time technologies could help:

reduce emission by 7 times more than the amount created by the ICT sector;
reduce global emissions by up to 15%.

Artificial Intelligence, supercomputing and pooled data will allow better analysis and decision-making on climate crisis and the environment. This will lead to better policy making.



As creators of enabling technologies such as AI:

Generally, we have not contributed to Climate Actions in a positive way enough, very far away from what we needed!

We create new problems for the Climate and Planet again!

“One of the biggest deep learning models developed thus far is the advanced language model known as GPT-3.

In a single training session, it is estimated to use the equivalent of a year's energy consumption of 126 Danish homes, and emit the same amount of CO₂ as 700,000 kilometres of driving.”

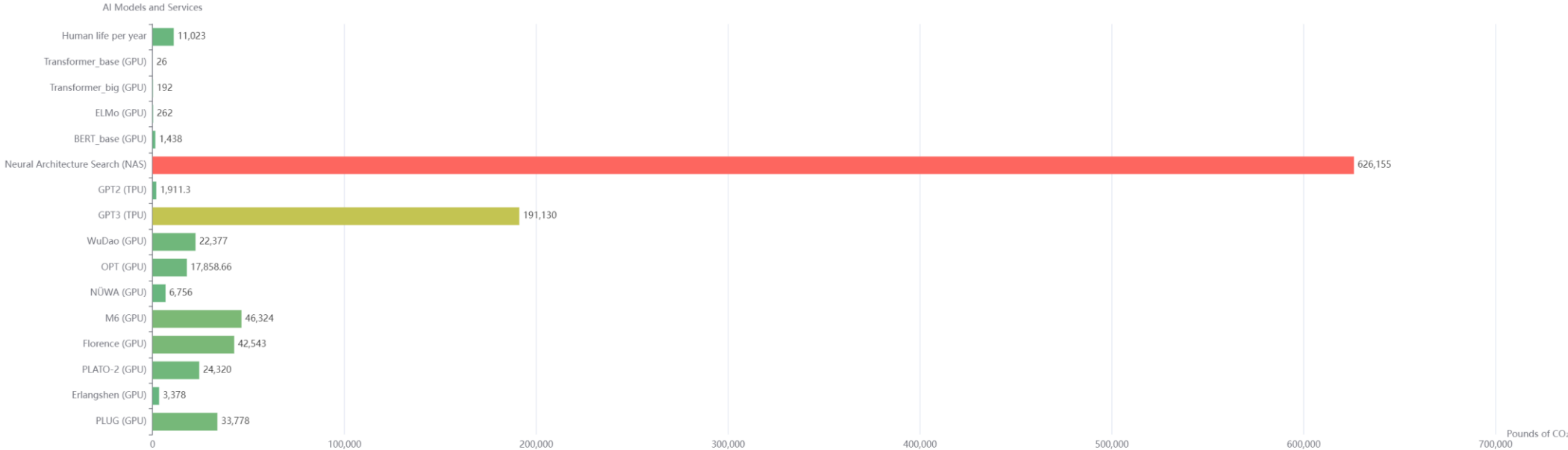
AI Carbon Efficiency Observatory (AI-CEO)

<http://ai-carbon-efficiency-observatory.ai-for-sdgs.academy/>

- SDG7: Affordable and Clean Energy
- SDG9: Industry, Innovation and Infrastructure
- SDG11: Sustainable Cities and Communities
- SDG12: Responsible Consumption and Production
- SDG13: Climate Action

Project AI Carbon Efficiency Observatory (AI-CEO) aims at providing comprehensive evaluations on various AI models and applications about whether the empowerment through AI are efficient from the perspective of Carbon Efficiency. Project AI-CEO is aimed at promoting the sustainable, green development of AI and empowerment through AI.

Carbon Emissions of AI Models and Services



Principles on AI for Climate Action



Values and Principles

For human and ecology good

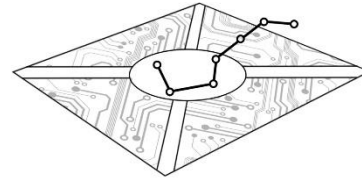
Energy conservation

Privacy protection

Fairness and justice

Promote education, training and employment

Sharing and cooperation



CAIEG/CASIA



cair

CENTRE FOR ARTIFICIAL
INTELLIGENCE RESEARCH



TUM
IEAI



BDDA
CUHK
Stanley Ho
Big Data Decision Analytics
Research Centre



SMU
SINGAPORE MANAGEMENT
UNIVERSITY

Centre for
AI and Data Governance

Recommendations for Action

- **Facilitate climate analysis and forecasting**
- **Promote energy conservation**
- **Contribute to reducing greenhouse gas emissions**
- **Promote greenhouse gas absorption and carbon storage**
- **Reducing the harm caused by climate change**
- **Empower the development of energy systems**
- **Contribute to the establishment of market mechanisms and policies conducive to the control of climate change**



联合国开发计划署
可持续发展创新实验室(成都)
SPARK UNDP SDG Innovation Lab | Chengdu



清华大学中国科技政策研究中心
China Institute for Science and Technology Policy at Tsinghua University



博智 Centre for Perceptual and
Interactive Intelligence
感知交互研究中心

Principles on Artificial Intelligence for Biodiversity Conservation

Principles

- **Promote Ecological Prosperity**
- **Humane Sustainable Development**
- **Avoid Harm**
- **Regulation and Protection**
- **Safety and Controllability**
- **Be Responsible**
- **Compliance with Laws**
- **Education and Training**
- **Cooperation**



Working Group on AI for Biodiversity

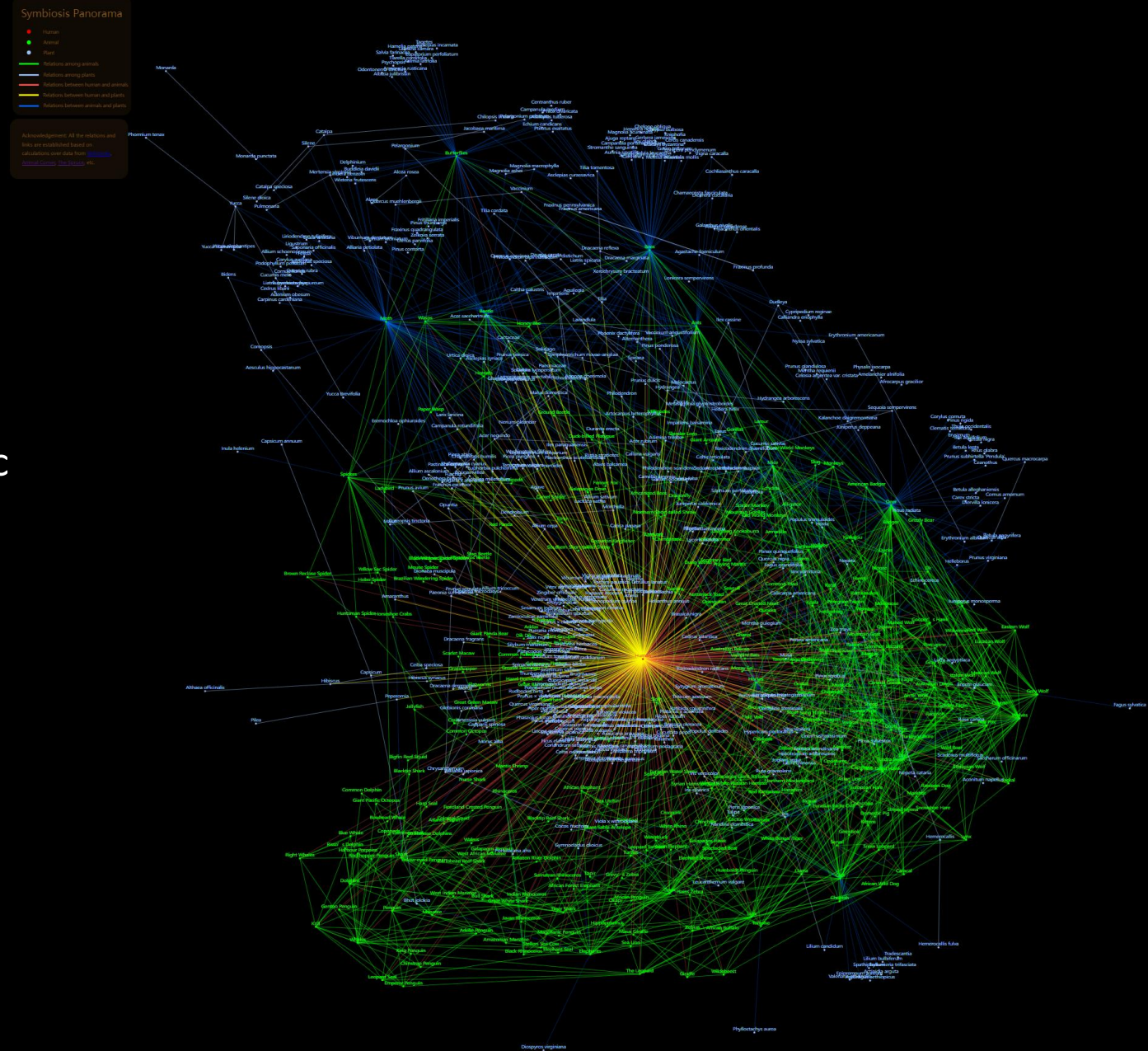
AI for SDGs Cooperation Network



<https://ai-for-sdgs.academy/working-groups/ai-for-biodiversity>

Symbiosis Panorama

- Weaving the web of human, animals, plants, and all living beings on their interconnectedness for a sustainable symbiotic society.
- Human, animals, plants, and all living beings are naturally and have already been closely related, while human does not fully aware of these interconnectedness, and protect the interconnections in a sustainable way.
- Enabled by AI to present and protect the natural interconnections among all living beings.



Cultural Interactions Engine

-- Linking People by Cultural Interactions and Exchanges powered by AI

<http://cultural-interactions-engine.ai-for-sdgs.academy/>



Covering all the UNESCO World Heritages
(Cultural: 897, and Natural: 218)

Imperial Palaces of the Ming and Qing Dynasties in Beijing and Shenyang

Inscribed In 1987 Cultural Heritage China Eastern Asia

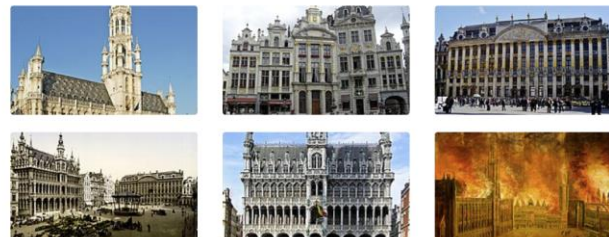
Seat of supreme power for over five centuries (1416-1911), the Forbidden City in Beijing, with its landscaped gardens and many buildings (whose nearly 10,000 rooms contain furniture and works of art), constitutes a priceless testimony to Chinese civilization during the Ming and Qing dynasties. The Imperial Palace of the Qing Dynasty in Shenyang consists of 114 buildings constructed between 1625-26 and 1783. It contains an important library and testifies to the foundation of the last dynasty that ruled China, before it expanded its power to the centre of the country and moved the capital to Beijing. This palace then became auxiliary to the Imperial Palace in Beijing. This remarkable architectural edifice offers important historical testimony to the history of the Qing Dynasty and to the cultural traditions of the Manchu and other tribes in the north of China.



La Grand-Place, Brussels

Inscribed In 1998 Cultural Heritage Belgium Western Europe

La Grand-Place in Brussels is a remarkably homogeneous body of public and private buildings, dating mainly from the late 17th century. The architecture provides a vivid illustration of the level of social and cultural life of the period in this important political and commercial centre.



A Similarity Map of World Heritage



| Culture Concepts | Imperial Palaces Of The Ming And Qing Dynasties In Beijing And Shenyang | La Grand-Place, Brussels |
|---------------------|---|--------------------------|
| City | 19 | 20 |
| Stone | 4 | 8 |
| Well | 9 | 3 |
| Architecture | 10 | 1 |
| Culture | 7 | 4 |
| Museum | 7 | 3 |
| Buffer Zone | 3 | 7 |
| History | 3 | 6 |
| Construction | 6 | 3 |
| Park | 5 | 1 |
| World Heritage | 3 | 3 |
| Tower | 3 | 3 |
| Sculptures | 1 | 5 |
| Region | 1 | 4 |
| Dragon | 4 | 1 |
| Tourism | 1 | 4 |
| River | 2 | 2 |
| World Heritage List | 1 | 3 |

National Principles and Norms of AI Ethics and Governance from China

National Governance Committee for the New Generation Artificial Intelligence

Governance Principles for the New Generation Artificial Intelligence--Developing Responsible Artificial Intelligence (2019-06-17)

Promote the **healthy development** of the new generation of AI, **better balance between development and governance**, ensure the **safety, reliability and controllability** of AI, support the economic, social, and environmental pillars of **the UN sustainable development goals**, and to jointly build a **human community with a shared future**.

Harmony and
Human-friendly

Fairness and Justice

Inclusion and
Sharing

Respect for Privacy

Safety and
Controllability

Shared
Responsibility

Open and
Collaboration

Agile Governance

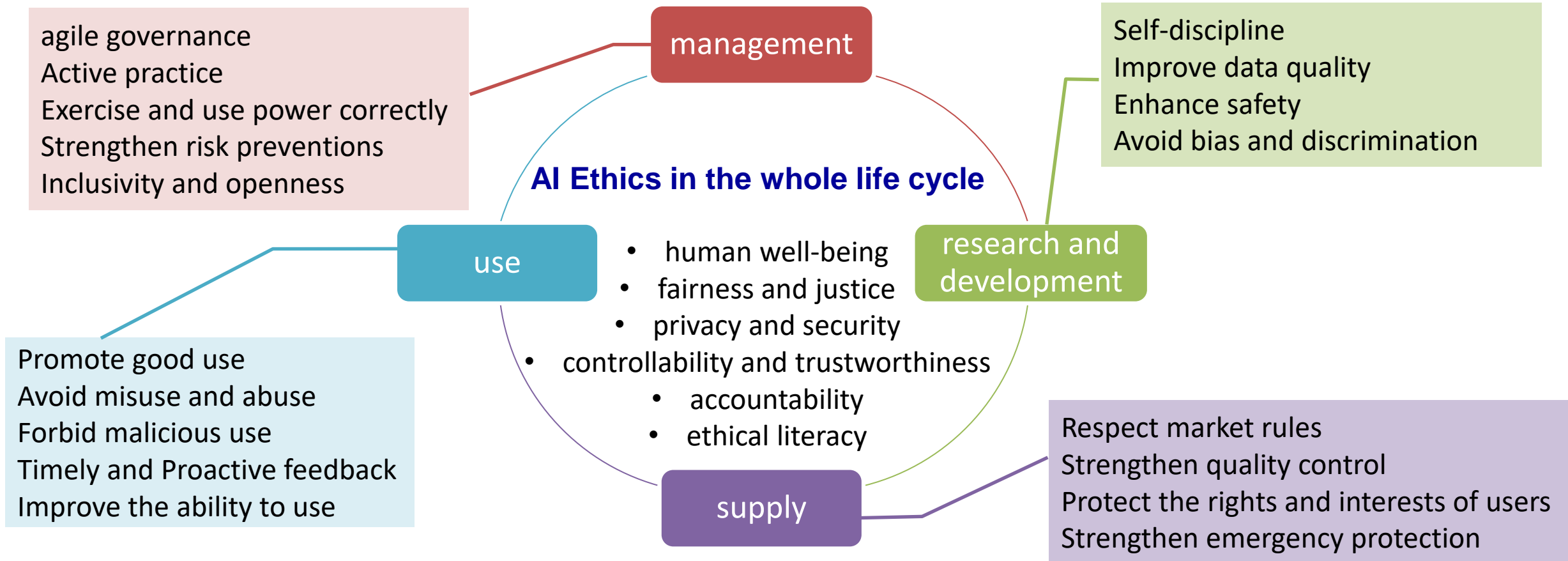
Chinese Version: http://most.gov.cn/kjbgz/201906/t20190617_147107.htm

English Version: <http://www.chinadaily.com.cn/a/201906/17/WS5d07486ba3103dbf14328ab7.html>

National Principles and Norms of AI Ethics and Governance from China

National Governance Committee for the New Generation Artificial Intelligence

The Ethical Norms for the New Generation Artificial Intelligence, China (2019-09-25)



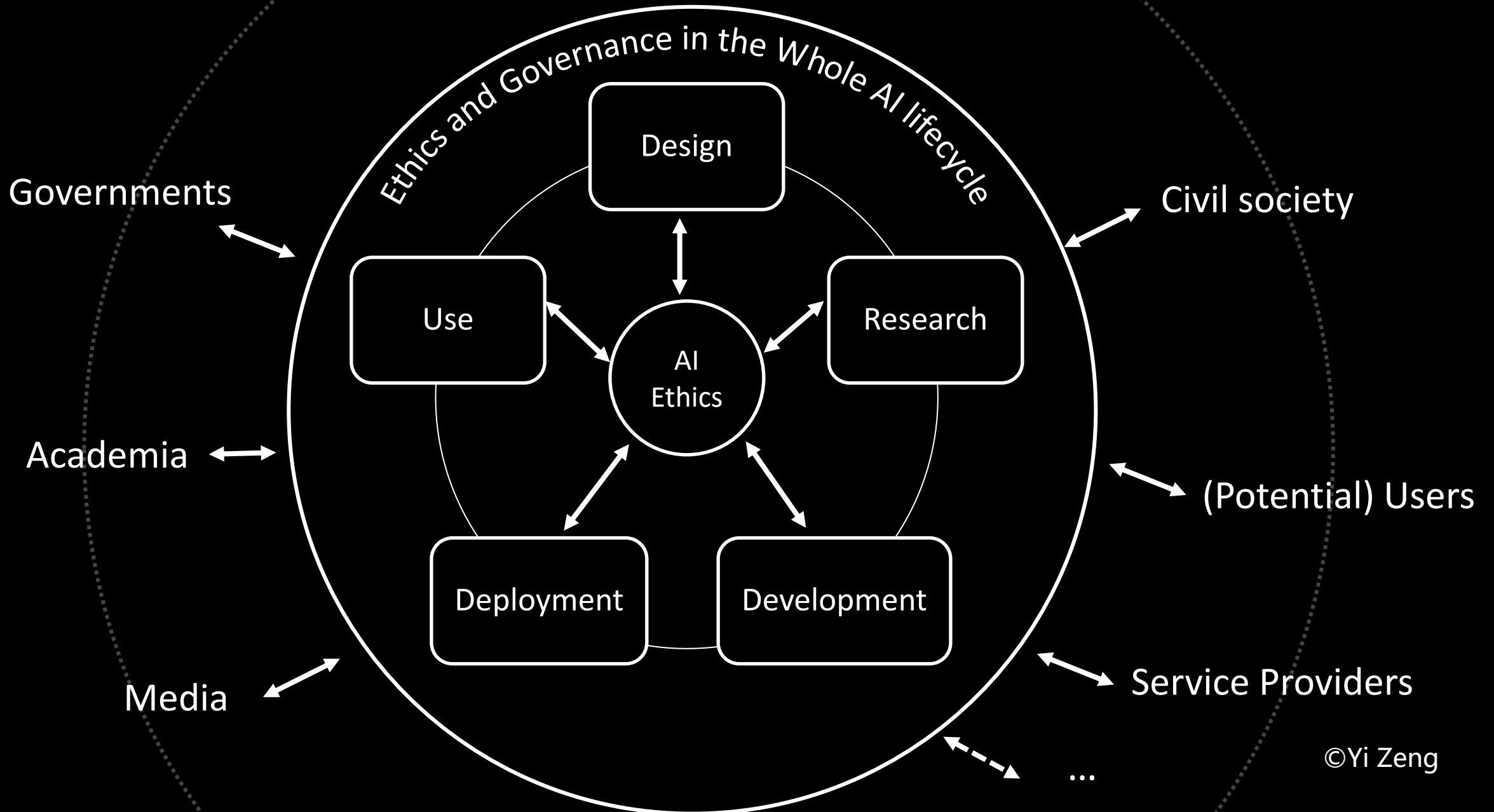
Chinese Version: http://www.most.gov.cn/kjbgz/202109/t20210926_177063.html

English Version: <https://ai-ethics-and-governance.institute/2021/09/27/the-ethical-norms-for-the-new-generation-artificial-intelligence-china/>

UNESCO member states adopt the first ever global agreement on the Ethics of Artificial Intelligence



Multi-stakeholder Proactive AI Governance for Responsible AI Enterprises



Ethics and Governance Evaluation of AI

<https://www.ai-governance.online/>

Helping various stakeholders of AI to evaluate AI projects and stakeholders for potential technical, and ethical risks.

To start your evaluation, please click each topic and answer all of the evaluation questions.

- + Legal compliance
- + Environmental and social well-being
- + Human-centric values
- + Fairness & Representativeness
- + Accountability & Traceability
- + Transparency & Explainability
- + Privacy & Data protection
- + Safety & Security

AI Governance Observatory

Malfunction causes dozens of drones to crash into building in Chongqing China

[Unexpected Condition Safety](#)

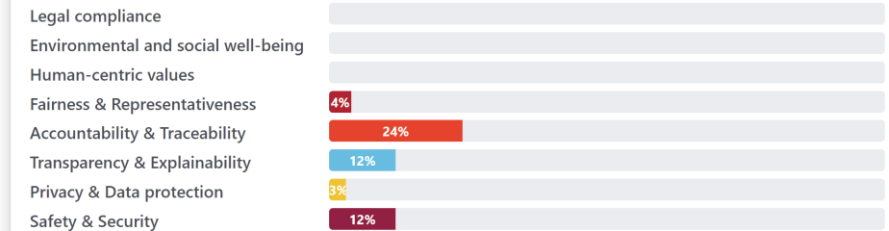
About 100 drones lost control and crashed into a building during a show in Southwest China's Chongqing Municipality on Monday night. A person familiar with the matter later disclosed that a crash in the mainframe control led to the incident, in which up to 100 drones lost control and malfunctioned. Although there were no injuries, the incident resulted in huge economic losses for the show designers.

2021

[Source](#)

A McAfee study fooled passport face recognition with generated pseudo

Your overall evaluation score is 3 out of 100



You need improvements in the following topics:


- [Law Abidance](#) [Sustainability](#) [Data Monopoly](#) [Technological Unemployment](#) [Vulnerable Groups](#)
- [Human Dignity And Rights](#) [Data Bias](#) [Model Bias](#) [Full Life Cycle Fairness](#) [Reinforced Bias](#)
- [Humans Are Responsible](#) [Technical Assurance Of Accountability](#) [Pre-Defined Responsibility](#)
- [Indication Of Non-Human Interaction](#) [Indication Of Non-Real Contents](#) [Transparency](#) [Predictability](#)
- [Legal Proper Necessary Data Collection](#) [Inform Users](#) [Obtain User Consent](#) [Comply With User Agreements](#)
- [Data And Service Revocation](#) [Human Control](#) [Abuse Control](#) [Third Party Security](#) [Physical Security](#)
- [Unexpected Condition Safety](#) [Safety Training](#)

Artificial Intelligence for Sustainable Development Goals (AI4SDGs) Cooperation Network


AI for Sustainable Development Goals (AI4SDGs) Think Tank

A global collection of AI projects and proposals that impacts UN Sustainable Development Goals, both positively and negatively. The goal is to promote the positive use of AI for Sustainable Development, and to investigate on the negative impact of AI on Sustainable Development. Detailed evaluation on each project is provided based on our rating scheme. You are welcome to share your project to the world and get evaluated by submitting your project or proposal information here.

BROWSE BY GOALS
SHARE YOUR PROJECT




**AI4SDGs
Cooperation
Network**
[Learn more](#)




**Artificial Intelligence: An
Accelerator for UN Sustainable
Development Goals**
[Learn more](#)


Champion Network




International Research Center for AI Ethics and Governance, Institute of Automation, Chinese Academy of Sciences (China)




Institute for AI International Governance, Tsinghua University (China)




Centre for Artificial Intelligence and Robotics, United Nations, UNICRI




The Centre for the Study of Existential Risk, University of Cambridge (UK)




Centre for AI and Data Governance, Singapore Management University (Singapore)




Baidu




XIAOMI




DiDi




MEGVII




YIDUCLOUD



Montreal AI Ethics Institute (Canada)



YITU



Korea Artificial Intelligence Association

- AI and Human Rights
- AI and Privacy Protection
- AI and Fairness
- Transparency and Explainability of AI
- AI Safety and Security
- Trustworthiness and AI
- Ethics for Augment Intelligence
- Long-term Ethical Challenges for AI
- AI and Law
- Ethical AI for Next Generation
- Ethical AI for Healthcare
- Ethical AI for Climate Actions
- Ethical AI for Biodiversity
- Cross Culture AI Ethics
- AI for Peace

Constituent Network



Central Asia Tech Law (Pakistan)



Institute of Technological Ethics (Australia, UK)



C Minds (USA, Mexico)



AI Policy Exchange (India)



Artificial Intelligence 4 Development Agency (Austria)



Yi Zeng
(Beijing Academy of Artificial Intelligence, and Chinese Academy of Sciences, China)



Danit Gal
(United Nations, and Leverhulme Centre for the Future of Intelligence, University of Cambridge)



Adrian Weller
(Alan Turing Institute, and University of Cambridge, UK)



Seán Ó hÉigeartaigh
(Center for the study of existential risk, University of Cambridge, UK)



Wendell Wallach
(Yale University, and The Hastings Center, USA)



Eugenio Vargas Garcia
(United Nations General Assembly)



Brian Tse
(Future of humanity institute, University of Oxford, and Partnership on AI, UK)



Edson Prestes
(Federal University of Rio Grande do Sul, Brazil)



Serge Stinckwich
(United Nations University Institute in Macau, Macau SAR China)



Kay Firth-Butterfield
(World Economic Forum)



Mattia Fantinati
(Chamber of Deputies, Presidency of Council of Ministries, Italy)



Steven Edwin Vosloo
(UNICEF)



Petra Ahrweiler
(Johannes Gutenberg University Mainz, Germany)



Alaa Khamis
(General Motors, Canada)

<http://www.ai-for-sdgs.academy/ai4sdgs-cooperation-network>

International Conferences on AI Ethics and Sustainable Development

Introducing AI Ethics and Sustainable Development

Artificial Intelligence (AI) is considered to be an enabling technology for the sustainable development of the society and ecology. While ethical challenges on the development and use of AI have already been an important and continuing issue all over the world. How to make good use of AI and avoid potential negative impacts are essential for the future of humanity and ecology.

The United Nations' Sustainable Development Goals (UNSDGs) are set to solve development issues in economic, social and environmental dimensions. The SDGs call for action by "all countries - poor, rich and middle-income - to promote prosperity while protecting the planet." In all the areas related to SDGs, Artificial Intelligence has a great role to play. It can contribute positively to realize the goals, while it also can bring negative challenges. A more systematic attempt to harness the potential and mitigate the risk of AI for SDGs are needed from the perspective of Ethics and Governance.

Hence, the International Conferences on AI Ethics and Sustainable Development is aimed at creating a platform for global dialogues and discussions on timely and long term issues related to AI Ethics and Governance under the context of sustainable development of humanity, society, and ecology. The conference series aimed at promoting reaching, implementing global consensus, and sharing best practices related to AI Ethics and Sustainable Development.

| Themes of the Conference:

Major themes and topics of the conference series include, but not limited to:

- AI and Human Rights
- AI and Privacy Protection
- AI and Fairness
- Transparency and Explainability of AI
- AI Safety and Security
- Trustworthiness and AI
- Ethics for Augment Intelligence
- Long-term Ethical Challenges for AI
- AI and Law
- Ethical AI for Next Generation
- Ethical AI for Healthcare
- Ethical AI for Climate Actions
- Ethical AI for Biodiversity
- Cross Culture AI Ethics
- AI for Peace

| Co-organizing Institutions:

- International Research Center for AI Ethics and Governance, Institute of Automation, Chinese Academy of Sciences (CAS)
- Institute of AI International Governance, Tsinghua University
- Big Data Decision Analytics Research Centre, Chinese University of Hong Kong
- Leverhulme Centre for the Future of Intelligence, University of Cambridge
- Institute for Ethics in Artificial Intelligence, Technical University of Munich
- Centre for Philosophy and AI Research (PAIR), University of Erlangen-Nuremberg
- Center for Philosophy and the Future of Humanity, Peking University
- Center for AI and Data Governance, Singapore Management University
- Centre for AI Research (South Africa)
- Research Center for Science, Technology and Society, Chinese Academy of Social Sciences (CASS)
- Research Center for Applied Ethics, Fudan University
- Center for Social Responsibility and Governance, Institute of Law and Technology, Renmin University of China
- Institute of Philosophy, Chinese Academy of Sciences
- AI for SDGs Cooperation Network

Yi Zeng, Professor and Director of International Research Center for AI Ethics and Governance, Institute of Automation, Chinese Academy of Sciences, and lead organizer of AI for SDGs Cooperation Network.



Seán S. ÓhÉigeartaigh, Program Director at Leverhulme Centre for the Future of Intelligence (LCFI), University of Cambridge.



Emma Rutkamp-Bloem, Professor and Head of Department of Philosophy, Faculty of Humanities, University of Pretoria. Ethics of AI Lead at Centre for Artificial Intelligence Research (CAIR).



Vincent C. Müller, Professor and Director of Centre for Philosophy and AI Research (PAIR), University of Erlangen-Nuremberg.



Helen Meng, Patrick Huen Wing Ming Professor of Systems Engineering & Engineering Management, Director of Stanley Ho Big Data Decision Analytics Research Centre, The Chinese University of Hong Kong.



Mark Findlay, Professor and Director of Centre for AI and Data Governance, Singapore Management University.



