PROF DR. MED. J. DE LAFFOLIE, MA, MME · Zentrum für Kinderheilkunde und Jugendmedizin · Allgemeine Pädiatrie und Neonatologie · Kindergastroenterologie

KI : WOHIN GEHT DIE REISE? EINE EINFÜHRUNG

Offenlegung von Interessenskonflikten

Referent: Prof. Dr. med. Jan de Laffolie

Ich habe folgende Verbindungen zu Unternehmen offenzulegen:

- Beratendes Gremium / Komitee: Takeda, Sanofi, mirum
- Förderung (Subvention / Honorar): Takeda, mirum, Sanofi
- Forschung / klinische Studien: GBA Innovationsfond, Abbvie, Falk, Takeda, Hexal, mirum, Sanofi
- Referent / Beratungstätigkeit: Takeda, Abbvie, Sanofi

AI Quotes

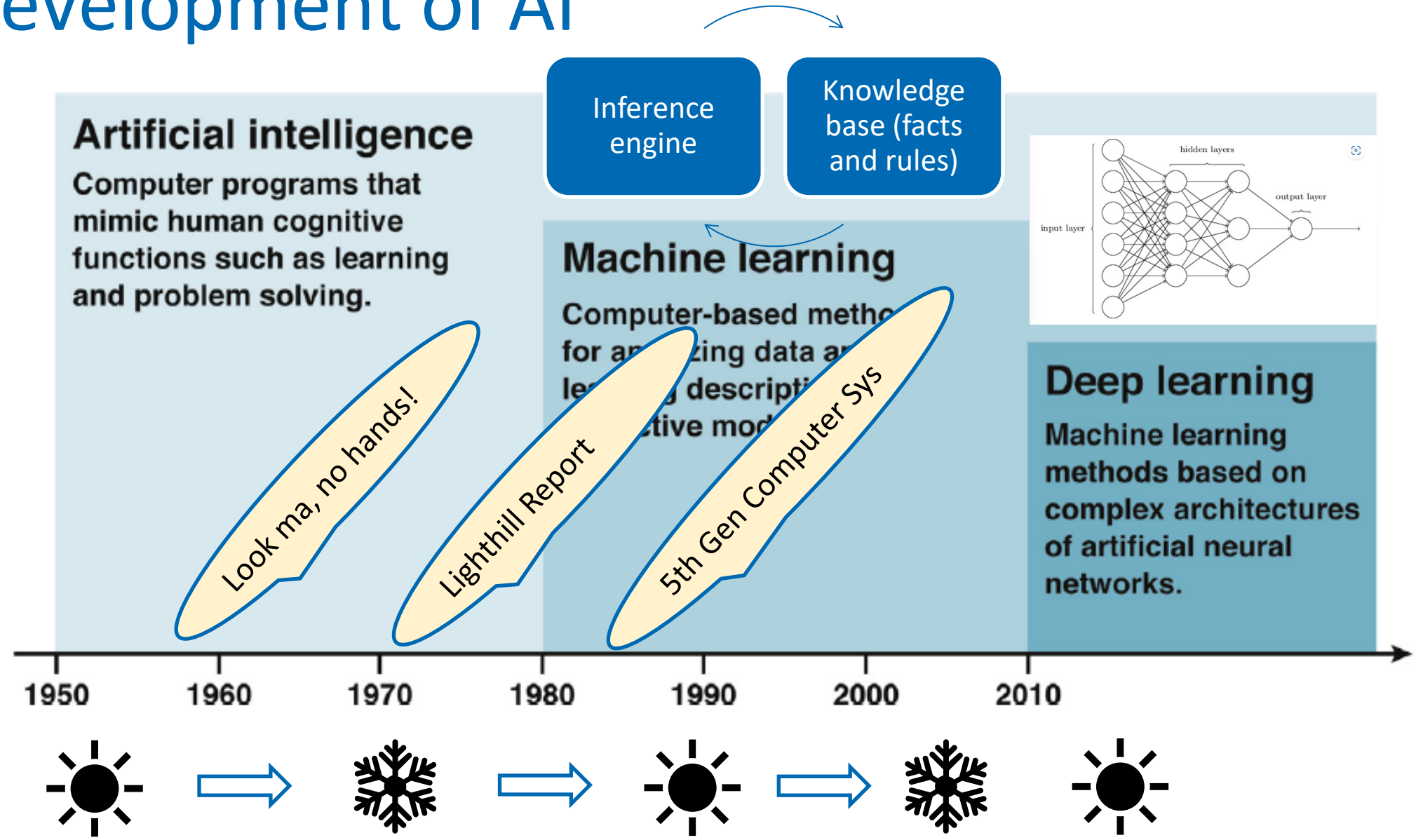
„Generative AI is the key to solving some of the world's biggest problems, such as climate change, poverty, and disease. It has the potential to make the world a better place for everyone."

Mark Zuckerberg

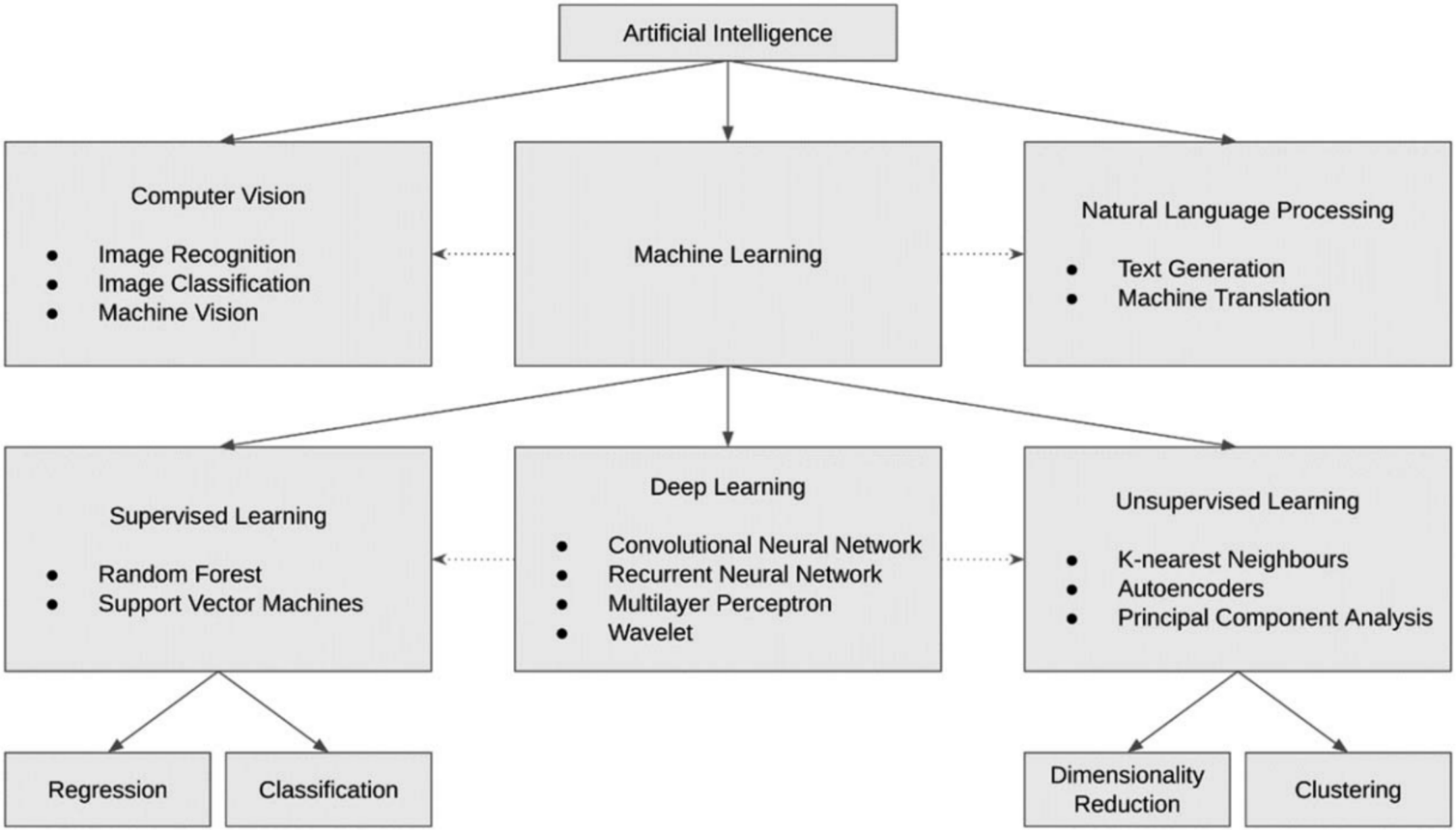
"AI is the most profound technology humanity is working on. More profound than fire, electricity, or anything that we have done in the past."

Sundar Pichai (CEO Alphabet)

Development of AI



Le Berre et al Gastro 2020


Artificial Intelligence
Computer Vision
Image Recognition
Image Classification
Machine Vision
Machine Learning
Natural Language Processing
Text Generation
Machine Translation
Supervised Learning
Random Forest
Support Vector Machines
Deep Learning
Convolutional Neural Network
Recurrent Neural Network
Multilayer Perceptron
Wavelet
Unsupervised Learning
K-nearest Neighbours
Autoencoders
Principal Component Analysis
Regression
Classification
Dimensionality Reduction
Clustering

Pushing the boundaries of medical knowledge – and transfering it to the bedside

Doubling Time of Medical Knowledge

1960s: Medical knowledge was estimated to double every 50 years.

1980s: Doubling time reduced to 7 years.

2010: Doubling time further dropped to 3.5 years.

2020: Estimates suggest it now doubles every 73 days

Explosion in Research Publications

- Over **1 million new articles** were added to PubMed annually by 2012, compared to just **300,000 articles/year** in the 1990s.
- The number of journals indexed in PubMed increased from **10,000 in 2000** to **30,000+ in 2020**.

Growth of Clinical Trials

ClinicalTrials.gov:

- In 2000, there were **2,119 registered trials**.
- By 2023, the number exceeded **450,000 trials**, showing a near-exponential increase.

Human Genome Project (completed in 2003) took 13 years to sequence the first human genom – now 24-48h

The use of machine learning in analyzing medical data has significantly increased the pace of new discoveries, such as predicting disease outcomes or identifying new drug targets.

Advances in computational biology, machine learning, and big data analysis are accelerating the discovery of new mechanisms and treatments exponentially.

D Levitin, J Roy Soc Med 2011

Ethical Dilemmata

- Data safety and – security
- Liability / Responsibility
- Bias/ Discrimination and Representation
- Human Rights / Dignity
- Autonomy / Souvereignity
- Access / Inclusion / Diversity
- Child protection

Empfehlungen des dt. Ethikrats zur KI in der Medizin

Empfehlungen
Deutscher Ethikrat

1 **Kooperation**
Zusammenarbeit mit Zulassungsbehörden und Fachgesellschaften für Qualität.

2 **Diversität**
Berücksichtigung relevanter Patientenfaktoren in Datensätzen.

3 **Transparenz**
Transparente Darstellung von KI-Ergebnissen und Reflexion.

4 **Datenschutz**
Strenge Datenschutz- und Aufklärungsstandards für Personendaten.

5 **Zugänglichkeit**
Zugänglichkeit von überlegenen KI-Anwendungen für alle Patienten.

6 **Bildung**
Integration von KI-Anwendungen in die medizinische Ausbildung.

7 **Expertise**
Expertise bei der Anwendung von KI-Komponenten und Datensorgfalt.

8 **Kommunikation**
Kommunikative Maßnahmen gegen Verobjektivierung und Vertrauensstärkung.

9 **Verantwortung**
Kein vollständiges Ersetzen von Ärzten durch KI-Systeme.

Stellungnahme dt Ethikrat März 23 / Nach F Kücking Osnabrück, Workshop KI Ethik 1. Dez 2023

Regulatory Efforts

Principles of Regulation

- Standards and Guidelines

  Exp. FDA medical software

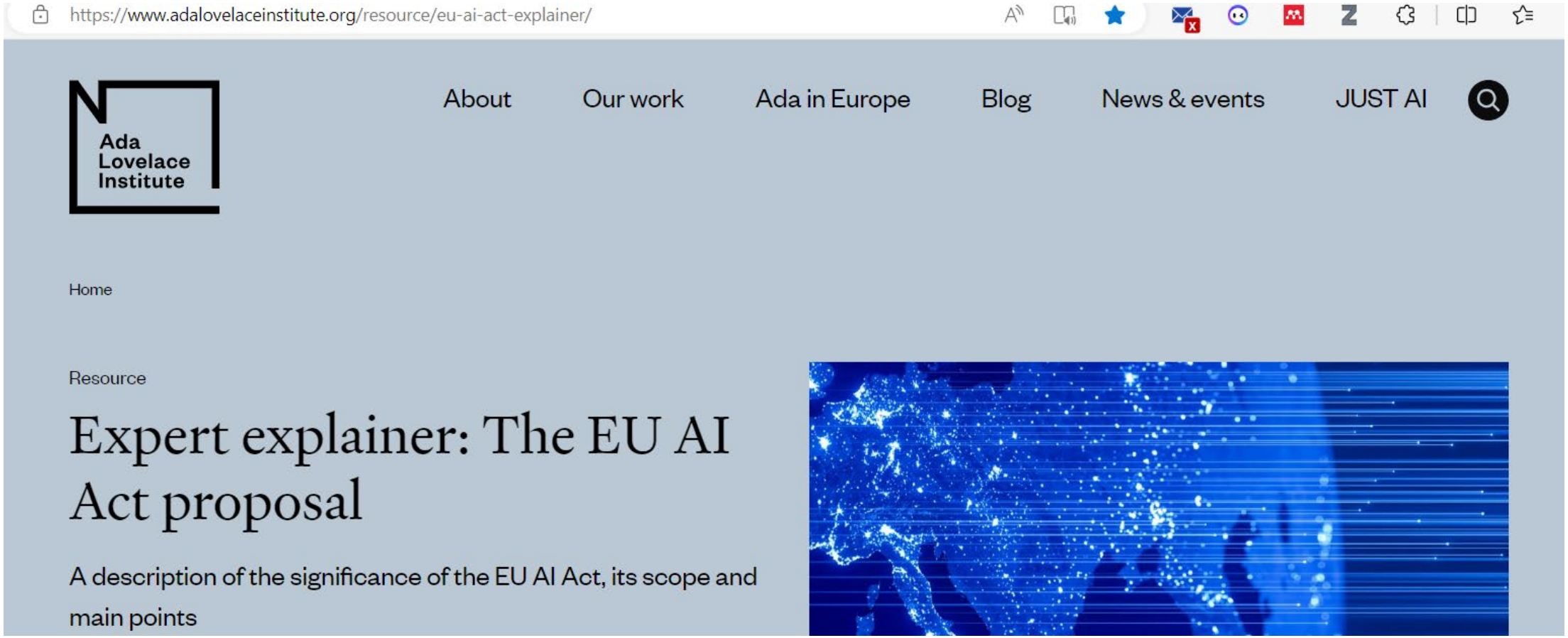
- Transparency and explainability

- Strengthen Data Safety and Security

  Exp. European Data Security Laws

- Enforce Diversity in Training Datasets

Want to understand AI regulation EU AI Act?



Fazit

- KI hat das Potenzial, die klinische Versorgung zu revolutionieren
- Nutzbare KI ist auch jetzt schon in zunehmendem Maß verfügbar
- Durch die Entwicklung regulatorischer Rahmenbedingungen müssen viele ethische Dilemmata angegangen werden.
- Fachgesellschaften kommt hier eine Gestaltungsaufgabe zu