Människan och maskinerna

Danica Kragic

AI

- Science and engineering of computer systems considering both software and hardware

- Applications consider tasks that draw parallel to human capabilities – visual perception, communication, decision making, planning

- AI systems can learn from data (experience) and improve own performance over time

- Various methods are used to achieve this: machine learning (deep learning), logical reasoning, expert and rule-based systems, case-based reasoning

Perceptual abilities =

Detection
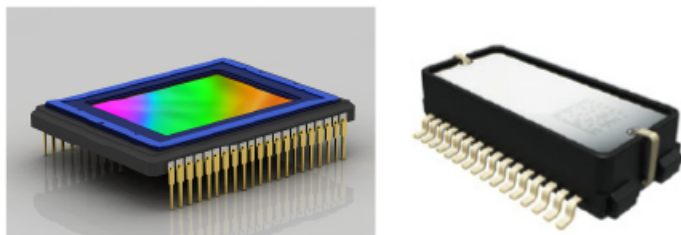(information gathering) **+**
Cognition
(information processing)

	Detection (information gathering)	Cognition (information processing)
Humans	Sensory receptors	Brain
Machines	Sensors	AI and other information systems

194 196 193 192 194
192 194 193 191 193
2 4 3 156 158
161 163 162 160 162
168 170 169 168 170
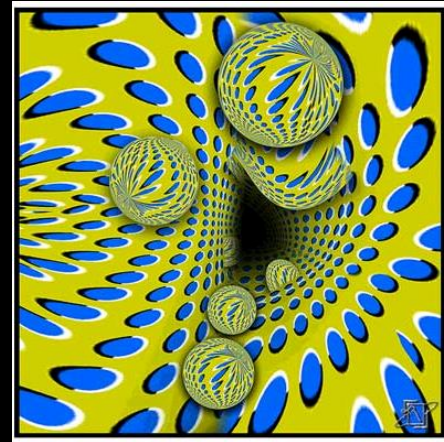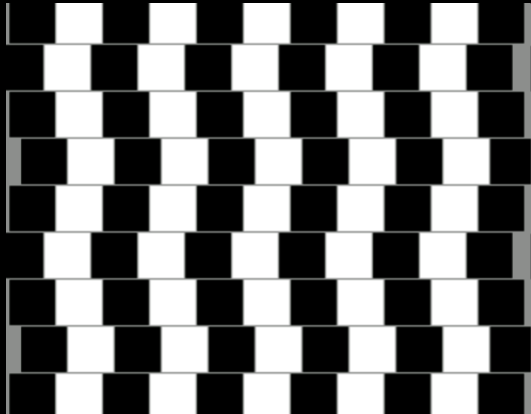173 179 177 173 179
175 177 176 174 176
170 172 172 165 169

Biological vision

- Purpose: survival and reproduction
  - We are good in recognizing each others
  - We are bad in interpreting bar-codes
  - We are easilly fooled by optical illusions

Part 1: Turn data into numbers

Part 2: Build model to learn patterns in numbers

Daniel Bourke @mrdbourke · Nov 1
"How do I learn #machinelearning?"

What you want to hear:
1. Learn Python
2. Learn Math/Stats/Probability
3. Learn software engineering
4. Build

What you need to do:
1. Google it
2. Go down the rabbit hole
3. Resurface in 6-9 months and reassess

See you on the other side.

```
[[116, 78, 15],
 [117, 43, 96],
 [125, 87, 23],
 ...,
```

```
[[0.983, 0.004, 0.013],
 [0.110, 0.889, 0.001],
 [0.023, 0.027, 0.985],
 ...,
```

Ramen, Spaghetti

Not spam

"Hey Siri, what's the weather today?"

Inputs

Numerical encoding

Learns representation (patterns/features/weights)

Representation outputs

Outputs

Discriminative

Generative
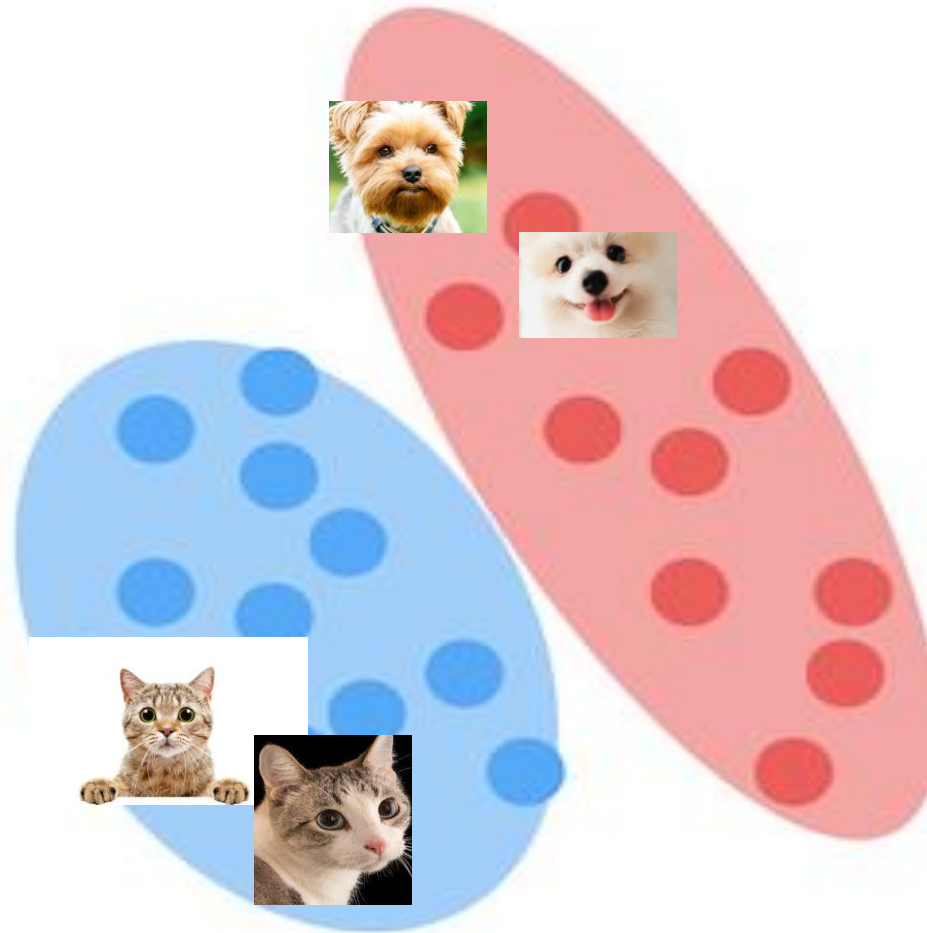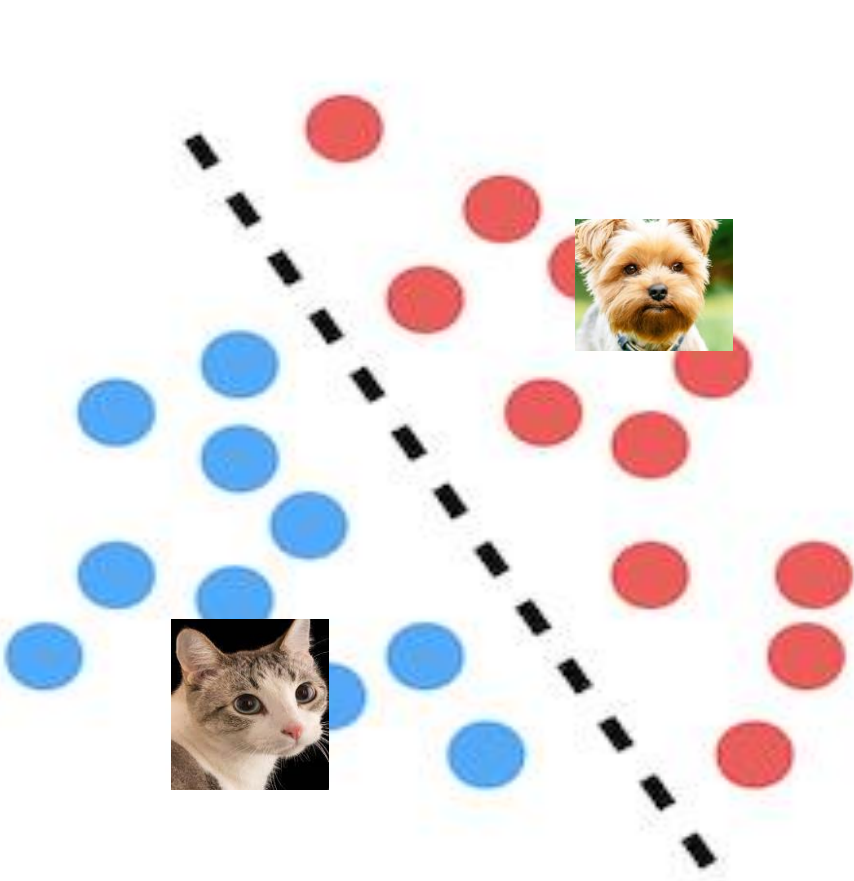
Coarse styles
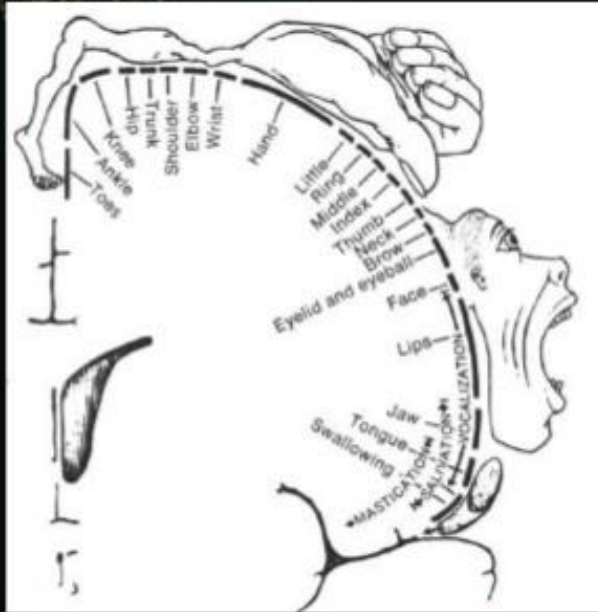$(4^2 - 8^2)$

Middle styles
$(16^2 - 32^2)$

Fine styles
$(64^2 - 1024^2)$

How your brain sees your body
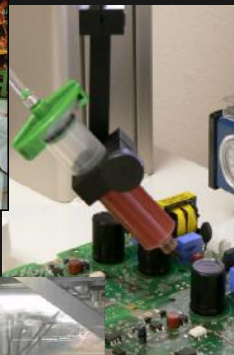

Motor Homunculus

Robotics and AI are everywhere

Industry

Outdoor
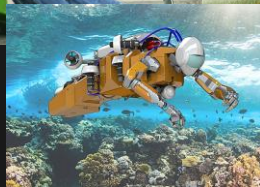
Service
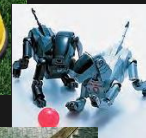
Human robot co-manipulation

KTH CVAP

Trimble and Boston Dynamics Announce Strategic Alliance to Extend the Use of Autonomous Robots

'Cognitive agents'
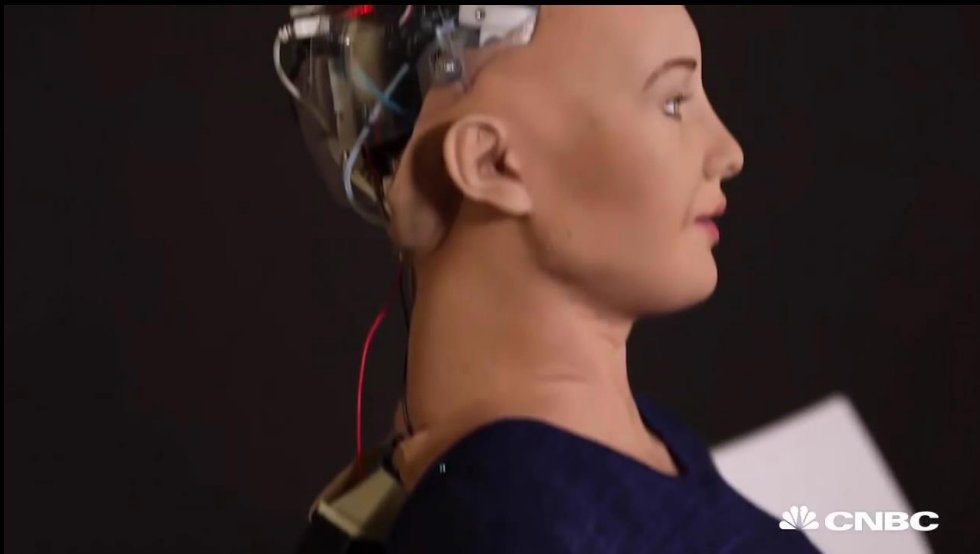
"Amelia understands what you actually mean"

… Amelia can comprehend the underlying meaning
of what is communicated just as a human would.

A paradigm shift in the interaction with technology
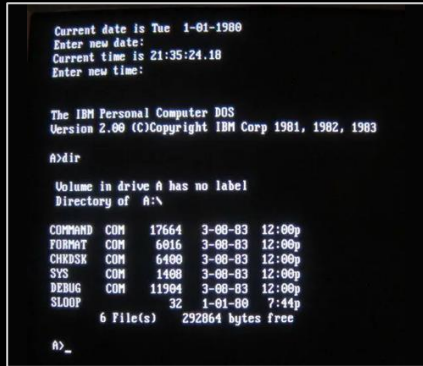
Command Prompt

Use complex commands to perform tasks manually

Graphical User Interface

Use a clickable interface to perform tasks manually

AI-enabled natural language interface

Write or speak in natural language to perform tasks automatically

Question Answering

Chart Summarization

Image Analysis / Labeling

Risk Stratification

Finding Similar Patients

Millions of EHRs

Medical Foundation Model

Natural Language Interaction
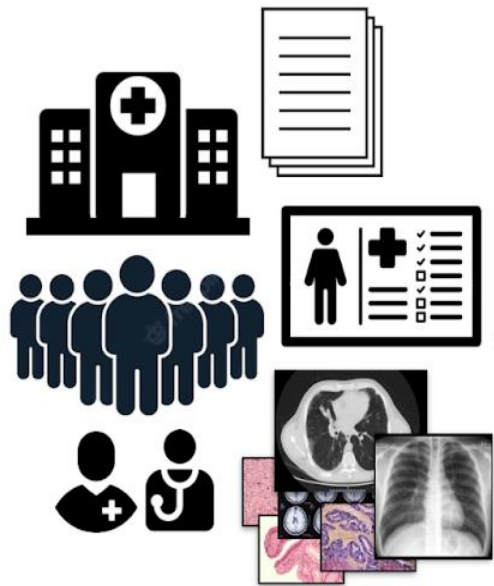
HEALTHCARE DATA

REUSABLE COMPONENTS
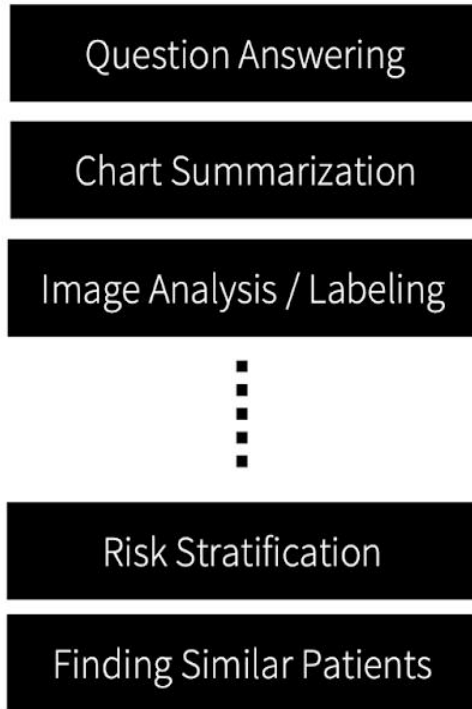
TASK ADAPTATION

HUMAN-AI COLLABORATION

PHYSICIAN

- Textbooks
- Lectures
- Clinical clerkships

5 YEARS — MEDICAL SCHOOL

- Textbooks
- Seminars
- Patient care
- Clinical Guidelines

3 YEARS — RESIDENCY

- Textbooks
- Seminars
- Patient care
- Journals
- Clinical Guidelines
- Research
- Mentorship

3 YEARS — FELLOWSHIP

- CME & Conferences
- Patient care
- Research & Clinical trials

ARTIFICIAL INTELLIGENCE

E-health Records
Medical Images
Medical Literature
Patient Vitals
Genomic Data

Machine Learning
- Support Vector Machines
- Decision Trees
- Bayesian Networks

Deep Learning
- Natural Language Processing
- Convolutional Neural Networks

Cognition Computing

Optical Character Recognition

Computer Vision

- Maintaining health records
- Clinical evaluation
- Differential diagnosis generation
- Computer-aided drug design
- Real time patient monitoring
- Treatment recommendation
- Clinical trial oversight and management
- Medical image analysis and reporting
- Precision management
.........................and more

Benefits of AI in Personalized Learning

Intelligent Tutoring Sytems

Automated Grading and Assessment

Chatbots and Virtual Assistants

AI IN EDUCATION

Curriculum Planning

Learning Analytics

Content Recommendation

PowerSchool

Data-Driven Decision-Making

Enhanced Assessments

Benefits of AI in Education Management Systems

Remote Learning and Online Education

Accessibility and Inclusivity
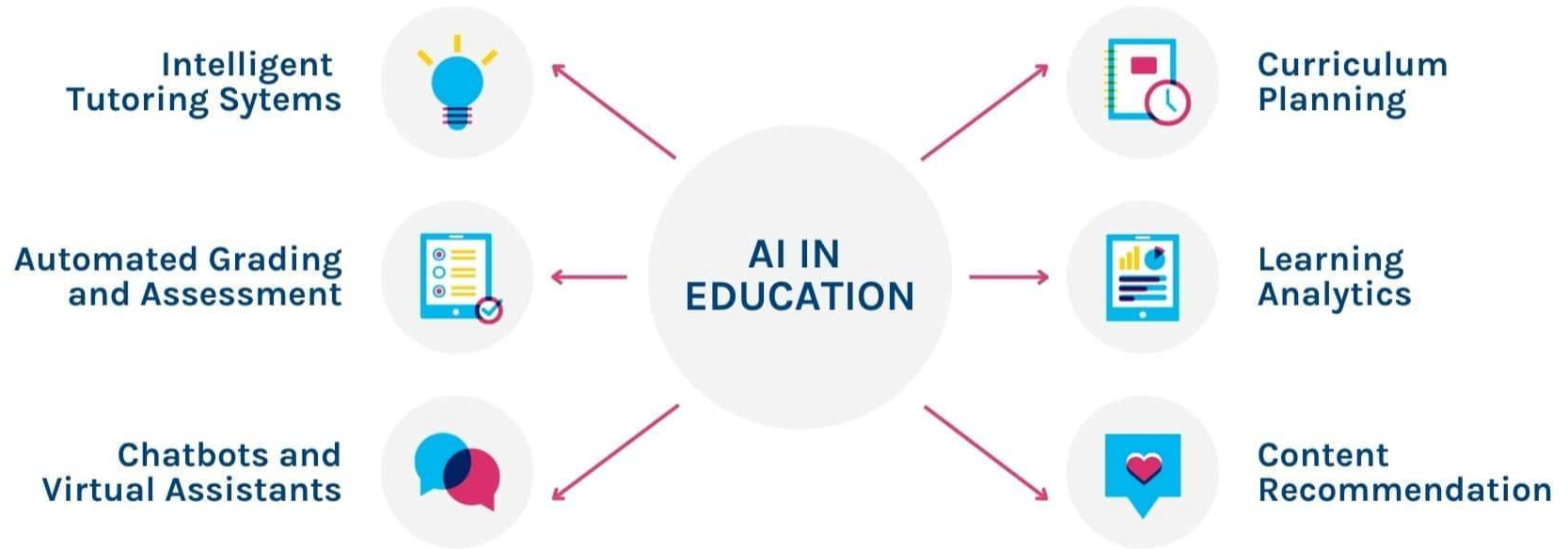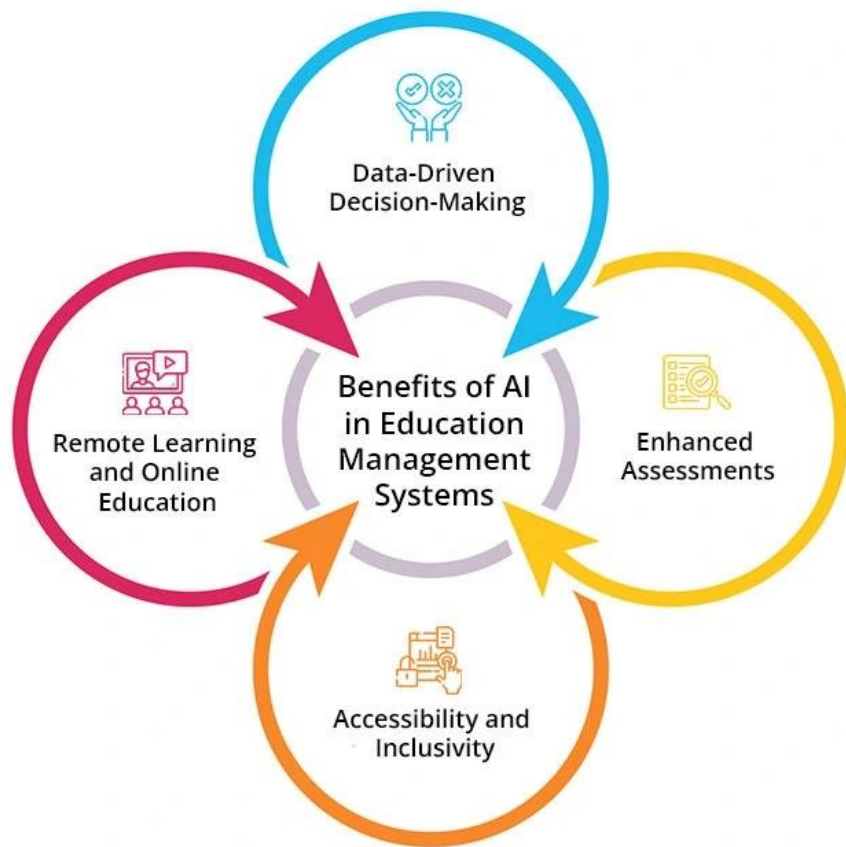
Role of Teachers

- Being a model to train AI
- Feeding AI systems about their professional development
- Feeding AI algorithms with student information and behaviors
- Checking accuracy of assessments
- Determining assessment criteria
- Providing pedagogical guidance for material selection
- Providing feedback about technical issues

TEACHERS

ARTIFICIAL INTELLIGENCE

Planning

- Receiving information student background
- Identifying the need of the students
- Planning activities

Implementation

- Timely monitoring
- Immediate feedback
- Timely intervention
- Selecting the optimum learning activity
- Tracking student progress
- Making teaching more interesting
- Increasing interaction
- Reducing teacher workload

Assessment

- Automated assessment and evaluation
- Providing feedback about effectiveness of instructional practice
- Better prediction of teacher performance
- Helping to make clinical decision

Tools

- PDFgear Chatbot – extract info from PDF files
- GrammarlyGO - generate content, rewrite, …
- Quizlet – help with memorizing information
- Duolingo – language learning app
- Slack – online messaging
- Jasper – writing assistant, works with topics
- WriteMage – integrates ChatGPT – generating ideas
- Open edX – learning platform (EdX + GPT), accessing courses etc
- Ivy.ai – mostly chatbot
- Kahoot – game-based learning platform, supports more personalized learning
- Notion AI – interactive, mostly writing assistant

LEARNING TREE INTERNATIONAL

Choosing Your **AI** Solution:
A Guide for Technical Decision Makers

Custom GPTs with OpenAI's GPT Builder

Key Points:

- Ideal for personalized customer engagement.
- User-friendly, no-code platform.
- **Challenges:** Needs to stand out, reliance on OpenAI platform.
- **Applications:** Financial advice, legal tech, educational tools.

OpenAI Assistants

Key Points:

- Requires coding proficiency, offers greater control.
- Best for intricate AI solutions and complex tasks.
- **Challenges:** Technical barriers, continuous management.
- **Applications:** Data analysis, customer service, recruitment.

Microsoft Copilot

Key Points:

- Integrated with Microsoft ecosystem.
- Simplifies data analysis in Excel.
- **Challenges:** Cost, limited customization.
- **Applications:** Data-driven decision making, content creation.

Autogen and Langchain Frameworks

Key Points:

- High customization, for technologically advanced users.
- Full ownership and control over applications.
- **Challenges:** Resource-intensive, requires deep technical expertise.
- **Applications:** Bespoke AI applications, human-in-the-loop scenarios.

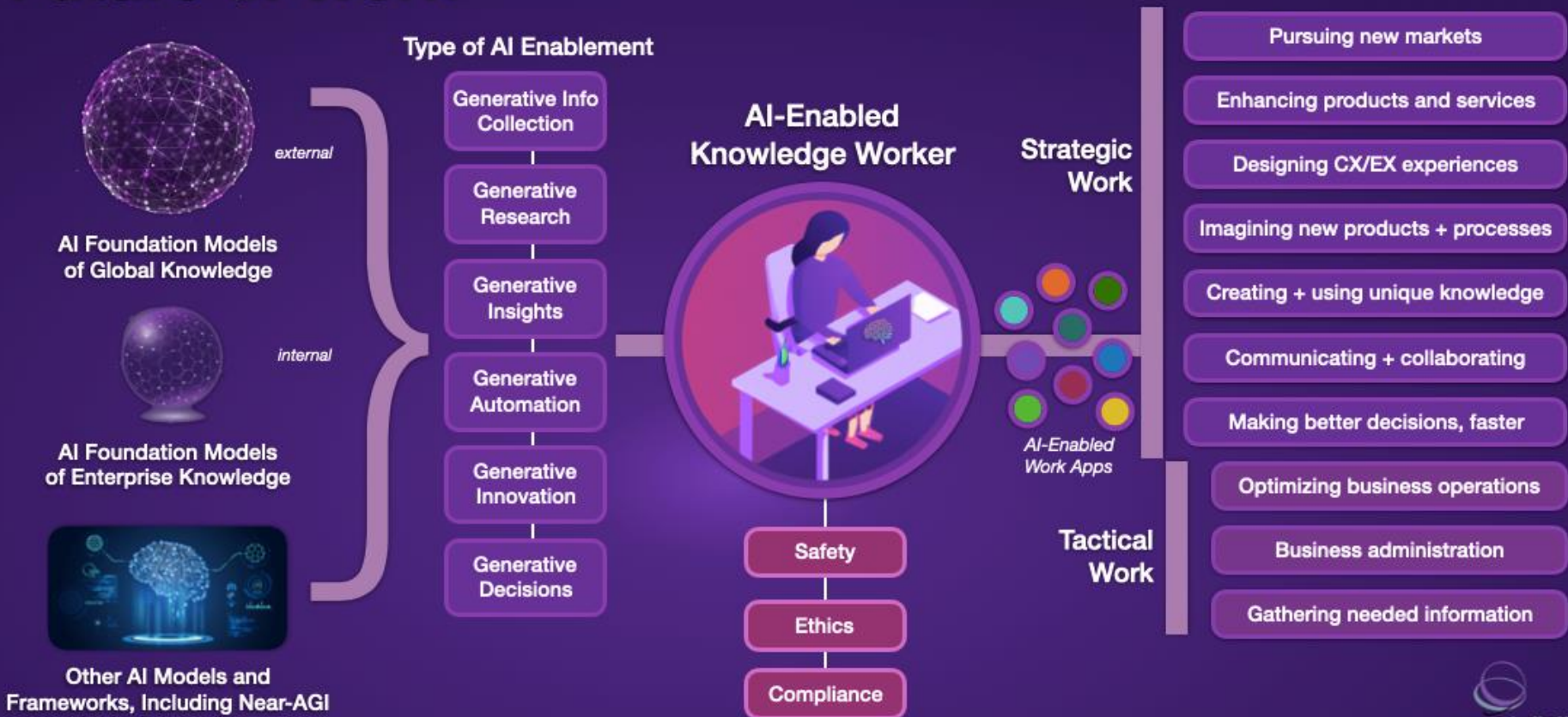## *Conclusion:*

The right AI path depends on your business needs, budget, and technical capacity. Engage your team and embrace flexibility for optimal results.

Learn More At:
LearningTree.com/topics/artificial-intelligence/

Generative AI and the Future of Work

How Artificial Intelligence Will Reshape the Workplace and Employee Experience

AI Foundation Models of Global Knowledge

external

internal

AI Foundation Models of Enterprise Knowledge

Other AI Models and Frameworks, Including Near-AGI

Type of AI Enablement

- Generative Info Collection
- Generative Research
- Generative Insights
- Generative Automation
- Generative Innovation
- Generative Decisions

AI-Enabled Knowledge Worker

- Safety
- Ethics
- Compliance

AI-Enabled Work Apps

Strategic Work

- Pursuing new markets
- Enhancing products and services
- Designing CX/EX experiences
- Imagining new products + processes
- Creating + using unique knowledge
- Communicating + collaborating
- Making better decisions, faster

Tactical Work

- Optimizing business operations
- Business administration
- Gathering needed information

constellation RESEARCH

by Dion Hinchcliffe

v1.0

AI Innovation, Competence and Research Ecosystem

Utveckling och användning av AI	Myndigheter, regioner, kommuner || Näringslivet

Stödja Innovation och tillämpning

AI SWEDEN   RI.SE   VINNOVA Sweden's Innovation Agency   Avancerad Digitalisering

Utbildning och kompetensutveckling

AI Competence of Sweden   WASP ED   elementsofai.se

Forskning

WASP — WALLENBERG AI, AUTONOMOUS SYSTEMS AND SOFTWARE PROGRAM   WASP–HS

CHALMERS UNIVERSITY OF TECHNOLOGY   KTH VETENSKAP OCH KONST   LI.U LINKÖPINGS UNIVERSITET   LUNDS UNIVERSITET   UMEÅ UNIVERSITET   UPPSALA UNIVERSITET   ÖREBRO UNIVERSITY   Övriga högskolor & universitet

WASP ED
WALLENBERG AI AND TRANSFORMATIVE TECHNOLOGIES
EDUCATION DEVELOPMENT PROGRAM

Manufacturing

Real-time monitoring and decision support

Optimized production process

Flexible and customized production

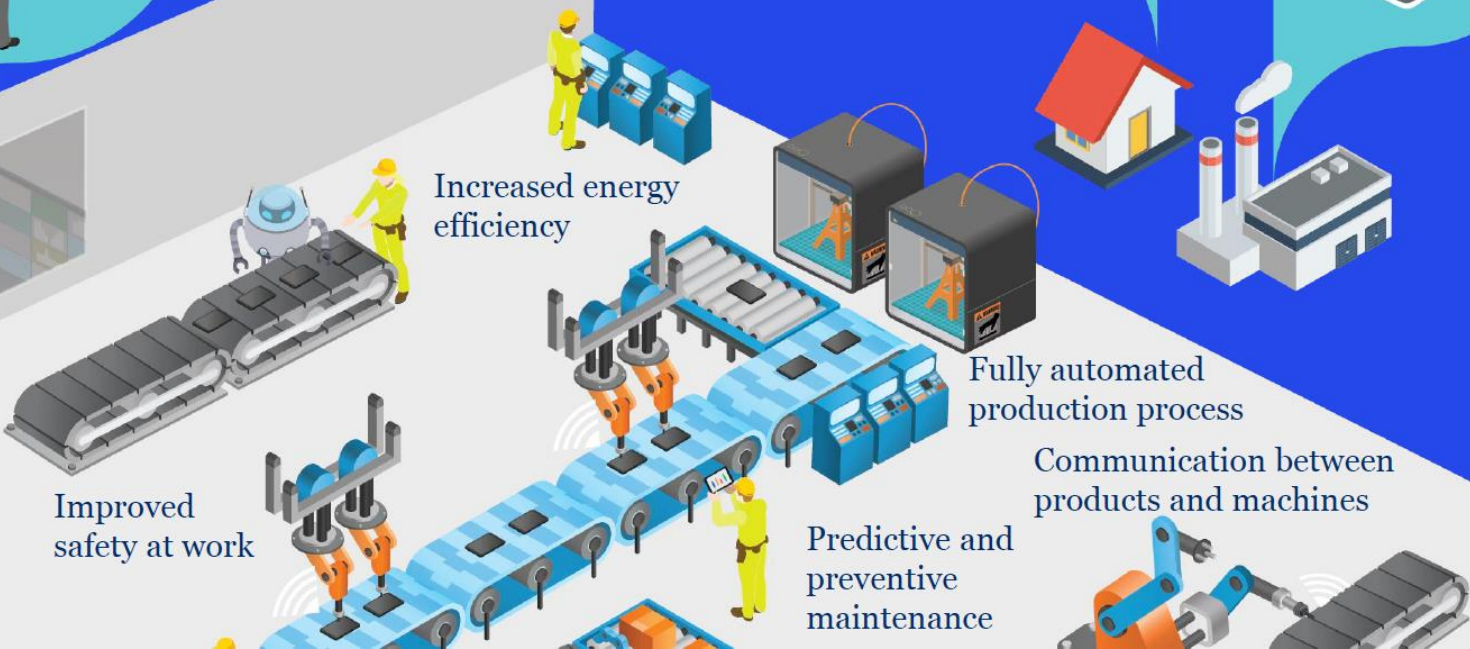Increased factory utilization

Increased energy efficiency

Optimized planning and warehousing

Improved safety at work

Fully automated production process

Communication between products and machines

Predictive and preventive maintenance

Transportation

Emission free and quieter cities

Reduced transportation costs with autonomous vehicles

Reduced queues and freed up public spaces with connected vehicles and smart infrastructure

Traffic accidents reduced by 90% with sensor technology

Quick and cheap home delivery option

Daily time savings of ~1h

"Peer-to-peer" carpooling solutions
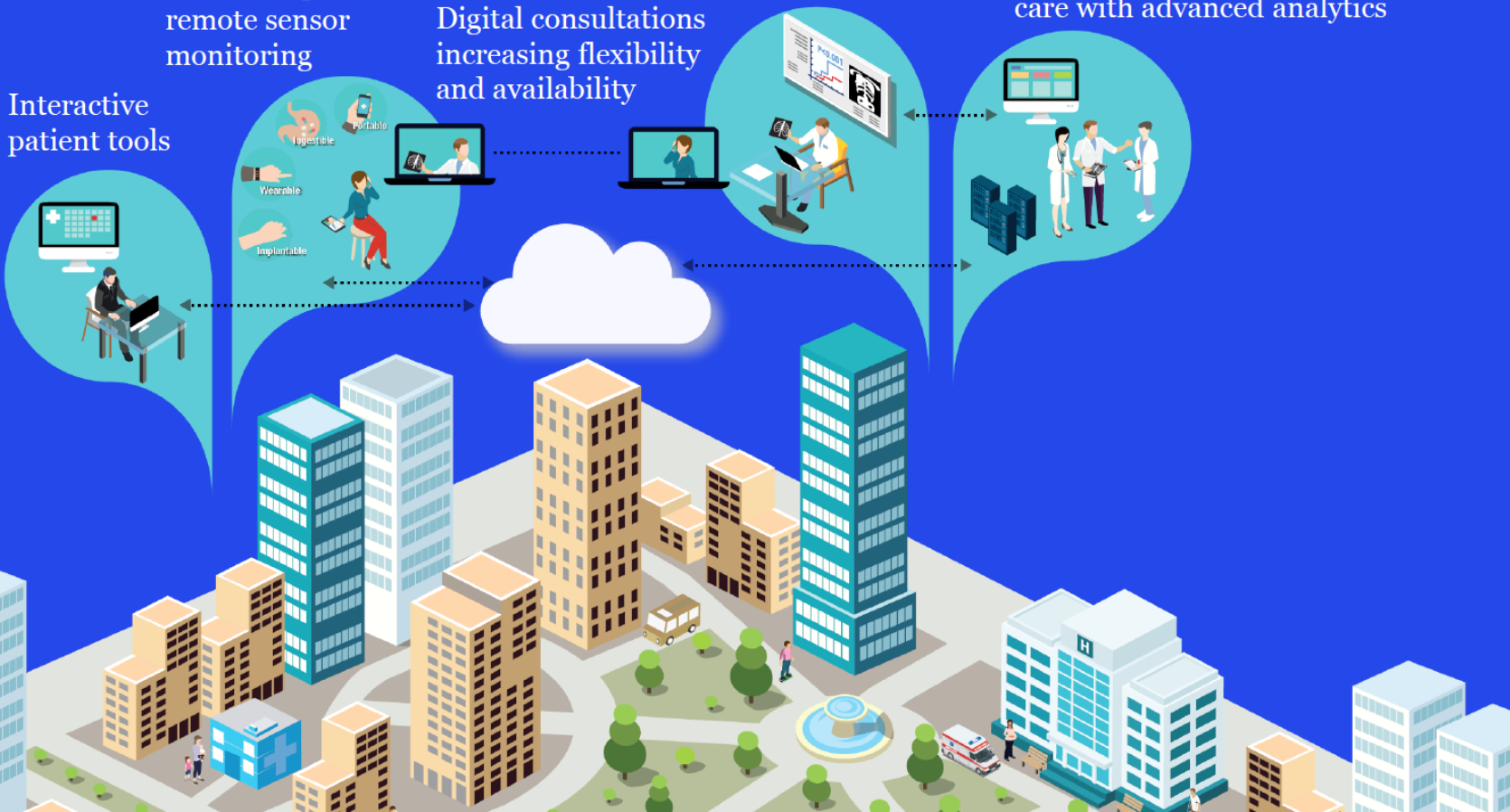
Increased mobility for all citizens

Healthcare

Interactive patient tools

Preventative care through remote sensor monitoring

Digital consultations increasing flexibility and availability

Fully accessible real time patient data

High quality and individualized care with advanced analytics

Public sector

Improved citizen services increasing quality of life

Automation of administrative functions

Reduced unemployment from effective labor market matching

Effective decision support

Seamless digital interaction between agencies

Reducing fraud and preventing criminality with advanced analytics

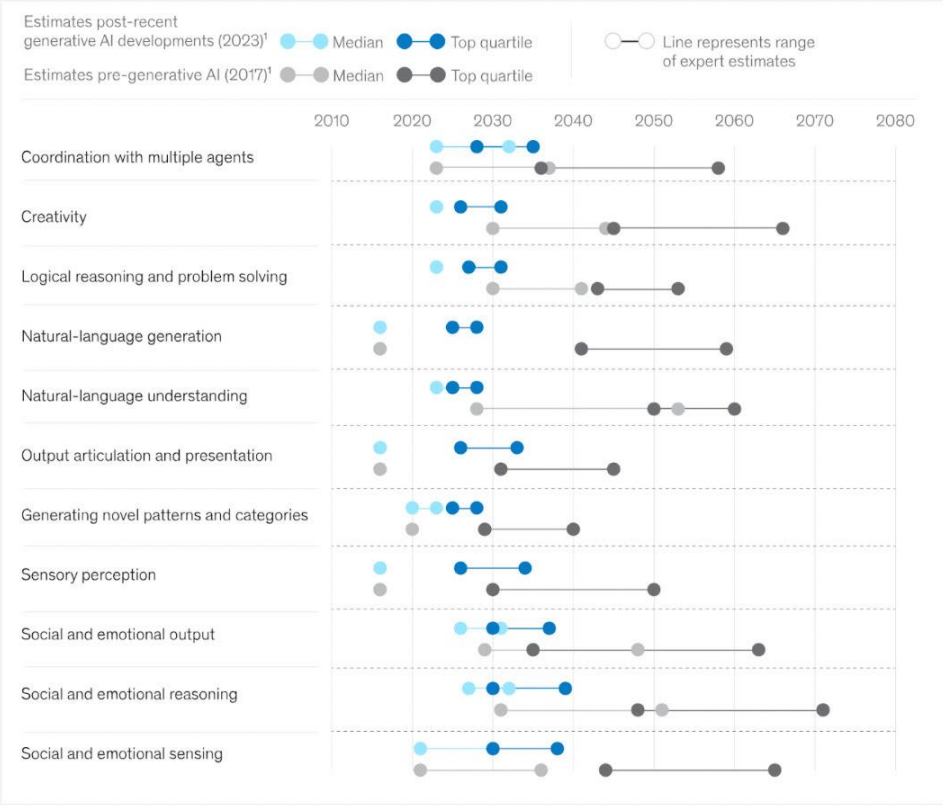Additional digital communication channels

Fully accessible, individualized high quality education

AI is approaching human-capabilities faster than expected

Technical capabilities, level of human performance achievable by technology

Estimates post-recent generative AI developments (2023)[1]: Median, Top quartile — Line represents range of expert estimates

Estimates pre-generative AI (2017)[1]: Median, Top quartile

Capabilities (top to bottom):
- Coordination with multiple agents
- Creativity
- Logical reasoning and problem solving
- Natural-language generation
- Natural-language understanding
- Output articulation and presentation
- Generating novel patterns and categories
- Sensory perception
- Social and emotional output
- Social and emotional reasoning
- Social and emotional sensing

Jobs of Tomorrow: Large Language Models and Jobs

Jobs emerging from the adoption of large language models

WORLD ECONOMIC FORUM

Large language models (LLMs) will transform collaboration between humans and AI, reshaping job roles. While outcomes remain uncertain, potential new job areas could emerge with LLM adoption.

- AI Model and Prompt Engineers
- Interface and Interaction Designers
- AI Content Creators
- Data Curators and Trainers
- Ethics and Governance Specialists

World Scope 1
Corpora & representations

World Scope 2
The written world

World Scope 3
The world of sights and sounds

World Scope 4
Embodiment & actions
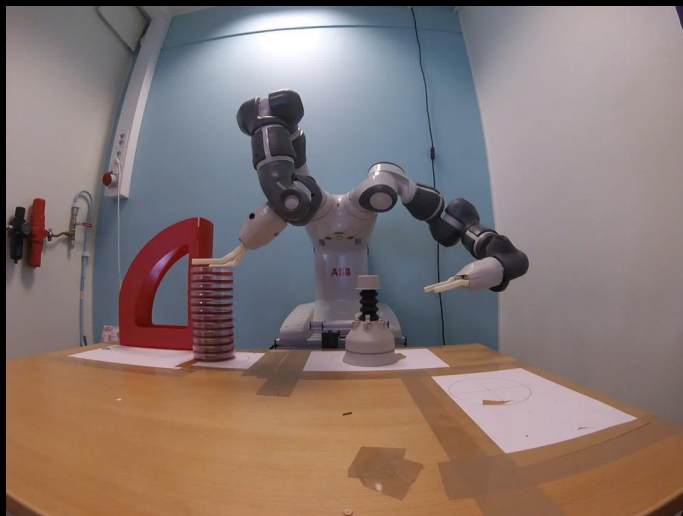
World Scope 5
The social world

Human robot co-manipulation

KTH CVAP

Automating tasks at Karolinska

Relevance for various sectors

1. Fraud/cheating detection: Analyzing large volumes of data, identifying suspicious patterns or transactions.

2. Customer and employee service: Chatbots and virtual assistants powered by NLP to find relevant information, educate and train …

3. Risk management: Analyze operational (financial, supply chain, legislation) data to assess customers and manage risks.

4. Personalization: Personalize experiences for customers by analyzing their habits, preferences, and behavior thus offering tailored products.

5. Compliance and regulatory reporting: improve compliance with regulatory requirements and reporting standards.

6. Resource management: analyze market trends, assess portfolio performance, identify opportunities for growth (market, investment, customer).
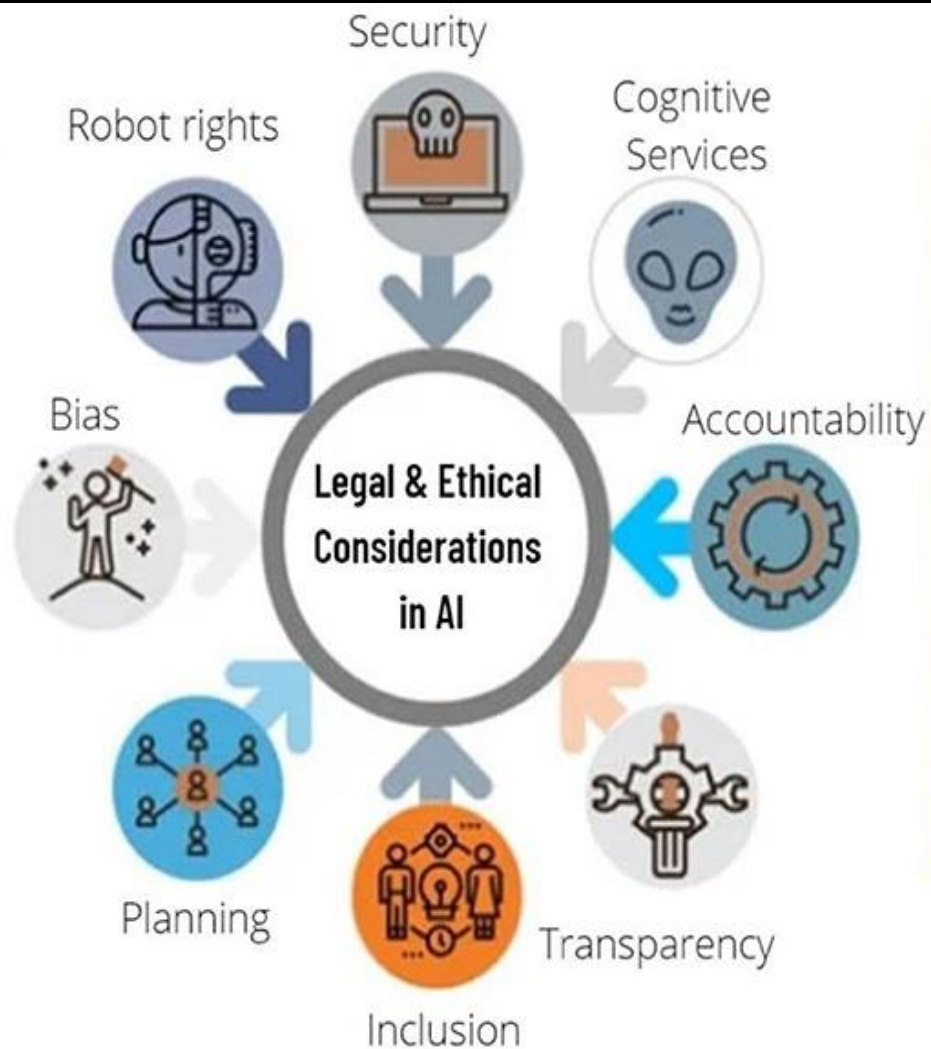
Ethical and moral considerations
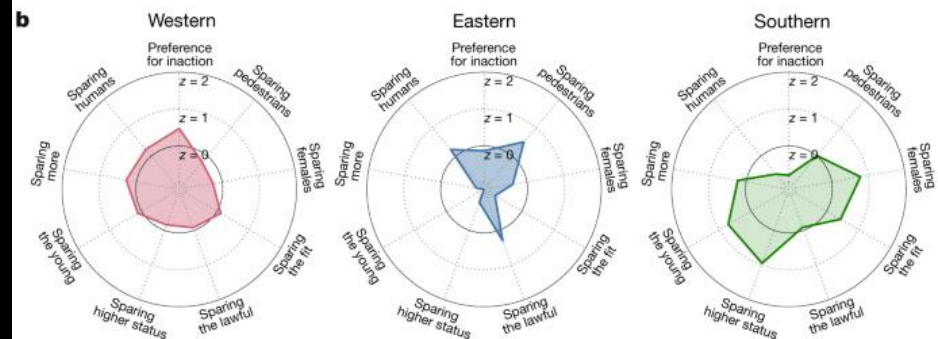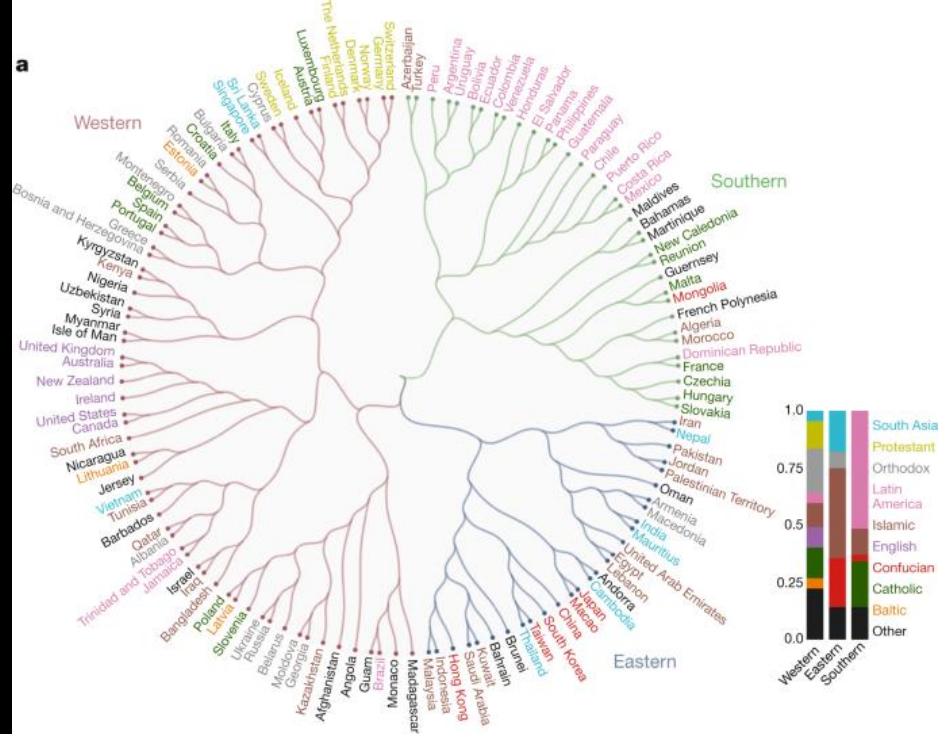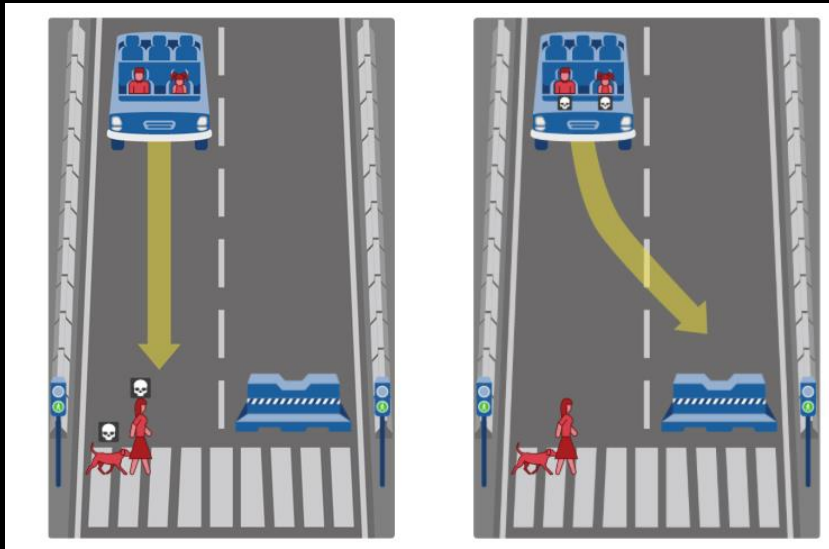
MIT's moral machine

A platform for gathering a human perspective on moral decision made by machine intelligence, such as self-driving cars.

Ethical aspects of AI

1. Privacy: AI systems should be designed to protect user data and ensure that user privacy is respected.

2. Transparency: AI systems should be designed to be transparent and explainable, so that users can understand how the system works and why it makes certain decisions.

3. Fairness: AI systems should be designed to be fair and unbiased, so that they do not discriminate against certain groups of people.

4. Accountability: AI systems should be designed to be accountable, so that users can hold the system accountable for any mistakes or errors it makes.

5. Security: AI systems should be designed to be secure, so that they are not vulnerable to malicious attacks or misuse.
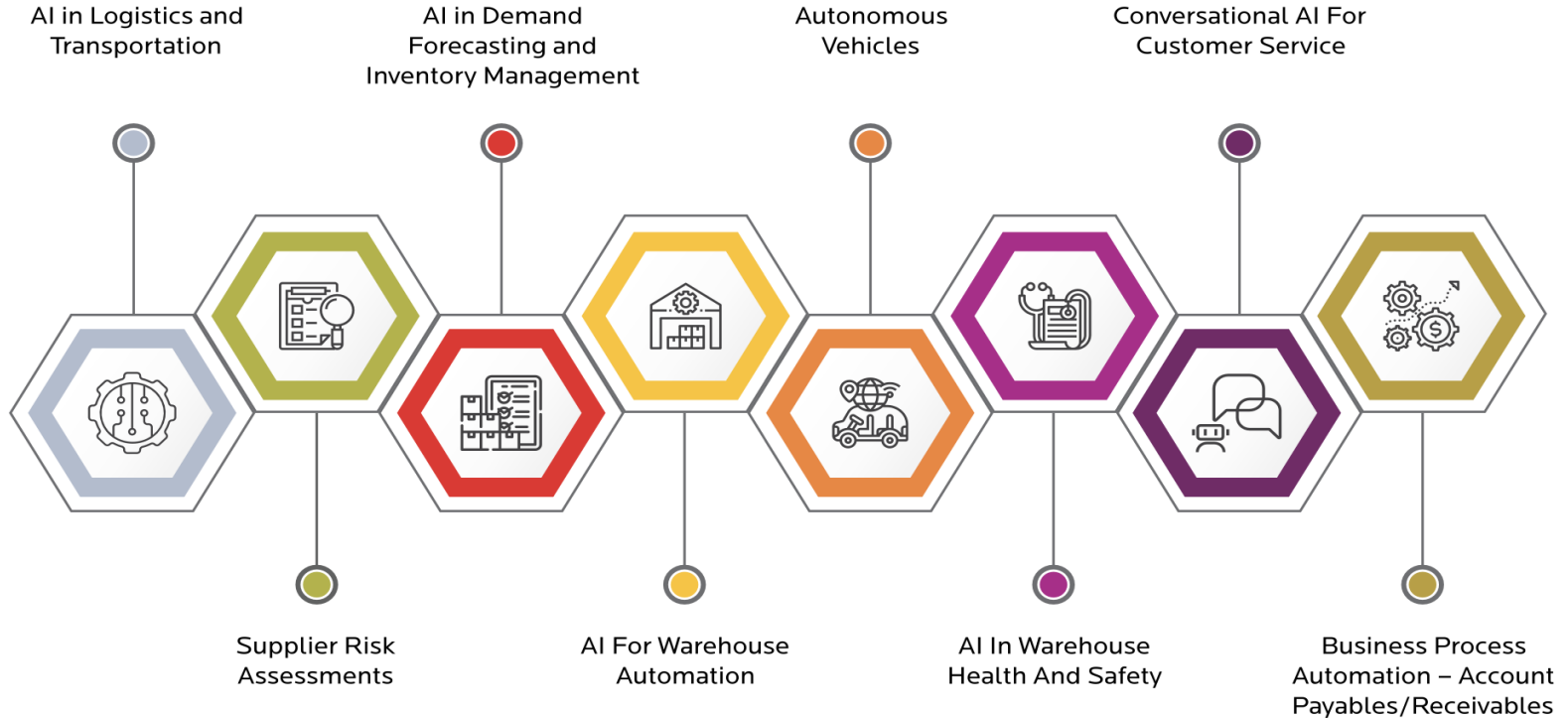
Moral aspects of AI

1. Autonomy: AI systems should be designed to respect the autonomy of users and ensure that users have control over their data and decisions.

2. Responsibility: AI systems should be designed to be responsible and to take into account the potential consequences of their decisions.

3. Dignity: AI systems should be designed to respect the dignity of users and ensure that users are treated with respect.

4. Equality: AI systems should be designed to be equitable and to ensure that all users are treated equally.

5. Justice: AI systems should be designed to ensure that justice is served and that users are not unfairly treated.

THE END

AI and supply chain

AI in Logistics and Transportation

AI in Demand Forecasting and Inventory Management

Autonomous Vehicles

Conversational AI For Customer Service

Supplier Risk Assessments

AI For Warehouse Automation

AI In Warehouse Health And Safety

Business Process Automation – Account Payables/Receivables

New Technology Trends 2023

- Artificial Intelligence
- Metaverse
- Blockchain
- Quantum Computing
- Digital Immune System
- Hyperautomation

FASHION INDUSTRY

- Datafication
- Industry Cloud Platforms
- Wireless Value Realization
- A Digitally Edible World
- The Hyper-Connected, Intelligent World
- Sustainable Tech

New Technology Trends 2023

- Artificial Intelligence
- Metaverse
- Blockchain
- Quantum Computing
- Digital Immune System
- Hyperautomation
- Datafication
- Industry Cloud Platforms
- Wireless Value Realization
- A Digitally Edible World
- The Hyper-Connected, Intelligent World
- Sustainable Tech

SERVICE
TRAVEL
EDUCATION
FINANCIAL