Navigating the AI Frontier: Evolution, Workforce Dynamics and Ethics

About me

- Founder
  Nural Research

- Product Manager
  Enterprise AI manufacturing start-up

Formerly

- Consultant
  McKinsey & Co.

- Choate Memorial Fellow
  Harvard University

- Natural Sciences (Physics)
  University of Cambridge

Today’s aim

1.

What is AI in 2023 and who are the key actors?

2.

How is AI influencing industries and the workforce?

3.

Ethical considerations and emerging regulation

Myth Debunking

Myth	Reality
AI and machine learning are the same	**Machine learning is a subset of AI**
AI will make humans obsolete in the workplace	AI works best when **augmenting human work**
AI will outpace human intelligence	Robust General AI is a distant future
AI makes more fair decisions than humans	**AI exacerbates the bias embedded within datasets:** Garbage in, garbage out
Data scientists and ML engineers are shaping the future of AI	**AI is shaped by all key decision makers.** Effective and ethical implementation requires interdisciplinary thought

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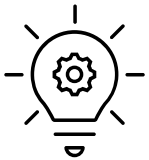
Understanding Generative AI



Traditional AI

vs

Generative AI

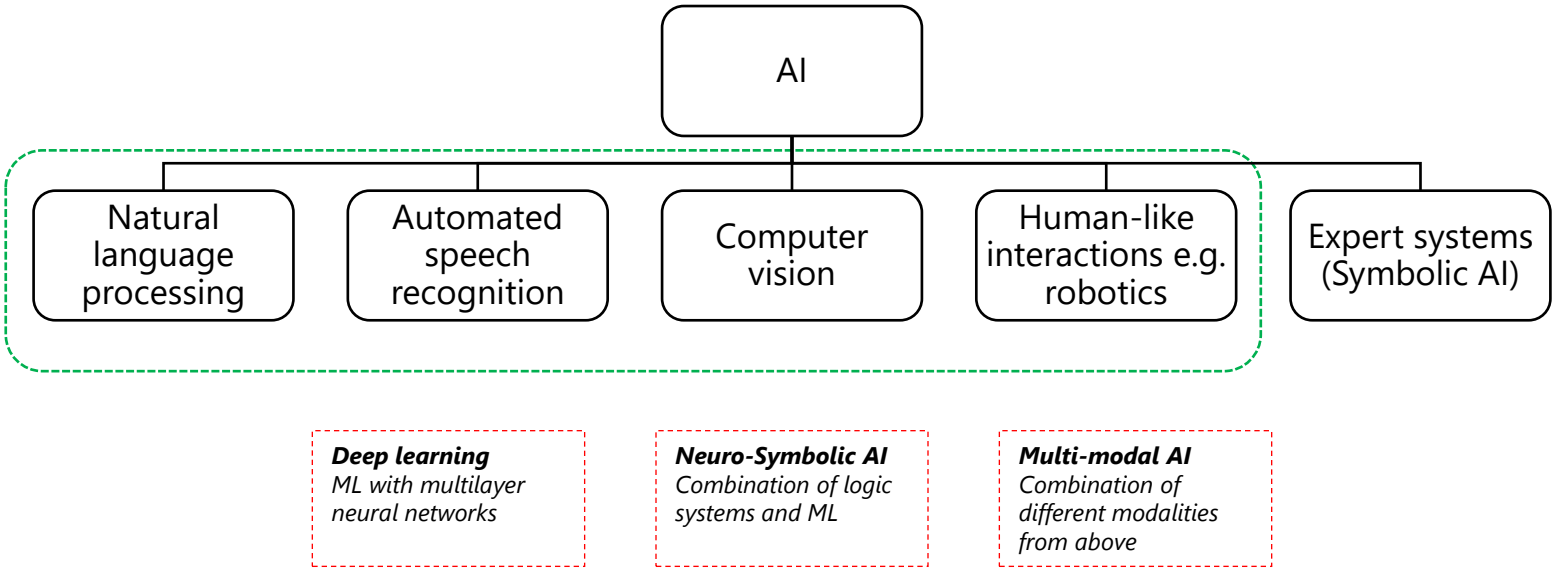
Generative AI has unlocked mass consumer and business adoption

Increased global spending:
Generative AI to Become a $1.3 Trillion Market by 2032

Time to reach 100m users
(Visual Capitalist)

For discussion
How does Generative AI link to the rest of the AI industry?

AI segments: Machine learning is the workhorse behind recent AI advancements



Deeper dive into ML

Unsupervised	• No labelled data • Finds previously unknown patterns in the data
Supervised	• Labelled training data • Tune parameters to training set
Reinforcement	• Learns from trial and error in real time • Leverages Neural Network as policy approximator • Rewards and penalties

Data structures seen in industry

Structured

- Standardized **data schema**
- Easy to **analyze and query**
- **Reduced storage** potential
- Increased **integration potential**
- Can be difficult to amend

SQL

Semi-structured

- **No pre-defined data schema**
- Contains some **structural properties or hierarchy**
- Easier to store than unstructured data

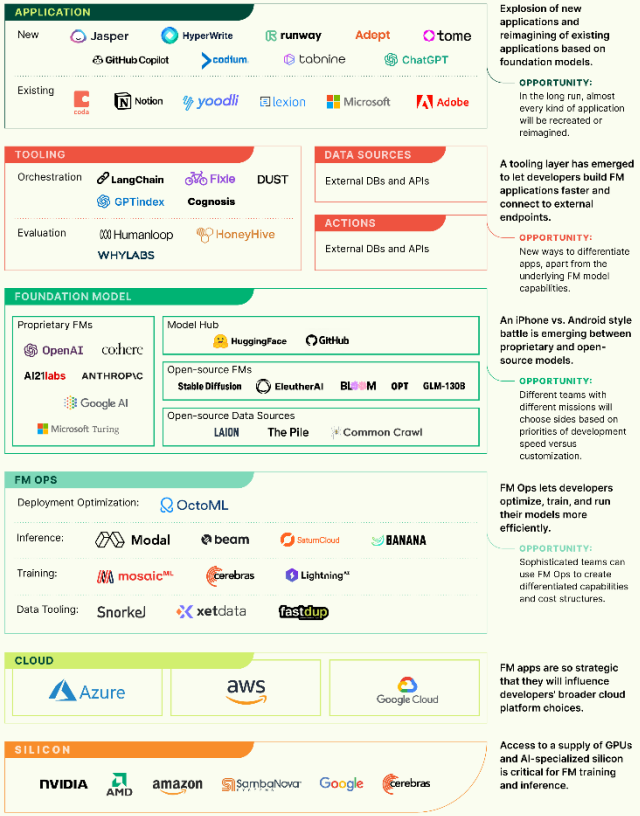
e.g. JSON, CSV

Unstructured

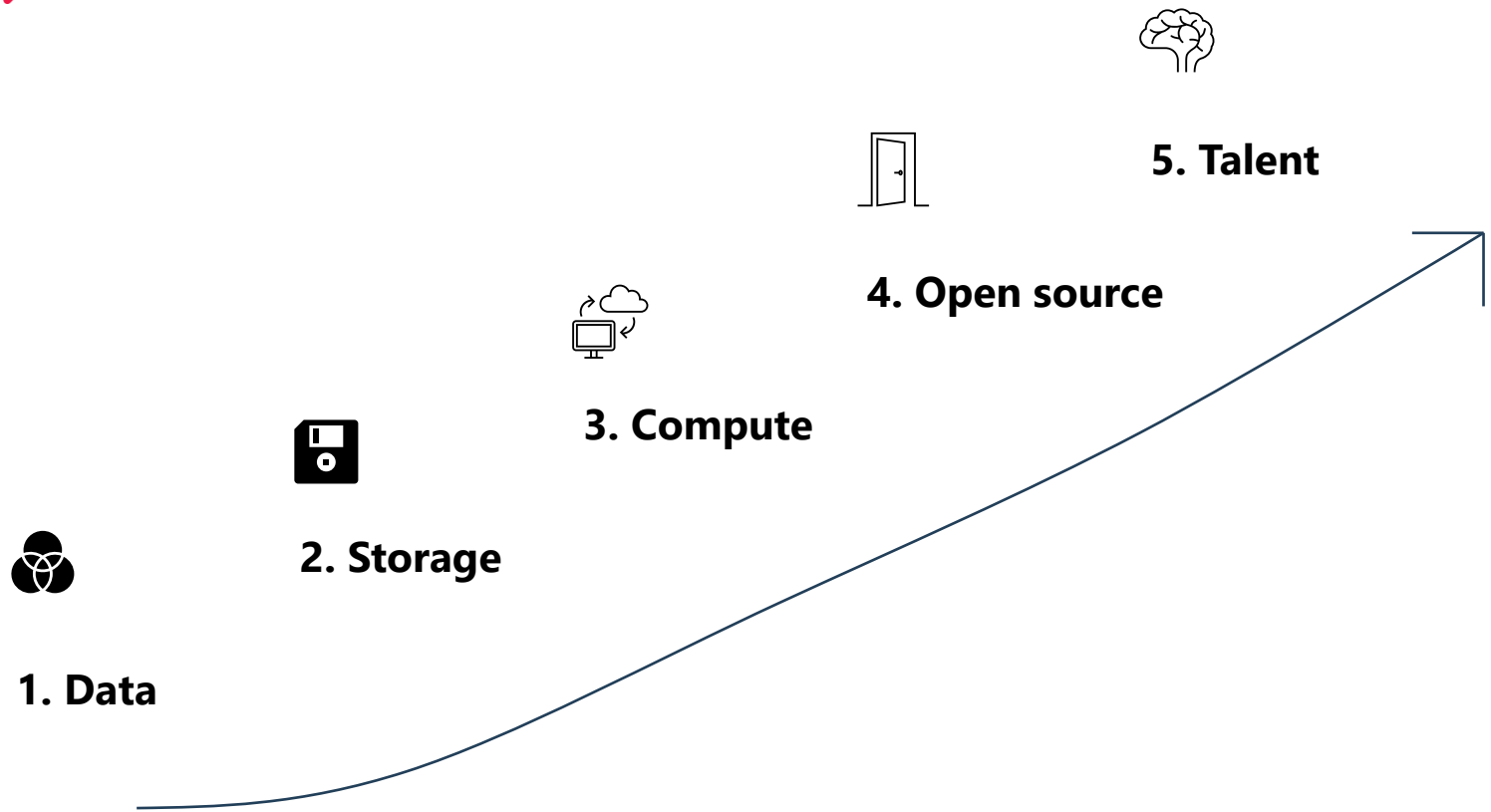
- **No clearly defined framework** (e.g. free text, images)
- Fast to collect, slow to process
- **Flexible schema** leads to faster queries (no joins)

mongoDB. Data lakes

The Foundation Model Stack is Growing More Powerful



5 Enablers to the AI revolution



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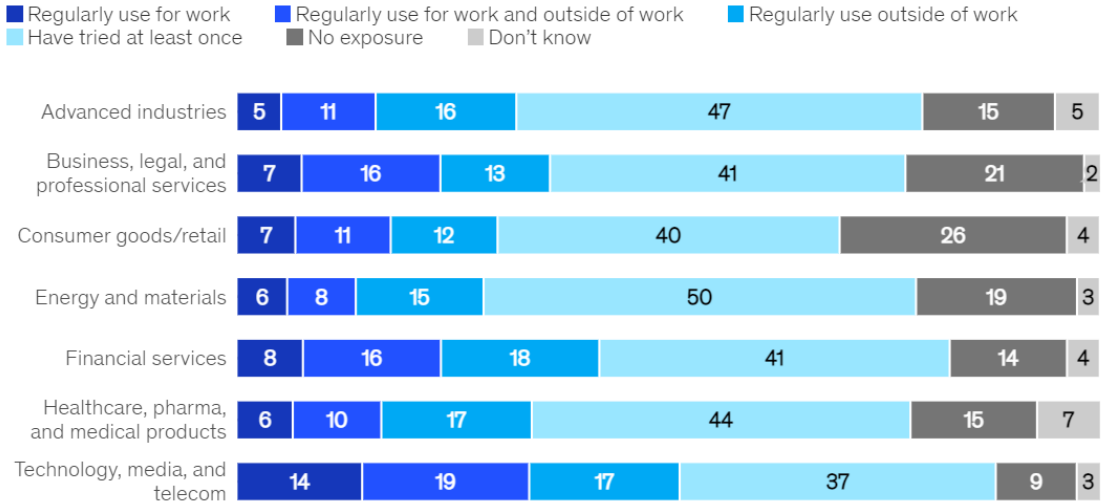
Industry focus: Industries requiring creativity or repetitive tasks are most impacted

Respondents across regions, industries, and seniority levels say they are already using generative AI tools.

Reported exposure to generative AI tools, % of respondents

Select demographic: By industry



"AI has risen from a topic relegated to tech employees to a focus of company leaders" - McKinsey

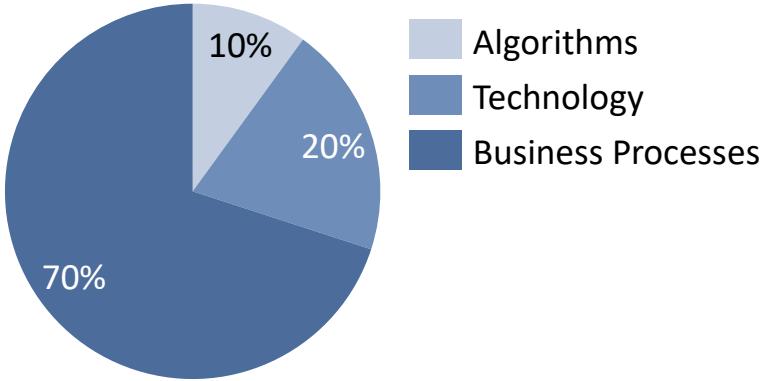
McKinsey

Business Functions: AI adoption is driving increased revenue and reduced costs

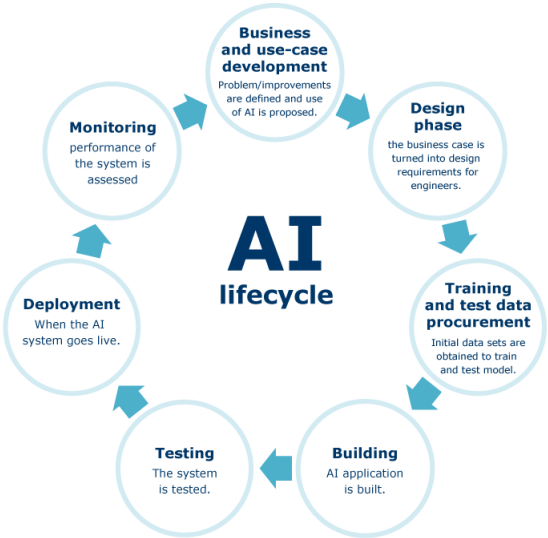
Area	Examples	Revenue impact	Cost impact
Risk	Impact & probability recommendation system, smart devices for safety	●	●
Strategy & Finance	Robotic process automation, auditing with NLP/ computer vision	◔	◑
Manufacturing	Stage by stage analytics for demand prediction, machine vision – quality control	●	●
HR	AI interviews, internal company chatbots	◑	◑
R&D	Trial automation, Novel data insights	◑	◔
Marketing & Sales	Tailored customer experiences	◑	◑

Implementing AI within a business

Typical AI investment allocation



Typical AI workflow



Workforce: AI will have the largest impact on knowledge work

4 workforce impacts of current AI technology

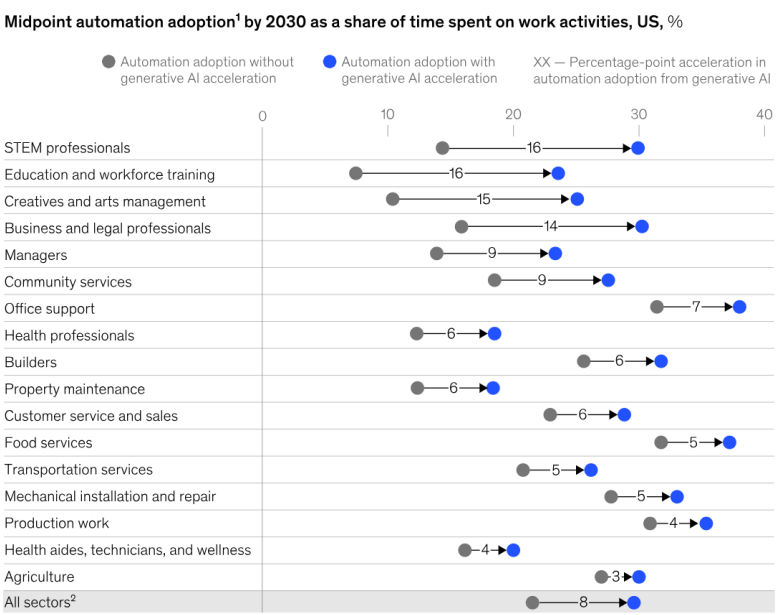
1. 60% of current time could be automated for knowledge workers by 2045
2. Demand for existing AI related roles will increase
3. Roles requiring language understanding, but low expertise at highest risk of displacement
4. Creative roles will be impacted significantly and may face “self-competition”

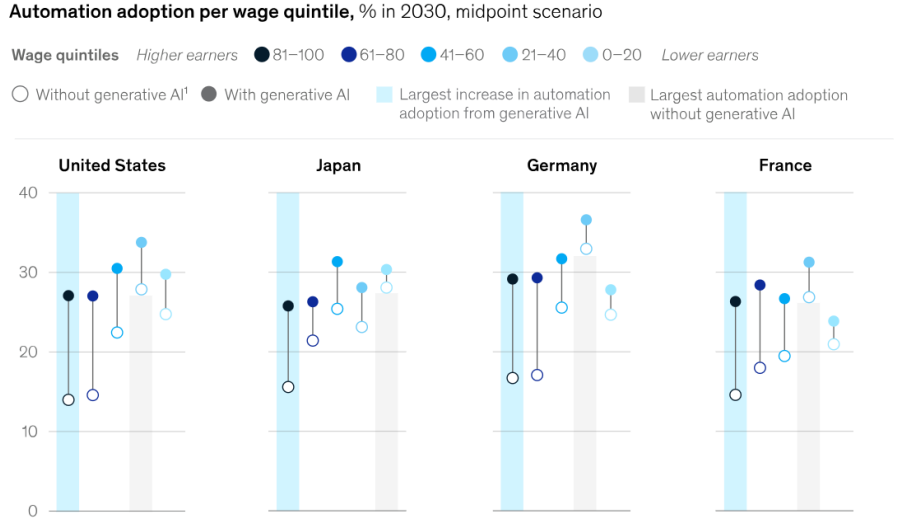
New AI related roles will emerge unlocking new enterprise capabilities

AI engineer

Prompt engineer

Workforce: While generative AI has the largest automation impact in high wage jobs, AI will impact low wage roles most significantly





McKinsey

5 AI and industry predictions: The next three years

1. AI adoption growth rare in industry will spike and plateau
2. Service operations workforce size will have significantly decreased
3. Most enterprises will have AI and prompt engineers
4. Major AI labs will face large lawsuits due to their training data
5. Robust, explainable ML will take prevalence over current generative approaches

Looking ahead: AI industry

	Levers	
Enablers	✓ Big data ✓ Increased processing power – Moore's Law ✓ Abstracted ML platforms	✓ Funding ✓ Demand for personalized experiences ✓ Human-level understanding
Challenges	✓ Regulation formation and navigation ✓ Explainability ✓ Liability	✓ Edge-cases ✓ Data and concept drift ✓ Data ownership
Opportunities	✓ Addressing inequality ✓ Growth of non- English AI	✓ Zero-shot learning

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Artificial intelligence

+ Add to myFT

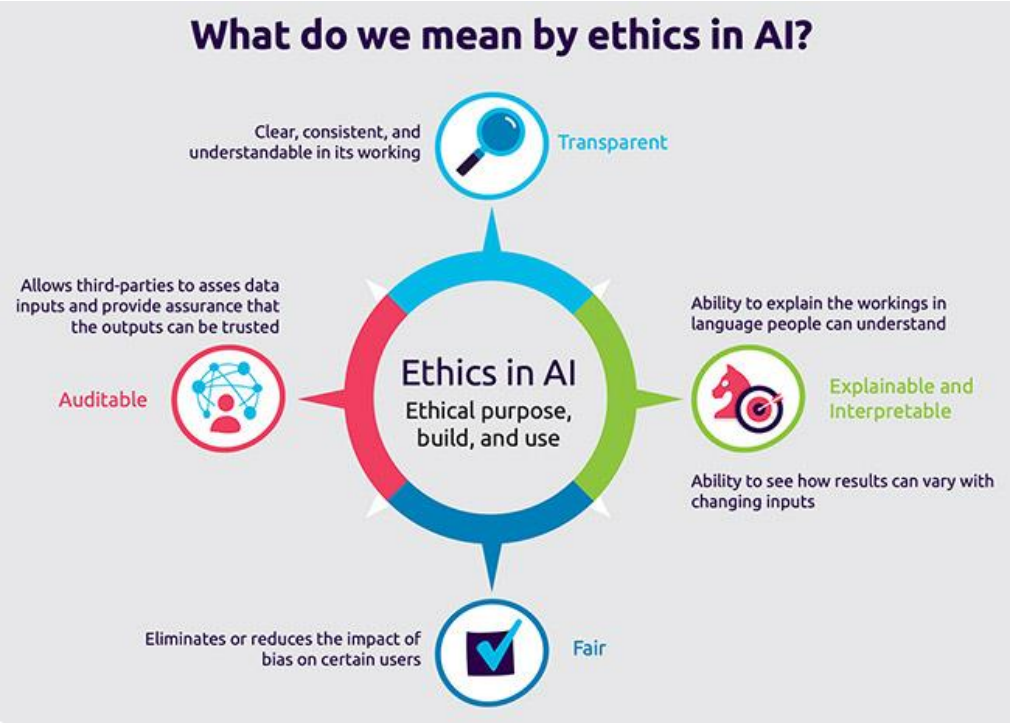
How actors are losing their voices to AI

Performers forced to compete with themselves as companies' use of technology for cloning prompts calls to update copyright law

What is ethical AI

Ethical AI considers:

1. The broader social externalities of AI use
2. Grand challenges to be solved leveraging AI



Framework: Where bias enters

1.

Data sources

2.

Modelling and training

3.

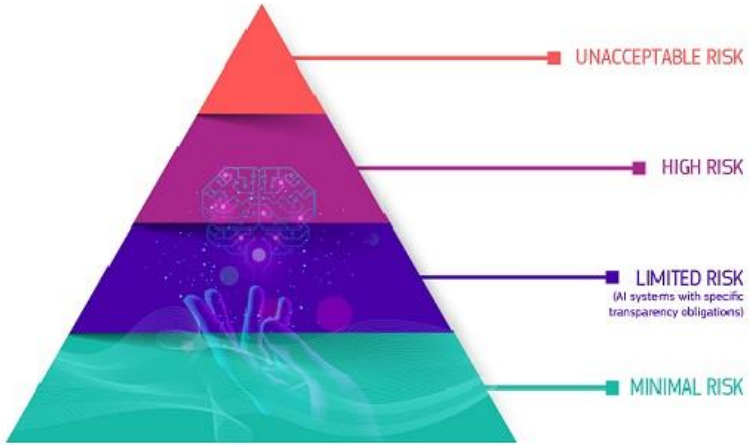
Poor implementation by end user

Risks

Category	Detail	Risk level
Safety & performance	**Poor performance in high-risk industries -** Data drift, hallucination	●
	Social weapons – Misinformation and manipulation and deepfakes	●
	Autonomous weapons	◑
Fairness & privacy	**Bias –** Reinforced by statistical distributions of datasets	●
	Data privacy	●
Externalities	**Job loss**	◑
	Free acting AI	◔

Regulation: Regulators are beginning to close the technology gap

EU AI act: Risk based approach



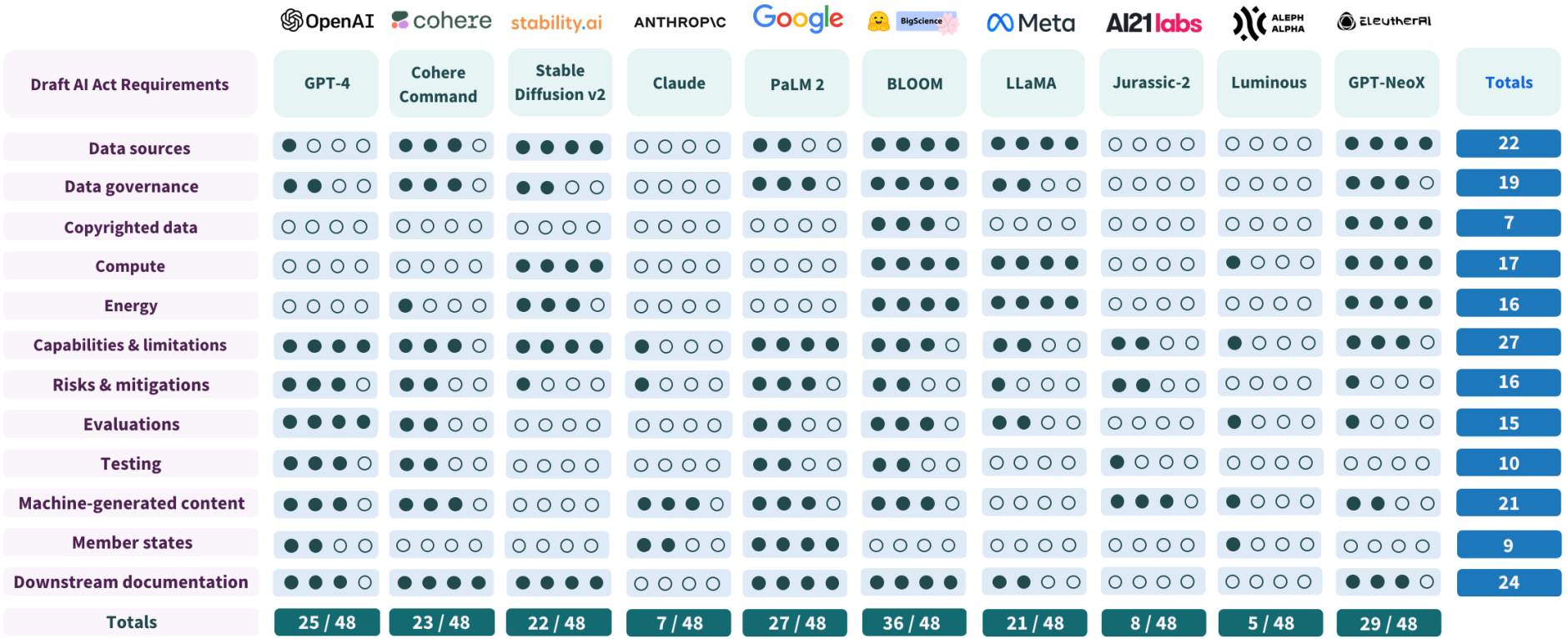
Note: LLMs were not predicted when initial act proposed

China: Interim Measures for the Management of Generative Artificial Intelligence Services

- Balancing innovation with regulation

Grading Foundation Model Providers' Compliance with the Draft EU AI Act

Source: Stanford Research on Foundation Models (CRFM), Institute for Human-Centered Artificial Intelligence (HAI)



AI 4 good

Ethical and legal implementation

Impactful application

About Nural Research

Exploring how AI is being used to tackle global grand challenges

Exist to bridge the gap between those going on to utilise AI and those developing them

AI and data science advisory

Subscription – Weekly newsletter and articles

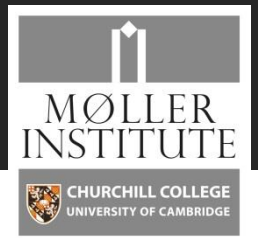
About Me

- Founder Nural Research
- Former Choate Memorial Fellow at Harvard focusing on Data Science
- Passionate about democratising knowledge and building without limits

Connect

Website: www.nural.cc

LinkedIn: Marcel Hedman



Thank you for listening

Marcel Hedman
Nural Research

Møller Institute Limited
Churchill College, Storey's Way, Cambridge CB3 0DE

The Generative AI Application Landscape

	TEXT	CODE	IMAGE	SPEECH	VIDEO	3D	OTHER
APPLICATION LAYER	Marketing (content) Sales (email) Support (chat / email) General writing Note taking Other	Code generation Code documentation Text to SQL Web app builders	Image generation Consumer / Social Media / Advertising Design	Voice Synthesis	Video editing / generation	3D models / scenes	Gaming RPA Music Audio Biology & chemistry
MODEL LAYER	OpenAI GPT-3 DeepMind Gopher Facebook OPT Hugging Face Bloom Cohere Anthropic AI2 Alibaba, Yandex, etc.	OpenAI GPT-3 Tabnine Stability.ai	OpenAI Dall-E 2 Stable Diffusion Craiyon	OpenAI	Microsoft X-CLIP Meta Make-A-Video	DreamFusion NVIDIA GET3D MDM	TBD

Ignitarium

Context:
Ignitarium is a product engineering design company based in India building products including a real-time noise suppression system

Problem:
Traditional approaches to noise suppression are not fully effective (incl. frequency filters and traditional DSP algorithms)

Solution:
The company implemented a deep learning-based(GRU) small memory noise suppression system
Works on devices with low available RAM

Outcome:
Noise suppression on stationary and non-stationary noise

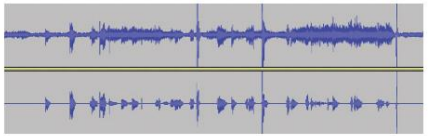
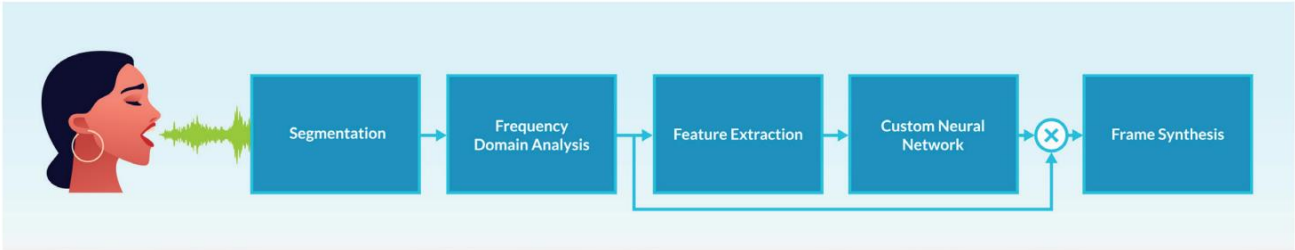


Fig.(a) Before and after noise suppression (time domain view)



Disney

Context:
Disney, founded 1923, has always stored archives of its content for future creators to draw inspiration from. Previously, physical archives and now digital

Problem:
Querying 100 years worth of content is time consuming and difficult without corresponding metadata tags

Solution:
Disney implemented a deep learning tagging system to augment the tagging process (“content genome”)

Trained to distinguish similar features within animations

Taxonomy must be robust

Outcome:
Specific, tailored searches (e.g. explosions)
Reduced manual watch time
Potential to disrupt future of video search