Should artificial intelligence be part of your strategy?

11 am, 19 September, 2019

Sagar Sen
Senior Research Scientist, Simula Research laboratory
SweetZpot, Co-founder

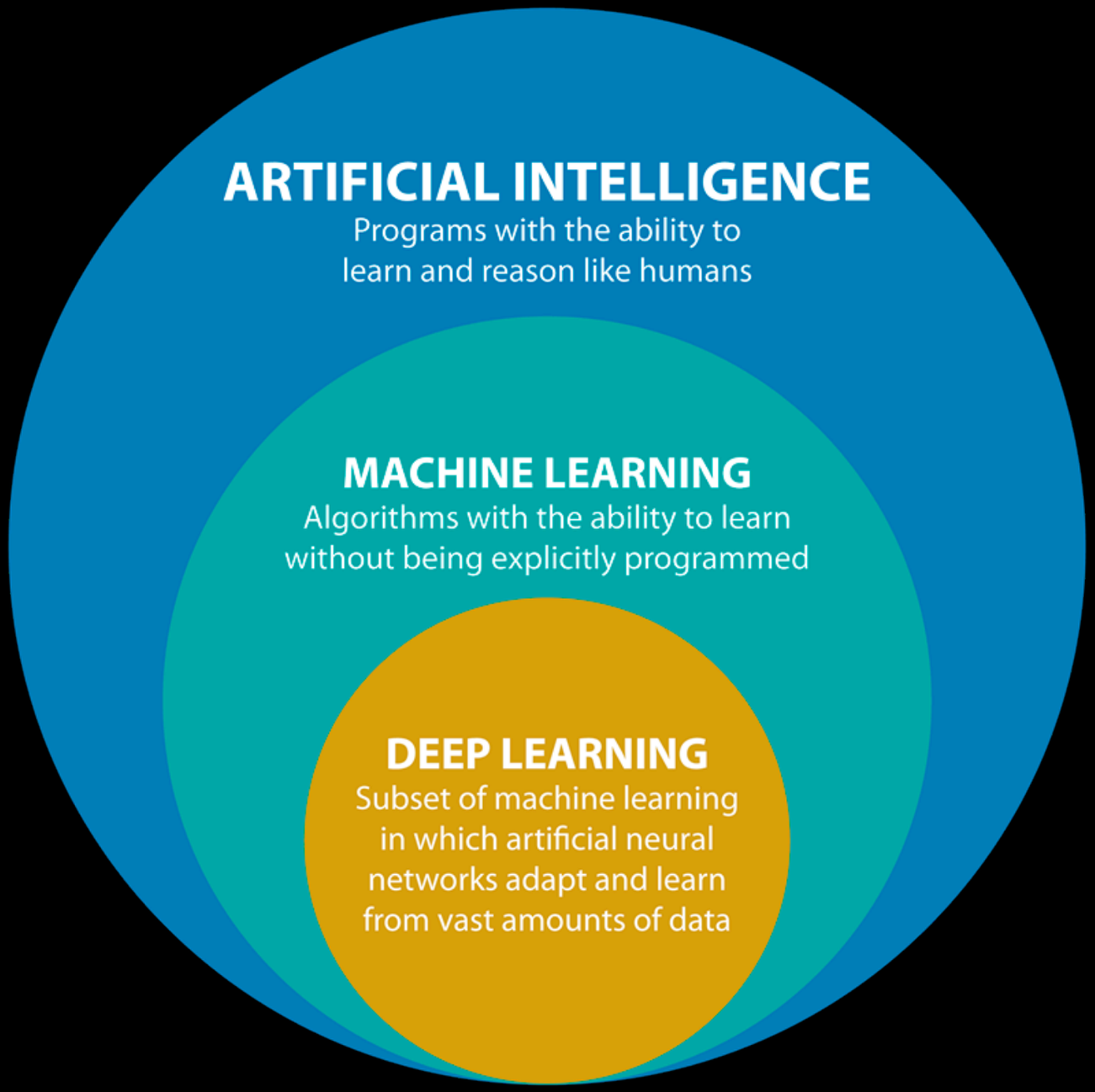
Outline

- **What is AI?**
- From Machine learning to Deep learning
- Use cases
- Reshaping business with AI
- Looking forward

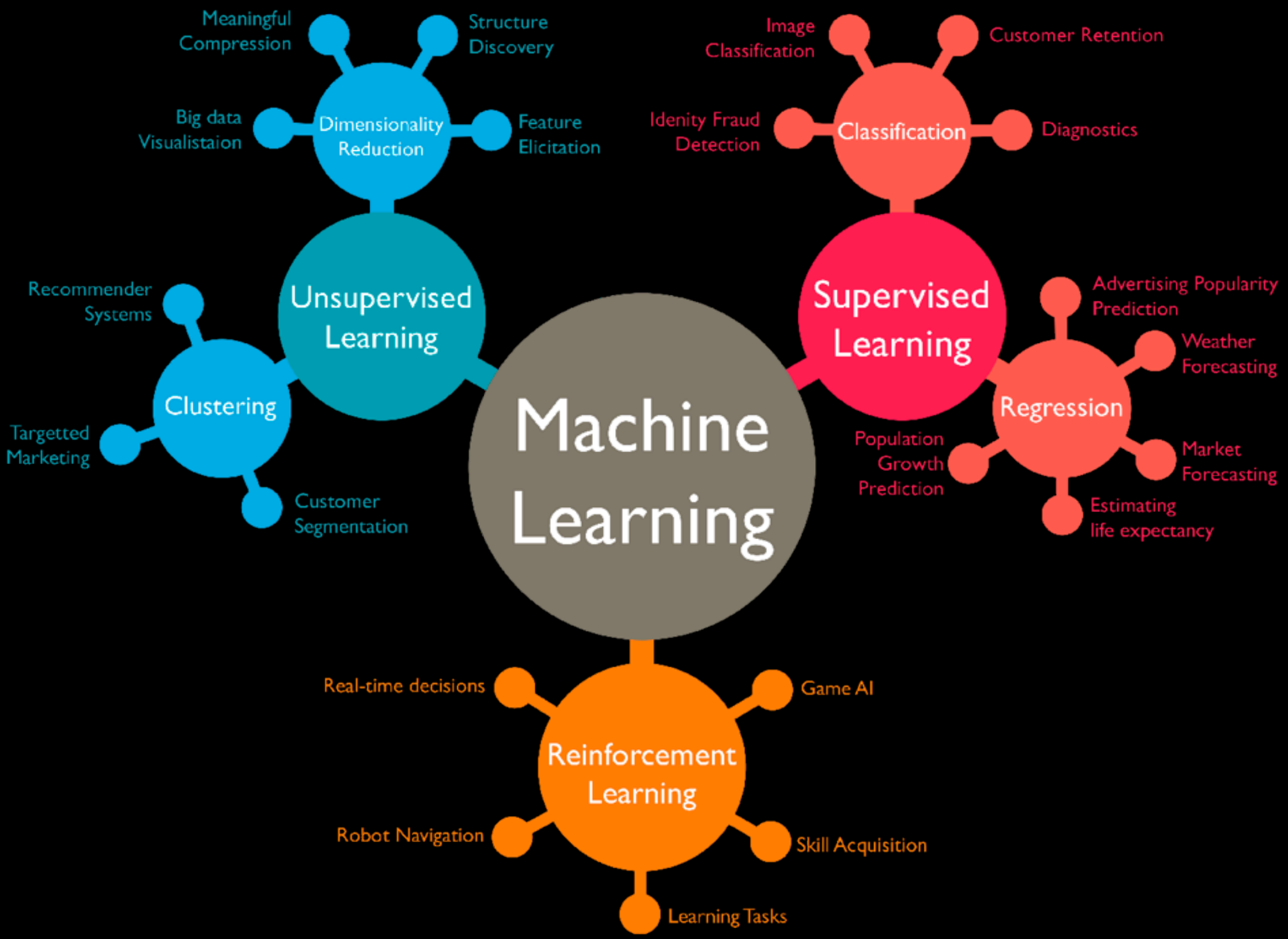
What is Artificial Intelligence (AI)?

*"The theory and **development of computer systems** able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages."*

Types of AI


ARTIFICIAL INTELLIGENCE
Programs with the ability to
learn and reason like humans
MACHINE LEARNING
Algorithms with the ability to learn
without being explicitly programmed
DEEP LEARNING
Subset of machine learning
in which artificial neural
networks adapt and learn
from vast amounts of data

Types of Machine Learning

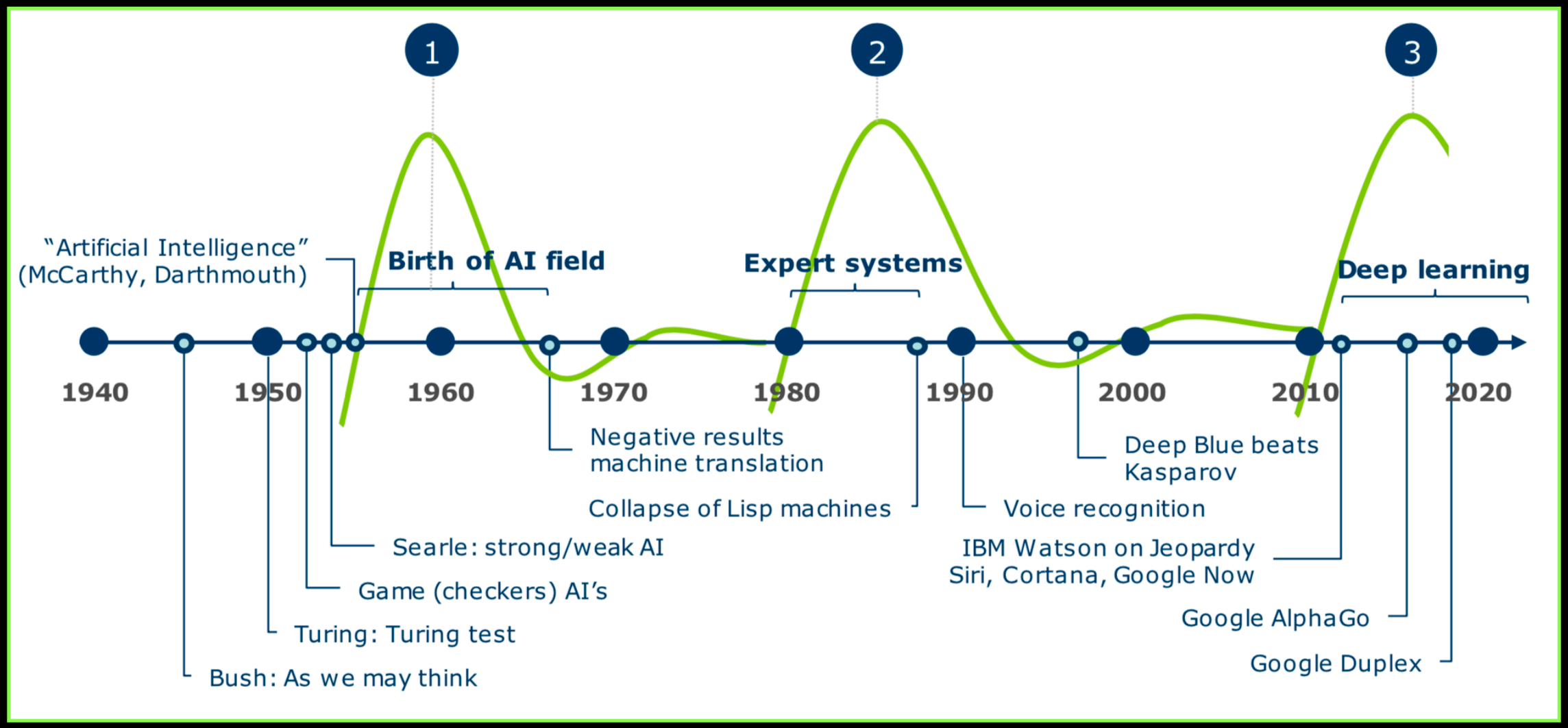


A Brief History of AI

AI from a neurological perspective: ***can we make a mechanical brain?***

AI from a cognitive perspective: ***we can create a machine that can reason?***

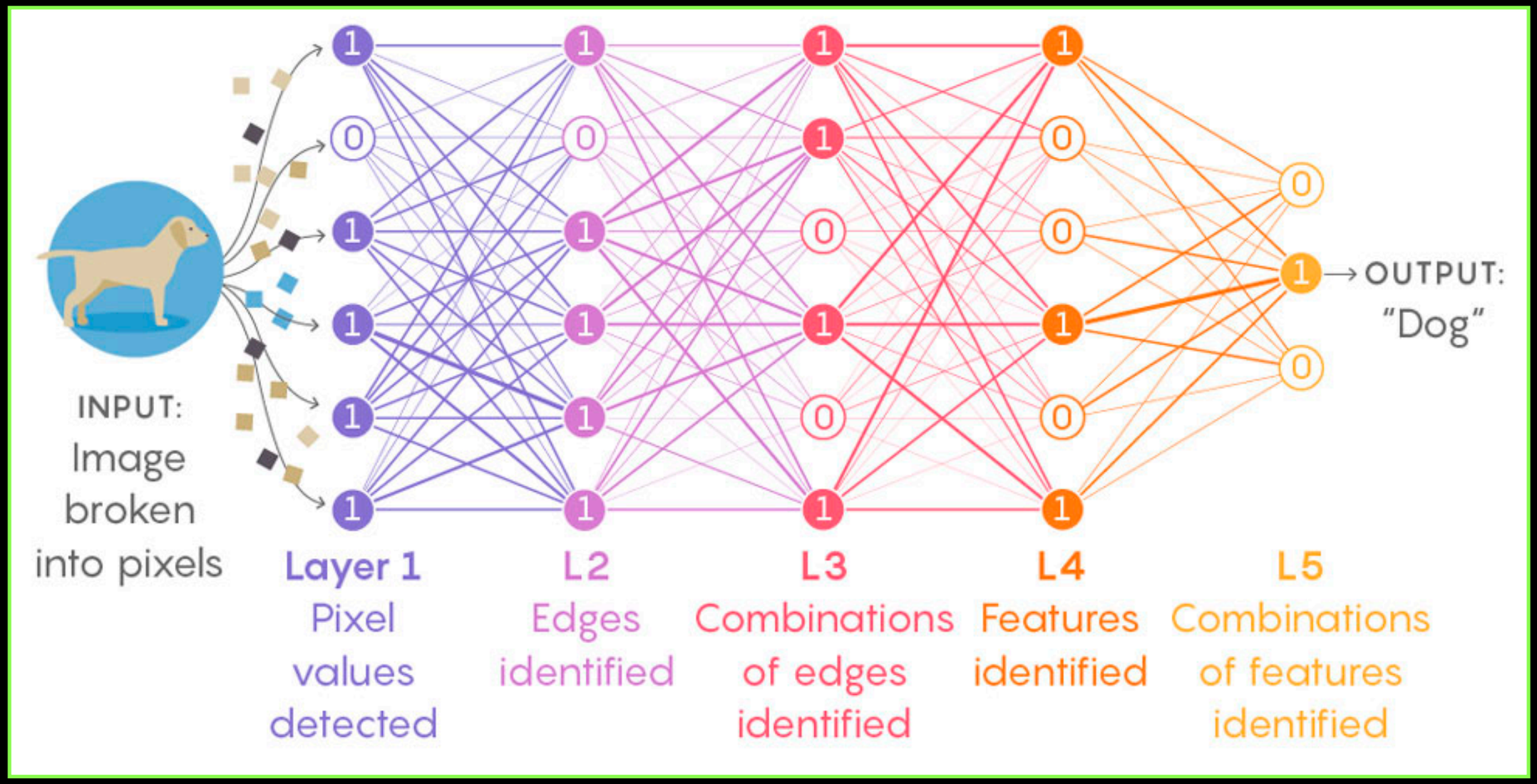
AI from a data perspective: ***we can learn a machine tasks based on large amounts of data?***



Outline

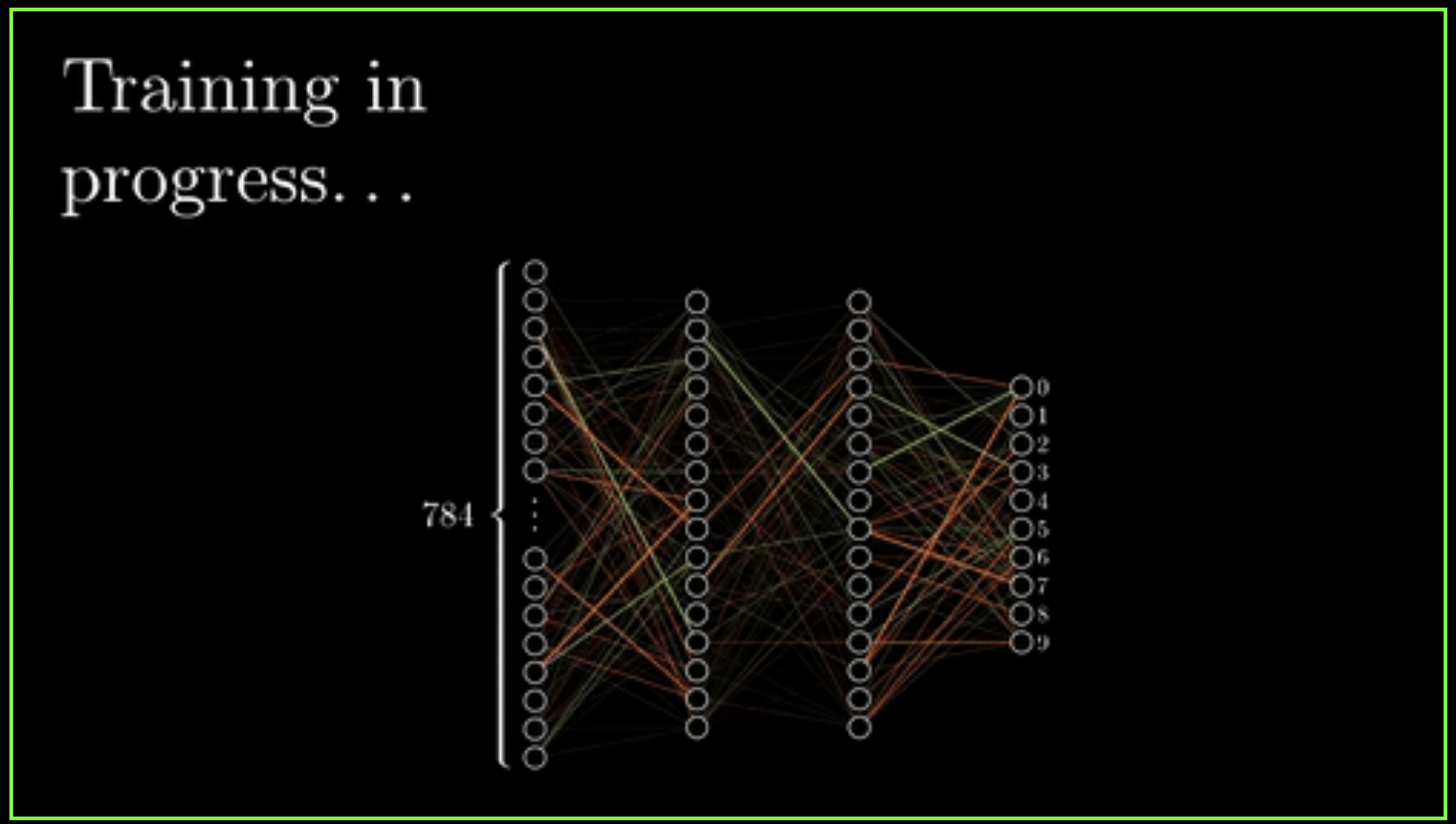
- A Brief History of AI
- **From Machine learning to Deep learning**
- Use cases
- Reshaping business with AI
- Conclusion

A (deep) neural network



Simple to create, hard to train

Training by back-propagation

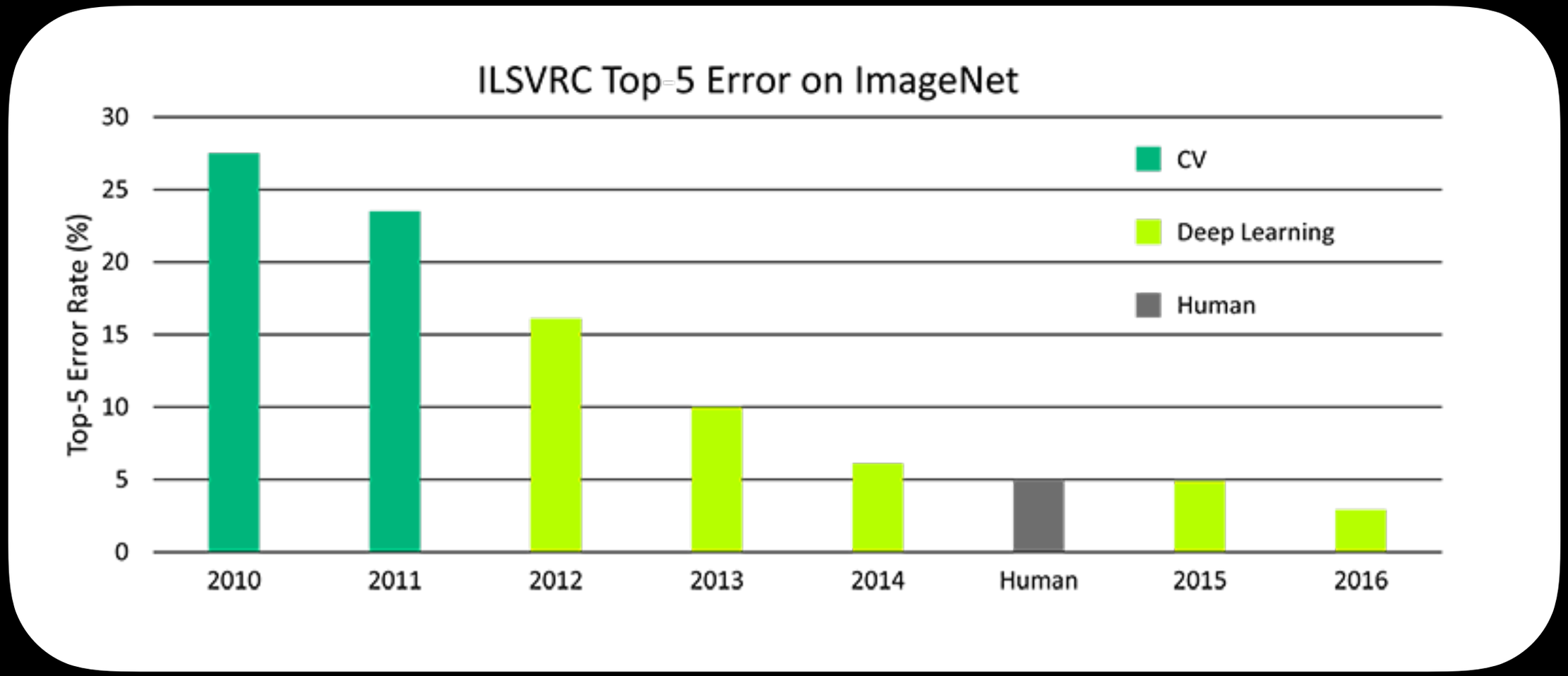


The turning point for deep learning…

ImageNet Challenge 2012

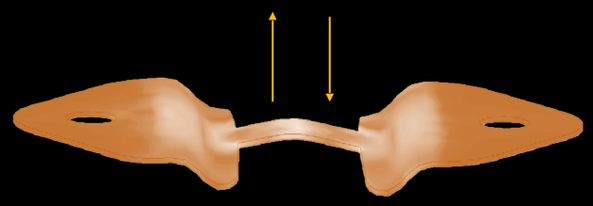
10,000,000 labeled images depicting 10,000+ object categories

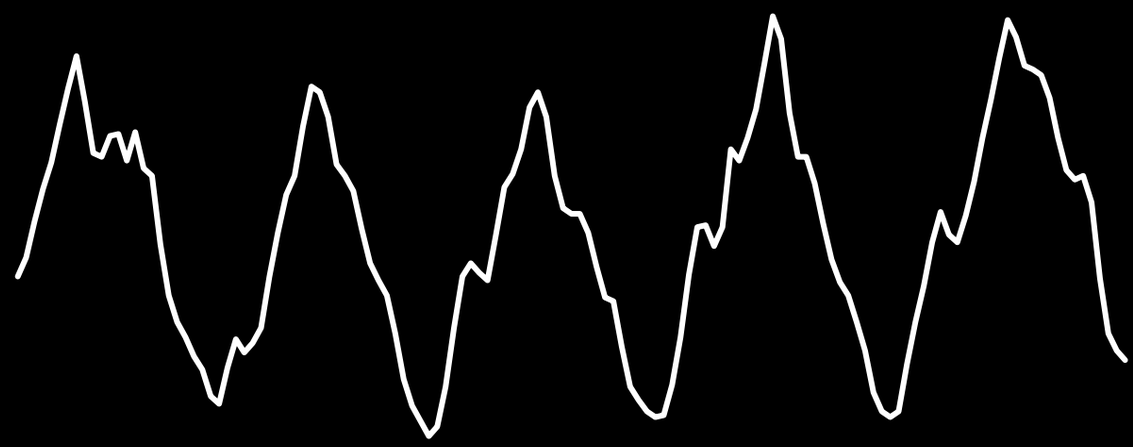
GPUs made it possible to train complex neural networks in reasonable time



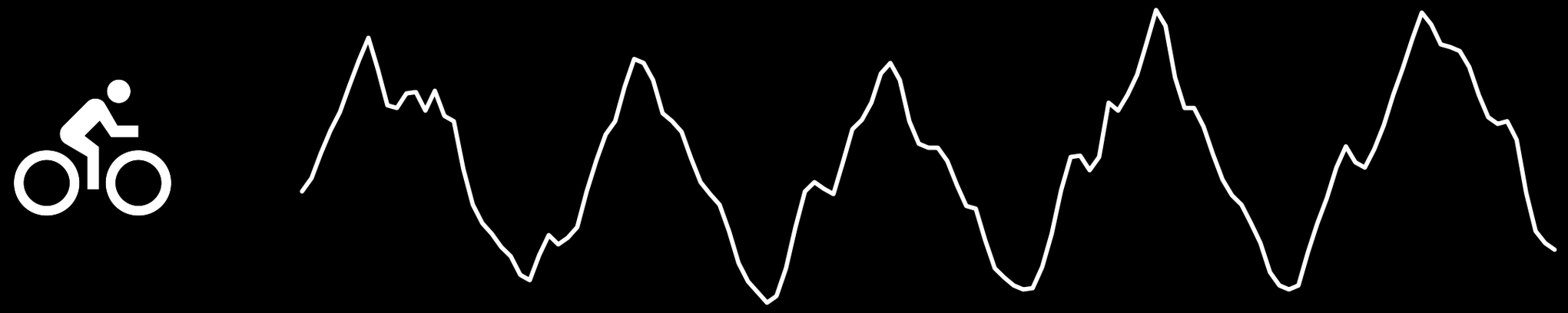
Transition from creating physical models
to
collecting data from the physical world and learning from it

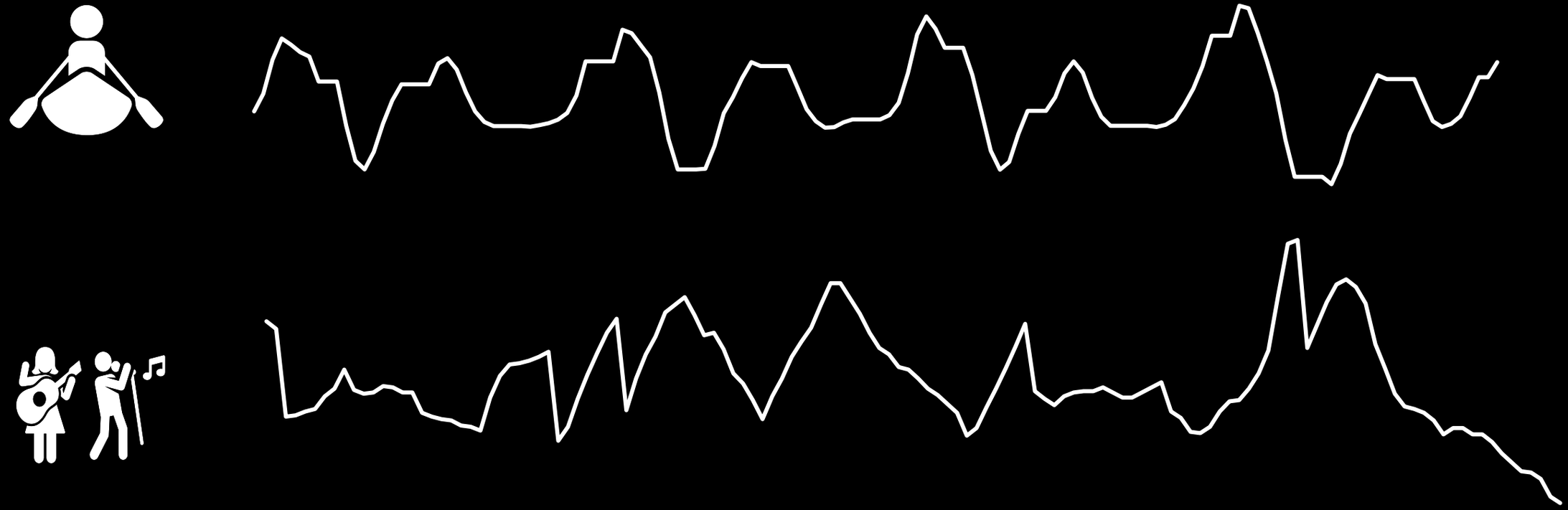
Our experience with sensing breath



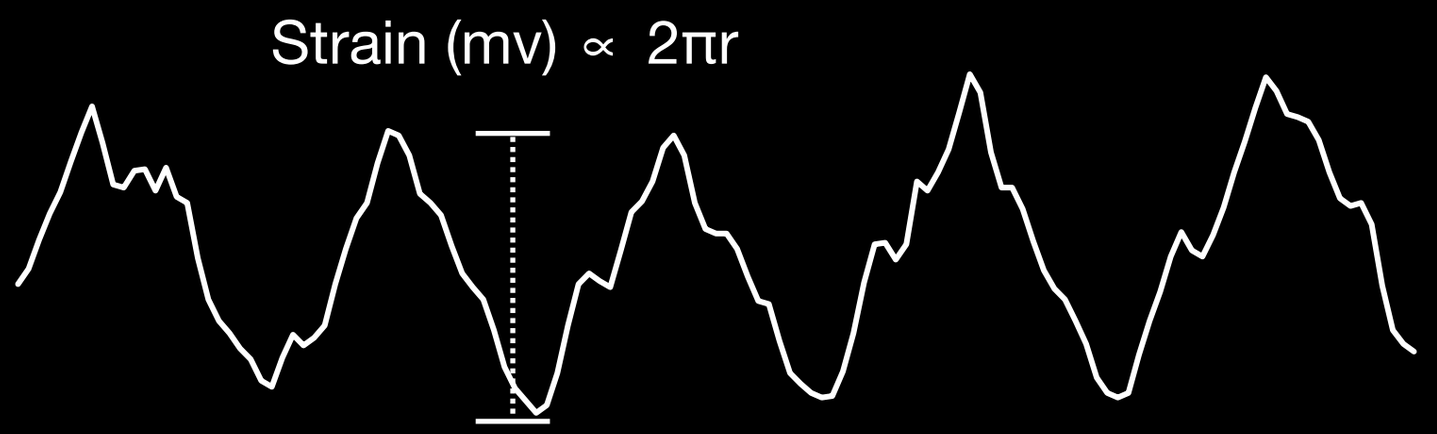


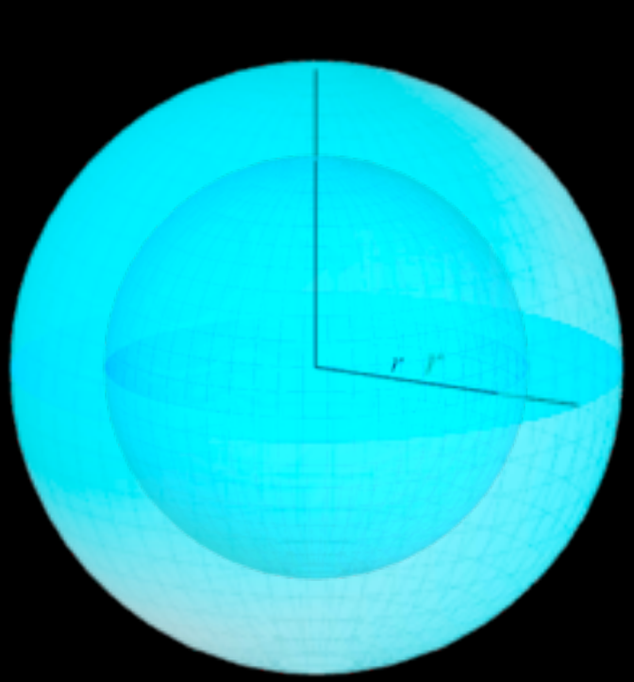
Can we make a physical model that fits all?

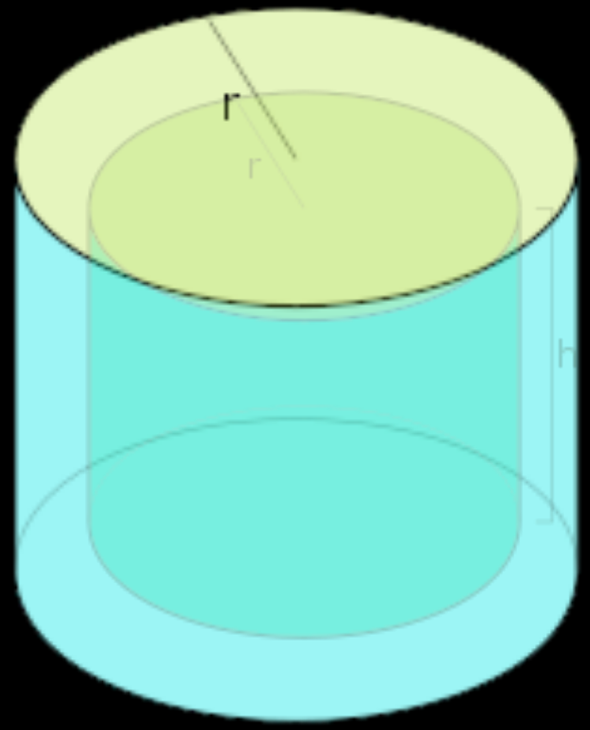




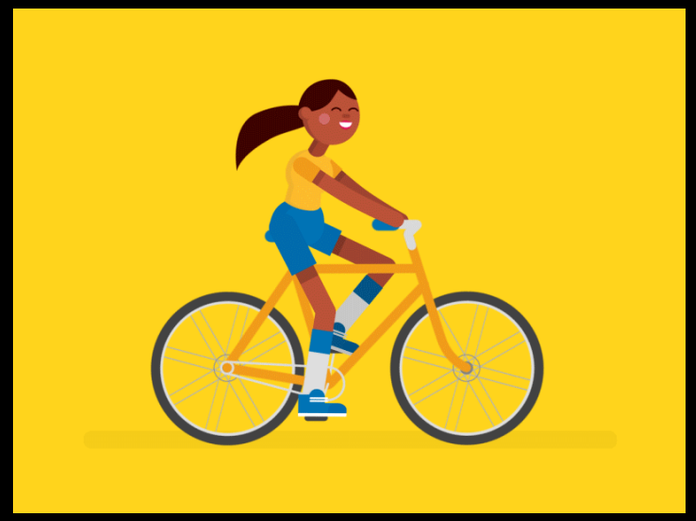
Physical models of breathing (2 years of work!)





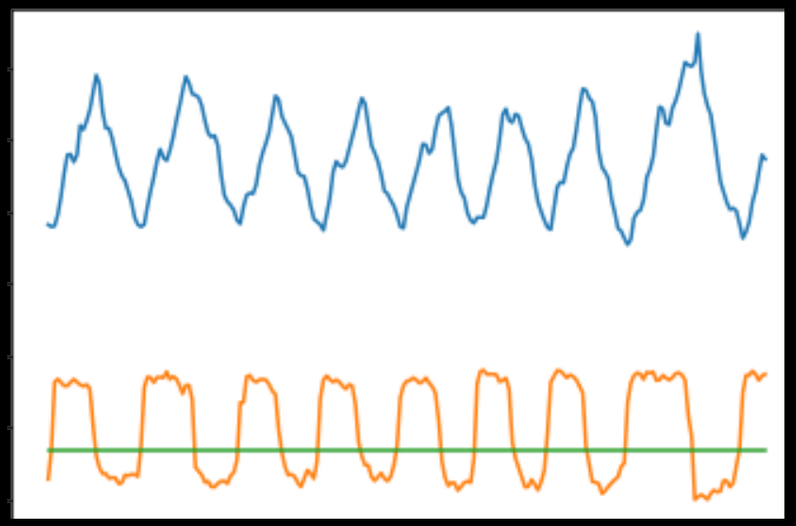


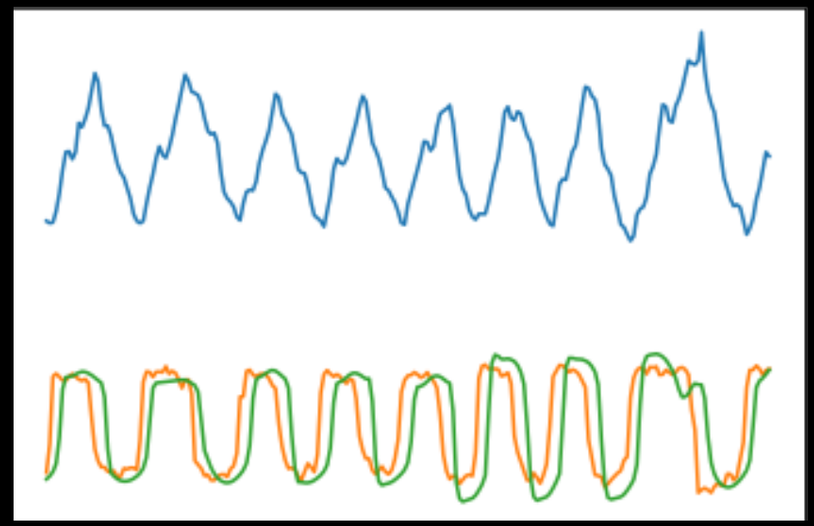
The physical model simply does not work in all situations



Deep learning of breathing patterns to predict respiratory flow

input
output
estimated





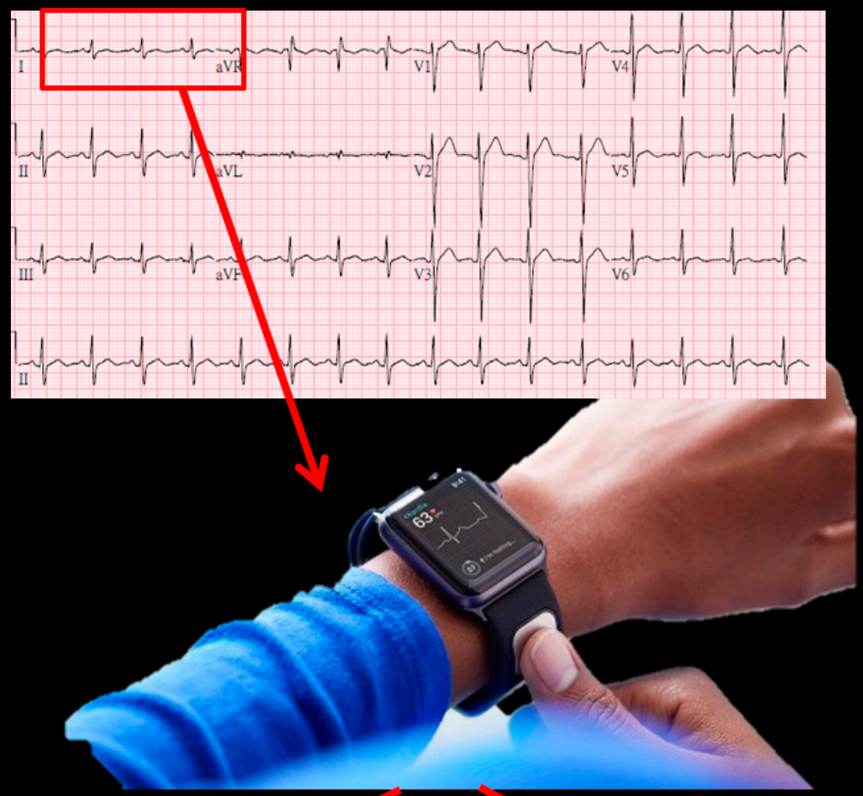
One afternoon’s work gave promising mapping

Outline

- A Brief History of AI
- From Machine learning to Deep learning
- **Use cases**
- Risks
- Conclusion

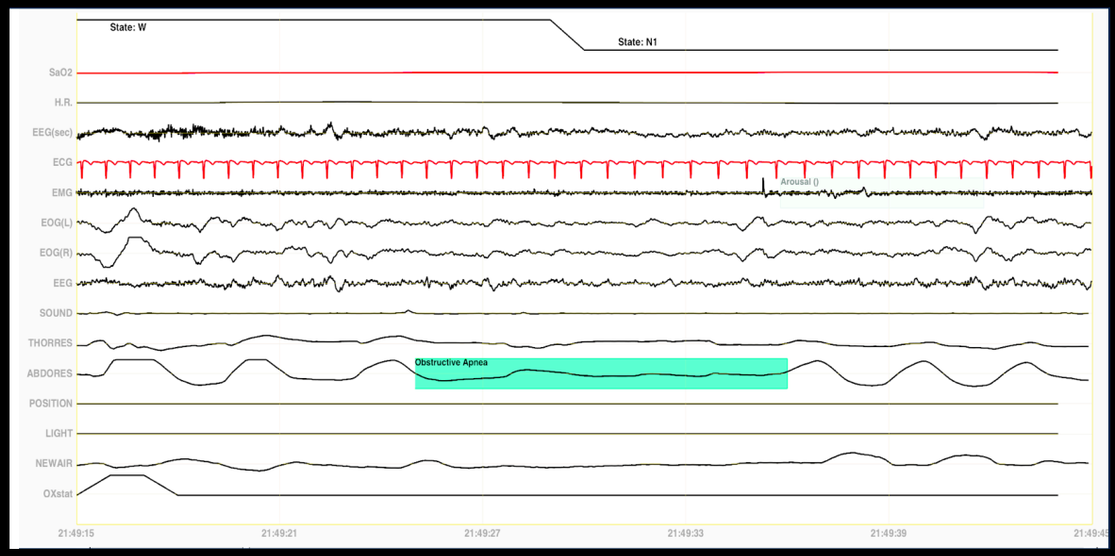
AliveCor®

Deep learning to predict arrhythmias



Nidra.ai

Deep learning to predict sleep apnea

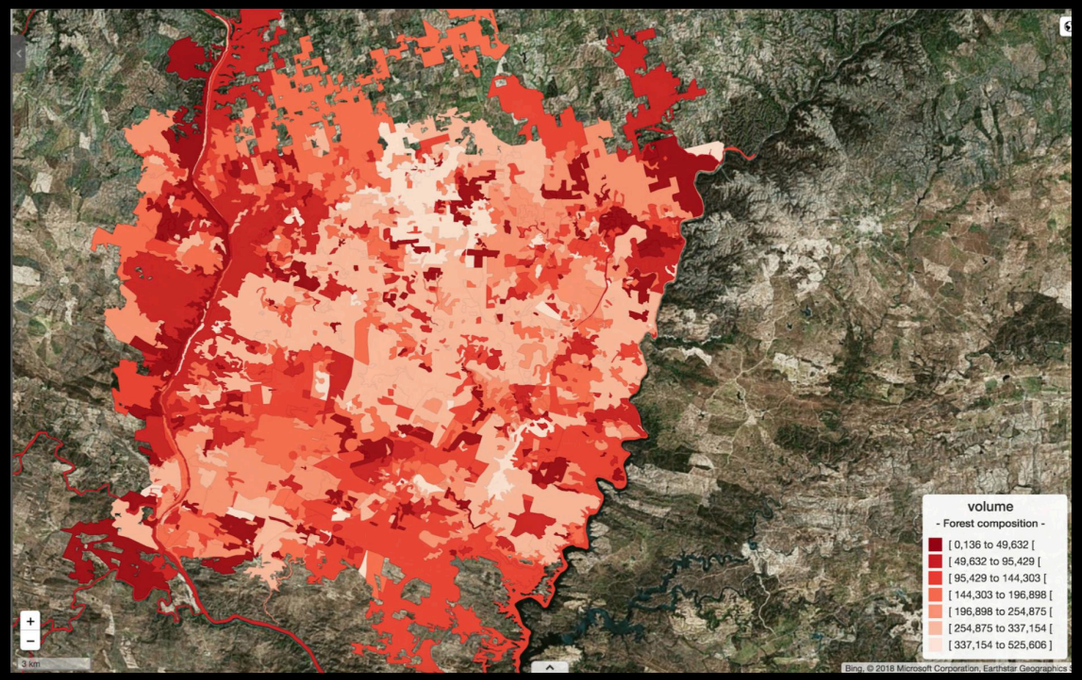


20tree.ai

Creating planet intelligence with deep learning

Soil and Water Intelligence

Forest intelligence



Urban Green Space

KINDAI UNIVERSITY

Deep learning to count Madai fingerlings (Red Sea Bream) and culling out the odd-shaped ones

Outline

- A Brief History of AI
- From Machine learning to Deep learning
- Use cases
- **Reshaping business with AI**
- Conclusion

MITSloan Management Review

https://sloanreview.mit.edu/projects/reshaping-business-with-artificial-intelligence/

Interviewed 30 technology experts and surveyed 3000 executives in 2017

Pioneers (19%): Organizations that both understand and have adopted AI. These organizations are on the leading edge of incorporating AI into both their organization's offerings and internal processes.

Investigators (32%): Organizations that understand AI but are not deploying it beyond the pilot stage. Their investigation into what AI may offer emphasizes looking before leaping.

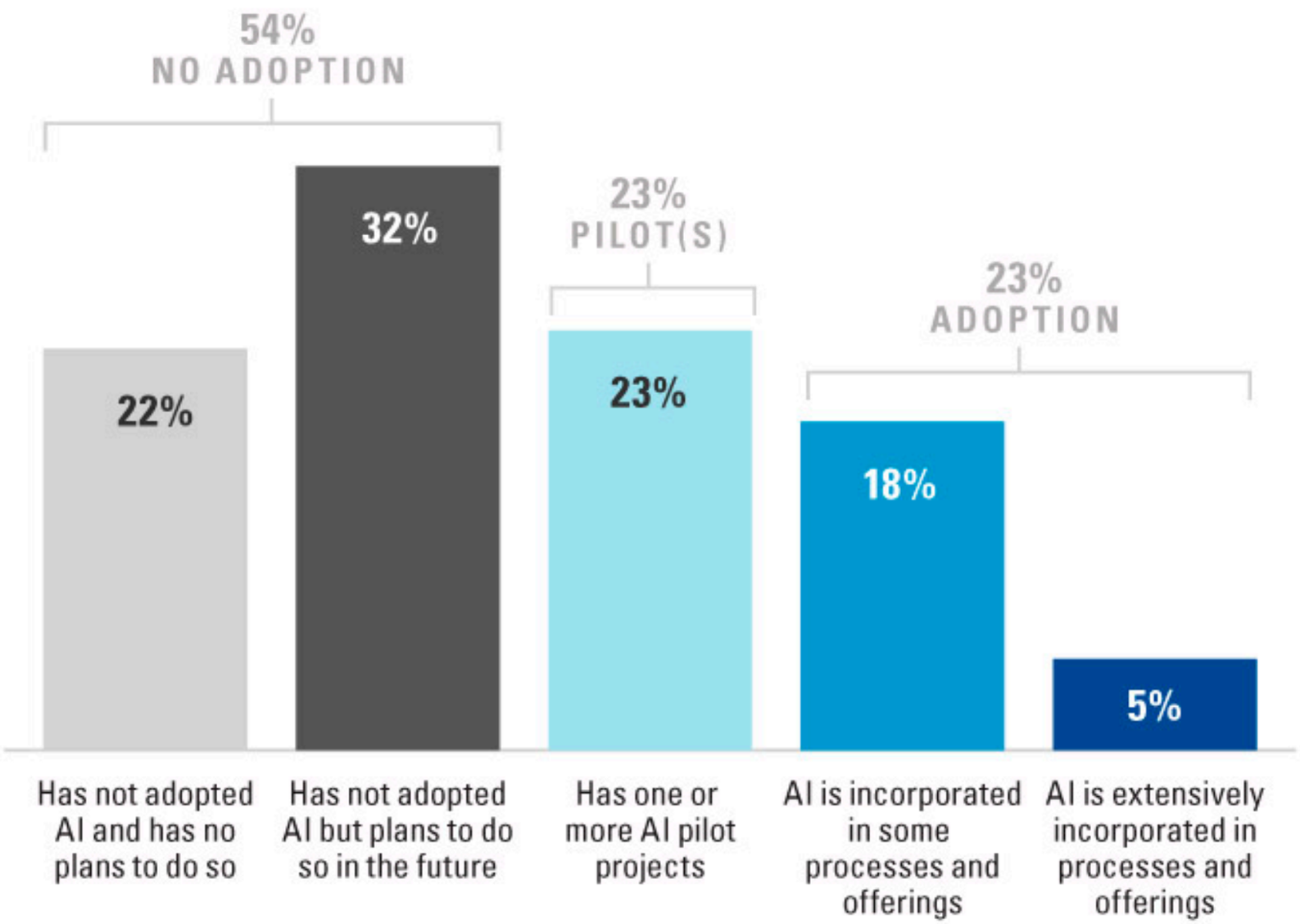
Experimenters (13%): Organizations that are piloting or adopting AI without deep understanding. These organizations are learning by doing.

Passives (36%): Organizations with no adoption or much understanding of AI.

MITSloan
Management Review

Adoption level of AI

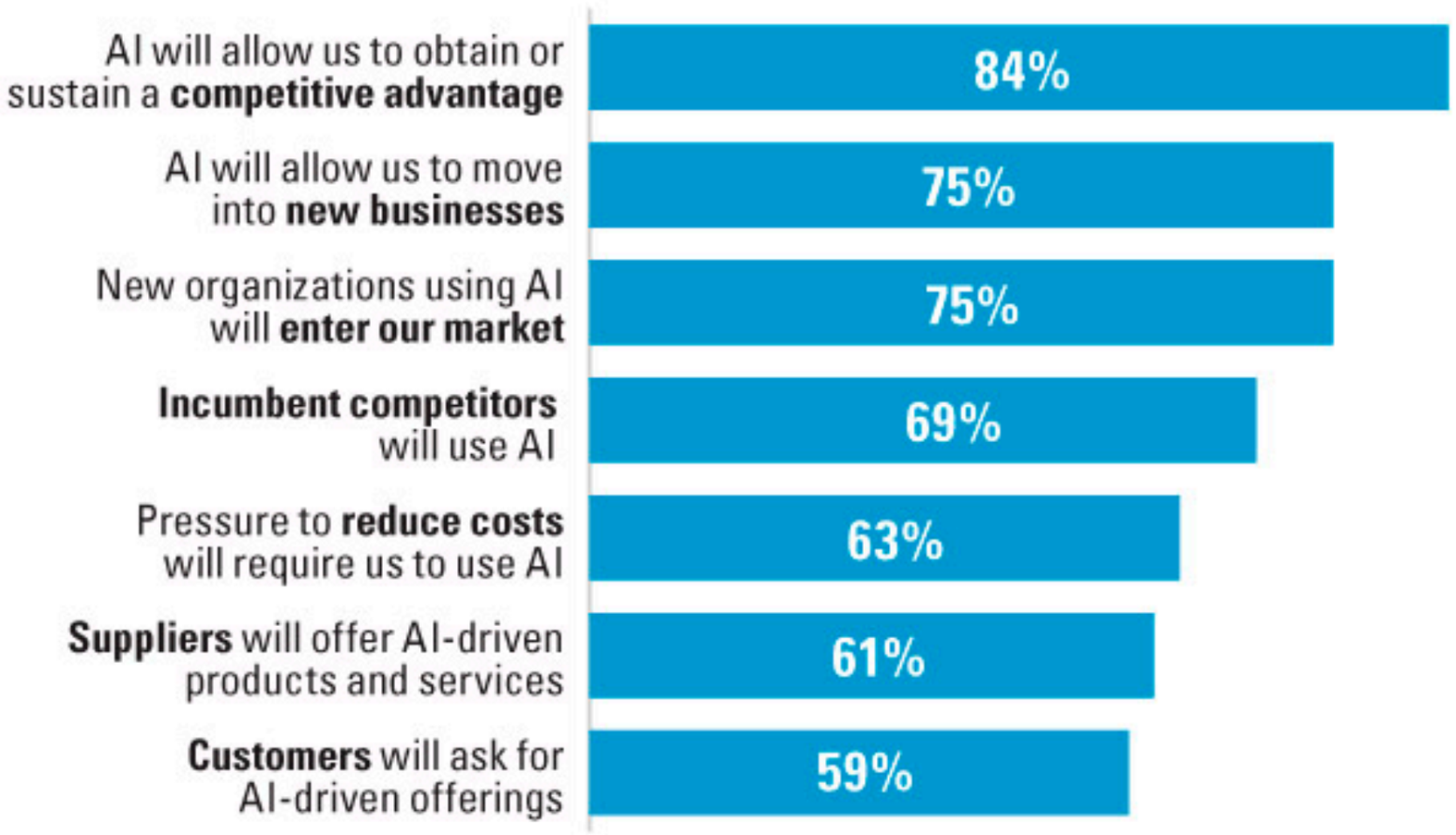
What is the level of AI adoption in your organization?



MITSloan
Management Review

Reasons for adopting AI

Why is your organization interested in AI?



Percentage of respondents who somewhat or strongly agree with each statement

MITSloan
Management Review

Approach to building AI-related skills

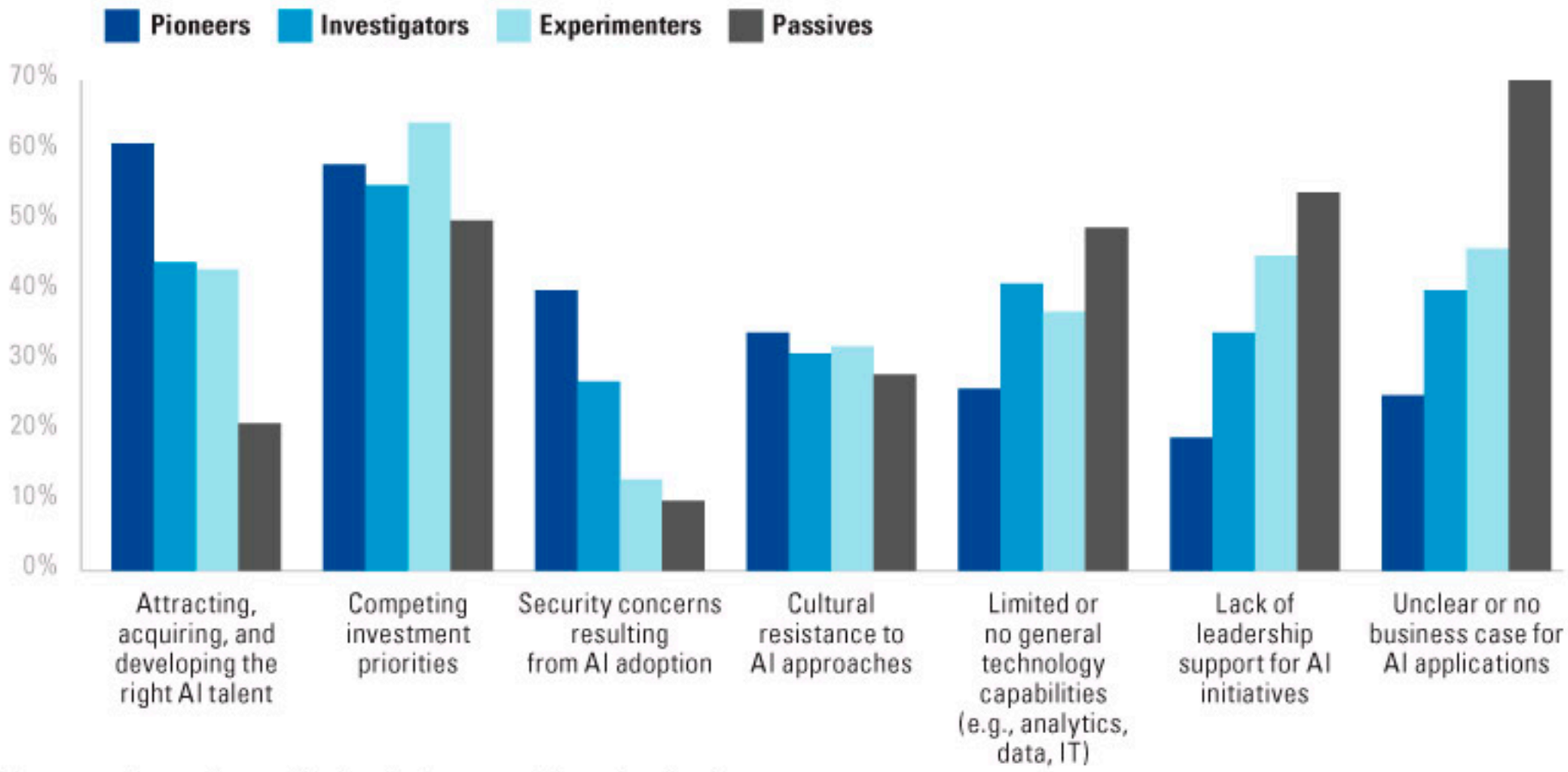
How does your organization build AI-related skills?

Percentage of respondents indicating they acquire skills in each way. Respondents could choose more than one option.

MITSloan
Management Review

Barriers to AI adoption

What are the top three barriers to AI adoption in your organization?

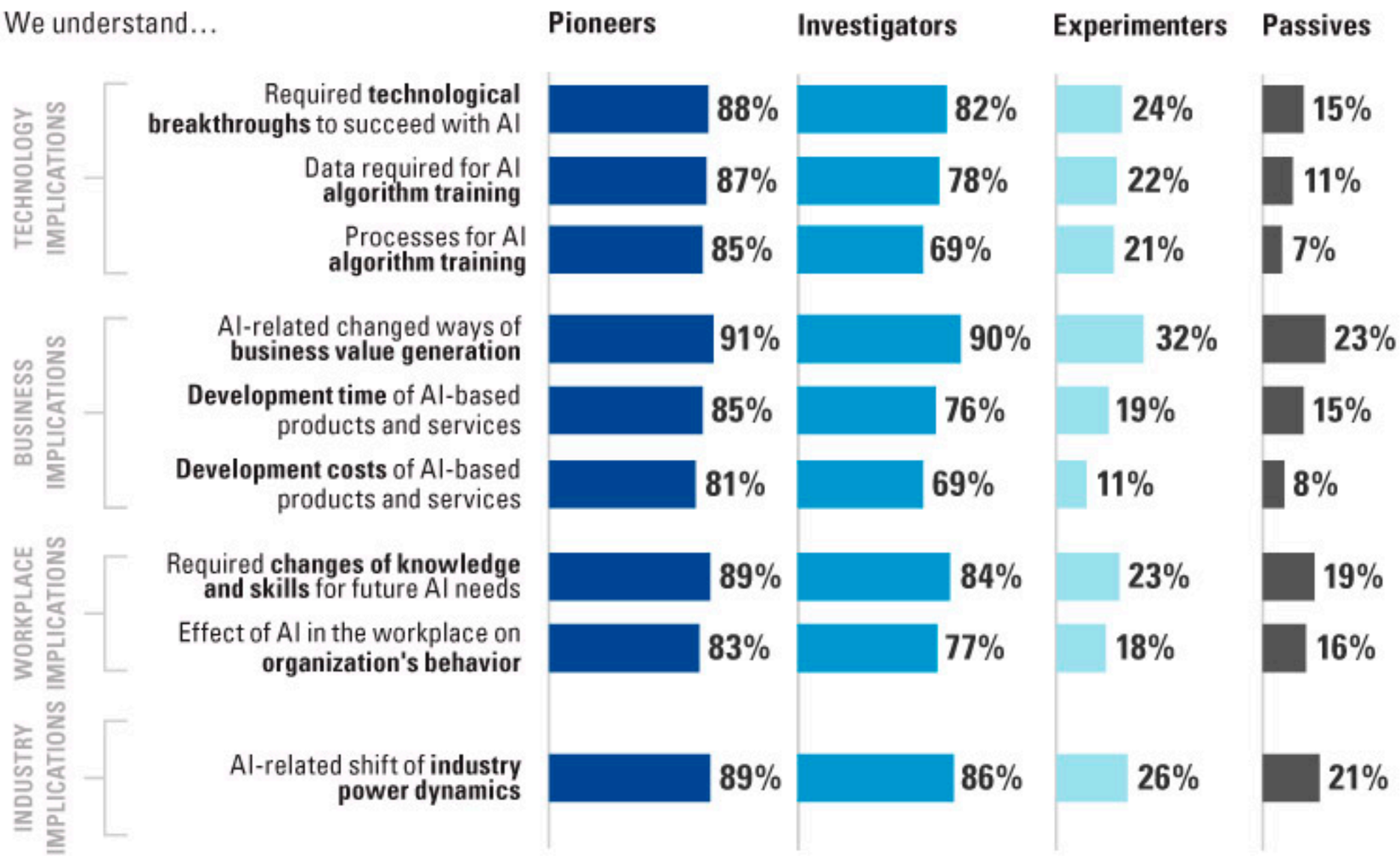


Percentage of respondents ranking the selection as one of the top three barriers

MITSloan
Management Review

Levels of AI understanding

To what extent do you agree with the following statements about your organization?

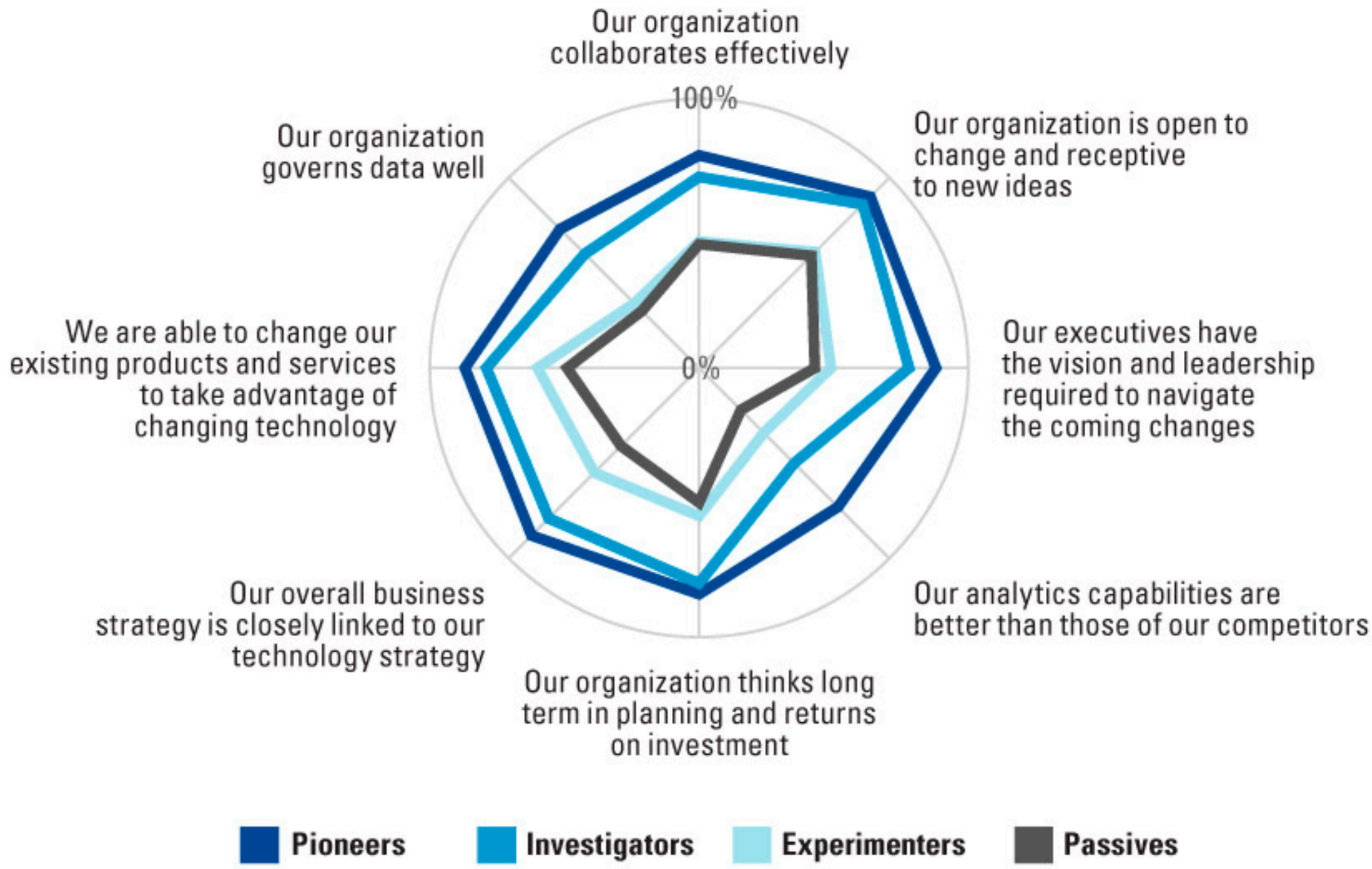


Percentage of respondents who somewhat or strongly agree with each statement

MITSloan Management Review

Link between AI and general organizational capabilities

To what extent do you agree with the following statements about your organization?



Percentage of respondents who somewhat or strongly agree with each statement

MITSloan
Management Review

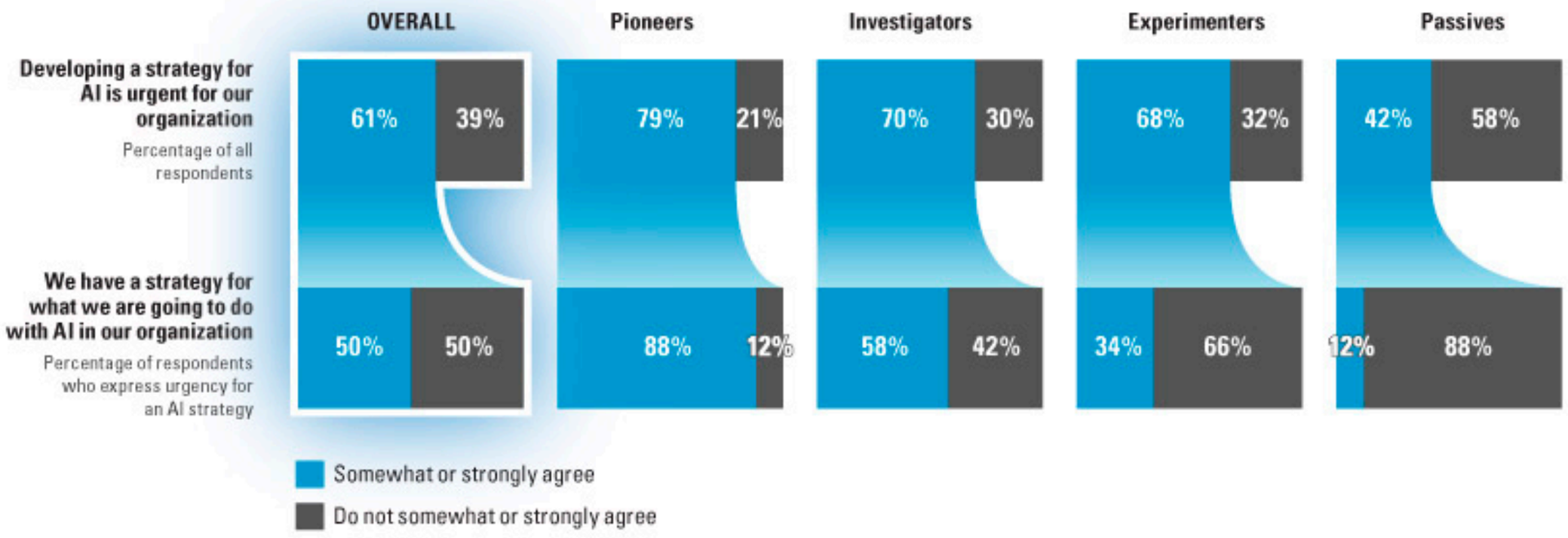
AI's effect on the workforce

How do you expect AI will affect the workforce in the next five years?

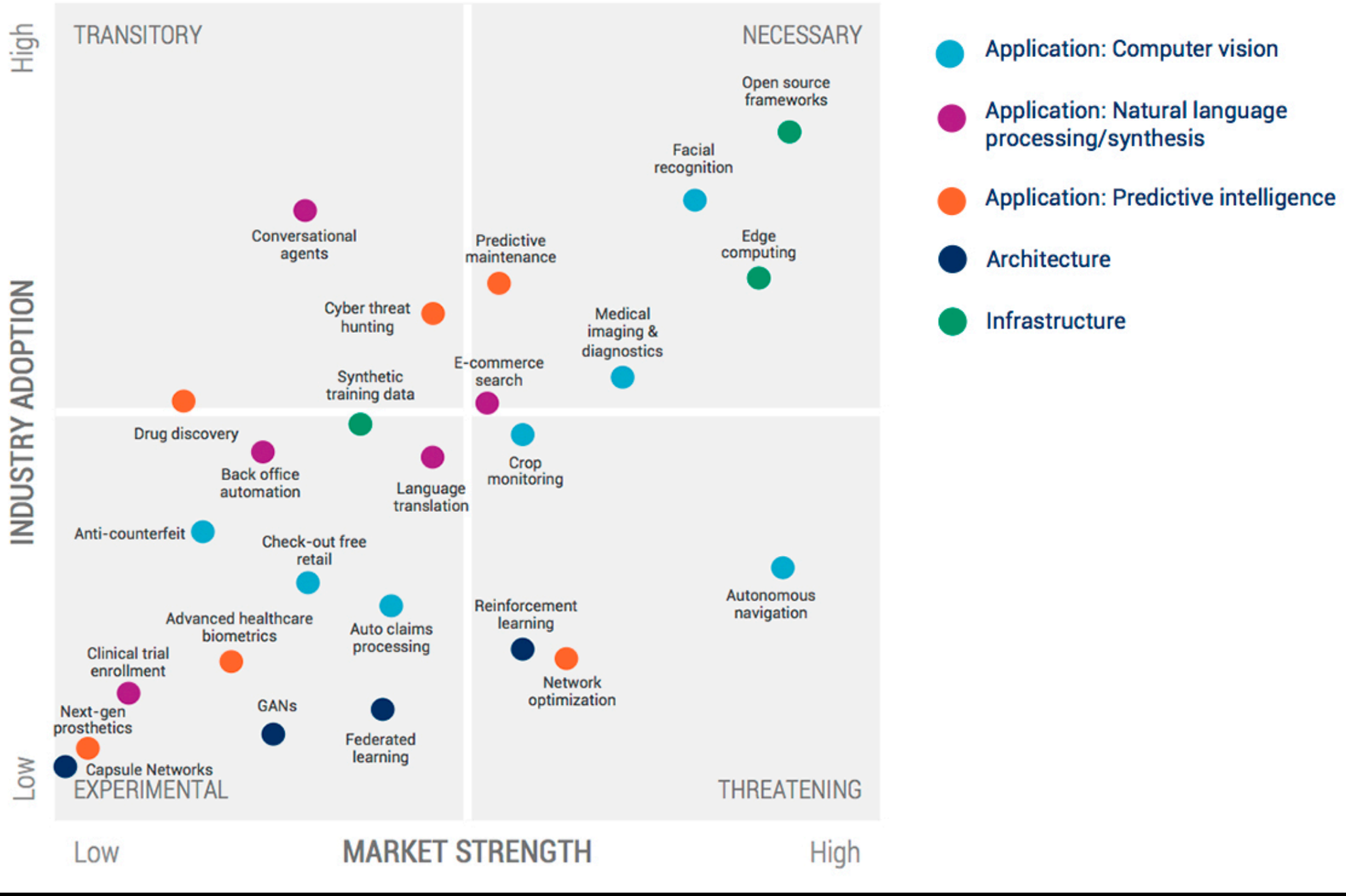
Percentage of respondents who somewhat or strongly agree with each statement

MITSloan
Management Review

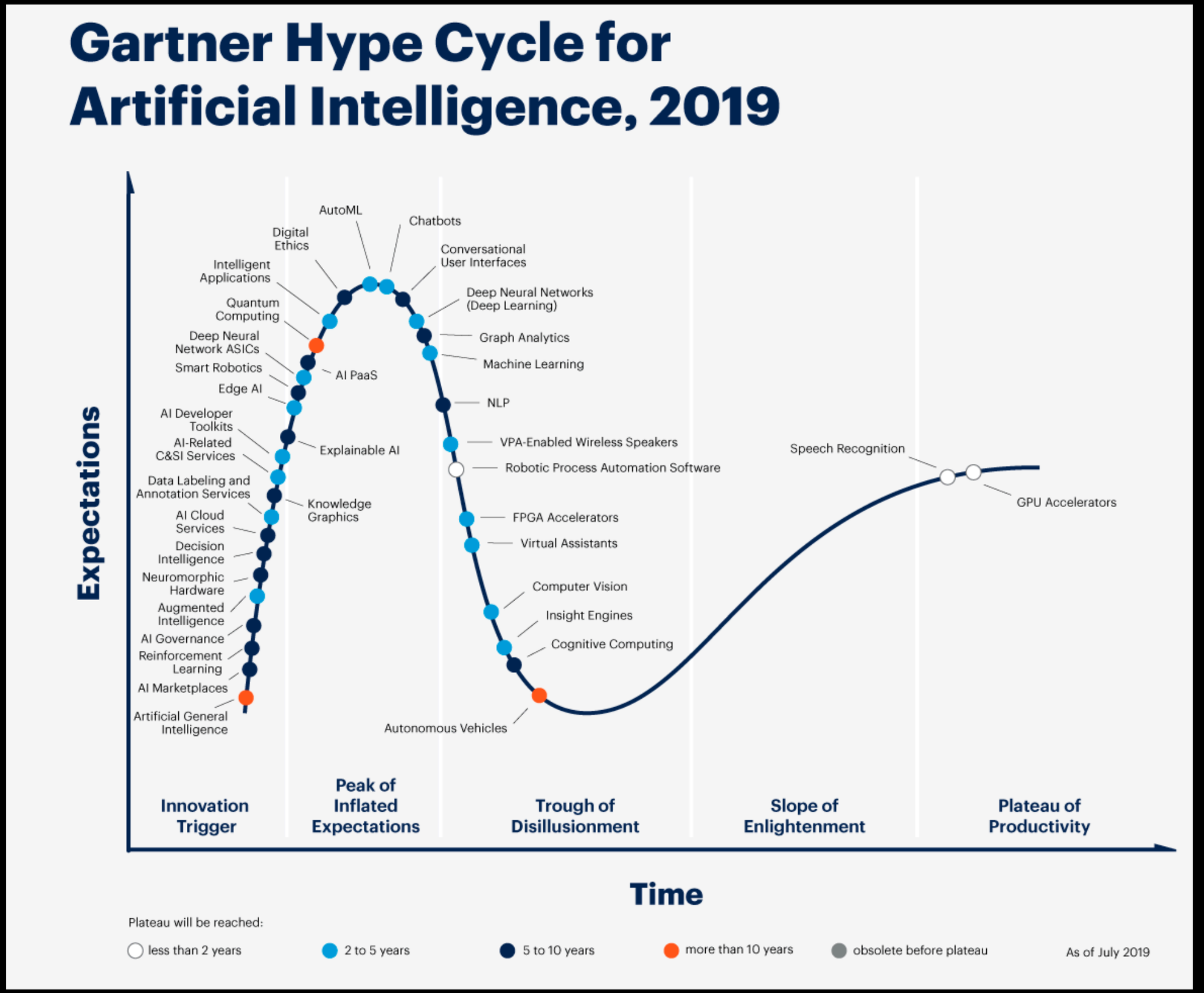
Need for an AI strategy



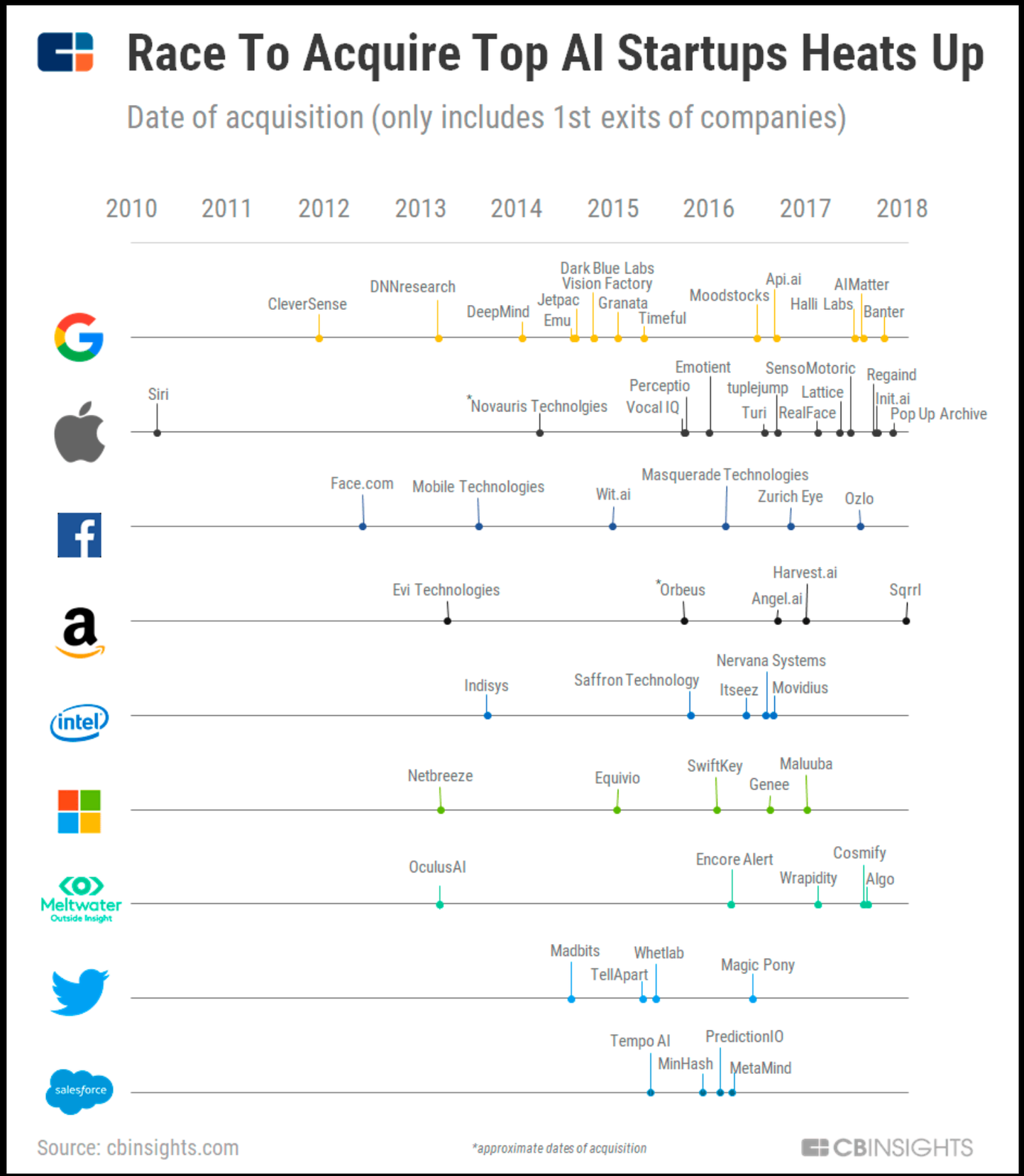
Industry Adoption vs. Market Strength



Gartner Hype Cycle for AI



AI Startup Acquisitions



Outline

- A Brief History of AI
- From Machine learning to Deep learning
- Use cases
- Reshaping business with AI
- **Conclusion**

Conclusion

- New business cases can be generated by AI but one needs big and high quality data and lots of computational power

- AI can support humans to make less errors but may not totally replace them

- Relatively quick to train AI staff with data analysis/engineering background

- AI can automate procedures but will need “explainability” (for e.g. in safety critical / legal scenarios)

- Many ethical concerns : bias in training, polarisation,…

- Some human intelligence tasks will need a paradigm shift in AI and cannot be solved by deep learning