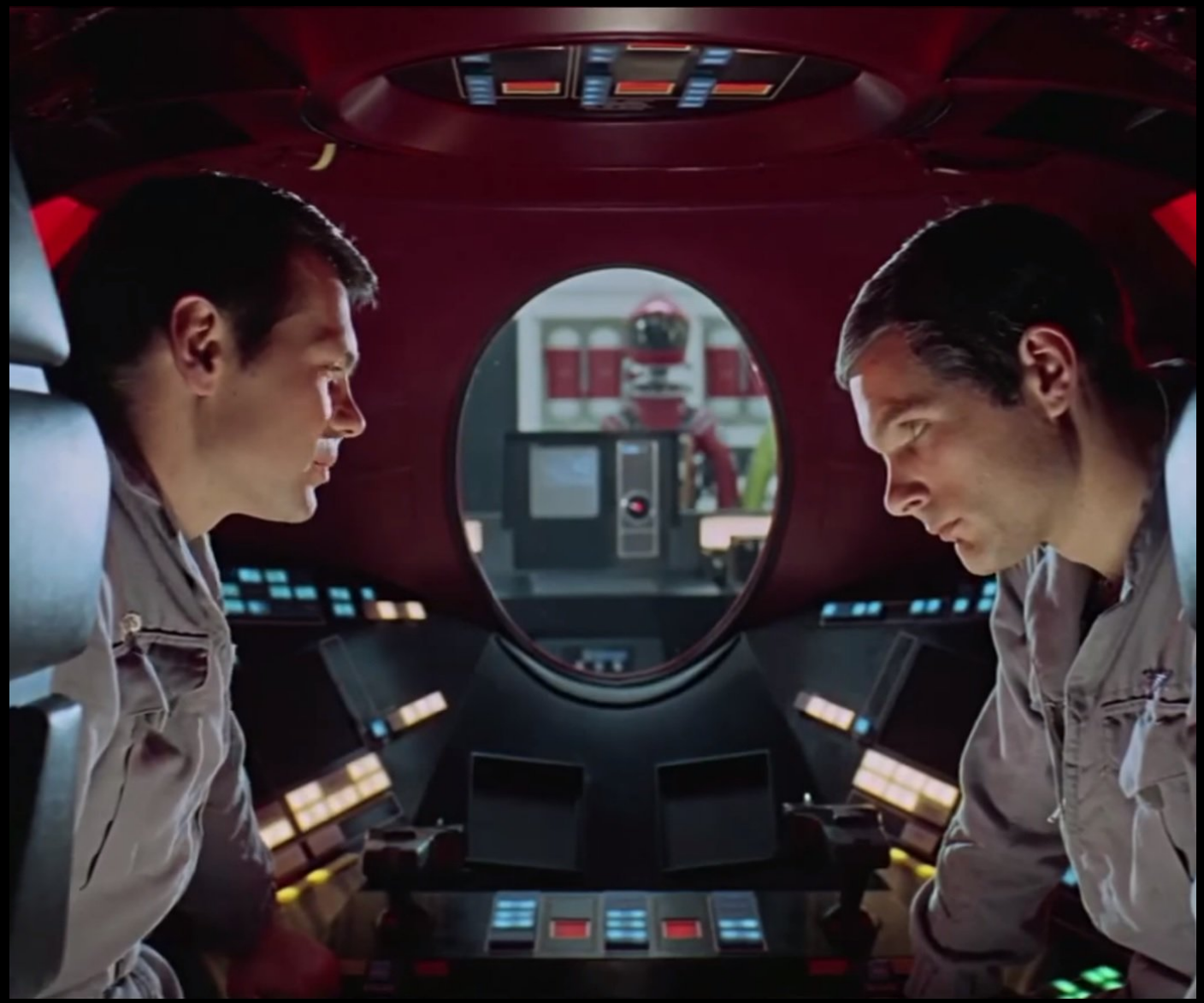
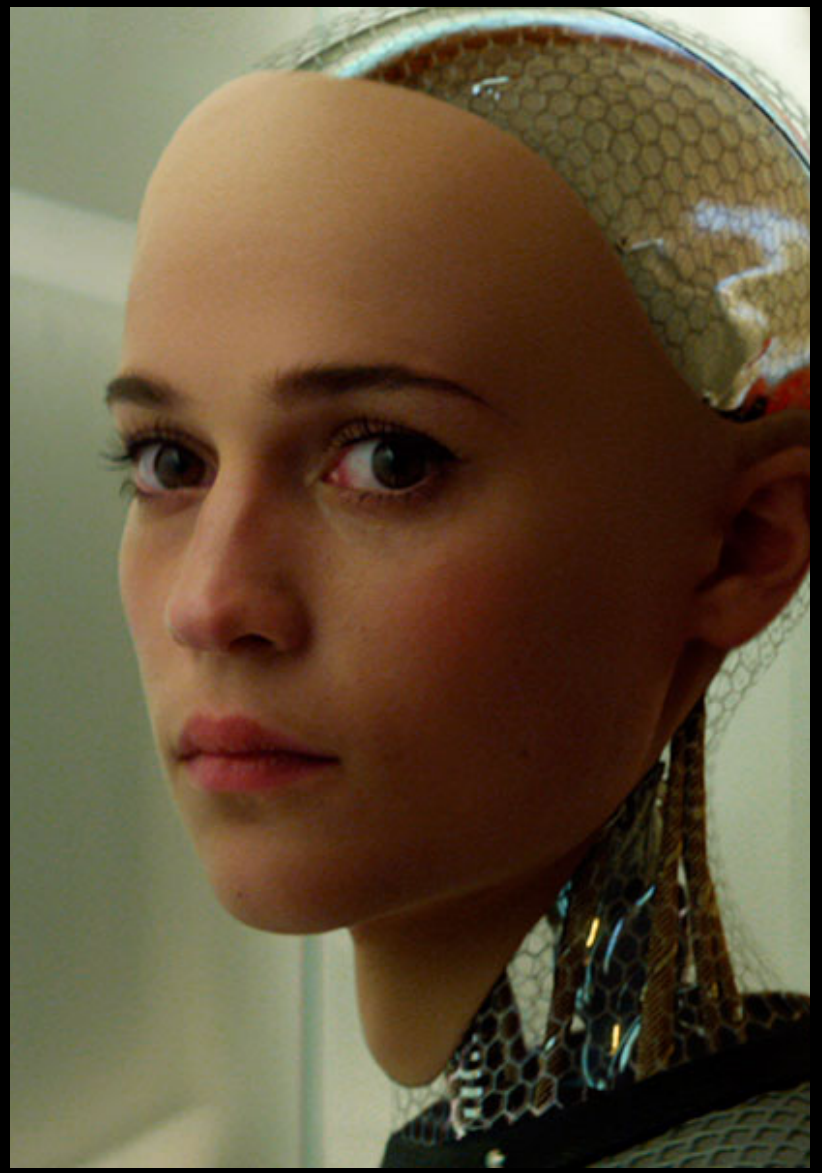
Systems for AI. Ready for today, Built for Tomorrow





Today's state of the art: image captioning example

Natural language description of an image created using reinforcement learning

End-to-end model trains a language and image network simultaneously

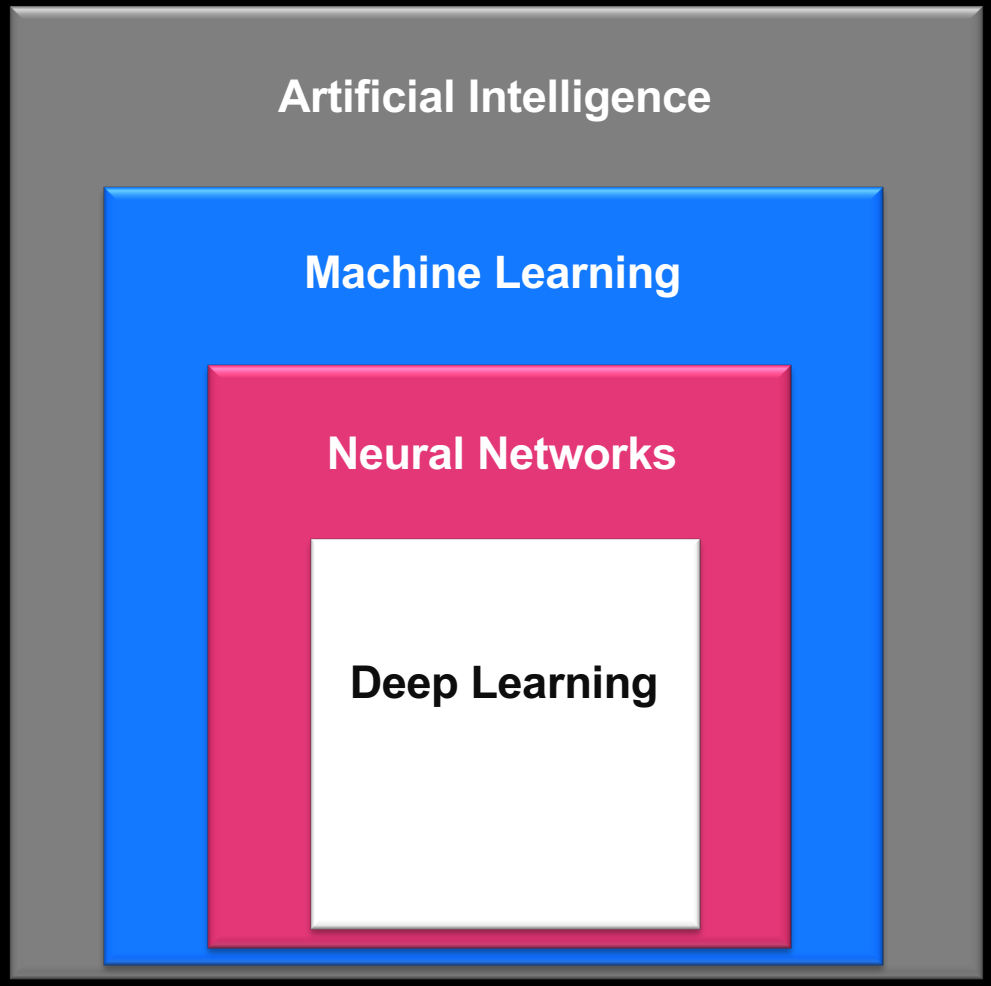
"A blue boat is sitting on the side of a building"

"A green bird sitting on top of a bowl"

"A woman sitting on a table with a giraffe"

Rennie, Marcheret, Mroueh, Ross & Goel, "Self-Critical Sequence Training for Image Captioning." CVPR 2017

What is AI?

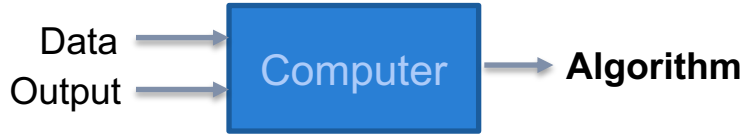


AI is all about making new Algorithms!

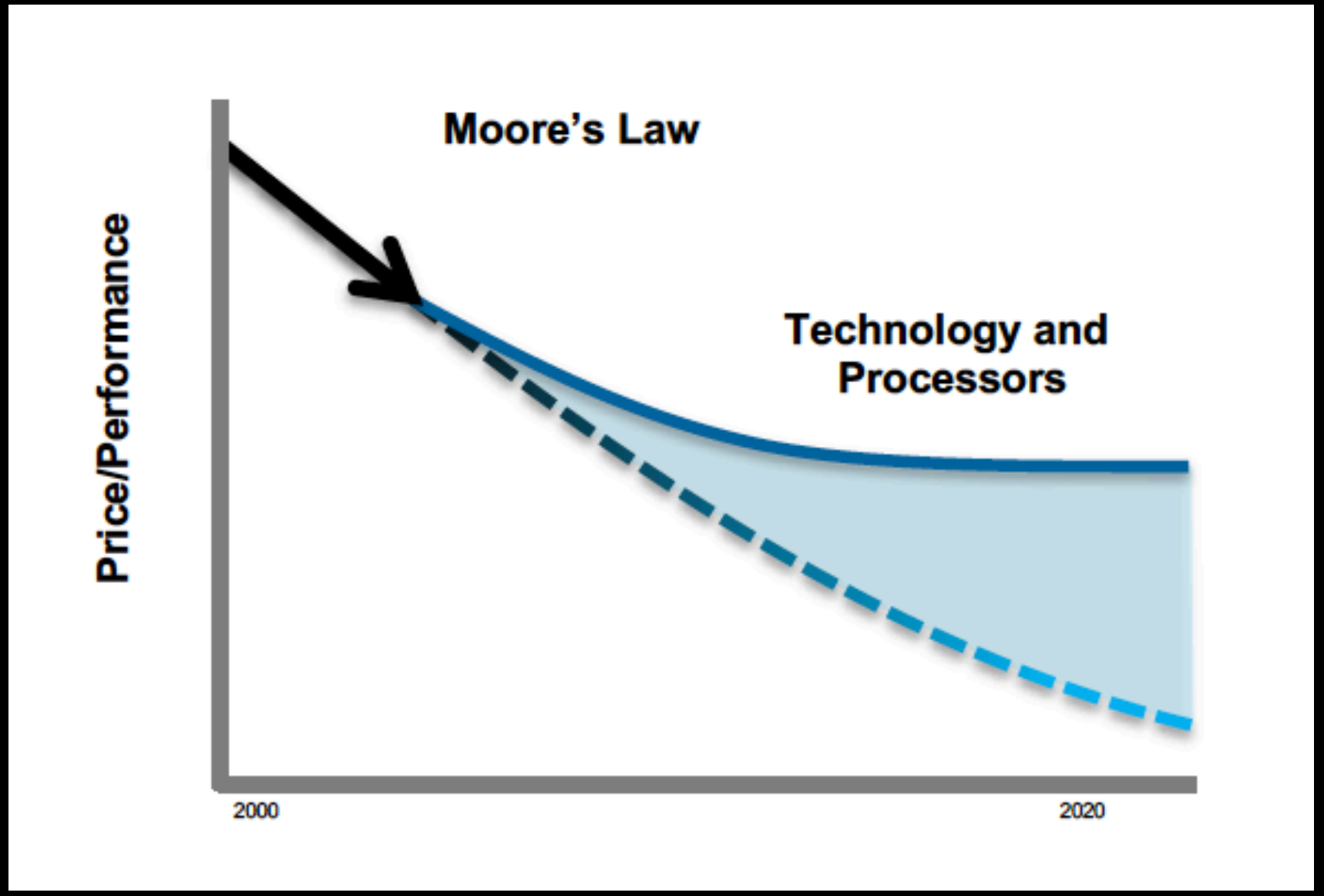
Traditional Programming

VS

Machine Learning / Deep Learning

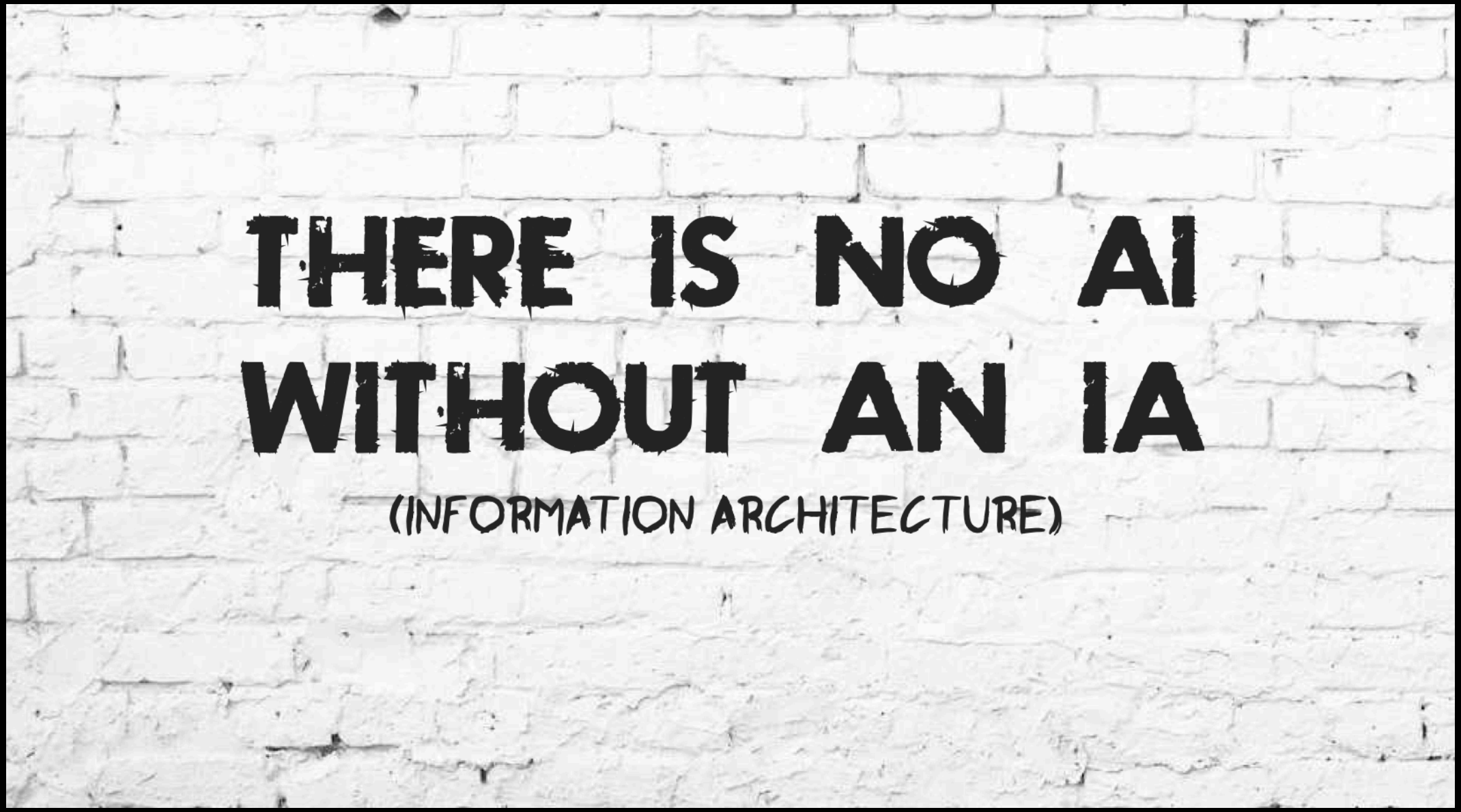


End of Moore's Law: It's not Just About Physics



Data Explosion. Exponential Growth

A cow alone generates 200MB of data every year


THERE IS NO AI
WITHOUT AN IA
(INFORMATION ARCHITECTURE)

#1 & #2 Supercomputers built for AI

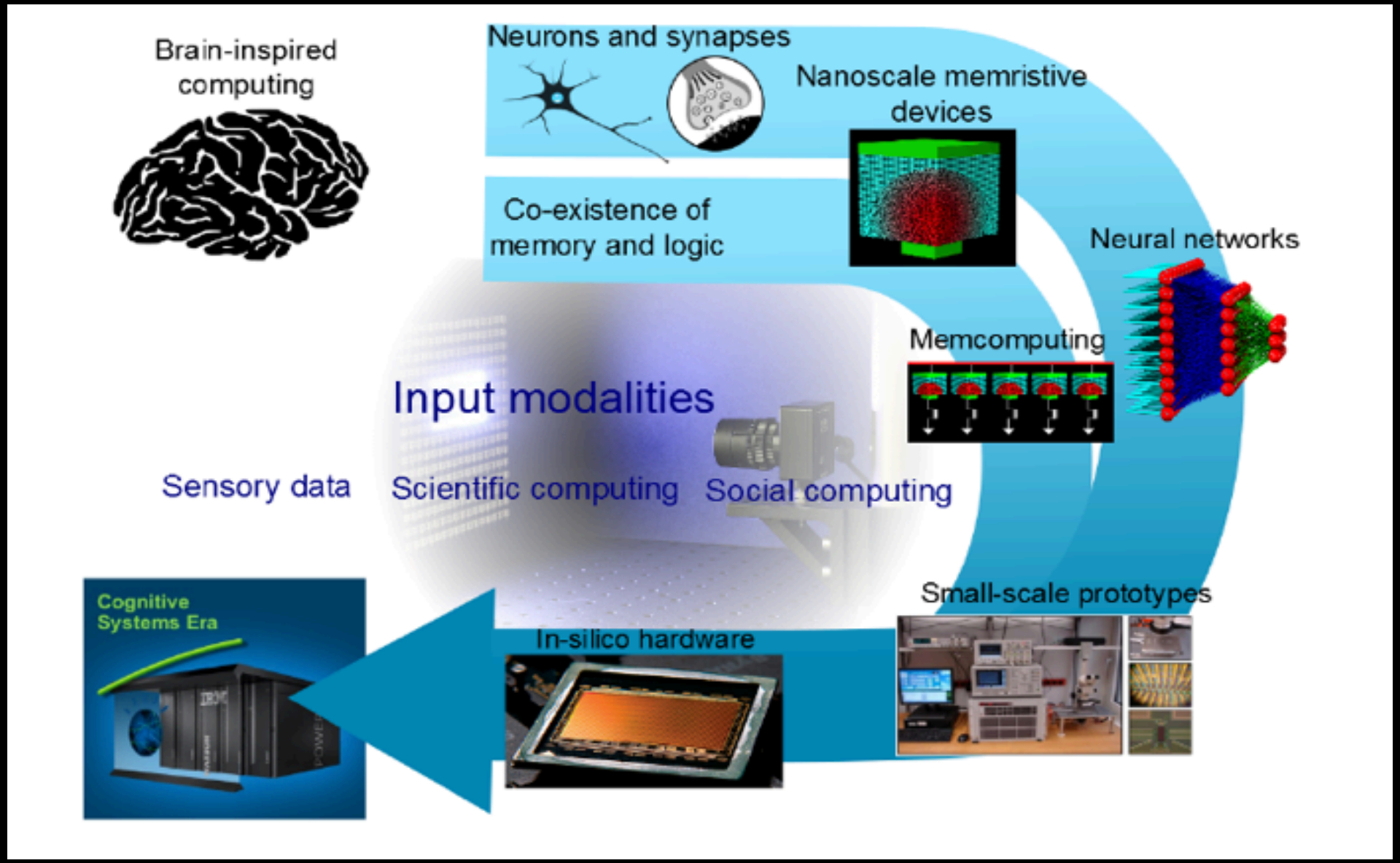
Summit and ***Sierra*** are the fastest computers in the world and purpose-built for AI workloads.

Together, more than 44,000 NVIDIA GPUs and 400 Petabytes of IBM Storage

- 2.5 TB/sec single stream IOR
- 1 TB/sec 1MB sequential read/write
- Single Node 16 GB/sec sequential read/write
- 50K creates/sec per shared directory
- 2.6 Million 32K file creates/sec

All Built upon Data Infrastructure with: IBM Spectrum Scale PowerAI

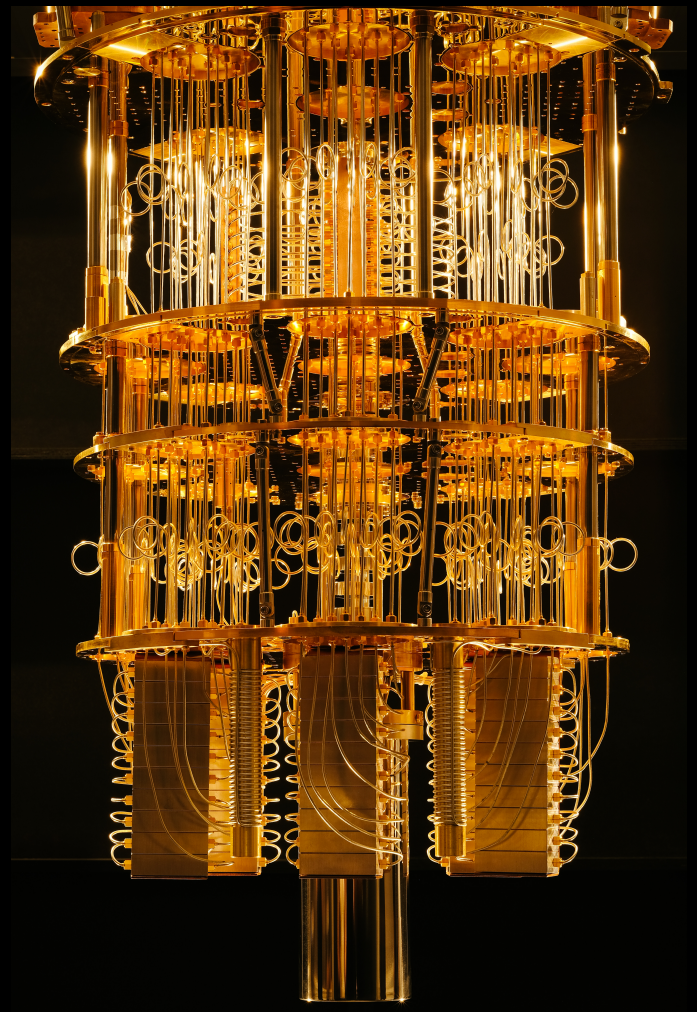
Next Generation PCM for Computational Memory



Next Generation Neuromorphic processors

	2011	2014
Programmable neurons	256	1 million
Programmable synapses	262,144	256 million
Neurosynaptic cores	1	4,096

Quantum Computing is a Reality



Adding an additional qubit means to double the compute power

Public Computers

16 qubits
IBM Q 16 Melbourn
16 qubits
IBM Q 16 Rüschlikon
5 qubits
IBM Q 5 Tenerife
5 qubits
IBM Q 5 Yorktown

Private Computers

20 qubits
IBM Q 20 Tokyo
20 qubits
IBM Q 20 Austin
50 qubits
Soon

quantumexperience.ng.bluemix.net/qx/experience

Quantum Computing is a Reality

From 28.000.000.000.000.000.000.000

years to only …

$$N = p * q$$

Quantum Computing is a Reality

From 28.000.000.000.000.000.000.000

years to only …

$$N = p * q$$

100 seconds