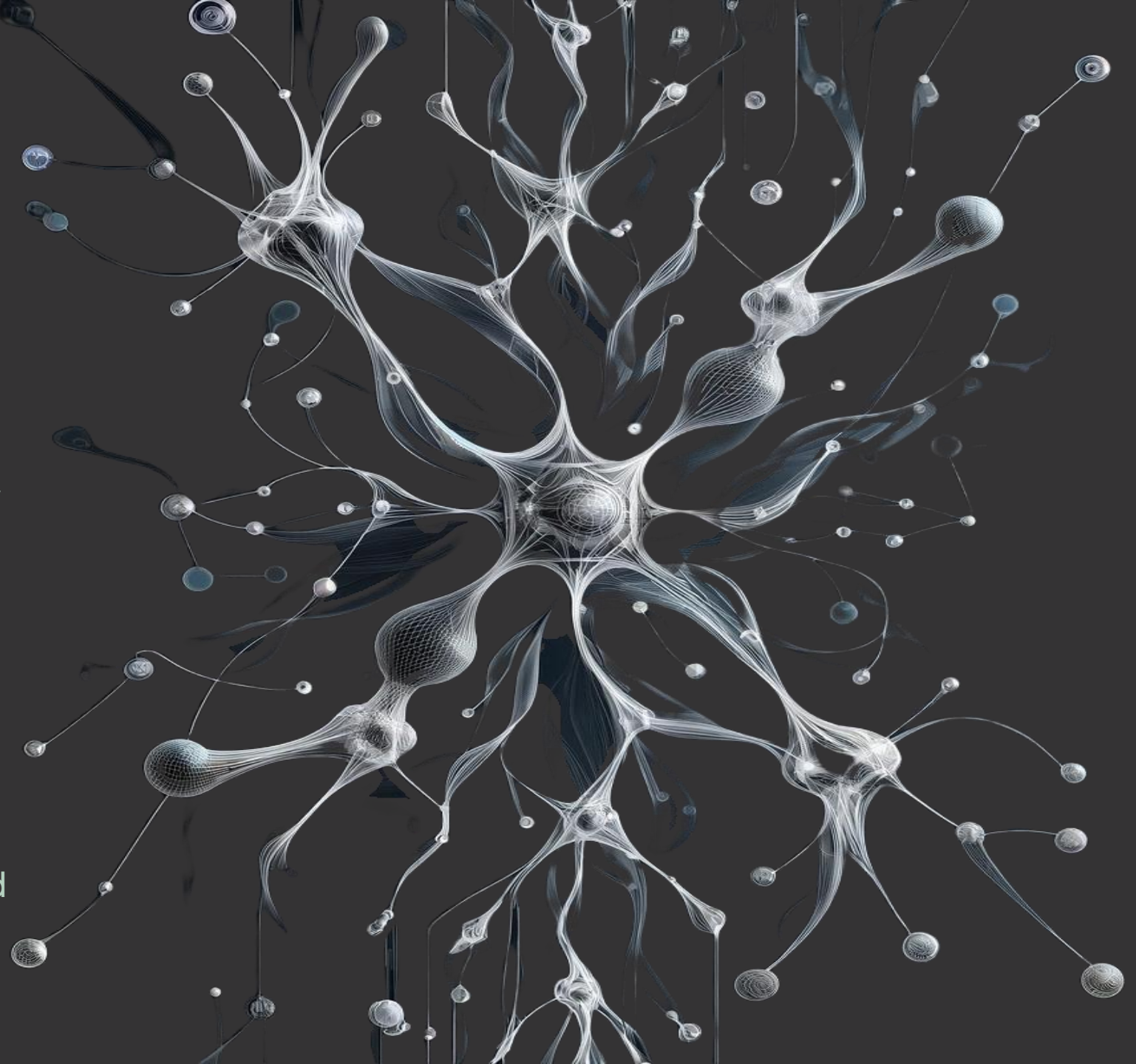


# AI: The Next Frontier for Irish Construction

**CITA** | **TECHLIVE**  
2024 AI in Construction

Sharon Richardson, PhD  
Director for AI, Hoare Lea

Sustainability and the built environment:  
What value does AI bring?



**2001**

3 V's of Big Data  
management

**2006**

Deep Learning for  
AI introduced

**2006**

AWS launches  
cloud computing

**2009**

Nvidia GPUs used  
for deep learning

**2012**

Images &  
computer vision

**2016**

Complex game  
simulation

**2020**

Language &  
generative AI

**2024**

Agents &  
robotics



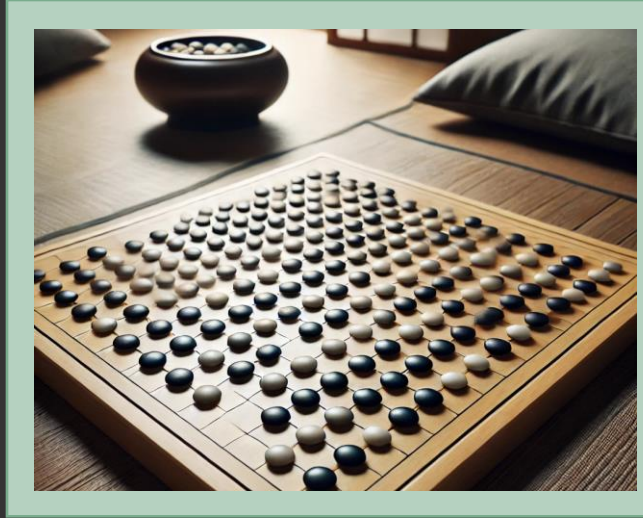
2012



### AlexNet

1.2 million images  
470 PFLOPS to train

2016



### AlphaGo

Approx 30 million moves  
1.9 million PFLOPS to train

2020

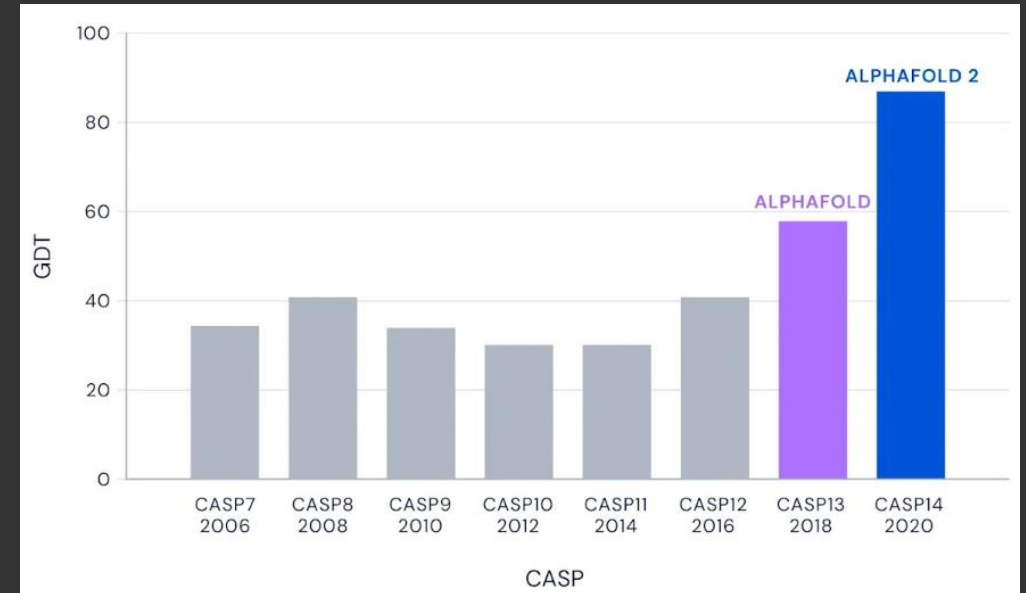


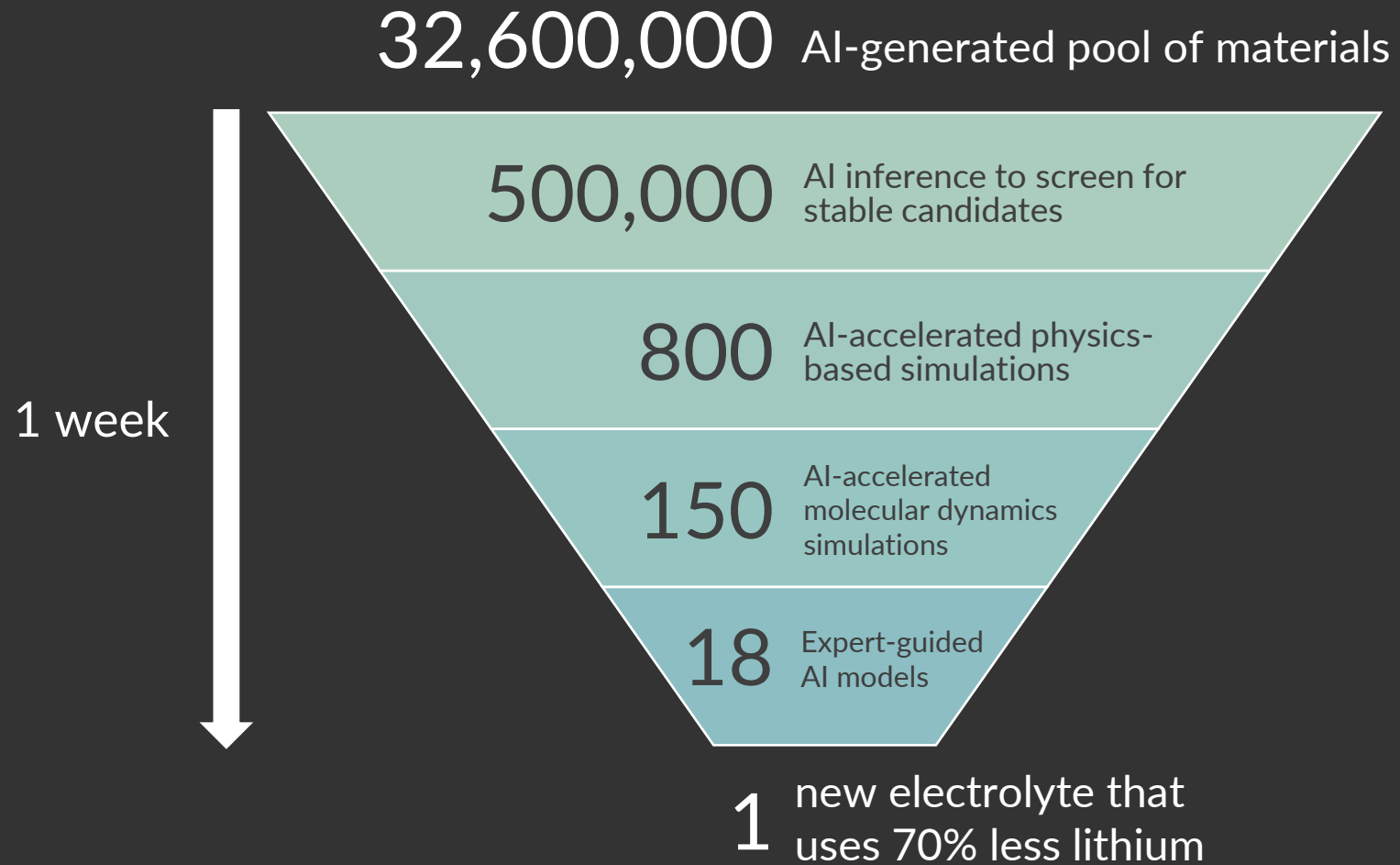
### GPT-3

Approx 200 billion words  
314 million PFLOPS to train

“We have been stuck on this one problem – how do proteins fold up – for nearly 50 years. To see DeepMind produce a solution, [after] wondering if we’d ever get there, is a very special moment.”

PROFESSOR JOHN MOULT, CO-FOUNDER AND CHAIR OF CASP

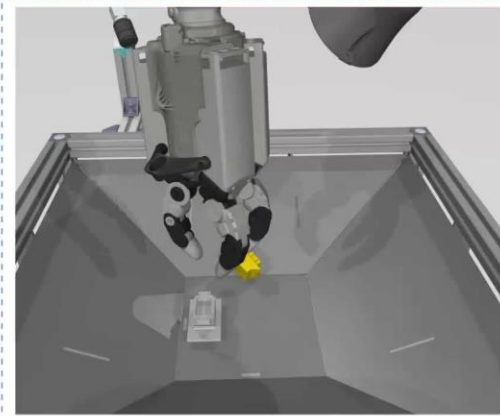




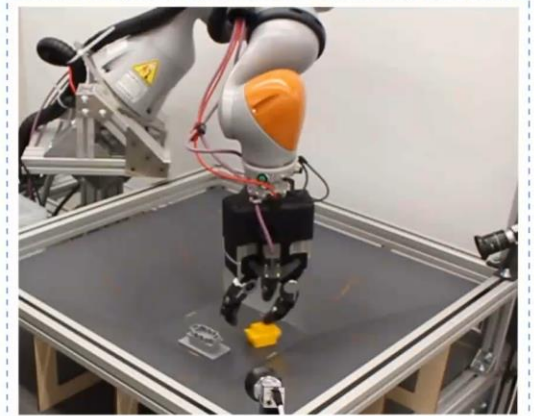
**DemoStart: Using reinforcement learning to help robots acquire dexterous behaviours in simulation requires 100x fewer demonstrations to learn how to solve a task in simulation [vs real world].**

GOOGLE DEEPMIND ROBOTICS TEAM

Plug-socket insertion



Simulation



Real-world

**At its most fundamental level, I think biology can be thought of as an information processing system, albeit an extraordinarily complex and dynamic one. Biology is likely far too complex and messy to ever be encapsulated as a simple set of neat mathematical equations. But just as mathematics turned out to be the right description language for physics, biology may turn out to be the perfect type of regime for the application of AI.**

DEMIS HASSABIS, FOUNDER DEEPMIND AND ISOMORPHIC LABS

## What value can AI bring to sustainability of the built environment?

The built environment is responsible for approximately 40% of global carbon dioxide emissions.

Buildings consume about 36% of the world's available energy, of which 20 to 30% is wasted due to inefficiencies.

The construction industry uses half of all raw materials extracted globally.

Construction and demolition contribute to 35% of total global waste.

Due to urbanisation pressures, the global building floor area is expected to double by 2060, equivalent to adding a city the size of Paris every week.

Embodied carbon can account for up to 50% of a building's total carbon footprint over its lifecycle.

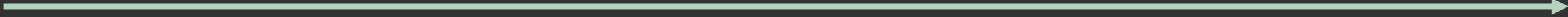
World Green Building Council  
Commitment: All new buildings to be net-zero operational carbon by 2030, and all existing ones, by 2050.



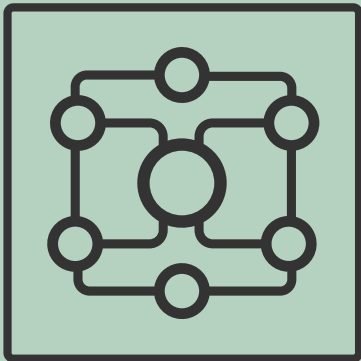
# What value can AI bring to sustainability of the built environment?

Digital

Physical



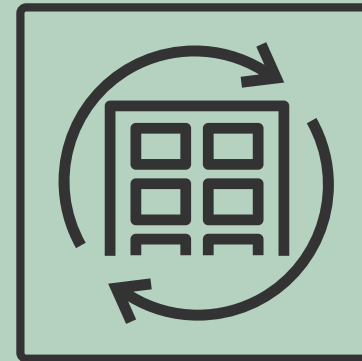
**Simulated**



**Sentient**



**Self-sustaining**





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**Thank you for  
your time**

Sharon Richardson, PhD  
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[linkedin.com/in/sharonr](https://www.linkedin.com/in/sharonr)

## References for sustainability quotes

The built environment is responsible for approximately **40% of global carbon dioxide emissions**, including both building operations and construction processes. **Source:** United Nations Environment Programme (UNEP), *2020 Global Status Report for Buildings and Construction*.

Buildings consume about **36% of the world's final energy**.

**Source:** International Energy Agency (IEA), *World Energy Outlook 2019*.

The construction industry uses **half of all raw materials** extracted globally.

**Source:** International Resource Panel (IRP), *Global Resources Outlook 2019*.

Construction and demolition contribute to **35% of total global waste**.

**Source:** World Bank, *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050*.

The global building floor area is expected to **double by 2060**, equivalent to adding a city the size of Paris every week.

**Source:** Global Alliance for Buildings and Construction (GlobalABC), *Global Status Report 2017*.

Embodied carbon can account for up to **50% of a building's total carbon emissions** over its lifecycle.

**Source:** World Green Building Council (WorldGBC), *Bringing Embodied Carbon Upfront*.

Aim for all new buildings to be **net-zero operational carbon** by **2030**, and all buildings, including existing ones, by **2050**.

**Source:** World Green Building Council, *Advancing Net Zero*.

It is estimated that **20% to 30% of the energy used in buildings is wasted** due to inefficiencies and suboptimal operation.

**Source:** U.S. Environmental Protection Agency (EPA), *Energy Star Buildings Manual*.