World Series Events on Artificial Intelligence

Event 1 Report

AI and Decarbonizing Construction

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United Nations Educational, Scientific and Cultural Organization

IRCAI
International Research Centre on Artificial Intelligence under the auspices of UNESCO

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About the Series

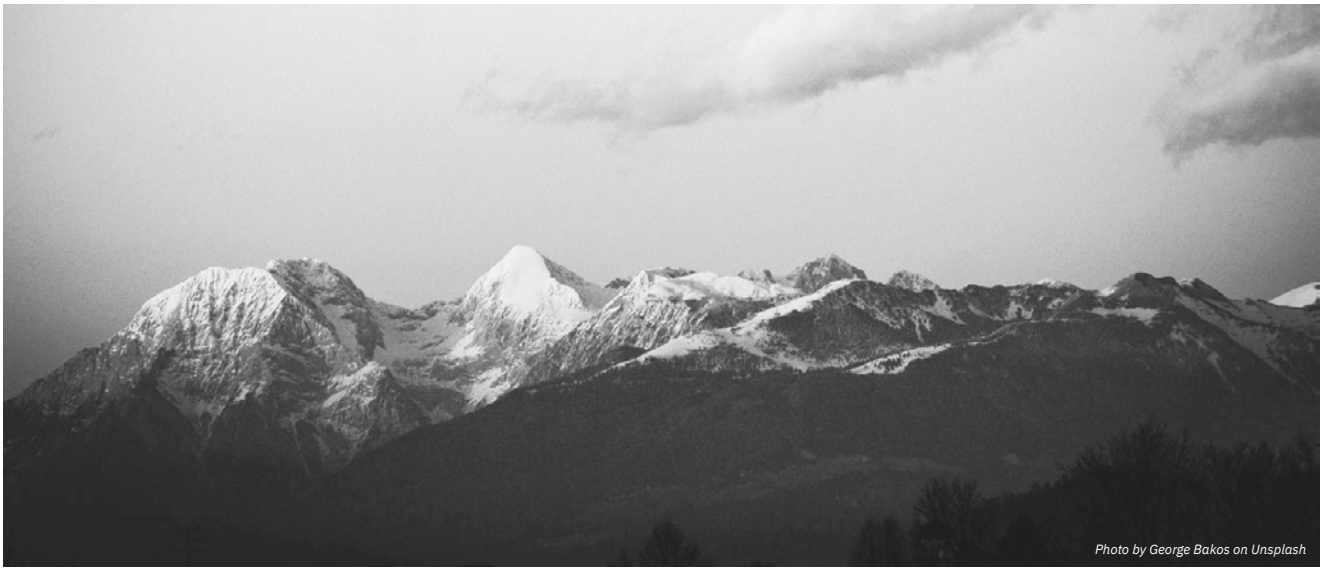

Photo by George Bakos on Unsplash

The Ministry of Foreign Affairs of the Republic of Slovenia, the Slovenian Presidency of the Council of the EU, and the International Research Centre on Artificial Intelligence, under the auspices of UNESCO (IRCAI), have joined forces to organise 12 events in close cooperation with Slovenian embassies and other permanent representations in 10 countries around the world. The aim of this effort is to set an active agenda for AI during the Slovenian Presidency, and to provide a basis for continuing and promoting bilateral discussions in the field of AI and sustainable development beyond the Presidency.

International Events

Showcasing government, research and business perspectives in AI and Sustainable Development across the world from Abu Dhabi, Ottawa, Tel Aviv, Genève, Bucharest, Tokyo, Pairs with OECD and Berlin and ending at the main stage event for DigiEduHack 2021 in Slovenia.

Digital Education Hackathon

Hosting main stage on AI and Education, themed across solutions for UN Sustainable Goals, as the final event of this international marathon. This is an EU flagship initiative, a two-day event made of 24 hours of 'hacking' and 'generating ideas'.

International Network

A distributed center of excellence for research, innovation and expertise, to become a world reference in AI that can attract investments in AI and Sustainability research and the best talents in the field, and provide in-depth work based on the multistakeholder global discussions coming from the events series.

International AI Award

A pan-European and international award started by the Slovenian Presidency and to be presented annually.

Event 1: AI and Decarbonising Construction

Photo by Eva Dang on Unsplash

London, United Kingdom / online
30 June at 18:30 BST (19:30 CET)

According to the Climate Change Committee, greenhouse gas emissions from manufacturing and construction were 66 $MtCO^2$ in 2018 – 12% of the UK total. If there is a lesson from the pandemic, it is that we need to multiply our efforts to mitigate climate change if we are to avoid economic, social and political disaster. Yet, we cannot achieve net zero goals without decarbonising manufacturing and construction. We need to tackle the hard problems today. This means industrial policies, R&D funding, business support and innovation that accelerate the zero-carbon transition needed to address these challenges.

This webinar is organised by Carbon Re together with the International Research Centre on Artificial Intelligence under the auspices of UNESCO (IRCAI), The Ministry of Foreign Affairs of the Republic of Slovenia, Embassy of the Republic of Slovenia to the United Kingdom of Great Britain and Northern Ireland in association with Climate Action Week and HumaneAI-Net.

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Agenda

Since 1990, emissions from the construction sector in the UK have increased by 45%. So while we are trying to meet our decarbonisation targets, this sector is moving in the wrong direction. This event brings together a wide range of stakeholders from the sector, to discuss how the use of Artificial Intelligence (AI) can counter this trend. Using an example of the use of AI in climate change, John Shawe-Taylor highlights the steps we need to take to unlock the full potential of AI in modelling a system as complex as our climate. Finally, three panelists (Sana Khareghani, Jade Cohen and Mark Enzer) look in more detail at the opportunities, standards and prerequisites for better use of AI in the construction sector. The most frequently mentioned prerequisites are cross-sectoral interoperability and the integrity of high-quality data, as well as an open attitude towards new technologies.

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Introduction

Simona Leskovar

Ambassador of the Republic of Slovenia to the United Kingdom of Great Britain and Northern Ireland.

Keynote Address

Professor John Shawe-Taylor

Professor John Shawe-Taylor holds the UNESCO Chair in Artificial Intelligence and is Director of the International Research Centre on Artificial Intelligence (IRCAI), under the auspices of UNESCO.

Panel Discussion

Sana Khareghani, *Head of Office for Artificial Intelligence. The Office for AI is a joint unit between the Department for Digital, Media, Culture and Sport (DCMS) and the Department for Business, Energy and Industrial Strategy (BEIS).*

Jade Cohen, *Co-Founder and CPO at Qualis Flow, who works with construction teams to enable them to track and manage their social and environmental impact, and take a data-driven approach to improving those impacts.*

Mark Enzer *OBE, CTO of Mott MacDonald and Head of the National Digital Twin Programme at the Centre for Digital Built Britain. The Centre for Digital Built Britain is a partnership between the BEIS and the University of Cambridge. It seeks to understand how the construction and infrastructure sectors can use a digital approach to better design, build, operate and integrate the built environment.*

Professor Aidan O'Sullivan *is Co-Founder and CTO at Carbon Re, Associate Professor in Energy and AI at the UCL Energy Institute and Programme Chair for AI and Climate Change at the International Research Center on Artificial Intelligence (IRCAI) under the auspices of UNESCO.*

Event Proceedings

Introduction

Simona Leskovar, The Ambassador of the Republic of Slovenia to the United Kingdom of Great Britain and Northern Ireland, presented the Slovenian programme for the Presidency of the Council of the EU. The Slovenian slogan for the EU Presidency is: Together. Resilient. Europe. It is in this context that the Presidency programme was created. It builds on the work done so far, and on the collaboration of the trio presidency together with Germany and Portugal, and also paves the way for the future trio presidency and its challenges.

The four essential chapters of the Presidency were outlined. The first was "Europe's resilience, recovery and strategic autonomy", the second was "the conference on the future of Europe", the third was 'the European way of life, the rule of law and equality for all', and the fourth touches on international affairs: "a credible and secure European Union, capable of ensuring security and stability in the region".

Ambassador Leskovar said that Slovenia will put a strong focus on AI, and noted that Slovenia has traditionally been very ambitious in the field of artificial intelligence. The plan is to accelerate work on horizontal regulation of AI, and to provide a framework for future regulation while limiting the risk of broader use. She also pointed out that IRCAI is an example of successful collaboration between scientific centres and the government.

Keynote

In a keynote speech showcasing the potential of AI in tackling climate change, **John Shawe-Taylor** (Director of IRCAI and UNESCO Chair in AI) starts off with the example of how a digital twin saved the Thames from dying out due to its low oxygen levels: A mathematical model predicted that if oxygen is introduced according to the underlying tide level, the river could be saved from dying out. A digital twin solved the problem of when and where to introduce oxygen.

However, the climate is a substantially more complex system, requiring such mathematical models to be accompanied by data-driven approaches. Moreover, to model such a complex system, we would need to:

- Combine different models into a complex digital twin, requiring estimations of uncertainty in order to fit the models together and understand how they would interact.
- Undertake component-based and structural modelling to make inferences, i.e. to answer questions on how big the impact of a climate intervention would be, facilitated by tools like bootstrapping
- Adopt and learn from experiences: we need to start acting right away to learn about and estimate the effects of the actions we take.

Thus, if these requirements are met, AI could prove to be a very adaptable technology with the potential to guide effective action, even in complex systems like our climate.

The transcript of the full keynote can be found here.

Panel discussion

Since 1990, in the UK, emissions from the construction sector have gone up by 45%. So, while trying to meet the national and global decarbonisation targets, this sector is going in the wrong direction. To discuss how this trend can be countered, three stakeholders from the sector joined the panel discussion:

- **Jade Cohen**, Co-founder of Qualis Flow (tech start-up working in construction)
- **Sana Khareghani**, Head of the Office for AI in the UK
- **Mark Enzer**, CTO of Mott McDonald & Head of the National Digital Twin Programme (NDTp)

Starting off with how the government works towards its ambitions of encouraging a cross-

sector adoption of AI, Sana emphasises that it would be highly beneficial to get AI across more than just the traditional AI-friendly sectors. This would imply also bringing AI to traditionally less digital-savvy sectors such as construction. While AI is not a necessary condition to hit net zero, it is definitely sufficient to reach the pace we need to hit the targets by 2030. Sana considers AI "an underpinning and enabling technology", which is why the government provides support in 3D printing and digital twin technology - both elements being relevant in construction. Furthermore, the government is ensuring the provision of foundational enablers of AI, such as a skilled workforce, access to high performance computing, access to the right datasets from the government, etc.

To get the AI community engaged in the construction sector, Sana highlights the role of the UKRI, namely to make sure the climate challenges faced by the sector are known, thus bringing the challenges to light and allowing stakeholders to start looking at solving them. Meanwhile, Jade claims that where sectors in particular can do well in adopting it, it is not necessarily targeting AI, but there is going to be a lot of AI technology that is used without the industry even realising it. It is very much around maintaining an open mindset to adopt new technologies, but not necessarily being prescriptive to what technology now actually entails. Mark, on the other hand, accentuates that it is where they get integrated or where we see the connections, that we can imagine the most value being released.
Discussing how far along the digitalisation journey the construction sector is, Jade asserts that there is enough to be going on with, but the results of any AI-based model have yet to be taken with a pinch of salt. The sector is, in fact, facing the challenge of predominantly siloed and segmented data. This is why Qualis Flow created a tool that sits on top of the supply chain to gather and consolidate data, and to bring it into a standardised format. Mark agrees that the interoperability of data is the main challenge: The longer we put it off, the more difficult it will become. This is why the Information Management Framework (as part of the NDTp) was launched, namely to enable shared reference data - a boring homework that needs to be done in order to unlock the fun stuff, according to Mark. Climate change is essentially a systemic challenge, which we cannot solve in silos. We need system-based solutions.

Hence, shared reference data needs to be used with shared standards. Sana emphasises that we need to ensure that standards are not only interoperable (so that we are not defining standards with one sector in mind that do not work for other sectors, but also that they should promote innovation. Jade added that the sector should not be waiting until the standards are available, in order to make sure there is consistency, to be able to leverage. Mark asserts that having a community that does learn by doing to discuss, and captures the best of what works, is what turns into guidance - and guidance can then turn into standards. Thereby, Mark's Information Management Framework (part of NDTp) categorises these standards into two parts: There are some technical standards forming the ontological basis, while the non-technical standards enable this soft half of the deal: stuff like commercial, legal and regulatory frameworks.

Finally, when discussing the upcoming opportunities for AI in the construction sector, Jade postulates on the potential of complete digital representation of the actual built environment (like NDTp does), while Mark regards firms like QFlow as an opportunity, as they take care of the early adoption of AI in meeting its climate goals in construction (while we need to make sure there is a rump following up). Finally, Sana adds on top of this that investors should be seen as the opportunity providers, because if brought to the table, they can ensure an increased implementation of AI in construction in the near future.

The transcript of the full panel discussion can be found here.

Quotes

Simona Leskovar

"We plan to accelerate work on the horizontal regulation on AI, which will establish a general framework for future regulation in this area, will formally define AI systems, and will limit the risk posed by a wider use." - *on the emphasis Slovenia will put on AI regulatory legislation during its 6-month EU presidency*

"With IRCAI, Slovenia positions itself on the global map with the most advanced technology, spearheading global and national policy regulation on AI, and many of the ethical questions arising from its use." - *on the importance of IRCAI for Slovenia*

John Shawe-Taylor

"The models need to be more complex; but with the ability to understand how changes will impact the dynamics, we need digital twins at a scale that can understand much more complex systems."

"Artificial intelligence is a very adaptable technology. It has the potential to guide effective action, even in complex systems like our climate."

Sana Khareghani

"AI is really an underpinning and an enabling technology."

"While it is not a necessary condition to hit net zero, it is definitely sufficient to reach the pace that we need to hit the targets by 2030."

"We (...) need to ensure that the standards are: not only interoperable (so that you're not defining standards with one sector in mind that do not work for other sectors), but also that they're useful and promote innovation."

Jade Cohen

"Enabling greater data flows (good quality data flows) between us and the components is of course going to be essential, to then apply any other sorts of technology on top of that as well."

"The biggest challenge that we have seen on site is a siloed segmented dataset."

Mark Enzer

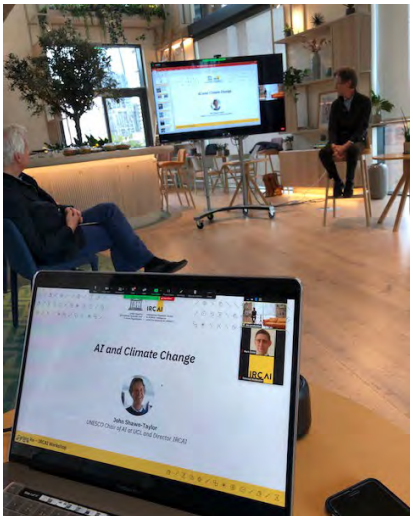
"I think it is where they get integrated or where we see the connections, that we can imagine the most value being released."

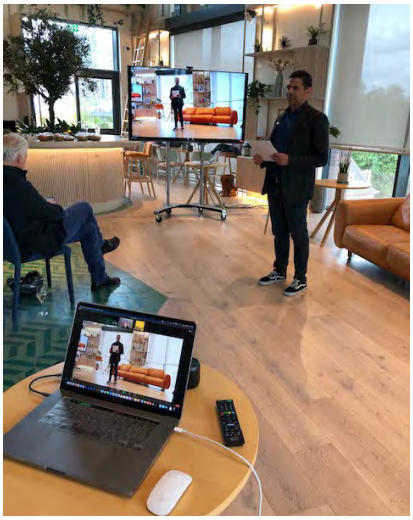
"The ontological foundations to minimise the friction in data sharing is something that we should really bite off and chew - because the longer we put it off, the more difficult it will become."

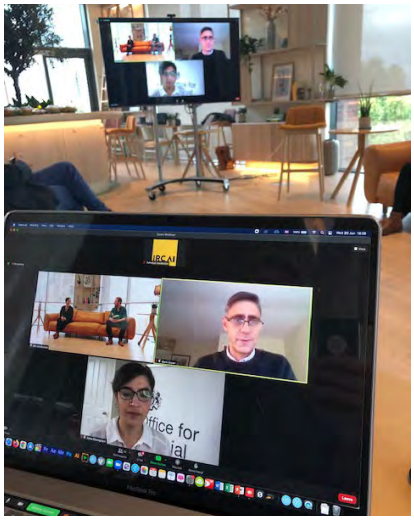
"Having a community that does learn by doing to discuss, and captures the best of what works - that can turn into guidance, and guidance can then turn into standards."

Participation

More than 100 participants joined the event online and about 20 people participated onsite. All participants were invited to submit the feedback form and responses are being collected.







Post-Event Media

The event was live streamed and all recordings posted on Videolectures.Net (link).