Research Agenda 2022

AURECON APPLIED RESEARCH



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Our guide to focus Aurecon's Applied Research resources and partnerships, accelerating the development and adoption of emerging solutions that will form the future technical excellence we deliver.

As we actively pursue a transition towards a more sustainable future for our people and planet, we seek to address some of our industry's most significant challenges by applying forward looking solutions in collaboration with clients and industry partners.

Our agenda is an invitation across our broad industry network to participate as partners in this endeavour and collaboratively solve these challenges together.

We are **building today** the future capability and eminence we as an industry will need for tomorrow.





Applied Research

We are living in an exciting time of change and complexity. Emerging technologies and techniques are redefining much of what we take as normal today, and more importantly are laying the foundations for what will be considered the normal of tomorrow.

Much of these coming changes lie outside what we know; experience won't always help predict the future. But there is opportunity to design the future for those willing to let go of the past.

At Aurecon, we are consistently reshaping our organisation to face the disruptive forces that will affect our markets, so we can, in turn, help our clients do the same.

Aurecon's commitment to building an organisation ready to capture future opportunities centres on three strategic pillars; innovation, eminence and digital transformation.

At the intersection of these three pillars is our Applied Research focus; our thought leadership put into action.

It is where we go beyond the insights and trends pertinent to our future, and take the steps to explore, experiment and accelerate these opportunities to make them reality.



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UPSTREAM

Exploration and discovery of technical solutions to industry challenges

Universities, Research Institutes, Startups

MIDSTREAM Validation of viable solutions using trusted industry expertise 👞

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Clients, Contractors, Suppliers

Ecosystem of Partners

Driving innovation across an industry requires an ecosystem of partners

To successfully translate and scale leading solutions we must work with diverse personnel and expertise across all aspects of our industry.

Upstream partners explore new technologies and techniques to address the difficult challenges faced across the industry. But a path to market for these innovations is not always clear, slowing the overall adoption of many solutions.

Downstream partners search for market-ready solutions to accelerate

in scaled, widespread use across the industry. Confidence in the readiness and maturity of novel solutions to scale commercially often hinders adoption.

Within this ecosystem, Aurecon seeks to engage midstream; supporting to bridge these gaps, connecting a path to market for leading solutions in upstream research, whilst also applying our technical expertise to validate solutions for our downstream partners to scale.

DOWNSTREAM

Accelerate and scale solutions within the industry



Research Streams

The environment around us continuously changes as advances in technology and greater connectivity unlock new challenges and opportunities. It is becoming increasingly important to navigate this complex environment, manage uncertainty and understand the roles we will play in the future.

Aurecon constantly examines these trends and signals of change, the **enablers** and **disruptors** which will impact us, our clients and the industries in which we operate.

Our Applied Research builds on these signals, accelerating opportunities across three research streams:

- > Materials, Methods & Manufacturing
- > Resilience, Net Impact & Renewal
- > Asset Intelligence & Decision-Making

These streams guide our focus, allowing us to ask **guiding questions** which push us to apply leading practices in our field, demonstrate responsible stewardship in our work, and impart lasting intelligence in the assets we support.

Leading practices in our field

Lasting intelligence in the assets we support



Materials, **Methods &** Manufacturing

The frontier of innovative design is ever expanding

The opportunity to push innovative and eminent design across our industry is growing. New methodologies, materials, and manufacturing techniques are emerging constantly. To help lead the charge, we must champion the integration of these innovations into how we deliver projects.

Sustainable approaches to materials and new manufacturing techniques must be built into design and delivery to become the norm in construction. To achieve this at scale we must unlock the economic barriers that slow their adoption.

Our adjacent industries can act as a guide for us to translate and leverage advances in automation, prefabrication, and lower impact materials, to become the new standard in how we design, deliver and maintain assets.

Our Global Impact

Under this stream we will address improvements and future impact to the align with following UN Sustainable Development Goals:



Guiding Questions

- manufacturing methods?
- delivery by half?
- questions with us?



How can we automate future design through the normal course of our work?

How do we reduce material usage through innovative design and

Where and how can novel design and manufacturing techniques reduce current

What part can you play in exploring these



Enablers & Disruptors

Lightweight structures & low impact materials

A reduction in material usage is needed across the built environment to lower its overall impact. This requires a rethink in which materials are used, and how they are applied throughout the entire lifespan of the asset they support.

Automated design & delivery

Computer-aided design and delivery is going beyond scripting

Robotic & modular onsite construction

of tasks towards an AI-enhanced collaboration with the design team. Low-level tasks are being automated and the data created is being used for rapid optioneering of new designs. From 3D printed concrete structures to robotic manufacturing and assembly onsite – technologies are disrupting construction. Leveraging these tools will be the key to reduce the time and risks in project delivery.



Resilience, **Net Impact** & Renewal

Our changing world requires a changing mindset

It is not enough to be reactive and reduce impact through minimisation. Sustainability will only become mainstream through collaboration, co-creation, and a commitment to regenerating the systems we live and work in, from infrastructure to business models.

The changing climate along with the transition towards a net carbon future presents a range of risks and opportunities in how we sustain assets, infrastructure and business models against uncertain yet probable futures. As we work towards creating, maintaining, and refurbishing greenfield and brownfield assets and infrastructure, research must focus on improving the resilience of built assets to extend their material life.

Our research pathways explore how to transition the asset and its materials while minimising impact across its lifecycle.

Our Global Impact

Under this stream we will address improvements and future impact to the align with following UN Sustainable Development Goals:



Guiding Questions

- hard-to-abate assets?
 - possible?
 - questions with us?



How do we design resilient assets & infrastructure in a changing climate while also embracing social transition?

How can we leverage resilience, net impact & renewal to move the dial on

How can we maintain materials at their highest usable value for as long as

What part can you play in exploring these



Enablers & Disruptors

Community & shared environments

Never before have we been more aware of the environment. Climate events and global health disasters are increasing our focus on the choices, actions, and long-term impact to people and the planet. Communities want to act and share responsibility.

Energy independence to interdependence

As we move from fossil fuels to renewable energy, we will see greater energy interdependence. But this shift to a customercentred energy system could create unintended disadvantages. We all have a role to play in designing a just transition that looks after everyone along the way.

Resilience, lifespan & asset transition

We must consider the circular lifecycle of the assets we create. The end-state and transition strategy of an asset starts at the design phase. From scheduled obsolescence, to repurposing of materials, to withstanding failures as a result of the changing climate; our assets have a lot to live up to.



Asset Intelligence & Decision-Making

The age of the connected and adapting asset is upon us

Digital transformation now forms a fundamental component of the assets we create and support. Lasting intelligence throughout the asset lifecycle is no longer emerging – it is critical.

Smart data and analytics yield insights which lead to better end-user awareness and decision-making throughout the whole lifecycle of an asset.

The DNA of the asset, product, and services we deliver must include a core of intelligent data capture, analysis and insight, through to strategic choices that reinforce themselves through operation.

With a data backbone as the analysis and insight enabler, no system should be dumb by design. Intelligence designed into an asset will allow operational efficiencies throughout the lifecycle and reduce the impacts of failure and asset downtime. To achieve this, we must incorporate both continuous and on-demand data capture solutions with the computational ability to assess and implement the most appropriate solution.

Our Global Impact

Under this stream we will address improvements and future impact to the align with following UN Sustainable Development Goals:



Guiding Questions

- performance?
- its lifecycle?
- questions with us?



How do we bridge multiple independent systems to optimise ongoing asset

How do we ensure data sources for asset performance are available throughout

How do we appropriately design fully autonomous and self optimising assets?

What part can you play in exploring these



Enablers & Disruptors

Systems will run on reinforced insights

Every industry and asset that generates or consumes data can and will be disrupted in some way by the enhanced intelligence and insights possible through Machine Learning. However, these systems however will only be as effective the quality of their data, and the expertise applied in their training.

Distributed computation & transactions

Computing and bidirectional transactions are shifting from centralised to decentralised models. Mobile devices in every pocket connect broad networks of compute power and provide individualised digital access, forming an interdependent layer to the assets they are interacting within.

Adaptation & disruption will be driven by data

With the ubiquity of smart devices, sensors and improved data management practices, businesses have increasing access to data and insights on the operational environment and asset performance. This enables opportunity to adapt, or if missed, be disrupted.







About us

Aurecon is a design, engineering and advisory company that brings ideas to life to create a better future for people and the planet.

In 2020, the Australian Financial Review named us Australasia's most

innovative company and most innovative professional services company. Our clients' ideas and aspirations drive all that we do. We work alongside them like no other firm to co-create clever, innovative solutions to <u>some</u> of the world's most complex challenges, adding value across the project lifecycle through deep technical and advisory expertise.

We serve our clients across a range of markets and international locations. Hardwired in our DNA are engineering, design and the deep need to leave a legacy. We are as diverse as we are dynamic. As curious as we are clever.

Drawing on our deep pool of knowledge, we bring vital engineering experience, technical capability and design expertise to the table. Then we listen deeply and intently.

We see the opportunities, possibilities and potential that others don't. Through a range of unique creative processes and skills, we collaborate

with our clients to re-imagine, shape and design a better future. We believe humanity depends on engineering; and we recognise we have a broader stewardship role to play. A deep responsibility to hold. As we continually strive for a life in balance, Aurecon clients will be ready for the future and engineered for life.



Our Markets



Our Expertise







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Aurecon brings ideas to life to design a better future. Imagining what is possible, we turn problems into solutions. ©2022 Aurecon

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Explore with us

Aurecon is seeking partners in creating an innovative and sustainable future for us all.

Whether you're a research team exploring a novel solution, a company in search of scaling one, or an organisation actively bridging the gap - If it aligns with our Applied Research Agenda we are interested.



Interested in exploring how we can accelerate the future together? Contact **Aaron Belbasis** to start the conversation.

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