

Connect to change 2026

Unlocking the power of systems thinking in the built environment

Highlights from the annual conference of the Built Environment Connective, held on 6 July

The Built Environment Connective launched its manifesto '[Connect to change](#)' in 2025, and set out nine recommendations to enable and accelerate positive systems change. Four have raced ahead and others are shaping up.

1. Commission the [Infrastructure Systems Review](#), to demonstrate the value of systems thinking in the built environment – now mid-way to completion.
2. Develop outcomes-focused, systems-based [metrics](#) and embed them in contracts and reporting structures – developed and informing the review.
3. Embed systems thinking in education and training curricula. Establish a clear and effective [competency](#) framework – mapped and ready for further development.
4. Advance a Connective [network](#) to activate and connect communities of action that will drive positive systems change – now spanning the whole value chain, all sectors, and growing internationally.
5. Empower a body with the remit to challenge the connectedness of built environment [policies](#) across government departments.
6. Empower a body provide [oversight](#) of how the built environment performs, as a whole.
7. Consolidate identified good practice in a [publicly available specification](#) on systems approaches for the built environment.
8. Roll out systems [leadership](#) development programmes; include systems thinking as a requirement in senior leaders' role descriptions.
9. Develop an information [platform](#) to connect people to tools, methodologies, case studies and guides.

Connect to change 2026, our second annual conference, shone a light on the progress being made.

Thanks to all of our speakers and panellists.

Thanks also to the 250 people – systems thinkers, systems doers and the systems-curious – who attended.

And thank you to the Infrastructure Client Group for supporting the event.

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Connect to change 2026 was organised by the Built Environment Connective steering group:
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Introduction



“We face a host of grand challenges and require systems thinking and doing to solve them.”

Alexandra Bolton, founder, Built Environment Connective

Why do systems matter?

We know that we’re living in a time of great change, with enormous challenges: climate mitigation and adaptation, nature protection and biodiversity, delivering infrastructure equity and creating the circular economy, not to mention the vast geopolitical changes happening and the economic uncertainty we’re all experiencing.

We also know that our built environment – economic infrastructure, made up of commercial buildings, communications, energy, transport and water, and social infrastructure of houses, schools, hospitals

and government buildings – is key to those challenges we face. In 2020 the weight of everything we’ve built surpassed the weight of all living natural things.

The built environment is more than asphalt, steel and concrete, bricks and mortar. It’s the people, services and society that flow through the built environment to create the outcomes we want – outcomes for the economy, society and nature: all of us.

The built environment is important and so are we.

All those challenges and the built environment itself are systems, and they interconnect. They form systems of systems.

Yet we manage them in silos – through siloed organisations and using siloed information.

We need to see the built environment as it is: a system of systems on which we utterly rely. And we need to manage it as such, with approaches that are long-term and joined up.

The built environment is much more than the sum of its parts, and we'll get best value from it when we take an outcomes-focused, whole life approach.

Each project must be planned, designed and delivered for integration into a wider system that already exists, with proper consideration for how it will affect that system.

We must look across the physical, social and informational systems that make up the built environment to create the outcomes we want.

Keynote: why the nation needs systems thinking



“We all need to be resilient, we all need to prepare for risks – and that is a whole system responsibility. The failure to be prepared will be a gross abnegation of our responsibility to our children and grandchildren.”

Lord Toby Harris, chair of the National Preparedness Commission

Critical national infrastructure (CNI) is essential. Without it we cannot function. All our critical systems are interconnected. This brings many efficiency benefits but creates new vulnerabilities.

Even a small disruption can have unexpected and major consequences. In 2019 a power outage that lasted a mere 15 minutes caused 24 hours of chaos across the rail network. On 5 December 2015, Storm Desmond caused

the River Lune to flood and swamp an electricity substation serving the City of Lancaster. More than 60,000 homes and businesses, and at least 100,000 people, were left without electricity for four days. Transport, communication and emergency services were disabled. ATMs went out of action. Fuel stations stopped dispensing petrol and diesel. Traffic lights stopped working. The railway station closed.

Text messaging, digital radio and the internet ceased to be available.

These were localised, short duration incidents, manageable in size. What would happen if the incident were larger and lasted longer? Some services would cease to work, and effects would cascade.

CNI has to work. To ensure it does, back-up systems are meant to be in place, but will they function? In reality, because they are only ever used in emergencies, when you need them, some back-up systems don't work.

Intelligence agency MI5 reported in 2004 that the UK was only four meals away from anarchy. The cascading effects of a major CNI failure could very easily put large parts of the nation in that position, and it does not take much to imagine the effects on civil order that would ensue. We know from the riots of 2011 how quickly the thin blue line of law and order can be overwhelmed.

We live in a TUNA world: turbulent, uncertain, novel and ambiguous. There are 89 acute risks in the government's published risks register along with 26 longer term slow burn threats in the government's chronic risks analysis.

We're closer to widespread war than we have been for 60 years, and the nature of war has changed – drone swarms, cyber-attacks, the use of proxies, and grey zone warfare; a willingness to ignore the established rules of war and to commit war crimes.

Cyber-attacks have crippled the NHS, Jaguar Land Rover and M&S.

The Salisbury poisonings in 2018, in which Russian agents attacked a defector on UK soil, resulted in an 80% reduction in retail footfall. A year later it was still down 10%. A million fewer tourists visited the city.

China experts expect either a physical assault or a blockade on Taiwan within two years. Taiwan plays a pivotal role in the global

economy as the world's leading supplier of advanced semiconductors required for modern electronics and AI. And the Taiwan Strait is chokepoint for international shipping. Disruption would be as severe for world trade as closure of the Strait of Hormuz. It would create a 5% downturn in GDP, equivalent to the 2008 financial crisis or covid.

And there's climate change. Much of our infrastructure was not designed for the climate parameters we're now experiencing. Moreover much of it has been inadequately repaired and maintained, a consequence of repairs and maintenance being deprioritised in favour of short term projects.

Our infrastructure needs to be prepared for more frequent extreme weather events.

At the same time, trust in public authorities is deteriorating and social cohesion has diminished. Government resilience plans rest on a fundamental assumption that in a crisis people will trust public information and act in accordance with advice.

Proper resilience and preparedness need to be based on a whole-of-society approach, involving individuals, businesses and organisations.

Much preparedness and resilience is threat-neutral – it enables better outcomes, whatever the threat.

Most businesses prepare for various contingencies, but events unrelated to them may disrupt them. Such events are unpredictable. It's not enough for organisations to focus solely on their own preparedness and resilience. They must begin thinking and acting systemically.

Government too needs to take a view of what's required for national minimum viability, considering what is essential to maintain a functioning society, economy and national systems in times of crisis.

Government must address a glaring challenge: that different systems have shared points of failure, but the systems are poorly

understood and their governance is fragmented.

Currently, government departments aren't joined up. They are often competing for budget and have priorities that are at odds with overall system resilience of the nation's critical functions. Regulators are also system specific.

Achieving systemic preparedness and resilience requires the biggest shift in mindset we've seen for many

decades – something that is recognised by both previous and new prime ministers.

We need readiness to devote tax revenues or see higher consumer prices to achieve system resilience. We need willingness to mandate critical infrastructure providers to do what is necessary. We need regulators to work together to deliver it. We need government itself to lead with a strong central purpose and drive coordination across different ministries and departments, to deliver systemic resilience in every region, city and town.

Keynote: building systems thinking into national strategy



“The Infrastructure Systems Review will show how coordinated systems thinking can reduce long-term risk, unlock productivity and improve outcomes from both new and existing assets.”

Margaret Read, deputy director of system change, National Infrastructure and Service Transformation Authority

In summer 2025 NISTA published the 10 Year Infrastructure Strategy and the National Infrastructure Pipeline, signalling a new, systemic, approach. They look at both social and economic infrastructure and think together about existing and new infrastructure.

Systems thinking is important because we live in a very interconnected world and because the supply chains and the customers for infrastructure overlap, and are often the

same. Historically they have all been managed separately.

Launching the strategy at ‘Connect to change’ last year, NISTA’s chief executive Becky Wood invited collaboration across the industry and with NISTA itself. We are pleased to be helping to sponsor and shape the Infrastructure Systems Review, which is collaboration in action.

The review is focused on how UK infrastructure operates as a whole system,

with the aim of moving beyond the siloed thinking and decisions that currently predominate, to an integrated approach to infrastructure that improves economic and social outcomes. Evidence so far indicates that it will show how coordinated systems thinking can reduce long-term risk, unlock productivity and improve outcomes from both new and existing assets.

The review lines up exactly with NISTA's strategy. It forms part of the evidence base to support implementation of the 10 Year Infrastructure Strategy.

The strategy signalled several changes. There's a lack of coordination between sectors, which means, for example, that energy assumes there will be water when they need it, and vice-versa. There is a lack of national, regional and local coordination. And there is insufficient means to surface and resolve trade-offs between projects and programmes.

We're seeking to resolve these problems by improving spatial and sector planning.

NISTA is working with the Ministry of Housing, Communities and Local Government to support local strategic authorities to take account of the sector plans, and to provide signals to the sectors on where they want to grow industry and housing.

Spatial priorities will drive spending decisions in both the public sector, through the spending review, and the private sector, through regulation and the provision of information to inform and attract investment.

Spatial prioritisation is being underpinned with analysis, using an aligned spatial tool that layers information on economic infrastructure capacity, environmental sensitivity, flood risk, land use and the distribution of industries. We plan to add data on the capacity of social infrastructure. And we're working with the Department for Environment, Food and Rural Affairs to integrate land use data.

The tool will be shared with strategic authorities as they develop their spatial development strategies, so that we're all using the same evidence base and everyone has the information they need to develop joined-up approaches at project and local levels. The tool is already helping to flag trade-offs that were previously hidden.

And it is complemented by the Treasury's place-based approach to business cases, which will enable decisions to be made at the level of whole places, rather than individual assets or sectors.

The tool, the strategy, the pipeline and Infrastructure Systems Review together begin to address the gaps we have in understanding whole system performance.

We are seeking, and now have practical steps towards achieving, clearer system-level insight, which leads to better decisions, which leads to greater confidence, which in turn leads to more investment.

Spotlight on the Infrastructure Systems Review



“Work got underway in February on a study that will shape policy, investment decision-making, behaviours and governance across economic, social and natural infrastructure systems.”

Mark Enzer, chair of the Built Environment Connective and fellow, Mott MacDonald

The Infrastructure Systems Review is being jointly sponsored by the National Infrastructure and Service Transformation Authority (NISTA), the Construction Leadership Council’s Green Construction Board, and the Infrastructure Client Group.

We set out the case for the review last summer in our manifesto ‘Connect to change: unlocking the power of systems thinking in the built environment’. Its purpose is to provide clear evidence to support greater investment in systems approaches within the UK’s built environment. The intended outcome is to

enable the built environment to deliver greater value at lower long-term cost.

The Review will inform national policy, guide investment, and help shape a more resilient, productive, and sustainable built environment for generations to come.

By quantifying the economic contribution of existing systems, identifying systemic inefficiencies, and revealing opportunities for improvement, the review will demonstrate how government can reduce fiscal risks, unlock

productivity, and align departmental policies around shared outcomes.

The intent is to ensure that every pound spent on the built environment delivers maximum

national benefit – for growth, resilience, and the wellbeing of people and places.

Publication is due late autumn 2026.



“The opportunity is not simply to build infrastructure more efficiently. It is to create more value from the infrastructure systems we already have, and those we will build in the future.”

John Russon, board member of the Infrastructure Client Group and director of portfolio management, assurance and commercial for flood risk management, Environment Agency

The Infrastructure Client Group represents major clients spanning the water, nuclear, rail, airports, power generation and distribution, roads, telecommunications and health sectors.

To drive change on certain issues requires clients to take leadership, and through the ICG we are focusing on five big issues:

- climate, which encompasses nature, climate resilience and decarbonisation
- data and digital, which is examining the life cycle of data across major projects, defining the role and purpose of chief data officers, and benchmarking our organisations' digital maturity
- people, focusing on workload planning, resilience, health, safety, and wellbeing
- productivity, developing practical productivity tools, examining barriers to technological adoption, and sponsoring a new productivity specification, PAS4010
- enterprise-based approaches to project delivery, under the banner of Project 13, that involve aligning owners, suppliers, and partners around shared outcomes rather than traditional transactional contracts.

These are all fundamentally systemic issues, which makes the Infrastructure Client Group a natural supporter and sponsor of the Infrastructure Systems Review.

Using systems approaches to get better performance from investments, existing infrastructure and from projects is important to all of us. We face growing pressure to deliver increasingly complex programmes faster, more efficiently, and at lower costs, in the face of an ever more challenging operating environment.

The ICG represents diverse sectors, and we are interfacing much more, and in ways we have never done before. Many opportunities are arising at the interfaces between our systems, and the challenge is increasingly one of system performance, not just asset performance.

Infrastructure challenges are increasingly system challenges. Understanding how to improve the performance of whole systems

is now as important as improving the performance of individual projects and assets.

This matters greatly. Resources and money have become more constrained as the burden of demand and environmental factors on the assets we own have grown.

The Infrastructure Systems Review is important, as it will aid clients in delivering better outcomes for people and nature, better value for existing investment, greater resilience, greater confidence for investors, and more effective delivery for national priorities.

The review will enable us to better define the outcomes we want and work out how to achieve them, understand our critical dependencies, and align incentives across organisational boundaries. All of which are really, really important for us all, as we seek to work more effectively together.

The review will improve our ability to take a whole life perspective on our work, invest in stewardship as well as in delivery, and build the capability to make better cross-system decisions.



“How do we get more for our money and improve performance? By focusing on outcomes, improving our understanding of dependencies, risks and opportunities, and helping people make better decisions. In short, through systems thinking.”

Julie Wood, integrator for the Infrastructure Systems Review, Institution of Civil Engineers president-elect and fellow, Mott MacDonald

The Infrastructure Systems Review is being delivered by a coalition of clients, consultants, academics, and systems practitioners.

They bring some of the strongest infrastructure experience in the UK, and the collaboration is both broad and constructive. It is truly boundary-spanning.

All the contributions are on a pro bono basis, motivated by a shared belief that there is real value in developing a more connected

approach to infrastructure decision-making, and a desire to achieve better outcomes for society.

As integrator, my role is to bring together evidence, identify common themes, test where the findings are strong enough to support recommendations, and shape the narrative so it is useful for senior policy and industry audiences.

Governance of the review is provided by a steering group and a senior stakeholder

group. The steering group holds us to account, and provides assurance and risk management; the senior stakeholders provide oversight. Both provide constructive challenge as well as support.

Our aim is to produce a credible narrative that conclusively demonstrates the value of applying systems approaches, supported by clear, actionable recommendations suitable for senior policy and industry audiences.

The review is being developed by studying 16 projects, representing a broad cross-section of sectors and regions of the country. They range in size from small and local to nationally significant giga-projects – we've categorised them using a scale of mice, dogs and elephants.

We are using a set of 'success factors' and 'outcomes-oriented performance indicators' to develop the case studies. These create consistency in how the case studies are presented, assist the identification of themes that emerge cross-sector, and enable the capture of learnings.

The process of shortlisting case studies started in February. They are now well developed, and we are entering the stage of synthesis and integration, bringing the

evidence together to identify common themes, test the strength of the findings, and then determine recommendations.

A clear pattern from all the case studies is that significant improvements can often be achieved by improving our existing systems before building new assets. It is possible to get much more from what we already have.

Value is often created or lost at the interfaces between organisations, sectors and systems. Several case studies demonstrate that decisions made within a narrow boundary can unintentionally create risks and constraints elsewhere. Narrow boundaries may be convenient, but they can also push problems elsewhere. Organisations that work across boundaries are better placed to improve performance, resilience and value.

We're also seeing evidence that fragmentation in governance, decision-making and funding reduces value.

How do we get more for our money and improve performance? By focusing on outcomes, improving our understanding of dependencies, risks and opportunities, and helping people make better decisions. In short, through systems thinking.

Infrastructure Systems Review: case studies snapshot



“Systems thinking brings awareness that we are not just maintaining an historic structure but protecting interconnected economic and social systems, and managing resilience of a region.”

**Sam Edwards, head of highways and economic infrastructure,
Lincolnshire County Council**

Sutton Bridge is a Victorian road bridge on the boundary between Lincolnshire and Norfolk.

It's a fascinating heritage structure that forms part of the strategic road network. Part of the problem is that it is viewed as a bridge that needs to be maintained. We actually need to think about it in terms of connectivity. Sutton Bridge is a critical node in a regional system

that supports agri-food, import-export and tourism economies.

When the bridge fails – and it is in the process of failing now – the impact will ripple out into all those different sectors, and into the secondary and tertiary sectors that feed into and from them.

Right now, none of the stakeholders in those sectors are aware that they depend on a system that can be dramatically disrupted by the failure of a single asset.

Right now, the engineering solution for keeping the bridge open isn't going to change, but what fundamentally changes is our understanding of the risk, or our collective lack of understanding of it.



“All of our major contracts are focused on the outcomes that are achieved rather than what is built.”

Neil Kerry, head of system integration on the Trans-Pennine Upgrade and director of operations, Jacobs

The Trans-Pennine Upgrade programme (TRU) is one of the elephants – an £11 billion investment in improving rail connectivity across the north of England.

The investment is focused between Manchester, Leeds and York, but the benefits extend far beyond.

A lot of column inches have been written recently about connecting the cities of the north and generating economic growth. TRU is about achieving that, providing more passenger seats and higher freight capacity, efficiently and cleanly.

We've taken those outcomes and worked with our stakeholders to make it clear who owns which part of the outcome, or in some cases how they share outcomes. We have

apportioned and allocated outcomes to people, and keep a close eye on progress towards delivering them.

That is supported by innovation in how we've contracted across the supply chain. We have employed Project 13 principles and create an enterprise organisation that includes the builders, the operator, the maintainer of the railway system, those who run the trains on the track, and the investors.

All of our major contracts are focused on the outcomes that are achieved rather than what is built.

The case study will provide some valuable learnings as to how we've been able to create the enterprise and the process of finding the right balance of investment, responsibility and outcomes. The project is by no means perfect, but it provides experience on which to shape a blueprint for future GBR rail investment.

We are only about 30% of the way to completion so far, but the electrification, improved signalling and new stations completed have already improved performance and enhanced social inclusion.



“Working together enables us to develop organisational, informational and financial solutions which potentially could become templates applicable to the many others who face the same problems as us.”

Ben Ramsden, HASTE Coordinator

I live in a beautiful kilometre stretch of Hastings beachfront, where increasingly wet winters over the last decade have triggered a series of landslides. People's homes and businesses are now being literally lost. Property value is sliding too.

What's happening in my home town is also happening across the country.

When Hastings was developed in the 19th century, it was planned and engineered as an integrated system, but in the last hundred years sight of it has been lost. The town's management has become fragmented, with siloed ownership, blurry accountabilities, and

services like mortgages and property insurance that do not interoperate or communicate with one another, leaving residents and businesses paralysed. We're not able to respond to the threats of landslides we have at the moment.

The Local Government Association, the Department for the Environment, Food and Rural Affairs, our local MP, the council... everybody sees this as a problem, locally and nationally. But there is currently no approach to address it.

HASTE stands for hydraulic activity stabilisation training enterprise, and has

been set up using volunteers and local skills from Hastings. Its purpose is to restore stability and make our homes safe to live in.

The first thing we started was a community trust company to orchestrate the stakeholders, to align incentives around improving asset value, to build trust, inspire belief, and leverage capabilities we have across the community – everything from designers to fundraisers to quantity surveyors, to people with the rope access skills to fix landslides, and many more.

We then aggregated data, which we treat as a public asset. We have used it to create an integrated ground model, to see exactly what is going on across the cliff system. We've deployed a sensor network to create an early warning system for residents. And now we're starting to pull all of this data together to start

to look at how do we create insurable, integrated designs.

Critically, we've got to fix the cliff in a way that is viable and affordable for all of the residents.

That means applying solutions that match local capabilities, and that can be maintained locally in the long term. Financing the work has to be done in a way that is almost painless for the community, by increasing asset value and leveraging off that.

All of that's impossible when you act alone. Working together enables us to develop organisational, informational and financial solutions which potentially could become templates applicable to the many others who face the same problems as us.



“To optimise our natural infrastructure and give it the muscular resilience it needs, activity must be at scale, aligned and connected.”

Steve Elderkin, director of environmental sustainability at National Highways, and co-founder of Rebuilding Nature

We use the phrase “critical infrastructure” to describe systems that provide essential goods and services. Nature absolutely meets that definition. It is the critical, foundational infrastructure on which all others depend, and in which the economy is embedded.

We are dependent on what nature provides, regulates and inspires.

A thriving natural environment provides materials, regulates the water cycle, sequesters carbon and feeds the workforce. We need to be immersed in nature to feel well and emotionally regulated.

Other infrastructure networks are operated, maintained and enhanced as a system, like National Highways’ strategic road network, with overseeing organisations and governance.

Not so for nature. The landscape is fragmented, good projects are isolated, policies are owned in different departments and they pull against each other.

To optimise our natural infrastructure and give it the muscular resilience it needs, activity must be at scale, aligned

and connected. We will achieve more, and gain best value for money, working together to a common plan for natural infrastructure.

The Strategic Nature Network has been developed to realise the prescription for nature recovery set out in the report by Professor John Lawton, 'Making space for nature', in 2010. The 'Lawton principles' are to create more, bigger, better, and better joined-up habitats.

The Strategic Nature Network is the critical national infrastructure to which policies,

funding, delivery programmes, planning and regulation should all align. Within it, there are nature investment zones, which are landscape-scale master plans for delivering the natural infrastructure required to underpin UK health, prosperity and resilience.

Establishing nature as effective critical infrastructure requires national effort. Commitment to the Strategic Nature Network as a government major programme – a nature-led infrastructure programme – will support growth, improve value for money, and allow for more strategic regulation.

It will safeguard the ecosystem services on which we all rely and it will leave a legacy that we can all be proud of.



“The value of a systems approach is in creating a shared understanding of the outcome we need to achieve, and working back to solutions from there.”

Ivan Lucic, senior director of integrated systems, Jacobs, and communities lead for the Built Environment Connective

The biggest elephant among the case studies is the Oxford Cambridge Growth Corridor, a programme to connect the world-leading science, technology and academic clusters of the two cities, unlock regional growth and unleash economic activity with national benefits.

But the scope was unclear. Was the corridor just about delivering an East-West Rail link, or more than that? What was it that had to be done? We quickly concluded there was no clearly identified outcome.

We decided to make this a case study in order to redress the situation. We held three

workshops, the first with the Treasury and NISTA.

In many ways the Growth Corridor is a “wicked problem” because it's very complex and there are so many interdependencies to consider. It's about engineering solutions, and also about people, society, the services that need to be provided, and the natural environment.

What we found is that many projects across the corridor had started without clearly defined objectives and outcomes.

The value of a systems approach is in creating a shared understanding of the outcome we need to achieve, and working back to solutions from there.

To begin resolving the wicked problem, we started by logging the key drivers, enablers

and blockers. We reviewed each in turn, to identify points of leverage and coordination.

There's a lot further to go, but with Treasury and NISTA's support the need for a joined-up, outcomes-oriented approach is now clear.

Systems success factors and performance indicators



“Eventually, every system has to answer the question: how do we know if it’s working?”

Jess Hollidge, strategic infrastructure advisor, Allora, and steering group member, Built Environment Connective

We usually default to simple targets to judge effectiveness – cost, time, safety. Whilst those matter, we need something more – a way of measuring the value of the built environment against the current and future needs of people and planet.

In our manifesto, ‘Connect to change’, we recommended the development of systems of “metrics” for assessing the performance of built assets and systems. The Connective’s Systems Specialists Community, in collaboration with the other communities

of interest and action, has developed two frameworks to enable that – a set of “success factors” and “outcomes-oriented performance indicators”.

They provide a stepping stone towards the development of a publicly available specification, or PAS, for systems thinking in the built environment – another of our Connect to change recommendations, and something that we are now discussing with the British Standards Institution, BSI.



“The two frameworks have been developed through massive collaboration across the Connective’s communities.”

Gary Smith, architect for engineering processes, Airbus Defence and Space, and lead for the Built Environment Connective’s Systems Specialists Community

It’s always been a big challenge to demonstrate that a systems approach does actually lead to better outcomes.

Systems thinking is inherently grappling with complexity – we rarely encounter simple cause, simple effect.

And that’s what we’ve been examining with the success factors and indicators workstream.

Success factors are essentially what we need to define, guide and keep us on track towards successful outcomes. We also need to be able to assess the extent of success –

performance indicators. Our two frameworks look at the beginning and the end of things.

They are flexible enough that they can be used across domains and disciplines: it doesn’t matter whether you’re working on a mouse-sized or an elephant-sized project, or you’re in water, transport or power.

The frameworks are sufficiently abstract that you can apply them to anything, but also sufficiently meaningful so that you can define a truly successful outcome, based on a systems approach.

The two frameworks have been developed through massive collaboration across the Connective's communities. Our first version was a massive 250 pages long, and we've consolidated that down, to seven success factors and seven outcome-oriented indicators, which I think are going to be really useful.

Briefly, the **success factors** are:

1. **Outcome clarity** – Those leading the endeavour are clear what outcomes they are trying to achieve.
2. **Systems capability** – Those involved have the capability to understand and work with the system as a whole.
3. **Leverage focus** – Interventions are chosen to influence the drivers of outcomes, not just deliver outputs.
4. **Authorising leadership** – Leadership provides the authority and support to act coherently across boundaries.
5. **Incentive alignment** – People and organisations are rewarded for doing what improves outcomes.
6. **Decision quality** – Decisions are reasoned, evidence-based, free of bias and timely.
7. **Adaptive learning** – Those working in and across the system learn from experience and adapt their actions.

The **indicators** are:

1. **Service performance improvement** for people, organisations and nature
2. **Wider outcomes** achieved and improved
3. **Whole-life value**
4. **Efficiency gain**
5. **Predictability**
6. **Integration** across organisations, assets, systems, data and services
7. **Systemic improvement** – removal of structural barriers, gaps and frictions



“Applied to the Infrastructure Systems Review case studies, the factors and indicators enable proper comparisons between projects.”

Doug Forbes, director, Whole Life Consultants, and honorary research fellow at the University of Dundee

It’s important to understand what’s going on in a system, what factors are contributing to its performance, and the outcomes that result from that performance.

Success factors and performance indicators are different to targets, and it’s an important distinction. One of the dangers of setting targets is that targets become objectives in their own right. That can drive the wrong behaviours. Success factors and indicators maintain focus on ultimate outcomes – the things we’re really trying to solve.

Applied to the Infrastructure Systems Review case studies, the factors and indicators enable proper comparisons between projects. The review team is better able not only to ensure they are comparing apples with apples, but Granny Smiths with Granny Smiths.

Part of our challenge in developing the two frameworks has been to find the balance between making them simple enough that they can apply across different scenarios, but complex enough that they actually capture specific system characteristics and detail.



“By focusing on outcomes and providing a consistent language for discussing them, the frameworks change the way we can think and behave.”

Emma Langman-Maher, associate director, Aecom

The language we use is fundamental to allowing us to have the conversations that we want to have. The frameworks provide a shared vocabulary and set of understandings. They create a basis for building understanding and trust across industries, disciplines and organisations.

By focusing on outcomes and providing a consistent language for discussing them, the frameworks change the way we can think and behave – to focus on achieving something together.

The frameworks are dynamic. They are not a rigid solution, forever and a day. They are designed to encourage evolution in how we interact and perform, and to evolve as we do – and we hope to drive continuous improvement.

The key is to use them and give feedback. Become co-contributors to their development by sharing your experience of using them.

Systems competencies

“Competencies are a key enabler of systems thinking and change in the built environment. We face a lot of systemic challenges. We also know that there are very substantial systemic opportunities. We need the knowhow, mental models, skills and capability to address them.”

Jess Hollidge, strategic infrastructure advisor, Allora, and steering group member, Built Environment Connective



“The framework aligns competencies with capability to undertake interventions that are aligned with outcomes.”

Mohammad Hassannezhad, lecturer in systems engineering, University College London and director of the Systems Frontier Lab

For a long time it's been assumed that competencies translate into capability. That is not always the case.

The Built Environment Connective's Academics Community has developed a framework that addresses this gap, with guidance and testing from across the Connective's other communities.

The framework's core principle is that organisational capability does not reside in competencies alone. It emerges through the interaction of competencies, roles and context. This leads to three core principles.

First, capability is emergent. Having people with the right knowledge and skills is necessary but not sufficient.

What people are able to do depends on their role, the decisions they are authorised to make, the environment in which they work, the experience they gain, and how their capabilities interact with those of others.

Second, systems thinking is developmental. It grows differently in different contexts. It's not something that we can train people in solely through a course of education. It develops through experience, reflection, relationships and practice. It has to be nurtured, cultivated and managed by organisations in an authentic way.

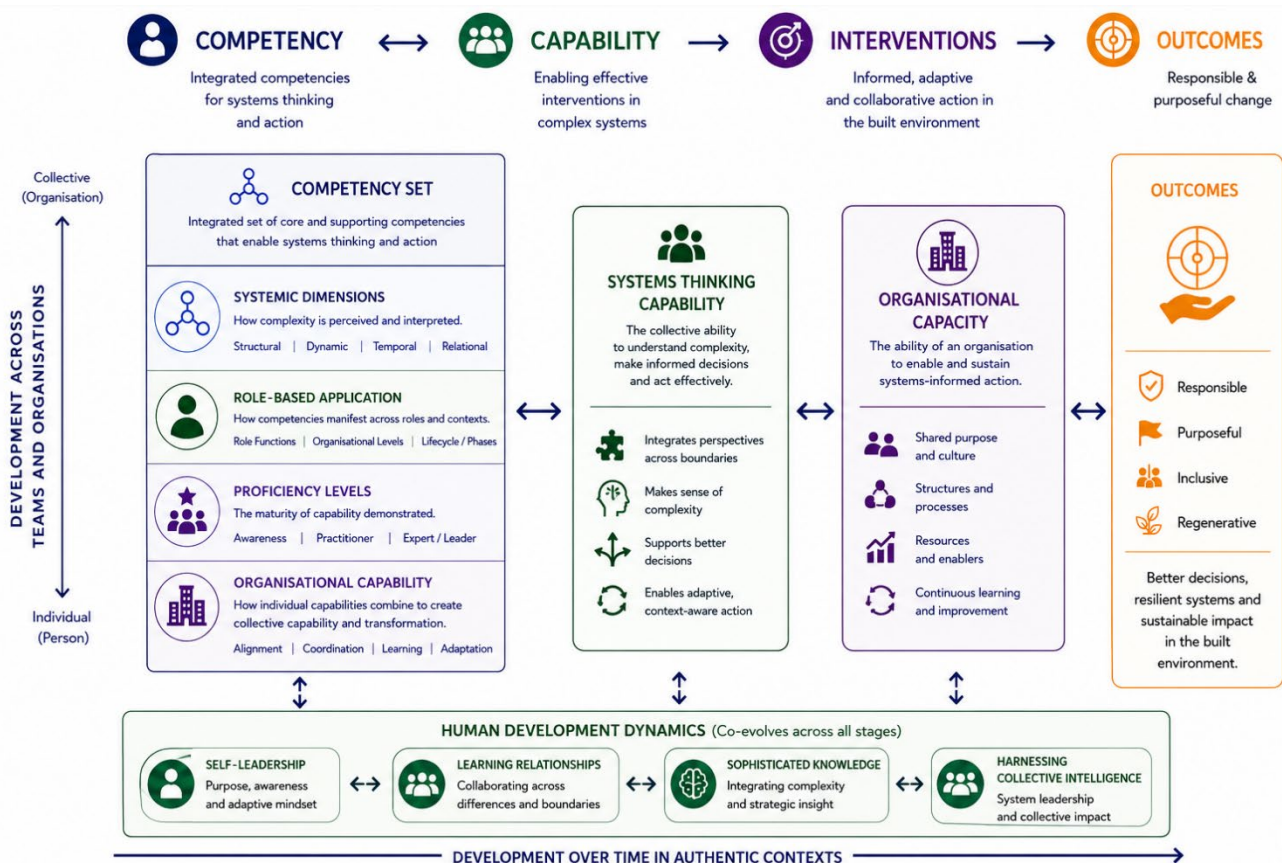
Third, human development and systems development go together. People manage systems and make interventions that change systems. Under conditions of complexity,

uncertainty and competing priorities, people with similar competencies can make very different decisions. How they interpret situations, work with others, adapt to changing circumstances and exercise judgement all influence the interventions they make.

The framework connects competencies to capability to undertake interventions that are aligned with outcomes. It recognises the need for human development spanning self-

leadership, learning relationships, sophisticated knowledge and collective intelligence – across individuals, teams and organisations.

We are developing the framework further. We're now seeking engagement from academics and practitioners to test it in different contexts and challenge its assumptions – helping to develop a practical approach to building the systems capability needed to deliver better outcomes for people, organisations and the built environment.





“EWB is a movement of change makers, and we are working towards a tipping point at which the engineering sector behaves in a way that is globally responsible, purposeful, inclusive and regenerative.”

John Kraus, chief executive, Engineers Without Borders UK

We've been doing a lot of work to encourage people across the entire engineering profession, and others in allied professions, to think about outcomes first, not technology first; and to think about people and place together.

For students, this approach provides a new way of thinking about engineering and equips them with really important employability skills.

We're seeing more organisations converging on this.



“There’s a recommendation that the next version of the standard will make systems thinking an explicit competence.”

Ben Jones, product manager, the Engineering Council

The Engineering Council is the UK regulator for the engineering profession, and the UK Standard for Professional Engineering Competence and Commitment (UK-SPEC) is the main lever that we have to support ongoing professionalisation in the sector.

Systems thinking is currently not explicitly referenced in UK-SPEC. Graduates from Engineering Council-accredited degree courses must learn and demonstrate a systems approach, and applicants for professional registration must already show they can evaluate the wider social, economic and environmental impact of their engineering activities. However, the addition of a specific competence is something that the

Engineering Council is planning to consider in drafting the next iteration of the standard.

UK-SPEC is dynamic: it is updated on a five to seven-year basis and we are currently working on what the next version will look like. Having consulted a wide range of professionals from across engineering institutions, industry and academia, drafting is now in progress, and following our interactions with the Built Environment Connective and other partners, it is expected that the next version should address systems thinking as a vital skill in its own right.

Once drafts of the new standard are available, they will be shared as widely as possible for consultation. If you would like to tell us whether we have got it right, sign up for updates: www.engc.org.uk/sr2026.



“We’d like to see more modular learning, supporting lifelong professional development, and equipping graduates and working professionals with competencies in systems thinking, alongside other future-facing skills.”

Milda Monamaitye, chief executive, Association for Consultancy and Engineering

We all know that projects are getting bigger and more complex than ever before. And at last we are waking up to the fact that we must sustain, manage, adapt and improve the existing built environment too – an even bigger and more complex challenge.

We recognise that this calls for systems thinking and are calling for it to be embedded

as a core professional capability. Infrastructure, architecture, engineering and construction are grappling with a longstanding skills shortage, and we believe that new approaches to education and training are required – the rapid evolution of the built environment calls for new course content, and more flexible ways of learning.

What's next for the Built Environment Connective



“We're not creating a new silo. We're seeking to grow and show the power of connection.”

Lily Whitaker, graduate analyst, Mott MacDonald and steering group member, Built Environment Connective

The role we want and already see the Built Environment Connective playing is in our name: connecting people, organisations and initiatives.

There are many organisations working to change systems and a lot of good activity across the built environment. The power of connection is in improving lines of sight on what different actors are doing, and shaping a shared language that aligns principles, enables coordination of efforts and the creation of synergies – improving everyone's ability to act systemically.

A key point for us is that the Connective is not a top-down organisation. It's not about

controlling, dictating or mandating. It's about the power of connections, realising a sum that is greater than the parts, and not reinventing the wheel.

Our vision is for a built environment that enables people and nature to flourish together for generations. Our mission is to advance systems thinking and drive positive systems change. And our way of working is outcomes-focused and systems based.

We're working with communities of like-minded individuals and organisations to unlock the value of systems thinking by:

- Translating systems thinking into practical action.
- Establishing a shared direction towards outcomes that genuinely matter.
- Connecting people, ideas and initiatives across organisational boundaries.
- Creating high-trust spaces where collective commitment grows.
- Developing shared understanding that enables alignment.
- Sharing learning so progress compounds over time.

As a young person, I'm really concerned about the future of

our increasingly volatile and uncertain world, and the pressures on our built and natural systems. We really need to act, together, effectively. And we need to act with speed and determination.

Connecting people and organisations, information and initiatives – connecting across silos – is how we achieve positive systems change.



“We all need to be ready for systems thinking, and it’s more than likely going to come down the line quicker than any of us think.”

Mark Coates, vice president of infrastructure policy advancement, Bentley Systems, and steering group member, Built Environment Connective

The Built Environment Connective is a public good organisation that brings people together to turn systems thinking into coordinated, lasting change. We’re guided by a “magnificent seven” Cs.

Convenors – Creating trusted spaces for shared purpose and collective commitment.

Collaborators – Working alongside partners to co shape agendas, pathways and shared work.

Connectors – Linking people, ideas, knowledge and initiatives so a fragmented system works coherently.

Coordinators – Aligning activities to reduce duplication and focus effort on shared outcomes.

Champions – Promoting approaches and behaviours that improve outcomes for people and nature.

Catalysts – Sparking fresh thinking and relationships to activate change and accelerate progress.

Challengers – Asking the hard questions that strengthen understanding and improve decision making.

The systems thinking message, and connective mindset, are now

catching and spreading internationally. Industry, government and investors are embracing systems thinking and showing interest in the messages and methods of the Connective.

Now, what does that mean? As that awareness and mindset become embedded, systems thinking is going to make its way into contracts. And that will drive it even further.

We all need to be ready for systems thinking, and it's more than likely going to come down the line quicker than any of us think.



“The Built Environment Connective is a proof point for a model that can travel across systems and geographies.”

Wolfgang Schuster, founder and director, Built Environment Connective

The Built Environment Connective set out a simple but powerful change logic in our manifesto last year that follows a step by step approach.

- Select the system of interest: the built environment
- Understand and agree outcomes – existing and desired
- Understand the systems that deliver those outcomes, and how they do so
- Design interventions that change the systems, to achieve the desired outcomes
- Observe, learn and iteratively improve through repetition

The Connective is not simply advocating that logic. It is a part of it.

Workstreams underway, relationships being created, trust being built and collaborations emerging are not simply supporting systems

change; they are themselves ‘interventions’ on the system of organisations that shapes and manages the built environment. And we can clearly see that those interventions are effecting change.

Last year many of us developed a shared understanding which is now providing the basis for priorities and coordinated action.

What is becoming apparent is that the underlying change logic can travel beyond the particular system we started with.

It is generating wider interest. Our ambition and strategy are to build on what the Connective is already achieving, and explore opportunities to unlock positive change in other systems and geographies.



“It would be incredibly ironic if we created a new silo for systems thinkers in our already fragmented industry. We have to practice what we preach, and connect.”

Anna Bowskill, strategic advisor, Allora Infrastructure, and Built Environment Connective advocate

A year ago the Connective was brand new. In July 2026 we launched and began socialising our manifesto and recommendations – and found they had really strong traction. As we have moved ahead with delivering the first of the recommendations, we’ve been raising

awareness and growing the network that is itself the Connective.

Part of that involves advocacy. What we want to do is connect together what already exists. It would be incredibly ironic if we didn’t do that, and simply created a new silo for

systems thinkers in our already fragmented industry. We have to practice what we preach, and connect.

As an advocate, I present and explain the Connective at events.

The Connective's agenda is relevant across a huge variety of fields – its manifesto, recommendations, and ways of working land extremely well.

Through the amazing network that has come into being, the Connective also provides a wealth of relevant insights and connections. It has a big role to play in how we can understand more about our sector – the issues at play, what's going on, who's doing what, and how to connect with all that.

Systems thinking needs advocacy – it's something I encourage everyone to do.



“Amazing things can be achieved when people come together with shared passion and commitment.”

Andrew Mylius, freelance writer and editor, and member of the Built Environment Connective steering group

In July 2025 we launched our manifesto, ‘Connect to change’. In it, we set out nine recommendations. What progress has been made in the last year?

Recommendation 1, the **Infrastructure Systems Review**, is well underway, scheduled for launch in late autumn this year.

2, **metrics** – better described as success factors and outcomes-based performance indicators – have been developed and are being used to deliver the review.

3, an initial **competencies** framework has been developed.

4, **networking** has taken off. The Connective is organic, self-organising and self-actuating. It is succeeding because lots of people believe that the built environment can be delivered better, can work better, and can deliver better outcomes. Networking has created five communities of action – academics, clients, consultants, investors, and system specialists. Networking has delivered the amazing progress already achieved. And across the Connective network, there is a real desire to go further and achieve more.

It feels like recommendations 5 and 6 are happening. They were **policy**, to improve cross-departmental policy making for the built environment; and **oversight**, to provide

ongoing systems-based oversight of the built environment, to improve its performance. Within government, the National Infrastructure and System Transformation Authority sees systems thinking and systems doing, across departments, as fundamentally important for getting best value from public sector investment.

7, we recommended a **framework** to embed systems thinking across the built environment, by sharing proven, effective approaches. The work on success factors and outcomes-based performance indicators is a major stepping stone towards a framework. There have already been initial exploratory discussions with BSI about developing a publicly available specification for systems thinking in the built environment.

8 was **leadership** training, to create a cadre of leaders capable of unlocking the benefits of systems thinking. Leadership is a dimension of the ongoing work on competencies. We can envisage courses, training programmes and certification being developed by educators and institutions as systems thinking takes deeper root.

And 9, was the creation of a **platform** to facilitate knowledge sharing and

collaboration, and provide access to resources. The Connective is exploring potential solutions for bringing together people and communities, information, events and innovations.

All of the progress achieved so far has been thanks to huge voluntary effort.

Amazingly, there are some limitations. Ongoing development of the competencies, the framework and the platform will depend on funding. Options are being explored, but our community leaders would love to hear offers or suggestions.

Our collective near-term focus is to deliver the recommendations. But the recommendations are not the totality of what the Connective is for.

Our world is full of challenges and opportunities that we can address better together. We hope that collectively we will define and deliver new workstreams that unlock the value of systems thinking, for a better built environment.

How to get involved

If you're interested, there is a place for you.
Please get in touch via one of our community leads.

