Jacobs

Challenging today.
Reinventing tomorrow.

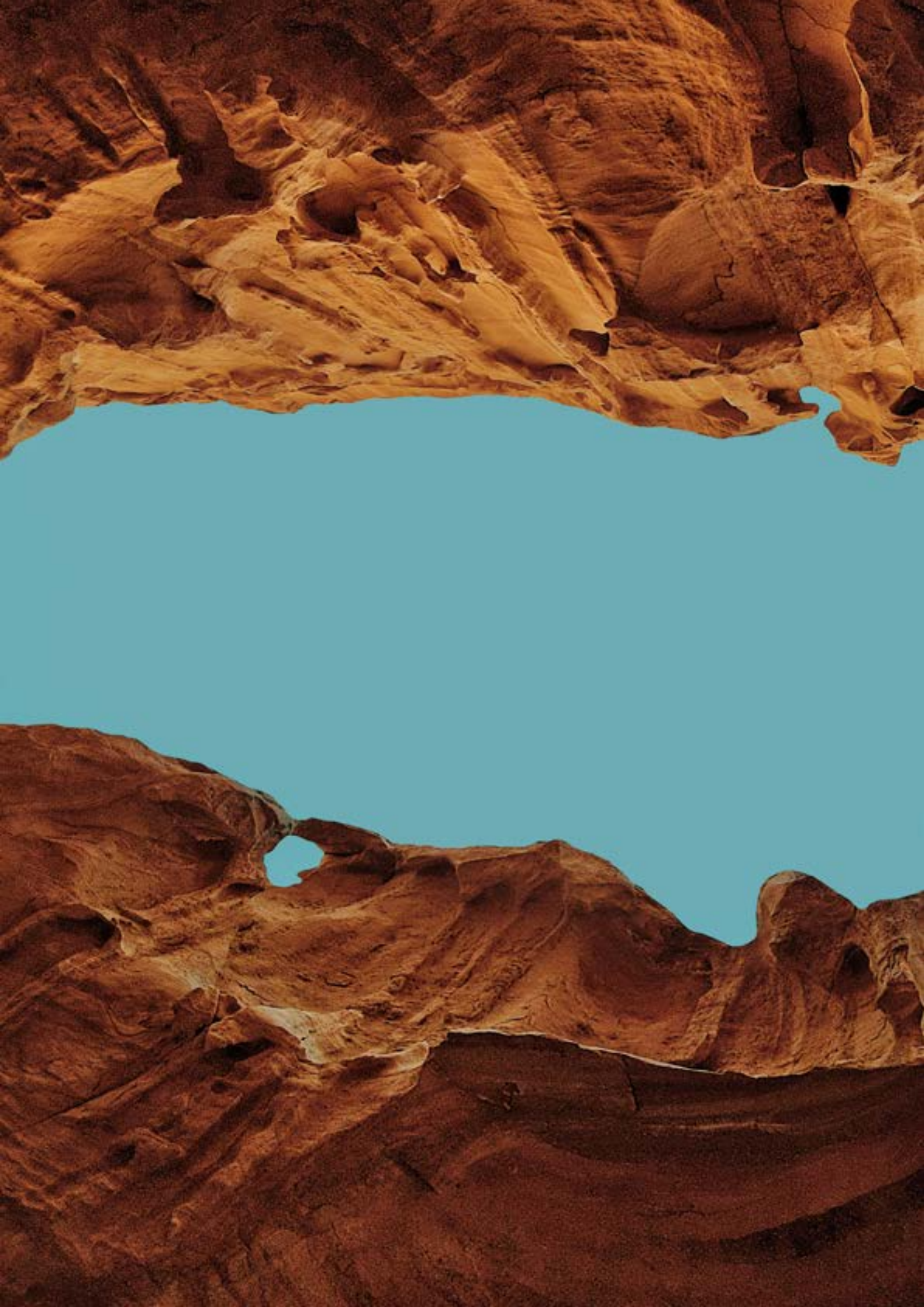
In collaboration with

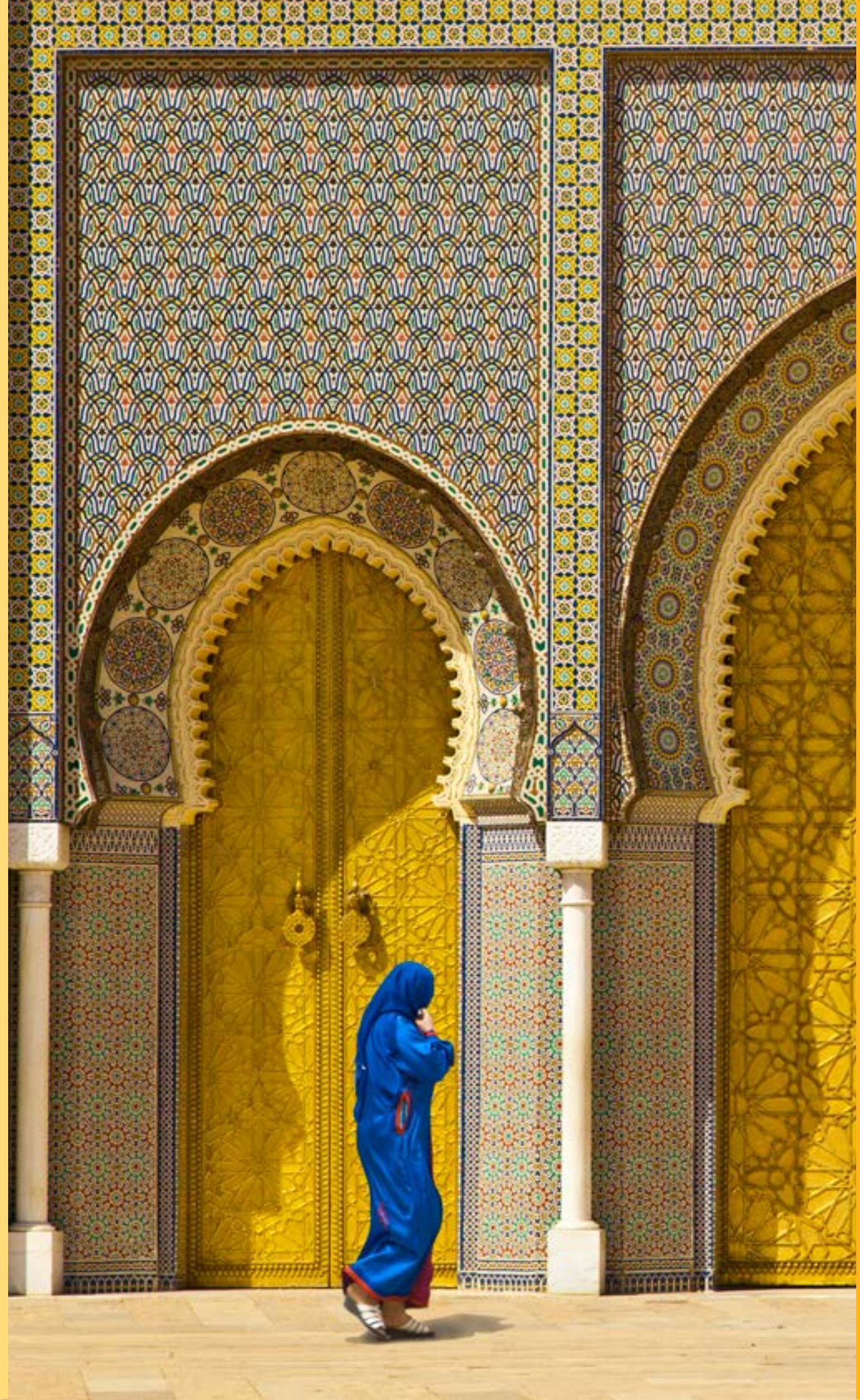
Global Infrastructure Hub

Beyond the Baseline

How infrastructure can deliver transformative outcomes

PART 1 Leading infrastructure teams to deliver transformative outcomes





A message from Jacobs executives

From great adversity comes great opportunity. The notion we must "build back better" resonates strongly across most countries and there is a growing desire to do more for the planet and its population – today and for future generations.

By 2024, G20 Governments are expected to spend several trillion dollars per annum on infrastructure. This infrastructure investment represents a once-in-a-generation opportunity to reshape our economic, social, environmental and governance systems for the better. To do this, we must set our aspirations for what infrastructure can deliver wider, higher and broader and target wide-reaching transformative outcomes.

As a purpose-led organization, Jacobs believes infrastructure can lead in transforming our lives, communities and places - physical, natural and digital - and collective infrastructure leadership is key to unlocking its full transformative outcome potential.

We are proud to release our *Beyond the Baseline* thought leadership series to help drive the collective will needed now, more than ever before, to implement change in how we conceive, plan and deliver infrastructure.

In writing the series we have collaborated with the Global Infrastructure Hub, an organization that is a hub within the global infrastructure community for advancing more sustainable, inclusive and resilient infrastructure through public and private sector collaboration. Thank you to the GI Hub and particularly Monica Bennett and Hala Hubraq for their valuable input to the series. We strongly encourage you to explore their *Transformative Outcomes Through Infrastructure* initiative and *InfraTracker* infrastructure stimulus tracking tool that have informed this series, as well as the other resources spanning all major topics impacting the future of infrastructure you'll find on their website.

We look forward to discussing, debating and being challenged on the views and approaches expressed in this paper and others to be released in the *Beyond the Baseline* series. Robust and respectful engagement causes us all to reflect on how we have delivered infrastructure in the past and challenge ourselves to do better.

Bryan Harvey

Vice President, Global Program Management, Jacobs

Marian Kurban

Global Vice President, Solutions & Technology, Jacobs

Contents

Note on Investment Figures and Currencies: To help readers easily compare the scale of investment from country to country, all foreign currency figures have been converted and are stated in US dollars. The original foreign currency figures are included in parentheses. Figures were converted to USD on 19 April 2022.

Authors and contributors

Lead authors

Bryan Harvey
Vice President, Global Program Management

Katie Godfrey
Principal Consultant

Aaron Hudson
Asia Pacific Regional Solutions Director, Program & Project Management

Andrew Tingay
Global Solutions Director, Strategic Consulting

Contributors

Jacobs

Silje Barningham
Human Resources Director, Australia & New Zealand

Janine Barrow
Global Technology Leader – Sustainability

Yuval Cohen
Global Technology Leader, Capital Projects & Transaction Advisory

Steffi Pleino
Director Global Learning Program Management & Delivery

Rick Robinson
Global Technology Leader, Connected & Secure Places

Danielle Swan
Director Strategic Growth, Asia Pacific & Middle East

Global Infrastructure Hub

Monica Bennett
Director of Thought Leadership

Hala Hubraq
Senior Policy Specialist

Editor

Emma Stanley
Marketing Manager - Content, Asia Pacific & Middle East

Graphic Designer

Georgina Brown
Senior Graphic Designer, Asia Pacific & Middle East

INTRODUCTION

There is an urgent need to **transform the outcomes** achieved through infrastructure

The ongoing climate crisis, growing inequality and more recently the global pandemic, have put into sharp focus the need to "build back better" immediately - not in 5 years, 10 years or longer. Governments around the world are aware of this need and have announced extensive infrastructure stimulus packages even as they continue to be pressed by competing priorities and constrained budgets.

This funding must be used to create infrastructure that delivers more and lasts longer. Infrastructure must move beyond a focus on stimulating economies and avoiding adverse social and environmental impacts. Instead, it must equally prioritize the delivery of as many other positive transformative outcomes as practicable. We don't have the time, resources or social license to achieve less.

In late 2020, the Saudi Arabian and Italian G20 presidencies asked the Global Infrastructure Hub (GI Hub) to "examine the role of infrastructure in facilitating transformative recovery from COVID" and in November 2021, the GI Hub publicly launched the *Transformative Outcomes Through Infrastructure* initiative.

The initiative tracked the infrastructure stimulus announced by G20 governments between February 2020 and August 2021 in response to the impact of the COVID-19 pandemic and examined the outcomes that G20 governments were targeting with the approximately $3.2 trillion in announced stimulus. The GI Hub found that G20 countries are targeting six transformative outcome categories through infrastructure stimulus. These categories are broadly aligned to the United Nations Sustainable Development Goals (UN SDGs).

The transformative outcome categories are defined as:

01. Environmental sustainability

Enhancing the environment by regenerating ecosystems and biodiversity, maximizing resource recovery, eliminating use of finite resources and becoming carbon positive.

02. Resilience

Building the capacity of individuals, communities, institutions, businesses and systems (natural and built) to survive, adapt, grow and thrive no matter what kinds of chronic stresses and acute shocks they experience.

03. Inclusivity

Improving the quality of life and wellbeing of individuals, specifically by reducing inequalities and inequity in all its forms.

04. Research and development

Creating for citizens and businesses new products and services that are more useful and valued, thereby developing an enduring innovation culture.

05. Digital/ InfraTech

Achieving rapid technology advancements as a result of infrastructure either scaling-up or advancing a new or existing secure (physical, information, operational) infrastructure technology.

06. Economic development

Supporting sustained and diverse growth that drives job creation and a rise in living standards.

The global, short-term infrastructure stimulus spend represents a once-in-a-generation opportunity to achieve these transformative outcomes at scale. With typical mega and giga infrastructure projects spanning a delivery lifecycle of more than five years, we need to act with urgency to deliver change. Infrastructure leaders responsible for allocating investment priorities must deeply embed all transformative outcomes into program and project objectives now.

Global infrastructure investment needs to reach

$94 trillion

by 2040 to keep pace with service needs and gaps.[1]

Embedding the commitment and capacity to realizing all transformative outcomes through infrastructure now will deliver an array of benefits to both current and future generations.

How can infrastructure be envisioned, planned, designed and delivered to realize more, if not all, transformative outcomes?

While the urgency and the need for infrastructure to do more is clear, the "how" is not.

As a purpose-led organization with over 75 years' experience delivering infrastructure of all shapes and sizes, Jacobs knows infrastructure can and should lead in transforming our economic, social, environmental and governance systems for today and tomorrow, and so we set out to answer this question.

In doing so, we have:

- **Collaborated with the GI Hub** to articulate the urgent need and opportunity to deliver transformative outcomes through infrastructure. The paper incorporates findings from the GI Hub's *Transformative Outcomes Through Infrastructure* initiative and *InfraTracker* infrastructure stimulus tracking tool.[2]
- **Drawn on Jacobs' global infrastructure program management experience** to better understand the leadership attributes required to successfully deliver transformative outcomes for clients. Jacobs' program management portfolio spans 60+ infrastructure programs located across the United Kingdom, Europe, Middle East, Asia Pacific and North America. The portfolio manages approximately $400 billion in capital investment across all infrastructure sectors.
- **Drawn on specific industry leading insights from our global Solution and Technology leaders**, spanning economic development, inclusion, resilience, digital, sustainability, environmental regeneration, capital projects and transactions.
- **Drawn on specialist advice from our Global Learning and Development and People group** regarding how to lead, inspire and equip infrastructure teams to realize transformative outcomes.
- **Reviewed recent leading practice publications** spanning infrastructure outcomes and leadership theory and practice.

We're excited to share all our findings in the *Beyond the Baseline: How infrastructure can deliver transformative outcomes* thought leadership series, as shown in Figure 1.

We hope the series will help drive the time-critical collective will we need now more than ever before to implement change at a jurisdictional, portfolio, program and project level.

FIGURE 1

Beyond the Baseline – how infrastructure can deliver transformative outcomes thought leadership series

YOU ARE HERE!

The first paper

Are our current and emerging infrastructure leaders ready and able to lead the charge on achieving each transformative outcome?

Leading infrastructure teams

Achieving all the transformative outcomes hinges on whether collective infrastructure sector leadership can justify solutions capable of meeting all transformative outcomes and inspire infrastructure teams to challenge themselves to deliver beyond what they have typically done prior.

This paper

- Identifies 13 leadership attributes needed to lead teams to deliver transformative outcomes through infrastructure.
- Outlines methods for developing these leadership attributes at a jurisdictional/ organizational and program/ project level.

SCHEDULED FOR JUNE

The second paper

How can we differentiate transformative outcomes and impacts from what infrastructure has typically delivered?

Inspiring infrastructure teams

To inspire infrastructure teams we need to clearly articulate the level of positive impact programs and projects are seeking to achieve for each transformative outcome. This clarity is fundamental to inspiring teams to provide infrastructure that delivers more and lasts longer.

This paper

- Outlines the difference between typical and transformative outcomes from infrastructure.
- Recognizes the key barriers that must be overcome to achieve transformative outcomes.

SCHEDULED FOR JULY

The third paper

How can we equip program and project teams to quickly and effectively reach a shared appreciation of these transformative outcomes?

Mobilizing and equipping infrastructure teams

Infrastructure programs and projects are fundamentally transitory activities, involving people and entities who are often working together for the first time. It can take weeks, months and sometimes years for teams to form a shared understanding of the actors, actions and initiatives that drive transformative outcomes. We need to mobilize and equip infrastructure programs and projects to have an immediate focus on transformative outcomes.

This paper

- Describes a clear set of activities to undertake from day one of an infrastructure program or project to mobilize and equip the team to realize transformative outcomes.
- Activities include engaging the market for private finance, producing a digital capability plan, understanding local project context, involving citizens, setting positive transformative outcome targets and appraising scope/options.

CHAPTER ONE

The outcomes required through infrastructure **have broadened significantly**

As the global COVID-19 pandemic took hold, governments around the world rapidly committed to stimulus initiatives designed to not only drive economic recovery post-COVID-19 but also to make the world more sustainable, resilient, prosperous and inclusive. You'll find examples of the types of bold initiatives announced by governments in Appendix A.

The Saudi Arabian and Italian presidencies of the G20 asked the Global Infrastructure Hub (GI Hub) to "examine the role of infrastructure in facilitating transformative recovery from COVID" and in November 2021 the GI Hub released the *Transformative Outcomes Through Infrastructure* initiative.

> The amount of infrastructure as a stimulus announced since the beginning of the pandemic will mean that the scale of infrastructure investment over the coming years will be significantly higher than normal. And, the bulk of these infrastructure stimulus announcements address the most pressing challenges of our times, targeting transformative outcomes like decarbonization and improved affordability and access to services.
>
> **— GI Hub**

Table 1-1 identifies the six categories of transformative outcomes being targeted by G20 countries* through infrastructure stimulus as identified by the GI Hub. The transformative outcomes represent a broad categorization of the United Nations Sustainable Development Goals (UN SDGs).

The types of outcomes pursued within these categories are much broader than direct economic growth and go far beyond reducing or avoiding adverse infrastructure-related direct and indirect impacts.

We explore each of the transformative outcome categories in greater depth in the second *Beyond the Baseline* paper, which addresses the topic of differentiating transformative outcomes and impacts from what infrastructure has typically delivered.

TABLE 1-1

Six categories of transformative outcomes through infrastructure[2]

Category	Overview of transformative outcomes targeted by category	Specific transformative outcomes contained in the category
Environmental sustainability	Enhancing the environment by regenerating ecosystems and biodiversity, maximizing resource recovery and eliminating use of finite resources and becoming carbon positive.	▪ Circularity ▪ Environmental regeneration ▪ Low carbon transition ▪ Pollution reduction
Resilience	Building the capacity of individuals, communities, institutions, businesses and natural and built systems to survive, adapt, grow and thrive no matter what kind of chronic stresses and acute shocks they experience.	▪ Disaster and climate adaptation ▪ Social cohesion
Inclusivity	Improving the quality of life and wellbeing of individuals, specifically by reducing inequality and inequity in all its forms.	▪ Inclusive mobility ▪ Digital connectivity ▪ Affordability and access to service
Research and development	Creating for individuals and businesses new products and services that are more useful and valued, thereby developing an enduring innovation culture.	▪ Disruptive innovation
Digital/InfraTech	Achieving rapid technology advancements as a result of infrastructure either scaling-up or advancing a new or existing secure (physical, information, operational) infrastructure technology.	▪ Digitalization ▪ Cyber-security ▪ Digital connectivity
Economic development	Supporting sustained and diverse growth that drives job creation and a rise in living standards.	▪ Job creation and economic growth

**The G20 members are Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, South Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, United States and the European Union. Spain is invited as a permanent guest.*

For infrastructure to realize its potential and obligation to transform our world, infrastructure programs and projects must embrace as many, if not all, of these transformative outcomes at every investment opportunity.

The GI Hub articulates the challenge:

> All infrastructure investments can achieve economic development outcomes such as job creation and economic growth. It is when these economic development outcomes are combined with long-term policies in areas such as environmental sustainability, inclusivity, resilience, digital, and research and development that a government progresses toward achieving transformative outcomes.[2]
>
> **— GI Hub**

Figure 1-1 puts the challenge into perspective relative to how our approach to infrastructure has evolved.

In the past infrastructure delivery was largely concerned with time, cost and quality and the impacts of a singular asset.[3] There was typically only cursory awareness of the adverse environmental and social impacts of the individual asset, such as social disruption due to dislocation, biodiversity loss and carbon emissions from the production and use of materials. Infrastructure largely focused on delivering economic outcomes through productivity improvements[4] and the improved provision of essential services.

In recent times, infrastructure planning and delivery has become progressively more aware of the potential impact of infrastructure on people and the planet. **In the present** infrastructure has embraced the challenge of avoiding and reducing infrastructure's adverse direct and indirect impacts.[5]

However, **in the future**, infrastructure planning and design approaches must evolve to focus on delivering blended infrastructure solutions—also referred to as integrated infrastructure solutions—capable of both:

1. Efficiently delivering infrastructure, for example reducing carbon emissions, cost and schedule
2. Effectively delivering multiple positive impacts across each transformative outcome category.

Blended infrastructure solutions combine different types of infrastructure to achieve outcomes greater than what is possible from an individual type of infrastructure alone. For example, planning how public transport, economic infrastructure, health infrastructure, education infrastructure, open space and diverse housing combine can deliver significant uplift in an individual's wellbeing and therefore that of the overall community.

Clarifying the terminology

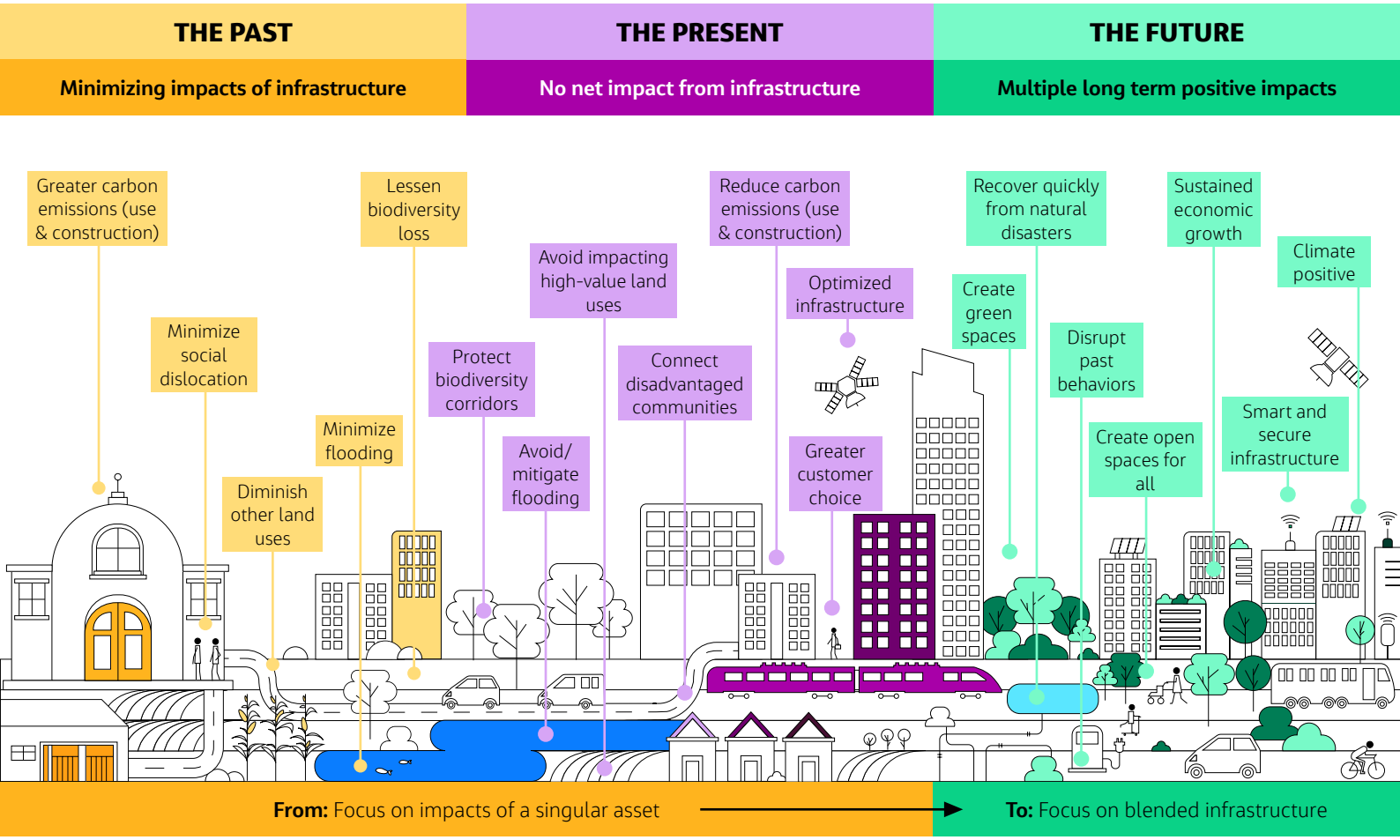
An *outcome* relates to the "change in state or condition" of the theme due to the infrastructure's activities/ features/ functions.

An *impact* is the level of contribution to achieving the change in state or condition.

A *positive impact* goes beyond a minimum standard or regulated level of impact. According to the UK's National Infrastructure Commission, a positive impact seeks to restore, enhance or replenish. The impact felt from these outcomes needs to be targeted across generations, not simply impact a single generation. We need to consider how the infrastructure is likely to be used now, by all users, across all demographics, but also how it is likely to be used in the future.

FIGURE 1-1

Infrastructure evolution – from minimize negative impacts to achieve multiple positive impacts over long term



The GI Hub is not alone in articulating the opportunity for infrastructure to deliver a greater range of outcomes than it has previously. A 2018 report by the United Nations Office of Project Services found infrastructure will have an impact on achieving up to 92% of UN SDG targets.[6]

The opportunity is also recognized at a jurisdictional level. For example, the growth in the breadth of outcomes expected through infrastructure is recognized by the Institution of Civil Engineers and United Kingdom's Infrastructure and Projects Authority.

The Institution of Civil Engineers expect infrastructure to play a key role in realizing all 17 UN SDGs and in excess of 80% of the specific targets.[7]

In September 2021, the United Kingdom's Infrastructure and Projects Authority's *Built Environment Model* recognized the realization of UN SDGs as the priority driver for infrastructure.[8]

Starting now, infrastructure leaders and program and project teams must urgently embrace the transformative outcomes and commit to delivering long-term positive impacts across all the transformative outcomes.

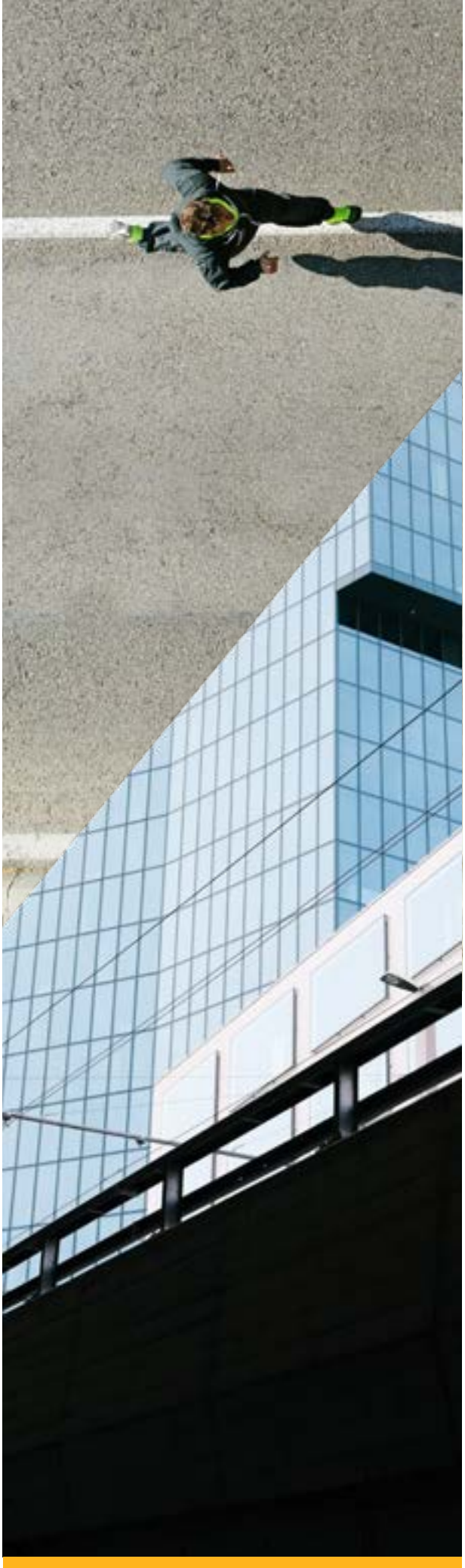
A once-in-a-generation opportunity

The global short-term infrastructure stimulus spend represents a once-in-a-generation opportunity to achieve transformative outcomes at scale. The GI Hub's analysis found approximately $3.2 trillion in infrastructure stimulus was announced by G20 countries between February 2020 and August 2021.[2] This includes the $1.2 trillion United States *Infrastructure Investment and Jobs Act* passed in November 2021. You'll find a breakdown of the sectors where G20 countries are investing these funds in Appendix B.

The GI Hub estimates this stimulus could represent a 45% increase in the average yearly infrastructure investment across the G20 if spent over the next two years (2021 to 2023).[2]

The GI Hub examined the massive infrastructure stimulus and found it targets outcomes well beyond the traditional focuses of job creation and economic growth. Figure 1-2 shows the bulk of the infrastructure stimulus seeks to deliver against at least two additional transformative outcome categories.

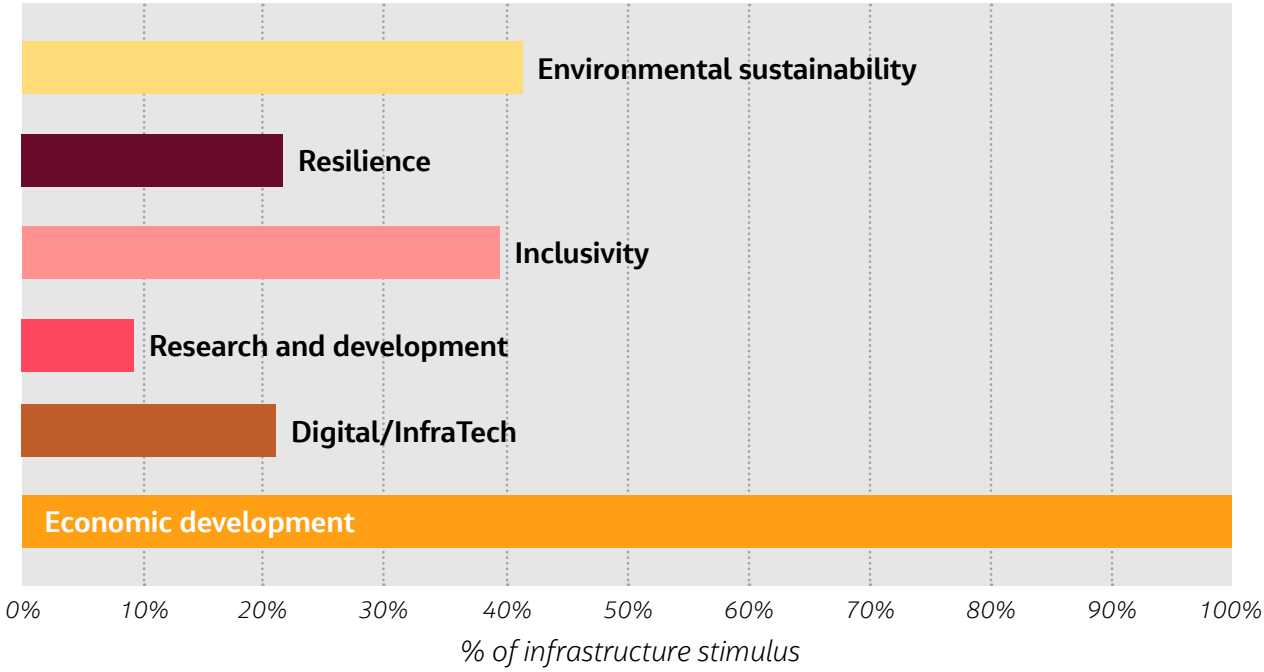
Figure 1-2 shows there is significant expectation for infrastructure to have a greater role in delivering transformative outcomes other than job creation and economic growth.



The opportunity for infrastructure to play a greater role extends well beyond the short-term infrastructure stimulus. The GI Hub estimates that global infrastructure investment needs to reach $94 trillion by 2040 to keep pace with service needs and gaps.[1]

FIGURE 1-2

Breakdown of transformative outcome categories sought by G20 countries from the $3.2 trillion infrastructure stimulus[2]



Note: The sum of transformative categories may not equal the total amount of spending as announcements can be classified as relating to more than one category

The role of leadership in delivering transformative outcomes

There is an urgent need to deliver transformative outcomes through infrastructure. The need is growing with every year – and in some cases every month – that passes. Infrastructure leaders responsible for allocating investment priorities must deeply embed all transformative outcomes into program and project objectives now.

We have chosen to begin the *Beyond the Baseline* series by asking the question:

What leadership attributes do current and emerging infrastructure leaders need to lead the charge on realizing transformative outcomes through infrastructure?

To deliver transformative outcomes through infrastructure requires programs and projects to go beyond what they have typically done before. The right leadership is a central element to inspiring and guiding infrastructure teams to challenge the accepted limits on what infrastructure can achieve.

In exploring the desirable attributes of infrastructure leaders, we are both realistic and practical. It is unlikely one single infrastructure leader will possess all the attributes described in this paper. The role of infrastructure leaders is to surround themselves with people, including direct reports and line managers, who possess the leadership attributes they lack. What matters most are the attributes of the collective group responsible for leading and delivering infrastructure programs and projects, and how individuals contribute to instilling the culture and behaviors needed to achieve transformative outcomes.[9] At Jacobs we refer to this as the "collective clever". The collective clever is activated when leaders empower staff to share their diverse perspectives and experiences to solve complicated challenges such as the urgent need for transformative outcomes through infrastructure.

Clarifying the terminology

For this paper, the term *"infrastructure leader"* is used to refer to an individual while *"infrastructure leadership"* refers to the collective leadership group responsible for delivering the infrastructure program or project. Both terms encompass leadership roles ranging from executive level right through to the program manager/director level of organizations.

CHAPTER TWO

Leading project teams to realize transformative outcomes through infrastructure

> We won't have a successful project unless a focus on the future impact is at the heart of all our decisions.[10]

Leadership plays a pivotal role in realizing transformative outcomes through infrastructure.

Leadership must instill the culture and behaviors needed for infrastructure program and project teams to embrace all transformative outcomes and commit to delivering long-term positive impacts for each outcome, and inspire teams to believe in, embrace and adopt strategies that realize them.

To achieve this, infrastructure leadership must possess a number of key attributes and abilities.

- ☑ Fully appreciate the complicated and dynamic nature of the strategic operating environment
- ☑ Have clear values and communicate these values
- ☑ Be able to mobilize private capital and partner with an array of potential investors
- ☑ Be exceptional at building and leading diverse teams
- ☑ Have the experience needed to deliver complex projects
- ☑ Have an entrepreneurial spirit
- ☑ Be politically astute and able to collaborate across government(s)
- ☑ Be excellent communicators
- ☑ Implement agile organizational structures with clear plans for resourcing both now and in the future
- ☑ Be data and analytics driven
- ☑ Be comfortable with disruption and change
- ☑ Commit to a learning-based approach
- ☑ Create an environment that values and facilitates cooperative relationships with partners.

ATTRIBUTE ONE

Fully appreciate the complicated and dynamic nature of the strategic operating environment

Infrastructure programs and projects, particularly mega and giga programs, operate within a complex and dynamic strategic operating environment. Infrastructure leadership must fully appreciate and successfully navigate the program or project through this environment.

The dynamic nature of the environment is driven by factors including:

- **The urgent time frame in which the transformative outcomes must be achieved.** For example, a well-publicized, urgent time frame is the need to avoid global warming beyond 1.5°C above pre-industrial levels. It is essential to reduce carbon emissions by 7.6% every year between now and 2030 to achieve this.[11]
- **The urgent need to ensure that every infrastructure stimulus dollar allocated contributes to achieving transformative outcomes.** The infrastructure stimulus is a once-in-a-generation increase in committed infrastructure spending. As indicated by the GI Hub, the stimulus funding may only last several years. The capacity to achieve transformative outcomes within the available funding period is further compounded by the growing global talent shortage across infrastructure sectors. For example, in October 2021, the United States recorded 402,000 unfulfilled construction positions.[12]

Infrastructure leadership must also understand each of the transformative outcomes the program or project is targeting. This involves having an appreciation of complicated topics as diverse as:

- **Information and operational cyber security.** Infrastructure leadership must address all three security profiles - physical, information and operational technology - in an integrated manner to provide a truly secure environment. The proliferation of operational technology devices used by infrastructure entities to monitor inputs to improve operational performance has dramatically increased the complexity of critical systems and cyber threat exposure.
- **Individual and community wellbeing.** Infrastructure leadership must challenge teams to incorporate physical design features and/or technology enabled services to improve people's access to wellbeing determinants, including education, skills, employment, health, housing, income, quality of the natural environment and opportunities for people to connect with the natural environment, as well as other social determinants, and the complex interrelationships between them.

ATTRIBUTE TWO

Have clear values and communicate these values

Delivering transformative outcomes through infrastructure requires infrastructure leadership to do things differently. Values are a key driver of actions and behaviors. Infrastructure entities must articulate the organizational and professional values they expect infrastructure leaders to adopt and support leaders to translate these values into behaviors and actions in the workplace.

Values must be grounded in challenging assumptions and rewarding creativity and imagination. We know most infrastructure leaders tend to look at transformative outcomes through the lens of feasibility.[13] While feasibility is important, our view is that infrastructure leadership should focus on desirability of outcomes first and then challenge teams to deliver. Instead of asking "What can we build?", "What fits within the funding envelope?" or "How can we leverage a specific technology?", infrastructure leadership needs to ask, "Why can't we deliver transformative outcomes?".

Infrastructure leaders must seek to instill the same willingness to challenge, create and imagine in their teams to look beyond the status quo and seek out the most effective solution rather than accepting what was delivered in the past, and provide protection against traditional cost and schedule pressures that might otherwise constrain their creativity.

CASE STUDY

Jacobs create a value set for our leaders to drive transformative thinking and outcomes

In 2019, Jacobs redeveloped its long-held values. Previously, Jacobs' values were focused on performance, growth, safety and integrity. These were redeveloped to become more people focused and to provide clear guidance on how Jacobs wants its people to interact with each other, clients and wider communities. These new values are focused on challenging each other and our clients to produce better solutions, to deliver what we say we're going to and to keep raising the bar higher.

Jacobs undertook a significant culture change management exercise to embed the new values at the heart of the business and educate its people on how it expects the values to translate into actions and behaviors. Activities included coaching/mentoring, training and development and embedding values into performance management systems.

Through these culture change management initiatives our Infrastructure Program Directors and Managers now seek to live our values of:

- **We do things right.** We always act with integrity –taking responsibility for our work, caring for our people, and staying focused on safety and sustainability. We make investments in our clients, people, and communities, so we can grow together.
- **We challenge the accepted.** We know that to create a better future, we must ask the difficult questions. We always stay curious and are not afraid to try new things.
- **We aim higher.** We do not settle –always looking beyond to raise the bar and deliver with excellence. We are committed to our clients by bringing innovative solutions that lead to profitable growth and shared success.
- **We live inclusion.** We put people at the heart of our business. We have an unparalleled focus on inclusion with a diverse team of visionaries, thinkers, and doers. We embrace all perspectives, collaborating to make a positive impact.

ATTRIBUTE THREE

Exceptional at building and leading diverse teams

Delivering transformative outcomes involves meeting the needs of a diverse user base of varying gender, race, age and socio-demographic characteristics. Infrastructure leadership will gain a deeper appreciation of how to meet the needs of such diverse groups by building teams that mirror that diversity and lived experience. Studies like those in Economic Geography[14] have shown diverse teams are more likely to challenge each other and use a combination of technical skills and lived experience to provide solutions that realize transformative outcomes.

Delivering transformative outcomes involves people with an array of technical skills, disciplines and lived experiences working together. Traditionally, infrastructure projects have largely been the domain of engineering and design specialists. Today, those specialists need to collaborate with environmental, social and behavioral scientists; economists and project finance specialists; diversity and inclusion specialists; software designers and engineers; as well as people with many other skill sets.

Within such diverse teams, infrastructure leadership must foster and instill a creative culture where everyone's input is equally valued. Team members must be encouraged to adopt a growth mindset of "Yes, and…", not "Yes, but…". The difference is subtle but powerful: one seeks to create opportunities while the other seeks to build resistance.

A "yes, but…" mindset kills creative problem solving, reflecting a team member's belief that only their idea or approach will achieve the transformative outcome. On the other hand, a "yes, and…" mindset fosters creative thinking, reflecting a team member's willingness to listen to the ideas of other discipline specialists, reflect on those ideas and make suggestions as to how they could be built upon or improved.

Fostering a creative culture often requires infrastructure leadership to be better at asking rather than answering questions. The power of a well-conceived open question about an apparent set of assumptions being relied upon by an individual or team can help change the thinking and result in a better solution.

ATTRIBUTE FOUR

Able to mobilize private capital and partner with an array of potential investors

Programs and projects that seek to deliver transformative outcomes open up the potential to use blended finance models* and attract a more diverse range of investors, including non-government organizations and philanthropic lenders, and traditional lenders such as private equity firms and government. Such models enable the delivery of innovations that cross traditional sectoral and industry boundaries. In addition, by aligning lender or investor interests to one or more transformative outcome, an infrastructure program or project is more likely to be able to deliver the transformative outcome with an added level of assurance.

Infrastructure leadership will increasingly need to engage the market and mobilize private capital to finance the realization of transformative outcomes and must be competent at engaging and partnering with an array of potential investors.

Infrastructure leadership must be highly familiar with Environmental, Social and Governance (ESG) investment priorities and requirements. Projects are more likely to attract and secure access to finance from private capital sources if their commitment to transformative outcomes can be aligned closely to ESG objectives.

**Blended finance refers to a mix of grants provided by foundations, governments or NGOs and development finance that enables, attracts and de-risks investment for commercial, private finance to finance projects enabling sustainable development.*

ATTRIBUTE FIVE

Experience needed to deliver complex projects

Leadership experience is critical to any successful program or project delivery. It is particularly important for mega infrastructure programs - large scale, complex, transformational programs that cost $1 billion or more - where the effort and complexity increase exponentially rather than linearly. Such programs require a step change in experience necessary to deliver the transformative outcomes.

Infrastructure leadership needs to have the right experience to deliver transformative outcomes, balancing technical delivery and strong program leadership experience. Experienced infrastructure leadership brings quick decision making and inspires the confidence in their team that they have delivered transformative outcomes before and can do it again.

ATTRIBUTE SIX

Entrepreneurial spirit

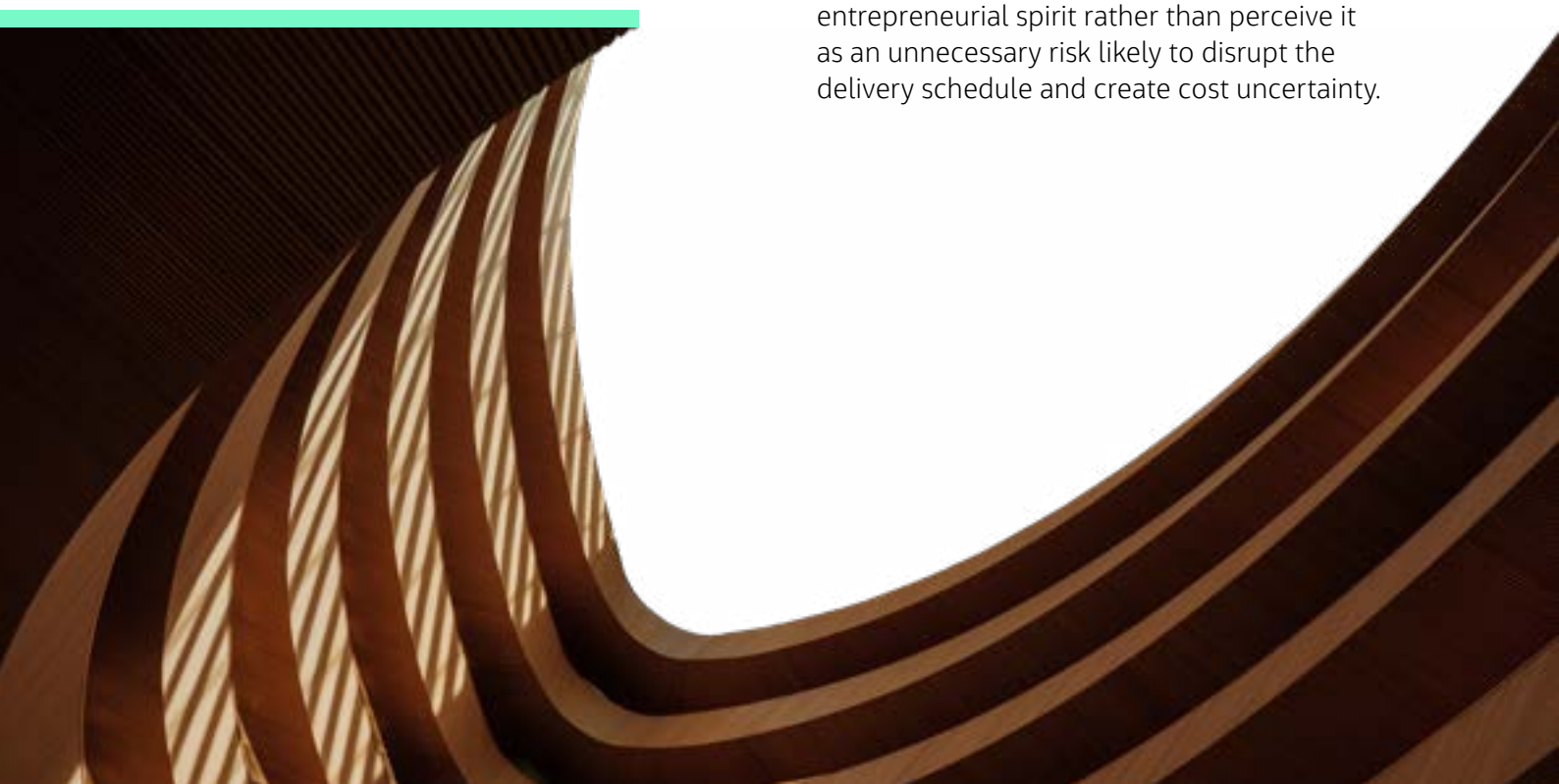
Collaborating with entrepreneurs is a key way that transformative outcomes, particularly in the research and development and digital/ InfraTech space, can be rapidly advanced.

By viewing every infrastructure project as an opportunity to deliver transformative outcomes, infrastructure leadership is more likely to attract the ingenuity of entrepreneurs, businesses, universities, think tanks and industry bodies.

This is highlighted in research by the World Economic Forum that concluded entrepreneurs are drawn to infrastructure where they perceive opportunity:

"Entrepreneurs are coming up with a wide array of innovative solutions to fix the shortcomings of infrastructure systems across the entire asset life cycle to fill infrastructure's "white space" – the areas of opportunity where unmet and unarticulated needs are uncovered to create innovation".[15]

Infrastructure leadership must harness this entrepreneurial spirit rather than perceive it as an unnecessary risk likely to disrupt the delivery schedule and create cost uncertainty.



ATTRIBUTE SEVEN

Politically astute and able to collaborate across government

Infrastructure delivery is increasingly politicized with more complicated stakeholder relationships to manage. This only increases in correlation to "who" is sponsoring the infrastructure program or project. The higher the level of the elected official or entity sponsoring the program or project, the more politically astute infrastructure leadership needs to be.

If infrastructure is to play its role in addressing complex and deep-rooted challenges, infrastructure leaders must be able to, at a minimum, coordinate and collaborate within and across governments. This is highlighted in the Organisation for Economic Co-operation and Development's (OECD) report *Getting Infrastructure Right – The Ten Key Governance Challenges and Policy Options*.

One of the 10 governance principles identified by the OECD was the need for strategic vision for infrastructure:

"The strategy should be politically sanctioned, co-ordinated across levels of government, take stakeholder views into account and be based on clear assumptions".[16]

The more infrastructure leadership can clearly align the infrastructure strategy to transformative outcomes, the easier it will be to coordinate and/or collaborate with complementary areas of government — for example health, education, economic development, environmental, energy transition and social/human services — that share similar policy aspirations and goals.

Infrastructure leaders must not let actual or perceived planning fragmentation between and within different spheres of government derail the realization of the transformative outcomes.

ATTRIBUTE EIGHT

Excellent communicators

Articulating the value and importance of realizing some transformative outcomes can be challenging. For example, initiatives that enable access to safe and secure public spaces for people to use for community-oriented activities help foster greater community cohesion and resilience, but it can be difficult to quantify the importance and value of such initiatives as part of the infrastructure solution.

Infrastructure leadership must fully appreciate both the importance and urgency associated with realizing each transformative outcome. They must be able to champion these outcomes if there are cases where stakeholders are sacrificing these transformative outcomes in favor of a narrower focus on more typical outcomes, such as avoiding or minimizing adverse impacts of infrastructure.

Infrastructure leadership must be able to craft and communicate a compelling narrative that includes objectives, targets and key performance indicators, and illustrates the current conditions endured by communities to communicate why delivering transformative outcomes is the right thing to do and how outcomes will differ from what a team has delivered previously.

Given the diversity of audiences to be engaged - direct users, the public, elected officials, executive level government officials, third party infrastructure operators, contractors, technology providers, not for profit sector, financiers, and infrastructure project teams - infrastructure leadership needs to master the many different forms of communication, including writing, presentations, speeches, interviews and social media. Whatever the audience or format, communication must be transparent and open; clear, simple and concise; and consistent.[17]

ATTRIBUTE NINE

Implement agile organizational structures with clear plans for resourcing both now and in the future

Delivering transformative outcomes requires iteration, agility and connectivity across the infrastructure project team. Rigid structures and lengthy, linear delivery processes constrain agility and iteration.

According to world renowned nature-based and nature-inspired solutions design firm Biomimicry 3.8*, early-stage infrastructure planning and design processes are far too linear and constrained, and moving progressively from stage to stage and phase to phase limits the capacity of project teams to explore, iterate and learn.

To achieve transformative outcomes, infrastructure leadership needs to adopt more agile and responsive processes and create a work environment where timelines are more open to discovering and testing innovative solutions early in the design and planning phase.

Earlier in the paper we highlighted the need for infrastructure teams to deliver transformative outcomes across all categories, rather than just one or two areas. To achieve this, infrastructure leadership needs to instill in teams a willingness to quickly share information about interdependencies and to collaboratively resolve scope conflicts that may degrade one transformative outcome at the expense of another.

**Biomimicry 3.8 is the world's leading bio-inspired consultancy. Jacobs signed a strategic teaming agreement with Biomimicry 3.8 in 2020 and together, they work to help clients develop and integrate regenerative best practices.*

Delivering transformative outcomes - or indeed any positive outcome - is dependent on having access to the right people, equipment and specific resources. Infrastructure leadership must instill a commitment to careful and responsive people planning.

Policies and mechanisms should focus on succession planning and accelerating the progression of talented individuals who are early in their career.

Periods of increased investment present excellent opportunities to accelerate skill development and advance individual careers, but it can be challenging for organizations to accept that an increased pace of career advancement is necessary to retain and attract key resources. Careful succession planning and accelerating the careers of individuals is essential to ensure there is a pipeline of future leaders to achieve transformative outcomes from infrastructure over the next decade.

Prioritizing diversity and inclusion is also crucial, including for reasons already discussed in section 2.3. Without diversity and inclusion, infrastructure entities are reducing their potential candidate pool. For example, one in six Gen Z adults who are now graduating and entering the work force identifies as LGBTQIA+.[18] If infrastructure entities can't offer inclusive environments where people can bring their whole selves to work, it will be impossible to attract - and even more importantly retain - the best talent.

CASE STUDY

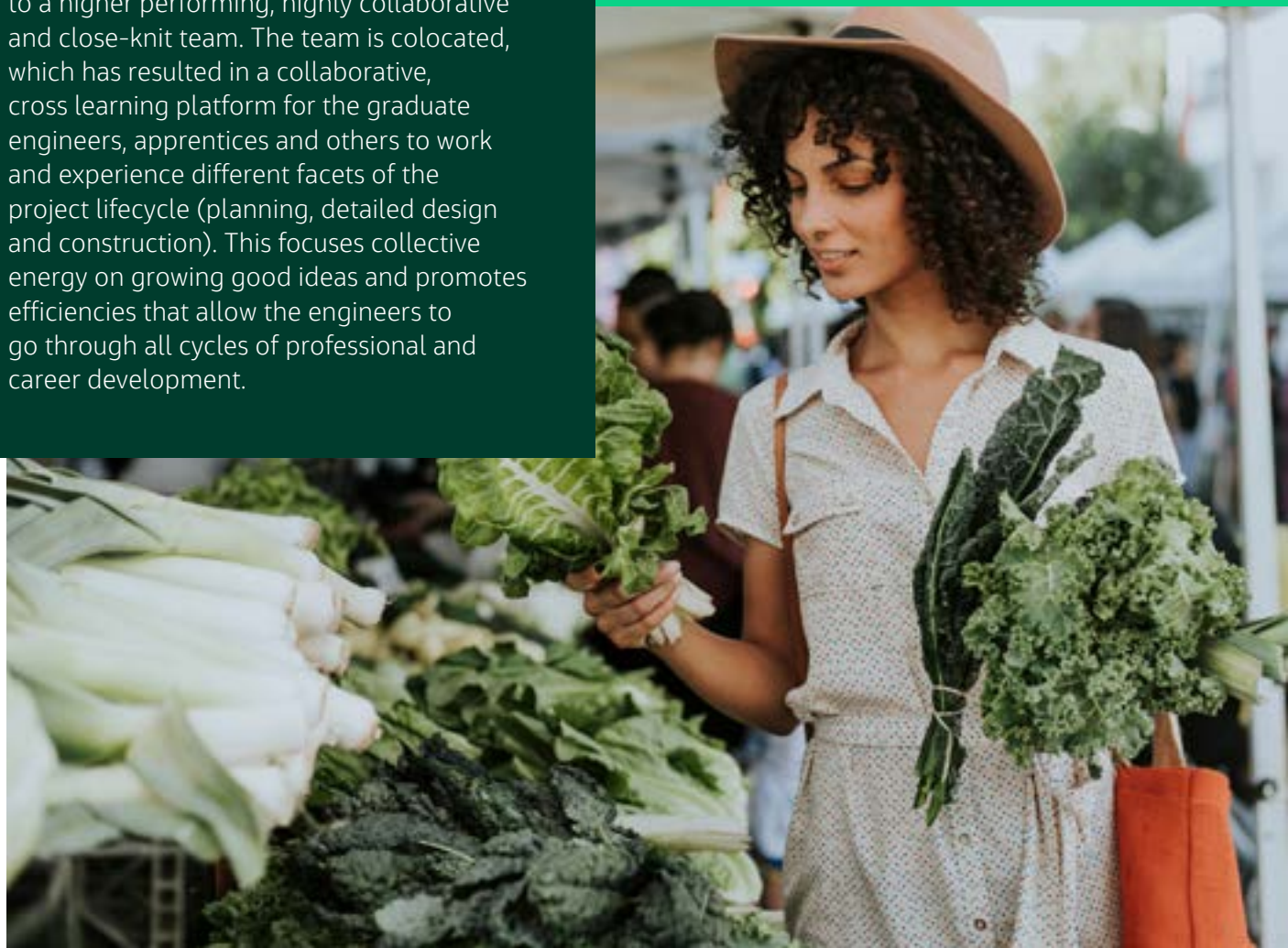
Talent Attraction and Retention - TEAM2100

Challenge

Thames Estuary Asset Management (TEAM2100) is the United Kingdom's Environment Agency's largest flood-risk management program. It is delivering new ways of working to manage flood defenses more efficiently and effectively. TEAM2100 is delivering the first 10 years of capital investment in tidal flood defenses as recommended by the 100-year Thames Estuary 2100 (TE2100) plan.

Talent retention policies and mechanisms

TEAM2100 is a highly diverse team of people from over 60 different countries, and various age ranges and genders. This diversity uniquely provides different insights and problem solving approaches, and leads to a higher performing, highly collaborative and close-knit team. The team is colocated, which has resulted in a collaborative, cross learning platform for the graduate engineers, apprentices and others to work and experience different facets of the project lifecycle (planning, detailed design and construction). This focuses collective energy on growing good ideas and promotes efficiencies that allow the engineers to go through all cycles of professional and career development.



ATTRIBUTE TEN

Data and analytics driven

Transformative outcomes are more likely to be realized if appropriate digital thinking and technology are utilized in all stages of the infrastructure lifecycle.

Infrastructure leadership must promote the value of data and data driven analytics to inform decision making and allocate resources through their words and actions.

For example, infrastructure leaders can:

- Use digital planning models to undertake system-based analysis, helping the infrastructure project team to understand the "overall place/system" in which the transformative outcomes are to be delivered and/or the infrastructure is proposed to be located and/or operated.
- Use digital engineering and 3D design models layered with cost, schedule and asset data such as 5D/6D Building Information Models for rapid, real-time visual progress reporting.
- Incorporate artificial intelligence into decision making by requiring data models to automatically compare proposed infrastructure plans against benchmark data models, thereby embedding continuous improvement into daily decision making and project planning.

ATTRIBUTE ELEVEN

Comfortable with digital disruption and change

We are living through a time of unrelenting digital disruption and change. The volume of digital data in the world surpassed non-digital data in around 2002 and is now doubling roughly every three years. In other words, we produced as much data in the last three years as in the entire previous history of humanity.[19]

For infrastructure leaders, the pace of digital disruption and change present both opportunity and challenge.

The vast amount of data can be utilized to inform better solutions; however, infrastructure leaders must be comfortable adopting what the World Economic Forum terms "flexible architecture".[20] Flexible architecture allows infrastructure being planned and delivered today to adapt and evolve to technological change in the future, while balancing the immediate challenges of budget and schedule.

Infrastructure leadership should focus on transformative outcomes, not defined scope. This will give them the flexibility necessary to adapt a given project and upgrade its scope to achieve better transformative outcomes if new technology becomes available and can be implemented within cost and schedule constraints.

ATTRIBUTE TWELVE

Commit to learning based approach

Delivering transformative outcomes requires a commitment to continually sharing knowledge and lessons learned.[21]

Infrastructure leadership should seek to embed into their programs and projects:

- Investment assurance guidelines that provide a framework for authorizing and periodically reviewing the program or project's progress towards achieving the transformative outcomes and transparent reporting of progress, issues and lessons learned
- Continuous improvement processes to assess, learn and improve how infrastructure planning, design, procurement, delivery and operating practices and governance can deliver transformative outcomes.

The guidelines and continuous improvement processes should value and promote cross sector learning, for example the energy and water sectors learning from each other about the use of smart meters/networks.

ATTRIBUTE THIRTEEN

Create an environment that values and facilitates cooperative relationships with partners and stakeholders

Transformative outcomes are more likely to be delivered if the program or project environment is founded upon trust, cooperation and communication between all partners and stakeholders.

Infrastructure leadership must set the expectation that their team and partners will patiently and cooperatively work through how best to deliver transformative outcomes.

This often starts with adopting the right procurement and contracting models. The procurement and contracting approach should match the complexity associated with delivering the transformative outcomes. By understanding the risks and complexities, infrastructure leadership can determine the optimal method of procurement. The higher the risks and the greater the complexity, the more collaborative the procurement and infrastructure delivery model should be.

CASE STUDY

Cooperative relationships – Project 13

Project 13 developed by the Institution of Civil Engineer's Infrastructure Client Group is an approach that promotes the delivery of infrastructure through the creation of an integrated delivery enterprise, formed from client organizations, key suppliers, advisors and sponsors. By moving beyond traditional transactional arrangements, these enterprises have the ability to achieve transformative outcomes by aggregating skill sets, knowledge and expertise.

This approach is also promoted by the United Kingdom's *Construction Playbook*.

CHAPTER THREE

Developing the leadership attributes needed

> Governments and private sector proponents must invest in people with the capability to be world-class project leaders who can deal with the dynamic risks and uncertainties of managing business and defining projects responsibly, transparently and accountably.[22]

We now need infrastructure leadership willing to robustly and responsibly focus on leading teams to deliver transformative outcomes.[8] As we stated back at the beginning of this paper, we're both practical and realistic. Whilst it is unrealistic to expect individual leaders will possess all the leadership attributes discussed in the previous section, it is essential these attributes are reflected across the collective leadership group.

There are a range of measures that can be implemented at a jurisdictional/organizational level or program/project level to develop the required leadership attributes.

Jurisdictional/organizational level leadership development measures

Develop a memorable leadership philosophy

Infrastructure entities and major programs and projects should adopt a unifying leadership philosophy that aligns the leadership approach across the infrastructure entity and the programs and projects the entity is responsible for.

The leadership philosophy should be:

- Memorable - easily recalled and able to be simply conveyed
- Relevant - clearly connected to the infrastructure entity's purpose and core values
- Relatable - resonate with current and aspiring leaders.

For example, the leadership attributes outlined in Chapter 2 are relevant and relatable but probably not memorable - 13 different attributes may be hard to recall and convey. However, by grouping them into key leadership themes, a leadership philosophy starts to emerge.

For example, based on the leadership attributes outlined in this paper, a leadership philosophy could look something like:

- **Values-based leadership** - encompassing the leadership attributes of clear values and the ability to communicate them, and building and leading diverse teams.
- **Strategic and systems thinking** - encompassing the leadership attributes of data and analytics driven, experience delivering complex projects and ability to fully appreciate the complicated and dynamic strategic operating environment.
- **Driving learning, resilience and agility** - encompassing the leadership attributes of entrepreneurial spirit, comfortable with disruption, commitment to learning-based approach, and the ability to implement agile organizational structures with clear plans for resourcing, both now and in the future.
- **Influencing and partnering with stakeholders** - encompassing the leadership attributes of excellent communication skills, political astuteness and able to collaborate across governments, and abilities to mobilize capital and partner with investors and create an environment for cooperative relationships with partners.

We hope the 13 leadership attributes and the example leadership philosophy can be used as a starting point for infrastructure entities and major programs/projects to further tailor.

Commit to developing adaptable and resilient leaders by providing ongoing professional training and development

The leadership attributes required to deliver transformative outcomes are diverse and span many different situations and environments, from justifying the rationale for delivering transformative outcomes to skeptical stakeholders through to working collaboratively with contractors to deliver the transformative outcomes.

Infrastructure leaders should participate in ongoing formal professional development training that supports the development and refinement of such skills as distinct to technical competency.

Ability to adapt one's leadership style is a vital skill. There are many different leadership styles and infrastructure leaders may demonstrate a natural affinity for one in particular. However, to lead effectively, infrastructure leaders need to be able to adapt their style based on the set of circumstances they face.[23] For example, a translational style where leaders build strong networks, "seamlessly working up and down and across various organizational hierarchies, connecting with groups who might otherwise be excluded, and translating between constituencies", is best when organizations, communities and places need to become more resilient.[24]

Through professional development, infrastructure leaders can be taught when and how to adapt their leadership style and create and sustain a network of relationships needed to deal with the uncertainty and complexity often associated with transformative outcomes.

There are many examples of governments and organizations with a strong commitment to professional development.

The Office of Projects Victoria in Australia provides advice to the Victoria State Government on major infrastructure projects. In conjunction with The University of Oxford and EY, it runs the Australian Major Projects Leadership Academy (AMPLA). AMPLA delivers a 12-month professional development program for infrastructure professionals delivering infrastructure projects focused on developing personal and technical leadership skills.[25]

In 2019, the Government of Hong Kong established the Centre of Excellence for Major Projects Leaders. At the launch, Financial Secretary and the Honorary President of the Centre of Excellence, Mr Paul Chan, said he "encouraged the participants to seize the opportunity to update themselves on state-of-art project management and leadership skills, and more importantly, their mindset, with a view to bringing the delivery of Hong Kong infrastructure to new heights and enhancing the livelihood of citizens".[26]

Industry member bodies also play a vital role in offering easily accessible training courses and seminars that improve capability to deliver transformative outcomes. Often, they aim to equip leaders to understand the key challenges and opportunities in achieving transformative outcomes through infrastructure.

For example, the United States Water Alliance is a membership organization whose mission states: "we believe that all water has value. It must be managed in a sustainable and inclusive manner to build strong economies, vibrant communities, and healthy environments."[27] Impressively, the Water Alliance offers courses, resources and events that address change leadership, climate action, resilience and inclusivity themes amongst others.[28]

Remove unconscious bias from leadership recruitment and selection

In recruitment and when building teams, we tend to select people who look, sound and behave like us. This is unconscious bias. Infrastructure leaders have historically come through engineering, design and project management pathways, often starting in graduate or junior design, engineering or project management roles and working their way up to leadership roles. While these technical skills and experiences are - and will remain - critical, we must recognize that the career pathways of future leaders are likely to be more diverse and may follow non-traditional pathways, for example a technology or business-oriented pathway.

Recruitment systems and processes should ensure that recruitment and selection processes are free from unconscious bias and do not disadvantage people that have followed non-traditional career pathways. Measures may include setting guidelines that require a diverse selection panel and writing role descriptions that don't bias towards certain backgrounds and experiences.

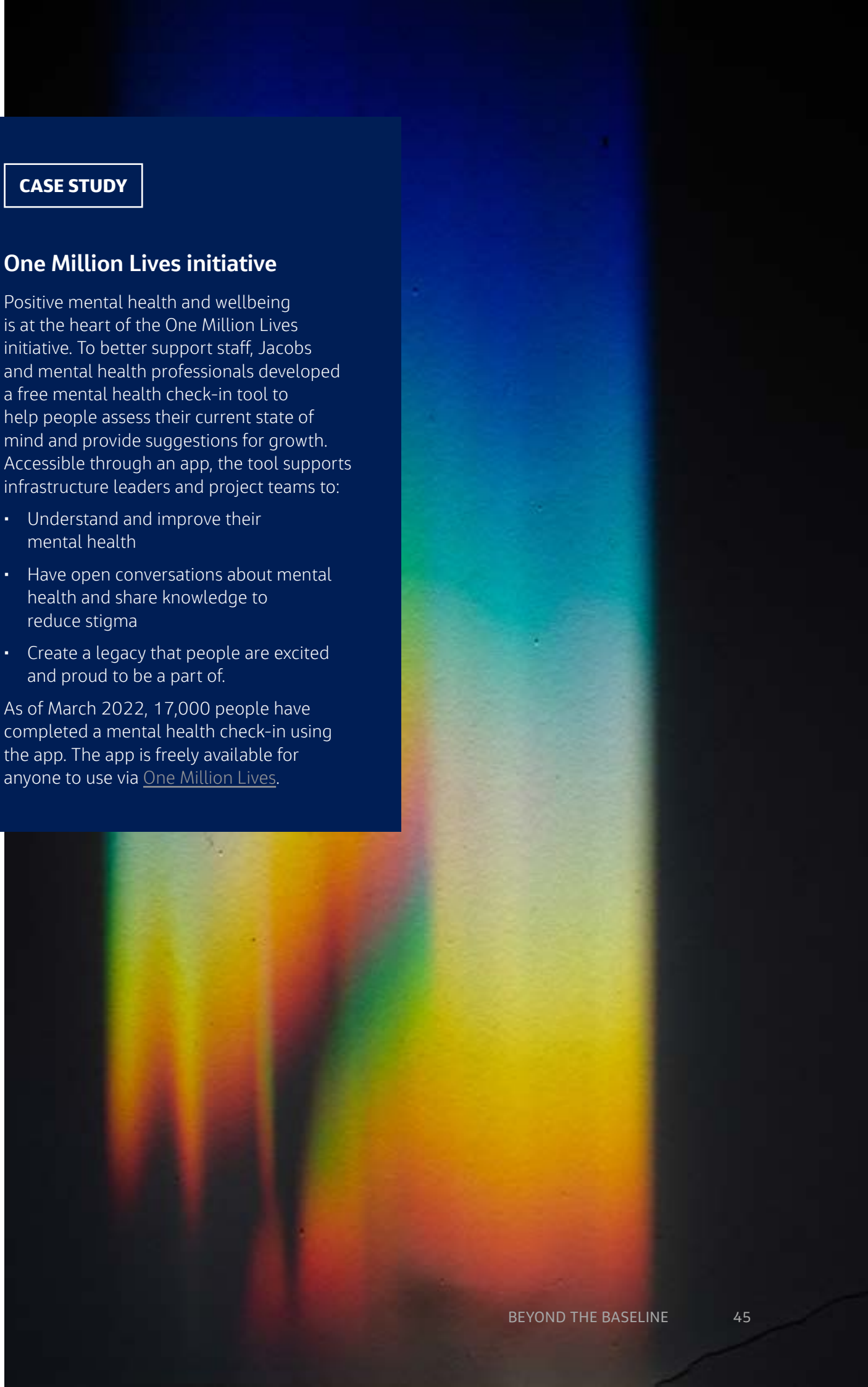
Many of the skills needed by infrastructure leaders are acquired through practical experience delivering infrastructure projects. A simple step infrastructure entities can take is to recruit leaders for minor to moderate size infrastructure projects and provide them with the opportunity to drive transformative outcomes through less complex infrastructure projects.

Equip leaders with tools and techniques to connect with their teams beyond the project needs

A central values-based theme running through most of the leadership attributes outlined in this paper is diversity - of skills and background.

Most leaders are comfortable having a "project performance" discussion with their teams but to build a diverse and inclusive project culture leaders need to connect with their staff holistically as well. This involves leaders showing a genuine interest in people's professional and personal lives and wellbeing, and making project resourcing decisions that help bring balance to their professional and personal lives. This is not an easy skill.

Working through their human resources or people functions, infrastructure entities should equip leaders with skills and techniques to help them establish a strong rapport and build trust with staff, and show empathy and understanding around both professional and personal issues. The One Million Lives initiative is one example of how infrastructure entities can equip leaders to engage staff holistically.



CASE STUDY

One Million Lives initiative

Positive mental health and wellbeing is at the heart of the One Million Lives initiative. To better support staff, Jacobs and mental health professionals developed a free mental health check-in tool to help people assess their current state of mind and provide suggestions for growth. Accessible through an app, the tool supports infrastructure leaders and project teams to:

- Understand and improve their mental health
- Have open conversations about mental health and share knowledge to reduce stigma
- Create a legacy that people are excited and proud to be a part of.

As of March 2022, 17,000 people have completed a mental health check-in using the app. The app is freely available for anyone to use via One Million Lives.

Program/project level leadership development measures

Make sure current leaders are leading by example

Through their actions and behaviors, infrastructure leaders play a key role in promoting the leadership attributes their teams need to succeed. Current leaders must be very mindful of their own "leadership shadow" and how it either fosters or inhibits the growth of emerging infrastructure leaders.

A leadership shadow is the collective effect of what a leader says, how they act, what they prioritize and what they measure, as outlined in Figure 3-1. Current leaders must ensure their leadership shadow reflects and promotes the desired leadership attributes.

To understand and improve their leadership shadow, each infrastructure leader should, at a minimum, complete a self-reflective assessment of how they and others perceive their leadership shadow, identifying any day-to-day changes - referred to as micro-changes - that will improve their leadership, for example how they conduct themselves in meetings or the tone used to write their emails.

A more challenging approach to improving the collective leadership shadow is for all leaders to share their shadow with the leadership group. Being willing to share their shadow and what they aren't "good at" and what they "don't know" helps leaders build vulnerability. Being vulnerable helps create a collaborative environment as leaders are more open to listening and learning. The leadership group can further challenge an individual's assessments as well as understand how well their collective leadership shadow aligns to the infrastructure entity's or program's leadership philosophy.

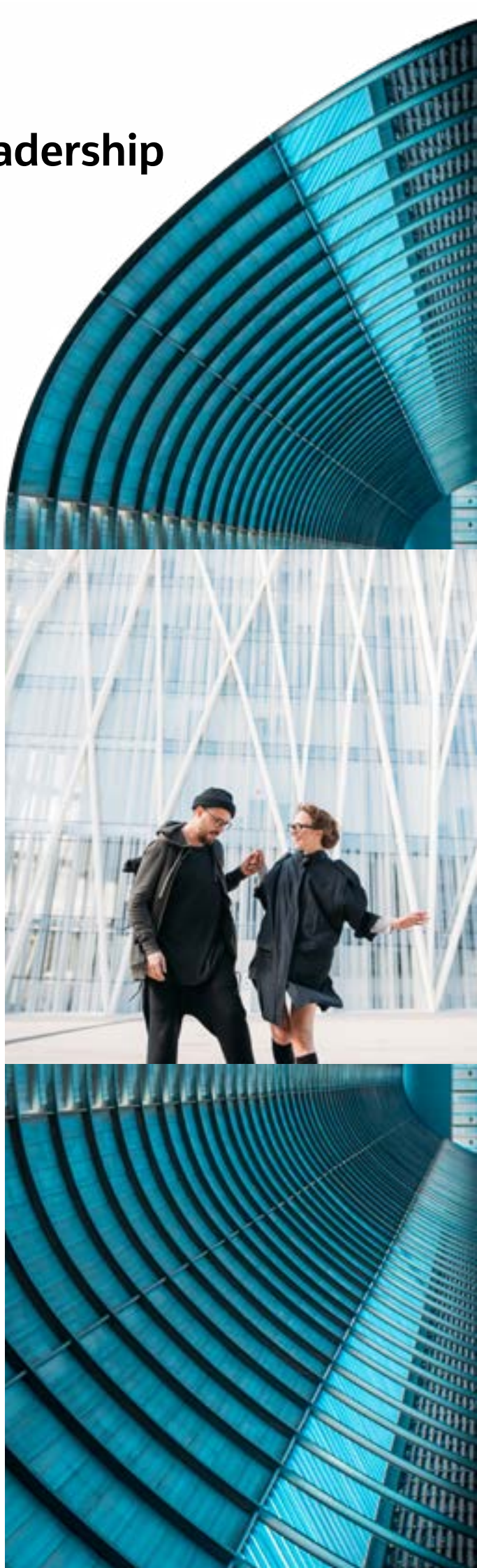
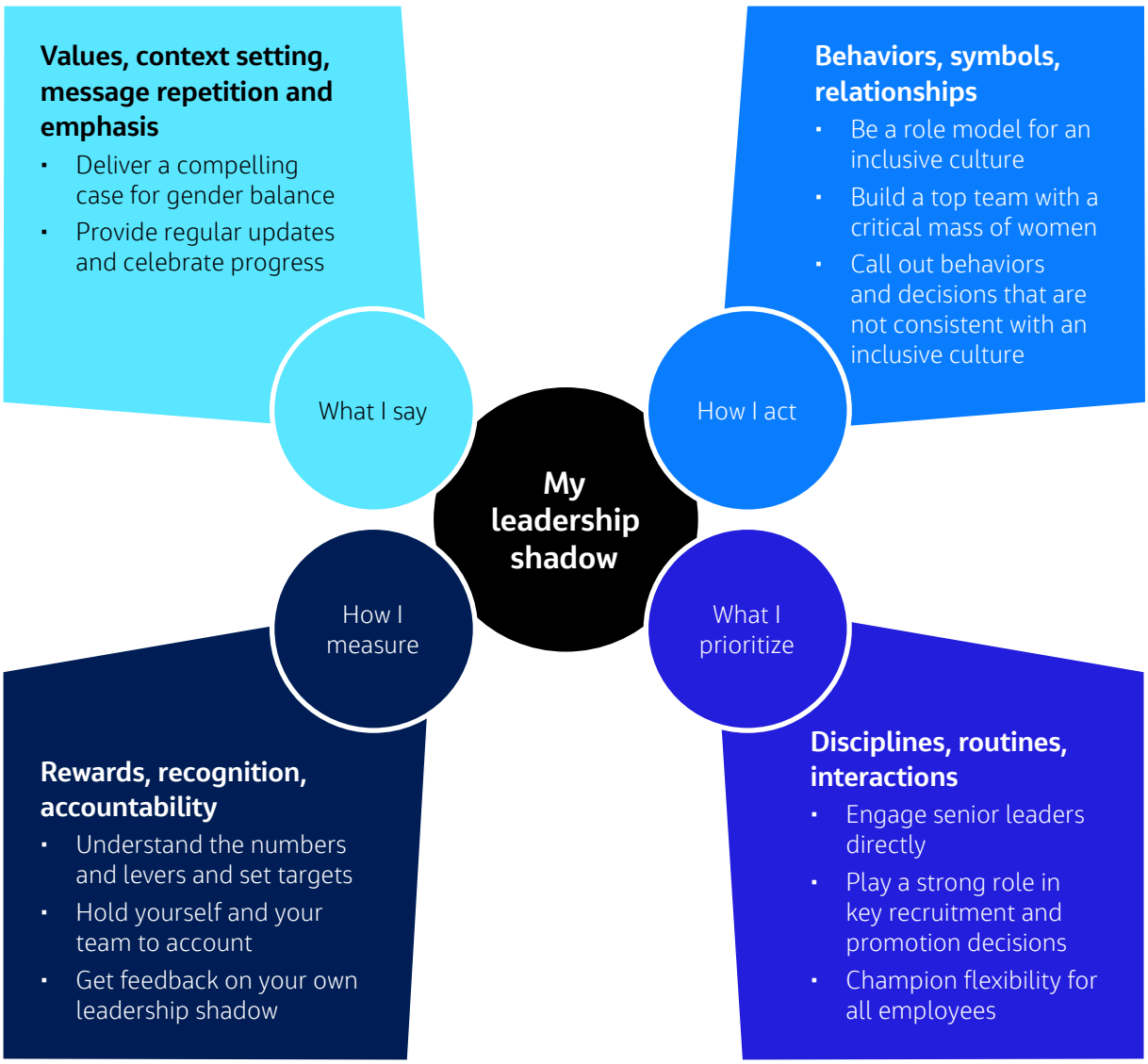


FIGURE 3-1

Your leadership shadow[29]



Make sure leaders remain aligned to the leadership philosophy

Having a clear guiding leadership philosophy is not enough. Infrastructure leaders must check in periodically on their degree of alignment with the leadership philosophy both individually and collectively as individual leaders will have different opinions on how well or not leadership is aligned.

A simple online questionnaire tasking leaders to reflect on the extent to which the leadership team is exhibiting the relevant leadership attributes and visualized results is an inexpensive technique to regularly check leadership philosophy alignment. Results can illustrate where the leadership team converges and diverges on their alignment to the leadership philosophy and thereby promote the leadership team to act where necessary.

Ensure that performance frameworks recognize the leadership philosophy and attributes

Performance measures set by infrastructure entities for infrastructure leaders must align with the required leadership attributes and philosophy. However, setting performance measures for the leadership attributes and philosophy can be inherently difficult. Unlike other measures such as budget and financial performance and safety and schedule, they are not easily quantified. To counter this, independent certification programs can provide a useful benchmark.

Independent associations like the International Project Management Association (IPMA) or the Project Management Institute have established objective certifications of project delivery, capability and performance. These objective certifications can be used as the basis for setting performance frameworks that incorporate leadership attributes.

For example, IPMA offers an international, competency-based, four level certification scheme.[30] Individuals can be certified as a Project Management Associate, Project Manager, Senior Project Manager or Projects/Program/Portfolio Director. Throughout the assessment process, assessors evaluate a candidate's technical competencies, demonstrated experience, emotional intelligence and leadership attributes such as managing team performance, stakeholder management and influencing, and resilience and coaching, relative to the level of assessment.

The IPMA individual competency baseline for project, program and portfolio management provides the basis for both assessment and for guiding maturity discussions in governance and delivery.

Like all performance metrics, leadership metrics can be refined through the lived experience of setting them, seeking to meet them and measuring and evaluating performance against them. The infrastructure sector would benefit from greater collaboration and sharing of experiences on how to set leadership performance measures.

Prioritize mentoring and coaching

All leadership roles can be stressful. This is especially true for infrastructure programs that are deadline driven, overloaded with numerous stakeholders with often competing priorities, affected by budget constraints and responsible for a large workforce that is often working in potentially hazardous situations.

In these stressful, fast-paced environments, leaders can find it difficult to prioritize time to reflect on their own performance and behaviors. In such environments, mentoring and coaching are important mechanisms to obtain context specific feedback and promote self-reflection.

Traditionally, mentoring was viewed as being tutored or guided by someone higher up in the organization. Today, mentoring is more holistic and can involve multiple mentors, including people who are:

1. Close enough to observe day-to-day behavior (especially in the highly stressful moments)
2. Part of the project team who must interpret and respond to a leaders leadership style
3. Someone higher up in the organization who can challenge leaders on what it takes to progress as a leader.

Each mentoring relationship should convey objective and meaningful feedback and promote reflection and course correction.

In addition to mentoring, enterprise-wide coaching programs for leaders can be beneficial in two ways. Coaching supports leaders in thinking through complicated issues and further builds their cognitive abilities and confidence. Leaders who experience coaching on a regular basis can also apply the same coaching techniques to their teams to help foster independent thinking and enhance team members' problem-solving skills and resourcefulness.

There are several ways to embed coaching into company culture, including Leader as Coach training, communities of practice and external coaching providers. Two examples of external providers who are making coaching work in a virtual and hybrid work environment are Better Up[31] and Ezra.[32] Both platforms offer leadership coaching and development resources aimed at either an organization or individual and use data and analytics to demonstrate results.

Maintain leadership learning network in a "work from home world"

Many infrastructure entities and professionals have permanently altered their working arrangements, adopting hybrid or flexible working arrangements as a result of the COVID-19 pandemic.

In 2021, the global human resources and learning professional development body, CIPD, in partnership with Accenture, completed their global *Learning and Skills at Work Survey*.

The survey captured the implications of workplace changes as a result of the COVID-19 pandemic for learning and development.

Unsurprisingly, 67% of organizations surveyed reported a decrease in face-to-face learning. Many organizations quickly adapted their learning and development programs to become more digitally enabled, autonomous and self-paced.[33]

Infrastructure entities, programs and projects must continue to facilitate and enable leadership learning, especially highly valuable informal learning, even in hybrid and flexible working environments. Infrastructure programs should:

- Reflect on and agree the leadership style(s) best suited to hybrid or flexible working environments. For example, leadership styles promoting greater empathy/listening, greater employee autonomy, choice and responsibility, and greater network building.[34]
- Update leadership training materials to reflect the preferred hybrid or flexible working leadership style(s). For example, encouraging more frequent one-on-one check-ins with team members to understand their personal situation and how hybrid work environment affects them.[35]
- Conduct regular interactive forums for infrastructure leadership to share experiences in leading in a hybrid or flexible working environment.

CONCLUSION

Infrastructure needs to deliver an array of outcomes and quickly

The already urgent need to deliver transformative outcomes through infrastructure is growing with every year - and in some cases every month - that passes. Infrastructure needs to deliver an array of outcomes spanning environmental sustainability, inclusion, resilience, research and development, Digital/InfraTech and economic growth, and it needs to do it quickly.

The injection of trillions of dollars of stimulus funding is a one-off opportunity to deliver these outcomes at scale. Achieving transformative outcomes at scale begins with individual and collective leadership. Infrastructure leaders must reflect on infrastructure they have delivered in the past and recognize what they can and should do better next time.

We've identified 13 leadership attributes current and emerging infrastructure leaders will need to lead the charge on realizing transformative outcomes through infrastructure. The diversity of the attributes may initially surprise people. On reflection however, we believe most current infrastructure leaders will be able to relate to and recognize the attributes as ones they are called on to utilize on a weekly or even daily basis.

By understanding the breadth of leadership attributes required, infrastructure delivery entities can:

1. **Develop leadership development initiatives and measures relevant to all their programs and projects.** For example, a leadership philosophy, on-going professional development, leadership recruitment techniques that minimize unconscious bias, and tools and techniques for leaders to holistically engage their staff.
2. **Equip programs and projects to provide the collective leadership needed.** For example, understanding the collective leadership shadow and adjusting accordingly, continually testing leadership alignment to the leadership philosophy, prioritizing coaching and mentoring, and equipping leaders to continue to improve their leadership capabilities in a hybrid work environment.

By being mindful of the breath of leadership attributes needed and through a collective and deliberate training and development effort, infrastructure entities can establish the infrastructure leadership necessary to inspire program and project teams to realize transformative outcomes.

Where to next?

Utilizing the leadership skills and attributes outlined in this paper, infrastructure leadership must inspire teams to aim higher, broader and wider and embrace all transformative outcomes.

The second paper in the *Beyond the Baseline* series explores **how to differentiate transformative outcomes and impacts from what infrastructure has typically delivered**. The paper provides an overview of measures and indicators to differentiate transformative outcomes from typical outcomes regarding:

- Environmental sustainability
- Resilience
- Inclusivity
- Research and development
- Digital/InfraTech
- Economic development.

The third paper in the *Beyond the Baseline* series addresses **how to equip program and project teams to quickly reach a shared appreciation of transformative outcomes**. It outlines a clear set of activities to undertake from day one to mobilize and equip infrastructure project teams to realize transformative outcomes.

Key activities include:

- Producing a plan to acquire the digital capabilities needed to realize transformative outcomes
- Understanding the local context to inform the level of positive impact possible for each transformative outcome
- Involving citizens in determining the level of positive impact for each transformative
- Setting positive impact targets for each transformative outcome
- Appraising infrastructure options to identify those most capable of delivering transformative outcomes.

Appendices

Appendix A
Examples of bold initiatives made by governments

Environmental sustainability commitments

- President Biden has pledged to cut US greenhouse gas emissions 50% by 2030, relative to 2005 levels.[36]
- 93 countries and the European Union have signed the L*eaders Pledge for Nature,* pledging to reverse the biodiversity loss.[37] For example, France has committed to end the import of unsustainable forestry/agricultural products, for example coca, rubber, soy, palm oil and wood by 2030.[38]

Resilience commitments

- Singapore has set aside $3.7 billion (SGD5 billion) as part of their *Green Plan* to provide coastal and flood drainage protection measures.[39]
- Canada has committed to spend over $3.2 billion (CAD4 billion) over 10 years to support nature-based solutions to climate change.[40]

Inclusivity commitments

- The UK has committed $6.2 billion (GBP4.8 billion) to a *Levelling Up Fund* that will invest in infrastructure supporting town center and high street regeneration, local transport projects and cultural and heritage assets.[41]
- New Zealand has published a *Living Standard Framework* to guide treasury policy and assess budget initiatives for their potential contribution to New Zealand's wellbeing. This is expected to be updated in 2021 to incorporate Māori and Pasifika world views, what matters for child wellbeing, and the different ways that culture contributes to wellbeing.[42]

Research and development commitments

- The UK government recently announced $490 million (GBP375 million) *Future Fund: Breakthrough* with the aim to "help high growth, R&D intensive companies bring game changing technologies to the market". This specifically includes deployment and commercialization of breakthrough innovations to help the UK transition to net zero and to drive skilled jobs and the economy.[43]
- The UAE recently announced their *Projects of the 50* including making $8.1 billion (AED30 billion) available to help invest in adoption of advanced technology.[44]

Digital/InfraTech commitments

- In its aim to become a "digital nation", the UAE has announced multiple strategies, including the National Artificial Intelligence Strategy 2031,[45] Fourth Industrial Revolution (4IR) Strategy[46] and UAE Digital Government Strategy 2025.[47]
- In 2021, Malaysia announced a federal budget for the Digital Economy of Malaysia that includes $242.5 million (RM1 billion) in funding focusing on smart technology and Industrial Revolution 4.0 and $434 million (RM1.8 billion) in funding for a cyber security strategy.[48]

Economic development commitments

- As part of the Australia budget (2021-22) the government has announced $81 billion (AUD110 billion) of funding for infrastructure projects with the aim of creating 100,000 jobs over the next 10 years.[49]
- Saudi Arabia's Vision 2030 sets out a plan to diversify and grow the economy through increased employment, opening the country up to investment, improving the business environment and deregulating the energy market to make it more competitive. As part of this vision, they have committed to raising non-oil exports from 16% of GDP to 50% of GDP, increasing women's participation in the workforce from 22% to 30% and to lowering the rate of unemployment from 11.6% to 7%.[50]

Appendix B

Where the G20 is investing $3.2 trillion in infrastructure[2]

Transport 26%

Rail $307,139M 33%	**Roads** $217,820M 24%	**Transport (unspecified)** $170,879M 18%	**Zero Emissions Vehicles Infrastructure** $157,729M 17%	**Air Transport** $33,043M 4%
Ports $32,260M 3%	**Maritime/Inland Water Transport** $5,082M 1%	**Active Transport** $1,517 (<1%)		

Social 26%

Healthcare and Wellness Services $300,749M 41%	**Education** $225,271M 31%	**Housing** $118,058M 16%	**Other Public Buildings and Structures** $45,299M 6%	**Urban Landscape /Public Spaces** $22,919M 3%
Tourism, Arts, and Culture $32,260M 3%	**Social (unspecified)** $1,168M <1%	**Justice** $937M <1%	**Sports and Recreation** $793M <1%	

Other Initiatives 17%

Disaster Management Infrastructure $252,685M 41%	**Environment and Nature Based Solution (NBS)** $150,263M 23%	**Commercial and Industrial Infrastructure** $142,690M 19%	**Agriculture** $72,613M 10%

Communications 13%

Digital/ Enterprise Solutions $228,614M 47.4%	**Wireless - e.g. 4G/5G, Satellites** $117,235M 24.3%	**Fixed - e.g. Broadband** $92,642M 19.2%	**Data Centers** $43,709M 9.1%

Water 7%

Water Treatment and Distribution	Dams and Irrigation	Water Efficiency Solutions	Sewage Treatment and Collection	Water (unspecified)
$123,906M 52%	$59,859M 25%	$25,910M 11%	$18,163M 8%	$12,623M 5%

Energy 7%

Electricity Transmission and Distribution	Hydrogen	Energy Storage	Gas Transmission and Distribution	Energy Distribution (unspecified)
$144,623M 62%	$48,807M 21%	$23,970.M 10%	$10,496M 4%	$6,085M 3%

Infrastructure 5%

Infrastructure (unspecified sectors)
$188,550M 5%

Renewable Generation 3%

Renewables (unspecified)	Solar
$65,008M 58.5%	$25,315M 22.8%

Wind	Other
$20,626M 18.6%	0.1%

Non-Renewable Generation 1%

Waste 1%

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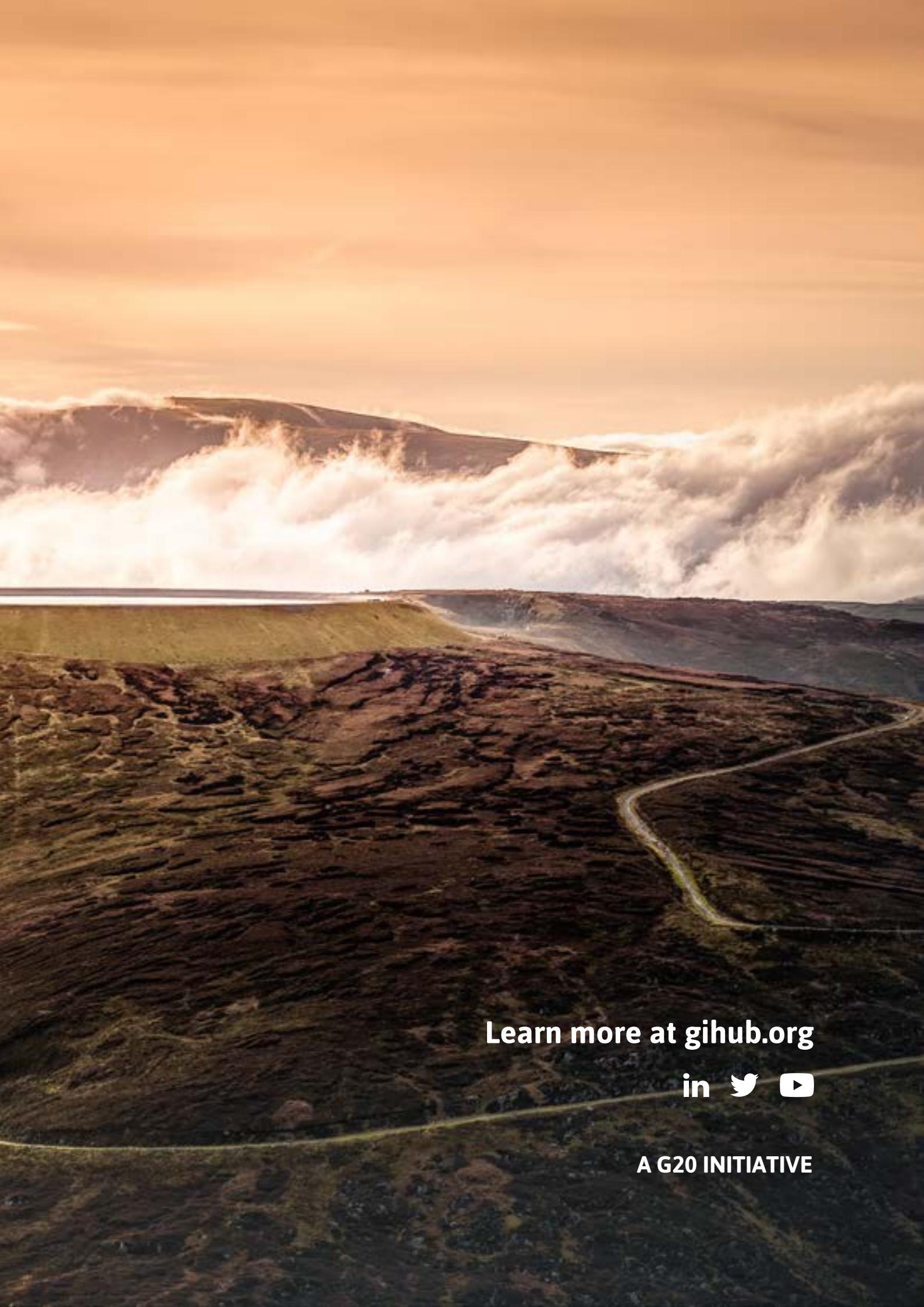
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For inquiries about this paper please contact:

ASIA PACIFIC & MIDDLE EAST

Nayyar Ehsan

Senior Director – Marketing, Brand & Communications
Nayyar.Ehsan@jacobs.com

EUROPE & AFRICA

Lisa Levy

Head of Marketing & Communications
Lisa.Levy@jacobs.com

AMERICAS

Kim Corbin

Director – Communications
Kim.Corbin@jacobs.com

Jacobs

jacobs.com

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