

Zero-Draft

Guide on improving the delivery of PPPs through digital transformation throughout the project lifecycle in support of the SDGs

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Disclaimer

This preliminary draft is provided for discussion purposes only to participants of the 8th edition of the [UNECE International PPP Forum](#). It is made available as received by the drafting team, and represents ongoing work that will be enhanced through dialogue and input from attendees. Following this collaborative feedback, the guide will undergo a rigorous peer-review process and is expected to be submitted for consideration by UNECE member States at the Working Party on PPPs in November 2024.

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I. Introduction

The development, availability and accessibility of data and digital tools are rapidly expanding, particularly with the surge in interest in Artificial Intelligence in 2023, assisting and enhancing industry and society globally.

Harnessing technology provides both opportunities and challenges to PPPs and infrastructure projects worldwide, requiring a holistic and considered approach to implementation to realise the benefits and desired outcomes. Moreover, in our pursuit to address global climate change and realise the SDGs, digital transformation and utilising digital tools is imperative.

Furthermore, as finance is the cornerstone of the traditional PPP methodology, digital tools are ideally positioned to enhance the efficiency of all financial operations and activities within the PPP project lifecycle. Digital tools are now vital to enable the extensive exchange and sharing of information between stakeholders, particularly given the complex, interdisciplinary issues that commonly arise in PPP projects.

The international community has already acknowledged the need and high importance for countries to engage in the digitalisation of sustainable infrastructure and PPP project preparation. For that purpose, the multilateral development banks undertook a joint initiative to lead and finance the multilateral platform SOURCE for sustainable infrastructure which is provided for free to developing countries. The UNECE considers SOURCE a key resource for implementation of the UNECE Guiding Principles to achieve “PPPs for the SDGs”.¹

This guide aims to equip governments and policy makers with insights and recommendations for improving the delivery of PPP projects through data and digital transformation, in support of the SDGs.

It provides an overview of the benefits and need for digital transformation, the issues to consider when implementing digital tools and the opportunities and challenges digitalisation can provide throughout the lifecycle of PPP projects.

Whilst the entire lifecycle of the PPP process is considered in this guide, emphasis is placed on the project identification and project development stages (i.e., the identification, preparation and organisation phases²), with a focus on stakeholder engagement and government approval processes. Project identification, in particular, continues to be one of the main challenges in PPP projects.

Digitalisation offers the potential to provide transparency, efficiency, insights, accountability, inclusivity and a more people-centred approach to PPPs than would be possible without the use of digital tools, ultimately accelerating processes and chances for success.

¹ A full list of ECE PPP policy documents on the “*PPPs for the SDGs*” approach, is available at: <https://unece.org/ppp/products>.

² Standard on Public-Private Partnerships / Concession Legal Framework in support of the Sustainable Development Goals and its Accompanying Guide, p.65, [2319184_E_web.pdf \(unece.org\)](https://unece.org/public-private-partnerships-legal-framework)

This guide is structured in seven sections:

1. Introduction
2. The need for digital transformation in “PPPs for the SDGs”
3. General principles for success
4. Project identification stage
5. Project development stage
6. Project implementation stage
7. Key policy recommendations

Background & context

In 2019 the UNECE published 10 Guiding Principles³ to assist governments’ transition to the new model of “PPPs for the SDGs”. The Guiding Principles are designed to achieve the following five UNECE outcomes for public infrastructure and service needs that prioritise “people” and “planet”:

- (i) Access and equality;
- (ii) Economic effectiveness including fiscal sustainability;
- (iii) Environmental sustainability;
- (iv) Replicability; and
- (v) Stakeholder engagement.

Achieving better outcomes for people and planet must be the focus of the existing built environment, and of its future development. At the global level, the SDGs provide a blueprint to achieve a better and more sustainable future for all: a balance between environmental, social and economic outcomes. Therefore, development of the built environment must take place within a context where outcomes are aligned from top to bottom: from global and national strategic priorities, through local requirements, to investment decisions for individual interventions.

Climate change has been one of the most defining issues of our time. As the UN’s Emissions Gap Report 2023 identifies, the world still needs to cut 2030 emissions by 42% to achieve the 1.5°C goal.⁴

According to the UN, fossil fuels are by far the largest contributor to global climate change, accounting for over 75 per cent of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions. PPPs are front and centre in sectors such as energy and transport, as the world moves towards cleaner sources of energy in the race to net-zero.⁵

³ Guiding Principles on Public-Private Partnerships in support of the United Nations Sustainable Development Goals, ECE/CECI/WP/PPP/2022/7.

⁴ <https://www.unep.org/resources/emissions-gap-report-2023>

⁵ <https://www.un.org/en/climatechange/science/causes-effects-climate-change#:~:text=Fossil%20fuels%20%E2%80%93%20coal%2C%20oil%20and,they%20trap%20the%20sun's%20heat>

The built environment is also a major driver of climate change and ocean acidification, responsible for more than half of global carbon emissions.⁶ The buildings and construction sector alone accounts for about 21 per cent of global greenhouse gas emissions, with investment in building decarbonisation expected to decline due to less a favourable investment environment as a result of rising costs.⁷

Although tackling environmental issues is one of the key priorities globally, the social and governance aspects should also be an integral part of project development and delivery, in particular in developing countries, as to not leave anyone behind, in alignment with the UN SDGs. Whilst digital adoption is accelerating globally, the digital divide continues to widen, exacerbating the poverty and productivity divide.⁸

Furthermore, there is a huge disconnect between the global funding available for infrastructure projects and the stakeholders' ability to access these funds. There is limited fiscal capacity within many countries globally to fund clean projects and ultimately benefit from reduced greenhouse gas emissions and the resulting employment and other important socioeconomic benefits. Yet, there is no shortage of private sector investment-ready financing available for projects, in particular from pension plans, insurance companies, banks and asset managers. The cause of this inability to access funding is the lack of shovel-ready, "bankable" projects, often resulting from bottlenecks at the pre-procurement stage: early project development, government approvals, consultation, obtaining stakeholder support, etc. The delays at this stage prevent projects from progressing to deliver the much-needed benefits to the economy.

There is not much time between now and 2030/2050 to achieve the SDGs and critical net-zero targets. Projects' preparation can take some time, as we have experienced over the years, and given the urgency of addressing climate change and the related consequences touching on all SDGs, it is imperative that this pre-procurement, preparation phase bottleneck be addressed in order to deliver more projects, faster and more efficiently. Closely coordinating public and private financing requirements will result in more projects being built, faster, to address current global challenges.

Fundamental transformation is needed to address both carbon emissions and enable a faster and more efficient delivery of the pre-procurement stage of infrastructure projects, and indeed all stages of the project lifecycle.

Digital tools and technologies have the potential to enhance project delivery and assist in overcoming these issues, providing greater effectiveness, efficiencies and insights. A wholistic approach to digital transformation throughout the project life cycle is needed, from both the

⁶ Hannah Ritchie, Pablo Rosado and Max Roser (2023), *CO₂ and Greenhouse Gas Emissions*, OurWorldInData.org. Retrieved from: '<https://ourworldindata.org/co2-and-greenhouse-gas-emissions>' [Online Resource: [CO₂ and Greenhouse Gas Emissions - Our World in Data](https://ourworldindata.org/co2-and-greenhouse-gas-emissions)]

⁷ <https://www.unep.org/resources/report/global-status-report-buildings-and-construction>

⁸ World Bank, Digital Progress and Trends Report 2023, <https://openknowledge.worldbank.org/server/api/core/bitstreams/95fe55e9-f110-4ba8-933f-e65572e05395/content>

private and the public sectors, keeping in mind the urgency to accelerate the early stages of project development.

Defining digital transformation⁹

Digital transformation is a term widely used, often with different meanings or intentions. In this Guide, the term *‘digital transformation’* is used to describe the process of moving an organisation or sector from an analogue (often paper-based) delivery or environment, to one which is driven by data and technology, delivering services and products in new and improved ways.

Digital transformation is synonymous with *‘digitalisation’*: transforming business and sector processes and operations through the adoption of digital technology, creating new opportunities and driving change. This is in contrast to *‘digitisation’*: the process of simply converting information from a physical format (paper) into a digital one, without any change process; for example, the scanning of a hard copy document to create a digital file.

This Guide largely focuses on digitalisation, the transformation of processes through digital technology. Any reference to digital transformation should be regarded as digitalisation.

The digital landscape

‘Technology’ in relation to PPP and infrastructure projects can mean:

1. technology projects which build digital infrastructure in an economy (for example, PPP infrastructure projects for communication, energy, transport, digital infrastructure and telemedicine);
2. technology or physical, digital assets which enhance existing infrastructure (for example, management and monitoring systems or surveillance and security systems); or
3. technology which assists, enables or enhances the processes to deliver PPP and infrastructure projects (for example, digital platforms used to collect and manage stakeholder feedback).

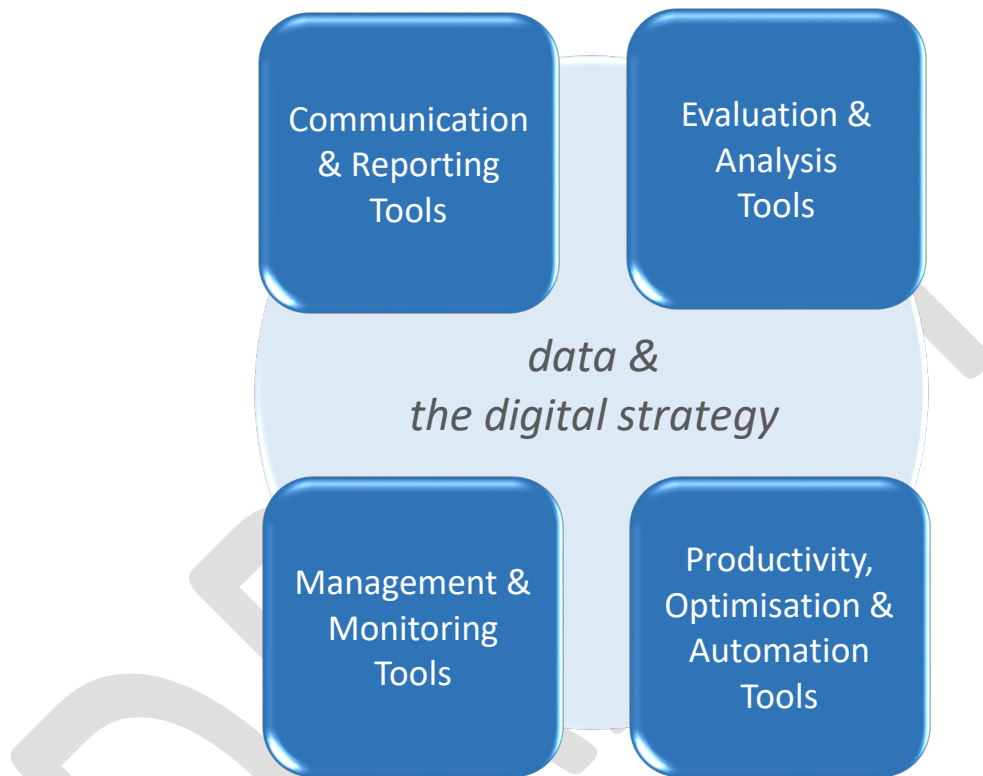
This Guide considers the third category: technology or digital tools used to assist, enable or enhance the delivery processes and activities of PPP and infrastructure projects.

The digital landscape of technology available to finance and deliver PPP and infrastructure projects is extensive. Technology continues to develop at speed and is growing globally in availability and accessibility. Digital tools are available at each stage and for all activities of the project lifecycle.

⁹ For definitions used in this Guide regarding PPP terminology, please refer to UNECE documents such as *‘Guiding Principles on Public-Private Partnerships in support of the United Nations Sustainable Development Goals’* and *‘Standard on Public-Private Partnerships / Concession Legal Framework in support of the Sustainable Development Goals and its Accompanying Guide’*, which can be found at [Ref].

These digital tools which have the potential to improve the delivery of “PPPs for the SDGs” broadly can be categorised into:

- Communication & reporting tools;
- Evaluation & analysis tools;
- Management & monitoring tools; and
- Productivity, optimisation & automation tools.



*Figure 1
The digital landscape*

Examples of these digital tools, and the opportunities and challenges they hold for the “PPPs for the SDGs”, are discussed in the following chapters.

Underpinning and fundamental to all of these digital tools is data and the digital strategy. To improve “PPPs for the SDGs”, a digital strategy must be established at the outset and the importance of data recognized and integrated throughout all PPP stages and activities. Both governments and the private sector are demanding more insights and information for the identification, development and implementation of these projects, which can only be achieved by harnessing and utilising data.

II. The need for digital transformation in “PPPs for the SDGs”

The world urgently needs clean, bankable projects, that are aligned with the SDG’s and completed on time and on budget. The use of data and digital tools have the power and potential to enable faster and more effective processes throughout the lifecycle of projects, increasing transparency, communication, collaboration and inclusivity.

Ultimately digital transformation has the potential to enable “PPPs for the SDGs” to achieve the five UNECE outcomes (access and equality; economic effectiveness including fiscal sustainability; environmental sustainability; replicability; and stakeholder engagement).

Opportunities in digital transformation

Digitalisation is not an end in itself, rather it is an enabler. Most importantly, digitalisation is about enabling people. Done right, digitalisation enables people:

- to use information to make better decisions, faster;
- to improve processes; and
- to apply and to integrate technology more wisely.

It is clear that digitalisation makes good commercial sense.¹⁰ Digitalisation of other industries has delivered efficiencies of up to 30% of the costs associated with undertaking processes, and this quantum of saving is still available to the built environment because its level of digitalisation is far behind other parts of the economy.

It is also clear that assets and networks are inextricably linked across the built environment. In other words, the built environment functions as a complex ‘system of systems’. Significant challenges like climate change, resource depletion and biodiversity loss impact the entire system. These systems-level challenges demand systems-based solutions – they cannot be solved in isolation. Silos in policy, decision making, development and operation can only produce suboptimal outcomes.

To get more from the existing built environment, as well as from what we are yet to build, we must address the whole system and all its asset life-cycle processes. While we cannot control these complex systems, we can influence them. Therefore, we must strive to understand them better, which inherently involves mastering the relevant data, information, knowledge and wisdom.

We must also intervene more effectively, which is essentially about making better decisions faster in our projects and delivery processes. This is what digitalisation can do for us, but it needs to be a shared endeavour.

¹⁰ KPMG (2021) showed that every £1 invested in information management could potentially secure £5.10 of direct labour productivity gains and £6.90 in direct cost savings [INSERT REF]. Furthermore, McKinsey Global Institute’s “*Generative AI and the Future of Work in America*” (2023) predicts that 30% of hours worked today are to be automated by 2030 with use of AI [INSERT REF].

With the opportunities and benefits of digital transformation, of course there are risks which must be considered, managed and minimised where possible. Nevertheless, the opportunities far outweigh the risks, and if digitalisation is not embraced, infrastructure projects risk falling behind in efficiency, innovation, and sustainability and facing increased costs. Some of the key opportunities and risks of digital transformation in the delivery of PPPs for the SDGs include:

Opportunities

- Surfacing insights
- Optimising performance
- Enabling transparency
- Minimising risks
- Accelerating processes
- Greater efficiency
- Monitoring and evaluating SDGs
- Potential for greater inclusivity and stakeholder engagement

Risks

- Unintended consequences
- Financial liability
- Operational issues
- Security/privacy issues

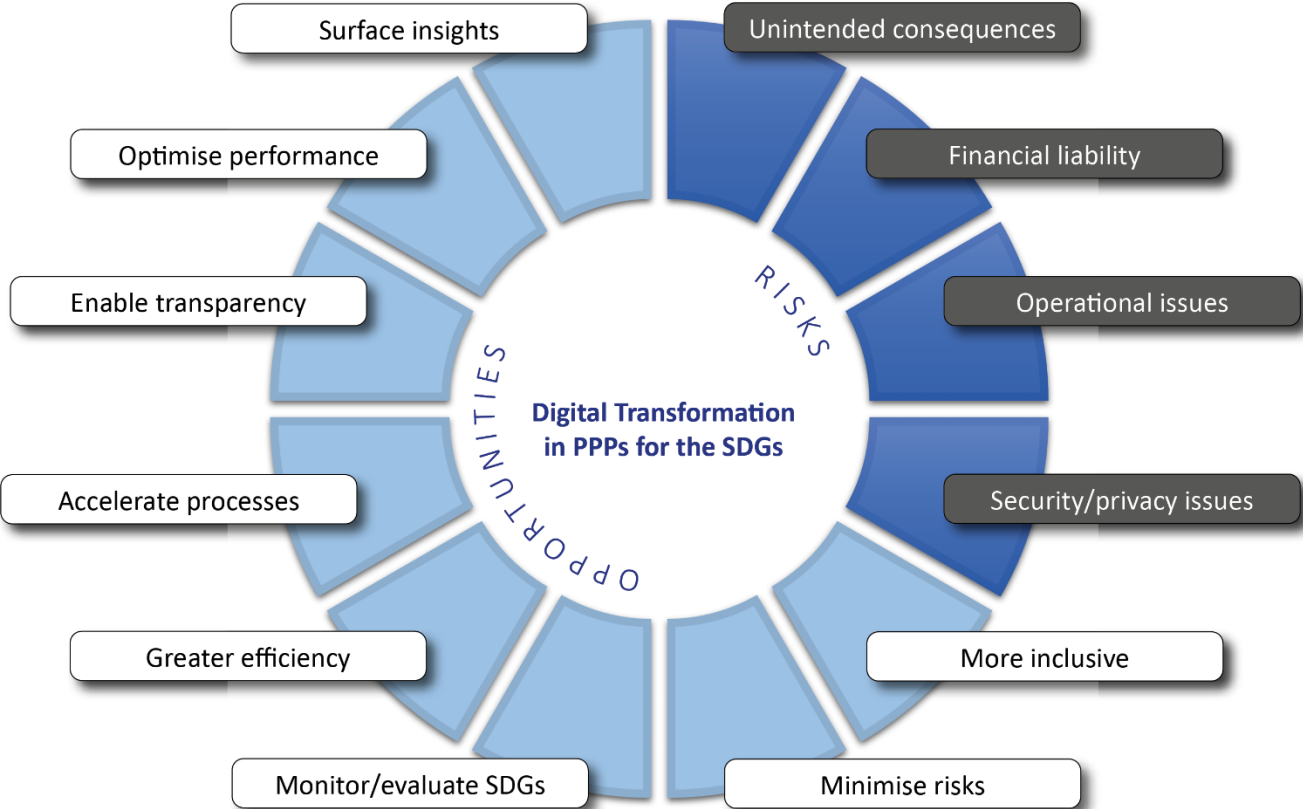


Figure 2
Opportunities & Risks in Digital Transformation in PPPs for the SDGs

III. General principles for success

For success in the digitalisation of PPP processes and projects across all stages, governments and procuring authorities should consider embracing the following 12 principles:

1. Establish and embrace a digital strategy;
2. Leverage data utilisation and address challenges with big data;
3. Use the UNECE PIERS methodology to evaluate and evidence alignment with SDGs;
4. Utilise digital tools developed for the PPP lifecycle (eg, SOURCE);
5. Promote communication and transparency;
6. Implement and align law, regulation and policy;
7. Endorse, embrace and manage cultural change to ensure adoption;
8. Provide leadership to drive strategy and cultural change for digital transformation;
9. Capacity building, talent and training;
10. Invest in and construct the requisite digital infrastructure;
11. Prioritise cyber security; and
12. Understand the opportunities and risks of Artificial Intelligence (AI).

A digital strategy

Any “PPPs for the SDGs” programme should have a clear, written digital strategy for each stage of its development, establishing which fields of digital transformation are likely to be relevant for a given PPP programme or project.

A digital strategy involves a comprehensive integration of digital technologies with project processes and methodologies, encompassing various components such as data, digital tools and cybersecurity measures. The aim of the digital strategy is to optimise project outcomes, enhance efficiency, reduce costs, and improve transparency and accountability through the strategic use of digital tools.

The strategy should define clear output specifications for the specific tools to be adopted, including digital goals, outcomes, needs and measures of success. It is important to create a robust way of evaluating the extent to which digital tools should be used within a programme, ensuring that they are relevant to the programme and to the digital maturity of the government, its economy and the potential market tenderers and investors.

A well-defined digital strategy ensures that technology is seamlessly embedded in infrastructure development, facilitating better risk management and more effective monitoring of project outcomes, and providing timely insights into project performance and potential challenges.

Case Study Example: *Amsterdam Smart City Initiative, Netherlands*

The Amsterdam Smart City initiative is a public-private partnership with the goal of transforming Amsterdam into a leading smart city by leveraging innovative technologies to enhance energy efficiency, mobility, and overall urban management. Digital strategy components include sustainable energy management, intelligent transport systems, open data platforms and ‘living labs’.

Harnessing data

Data is fundamental to the success of digital transformation and achieving the SDGs. Without data, monitoring, reporting, benchmarking, analysing, optimising and the use of digital tools is not possible: data-driven decision making is needed throughout all stages of the project.

Some of the opportunities and challenges to consider regarding data include:

Opportunities	Challenges
<p><i>Informed Decision-Making:</i></p> <p>Data plays a crucial role in facilitating informed decision-making processes related to the SDGs. By providing empirical evidence and insights into social, economic, and environmental trends, data enables policymakers to make informed choices about resource allocation, policy formulation, and program implementation. This ensures that decisions are grounded in evidence, align with SDG objectives, and maximize impact on sustainable development outcomes.</p>	<p><i>Access and availability of data:</i></p> <p>Data may not always be readily available. It can be siloed and difficult to obtain (for example, in different government departments or ministries on different servers/etc). Stakeholders may not be aware that relevant data exists and/or they do not have easy access to it. To enable successful projects, at it is important at the outset to identify available data and/or data which must be collected or accessed.</p>
<p><i>Monitoring and Evaluation:</i></p> <p>Data serves as a cornerstone for monitoring and evaluating progress towards the SDGs. By tracking key indicators and benchmarks, data enables stakeholders to assess progress, identify gaps and measure the effectiveness of interventions aimed at achieving SDG targets. Through data-driven monitoring and evaluation processes, policymakers can make informed adjustments to policies and programs, ensuring that efforts are aligned with SDG priorities and objectives.</p>	<p><i>Data ownership and data sharing:</i></p> <p>Governments and public authorities must have legal ownership and control of the relevant data needed at each stage, and/or understand any challenges which might arise with any data they are not entitled to use on project completion. Sharing data between stakeholders is key to achieving successful outcomes, but may prove problematic if issues of data sovereignty or data ownership are not dealt with at the outset. In addition, with the use of artificial intelligence, any issues of copyright and intellectual property rights must be addresses.</p>
<p><i>Innovation and Technology:</i></p> <p>Data-driven innovation and technology play a transformative role in advancing the SDGs. By leveraging data analytics, artificial intelligence, and emerging technologies, stakeholders can develop innovative solutions</p>	<p><i>Data governance - security and privacy:</i></p> <p>As data sharing between stakeholders at various stages of the PPP process is essential, data security and data privacy may become more challenging. It is important to establish best practises in IT security, cloud computing</p>

<p>to address complex development challenges. From precision agriculture to renewable energy, data-driven innovations offer scalable and sustainable approaches to achieving SDG targets, unlocking new opportunities for economic growth, social inclusion, and environmental sustainability.</p>	<p>and access management/permissions, implementing cybersecurity measures as a top priority.¹¹</p>
<p><i>Facilitating Cross-Sector Collaboration:</i></p> <p>Data serves as a catalyst for facilitating cross-sector collaboration and partnerships to advance the SDGs. By providing a common language and platform for information sharing, data enables stakeholders from diverse sectors, disciplines and geographic regions to collaborate effectively towards shared SDG objectives. Through data-driven collaboration, stakeholders can leverage complementary expertise, resources, and networks to address interconnected development challenges comprehensively and holistically.</p>	<p><i>Identifying data requirements at the outset:</i></p> <p>Governments and public authorities need to identify data that the private sector ultimately requires, and incorporate this in bidding documents and specifications. Incorporating reference to data that the private sector needs for reporting and disclosure requirements with respect to the SDGs (ISSB, ESRS, SEC, CSRD) at the outset can avoid “after the fact” surprises. This can greatly facilitate private sector financing in particular from SDG oriented funds (climate funds etc.)</p>
<p><i>Supporting Long-Term Planning and Risk Management:</i></p> <p>Data plays a crucial role in supporting long-term planning and risk management strategies. By providing insights into future trends, vulnerabilities, and opportunities, data enables stakeholders to model and anticipate risks, develop resilience strategies and plan for sustainable development pathways. Through data-driven risk management and scenario planning, policymakers can identify priority areas for intervention, allocate resources strategically and build adaptive capacity to navigate uncertainties and shocks on the path towards achieving the SDGs.</p>	<p>All data is not “good” data:</p> <p>Having too little data, too much data or unstructured data can may hinder objectives and the success of projects, or even cause delay. Understanding the data available and any data management, data cleansing and/or data mapping activities to be put in place is key to surfacing insights from data and being able to use data effectively.</p>

¹¹ For one example of the issues to consider regarding data governance, see the World Bank Report “*Data Governance Practices in MENA - Case Study: Opportunities and Challenges in Morocco*”, November 2020. <https://documents.worldbank.org/en/publication/documents-reports/documentdetail/597571616485453643/data-governance-practices-in-mena-case-study-opportunities-and-challenges-in-morocco>

UNECE PPP Infrastructure Evaluation and Rating System (PIERS)

PIERS¹² is a digital tool for governments and public authorities to consider at the outset any PPP programme of projects.

The UNECE PIERS platform is a new digital assessment tool that puts people and sustainable development front and centre. PIERS scores infrastructure projects against the SDGs and the PPP for the SDGs criteria. Put simply, it ensures projects create “value for people” and “value for the planet,” with a focus on the world’s most vulnerable. PIERS integrates considerations of resilience, sustainability and circularity, bringing together the five PPP for the SDGs¹³ outcomes.

PIERS currently is available online, free of charge, to enable efficient self-assessment.¹⁴ PIERS can be used early on in project identification through to project development and implementation.

Digital tools for the whole PPP lifecycle

It is important for PPPs for the SDGs to adopt a wholistic approach to digitalisation, in line with best practice, throughout the project life cycle, keeping in mind the urgency to accelerate the early stages of project development. Various digital tools are now available specifically to assist PPPs for the SDGs, several of which are free of charge.

Two examples include: (1) the SOURCE platform, coordinated by the Sustainable Infrastructure Foundation on behalf of the Multilateral Development Banks (MDBs), which digitalises the workflow at each stage of the project cycle, and (2) fiscal transparency and fiscal sustainability digital tools.

SOURCE

The MDBs recognised the importance of digitalisation in PPPs and as a result, established a joint initiative to create and finance the multilateral platform SOURCE¹⁵ for digitalizing infrastructure and PPP preparation, over the full project cycle. SOURCE is acknowledged and supported by international bodies such as G20, G7, OECD, IMF, and others. It is also supported by the United Nations Inter-Agency Task Force on Financing for Development.

SOURCE is the multilateral platform for sustainable infrastructure designed to support the:

1. development of projects to bridge the infrastructure gap;
2. digitalisation agenda of governments globally; and
3. mobilisation of private finance.

¹² <https://unece.org/ppp/em>

¹³ The ECE Guiding Principles have defined “PPP for the SDGs” as: “... a type of Public-Private Partnerships (PPPs) designed to implement the Sustainable Development Goals and thereby to be “fit for purpose”. It is defined as an enhanced approach for PPPs that overcomes some of the weaknesses in the way the traditional PPP model has been implemented. PPPs are contract delivery tools for public infrastructure provision involving initial private financing. They include two types: “government-pay PPPs” which are primarily funded by taxpayers and “concessions” which are primarily funded by the users of the infrastructure.”

¹⁴ <https://piers.unece.org/>

¹⁵ <https://public.sif-source.org/source/>

SOURCE is an online infrastructure project development software, under UN servers, designed for both traditional procurement and PPPs. It provides project development management and an infrastructure intelligence solution, enabling a well-prepared pipeline of projects.

The platform digitalises the workflow for infrastructure and PPP preparation at each stage of the project cycle. SOURCE is therefore key to reaching financial close and fulfilling the SDGs, by facilitating an early identification, evaluation and allocation of the projects risks and impacts, while enabling the monitoring of KPIs during implementation.

SOURCE offers a common framework, engaging standardization on a global scale, incorporating international best practices and private sector requirements, which is adaptable to each country's processes and is interoperable with complementary IT systems. SOURCE strengthens the capacity of project developers to package sustainable infrastructure projects and address such issues as: the interfacing of multiple stakeholders, ownership of the data, legal protection and technical security of data.

The international community recognises the value of digital tools, such as SOURCE, which support and manage project information and preparation throughout the project life cycle and help to disseminate materials. Additionally, platforms such as SOURCE should be scaled-up in countries lacking expertise in developing quality infrastructure projects, to enable transparency and speed of information for all stakeholders.¹⁶

For successful PPPs for SDGs, governments and public authorities should consider the use of SOURCE and other available platforms for their PPP programme of projects to enable digital transformations and successful infrastructure projects which achieve the SDGs.

Case Study Example: *SOURCE Success Stories*

In March 2024, the Sustainable Infrastructure Foundation (SIF) published six success stories from the countries where SOURCE has achieved a complete integration.

Fiscal transparency and sustainability tools

Digital tools are also available to assist with identifying fiscal risks in PPP projects and assessing the need for risk mitigation measures.

One example is the International Monetary Fund (IMF)/World Bank's digitalisation tool *PPP Fiscal Risk Assessment Tool (PFRAM)*. PFRAM is an analytical tool to assess fiscal costs and risks arising from PPP projects. It is designed to assist governments in assessing fiscal implications of PPPs, as well as in managing these projects in a proactive manner. PFRAM helps to better understand the medium- to long-term fiscal implications of PPPs.¹⁷

¹⁶ OECD Reference Note on Environmental and Social Considerations in Quality Infrastructure, G20 Reference Note, June 2019. <https://www.oecd.org/g20/summits/osaka/OECD-IMF-Reference-Note-on-Governance-of-Quality-Infrastructure-Invest.pdf>

¹⁷ <https://ppp.worldbank.org/public-private-partnership/library/public-private-partnerships-fiscal-risk-assessment-model-pfram-version-2-0>

Further examples are the IMF's Public Investment Management Assessment (PIMA¹⁸) and Climate-Public Investment Management Assessment (C-PIMA¹⁹) digitalisation tools. PIMA is a comprehensive framework to assess infrastructure governance practices for countries at all levels of economic development and C-PIMA helps governments identify potential improvements in public investment institutions and processes to build low-carbon and climate-resilient infrastructure.

Communication and transparency

The use of digital tools for clear, accessible and transparent communication with all stakeholders and the wider community is key for timely progress and success at every stage of the project, from project identification to project implementation and completion.

At the project identification and development stages, publishing and disclosing the project identity, consultation dates, procurement details, location, duration, status, etc, can address issues of transparency and fair dealing and enable proper project preparation. This also allows stakeholders to plan and contractors to prioritize and manage their pipeline of work and supply chain. Similarly, financial institutions use this information to plan their PPP participation based on type of project, geography, size and other relevant factors.

Providing this clarity of project pipeline early during the identification stage helps governments best manage affordability and budget issues, the private sector to line up projects and manage their PPP investment portfolios, and construction companies to also manage their own work backlog and subtrades availability. Maintaining it throughout the development and implementation stages provides clear communication and has the potential to manage expectations and community involvement.

Publishing information on a central, public website, with links to relevant documents, allows stakeholders to take part in the early consultation process, and be informed throughout all stages of the project.

Most developed economies have their own project identification and disclosure processes. However, smaller jurisdictions or less developed economies could benefit from organizing similar open public disclosures, taking advantage of digitalization tools, via a common open website and potentially leveraging internal data, from SOURCE for example, to facilitate publishing projects and project details more broadly, as each jurisdiction considers appropriate.

Case Study Example: *Province of Ontario, Infrastructure Ontario Database*

One significant factor which helped the Province of Ontario in Canada to accelerate its PPP leadership was its open and transparent disclosure from very early stages of PPP projects.

¹⁸ <https://infrastructuregovern.imf.org/content/PIMA/Home/PimaTool/What-is-PIMA.html>

¹⁹ <https://infrastructuregovern.imf.org/content/PIMA/Home/PimaTool/C-PIMA.html>

Law, regulation and policy

In order for digital transformation to succeed, it is fundamental that the laws, regulations and policies of the country are aligned to create an enabling environment, and do not prohibit or contradict digitalisation.

Governments and public authorities should ensure that relevant laws and public policies exist to support the implementation of the PPP programme, and that any obstacles and inconsistencies are addressed before the programme is implemented. In addition, proposed PPP programmes need to align with public values (for example, in relation to citizens' willingness to accept facial recognition) and realistically align public sector needs with private sector competencies.

Specifically, as AI is set to reshape the delivery of infrastructure projects, it is crucial to ensure that the regulatory framework which governs AI's integration, as well as data privacy and data security policy, is robust and responsible (for example, the EU AI Act 2024²⁰ and the UK AI Framework²¹).

Case Study Example: *UK's legal status regarding smart contracts*

With the rise in use of smart contracts, there had been some debate in the UK regarding their legal status and whether such a contract is valid and enforceable. The Law Commission's and LawTechUK's publications 2021 and 2022 are an important step for the digital transformation of the UK infrastructure and construction industry, providing much needed guidance.

Adoption and cultural change

Digital transformation by its nature involves a shift in culture and change from traditional ways of working. This can prove challenging for some organisations. Governments and public authorities need to create an enabling environment, promoting change and innovation, with leadership driving strategy.

New digitalisation initiatives must also be monitored to ensure new processes, digital tools and ways of working are adopted and implemented. To do so, adoption plans should be formulated which satisfy the objectives of consistency, interoperability, efficiency and value for money in a project-specific "digital transformation tool kit".

In addition, authorities need to review the effectiveness and efficiency of any digital transformation initiative to ensure the tools are being used on early projects, and apply lessons learnt on subsequent projects.

Leadership

Implementation and adoption of digitalisation will only be successful with the drive, vision, oversight and involvement of the leadership within an organisation. Effective leadership has the

²⁰ https://www.europarl.europa.eu/doceo/document/TA-9-2024-0138_EN.pdf

²¹ <https://www.gov.uk/government/consultations/ai-regulation-a-pro-innovation-approach-policy-proposals/outcome/a-pro-innovation-approach-to-ai-regulation-government-response>

potential to drive alignment throughout an organisation, ensuring that digital strategies are effectively integrated with the organisation's goals and objectives. Leadership also has the potential to foster a culture which embraces change and innovation, and therefore adoption. Vision and direction are key for digital transformation and navigating any complex decisions, politics and/or investments required.

It is important for authorities to allocate experienced and competent leadership resources to develop credible and realistic business cases and procurement documentation, and lead the digitalisation initiatives throughout the identification, development, implementation (including operation and hand back of the concessions and assets).

Capacity building, talent and training

Governments must have the requisite capacity to enable digitalisation throughout all stages of a PPP programme. Finding talent, particularly in relation to AI tools, can be difficult and therefore upskilling and re-skilling may be necessary. Talent development and capacity building must be part of the digital strategy for digital transformation and, in particular, for any implementation of AI.

In addition to digitalisation, a better understanding by governments of private sector requirements with regard to infrastructure investments early on in the process is key for successfully attracting private sector participation. Authorities must evaluate the capacity of its organisation, as well as the market economy, for designing, delivering, operating and financing its programmes and projects. Where necessary, establish a programme to build the relevant capacity and train the authority and market participants in the intended programme.

Case Study Example: *G7 Sustainable Infrastructure Fellowship Program*

The Sustainable Infrastructure Fellowship Program is a G7 initiative for global capacity building and training. The goal of the program is to provide public and quasi-public sector officers, multilateral banks and the private sector with the necessary knowledge and skills to deal with private investment in infrastructure following best practices and to make projects “bankable” from an investment perspective, through the use of virtual classes.

Digital infrastructure

Digital transformation is only possible if the underlying technical infrastructure is in place. Authorities need to invest in and develop the technical infrastructure and environment necessary to support the proposed transformation.

In terms of the technical infrastructure, with regard to the delivery of the PPP programme, this could mean investing in and/or building the required software, platforms, servers and/or data centres needed, as well as establishing technical support throughout the project. Consideration should also be given to the required bandwidth, grid power capacity, or other infrastructure needed to support the transformation.

In particular, data centre capacity shortage may be problematic for AI development and adoption. Training and using AI data sets requires increased power consumption and high-power density. Innovative and safe solutions for power, cooling and physical infrastructure requirements for data centre facilities must be considered as part of the overall digital infrastructure strategy.

IT systems should embrace platforms that allow for real-time data capture and the seamless ability to securely access and share data (needed for decision-making) and consider having a secure, centralized cloud-based platform to enhance this real-time collaboration and data-sharing.

There are of course challenges and cost implications of designing and maintaining the required IT systems. However, with good planning and by establishing a realistic and robust digital strategy up front, as well as taking advantage of any available free platforms or services available to member states (for example, PIERS and SOURCE), these hurdles can be managed and minimised.

Case Study Example: *Smart Rwanda 2020 Master Plan*

A national ICT strategy focusing on increased private sector participation in ICT infrastructure investment and development through public-private partnerships to spur job creation and economic growth, including a 25-year agreement between the Government of Rwanda and Irembo to digitise and maintain public services on a single window platform.

Case Study Example: *Morocco Digital Transformation Strategy*

Case Study Example: *Kingdom of Bahrain Cloud-First Policy*

Cyber security

Cyber-crime is a significant threat to public services, any organisation and society in general. As PPP infrastructure projects often involve large-scale infrastructure critical to national security, they can become prime targets for cyber-attacks. Safeguarding sensitive data and ensuring the continuity of critical services is essential in PPP projects.

Enhancing cybersecurity measures can prevent data breaches, reduce the risk of service disruptions and protect against financial and reputational damage. Furthermore, robust cyber security frameworks in PPP projects foster trust among stakeholders, encouraging further investment and collaboration in public infrastructure. This commitment enhances operational resilience and therefore should align with broader national security strategies, ensuring that public assets remain secure.

To ensure the government's functions and services are resilient to the cyber threats, prioritise cyber security regarding all technology and implement a cyber security strategy for the responsible and safe use of digital tools throughout the PPP programme.

Artificial Intelligence (AI)

Since the release of OpenAI's ChatGPT in November 2022, AI has taken the world by storm, revolutionising how we interact with technology and sparking debate about the balance between technological advancements and ethics, privacy, and the changing nature of the human-computer interaction.

Of course AI was not new at that point, its inception being some 75 years ago in the mid-1900s; however, what was new and novel in November 2022 was the public's accessibility to AI and its awareness of AI.

Now, AI is one of the key issues facing the infrastructure industry today. Whilst it has the potential to assist the industry as a whole, to overcome some of our toughest challenges, including climate change, safety concerns, labour shortages and cost and schedule overruns, it also carries with it risks which must be carefully considered, both before and during any utilisation of AI tools.

This Guide does not cover the specific opportunities and risks of AI for PPPs for the SDGs in detail. However, given it is a digital tool which is set to disrupt, enhance and optimise PPPs for the SDGs, most of the general principles for success and the key recommendations outlined in this Guide are directly applicable for the use of AI. In addition, some specific references regarding the use of AI in the PPP stages are included in the chapters below.

As AI is a technology here to stay, and is developing at pace, it cannot be ignored. It is important for governments to establish an AI strategy in relation to its PPP programme and consider how to operationalise responsible AI. Governments must create an environment which encourages innovation and utilisation, but also implements practical steps and measures to ensure that AI is used in ways which are ethical, fair, transparent and accountable, addressing issues of bias and privacy issues and protecting and safeguarding the public.

IV. Project identification stage

Introduction

Project identification refers to the concept stage of the project (that is, the original idea for the project) when pre-feasibility studies are conducted. During this stage of the project, the public partner sets forth its ideas, strategy and objectives for the project,²² as well as conducting both stakeholder engagement and government approval processes. This stage notoriously can suffer from delays and bottlenecks.

This chapter considers how digital transformation and use of data and digital tools can assist specifically at this stage of the PPP lifecycle, in the processes of:

1. Project identification & assessment;
2. Stakeholder engagement & public participation; and
3. Government approval processes.

Each of these processes can harness digital tools to enhance productivity, openness and transparency, and accountability and efficiency, thereby enabling a swifter and smoother development of the project and minimising delay.

The Working Party has convened an expert group to prepare a guide specifically on stakeholder participation in PPPs: “*Enhancing Stakeholder Engagement in PPPs for the SDGs*”. That guide will consider stakeholder engagement, one of the five desirable UNECE PPPs for the SDGs outcomes, and the diverse set of processes necessary to foster meaningful participation and inclusivity. The following chapter in this Guide solely considers data and digitalisation in relation to stakeholder engagement and public participation.

1. Project identification & assessment

Effectively and efficiently assessing possible projects is key to identifying “bankable” projects, accessing funding and successfully commencing projects without delay. In the project identification and assessment stages, governments can leverage a variety of digital tools.

Digital tools

Examples of digital tools which can assist in these activities include the use of:

- *[continue to develop list]*
- PIERS to assess projects against the SDGs;
- SOURCE to access standardised templates to help with the initial identification and definition of projects; detailed sector-specific checklists, assessment tools for feasibility studies (technical/financial/environmental viability); mechanisms for risk identification and management; and international best practice guides and standards.

²² https://unece.org/sites/default/files/2023-04/ECE_CECI_2023_4_2305092E.pdf

- tools to identify and communicate viable opportunities swiftly, assess market demand, and conduct feasibility studies more efficiently. This enables PPPs to expedite project development timelines, reduce project delays, and deliver tangible benefits to communities in a timely manner.
- analytical tools (PFRAM discussed above) to assess fiscal costs and risks arising from PPP projects. The PFRAM is designed to assist governments in assessing fiscal implications of PPPs, as well as managing projects in a proactive manner.²³
- IMF digitalization tools available for PPP preparation; and
- geographical risk tools to assess the risks and benefits of a given geographical location.

Case Study Example: *Mapping Sierra Leone's Energy Infrastructure*

PPP project used digital tools where simply inputting a project location allows decision makers to drill down on due diligence items such as accessibility, natural risks, quality of wind and sun exposure and many other variables.

Challenges

[to be developed / inserted]

2. Stakeholder engagement & public participation

Effective and inclusive stakeholder engagement and public participation in decision-making processes and throughout the life of the PPP are important ingredients for successful project delivery. Stakeholder engagement and public participation in PPPs for the SDGs means creating an enabling framework of regulations, procedures, and contractual provisions, as well as incentivising contracting authorities and private partners to recognise the value of effective and inclusive stakeholder engagement and public participation.²⁴

To enable successful stakeholder engagement processes, digital tools have the potential to provide solutions which can make consultations more broad, democratic, accountable, open and transparent.

As the assessment criteria in PIERS shows, PPPs for the SDGs must collect metrics, track, report and analyse data in order to achieve positive results in the stakeholder engagement and public participation process.

PIERS sets out four categories, all of which require data to be collected and considered:

²³ <https://www.imf.org/external/np/fad/publicinvestment/pdf/PFRAM2.pdf>

²⁴ [Reference to PIERS text.]

Stakeholder Engagement Intent (PIERS)	Data / activity required
SE1: Plan for Stakeholder Engagement and Public Participation	<ul style="list-style-type: none"> • Identify stakeholders and map; • Prepare stakeholder engagement plan, including the identity of specific stakeholder needs and issues to be addressed; • Measure the effectiveness and inclusiveness of the stakeholder engagement and public participation process, and measure the specific outcomes achieved; and • Publish and disseminate project information.
SE2: Maximise Stakeholder Engagement and Public Participation	<ul style="list-style-type: none"> • Document and track stakeholder and public participation plan(s) throughout the project’s lifecycle; • Record how the public is able to express views and participate freely without fear of being penalized, persecuted or harassed; • Obtain stakeholder feedback and demonstrate how it is: <ul style="list-style-type: none"> ○ incorporated into project plans, designs, processes and decision-making; ○ treated fairly and equitably; and ○ sought from stakeholders.
SE3: Provide Transparent and Quality Project Information	<ul style="list-style-type: none"> • Provide quality and pertinent project information to all stakeholders, including members of the public in a transparent, timely, understandable and accessibly fashion; and • Publish regular reports summarising the substantial outcome of general stakeholder engagement meetings.
SE4: Manage Public Grievances and End User Feedback	<ul style="list-style-type: none"> • Set up processes and mechanisms to manage public grievances and end-user/customer feedback; • Record resolution and/or outcomes of public grievances and end-user/customer feedback; and • Track and make available (subject to personal data protection regulations) public grievances and end-user customer feedback.

Digital tools

The collection and management of data is fundamental to each of the activities above, as well as creating a data strategy which enables a shared data environment. Examples of digital tools which can assist in these activities include the use of:

- public websites and chatbots for citizen services, to disseminate information and improve engagement with the public and project stakeholders;
- interactive and/or visualisation tools to enable the public and stakeholders more easily visualise and understand the proposed projects and their potential benefits;
- social media and local community channels to reach public stakeholders and the community to provide information and enhance communication;
- digital platforms to collect stakeholder feedback efficiently and provide a public engagement platform which may be able to extend further and reach more stakeholders than traditional analogue methods;
- artificial intelligence and other data analytic and measurement tools to assess and analyse stakeholder and public engagement feedback and surface insights more quickly;
- communication and virtual meeting software to hold virtual stakeholder and public engagement meetings and presentations, to enable a wider reach in situations where it is not possible to convene in-person;
- reporting tools to enable faster and more efficient summarising and publishing of stakeholder engagement meetings; and
- digital platforms for tracking and documenting (for example, plans, schedules, status, decisions).
- *[continue to develop list]*

Challenges

Whilst the potential benefits and opportunities created by digital tools are clear, in addition to those issues which challenge PPPs generally, it is also important to understand the hurdles and difficulties which may nevertheless exist at this stage, for example:

- *Access to digital tools and devices:* Whilst technology and digital transformation certainly has the ability to reach more stakeholders and public community grounds, there will always be hard to reach groups; for example those who do not use or have access to digital tools and devices. PPPs for the SDGs must be inclusive and leave no one behind. The over use of technology could adversely impact certain groups, and therefore identifying and mapping stakeholder capabilities is essential.
- *Data privacy and data protection:* When collecting feedback during stakeholder engagement and public consultation processes, if personal data is obtained, it must be kept safely and securely and used in line with the laws and regulations of the country.
- *Technology as an enabler, not to be used in isolation:* Engaging stakeholders and the public in consultations is more successful when the process is trusted and transparent and involves human interaction. An entirely digital approach may be appropriate in some

situations; however, not all. Technology should be seen as an enabler to traditional methodologies or processes, or as a means to conduct stakeholder engagement and public consultations in new and innovative ways – but not as an entire replacement to human interaction.

3. Government approval processes

Digitalisation can facilitate the interaction between the various government entities, as well as providing standard template documents for use across the public sector, to expedite the PPP appraisal process, and to make it more transparent and efficient.

Digital tools

As with stakeholder engagement and public participation described above, the collection, management and access to data and its insights is fundamental. Examples of digital tools which can assist in these activities include the use of:

- *[continue to develop list]*
- SOURCE to simplify access to international best practices, provide a central platform for data and documents necessary in the project approval process, empower governments to make well-informed decisions through the consolidation of required information, including those relating to social, climate, and biodiversity qualitative and quantitative targets;
- shared data platforms to improve communication and data sharing between different government departments or local authority entities;
- financial modelling tools, for modelling scenarios and sensitivities;
- tools for analysing, comparing and allocating risk including funding risk, commercial risks, delivery risk and operational risks (eg monte carlo simulation);
- tools for evaluating the benefits and value offered by PPP for the SDGs in comparison to alternative delivery mechanisms such as direct delivery or bond financing (eg business case / public sector comparator creation); and
- data analytics to enable data-led decision-making processes, and ultimately accelerating project approvals.

Challenges

Digitalisation regarding approval processes can face challenges, such as:

- *Data silos*: if the relevant and necessary information and data for decision-making exists, but is not accessible to the relevant stakeholders (or the relevant stakeholders are not aware the data exists), data-led decision making is not possible and delays and bottlenecks become more likely.

- *Cultural change:* some government institutions may find resistance to change. Transitioning from traditional ways of working requires cultural change management. Stakeholders may be reluctant to adopt new technologies due to fear of the unknown, potential job losses, or a decrease in control over processes.
- *Interoperability and standardization:* Different government departments may use different systems and technologies. Achieving interoperability, to enable data-led decision making and a data-led approval process, may prove challenging, requiring standardized data formats and protocols to ensure seamless data exchange and communication.

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V. Project development stage *[to be further developed]*

Introduction

Project development refers to the stage of the project where the detailed shaping of the project occurs through full feasibility, tendering, technical design, legal and financial structuring up until contract signing and financial close.²⁵

This chapter considers how digital transformation and use of data and digital tools can assist specifically at this stage of the PPP lifecycle, in the processes of:

1. Feasibility & design;
2. Tendering & procurement; and
3. Contract negotiation & contract management.

1. Feasibility & design

[INSERT TEXT & DEVELOP TEXT BELOW]

[Include importance of defining at the outset any digital requirements and outcomes need for operation.]

Digital tools

- *Digital Twins:* The use of digital twins has become widespread in the construction industry. Digital twins act as dynamic, virtual models of physical assets, enabling professionals to simulate and analyze scenarios. A large number of studies is available describing the principles and benefits of digital twins. While the use cases have mostly been widespread in the built environment, applications to other types of real assets, such as offshore wind farms, are emerging too. [improve predictability & reduce project deliver costs]
- *Automation Tools:* Workflow automation tools and software automate manual processes and repetitive tasks with rule-based logic. A more recent development, they have a clear merit in creating efficiencies in allowing the public sector to better manage priorities and track tasks. Project management is one of the main fields of application of task automation. Any project finance transaction is characterised by the number of stakeholders and the need to drive this web of stakeholders towards a commonly shared goal in a timely manner. Work-flow automation applied to project management for project finance transactions has clear benefits of increasing productivity across the entire value chain and reducing the risk of human error. Again there is a whole ecosystem of providers with technical solutions of a comparable merit that allows the public sector to pick and choose the solution best suited to their needs. Furthermore, because these tools are now well tested and proven, the end-user risk is limited.

²⁵ https://unece.org/sites/default/files/2023-04/ECE_CECI_2023_4_2305092E.pdf

- *Building Information Modelling (BIM)*: enhancing the design, construction and operational processes (eg computer-aided design, etc);

2. Tendering & procurement

[INSERT TEXT & DEVELOP TEXT BELOW]

[Facilitate and manage risk allocation and sharing and payment mechanisms - Build flexibilities at the start using digital - Manage relationships and contracts/contract data (including risks, contract conditions and contract variations - Contracting tables, graphs and analysis - Manage supply chains and sub-contractors]

Digital tools

- *Use of available platforms to assess project readiness*: Prior to launching any public procurement process, assessing project readiness is key. Digitising internal checklists, or using those publicly available and supported by investment banks, such as the *PPP Project Preparation Status Tool* provided by the European PPP Expertise Centre (EPEC),²⁶ will assist communication, transparency and project readiness for procurement.
- *Use of AI for due diligence*: A number of other industries use data extraction, massaging (format/location) and augmentation technologies to make sense of large and complex sets of data. An example is using AI to streamline the project due diligence process. Mapping the key requirements from a technical due diligence report, for example, could be done without human intervention. A major portion of the time spent by analysts in project deal teams is reading hundreds of pages of reports and making notes which they can then use for their analysis. The analysis is the important part, yet the time spent on data extraction is a driver for the upfront fees charged by financial institutions. Reducing manual intervention also means reducing the risk of error in predictive modeling which is so key to the project finance scenario analysis work. Reducing the manual work and automating the low value added tasks such as report reading would be a significant progress in the project finance industry.
- *A standardising, platform-based financial model*: Project finance and PPP preparation and execution has not evolved much in the past 30 years. The use of Word for legal documentation and Excel for the all-important financial modeling remain the norm. This constitutes a cost base that could be avoided as follows: Procuring authorities to prescribe a given financial model to be part of the bidding guidelines. In the same way as the private sector is given a template concession agreement, a template financial model would be prescribed with justification to be provided for deviations. To the objection that will inevitably be raised by financiers that the financial model needs to be tailored to the project and is unique, the counter-argument is that what makes the project unique is the data that are being input, not the architecture of the model itself. A parallel can be made with the rating models used by the main rating agencies, with different templates to rate social infra,

²⁶ <https://www.eib.org/epec/what-we-do/index>

renewables, transportation etc. This would drive project preparation and implementation costs down two fold: The finance parties up-front fees could be reduced as a considerable manpower goes into designing financial models, running scenarios etc. The cost of auditing the financial model would go down too: the more bespoke the architecture of the financial model the higher the audit costs. Excel could be replaced by other software containing a high degree of automation, which would constitute a progress for the project finance industry as a whole. Reducing manual intervention also means reducing the risk of error in predictive modeling which is so key to the project finance scenario analysis work.

- *e-Procurement Platforms*: tracking and comparing objectively the relative benefits of different tender solutions in a transparent way

Cast Study Example: *e-Procurement, Ukraine*

The e-procurement system ProZorro was launched in 2015. It has been developed by a public private partnership based on the Open Contracting Data Standard. The digital approach increases efficiency and effectiveness of public procurement through standardisation of the process and more competition, enabling greater accessibility and fairness in contracting.

Case Study Example: *Implementing eMobility in the City of Kranj, Slovenia*

Kranj City Council managed the competitive dialogue public tender the implementation of “Electromobility in the City of Kranj” completely electronically, following digital-by-default approach, using a digital online platform.

- *Virtual Data Rooms (VDRs)*: The use of VDRs and work-flow automation tools are widely used in the private sector.

Case Study Example: *Virtual Data Rooms for syndication and trading*

3. Contract negotiation & contract management

[INSERT TEXT & DEVELOP TEXT BELOW]

Digital tools

- *Contract management platforms*: digitise the contract, track the contract processes for traceability - managing contract obligations, contractual risks and the supply chains;
- *Smart Contracts*: [refer to Weather Ledger]
- *Use of AI in contract completion and contract analysis*:
 - *Automated data extraction and data entry*: AI as the ability to scan contracts and extract key information such as parties’ names, dates, clauses and obligations. This

can eliminate the need for manual data entry and ensure accuracy in capturing crucial details. This may be particularly helpful in due diligence exercises and/or managing risk across large quantities of similar contracts, e.g. supply contracts or subcontracts.

- *Clause identification and analysis:* AI has the ability to identify specific clauses within contracts, such as indemnity clauses, confidentiality clauses, termination clauses, etc., speeding up the process of locating important sections for review.
- *Monitoring contractual risk:* This topic is very much in spotlight just now. Companies are keen to develop solutions which align to their internal policies and “playbooks”. AI has the potential to assess contractual risk by comparing clauses/contracts against predefined criteria, company policies and/or legal standards/regulations. If an AI system has been trained on a playbook, it can identify whether a clause is likely to be company-approved and/or whether it contravenes any liability limits or caps, along with which negotiation possibilities or variations on a clause may be acceptable. By highlighting clauses of concern and flagging which clauses need further human review, this helps prioritise review efforts and focus on high-risk issues.
- *Consistency checks:* AI can detect inconsistencies or contradictions within a contract or between multiple contracts. This ensures that the terms and conditions are coherent and aligned throughout.
- *Cross-referencing:* AI can cross-reference various sections of a contract to check for inconsistencies or conflicts. It can also cross-reference clauses with relevant legal precedents or regulations.
- *Workflow automation:* AI and other technologies can help create and manage workflows for contract review. It can assign tasks, track progress and notify relevant parties when specific actions are required.

VI. Project implementation stage *[to be developed]*

Project implementation refers to the construction, operations and contract management stages of the project over the project lifespan. At this stage of the project, the project design and commitments are crystallised, and the public partner is in the position of monitoring performance and compliance.²⁷

Digitalisation and the use of digital tools during the implementation stage of detailed design, construction and operation is common, and often extensive, in the private sector. This Guide does not consider these tools in detail, but rather, provides a brief overview and looks at the issues governments need to consider.

1. Delivery & commissioning

- Contract management with supply chain/etc
- Modern Methods of Construction (MMC), BIM, autonomous robots, cloud computing, 3D printing, the Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), and Big Data are transforming project delivery and significantly improving efficiency and productivity.

2. Hand back & operation

- Enable transparent delivery and reporting as well as interoperability with other tools;
- Use digital for reproducibility and data consolidation during project delivery;
- Real time automation (flexibility and efficiency)
- Merge data and feedback from previous stages and assess new needs;
- Facilitate contracts and needs review and automatic updates and alerts;
- Digital for reflection and lessons learned reports;
- Long-term record keeping
- Use of digital twins – training/operation/performance
- Tools for knowledge management during hand back & operation

²⁷ https://unece.org/sites/default/files/2023-04/ECE_CECI_2023_4_2305092E.pdf

VII. Key policy recommendations

The following sets out ten key policy recommendations, developed from the discussion set out in this Guide, to improve the delivery of PPPs for the SDGs through digital transformation throughout the project lifecycle.

- 1. Establish and embrace a digital strategy:** A well-defined digital strategy enables technology to be seamlessly embedded in infrastructure development, facilitating better risk management and more effective monitoring of project outcomes, and providing timely insights into project performance and potential challenges.
- 2. Harness data for data-led decision making and address challenges in big data:** Data is fundamental to the success of digital transformation and achieving the SDGs. Governments, financing institutions and the private sector all require more insights and information for the identification, development and implementation of PPP projects, which can only be achieved by harnessing and utilising data. Key issues surrounding the use of data must be a top priority to ensure effectiveness and minimise project risks: data privacy, data sovereignty, data ownership, availability of data, interoperability, appropriate access to data, data sharing among stakeholders as needed, etc.
- 3. Build talent and increase digital capabilities and skills:** Invest in upskilling or re-skilling the workforce with digital training, embracing new ways of thinking and working to build digital capabilities.
- 4. Implement and align law, regulation and policy:** Digital transformation is not possible without the alignment of laws, regulations and policies of the country to create an enabling digital environment.
- 5. Use the UNECE PIERS methodology to evaluate and evidence alignment with the SDGs:** Using either the PIERS digital spreadsheet or the online digital platforms enables efficiency to evaluate and evidence alignment with the SDGs, which can be necessary for financing and support.
- 6. Take advantage of digital tools developed specifically for the PPP lifecycle, some of which are available free of charge to member states:** Various digital tools are now available specifically to assist PPPs for the SDGs, many of which are free of charge. For example, the MDBs' initiative SOURCE and the IMF/World Bank's digitalisation tools to assist with issues of fiscal transparency and fiscal sustainability.
- 7. Prioritise cyber security:** Cyber-crime is a significant threat to public services, any organisation and society in general. To ensure the government's functions and services are resilient to the cyber threats, prioritise cyber security regarding all technology and implement a cyber security strategy for the responsible and safe use of digital tools throughout the PPP programme.
- 8. Ensure leadership drives a culture of digital transformation:** Implementation and adoption of digitalisation will only be successful with the drive, vision, oversight and

involvement of the leadership within an organisation. Allocate experienced leadership and resources to develop credible and realistic strategies and documentation, and lead the digitalisation initiatives.

9. **Invest in digital infrastructure:** Digital transformation is only possible if the underlying technical infrastructure is in place. Invest in the necessary infrastructure (data centres, grid power, etc) to enable digitalisation.
10. **Adopt an AI strategy to enable the responsible, ethical and safe use of AI:** As AI is a technology here to stay, and is developing at pace, it cannot be ignored. It is important for governments to establish an AI strategy in relation to its PPP programme and consider how to operationalise responsible AI.

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ANNEXES

- Annex I Case Study Examples
- Annex II Members of the Drafting Team *[to be inserted]*

Annex I: Case Study Examples

[*The information in this Annex will be developed further once the Case Study examples are agreed.]

Case Study Example: *Amsterdam Smart City Initiative, Netherlands*

The Amsterdam Smart City initiative is a public-private partnership, comprised of 20 permanent partners including government, knowledge institutions, social organizations and innovative companies active in the Amsterdam Metropolitan Area. The Smart City goal is to transform Amsterdam into a leading smart city by leveraging innovative technologies to enhance energy efficiency, mobility, and overall urban management.

Digital strategy components include sustainable energy management, intelligent transport systems, open data platform and 'living labs'.

REFERENCE: <https://amsterdamsmartcity.com/>

Case Study Example: *SOURCE Success Stories*

In March 2024, the Sustainable Infrastructure Foundation (SIF) published six success stories from the countries where SOURCE has achieved a complete integration. The report sets out the context, the rationale for the use of SOURCE, the integration features, the results and the lessons learned for each country: Uzbekistan, Ecuador, Ukraine, South Africa, Angola and Panama.

REFERENCE: [INSERT]

Case Study Example: *Province of Ontario, Infrastructure Ontario Project Database*

One significant factor which helped the Province of Ontario in Canada to accelerate its PPP leadership was its open and transparent disclosure from very early stages of PPP projects starting at the Planning stage, up to Project Completion, as posted on its website.

This early disclosure in the "In Planning" section, made available broadly, helps stakeholders be informed about the process, location, type of project etc. For example, some vertical projects may not impact Indigenous Communities or the community at large, whereas linear projects often do. Showing maps and project location allows impacted parties to be aware. Stakeholder consultation dates are also included on the page, addressing fair dealing best practices.

REFERENCE: <https://www.infrastructureontario.ca/en/what-we-do/projectssearch/?cpage=1&facets=projecttype:p3major>

Case Study Example: *UK's legal status regarding smart contracts*

With the rise in use of smart contracts, there had been some debate in the UK regarding their legal status and whether such a contract is valid and enforceable. This of course is important for government, organisations and companies to understand before contracting with the use of a smart contract.

In November 2019, the UK Jurisdiction Taskforce (UKJT) published its legal statement on cryptoassets and smart contracts. It concluded that, in principle, smart contracts are capable of giving rise to binding legal obligations and are enforceable in accordance with their terms. Following this, the Ministry of Justice asked the Law Commission to undertake a scoping study on smart legal contracts, building on the findings of the UKJT legal statement.

In November 2021, the Law Commission published its advice to government. It confirmed that the current legal framework in England and Wales is able to facilitate and support the use of smart contracts without the need for statutory reform, and that current legal principles can apply to smart contracts in much the same way as they do to traditional contracts. The Law Commission helpfully summarised smart contracts and identified that they can take different forms, albeit that, regardless of the form used, the performance or execution of the contract (or a clause / obligation of the contract) is by code, i.e. with the use of technology.

The Law Commission set out the main features of a smart contract: (1) some or all of the contractual obligations are performed automatically by a computer programme; and (2) the contract is legally enforceable. In addition, the Law Commission reviewed the formation, interpretation and remedies when dealing with smart contracts, and includes a non-exhaustive list of issues that parties may wish to provide for in their smart legal contract.

In February 2022, LawTechUK published “Smarter Contracts”, a report documenting the outcome of its project which identified important examples of how technology is transforming contract use across various key industries. The report sets out case studies which demonstrate digital-first solutions to real-world problems: electronic signatures, contract automation and management, insurance, renewable energy, financial services, trade, sale of goods and services, logistics and transportation, the digital ownership of physical assets, sport sponsorship, home buying and selling and the digital company.

The Law Commission’s and LawTechUK’s publications are an important step for the digital transformation of the UK infrastructure and construction industry, providing much needed guidance.

REFERENCES: <https://lawcom.gov.uk/project/smart-contracts/>; <https://lawtechuk.io/our-reports/>

Case Study Example: *G7 Sustainable Infrastructure Fellowship Program*

The Sustainable Infrastructure Fellowship Program is a G7 initiative for global capacity building and training. Fellows are awarded a Masters Certificate in Sustainable Infrastructure Development and Finance with 67 (largely government officers) having graduated from the program across 22 countries (largely in the global south) during the first three years of the program. It is a combined initiative of the Government of Canada, large global infrastructure investors who share best practices and the Schulich School of Business, York University in Toronto. The goal of the program is to provide public and quasi-public sector officers, multilateral banks and private sector with the necessary knowledge and skills to deal with private investment in infrastructure following best practices and to make projects “bankable” from an

investment perspective. Virtual classes are a good example of using technology for stakeholder engagement where the channel is open for further communication and collaboration. Specifically on the use of technology, the programme involved guest speakers which included representatives from the SOURCE on project digitalization. Digital twinning and the use of AI for demand modelling were also part of innovation-centered discussions. Program participants bring a wealth of knowledge on technologies being used in their respective jurisdictions to share best practices with the group.

Case Study Example: *Smart Rwanda 2020 Master Plan*

A national ICT strategy focusing on increased private sector participation in ICT infrastructure investment and development through public-private partnerships to spur job creation and economic growth, including a 25-year agreement between the Government of Rwanda and Irembo to digitise and maintain public services on a single window platform.

Digital transformation: Multiple smart initiatives including citizen access to public services, a one stop shop platform for development permitting, wifi and contactless payment on public transport, digital pollution mapping, SMS reporting of education data, smart utility meters, drone deliveries, an infrastructure geoportal and 4G LTE.

Lessons learned: (1) need for continuing high level political championship; (2) resource mobilisation to implement the policy and plan to deliver multiple initiatives and projects; (3) stakeholder participation in policy and plan development process to ensure buy-in and acceptance of the need to pursue an ICT4D agenda; and (4) a clear vision, mission and strategy and a well-scheduled execution plan with a step-by-step approach including specific milestones and expected outputs are crucial.

Overall, attaining a higher ICT maturity level is hindered by low accessibility – inadequate distribution of key backbone networks, cloud, and other access channels. Further, acceleration of growth is constrained by lack of an effective ICT implementation organization.

Case Study Example: *Morocco Digital Transformation Strategy*

[INSERT DESCRIPTION / CONSIDER WHETHER TO INCLUDE]

Case Study Example: *Kingdom of Bahrain Cloud-First Policy*

[INSERT DESCRIPTION / CONSIDER WHETHER TO INCLUDE]

REFERENCES: [Creating a Cloud Nation \(bahrain.bh\)](https://www.bahrain.gov.bh/en/creating-a-cloud-nation)

Case Study Example: *Mapping Sierra Leone's Energy Infrastructure*

PPP project used, <https://vida.place>, which is a subscription-based software where simply inputting a project location allows decision makers to drill down on due diligence items such as accessibility, natural risks, quality of wind and sun exposure and many other variables. This tool is currently used by the IFC and the World Bank.

[Points to note: a data-led approach to risk assessment has obvious benefits - use without having to incur advisory costs – will not replace detailed due diligence – making statistical data available to decision makers – making sense of data – not replacing people who are needed to think strategically]

The use of VIDA is an example of technology leapfrogging for rapid infrastructure development.

REFERENCES: <https://vida.place/stories/sierra-leone>

Case Study Example: *e-Procurement, Ukraine*

Synopsis: The e-procurement system ProZorro was launched in 2015. It has been developed by a public private partnership based on the Open Contracting Data Standard. It has been estimated to have saved USD 1.5 million of public funds in the first three month of piloting.

Digital transformation: Using e-procurement tools increases accessibility to, and fairness of government contracting. The digital approach increases efficiency and effectiveness of public procurement through standardisation of the process and more competition. It is helpful to have legislation, regulation and policy in place that allow or mandate the use of electronic methods and instruments for public procurement.

Lessons learned: (1) consistent coverage of the public procurement cycle across all levels of government, (2) a user-friendly approach, with tools that are easy to understand and use systems that ensure privacy, security of data and authentication, and fair treatment; (3) integration with existing systems such as financial management information system; (4) capacity development for users (government agencies and bidders/suppliers); (5) clear communication to promote awareness and acceptance among users.

Case Study Example: *Implementing eMobility in the City of Kranj, Slovenia*

In November 2019, the Kranj City Council adopted a Decree on the Public-Private Partnership for the Implementation of the Project “Electromobility in the City of Kranj”.

A rather holistic approach was taken in the Decree. First, the project’s basic premise was not to additionally burden the energy distribution system by newly implanted electric vehicles. Thus, the required electric energy for newly introduced vehicles should have been produced by simultaneously implemented solar power plants. Second, the project was designed under the energy performance contracting (EPC) approach, which, until then, was predominantly used (in Slovenia and within the EU) for energy retrofit of public buildings. Namely, the operational cost (opex) of fossil fuels vehicles is significantly higher than of electric vehicles. Therefore, replacing the fleet, and identifying additional potential for optimisation and better utilisation of vehicles with the introduction of co-use, enabled significant savings, which were used to finance the investment cost of implementing the project.

The project was accordingly structured under three pillars:

- First pillar: fleet of electric vehicles with domicile charging stations for vehicle charging;
- Second pillar: a public network of electric charging stations; and

- Third pillar: installation of solar power plants with local electricity storage.

Public tender was published in National Notification Portal and Tenders Electronic Daily on 4 February 2020. The competitive dialogue was chosen as the type of procedure. The award criterion was the economically most advantageous tender. The public tender in the form of competitive dialogue was managed completely electronically, following digital-by-default approach, on the platform, powered by Portuguese e-Sourcing and e-Procurement solutions provider Vortal's and to Slovenia localised and operated by S-Procurement.

As part of the Sixth UNECE International PPP Forum in 2022, UNECE organized a showcase of the five best public-private partnership (PPP) and infrastructure projects that contribute to the circular economy agenda and the Sustainable Development Goals (SDGs). The Implementing eMobility in the City of Kranj was among the five projects to be showcased.

REFERENCES:

Video of the project: <https://www.youtube.com/watch?v=8kj7xLpSjHI&t=16s>;
<https://www.vortal.biz/>; <https://www.s-procurement.si/>;
<https://unece.org/sites/default/files/2022-09/UNECE%20PPP%20Evaluation%20Methodology%20Official%20launch%20-%20Petra%20Ferk.pdf>

Case Study Example: *Virtual Data Rooms for syndication and trading*

[FIND PROJECT EXAMPLE RATHER THAN SPECIFIC TECHNOLOGY COMPANY]

VDRs such as DebtDomain and Intralinks are widely used by private sector stakeholders for the communication of large pieces of documentation to a large group of lenders. DebtDomain and Intralinks have been in use for a long time in the syndicated loan market. They allow for segregation of information and control of access, read and write rights on a project by project basis. This has the benefit of traceability and confidentiality, as sending the same documents by email is less secure and does not allow for an audit trail of who has accessed the document or not. The use of VDRs for dissemination of documents could benefit all the stages of a project, from preparation to implementation to monitoring. Given the abundance of providers, the public sector also has the choice of platform and can create a healthy competitive tension between providers.

REFERENCES: <https://www.debtdomain.com/>