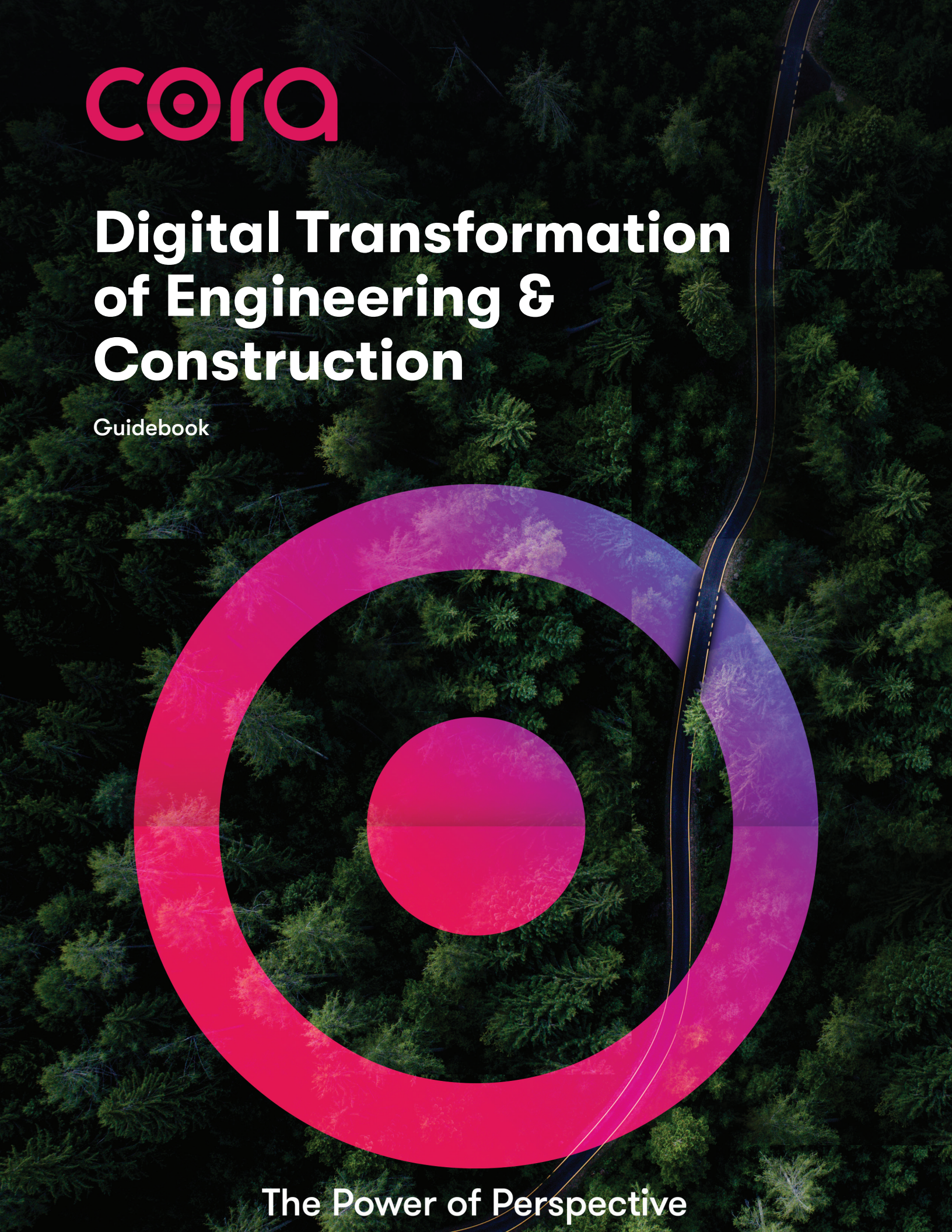
cora

Digital Transformation of Engineering & Construction

Guidebook



The Power of Perspective

Executive Summary

When compared to other business sectors, engineering & construction has been slow to adopt digital transformation strategies, even lagging behind in last place in some indexes. Why is that? Some of the digitization delay is due to technical and cultural reasons, including reliance on so many subcontractors and suppliers; limited R&D budgets; projects that take place historically in difficult, outdoor terrain, as opposed to office environments, to name a few. Opportunities are being missed as a result. Inefficiencies are in-built. This guidebook examines how these hurdles can be overcome so that smart engineering & construction firms can best position themselves to successfully compete in the long run.

Introduction: A Laggard at Digital Transformation

Construction was among the least digitized sectors in the world, according to a recent McKinsey Global Institute's Digitization Index. In the United States, construction came second to last, and in Europe it was in last position on the index.

Construction projects often hit delays and budget overruns and with only small increases in productivity in recent years. The difficulties are understandable. The typical construction project involves a multitude of independent subcontractors and suppliers, who have little incentive to embrace new methods for the short length of time they are working on a project and who are usually working on several different projects for numerous main contractors.

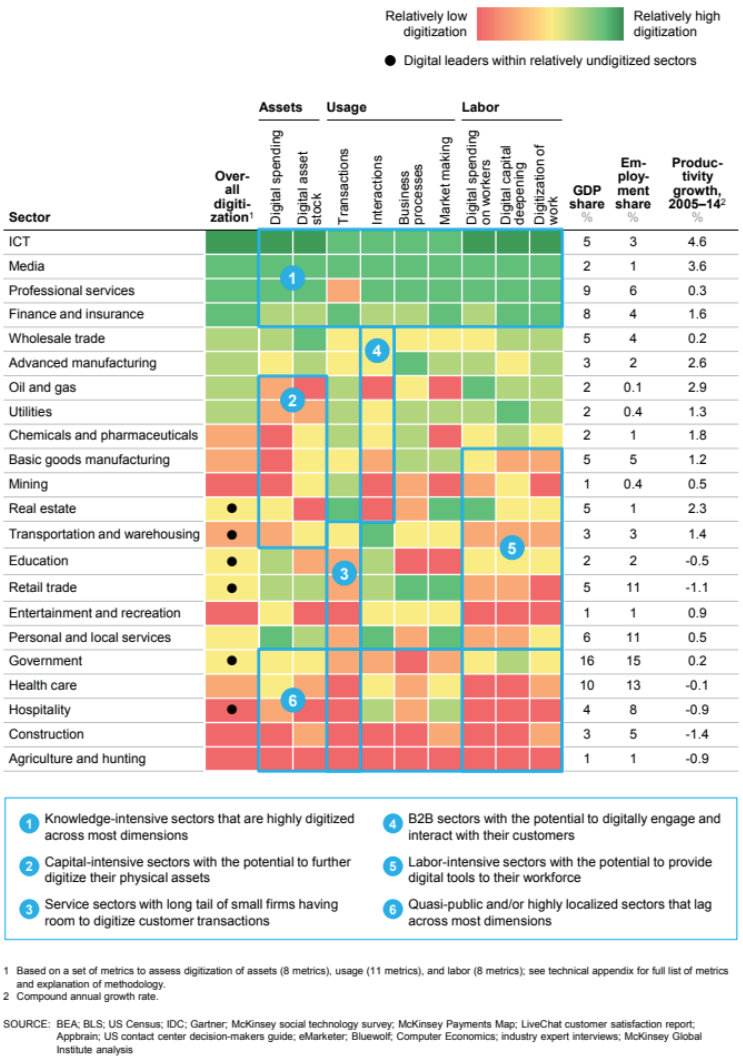


Figure 1: Digital America: A tale of the haves and have-mores (McKinsey Global Institute)

Construction projects vary greatly, so engineering and construction (E&C) companies often struggle to develop tools and methods they can apply repeatedly. Limited R&D budgets prevent E&C companies from spending as much on digital as companies in other sectors do. Construction project work often takes place in difficult environments, too, that are not well suited to the hardware and software that have, in the past, largely been developed for office use. It is no surprise, then, that many E&C companies invest in such technology is an unstructured way, often motivated by the preference of individual senior managers, and can end up with little enduring value to show for their technology investments.

While digitization can be a threat if not approached properly, it presents opportunities regarding cost efficiency, as well as delivering improvements in top-line client experience and offering differentiation from competitors in meeting a client's requirements.

The built environment is undergoing a major but slow transition towards increased digitization, and automated production, assembly and delivery. The impact of the Covid-19 pandemic has accelerated our use of technology and innovative processes, not only to make continued working possible, but also in response to increased awareness around cost, efficiency, and health and safety benefits.

CHAPTER 1

Key Elements of Digital Transformation in Engineering & Construction

An increasing number of E&C companies are looking to transform projects or even business divisions using digital transformation. For many years E&C companies have been using software tools like schedulers (Microsoft Project, Gantt, Primavera P6, etc.), financial management systems (Oracle Integra & Financials, Agresso, SAP, etc.), document management systems (Sharepoint, Alfresco, Documentum, OneDrive, etc.) and geographic information systems (Bing Maps, ESRI, etc.). However, these have generally all been used as standalone unconnected systems and have not been implemented as an integrated digital strategy by the business.

Senior managers must start with a clear definition of how digital transformation will create value for the business and address existing problem areas and then develop an overall strategy for implementation. During the implementation, they must spend as much time, if not more, on operational change management as they spend on technology.

Those that do this stand to realize a significant productivity payoff. Research by the University of Southampton's Centre for Operational Research, Management Science and Information Science, entitled Quantifying the Benefits of Investment Portfolio Optimization versus Prioritization for Asset-Intensive Organizations, shows that portfolio optimization through digital transformation can deliver 7% to 20% more value to companies from their portfolios.

5 Steps to Digital Transformation

E&C companies that are successfully implementing digital transformation, and moving to having integrated solutions across their entire business operations, have five practices in common. Other E&C companies embarking on similar transformations may learn from their experiences.

1. A focus on solving existing problems, not installing IT solutions
2. Implement collaborative digital use cases
3. Upskill and restructure engineering teams
4. Adjust project baselines to capture earned value
5. Use enterprise portfolio management to assess and plan across the entire business

“Portfolio optimization through digital transformation can deliver 7% to 20% more value to companies from their portfolios.”

Quantifying the Benefits of Investment Portfolio Optimization versus Prioritization for Asset-Intensive Organizations, University of Southampton

The digital revolution of the built environment is happening slowly but surely. For example, the use of technologies like building information modelling (BIM) has attracted renewed interest recently due to the publication of the 10th Annual BIM Report, a study about BIM international standards, as part of its ISO19650 series.

There has been increased awareness and requests for the use of BIM within the engineering and construction industry with many engineering consultancies using BIM as standard, and, as a result, they have positioned themselves as digital leaders in the industry. Embracing digital technologies creates a better, more efficient built environment. It allows a deeper understanding of the impact designs have on people, along with wider social and economic consequences.

Pressure for change in the E&C sector comes from several complementary directions. Evolving client expectations for their homes, offices, commercial buildings and infrastructures has led to these being increasingly connected to the Internet of Things (IoT) and providing "smart" technologies to allow for performance tracking, energy management and improved security, and even environmental quality for health benefits.

New developments in technological capabilities such as sensors and similar hardware – including more innovative types and wireless sensors, as well as software – have seen the cost of IoT sensors steadily decreasing (Goldman Sachs, 2018), making them more affordable and leading to increased deployment. Technologies available on the market are more numerous than ever before (such as virtual and augmented reality, drones, robotics and 3D printing) making it important to identify the more valuable ones that can contribute effectively to improved delivery of business operations.

A new generation of craftsmen and professionals entering the E&C sector has accelerated the adoption of digital tools and technologies. Innovative curricula are training the younger generations for roles in the E&C sector that will encompass even greater application of technology-related tools. Digitization provides a great opportunity to reduce the environmental impact of construction projects right through the delivery process from:

- design by engineering consultants
- reducing carbon footprint of construction materials and equipment by suppliers
- the methods deployed in construction by contractors

CHAPTER 2

How Digital Transformation Can Be Implemented in an Engineering and Construction Business

Key success factors to enable a long-lasting digital change in an E&C business and to implement an integrated digital strategy are:

Leadership

The senior management team need to lead the implementation to demonstrate its importance and ensure that the resources are provided to ensure success. Importantly, sometimes the leadership team's mindset also has to evolve to become fully supportive of the change.

Clear Communication

To explain the strategy and implementation plan to all staff, sub-contractors and suppliers, to get their buy-in from the outset and ensure they understand the benefits digital transformation will bring to the overall business.

Resources and Structure

The implementation of digital transformation demands a strong framework be put in place, with working groups, regular reporting and effective governance, to track progress and ensure efficiency. Flexibility will be required all the way through, and where resistance to change is encountered, as it inevitably will be, it will need to be managed carefully. With feedback coming from teams acknowledged and taken on board.

Change Management

Implementation of digital transformation may necessitate changes in ways of working to a greater or lesser extent, depending on the organization's current practices. The success of digital transformation is largely dependent on how successfully change management of people and processes is managed. Identifying early adopters and getting quick wins are key for successful wider roll-out. The training effort will be significant, as knowledge transfer will only be achieved through a comprehensive training and knowledge transfer program, delivering the right training at the right time to key personnel, such as construction site managers.

Business Intelligence

Digital transformation will generate significant amounts of data and other information. This will arrive into the organization quickly and cover a large range of areas/topics. If carefully managed, this presents a huge opportunity to generate new value, but requires a structured approach to be able to provide synthesized information in a manner that will facilitate the business' senior management to make well-informed decisions. One can easily and very quickly drown under the amount of information generated if it is not managed effectively to gain best value from investment in digital transformation.

Moving from today's often paper-based processes to digital solutions can help address many typical pain points, be it managing the supply chain or tracking productivity of operatives, to name but two of many challenges. Large construction projects are incredibly complex and require synchronization of people, equipment and materials all the way from planning to on-site execution.

Existing digital solutions can allow real-time and granular transparency on 'all the moving parts' for E&C businesses, powerful and timely analytics on progress and risks, enhanced coordination and, ultimately, better end-to-end management.

Conclusions: Work Done, More to Do

Digital transformation in the E&C world is still in the early stages but will transform the industry and the way E&C businesses work. While innovation continues in terms of developing materials, products, equipment and technologies, it remains fragmented.

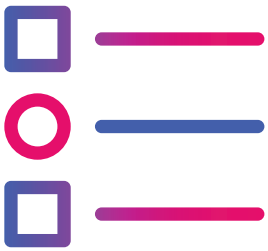
The time is right for the implementation of a real digital transformation strategy by E&C businesses to ready themselves to take advantage of upcoming opportunities and best position themselves to be able to successfully compete in the long run.

CHAPTER 3

How Cora Systems Powers SPM

The Cora SPM platform – which is Gartner-approved – will provide you with the visibility for advanced portfolio management and decision-making. It will give you the confidence to select the right portfolio, and the digital know-how to execute it successfully, as well as ensuring the governance, monitoring and execution of your change initiatives.

The Cora SPM platform is built on four fundamental pillars:

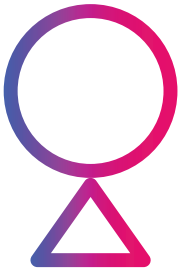


Inventory

Translate your business strategy into an actionable portfolio.

Analyze

Based on strategic criteria; analyze and select the best initiatives.



Balance

Implement the best aligned projects by allocating budget and resources that provide maximum business impact.

Execute

Manage approved projects to completion with full visibility over deliverables, timescales, scheduling and progress.

Strategic functionality

The strategic functionality required to optimize capacity, prioritize and track the benefits of your business plan, inform all stakeholders and integrate across the business technologies to achieve maximum performance from your portfolios of work.

Portfolio Selection

Auto-select the preferred portfolio based on your criteria and compare alternatives, ensuring your portfolio delivers the maximum return.

Scenario Planning

Make Portfolio balancing easy, while ensuring strategic alignment, capacity planning and global efficiencies across the enterprise.

Top-Down Budgeting

Logically split budget across your portfolios. Easily track forecasting from execution against portfolio budgets to measure performance.

Prioritization

Using criteria, based on your requirements to score and weight projects, slice-and-dice data to come up with a repeatable, reliable and robust portfolio scoring mechanism.

Better Decision-Making

Increase return on investment, eliminate “CEO-specials” or “good-hunch” and enable decisions on the portfolio to be made with clarity and without guesswork.

Business Intelligence

Embedded “BI” provides powerful data and insights that enable fast, informed decisions accessible to everyone via shared dashboard and interactive reports.

Strategic Capacity Management

Easily understand requirements for the year ahead and maximize usage of global resource pools.

Benefits Realization

Plan and track benefit realization across the organization.

Execution functionality

The essential functionality required to automate your PMO, providing you with the ability to plan, prioritize, execute and evaluate your project portfolios.

Engine

A full set of tools needed to create, plan and manage your entire portfolio of projects.

Finance

Manage your project finances from initial estimate through to actual spend.

Document Management

Attach or link documents to projects, risks, tasks & registers. Annotate documents with mark tools directly within the application.

Forms

Turn free-format text into structured, reportable data.

Registers

Completely customizable logs for managing actions, lessons learned, decisions & more.

GIS Mapping

Plot projects on a map, visualizing activity location and identifying synergies.

Dashboards

Project and program level, visualizing the health of your portfolio; personal dashboards provide a digital “to-do” list.

Reporting

Suite of reports that are used by various roles to extract and publish information in just a few clicks.

Mobile

Mobile apps for Android and iOS. Access and update key project activity from anywhere.

Resources

Plan resource requirements for your project; track variation between planned and actual resources.

Workflow

Design and manage the approval of data in Cora Forms and Cora Registers.

Portal

A flexible framework that provides access to data contained in Cora PPM to a wider audience.

Integrations

Facilitates easy integration with any enterprise technology architecture, allowing for a central, enterprise platform, providing one version of the truth.

Scheduling

Solid, sophisticated scheduling throughout project lifecycle, including inter-project and inter-program dependencies.

Progress Management

Ensures automatic digitization and tracking of corporate goals.

Satisfied Clients

"Cora PPM gives us a single version of the truth. We've got 50+ countries in which we work, with 12,000 people in our part. We have in the region of 40,000 live projects every day. Cora PPM provides us with insight into all of those projects."

Phil Howe

Project Management Excellence Lead,

Honeywell

"We have specific timelines, deliverables, stakeholder communications, risks and mitigations, all of these tasks need to be delivered and managed, Cora has helped us and supported us to be successful."

Alejandro Gutierrez

Senior Engineer,

Boston Scientific

"We save time and money and deliver quality information and Cora's solution enables us to do this."

Mark Cain

Program Manager,

NHS Digital

"It works well at a low level for project planning, risk and issues, change logs, benefits tracking, weekly reports, etc. Then the PMO can roll up and summarize that low-level data into a full program/portfolio view."

Justin Leese

Program Director, Local Full Fibre Networks,

Department for Digital, Culture, Media & Sport

"It has an extremely customizable PPM solution, which is what we needed – a solution that would fit to the way our business processes operate."

Mark Ruettiger

North America Operations Manager,

Automated Logic

"With Cora, we're able to sit around the table at senior management level and understand where we are much better than previously."

Paul Moody

Director of Global Engineering,

Allergan

"Cora really allows us to drill down into information so we can give our senior management the key decision-making information to make informed decisions on all our schemes."

Ian Thrupp

Head of Planning and Project Controls,

WSP

"Cora gives us that single source of truth to what's going on in the organization. It gives us the ability to prioritize what's really important to us, to allocate resources and funding for those projects, and to help move us into that strategic position, which is invaluable."

Sarah Malin

Head of Program Management,

CityFibre

The Value

Digitize your programs and lifecycles, gain greater insights, more informed decision-making, and streamline your governance and reporting.

- **Strategic Insights**
  Roll out failsafe, strategically-aligned projects that utilize resources and deliver maximum value.
- **See The Full Picture**
  Quickly view data dashboards that visualize the health of your portfolio and drill-down to focus in on any issues.
- **Support Governance**
  Ensure the right people have the right oversight with multi-level access protocols.
- **Easily Scale**
  Small to large, local to global, all in the cloud.
- **Complete Control**
  Manage scope, financials, progress and quality of project delivery in one centralized system.
- **Seamless Collaboration**
  No matter the team – internal or contractor, desk-based or mobile – integrations make workflows seamless.

$20 BILLION

Worth of projects managed on Cora PPM.

400,000+

Projects live on Cora at any one time.

50+

Countries where Cora is in use.

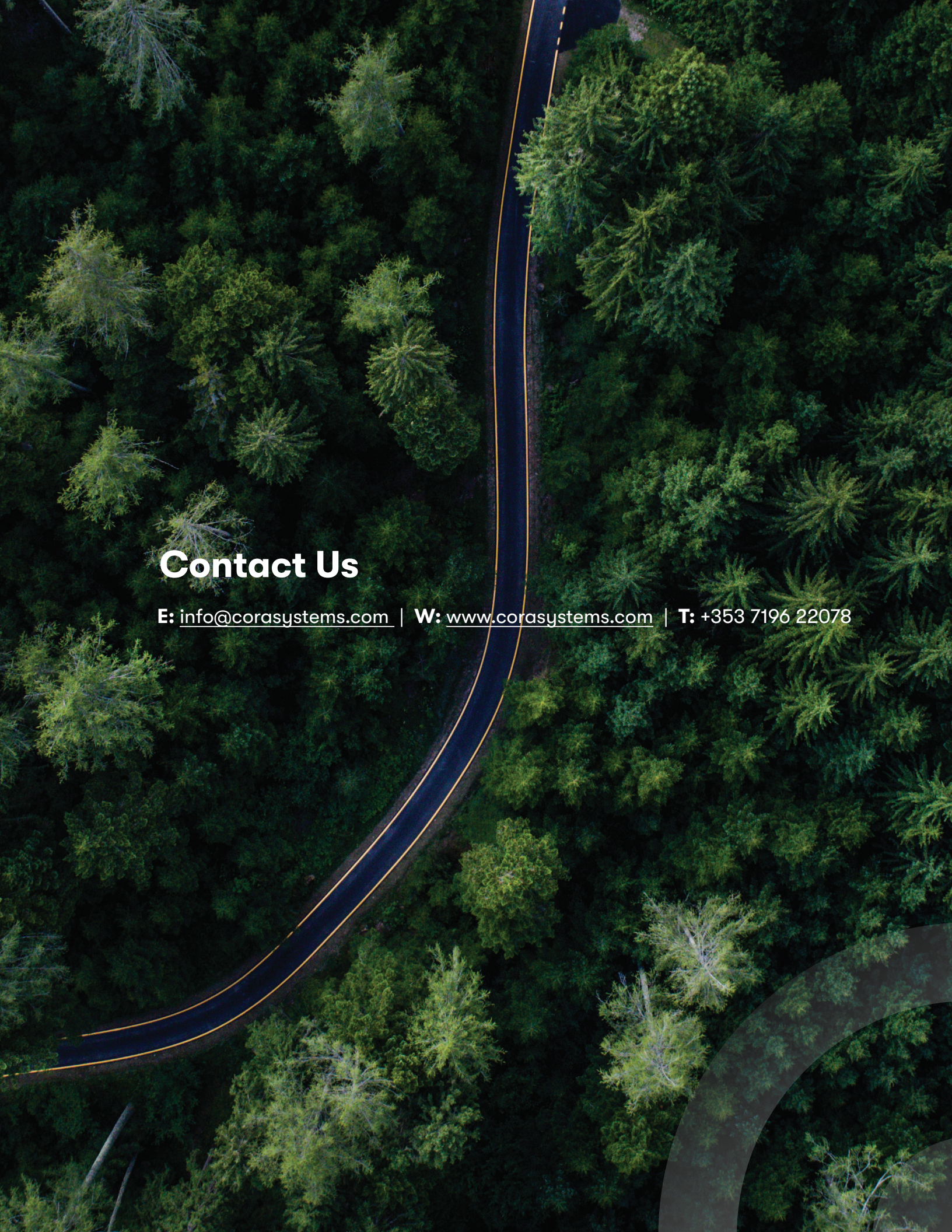
1

Platform & version of the truth.

Author Bio

Gerry Galvin has worked in the water industry for over 40 years. He spent more than 20 years in Ireland's Department of Environment, Community & Local Government, responsible for technical oversight to support the development and implementation of policies, strategies and the investment program for the water sector in the country. In his last 10 years with the department, he served as Principal Engineering Adviser in its water division where he was responsible for capital project planning, implementation and expenditure reviews, including the application of project control systems.

Gerry joined Irish Water, the national water utility, on its establishment in 2013, in the role of Chief Technical Officer on the Management Team where he served for seven years. He was responsible in this role for enterprise risk management co-ordination, technical competency development and health & safety, as well as serving on investment and contract approval committees, providing governance on the utility's capital investment plan projects. He currently works as a Government and Utilities Industry Principal, Executive-in-Residence with Cora Systems.



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