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Construction Cloud

The Public Authority's Guide to Delivering More Value for Citizens Through Their Estates and Infrastructures

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Delivering Value for Citizens

The welfare of all citizens is the primary objective for all Public Authorities. The physical estates and infrastructure of the public sector are key to this, acting as the bedrock for delivering the services that citizens depend on.

However, there are significant pressures to balance. The cost of building materials has risen by 36% since May 2020,[1] while the cost of energy remains high following the surge in costs in 2021. Citizen needs and expectations are evolving—and at the same time public sector organisations are being asked to operate more sustainably, in line with national climate change targets.

Public Authorities must manage their estates through capital investments and operational maintenance. However, leaders face challenging decisions over where to place finite resources—amidst budget pressures and public scrutiny. Making decisions with incomplete or unreliable data adds complexity, delay and cost.

Better access to data is key to making informed decisions and understanding these complex trade-offs. More complete information can enable Public Authorities to improve the productivity of how capital projects are delivered, and in turn improve the performance of an estate during operations.

There are significant opportunities for Public Authorities to cost-effectively leverage digital technology and data use into project lifecycles, from planning through to operations and maintenance. This eBook will explore four ways to improve productivity, mitigate talent shortages and support regulatory reporting—ultimately delivering more valuable capital projects for citizens.

Four Ways To Ensure Greater Value Across the Public Sector Estate Lifecycle

1. Deliver Successful Capital Projects With Higher Productivity and Fewer Errors

2. Increase Operational Efficiency From Day One With a Smooth Handover and Usable Data

3. Use Past and Present Data To Make Informed Future Decisions

4. Meet Regulatory Requirements and Talent Needs Today and in the Future, by Focusing on the Use of Data

1. Deliver Successful Capital Projects With Higher Productivity and Fewer Errors

Public Authorities are already under significant cost pressures and face consistent public scrutiny. Nonetheless, projects routinely fail to meet their budget and schedule. Two thirds of construction projects exceed the original budget by more than 10%.[2]

Errors in project delivery that require re-work can add significant cost and delay to projects. Poor information-sharing, including inadequate version control, is a frequent source of mistakes; the second most common cause of disputes is incorrect designs.[3]

This can create further challenges for Public Authorities, particularly as the cost and availability of materials fluctuate. Cost control has in fact become the biggest challenge for most organisations in the architecture, engineering and construction (AEC) space, according to the 2024 State of Design & Make report.[4]

Low productivity in an appointed supply chain is also a consistent issue. Public Authorities are reliant on a very broad supply chain, from global main contractors to highly specialised traders, such as stained-glass window repairers for historical buildings.

Complex project performance may be hampered by the variations in digital maturity and often limited technology and standards adoption across such intricate supply chains. Recent research from Deloitte suggests 88% of all European construction organisations have beginner or emerging levels of data capabilities[5]—increasing the likelihood of miscommunication, errors and delays.

The issue of poor productivity is even more acute in the context of construction's overarching talent shortages. In the UK, around 225,000 new construction workers are needed by 2027.[6] With both private and public sector projects facing a battle for limited talent, maximising productivity will be critical to delivering planned assets.

12%
average time wasted[7] because of fragmented data

Owning a single source of truth

Eliminating all mistakes is unlikely. However, having the whole supply chain work from a centrally managed single source of truth that is owned by the Public Authority in a highly collaborative digital environment is proven to reduce errors, increase productivity and improve predictability, as shown by a University of Cambridge study in 2021.[8]

And with visibility of supply chain activities and access to reliable and accurate information, the Public Authority can make better decisions throughout the project, protecting its finite resources. Importantly, those decisions can also be clearly explained and stand up to scrutiny from the public, regulators and even suppliers.

Outcomes

- Deliver projects on schedule and increase cost predictability

- Improve decision-making with data

- Increase the productivity of the supply chain

Tools for success

Construction project management software, anchored to a common data environment (CDE), can help to deliver projects on schedule and increase cost predictability, improve decision-making with data and increase the productivity of the supply chain.

1.7x

construction organisations identified as data leaders are 1.7 times more likely to be optimistic[5] about future financial performance and growth

In Focus: Infrastructure owner CFL uses a single source of truth for more efficient collaboration[9]

CFL (Société Nationale des Chemins de Fer Luxembourgeois) is a national rail operator dedicated to low-carbon transportation. By 2035, they want to have all their buildings and railway infrastructure hosted in a dynamic digital twin.

"We are very active in supporting the supply chain in Luxembourg to be sure that architects and engineers have the level of maturity to work with BIM," said Gilles Pignon, Head of BIM Division, Infrastructure Projects Department. "We want them to deliver a 3D model—not just geometry—with information, to be sure that our maintenance system can manage all the information."

"We have all our data and documents in a single source of truth. The real gain is that we don't lose a lot of time finding the good information. The result is better collaboration between all stakeholders on the project. They communicate more efficiently and more directly."

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2. Increase Operational Efficiency From Day One With a Smooth Handover and Usable Data

Operational planning and maintenance are critical to retaining an effective estate. However, the quality of information provided to Public Authorities about their facilities and assets on completion of capital projects is often poor.

A significant proportion of project record and asset information is usually lost during the handover, with 95% of asset data going unused.[10] This requires teams to effectively survey and document each new facility or refurbishment post completion—adding costs and hindering operational agility from day one of operations. This can cause significant issues in delivering front line services that constituents depend on, and in turn damage public opinion.

72%

use spreadsheets[7] for facilities management

The advantage of data from day one

Robust O&M documentation and asset data provided in a format that is compatible with existing facility and asset management systems can enable Public Authority facilities to be properly documented and fully operational from day one of occupation.

This eases the burden on operations and maintenance teams in documenting the new facility, freeing them up to undertake their critical daily tasks and inspections. Comprehensive information will also help to minimise downtime and reduce running costs over the life of the asset, increasing the productivity of estate management teams, an important consideration when Public Authorities face talent shortages.

The potential of digital twins

Due to these improvements in the quality and management of capital project data deliverables, Public Authorities can also look to start taking advantage of digital twins. These live digital replicas of facilities, augmented by live sensor and telemetry data, can enable operations and maintenance teams to better analyse the performance of the estate and quickly understand and address issues remotely.

Digital twins can also provide the insight teams require to significantly increase the efficiency of assets, while reducing the amount of time and resources needed to evaluate issues on-site. These benefits will further support the effective delivery of services to citizens.

Outcomes

- Increase asset life expectancy and minimise downtime

- Reduce running costs

- Increase productivity to address the talent challenge

96%

of facilities managers believe the data generated through AEC processes can bring significant value to operations[7]

Tools for success

A digital platform approach to information and data management, anchored by a CDE, will enable organisations to integrate and link data with technology that is accessible, extensible and open, for maintenance teams to access and use regularly.

Digital twins use sensor and telemetry data to create an accurate digital model of the estate, to support ongoing operations.

Port of Antwerp Bruges

In Focus: Creating a Digital Copy of the Port of Antwerp-Bruges[11]

Located 80 kilometres inland from Belgium's coast on the North Sea, The Port of Antwerp-Bruges offers the fastest and most sustainable connection for delivering goods deep into the European hinterland.

Introducing Autodesk Docs as the common data environment (CDE) for the port has allowed Peter Rollier, BIM Office Manager for the port and the extended team to have one central repository for all project information and a shared understanding of where data must be stored.

"The accessibility of data makes decision-making much easier," Peter explained. "And the teams can communicate clearly in a more time-effective way. We use the model as the centre of our discussions in weekly meetings. Our team members can visualise what is happening much more clearly, and we can collectively make decisions earlier, rather than last minute changes after elements have already been installed."

With a clear vision for the future, underpinned by the use of digital technologies, the port is host to the world's first smart port digital twin. The overall goal is to build and maintain a digital twin of assets including sensors, autonomous drones and smart cameras to use for inspections and oil spill detection.

Not only does digitalisation offer greater predictability, but it also helps the port meet its sustainability ambitions. The port can design for disassembly by proactively capturing all asset information for maintenance schedules throughout the project lifecycle while considering environmental factors. "Our overall goal is to ensure we can understand the impact of the infrastructure on the environment, the local people living near the port and the wider world," reflected Peter.

→ **Learn more**

3. Use Past and Present Data To Make Informed Future Decisions

From schools and hospitals to local authority buildings, understanding the performance of the estate is critical to delivering services more effectively. However, information on assets is often disparate, difficult to access, or simply incomplete and outdated.

Naming conventions and data practices often vary between supply chain authors; across the industry, 39% of construction organisations store data on too many different platforms,[5] while a further 39% of businesses are experiencing difficulties integrating data across their various platforms, according to Deloitte. This inconsistency can hinder the ability of Public Authorities to organise, identify and plan estate improvements.

86%

say data generated in design and construction would be valuable for improving asset maintenance and strategic planning[7]

Planning ahead

Moreover, a lack of standardised information makes it challenging for Public Authorities to analyse data and make informed decisions for the future, including how the estate should evolve to meet changing and growing needs for citizens, patients and students.

Easily accessible, reliable, up to date and accurate information increases our knowledge of an estate and how public services are used—improving the ability to plan budgets and devise performance measures. Notably, 52% of facilities managers say design and construction data would be valuable[7] to inform future renovations, reuse materials and avoid rework.

Learning from previous projects

It is also difficult to learn from previous projects, as capital projects can be almost isolated events, even structured as separate, dedicated project companies. This means that valuable learnings and best practice can be lost, along with opportunities for improvement.

In turn, a more robust data collation and management strategy can help Public Authorities to create better processes for capturing learnings and embedding that best practice in new and ongoing capital projects— establishing consistency and gradual performance improvement over time.

Outcomes

- Improve the performance of the estate to deliver services

- Improve capital planning

- Standardise delivery across projects and institute continuous learning

Tools for success

A user-friendly, collaborative data sharing ecosystem built on top of a common data environment (CDE) can be used to digitalise and centralise the understanding of the existing estate. For example, point cloud laser scans can be imported, and viewed in a web browser, simplifying the use of data capture of existing facilities to support ongoing operations, reduce site visits, provide comprehensive pre-construction information for new capital projects and improve health and safety and project planning.

Asset data can be linked to more commercially driven information stored in Enterprise or Asset Management Systems.

Further down the line, AI-powered design tools will be able to amalgamate this information to empower Public Authorities to plan for better public acceptance.

In Focus: How the University of Birmingham Used Digital Twins To Revolutionise Facility Management[12]

Rich Draper, the head of BIM and digital assets at the University of Birmingham, has worked in AEC for two decades, and today supports space management at the historic university. He explained, "We've got 17 sites, comprised of around 300 buildings, not just across Birmingham but the North of England, Dubai and Australia. We also have a huge number of people who move across those estates.

"Our thinking with the digital twin approach is to try to understand the activity that happens across that estate. It's not just teaching; there's a huge amount of research, including medicine and engineering, as well as a full breadth of building types to manage strategically.

Alongside our sustainability goal of net zero, we want to capitalise on the efficiency gains of better space management, which ultimately will help us with financial management whilst still providing an estate that is fit for purpose."

"We wanted to start with the BIM perspective, to ensure accurate data throughout the course of construction projects as well as building surveys, taking a consistent and standardised approach to structure the data. We're finding great value in these BIM models, not only from construction management, but our stakeholder engagement: helping academics and end users understand what they're actually receiving from the end of a project."

The team has now progressed to the creation of a smart campus and digital twins, in partnership with Autodesk Tandem. Tim Packwood, technology strategy partner & innovation lead, explained, "On campus, across our 300 buildings, we have over 40,000 occupancy sensors, as well as about 10,000 environmental sensors. Tandem has given us the information and insight into our campus that we couldn't get previously. This will mean we can not only save money and reduce costs, but continuously improve the space and experience of people at the same time."

→ **Learn more**

4. Meet Regulatory Requirements and Talent Needs Today and in the Future, by Focusing on the Use of Data

Public Authorities are subject to a whole host of regulations which vary between regions and over time. This can range from environmental reporting requirements, like the EU's Corporate Sustainability Reporting Directive[13] (CSRD), to safety regulations like the Building Safety Act[14] in the UK.

It's crucial for Public Authorities to have access to the current and historic information that they need to report effectively on different areas. However, because information is often disparate and difficult to access, time-consuming investigations are often necessary to fulfil the requirements of compliance checks and audits.
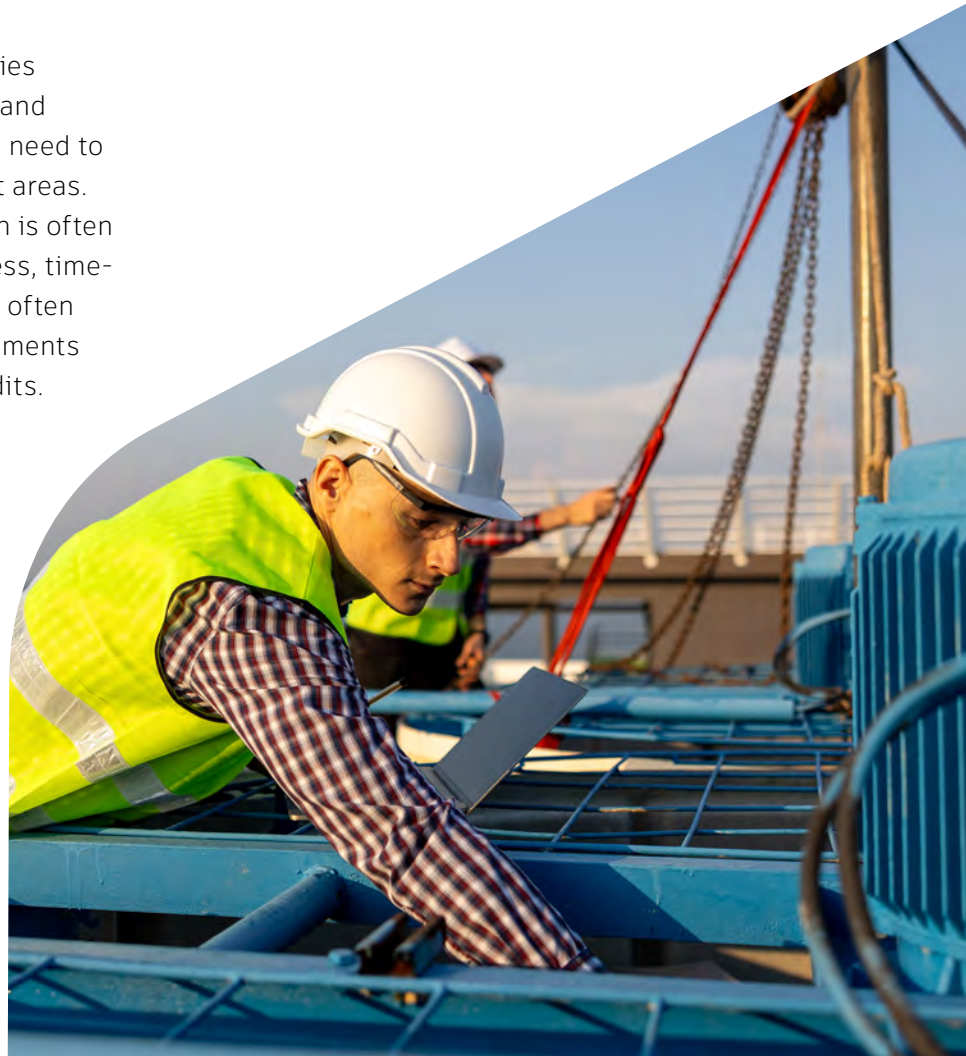
The value of data for sustainability

Accurate, appropriately organised and centrally stored data is crucial for enabling authorities to understand and maintain regulatory performance in areas like carbon emissions, as well as identifying how estates can be adapted for future compliance. In this regard, ongoing digital transformation efforts can in turn support reporting; in fact, 61% of companies identify sustainability as a top advantage of digital transformation.[4]

An understanding of the estate is also crucial for planning and making changes like the move to sustainable fuels, which can be made in tandem with other changes as citizen needs evolve.

Looking ahead, AI-powered generative design may also play a valuable role when planning new developments, by enabling design teams to quickly explore the environmental impact of different options and optimise plans against different outcomes.

AEC organisations' top actions on sustainability[4]

1. Using AI to be more sustainable

2. Using more recycled materials

3. Decreasing waste from construction

Strengthening the talent pipeline

Talent is another important consideration for Public Authorities, along with the wider construction sector. Research suggests that due to retirement and rising demand, between 2022 and 2035 4.2 million construction job openings[15] will need to be filled. The skillsets required are also shifting, as civil infrastructure owners identify digital project management as the most important skill for new hires.[4]

Public Authorities can take incremental steps to address talent shortages across the industry by building in digital upskilling at all levels of experience – from the apprenticeships that attract new candidates, to training for long-standing staff. Upskilling will in turn enable the organisation to make greater use of data, as Deloitte has found that companies investing in widespread data training are three times more likely to achieve leader status in data capabilities.[5]

Talent and sustainability programmes can be mutually beneficial, as 72% of organisations consider sustainability a top retainer of talent.[4]

Outcomes

- Deliver projects on schedule and increase cost predictability

- Improve decision-making with data

- Increase the productivity of the supply chain

Organisations are addressing a lack of access to skilled talent with expanded talent acquisition and recruitment (**25%**) and upskilling and development for existing employees (**21%**)

Tools for success

A CDE can help teams to quickly gather the information needed for regulatory reporting, as well as identifying improvements for the future.

AI-powered design can deliver informed planning and material choice decisions to support decarbonisation, through scenario analysis of new builds and retrofitting.

NHS

Milton Keynes University Hospital

NHS Foundation Trust

In Focus: Milton Keynes University Hospital Redefines Patient Experience With the Creation of a Common Data Environment (CDE)[16]

Milton Keynes University Hospital (MKUH) offers a wide range of acute hospital services and an increasing number of specialist services to Milton Keynes' growing population. As part of the UK Government's New Hospital Programme (NHP)—the biggest hospital building programme in a generation—MKUH was granted seed funding to improve their hospital estate.

Using Autodesk Construction Cloud, MKUH created a CDE to house all the 3D models, 2D drawings, and an assortment of operations and maintenance manuals from the planning, design, and build process of the Cancer Centre.

"Using this environment to capture all of our common data means we can facilitate version control and align with ISO 19650, an international standard for managing information over the whole lifecycle of a built asset," noted Claire Orchard, MKUH's Head of Digital Innovation.

Then, MKUH used Autodesk Docs, Autodesk Tandem, and Autodesk Revit to develop their COBie (Construction-Operations Building information exchange) model to store relevant project documents—dynamically linked to each asset and visualised within a 3D model—generating an early digital twin.

For MKUH, incorporating new Autodesk Construction Cloud solutions improved their ways of working across projects. Now, they can collaborate more effectively with project and supply chain partners and digitise efforts in the iterative development of their estate's portfolio.

"We're planning to use and test our workflows in real-time on the build of future projects," concluded Claire. "I'm excited to be working in this collaborative way, learning more about how we can harness building data and IoT technology to improve the care and experience that we deliver to our patients."

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Conclusion

Public Authorities are adept at working within very challenging circumstances to deliver the services that citizens depend on— and improve society as a whole. There are now opportunities to use digital technology to gain even more value from the physical estates at the heart of these services.

Improved data usage can increase the productivity of supply chains—reducing costly errors and delays—as well as supporting greater efficiency in facilities management. It's possible for Public Authorities to make more informed decisions about the physical estates and how they will evolve over time, with data insights that will be robust in the face of outside scrutiny.

And with strong data foundations in place, Public Authorities can not only meet the regulatory demands of the present but be prepared to take advantage of emerging technologies like digital twins and artificial intelligence, to ensure even greater value from public sector assets in the future.

People will be central in this evolution, whether within public sector organisations or the wider supply chain. It's important that employees and collaborators gain digital confidence, to not only use digital tools but ensure that data is gathered and used in a standardised way, to drive the greatest value. Upskilling, whether on the job or through formal training, will drive progress in the sector's digital maturity—and lead to better outcomes.

By establishing a data-driven approach, Public Authorities can benefit citizen welfare and society as a whole. Learn more about the technologies discussed in this report here.

References

[1] Construction building materials: commentary
UK Government, 2024

[2] Climbing the curve, KPMG
Global Construction Survey
KPMG, 2015

[3] CRUX Insight Sixth Annual Report
HKA, 2024

[4] Autodesk State of Design & Make report
Autodesk, 2024

[5] Navigating the Future of Construction
Autodesk blog, 2024

[6] The UK Construction Skills Shortage
Colemans 2024

[7] Optimizing Building Management
with a Lifecycle Approach report
IFMA, Autodesk

[8] The value of Information Management in
the construction and infrastructure sector
University of Cambridge, 2021

[9] CFL uses a single source of truth for
more efficient collaboration
Youtube, 2023

[10] Harnessing the Data Advantage
in Construction report
Autodesk, 2022

[11] Creating a Digital Copy of the Port
of Antwerp-Bruges
Autodesk blog 2022

[12] Revolutionizing facility management
for a historic educational institution
Autodesk webinar, 2024

[13] Corporate Sustainability Reporting Directive
European Union, 2023

[14] Building Safety Act
UK Government, 2022

[15] Construction workers: skills opportunities
and challenges (2023 update)
CEDEFOP, 2023

[16] MKUH redefines Patient Experience
with Autodesk Construction Cloud
Autodesk, 2023

See the Future of Connected Construction

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Our industry requires solutions that connect their information, teams, and technology —breaking down data silos and disconnected processes that hinder true transformation. As we navigate the ever-present push to do more with less, we need to uncover new ways of working, enhance connected digital workflows, and incorporate advanced analytics. To support us on this journey of transformation, we must lean into tools that connect construction — from design to plan, build, handover, and operations.

Built on a unified platform and common data environment, Autodesk Construction Cloud is a powerful and complete portfolio of construction management products that empowers general contractors, specialty trades, designers and owners to drive better business outcomes. Autodesk Construction Cloud combines advanced technology, a unique builders network and predictive insights to connect teams, workflows and data across the entire building lifecycle.

While the industry experiences unprecedented transformation, our mission remains the same: to help construction teams meet the world's rapidly expanding building and infrastructure needs while making construction more predictable, safe, and sustainable. And we've remained steadfast in our promise to deliver the industry's most compelling solutions, connecting data, teams and workflows from the field. This is our commitment to connected construction.
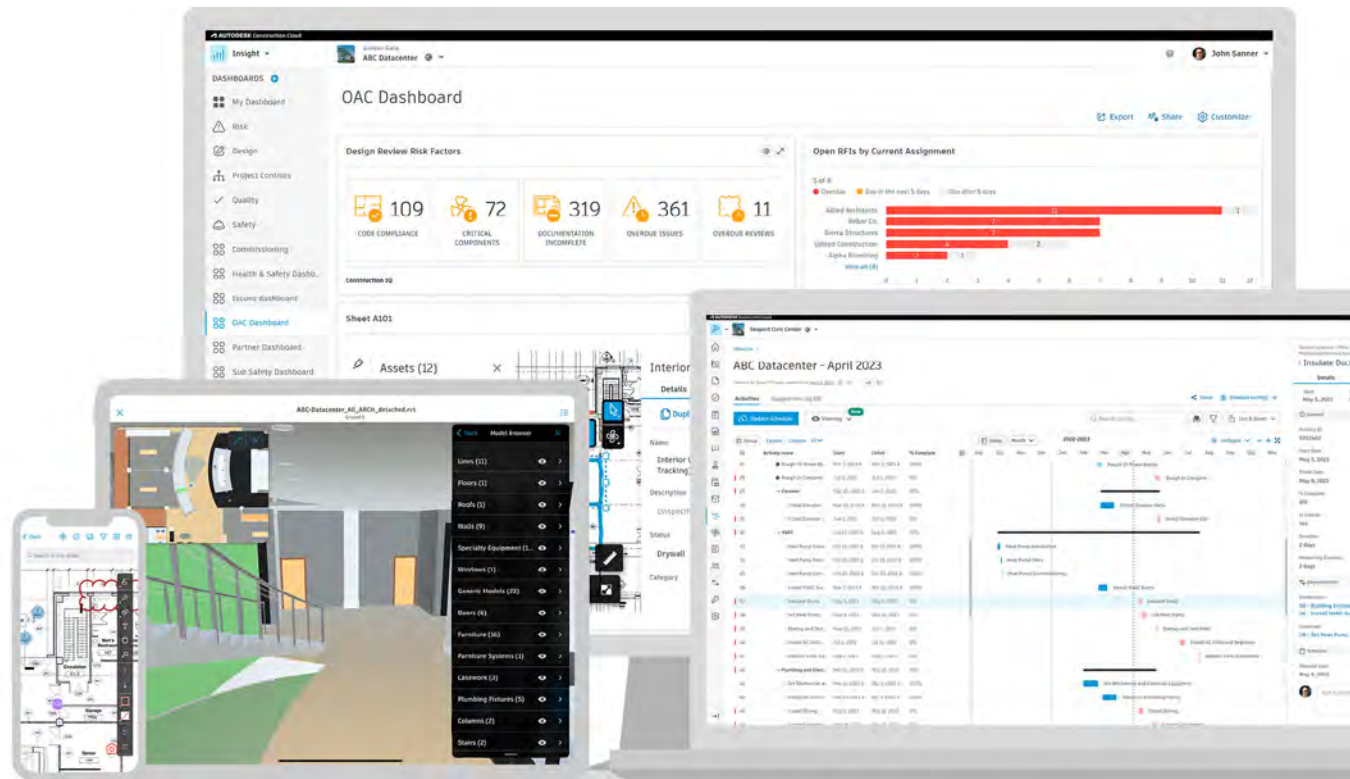
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