



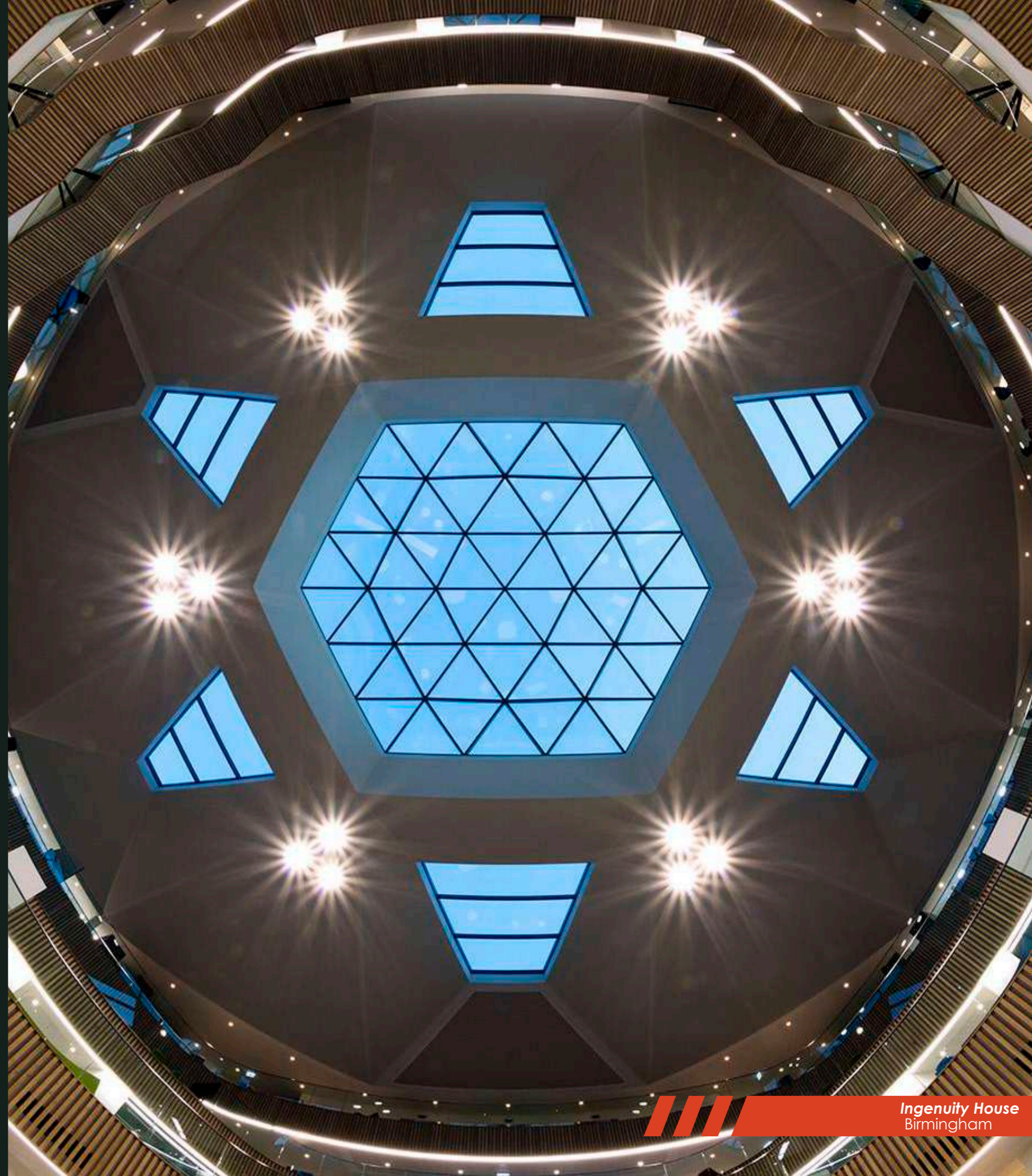
Tilbury Douglas

Digital Construction Capability Brochure

Introducing our award-winning
Digital Team and exploring our
digital transformation.

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Navigating The Digital Landscape

Construction is undergoing a digital transformation, one that focusses on innovation as an ongoing standard.

Due to the disruptions of the pandemic, 62% of construction executives rate digital transformation as “high or very high priority” for 2022, a sharp contrast to the 17% of 2018.

The early stages of Tilbury Douglas' digital transformation happened almost a decade ago, and it has only grown since then.

With the expertise of our Digital Team, we were the first main contractor to successfully pilot Building information Modelling (BIM) Level 2 on a Ministry of Justice project in 2012. This achievement, combined with our dedicated digital resource, highlights Tilbury Douglas as a long-standing and leading adopter of technology in construction.

As part of our ongoing strategy, we have strengthened our investment in our Digital Team. They spearhead the implementation of technology, data and sophisticated software across our engineering, infrastructure and fit-out operations.

They lead the implementation of industry standard processes, technology, and training across our engineering, infrastructure and fit out operations, in line with our strategic goals:

Digitisation

- Digitise customer experience and day-to-day operations to improve efficiencies.
- Lean process design streamline processes and minimise waste, leading to continuous improvement.

Intelligent process automation

- Maximise efficiencies and empower our employees to do more by removing repetitive and admin-heavy tasks.
- Advanced analytics provide intelligence to facilitate decision making.

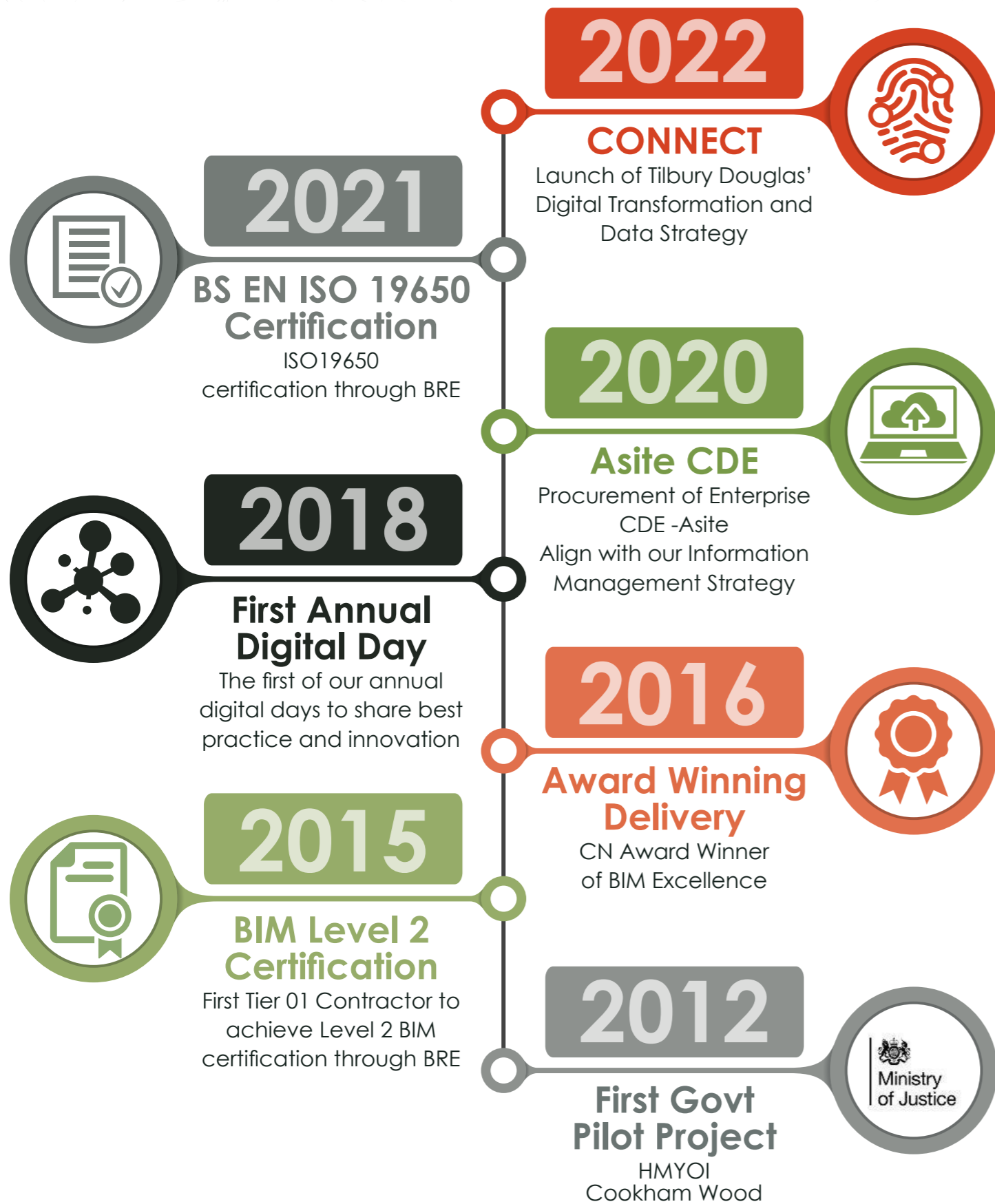
Through leveraging their expertise and in alignment with the Construction Playbook, the Digital Team embeds data and technology throughout our works, bringing benefits in cost, sustainability and quality to our clients.



Leading in digital connectivity throughout the built environment

Our Digital Journey

10 Years of BIM Experience



Understanding A Changing Industry

Regulatory bodies, the government and leading organisations are prioritising innovative methods to create greater value in how works are delivered and experienced.

Improved safety standards are also being urgently addressed. The government has issued key guidelines and mandates to this effect, including the following:



A legislative response to the Grenfell Tower fire that issues extensive safety reforms.

It requires the golden thread, the creation and management of information covering a building's life cycle, including inception, so that it can be safely looked after. It must be kept in a digital format.



Policies and guidance on improving productivity, sustainability and strategic relationships in the built environment, with an emphasis on digital approaches and modern methods of construction.



A plan to improve infrastructure output and resilience through digital and technological means, while prioritising societal needs.

We are channelling these fundamental interventions through our own data-driven capabilities to refine our business model, prioritise net zero in project delivery and increase information transparency for better safety outcomes.

Our capacity to achieve these outcomes is due to the Digital Team's development of our technological ecosystem and information management platform, Connect.

Welcome To

connect

A Tilbury Douglas Solution

Information management drives Connect. It enables a baseline digital offering that empowers our people through a set of core technologies, processes and governance that can be applied to any scheme.

It positions digital tools at the centre of our operations, allowing our baseline offering to include solutions based on robust outcome-focused selection processes.

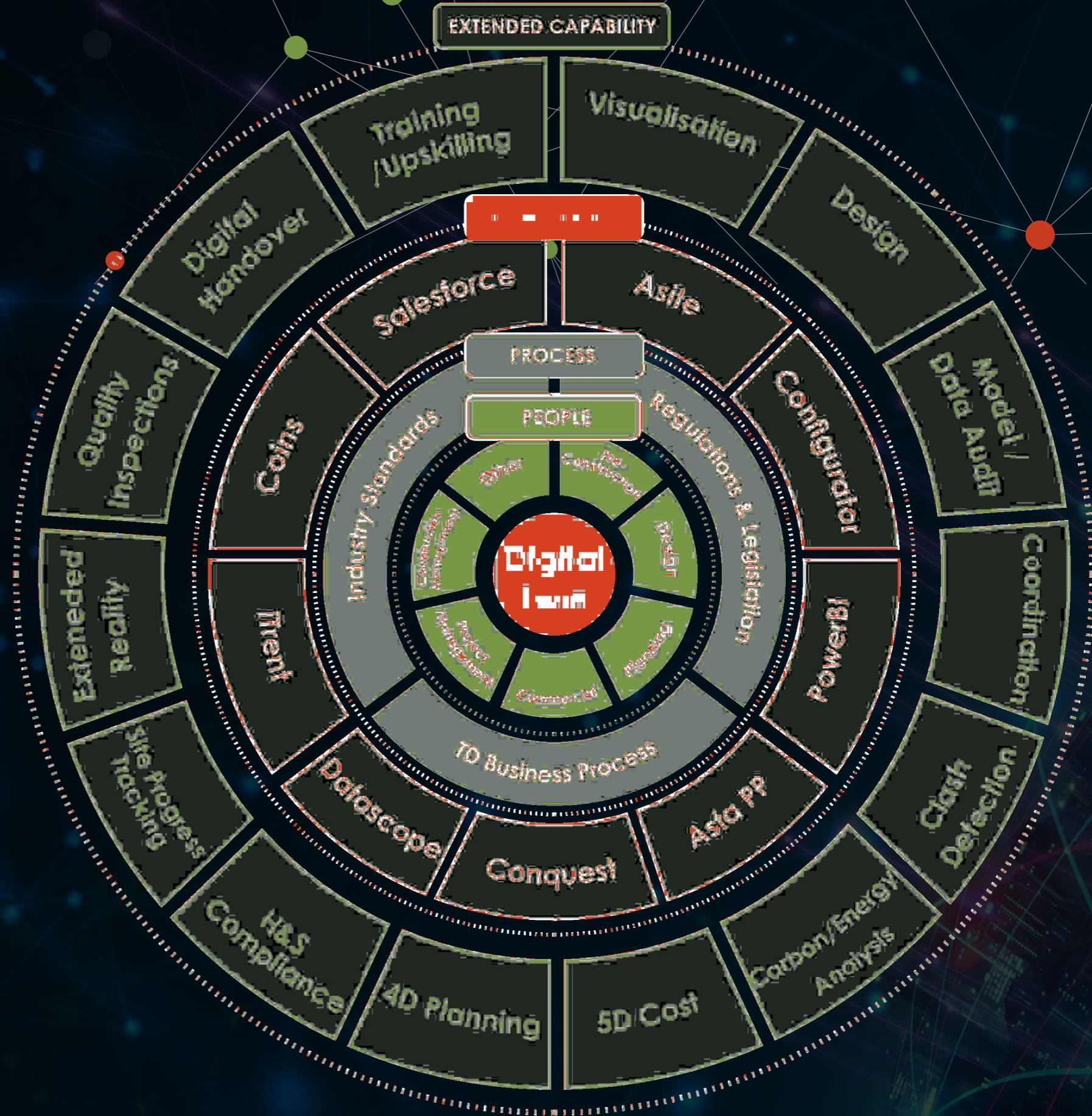
A modular approach to technology, Connect allows us to continually evaluate our technology ecosystem to ensure tools are always fit for purpose and achieve the desired results. By doing so, we are able to enhance or replace tools appropriately.

This baseline offering and standardised approach eliminates the need for new project strategies. As such, planning and coordination of teams and resources becomes predictable and leads to assured outcomes. These actions are refined and repeated in subsequent projects. Efficiency becomes a matter of best practice.

The buy-in of our process owners is integral to information distribution throughout the business.

They manage our vetted tools within Connect, enabling training through the platform where required. They also support the Digital Team in ensuring that our tools are suitable and provide best value.

Driving information management across our digital transformation, Connect is also ISO 19650 compliant.





Managing The Golden Thread

Connecting The Benefits

Curating a completely bespoke strategy for each new scheme is time-consuming, and it misdirects resources from refining project opportunities. Clients are also seeking greater added value and faster delivery times to accommodate their needs.

Connect's technological ecosystem drives the integration of our business activities, processes, tools and information management in a central digital space, addressing these issues. Its interoperability eliminates the need for file transfers and banishes programme incompatibilities amongst stakeholders. Additionally, operating from a pre-established baseline allows the Digital Team and delivery teams to focus on innovations that benefit our customers.

Connect Drives The Integration Of Our Business Activities

For example, what would add value to the project and support the required outcomes?

Here, the Digital Team chooses from an additional repository of our technical capabilities and interconnected tools to deliver a holistic solution. Perhaps the client emphasises sustainability in their preferred outcome. In this scenario, the Digital Team pulls from their cache of sustainability tools (including accreditations, calculation methods and processes) and adds them to the baseline offering.

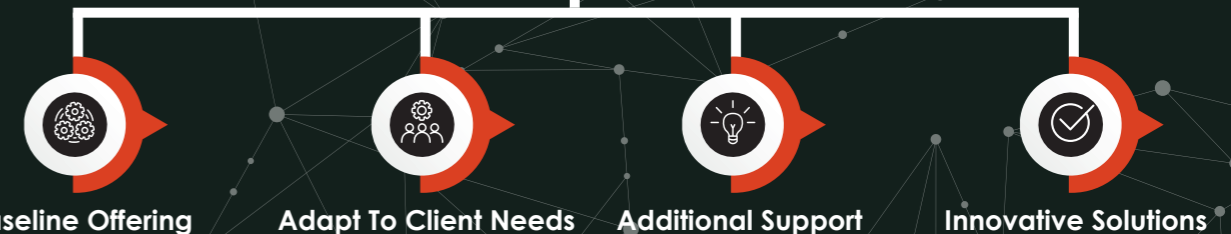
Connect allows the baseline offering and additional catalogue of assets to seamlessly interact, saving time in project planning. As the structure is designed to reduce waste, sustainability continues post handover.

Workstreams And More Digital Currents

Delivering our baseline digital offering and additional catalogue of assets creates huge amounts of data that must be saved, managed and shared. Connect allows us to take this data and assign it to three main focus areas.

- Managing the golden thread.
- Strengthening our digital operations.
- Advancing towards industrialised construction.

connect
A Tilbury Douglas Solution



Managing The Golden Thread

The golden thread focuses on standardising our information management capability. A critical part of managing any given project is being able to look back and know who did what, when, and why.

Our standardised approach focuses on setting up a framework of tools and processes to define how we manage our project information and effectively provide the following:



Clarity of deliverables (internal or external)



Process & technology to support



The ability to share resilient (i.e. quality checked) data between platforms



Confidence in our ability to access & share data only as required



Data & information (and even solutions) to suit a purpose

Harnessing The Right Tools

We use Asite, an enterprise-wide common data environment (CDE), as our central platform for managing the golden thread of information across our projects.

It maximises collaboration across project stages and its traceable infrastructure promotes transparency across our stakeholders.



ISO19650 compliant, Asite's interoperability helps us manage and reduce risk, eliminates data loss and allows our teams to interface across various tools and systems. It empowers us to move away from redundant admin, double information entry from different platforms and duplicated, unnecessary stakeholder behaviour. In doing so, our people can more effectively channel their expertise and adopt a modular, purposeful approach to information exchange.

Promoting transparency across our stakeholders, Asite is our CDE for managing the golden thread in our projects.

Integrating Powerful Analytics

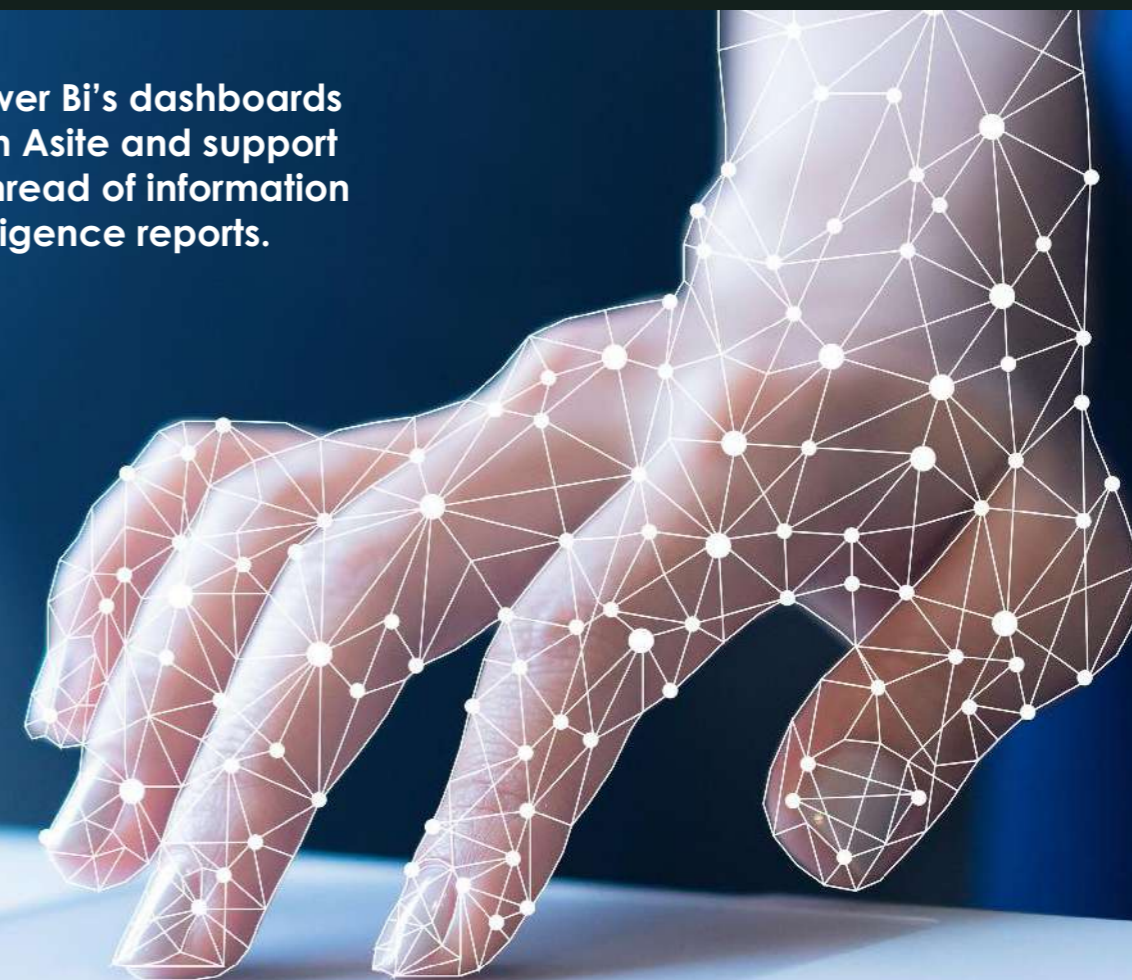
Additional resources at our disposal include Microsoft's Power Bi, a collection of cloud based apps and services.

Power Bi collates, manages and analyses data from various sources to provide intelligence and reports on business activity.

We have integrated Power Bi into Asite to centralise project progress in one platform, harnessing its data processing so that stakeholders can engage with design and site information via a user-friendly dashboard.



Microsoft Power Bi's dashboards integrate with Asite and support the golden thread of information through intelligence reports.





Strengthening Our Digital Offering

Strengthening Our Digital Offering: BIM

In addition to being the first contractor to pilot BIM on a government project, Tilbury Douglas was also the first Tier 1 contractor to acquire BIM Level 2 certification in 2015.

This achievement was ahead of the mandate to deliver BIM Level 2 compliance on all public sector work from 2016 onwards.

Updating Our Approach

We are ramping up our BIM capabilities to digitise information throughout all operations and construction stages, embedding information management throughout a larger business model.

We deliver to the current international information management standard of BS EN ISO 19650, demonstrating our ability to adhere to best industry practices and provide a return on customer investment via reduced costs and waste elimination.

As a Platinum Plus patron of the UK BIM Alliance, we are committed to supporting the Alliance in driving digital transformation across our industry. We intend to influence change by supporting the Alliance's practical implementation of standards, processes and technology that will work towards future proofing our industry.

Sharing our expertise

As a standard, we support our clients on their BIM requirements, helping shape their digital strategies when needed and as early as possible.

For example, we sit on special interest groups (SIGs) for government departments, providing guidance that enables them to make informed BIM decisions. We have collaborated with SIGs for the Ministry of Justice, Defence Infrastructure Organisation and Procure22.



Engineering Services Powering Digital Capabilities

Tilbury Douglas Engineering (TDE) leads the industry in mechanical, electrical and plumbing solutions.

Their offering encompasses in-house design expertise, incorporating BIM methodologies, practical and efficient engineering resources and robust digital engineering technologies. As such, our customers benefit from a comprehensive and digitally informed engineering service. It enables the smooth integration of suitable supply chain input and high-level coordination to develop a scheme from RIBA Stage 3 onwards, crucial results that drive project success.

Collaborating with the Digital Team

In step with our digital ways of working, TDE contribute significantly to our information management process and play a key part in delivering Connect, maintaining the Golden Thread. Their designers interface closely and regularly with our Digital Team, sharing the same digital approaches. A cross-pollination of insight and solutions allows both teams to support one another in applying technological processes throughout delivery.

TDE's designers adopt the Digital Team's resources and tools, and also share feedback that optimises the Digital Team's outputs. This integration not only benefits both teams' performance, but also strengthens their relationships with their supply chain partners. Both parties have the knowledge and experience to bring informed and technologically enriched solutions to their strategic partners. To cultivate this relationship, we continue to invest in TDE's skilled designers and state-of-the-art software and technology. By doing so, we fully support TDE as a forerunner in the current digital revolution.

Harnessing Digital Engineering to Mitigate Risk

As such, TDE melds its digital engineering capabilities and practical engineering solutions to eliminate the below common pitfalls associated with MEP design deliverables:

- Lack of alignment with the entire design team.
- Poor incorporation of supplier information.
- Inconsistent task coordination of engineering works.

By applying Connect's baseline offering, TDE sync contractor and designer competencies. They reduce risk for to all stakeholders and improve the overall quality and safety of the deliverables provided.

The Right Technology to Optimise Delivery

Under our collective ethos of continual improvement, TDE have significantly extended their capability and streamlined their installation processes. For example, they have comfortably adopted Trimble's SysQue software. This allows:

- The production of MEP models based upon specific products / materials
- Automatic compliance with relevant standards.
- Easier access to fabrication information.
- Detailed support / bracketry outputs.

Refining their offering also includes increasing the level of detail included in their models, allowing them to adopt the Trimble Field Link Layout Solution. It utilises the BIM model and Trimble Robotic Total Stations to automatically set out hanger positions on site. This significantly improves the setting out process, providing accuracy, without complexity.

Additionally, the Matterport 360° camera operates in conjunction with an iPad to scan areas of a building. It then combines the scans together to create a holistic 360-degree representation of the structure. These scanned images can then be used by clients for virtual tours of the building, FM / staff training and are linked back to the operation and maintenance manual. Our delivery of the Christie Proton Beam Therapy Centre expertly demonstrated the application of this technology in supporting the Trust's FM team.



The Christie Proton Beam Therapy Centre



Benefits of the Matterport 360° camera also extend to design and delivery efficiencies. In surveying refurbishment schemes, exporting point clouds from the Matterport scan into a Revit model reduces design periods and improves accuracy of models.

An Expert with a SMART Edge

Specialising in developing and delivering SMART* innovations is a key skill that equips TDE with a competitive edge.

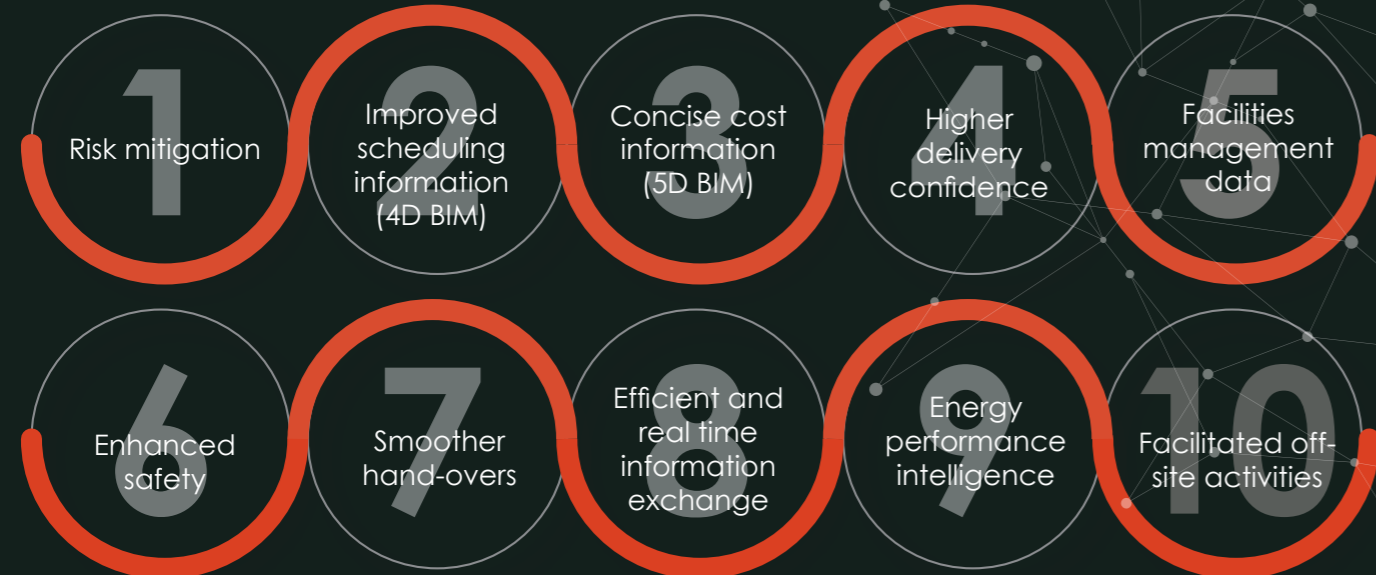
Our design and development of Ingenuity House was a notable expression of this ability. In 2019 the impressive structure was named among the best workplaces in the UK at the British Council for Offices (BCO) annual National Awards. It took home the highly coveted Innovation Award for use of SMART tools. The judges were impressed at Ingenuity House's provision of an intelligent occupier analysis system. This cutting-edge resource provides information on energy use, allowing the adjustment of core FM settings to minimise consumption.

This type of innovation is a valuable step towards the development of digital twin technology and finding more ways to support our customers.



Ingenuity House

What We Provide Through BIM



Providing Support Beyond Handover

Revolutionary in its own right, BIM is a significant contributor to the evolution and wider application of digital construction in project delivery. Our designers, supply chain partners and delivery teams implement BIM processes as part of our baseline offering that Connect facilitates.

The increasing sophistication of technology, both in-house and throughout the industry, allows us to dynamically interact with buildings and infrastructure. Information management throughout the BIM dimensions position us to capture data that could impact the facility's future management.

Cost (5D) could support maintenance budgets, while accurate energy predictions calculated from the design could inform building sustainability performance.

BIM has the power to provide building intelligence that influences the behaviours of delivery teams and building occupants. This has positive implications regarding sustainability and cost management, benefits we can share with our customers beyond handover.

Empowering Clients to Do More: Making Data Accessible and Actionable

Digital Handover:

A key element of digital delivery is handover of usable, useful, asset data. As standard our delivery includes an Asset Information Model, the single source of approved and validated information related to the completed assets. This includes:

- Data and geometry describing the assets
- The spaces and items associated within it
- Data about the performance of the assets
- Supporting information about the assets such as specifications, O&M manuals and health and safety information

We recognise that an effective Asset Information Model plays a vital role in ensuring that a newly constructed facility can be efficiently maintained and used as intended, from day one; we therefore provide information deliverables (models, documents and data) that will enable operation, maintenance and assessment of the ongoing performance of the delivered asset.

Our Connect platform plays a vital part of our digital handover; the way we generate, collate, share and manage information across our digital tools forms a big part of the handover process, and ensuring we are able to maintain the golden thread of information from design to construction to facilities management.

Strengthening our digital operations: Gearing up to digital twin technology

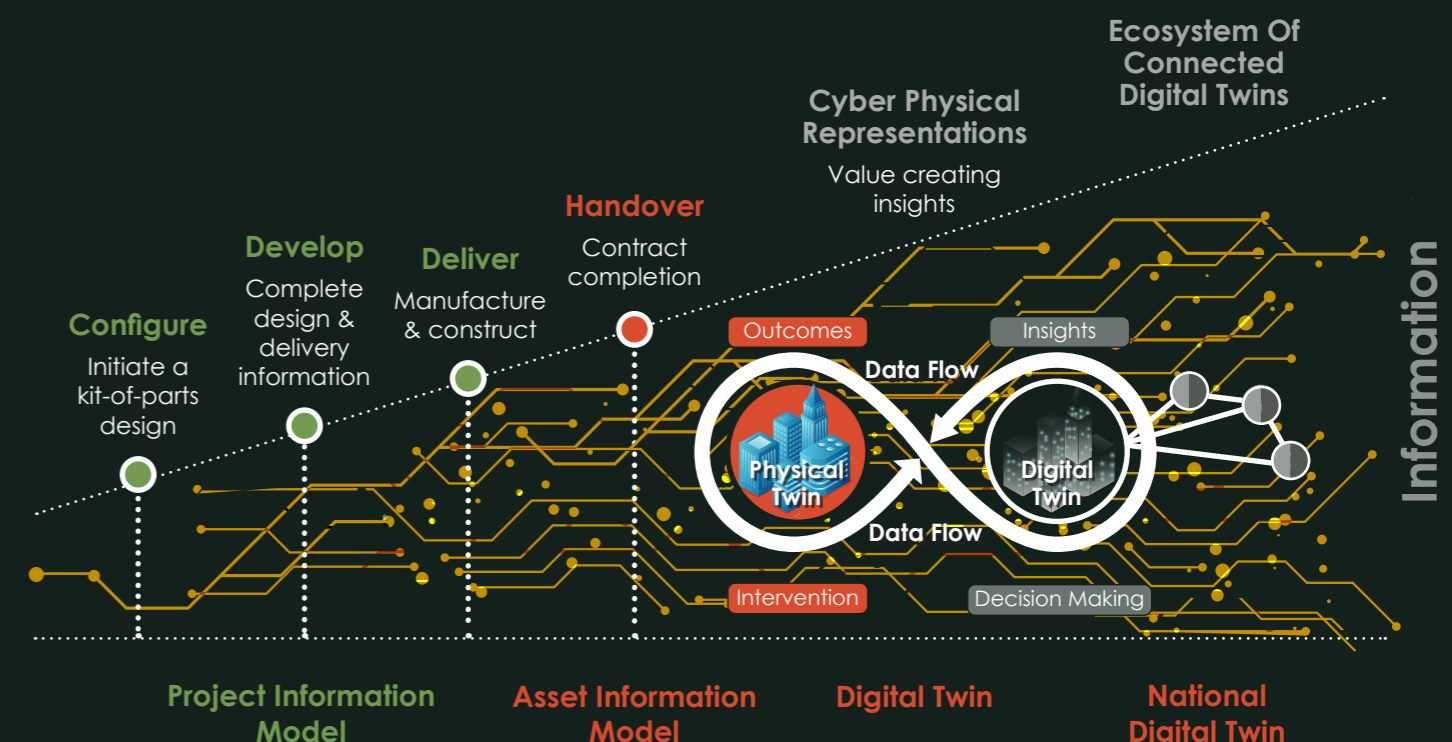
As our Connect platform evolves and our capabilities advance, we see Digital Twin technology changing the way we handover our projects. A digital twin is a cyber-physical representation of our assets. These digital representations of real world assets are connected to the corresponding physical asset to enable the real time asset data to be fed back into the virtual model. This data could be a combination of Asset Information Models linked to sensor technology, simulation data, utility meter data and more.

As part of a digital handover to our customers, we see digital twin technology providing our clients and their FM teams with the ability to understand operational performance (e.g. occupant behaviour, space utilisations, energy consumption), analyse data and make informed decisions. This quickly allows operations and maintenance teams to move away from reactionary measures and become more proactive in the management of any asset.

With data flowing between the digital and physical asset, combining various sources of data into a federated environment, the digital twin not only reflects current asset conditions, but also predicts future conditions for inspections, reporting, and value creating insights.

With a robust Connect platform in place, and Information Management at the heart of our strategy, we're making headway in strengthening our digital handover capabilities, to ensure we continue to have the right processes and technology in place to deliver digitally. And as we incorporate more modern methods of construction into our delivery process, we see real benefit in the ability to support the delivery of digital twins at scale, across repeatable schemes, maximising our continuous improvement ethos.

Golden Thread - Digital Twin



Advancing Towards Industrialised Construction

Planning For Cradle-To-Cradle In The Built Environment

We are also developing our digital twin capability to integrate with our modern methods of construction (MMC) capability. This strategy puts us on course to treating buildings and infrastructure as commodities, with parts that can be repeated, recycled and reused in new schemes. This cradle-to-cradle strategy mimics nature's re-absorption of waste into the environment, where it sustains life and then is re-absorbed again.

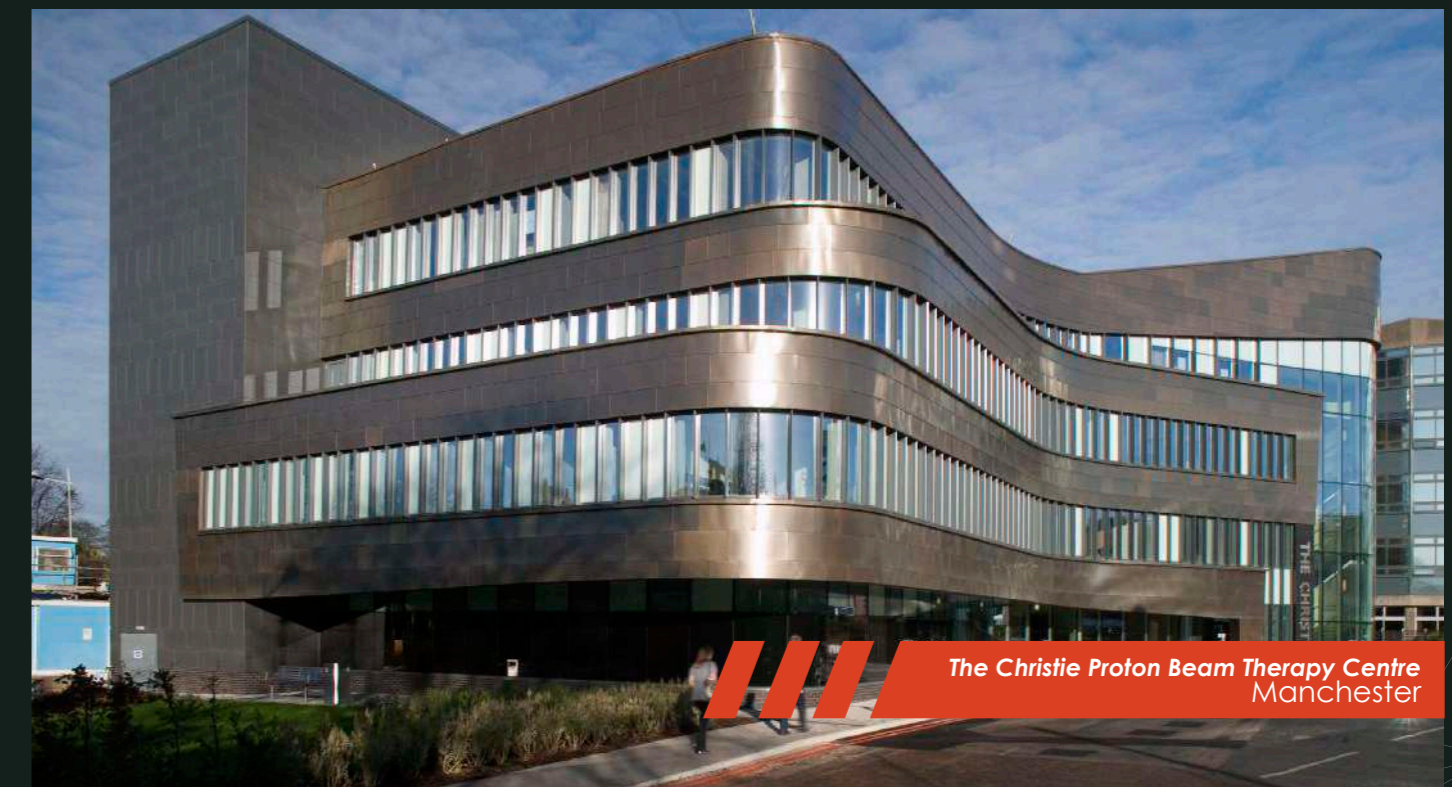
As such, we are planning our digital twins to capture information that can also be applied to subsequent schemes, maximising our continuous improvement ethos.

What is the difference between BIM and a digital twin?

BIM provides a detailed yet static, "snapshot" of a building model. It is characteristically based on construction documents and design assumptions, and it is updated at key project stages.

Our strategy is for the digital twin to be created at project completion, so that there is a physical asset the data can interface with. This is different from BIM, which is an information management process during project delivery and does not provide "live" readings, so to speak.

Although at different points, the two innovations will be implemented throughout the course of a project's life cycle. BIM is also a fundamental contributor to our plans for our digital twin technology.



The Christie Proton Beam Therapy Centre
Manchester



Birmingham Children's Hospital
Birmingham

Industrialised construction (IC) is an ongoing and long-term shift in construction behaviours and philosophies. Its aspirations encompass digital construction processes with the scalability of MMC, treating construction as a commodity.

Digitally Hands-On Customers

We have embraced the spirit of IC, and we are modelling our growing digital and MMC offering to reflect its innovations.

The Digital Team has developed the Configurator, a revolutionary and web-based design tool where clients drag-and-drop from a catalogue of standardised components to virtually assemble their desired building. This will arm them with a novel opportunity to take a more active role in creating the building that meets their specific criteria and vision.

For example, a school could pick from a library of room layouts and add bespoke details such as furniture to create classrooms, faculty areas and a library. It could also set additional parameters relating to cost, size, energy goals and a possession date to further specify need.

Presented with a digital representation of key requirements, our project team can develop early designs to inform Stage 2 designs. The Configurator bridges the gap between us and our customers. It allows us to better capture their goals in the programme and also give them a glimpse into the future of their new building.

The Configurator will empower our customers to play an active role in the design of their desired building.



Kit-Of-Parts Technology

The Configurator is a compelling and exciting innovation that takes the concept of standardisation and applies it to the digital and built landscape.

It is our own Kit-of-parts platform, whereby powerful software enables users to browse, choose and arrange repeatable building components according to their preference.

In the school scenario for example, the catalogue of options is the kit-of-parts and the Configurator is the platform that makes the arrangements possible.

Kit-of-parts platform technology already exists in high-productivity industries, such as automotive and manufacturing, and it is gaining traction in construction. Key reasons for its growth are the possibilities for scalability that standardisation allows across buildings.

While the Configurator is a client-facing tool, our project teams harness the Kit-of-parts platform approach by defining building components that can be manufactured off-site and delivered to the project's location.

Innovation Through Standardisation

The Configurator standardises our design processes to provide greater flexibility and more efficient solutions. We have learned from automation-dominant industries, such as manufacturing, to vastly improve our productivity.

Its repeatable processes and building components also support the sustainability and social value initiatives outlined in our People, Planet and Performance strategy. Standardisation reduces waste in resources, energy, and time.

It also helps us maximise the talents of our people and foster new relationships through emerging jobs necessary for our digital aims.

Digital Tools For Immersive Delivery

We believe that providing an immersive experience throughout a project's delivery stages significantly boosts understanding and enables more informed decision making. For this reason, we harness the power of Extended Reality (XR) technology.

Augmented (AR) and Mixed Reality (MR): We have invested in Microsoft HoloLens 2's, MR headsets that allow the wearer to see a 3D model overlaid onto the real world. Through lenses at a 1:1 scale, the wearer can see elements of the project which have not yet been built. They can also check built items directly against the model, all while standing on the physical site.

We also see AR technology as an important tool for community engagement. We aim to give members of the public the ability to scan a QR code and view the model of a building on their phone from outside of the site boundary.

Virtual Reality (VR): We are also investing in the Oculus VR headset to provide an immersive experience of a design before any physical elements are ever built. This allows for design decisions to be made as early as possible and eliminate any late changes. The Oculus headset will also be valuable for smoother soft landings and handover processes.

We also want to take this technology further by looking to create a collaborative VR setting where project stakeholders from any location in the world can come together virtually and inspect and talk through a design. This would be very similar to a multi-player game, where different people are collaborating in a shared virtual and immersive space.



Meet The Digital Team

Our investment in the Digital Team has created a dedicated resource of talented individuals with extensive backgrounds in developing and implementing digital tools.

They are digitising our information management and are a key element in delivering our sustainability strategy, People, Planet and Performance (PPP). An emphasis on continuous improvement sits behind PPP, identifying digital practices as avenues for strengthening our performance as an ambitious yet responsible business.



Mark Buckle Technical Director

I oversee Tilbury Douglas' digital transformation strategy and application of Modern Methods of Construction. I interface with the Digital Team to ensure the business aligns with the government's digital reforms outlined in the Construction Playbook.



Aneesa Mulla - Head of Digital

I'm passionate about leading the company's evolving digital transformation strategy. With a wealth of experience in digital construction and BIM techniques, I recently drove the procurement of a business wide CDE (Common Data Environment), driving significant change through the business. Key focus includes implementing principles from the Government's Construction Playbook, MMC and design for manufacture.



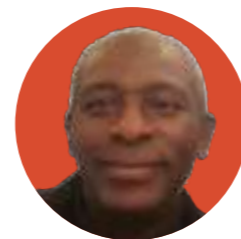
Alan Moylan - Solutions Manager

I believe that a robust process and smart technological solutions should be tools for empowering people, providing them with guidance and applications to do their best. In this way, we make technology deliver the outcomes we want to achieve for ourselves and our clients.



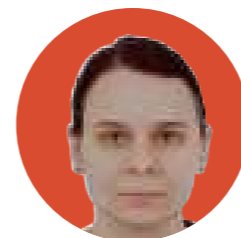
William Barry - Senior Digital Engineer

I am keen to be a part of Tilbury Douglas' digital transformation and apply my skills across Building Fabric Design, Product Information, Design Specification, Construction Package Drawings, Planning, Building Regulations, 3D modelling, and Building Information Modelling.



Martin Huggins - Senior Digital Engineer

As a chartered Technologist and coming from a design and construction background I have a keen desire and wealth of experience in developing and using cutting edge digital solutions to help the process of building procurement produce the best possible outcomes for clients and users. I have a deep interest in the use of visualisation techniques that give the best possible understanding of design intent.



Aggie Naliwajko - CDE & Information Manager

I have experience in implementing and managing CDE solutions and procedures within the construction industry. By streamlining information management processes, I lead and support digital transformation across the business. I use detail-orientated and systematic approach to enhance construction's quality and standards.

Ingenuity House

Project Capability

Client Tilbury Douglas (formerly Interserve Construction)
Value £50m
Location Birmingham
Sector Smart building

We designed and built Ingenuity House to showcase our capabilities in one integrated project. Our extensive use of technology demonstrated our ability to weave innovation throughout our works, creating predictable outcomes that spurred the programme.

Additionally, our portfolio of digital tools enabled us to efficiently manage information throughout all parties and engage our people on every step of our journey.

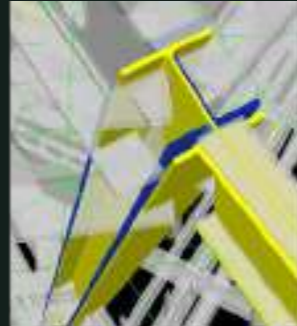


Ingenuity House

Innovation in software: quality on site



ClearEdge3D



We harnessed technology to improve the way we managed quality on site. Our design team collaborated with ClearEdge3D to intelligently compare point cloud data and design intent models to identify any variances against our tolerances.

The team accurately tracked construction progress and quality by determining if elements were built to specification and exploring how they behaved over time.

Beginning the right way: early end user engagement

Virtual reality proved invaluable for connecting with our end users and incorporating them into the project. Virtual tours generated interest in the works and showcased what to expect from Ingenuity House, rich insights that would facilitate the transition into the offices. An interactive online orientation further boosted stakeholder interest and supported our end users' preparations for the move.

Delivering ingenuity through BIM

Building Information Modelling (BIM) played a central role throughout our ambitious works. It drove collaboration throughout project stakeholders, and its ability to provide information at the point of need maximised efficiencies throughout the project.

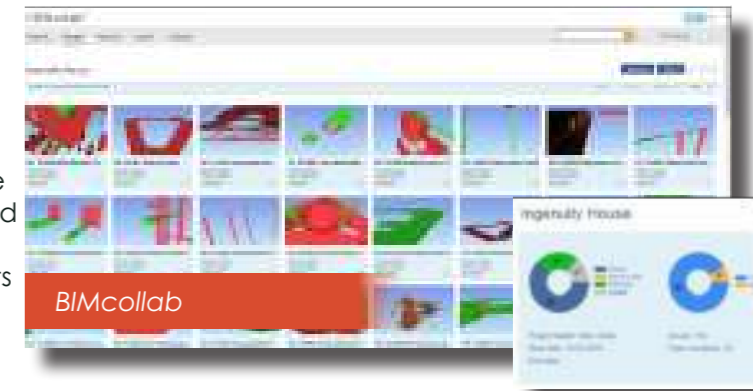
Sustainable value through commercial needs

BIM's efficiencies in our commercial responsibilities positively impacted our sustainability efforts. Modelling allowed a lifecycle assessment tool to determine the embodied carbon levels that could be expected based on the current design. Having a BIM model provided access to quantities and environmental data, supporting our vision of responsible construction. The company was upholding our SustainAbilities agenda at the time of delivery, yet BIM's sustainability advantages continue to support our current People, Planet and Performance strategy.

Digitising comprehensive information management

Our BIM capabilities and the expertise of our people enabled smooth digital information management across different disciplines. This led to successful achievement of KPIs, eliminated hurdles to knowledge sharing and ensured cohesion throughout the project team. As such, we significantly invested in vBIM, our online BIM solution, which users could access at any location and time. Additionally, our designers utilised BIMcollab, an issue management and model validation software, to cooperatively manage the design.

Working in a common data environment (CDE) provided a single source of information, including BIM and conventional processes, with our entire project team. Our CDE removed barriers to information and documentation exchange, greatly reducing duplicated data and mistakes. Its ability to coordinate multiple models into a single federated model enabled our design and construction teams to identify issues early. By doing so, it provided accurate project insights and predictable outcomes, thus creating confidence in the works.



BIMcollab

Modelling for safety and timely delivery

Our teams wielded BIM's capabilities to maximise safety throughout the works as well. We were able to manage risk by conducting CDM designer safety tours through 3D representations of the project. Used in conjunction with BIMcollab, the models enabled automatic clash detection and allowed designers to identify and mitigate risks.

Additionally, our delivery team ran 4D digital rehearsals to improve certainty of outcomes and consistently mitigate risk in the programme. By visualising the project schedule in a 3D space, our planners were able to flag issues that they could have missed in a Gantt chart. For example, the steel work sequence of a main structure and podium installation unearthed a clash in the subsequent cladding installation. As such, the digital rehearsal prompted early problem solving before the activity on site. This saved time, money and potentially avoided a health and safety incident.



CDM safety tours



4D digital rehearsal



Modelling from AIM

A full digital offering

Data sets taken from BIM supported the facilities management team post project completion. Information spanning design, construction, commissioning and handover was captured in an Asset Information Model (AIM) using the Active Plan system. This process took place within the CDE. We therefore equipped the facilities management team with a wealth of digital information on the operation and maintenance of Ingenuity House's building assets. By doing so, we provided a full digital offering and supported the golden thread.

Christie Proton Beam Therapy Centre

Project Capability

Client The Christie NHS Foundation Trust
Value £90m
Location Manchester
Sector Health

Our comprehensive digital construction methods enabled us to successfully deliver the Christie Proton Beam Therapy Centre, the first NHS high energy proton beam therapy treatment in the UK.

Procured under the P21+ framework, we completed the works on time and under budget.

Collaborative tools for Stakeholder Engagement

Stakeholder engagement was vital to the project's success. Our collaborative tools linked with the BIM model, ensuring our stakeholders (the Trust, FM team, patients and residents) were always aware of what was happening throughout the works and what to expect. This included the use of 3D printing and ENSCAPE, a full 4K rendering straight from the BIM model, that allowed our stakeholders to visualise and comment on the spaces within the hospital early on.



VR user engagement

Design Review and Clash detection

We also harnessed a federated model throughout regular Design Review and Clash Detection workshops, held every two weeks. By doing so, we were able to flag clashes early, avoiding costly construction mistakes and delays in the programme. For example, the model revealed that external cabling clashed with the bunker wall in the treatment gantries, which were designed to rotate around the patient. Through the model, we were able to rectify this issue at the design stage.

The clinicians participated in the works and engaged with the delivery team through virtual tours. Our virtual reality headsets allowed them to test and adjust project components such as space, equipment positions, fixtures and fittings. This involvement provided valuable insight regarding optimal patient experience and journey, whilst future proofing the design.

Project Information Management

Taking advantage of a common data environment (CDE) at the point of need is common practice in Tilbury Douglas. Both office-based and site-based teams in the Christie works utilised the CDE to engage with BIM and work collaboratively. We required our supply chain partners to also operate within our CDE to ensure all stakeholders worked from a single source of information.



BIM at the point of need

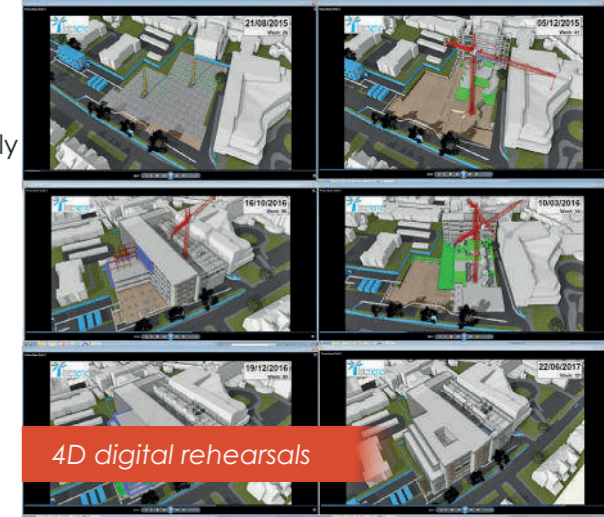


Instant Dashboard reporting

4D Digital Rehearsals

Our teams were able to accurately monitor the works and instantly assess the impact of any changes through digital rehearsals of a 4D model. A virtual representation of the build sequence meant that we could interrogate and optimise progress, providing the Trust with certainty that we could meet its project needs.

Additionally, the 4D model articulated the design and visually represented the construction methodology during project-focused and public facing progress updates. These included regular client and stakeholder engagement meetings, along with resident open evenings. The 4D model was also used at site inductions with supply chain partners and operatives.



4D digital rehearsals

QR coding for drawings

All drawing issue sheets included QR codes to instantly view the BIM model. Accessed via smart phones and tablets, the codes enabled quicker signoffs and effective stakeholder engagement.

Taking the accuracy to the field

We harnessed a Trimble robotic station to set out from the BIM model (as in, transfer the building design onto the site). By enabling our engineering teams to accurately set out from the model, this surveying technology ensured exceptional installation accuracy and greatly reduced the risk of errors.



EndBIM for FM team support

Digital Handover

As a means of engaging with the Trust's FM team, our delivery team brought EndBIM on board. This digital tool allowed the project's complex 3D models of maintainable assets to be displayed on portable devices.

Using a secure web platform linked to O&M documentation, EndBIM enabled the graphical model and all the non-graphical data (i.e. schedules, drawings, H&s files, etc.) to be combined into a data rich digital asset. This provided the Trust's FM team and supply chain with instant access to all information needed to maintain and manage the building in an easy-to-use format.

Discover how we also implemented Modern Methods of Construction (MMC) throughout the Christie in our dedicated MMC brochure.



The Christie Proton Beam Therapy Centre

To discover more of Tilbury Douglas' technical capability, please familiarise yourself with our **Modern Methods of Construction** brochure.





Tilbury Douglas

Tilbury Douglas Construction Limited

30-40 Eastcheap

LONDON

EC3M 1HD