



Business challenge

Buildings can take months to design and years to build, but they will be used for decades. How can architects, builders and operators ensure projects remain sustainable over their entire lifespan?

Transformation

Sixsense and IBM have created Beyond—a platform that combines building information modeling (BIM), 3D mapping and Internet of Things (IoT) technologies to provide new insight across project lifecycles.

Business benefits:

Creates

new ways to collaborate, with end-to-end visibility of project-related data

Enables

companies to share information safely and securely—even if they are competitors

Provides

seamless access to data in the field, anywhere in the world, both online and offline

Sixsense

Mapping out the future of engineering, construction and operations with transformative technology

Sixsense is an international company with expertise in the fields of technical, digital and scientific solutions for the construction, civil engineering and infrastructure management markets. Part of VINCI Group, the world's largest construction company, Sixsense employs 700 people in 20 countries and operates in four major business lines: Engineering, Monitoring, Mapping and Platform Solutions.

"We needed a partner with the global capabilities to deliver a seamless user experience anywhere in the world, with impeccable credentials in security and governance. That's why we chose IBM."

Fabrice Del Aguila
Deputy General Manager
Sixsense

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Groundbreaking achievements

La Défense, in the center of Paris, is one of the world's great engineering showcases, with dozens of spectacular buildings that serve as the headquarters of some of the greatest companies in France. Yet while the district's 19 skyscrapers may be its most eye-catching edifices, perhaps its most impressive engineering feat is taking place 20 meters beneath the surface.

In 2016, work began on building a new train station for La Défense. The site chosen was directly underneath CNIT, one of the largest buildings in the district, which is home to a busy shopping mall with four levels of underground car-parking. VINCI, the constructor on the project, was tasked with excavating and building the new 18,000-square-meter station without disrupting the hundreds of businesses and thousands of shoppers directly overhead.

Fabrice Del Aguila, Deputy General Manager at Sixense, a subsidiary of VINCI Group, recalls: "The engineering, construction and operations [EC&O] industry today is crazy. It's magic. VINCI's engineers have kept the CNIT mall floating in the air for four years while they build a train station underneath it. Meanwhile, Sixense has been providing monitoring, using real-time sensors on the foundations to check that the structure remains secure. That's the kind of project that really inspires people, because it shows that it is possible to change the world with groundbreaking construction.

"But the strange thing is, even though we can achieve so much, the processes and tools that EC&O companies use are still very primitive. Information is siloed in different systems owned by different teams, and none of the stakeholders has a complete view of the history or status of a project. And at every stage from design through construction to operation, important information gets lost."

Sixense is in a perfect position to understand the complexities of the problem. Its four business units have historically focused on developing technologies to support multiple different aspects of the EC&O lifecycle—from Internet of Things (IoT) sensors to monitor the integrity of the ceiling above a tunneling machine, to three-dimensional LIDAR mapping that helps architects understand the lay of the land when designing a new bridge or highway.

"We asked ourselves, what if we could bring all these powerful technologies together into a single platform?" reflects Mr. Del Aguila. "We realized that if we could bring all the data together and visualize it in a coherent way, we could completely transform the way the EC&O industry operates."

Building a partnership to realize the vision

To turn its vision into reality, Sixense embarked on an ambitious project to develop a new comprehensive

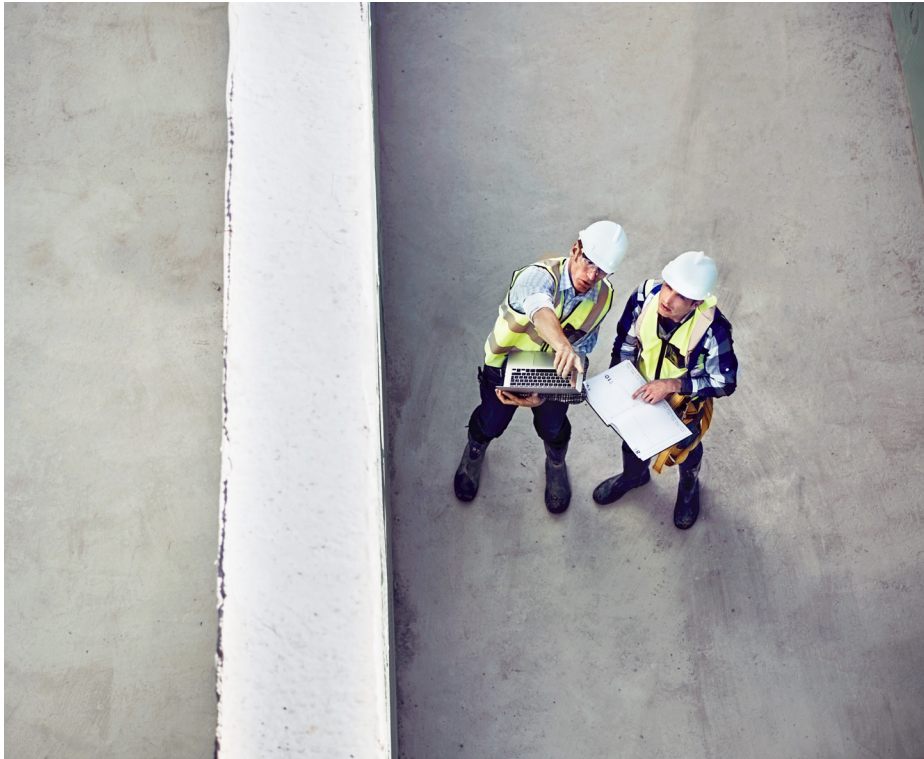


platform for the EC&O industry, codenamed "Beyond". To deliver the Beyond platform, the company had to solve a complex set of technical and organizational challenges.

For starters, construction projects can take place in remote areas, in all weather conditions, and even underground. To give people access to the information they need while they are working on site, the new platform would have to deal flawlessly with situations where connectivity was limited, unreliable, or even non-existent. Since building sites are hazardous places to work, the interface had to be simple to allow users to focus

on their work and not get distracted or put themselves at risk. And because projects can take place anywhere in the world, the platform needed to guarantee a responsive user experience regardless of location.

Moreover, EC&O companies operate in an environment of co-opetition; many different companies may work together on one project, while simultaneously competing with each other to win other contracts. The element of competition means that companies are extremely protective of their own data and wary of sharing potentially sensitive information with their rivals. Sixense knew that its



platform would only succeed if EC&O companies outside the VINCI Group could trust that their data would be safe and secure.

“The reality was that this was a project we couldn’t deliver on our own,” says Mr. Del Aguila. “We needed a partner with the global capabilities to deliver a seamless user experience anywhere in the world. And we needed a third party with impeccable credentials in security and governance to give our clients the confidence that their data would be safe. That’s why we chose IBM.”

To deliver the new platform, IBM® Services™ and Sixense formed a joint team which currently comprises around 60 full-time developers divided between the company’s headquarters in Paris and the IBM Client Innovation Center (CIC) in Lille. The team has adopted a fully agile development model, delivering new features in short sprints, gaining feedback from the business, and then enhancing the software iteratively.

To set the overall goals and roadmap for the new solution, the team used IBM Design Thinking principles, which helped to identify the key features needed

for a minimum viable product and design a technical architecture capable not only of proving the concept, but also ramping up to enterprise scale.

The Beyond platform will run in a multicloud context, using a containerized, microservices-based architecture running on IBM Cloud™ Kubernetes Service. The ambition is to orchestrate the different components across both IBM Cloud and third-party public cloud platforms, providing local access to Beyond services for users around the globe.

Beyond will also use IBM Cloud Object Storage to host the vast quantities of building information modeling (BIM) data that modern construction projects generate, and IBM Cloud Databases for MongoDB to provide a fully managed, massively scalable database that is flexible enough to handle semi-structured data in a variety of formats. To give users rapid access to project-related data, wherever they are working, IBM Aspera® will provide high-speed file transfer and data streaming, across any distance, worldwide.

“In a very short time, we’ve built a very strong relationship with the IBM team,” says Mr. Del Aguila. “In fact, it’s so seamless that it can be difficult to tell who works for Sixense and who works for IBM. As a relatively small organization at the beginning of a big adventure, it’s a real advantage to have the flexibility to scale our resources to balance the workload and always have the right expertise on hand.”

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Fabrice Del Aguila, Deputy General Manager, Sixense

He adds: “Having access to IBM’s labs is a major bonus. We are able to work with very highly skilled people at IBM to test new ideas and collaborate with our clients to run experimental projects and proofs-of-concept. That’s the difference between hiring a local software development company and partnering with IBM. Engaging with IBM gives you much more than just development resources; they help you think outside the roadmap and stay ahead of the curve.”

Transforming construction

Working with IBM, Sixense has already established the foundations of the new cloud architecture for Beyond, and is now starting to work with clients to build out the first use cases for the platform. Instead of requiring companies to rip-and-replace their existing systems, Beyond will act as an integration layer, using APIs to flow data from legacy source systems into a new central cloud repository. Once the data is available, Beyond will then empower users to interact with it in entirely new ways—for

example, combining mapping and 3D modeling data to create a perfect virtual replica of each project site and enabling all stakeholders to gain a complete, 360-degree view of progress.

“It’s the most inspiring project I have worked on in my career,” says Mr. Del Aguila. “Imagine being able to visualize all the thousands of facets of a major engineering project in one place. Instead of everyone just seeing their own little piece of the puzzle, all project participants will be able to see the big picture and understand the logic of what they’re doing. That’s going to be completely transformative, not only in

terms of making better decisions during construction, but also because it will capture the data behind those decisions for reference throughout the operational life of the building.”

He concludes: “Our partnership with IBM is helping Sixense move beyond today’s realities and envision a new future for the EC&O industry. With the IBM Cloud, we can spin up a new service almost anywhere in the world with just a few mouse-clicks, so we can give architects, engineers, construction teams and facilities managers the data they need to think smarter and work more safely on projects around the globe.”

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Fabrice Del Aguila, Deputy General Manager,
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Solution components

- IBM® Services™ - Cloud Application Innovation
- IBM Client Innovation Center France
- IBM Aspera®
- IBM Cloud™
- IBM Cloud Databases for MongoDB
- IBM Cloud Kubernetes Service
- IBM Cloud Object Storage
- IBM Design Thinking

Take the next step

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