

BIM AND DIGITALIZATION: HOW TO CONVERT THESE CHALLENGES IN GREAT CHANCES FOR PRECAST CONCRETE INDUSTRY

Alejandro López Vidal – Technical Director ANDECE



¿ANDECE?

- Spanish Precast Concrete Association
- Founded in 1964
- + de 100 precast producers de PH (70% of Spanish industry) & 20 ad-members (materials and services suppliers)
- BIBM members amongst other important construction federations
- **Main goal: to ease the labor of our members and help them to improve their competitiveness within a very shifting context**



Arising construction challenges

rebuildexpo.com/retos-sector-construccion-nueva-decada/



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10+1 challenges of the construction sector for the new decade



- 1) **SDG's** in building
- 2) Construction for **health**
- 3) Industrialize to be more effective
- 4) Urban agenda
- 5) Collaborative construction
- 6) Need to **digitize**
- 7) **Digital Twin** in construction
- 8) Towards a New Building Code and a New Contracting Law
- 9) Advanced financing mechanisms, housing use models
- 10) **Decarbonization** of construction and **circular economy**
- 10+1) Training for the new construction

Arising construction challenges

9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE

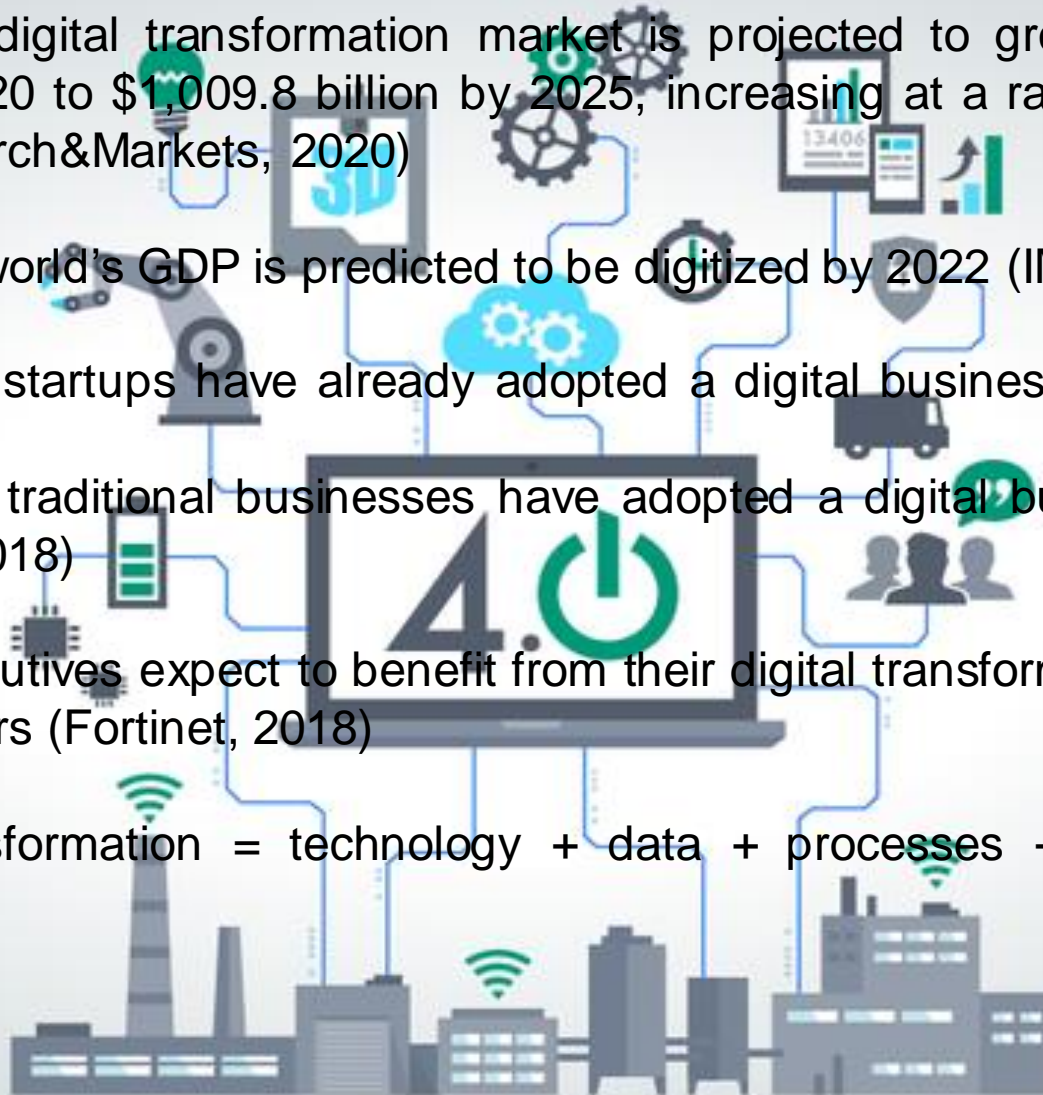


**Build resilient
infrastructure, promote
inclusive and sustainable
industrialization and
foster innovation**

Digitalization + **Sustainability** = ¿Industrialization?

Digital transformation figures

- The global digital transformation market is projected to grow from \$469.8 billion in 2020 to \$1,009.8 billion by 2025, increasing at a rate of 16.5% per year (Research&Markets, 2020)
- 65% of the world's GDP is predicted to be digitized by 2022 (IMF, 2020)
 - 55% of startups have already adopted a digital business strategy (IDC, 2018)
 - 38% of traditional businesses have adopted a digital business strategy (IDC, 2018)
- 39% of executives expect to benefit from their digital transformation initiatives in 3 to 5 years (Fortinet, 2018)
- Digital transformation = technology + data + processes + organizational change

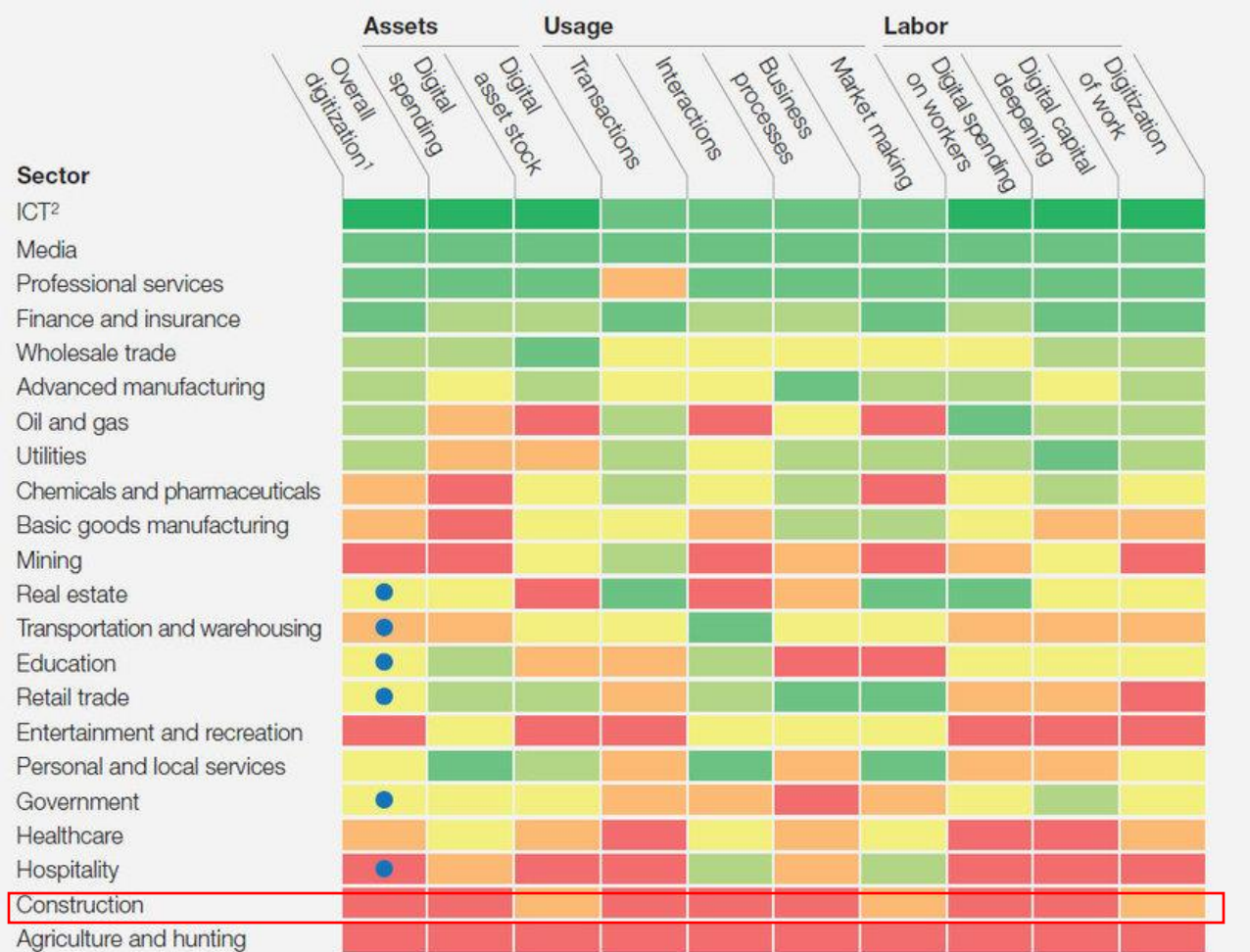


Where we are?

McKinsey Global Institute industry digitization index;
2015 or latest available data

Relatively low digitization  Relatively high digitization

● Digital leaders within relatively undigitized sectors



Source: McKinsey Global Institute. Industry digitalization index, 2016

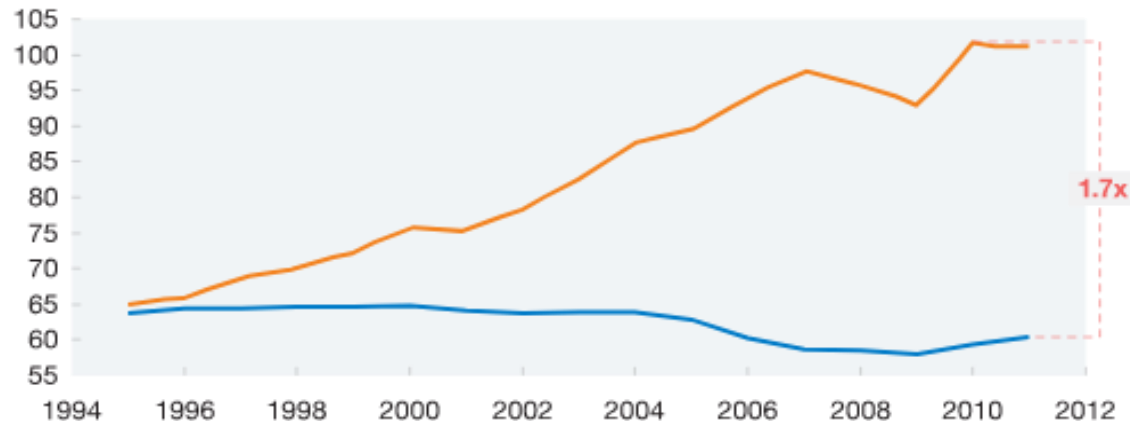
Construction productivity

Productivity in manufacturing has nearly doubled, whereas in construction it has remained flat.

Overview of productivity improvement over time

Productivity (value added per worker), real, \$ 2005

\$ thousand per worker



Source: Expert interviews; IHS Global Insight (Belgium, France, Germany, Italy, Spain, United Kingdom, United States); World Input-Output Database

McKinsey&Company

At least 20% is waste

- ~10% materials are wasted
- ~30% of construction is rework
- ~40% of jobsite work is unproductive
- ~40% of projects are over budget
- ~90% of projects are late

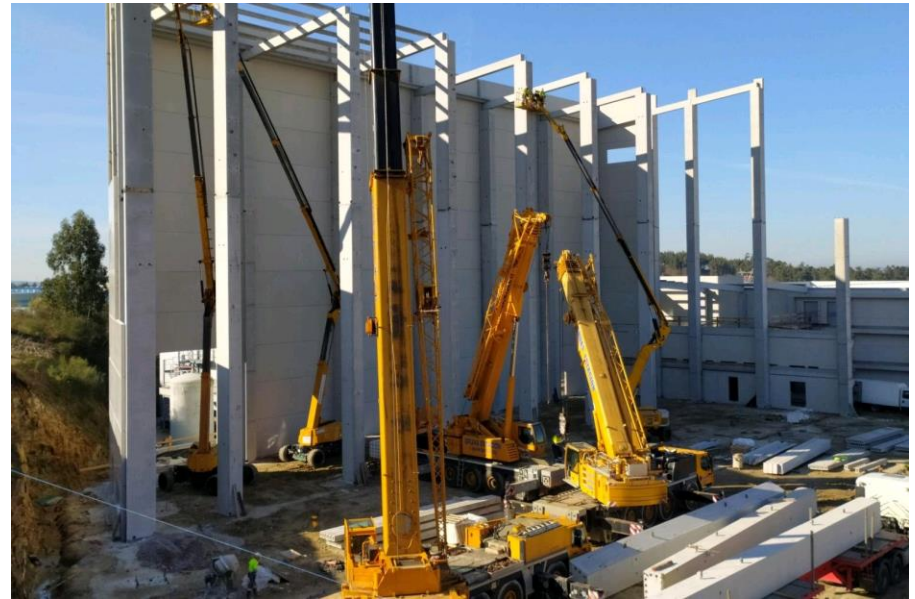


Mostly due to ineffective communication, planning and collaboration

On-site (conventional) vs Off-site (industrialized)



≠



- Predictable physical activities, for which it is easy to establish a typified procedure, and which occur in a controlled environment (e.g. precast products manufactured in an industrial plant) are highly automatable.
- The activities carried out on the site or plot on which it is built, to which a large percentage of time is currently dedicated, have a medium-low potential.
- Those that involve responsibility or applying experience to solve unexpected situations, quite typical for example in the rehabilitation works of buildings of a certain age, are not very automatable.

On-site (conventional) vs Off-site (industrialized)



≠



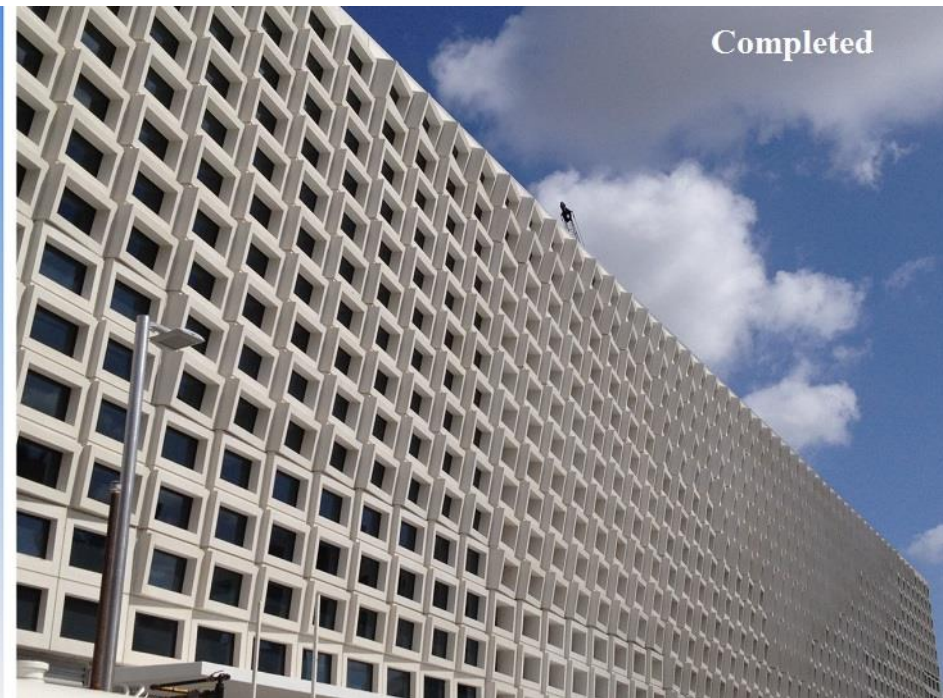
- Predictable physical activities, for which it is easy to establish a typified procedure, and which occur in a controlled environment (e.g. **precast products** manufactured in an industrial plant) **are highly automatable**.
- The **activities carried out on the site** or plot on which it is built, to which a large percentage of time is currently dedicated, **have a low potential**.
- Those that involve responsibility or applying experience to solve unexpected situations, quite typical for example in the rehabilitation works of buildings of a certain age, are not very automatable.

Shaping the Future of Construction



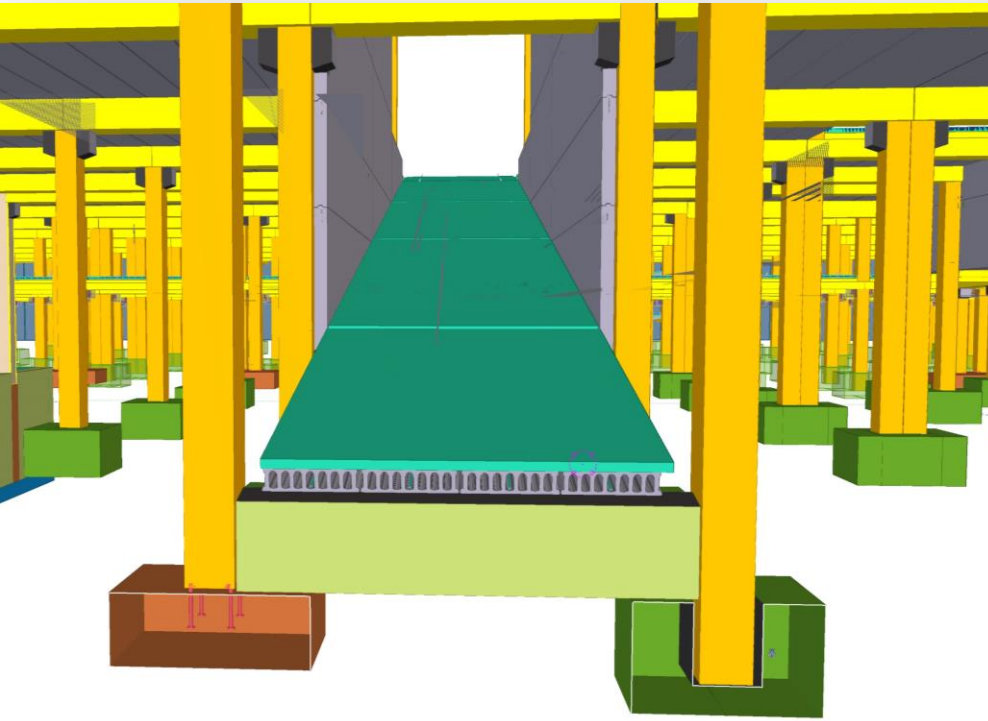
Source: World Economic Forum. 2016

BIM as approach



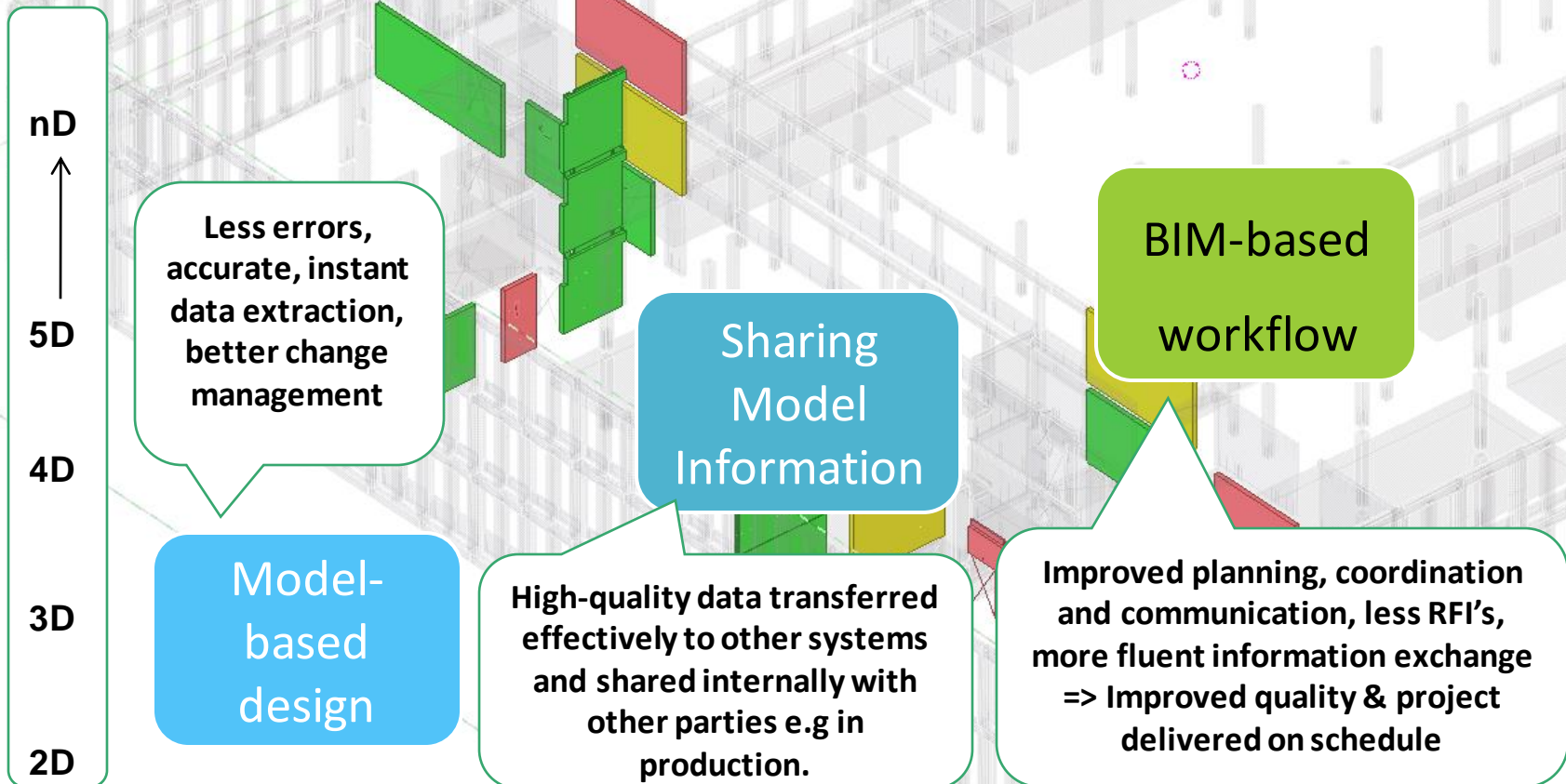
- Use of a shared digital representation of a (construction) asset to facilitate design, construction and operation processes, and provide a reliable basis for decision-making from 2D to 3D (→ 4D ... 7D), from drawings to digital models: lines → volumes with information
- It offers a better follow-up in the elaboration, execution and maintenance of a project, avoiding risks and inconsistencies in design and documentation generated

BIM as approach



- Change of approach: traditional (tasks and responsibilities are diluted) to much more technical one (work = project), with technology support
- Designed mainly for buildings (↑ number of components, ↑ risks of collisions, ↑ diversity of stakeholders) rather than for infrastructures

Towards BIM-based workflow



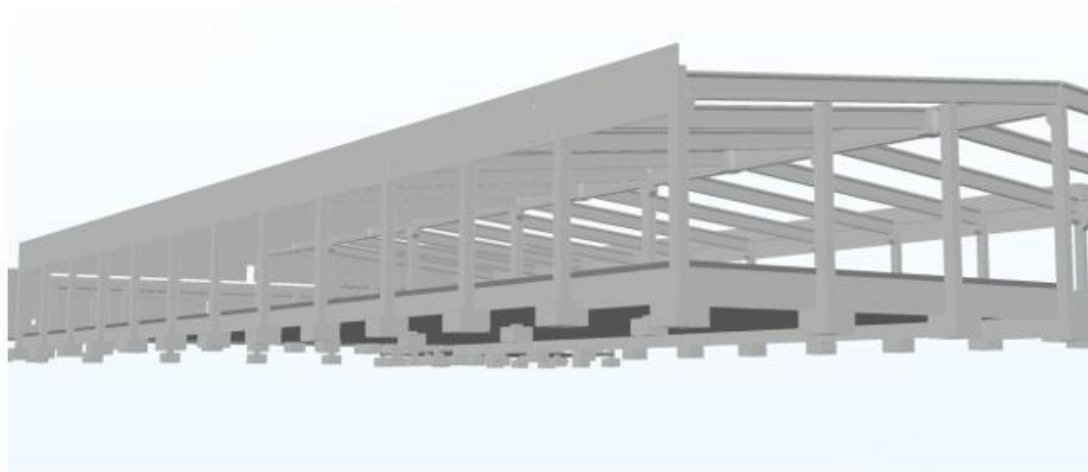
The importance of software to be selected

- Choose the software best suited for the purpose (material, type of construction, systems to be modelled...)
- Freedom to transfer data between different tools (interoperability with clients/designers softwares)
- Return of investment
 - Software/s (licenses)
 - Training
 - Period to get the maximum profit from use of software



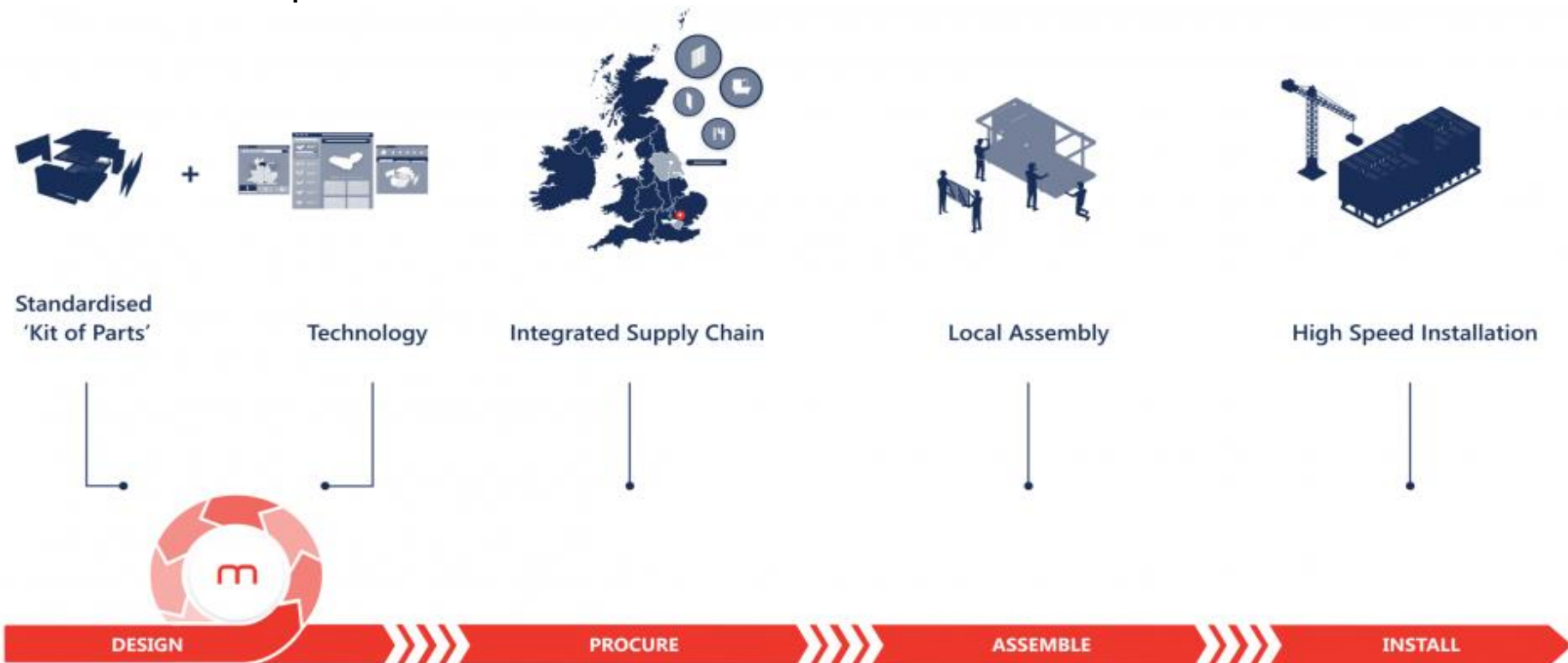
Prescription (from design): only precast parts

- It also permits to look earlier the final appearance of the real work as a way to convince other agents (developers, architects, builders...) about the constructive solution (in favour of industrialization)



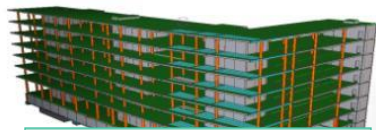
Prescription (from design): the whole “package”

- Boosting networks of different manufacturers to produce the parts kit rather than building dedicated factories unlocks the scalability and digitization of the parts kit and allows generative design software to quickly repeat comparable solutions, freeing architects to focus on the value-added aspects of their creative input

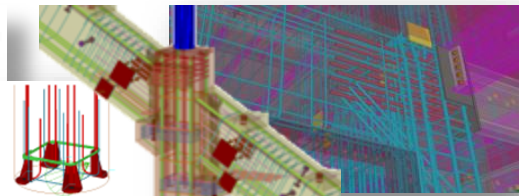


Source: MODULOUS

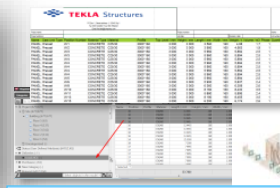
Minimize costly surprises and rework, enhance information transfer and coordination



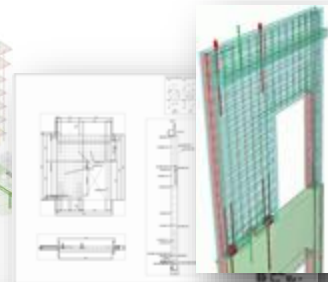
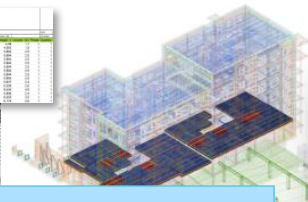
Value engineering,
Estimation qty's,
3D visualizations & 4D
animations



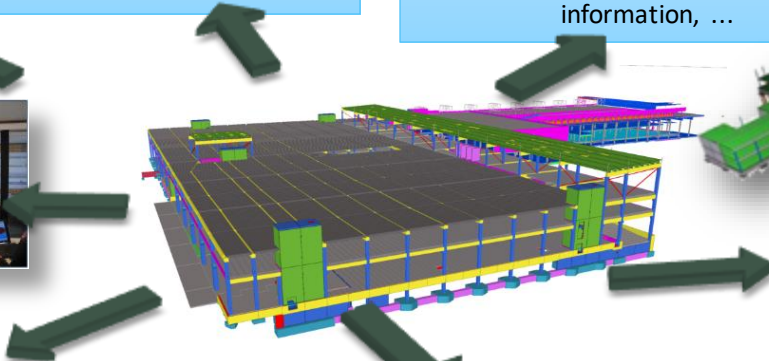
Intelligent detailed connections,
reinforcements, embeds



Quantity, geometry, material, weight,
location, attributes, process
information, ...



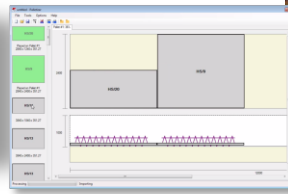
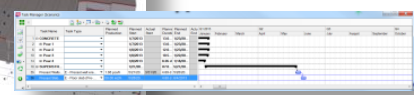
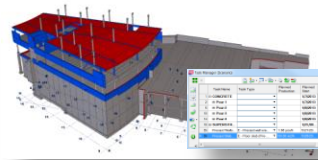
GA and fabrication drawings,
reports and bending schedules,
3D visualization



Project progress follow-up,
coordination & communication

Erection planning and sequencing
Delivery sets and scheduling

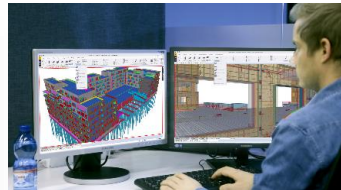
Data for production
planning & management,
output to ERP- and CAM-solutions



Model-based working supports users through the fabrication process



Estimator,
Sales manager



Detailer, Drafter

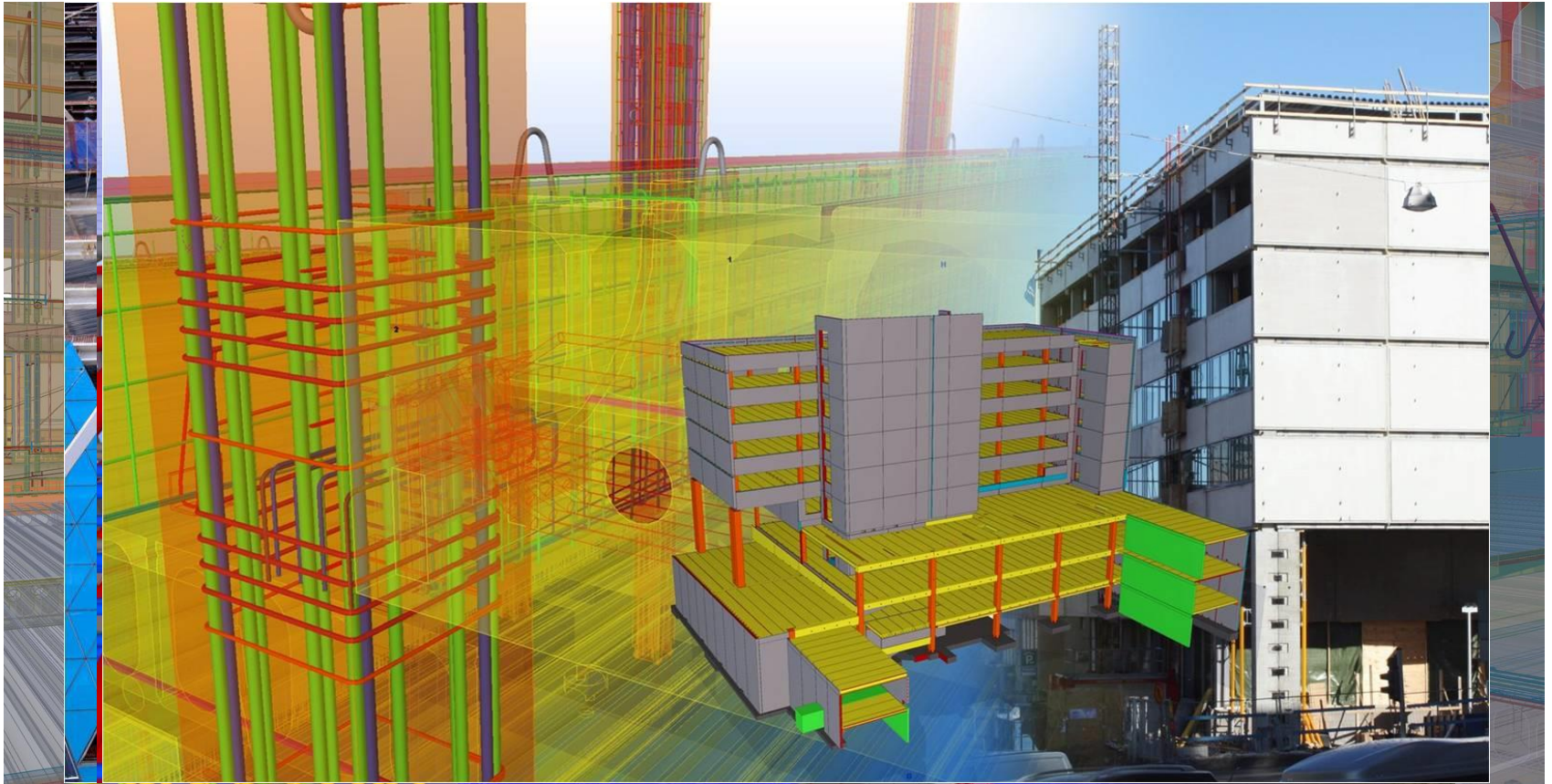


Production Planner,
Purchaser
Delivery coordinator



Installation
manager/
coordinator

Constructible (fabricable) models



Source: TEKLA

Our role as (just?) products suppliers

(EN 13369) Product made of concrete and manufactured according to a specific standard, in a place other than its final location of use, protected from adverse environmental conditions during manufacturing and which is the result of an industrial process under a factory production control system, with the possibility of shortening delivery times



Information control along all the construction stages

(EN 13369) Product made of concrete and manufactured according to a specific standard, in a place other than its final location of use, protected from adverse environmental conditions during manufacturing and which is the result of an industrial process under a factory production control system, with the possibility of shortening delivery times



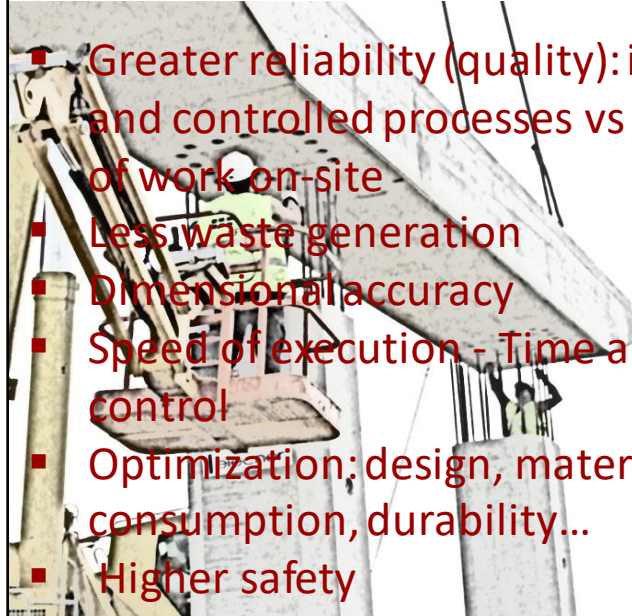
Precast + concrete = industrialization

CONCRETE (AS MATERIAL)



- Structural capacity
- Fire resistance
- Acoustics
- Energetics (thermal inertia)
- Recyclability
- Room for improvement (R+D+i) → new features (decontamination...)

PRECAST (AS TECHNOLOGY)

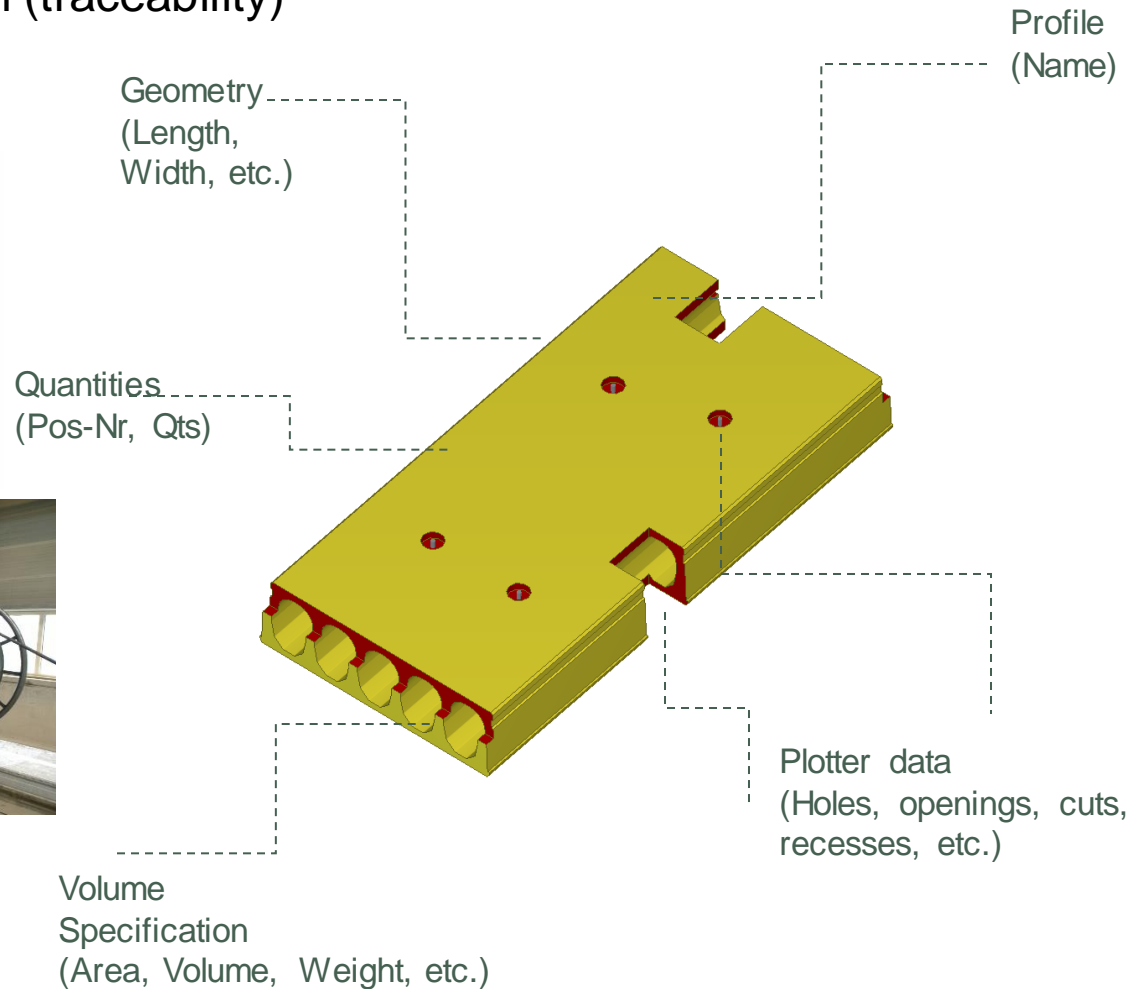
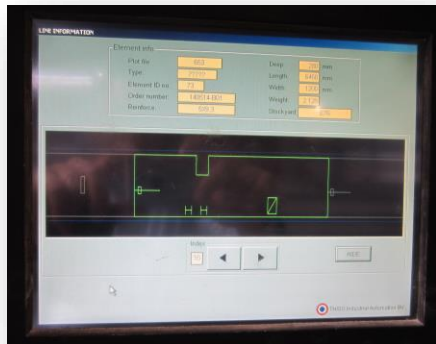


- Greater reliability (quality): industrial and controlled processes vs uncertainty of work on-site
- Less waste generation
- Dimensional accuracy
- Speed of execution - Time and cost control
- Optimization: design, material consumption, durability...
- Higher safety

Sustainability + **Digitalization** = ¿Industrialization?

Efficient production

- Complete description of every precast element and its history from 3D model design to dispatch (traceability)



Efficient production / logistics

- Track/moulds management according to truck load planning

Bed layout, productionbin: main

Bed number 1 of 3

Bed number : 1
 Bed length : 175,000 m
 Slab type : WT1250
 Slab position : 8
 Strand top : ---
 Strand bot1 : 33 - 5,0
 Strand bot2 : ---
 Number of slabs : 30
 Narrow slabs : 15
 Lifting hooks : 0

Slab Id.no. 2008

Job number : **H755460-002**
 Mark : 2008
 Length : 1980 mm
 Width : 350 mm
 Area : 0,66 m2
 Strand top : ---
 Strand bottom 1 : 14 - 5,0
 Strand bottom 2 : ---
 Load number : ---
 Door number : 0

Bed information

Total area : 210,00 m2
 Area in use : 172,20 m2
 Area lost : 37,80 m2
 Area in use : 82 %
 Area lost : 18 %
 Bed length : 175,000 m
 Length in use : 170,436 m
 Bed remaining : 4,564 m

Add unsigned slab

Add/change doors

OK

Temporary bin

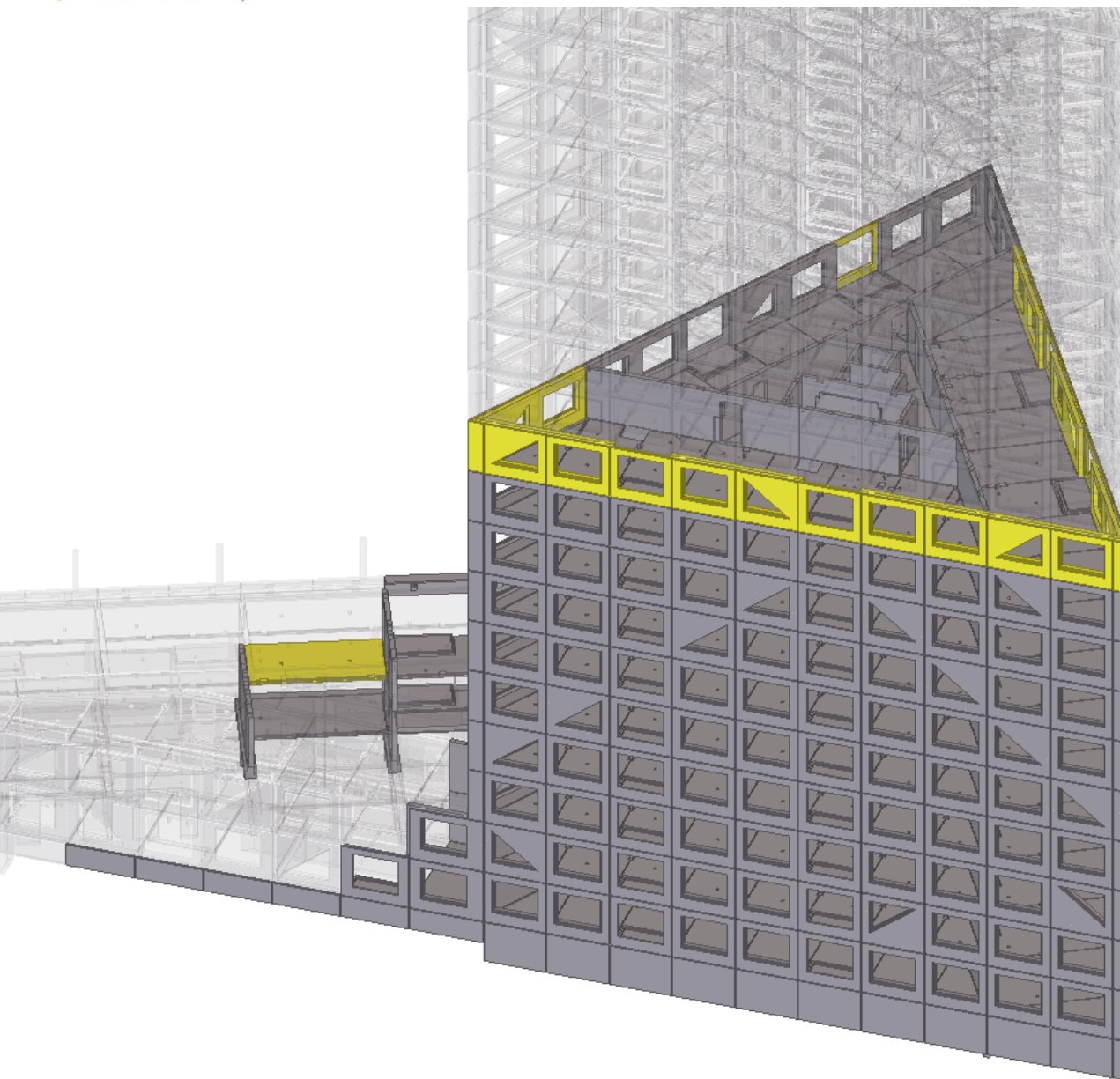
Projectnumber	Slabid.	Mark	Length	Width	Load/layer

Main bin

Projectnumber	Slabid.	Mark	Length	Width	Load/layer
H601229-005	5001	5001	6905	1200	500
H601229-005	5002	5002	6905	600	500
H601229-005	5003	5003	6905	1200	500
H601229-005	5004	5004	6905	1200	500
H601229-005	5005	5005	6905	1200	500
H601229-005	5006	5006	6905	1200	500
H601229-005	5007	5007	6905	1200	500

Sort on slab id. Sort on mark Sort on load no.

Efficient execution



Weergave Project Status

Opslaan Laad standard Opslaan als standard

Herzien
Datum herzien: 31.03.2014

Stap terug of vooruit:
<< >> 1 dag(en)

Of selecteer een datum op de tijdschuif:

Schaal start: 01.08.2010 Schaal eind: 30.09.2010

Object weergave: 4D_Montage Bewerken...

☒ Automatisch venster verversen

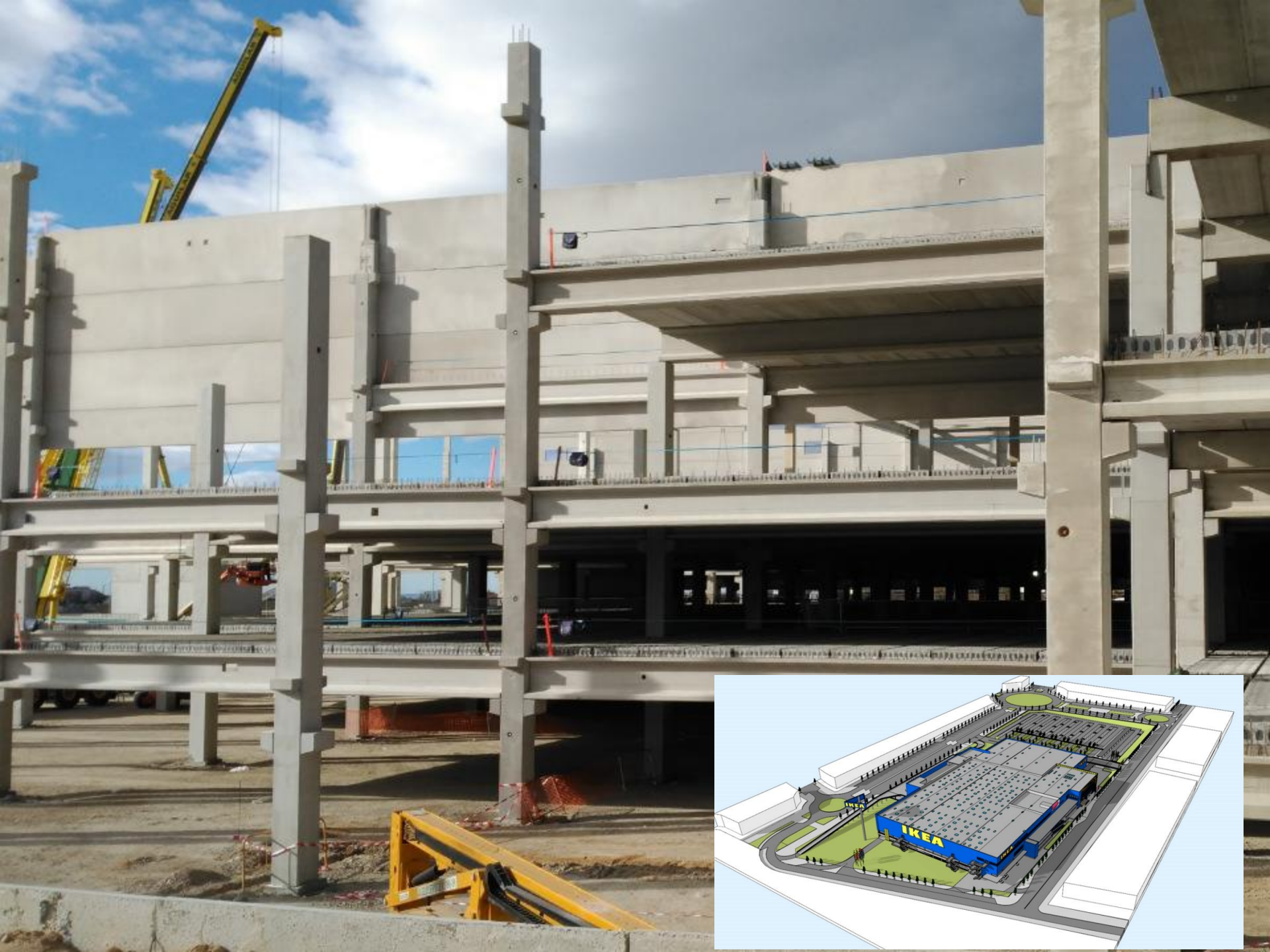
Rapportage
☐ Maak lijst

Lijst ☒ Laatste tijd stap ☐ Project status herzien datum

Report template: BM-lijst

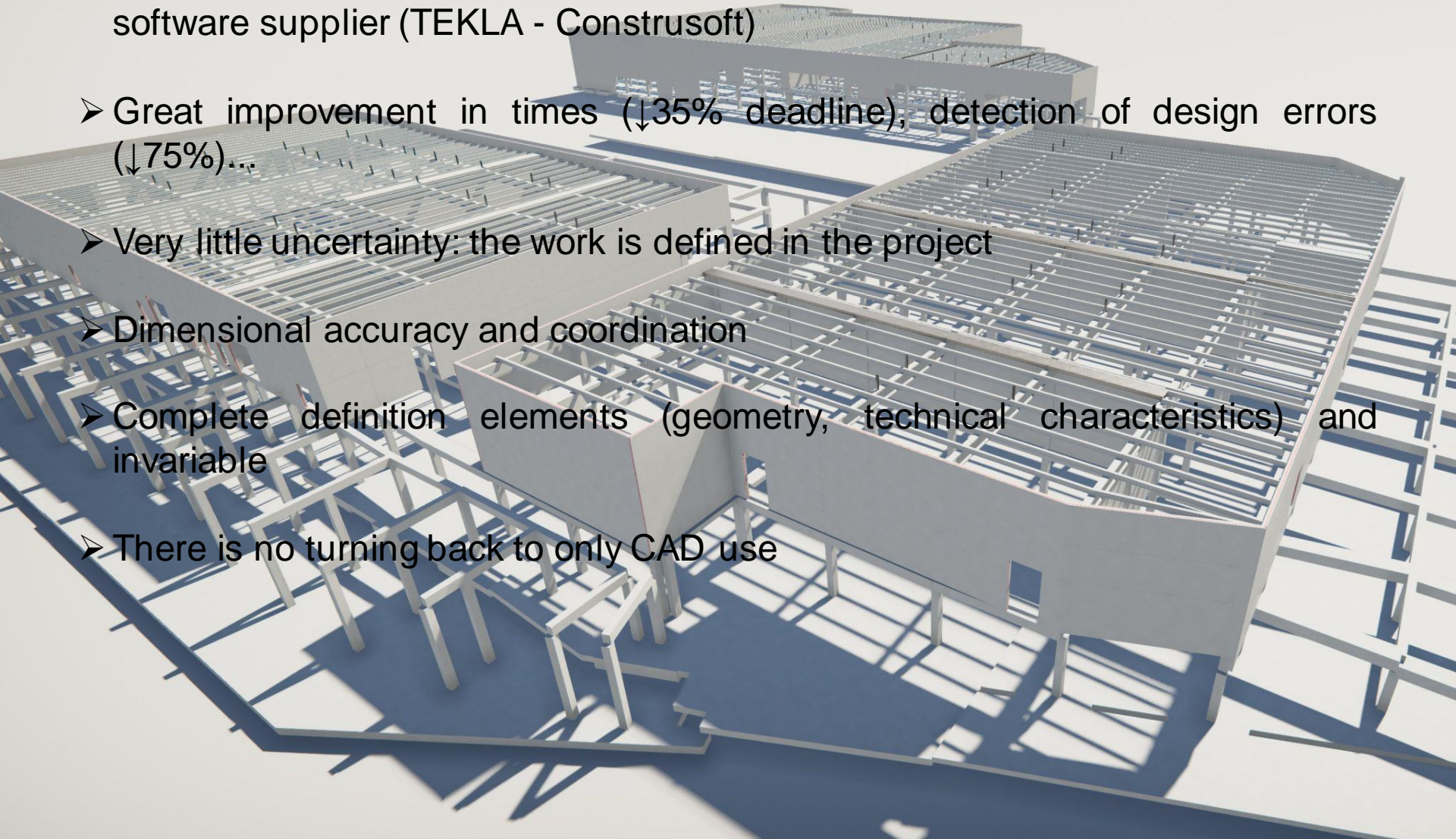
Verversen Sluiten





Advantages from the beginning

- Enhance the collaboration between the precaster (Engineering Role) with software supplier (TEKLA - Construsoft)
- Great improvement in times (↓35% deadline), detection of design errors (↓75%)...
- Very little uncertainty: the work is defined in the project
- Dimensional accuracy and coordination
- Complete definition elements (geometry, technical characteristics) and invariable
- There is no turning back to only CAD use



Global efficiency



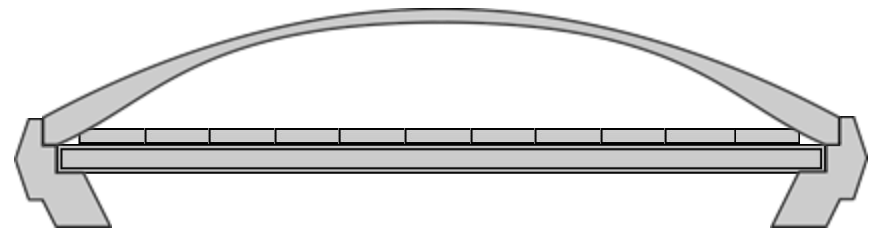
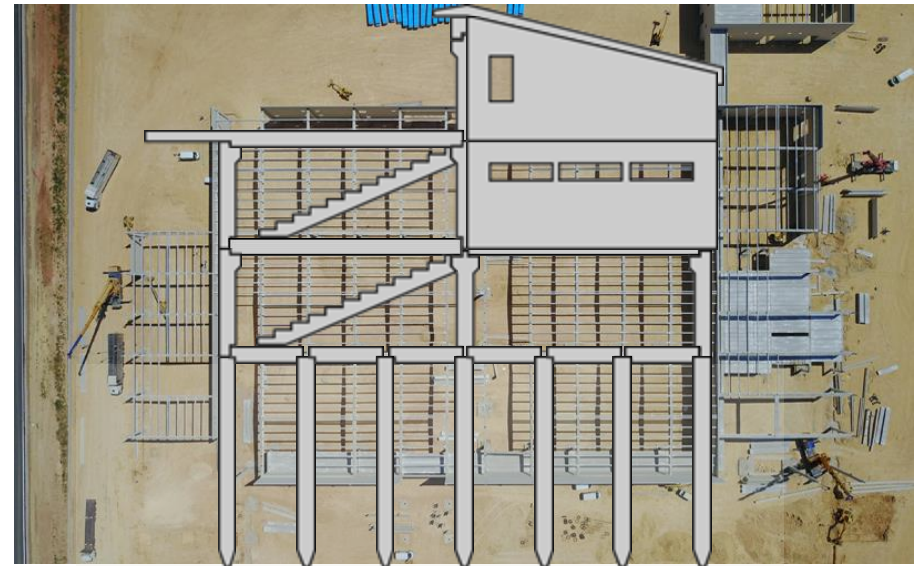
Digital strategy for the precasters (1) BIM



- Is BIM necessary? Do my clients request me the use of BIM? Is it or not mandatory within the region/works/projects where I perform?
- Will it allow me to be more competitive/efficient?
- How many resources will I have to invest?
 - ✓ Software/s licenses
 - ✓ Training
 - ✓ Digitization of portfolio
 - Internal or external development
 - Amount of data (LOD)
 - Just website and/or BIM objects platforms

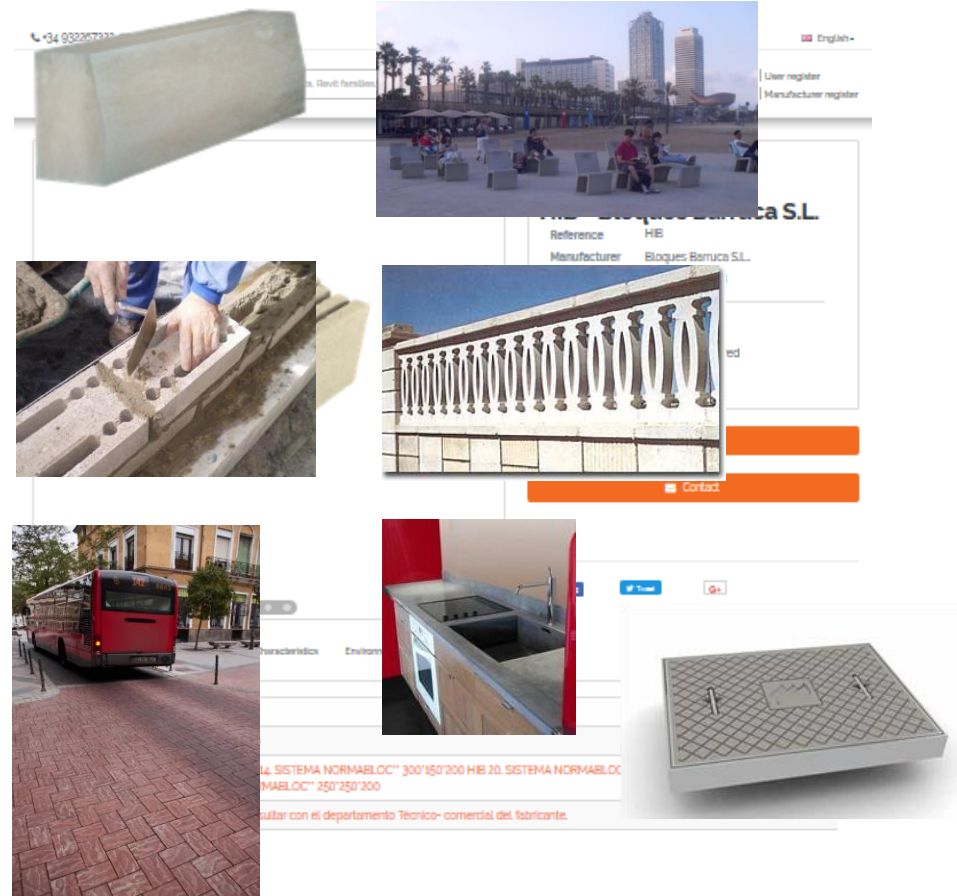
Degree of implementation/interest (1)

- Structural elements for buildings and civil works → More industrialized process
- Reinforced and prestressed concrete elements (use of steel)
- Medium and big enterprises, able to participate on design decisions
- Each company has their own designs (moulds, software)
- Technical characteristics ≈ harmonized standards under M/100
- Advanced BIM by both external demand and internal efficiency (design → production → installation)



Degree of implementation/interest (2)

- Non structural elements (very standardized elements) → Lack of industrialization (very dependent of the execution itself)
- Precasters: small and médium enterprises, generally no intervening on design decisions and final execution
- Technical characteristics ≈ harmonized standards under different mandates
- Small/medium adaptation to BIM
- Brand strategy



What could we do from ANDECE?

Design

Analysis

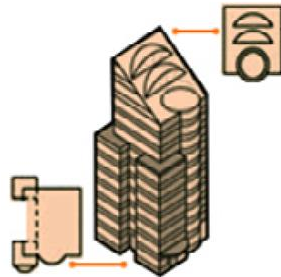
Documents

Construction

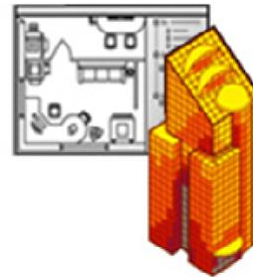
Management



LOD 100



LOD 200



LOD 300



LOD 400



LOD 500

**Generic
content**

**Generic
content**

**Brand
content**

**Brand
content**

**Brand
content**

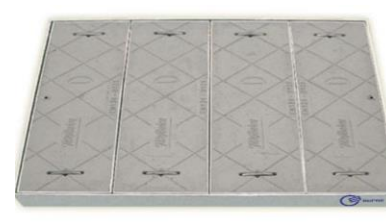
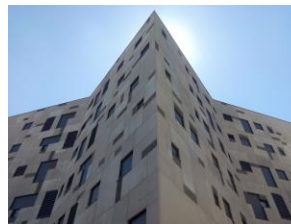
**Brand
content**

**Brand
content**

BIM objects – Generic platform

Selection of representative products → Digitization into BIM files (IFC)

- Paving units
- Blocks
- Beam and block floor systems
- Bridge girders
- Furniture
- Hollow core slabs
- Poles
- Pipes
- Wall elements
- Railway sleepers
- ...41 precast products



BIM platform 1 (BIMETICA)

Bimetica x ANDECE Prefabricados de hormigón x +

bimetica.com/ficha_fabricante.php?bimfab=207&lang=es

+34 932267322 info@bimetica.com Nosotros Noticias FAQ Español

Bimetica
BIM es tu lado

Primera plataforma internacional de objetos BIM de Calidad

Descarga Objetos BIM Gratis...

17428 Archivos BIM - 412 Fabricantes - 175 Categorías

Mostrando 1 - 41 de 41 resultados.

Categorías



















Países de venta

Objetos estandarizados

Reset

Solicitud de objeto BIM

Estándar GDO-BIM

 ANDECE Viga delta	 ANDECE Viga jácena rectangular	 ANDECE Viga jácena en T	 ANDECE Viga Genérica doble T para puentes	 ANDECE Pilar cuadrado	 ANDECE Pilar prefabricado de hormigón de sección circular	 ANDECE Pilote de cimentación cuadrado	 ANDECE Escalera prefabricada de hormigón	 ANDECE Correa tubular
 ANDECE Placa Alveolar de Hormigón Prefabricado	 ANDECE Prelosa Genérica Prefabricada Hormigón Pretensado	 ANDECE Losa de hormigón pretensada maciza de 80...	 ANDECE Vigueta prefabricada de hormigón pretensada	 ANDECE Bovedilla de hormigón	 ANDECE Casetón de hormigón	 ANDECE Muro doble para sótanos	 ANDECE Panel arquitectónico autoportante de hormigón...	 ANDECE Panel arquitectónico autoportante de hormigón...

www.andece.org/galeria-genericos-bim-de-andece/

Direct management of BIM precast library

The screenshot shows the 'Editar Perfil de Producto' (Edit Product Profile) page in the Bimetrica application. The page is in Spanish and contains the following sections:

- Datos de producto:** A section with a warning: 'IMPORTANTE: Introduzca la mayor cantidad y calidad de datos en el perfil del producto para mejorar la ratio de descarga. El usuario lo agradecerá.' It includes fields for 'Nombre de producto', 'Referencia', 'Serie', 'Precio', and 'Divisa'.
- Presentación y venta del producto:** A section for 'Descripción' and 'Condiciones generales'.
- Criterios de búsqueda:** A section with 'Tags' and 'Idioma'.
- Características técnicas:** A section with 'Dimensiones: Ancho', 'Alto', 'Profundidad / grosor', 'Unidad', 'Vida útil', and 'Certificados'.
- Características técnicas:** A section with 'Características técnicas' and 'Materiales y acabados'.

The interface also includes a sidebar with navigation options like 'Editar ficha fabricante', 'Panel de producto', 'Crear Perfil Producto', 'BIM Analytics', 'Gestión solicitudes', 'Datos solicitudes', 'Gestión de notificaciones', 'Bimchannel', 'Bimsupport', 'Paraproy', 'Bim Legal', 'Upgrade Plan', and 'Salir'. At the bottom, there are icons for 'Mis Proyectos', 'Contacto', 'Soporne BIM', 'Descargas', 'Presupuesto', 'Otro Archivo BIM', and 'Recomienda'.

➤ Flexibility to define the content structure according to BIM standards and rules → creation of common language of data

➤ Pset:

➤ Geometry (fixed dimensions and open dimensions)

➤ Technical performance (according to harmonized standard) and other data (EPD values...)

➤ Serve of basis files for our precast members (reducing time of development, use the same formats...)

BIM platform 2 (BIM&Object)

bimobject Busca objetos BIM Apps Prensa Info











Q Fabricantes: ANDECE

10 Familias de productos 1 marcas 1,604 descargas

Fabricantes: ANDECE Resetear filtros

Filter products

- Fabricantes (929)
- Tipo de objeto BIM (4)
- Tipos de archivos (1)
- Regiones (3)
- Tipos (1)

 <p>Banco de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Muro de Bloques de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Panel de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Pavimento de Adoquines ANDECE</p> <p>Añadir</p>	 <p>Placa Alveolar de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Poste de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Prelosa de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Traviesa de Hormigón ANDECE</p> <p>Añadir</p>	 <p>Tubo de hincia ANDECE</p> <p>Añadir</p>	 <p>Viga artesa de puente ANDECE</p> <p>Añadir</p>
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www.andece.org/galeria-genericos-bim-de-andece/

Los objetos BIM de Andece

En breve

Objetos BIM (13)

Miembros (5)

Filtros avanzados

Filtrar por criterios














Ordenar por

Ordenar por

Primera publicación

Número

16

 <p>Baldosas de hormigón (sin dimensiones)</p>	 <p>Bordillos de hormigón (sin dimensiones)</p>	 <p>Baldosas de terrazo (sin dimensiones)</p>	 <p>Tuberías de hormigón</p>	 <p>Pretosas de hormigón para forjados</p>
 <p>Banca de hormigón</p>	 <p>Traviesa de hormigón</p>	 <p>Posta de hormigón</p>	 <p>Bloque de hormigón</p>	 <p>Placa alveolar de hormigón pretensado</p>
 <p>Adoquines de hormigón (sin dimensiones)</p>	 <p>Viga artesa de puente</p>	 <p>Bloque de hormigón</p>		

BIM for precast concrete producers

Guías técnicas ANDECE



BIM technical guidance for precast concrete manufacturers

Versión 4 – Septiembre 2020

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Strategy



Embedded sensors: real-time measurement of curing → strength development

- Knowing when heating is required
- Estimation of energy costs
- Customized suggestions for optimization



Source: Maturix is a complete solution for concrete strength monitoring. The sensor solution helps precast concrete plants to optimize processes and work more efficiently. The concrete strength is calculated by taking temperature measurements in the concrete directly

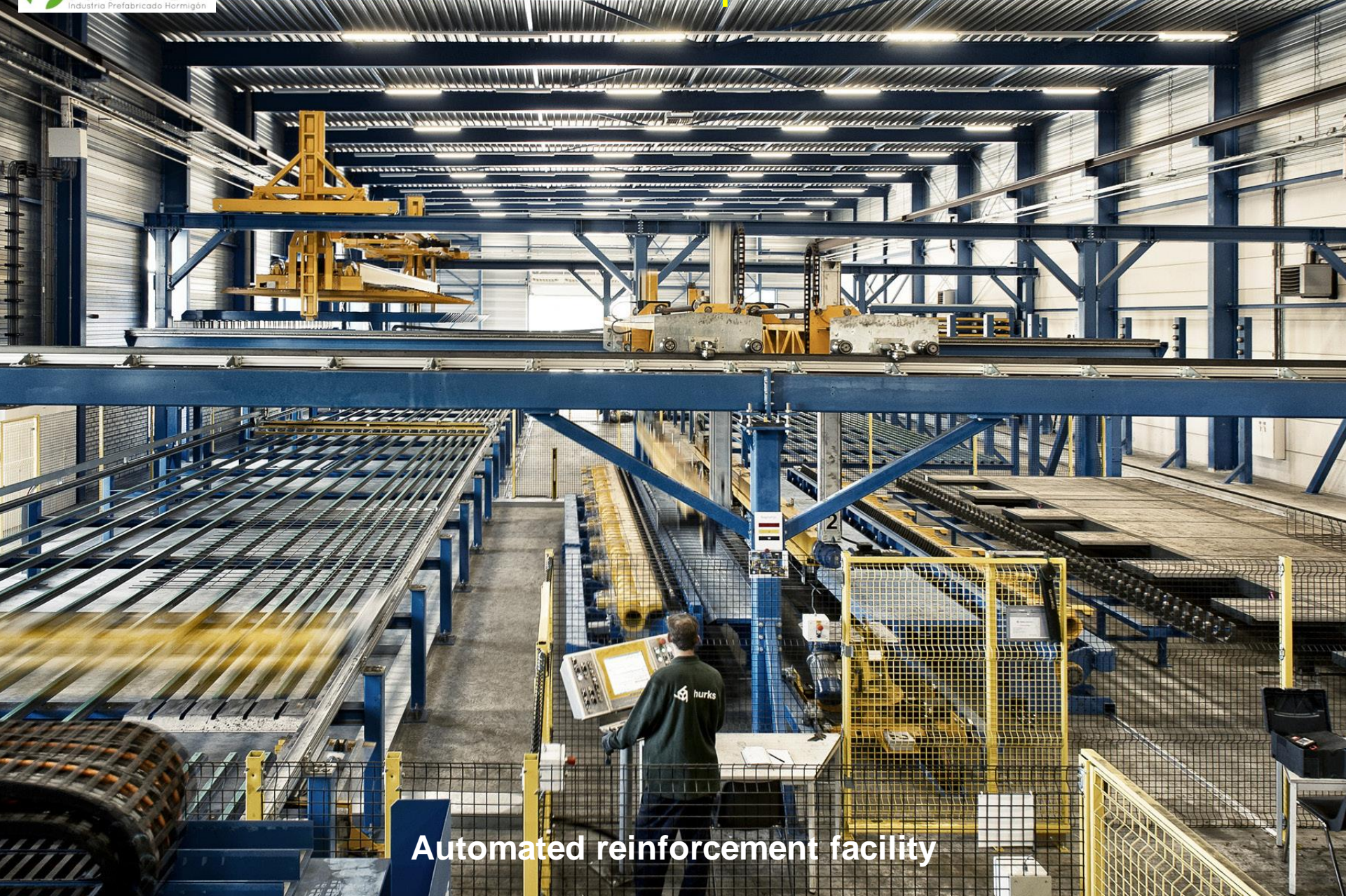
Other kind of technological devices for production machinery, to increase efficiency and safety within the precast plants



Source: BIANCHI. Backeye (R) 360 is a camera with 360° vision all around the vehicle that uses appropriate software to process the images from the four ultra-wide-angle cameras into a single image, combine and display them in real time on the monitor in the driver's cab



Source: TECNALIA



Automated reinforcement facility

Virtual factory



Source: Digital Twin of the RECENSE factory which produces metallic elements (fixings, connections,...) for precast concrete elements



Source: First pedestrian bridge made of 7 precast concrete pieces 3D printed. ACCIONA, Alcobendas (Madrid). 2016

Augmented reality



Source: Apps like Morpholio AR Sketchwalk allows us to implant our 3D model of the building on its real location and tour it virtually, from our mobile or tablet, or using virtual reality glasses. It even allows to raise the walls of the internal divisions, for a greater understanding of the space.

Opinión

A FONDO >

Cloud is made of concrete

El mundo digital está reorganizando y ampliando el mundo físico, no sustituyéndolo. Atender solo a los cambios online es ir al teatro a ver el telón

5D

ANICETO
ZARAGOZA

- Increasing of e-commerce (+400% online purchases for the last 7 years) → Logistic buildings → Total precast concrete buildings



↑↑ Digitalization ↔ ↑↑ Precast concrete

- Increasing of e-commerce → Logistic buildings → Total precast concrete buildings
- Teleworking → Second homes out of cities, new nearby facilities

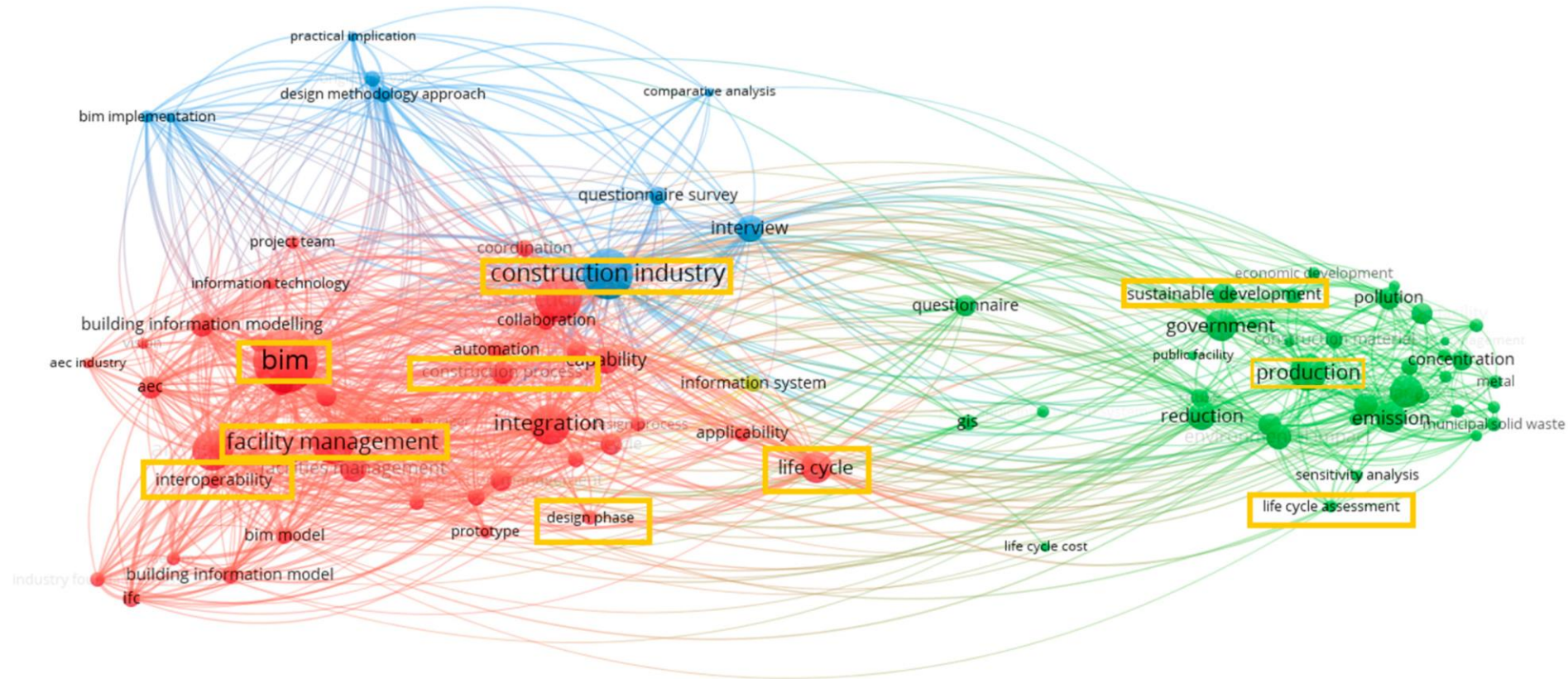


↑↑ Digitalization ↔ ↑↑ Precast concrete

- Increasing of e-commerce → Logistic buildings → Total precast concrete buildings
- Teleworking → Second homes out of cities
- New energy infrastructures



Arising construction challenges



Digitalization + Sustainability = Industrialization

< Previous Next >

Digital and green transformation at the core of new partnership between Cobuilder, IFS and GS1

Posted by Vessela Kodjeykova-Merriman

Published on October 25, 2021 | Modified on October 28, 2021

Cobuilder, IFS and GS1 have joined forces in a pilot project that seeks to demonstrate the benefits of standards-based data sharing throughout all phases of construction and asset lifecycle management.

By working together, the three organisations are combining their expertise to deliver a proof-of-concept for a complete solution that enables the free flow of trusted

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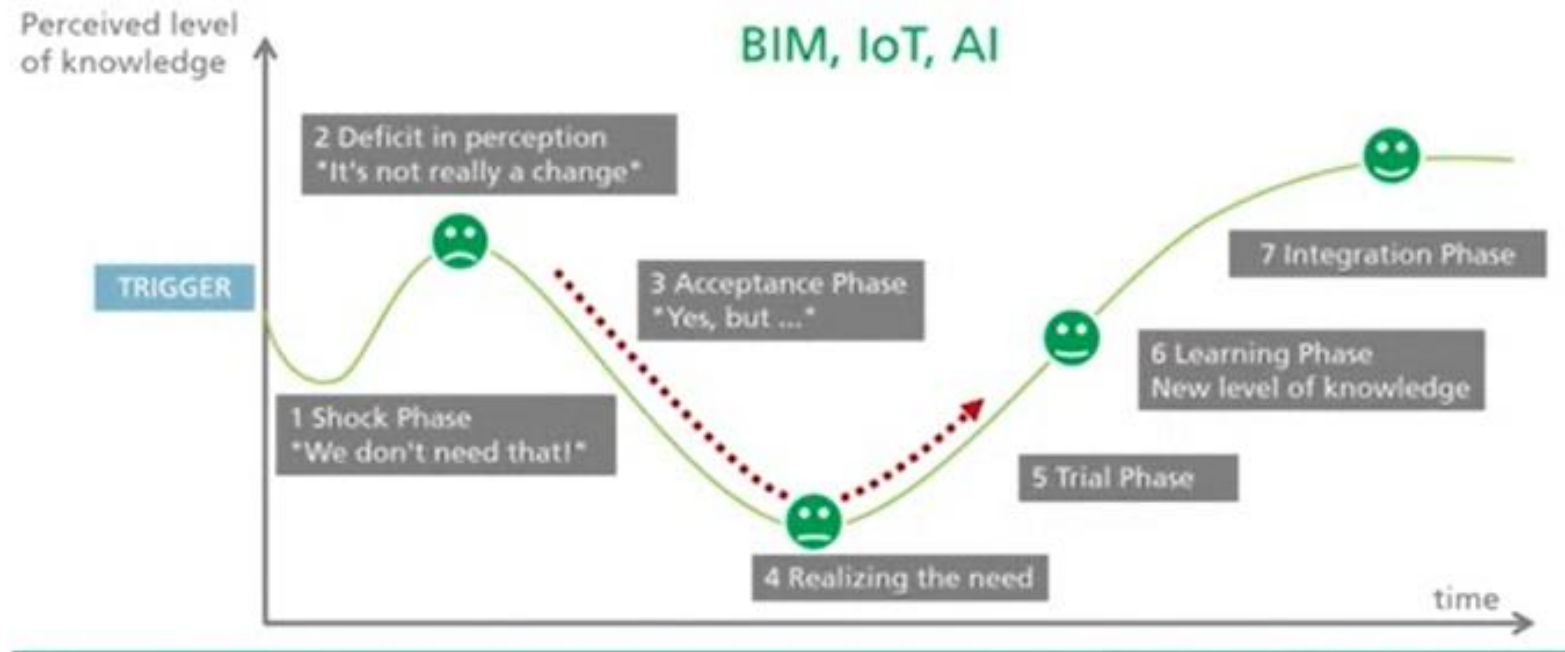


*Según modelos estimativos elaborados con KPMG y EIG



Implementation of digitalization

STATUS OF DIGITIZATION PROBLEMS FOR CHANGE



Source: FRAUNHOFER

- Construction industry is aware of the need for digitalization but the problem is its implementation

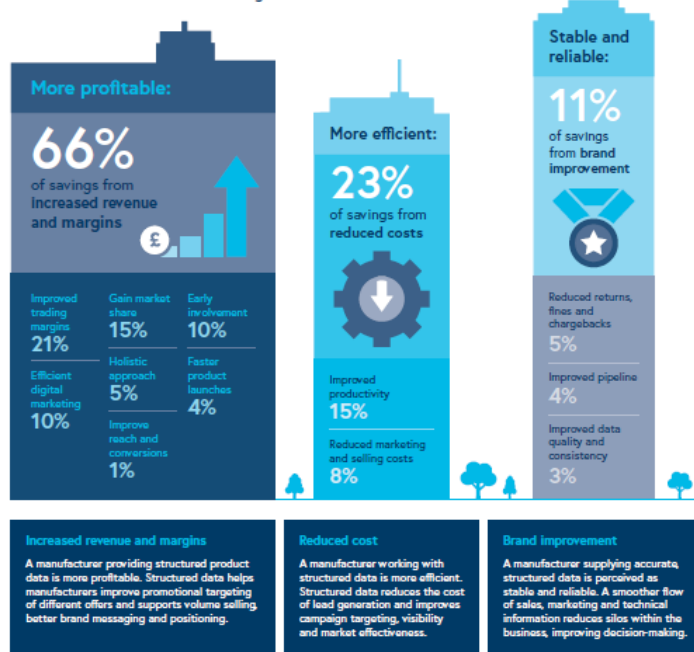
Don't wait more to jump into digital era

Digitisation for construction product manufacturers: a plain language guide

How manufacturers can structure and share data safely and sustainably.

The plain language guide helps decision-makers in manufacturing identify why supplying structured data is important, how to avoid poor investment decisions, how to set priorities for information management, and ways to safely share product information across the supply chain.

The manufacturer's benefits can be segmented into three areas:



Why should manufacturers go digital?

Digitisation is the first step to compliance

Regulation is coming post-Grenfell and digital transparency will be key. Structured, secure, verified and interoperable product information will be a key element of the golden thread.

Digitisation supports integrity

It's only through digital transparency that industry and society will be able to confidently confirm the compliance of products. Digitally transparent manufacturers will demonstrate their commitment to integrity.

Digitisation makes commercial sense

A manufacturer providing accurate, structured product data is more profitable, more efficient, more stable and more reliable.

Digitisation futureproofs the industry

In the future, zero-carbon initiatives will also require traceability of products and evidence of conformance. Making structured information available to the supply chain is an essential step in this process and essential for manufacturers to future proof their business.

Produced in partnership with:



For further information and to read our full guide, visit:
theiet.org/product-manufacturers

Read our blog on IET Communities: bit.ly/ManufacturersPLG
Join our LinkedIn Group: bit.ly/ManufacturersPLGlinkedin

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6622902/Build and Innovate/2021

Our recommendations



For Manufacturers

Follow the guide. The guide sets out a simple process to implement internal digitisation as a first step to compliance and commercial benefit.

Make a commercial decision. Manufacturers can make commercial decisions about how to proceed in line with the standards to ensure compliance.

Work with your trade association. Ask your trade association to support this work for your sector and your fellow manufacturers.



For the UK Government

Support the digitisation agenda. By taking a digital-first approach to its policy initiatives, regulation and guidance, UK Government can encourage manufacturers to digitise.

Communicate digitisation to manufacturers. The Government needs to take the lead on communicating that digitisation is necessary, that it's easy to implement and set out the ways in which manufacturers can do this.

Engage and support small and medium-sized enterprise (SME) manufacturers. Government should encourage those working on policy initiatives to engage with SMEs directly through their trade associations.

Changing the way of work in the construction sector – part 1: the background

To “BIM” or not to “BIM” – The precast concrete industry

Increasing introduction of BIM methodology within the projects is such an excellent definitive consolidation. Both BIM and precast concrete are based on similar lifetime costs and, as result, more efficiency along the whole construction process. The aim of this article, divided in two parts, is not to present BIM methodology development, to foresee how will be the scenario in the upcoming years, and to be pretty connected with the success of BIM implementation within the company.

■ Alejandro López Vidal, Technical Director of ANDECE, Spain ■

Basic concepts about BIM

Building information modelling (BIM) is a new approach to design, construction and facility management in which a digital representation of the building process is used to facilitate the exchange and interoperability of information in digital format.

BIM interoperability among different stakeholders in construction projects may be seen as a modern version of the Tower of Babel. For centuries people have designed, built, and maintained facilities. However, with the increasingly costly and inefficient processes used, the time, cost, material, and labor expended result in disappointing quality, value, and financial returns. Construction projects today are complex and involve highly specialized and fragmented professional services. They require strong interdisciplinary teams, with stakeholders willing to collaborate, including clients and their representatives, designers, contractors, and the range of specialist consultants with their deep domain knowledge and experience.

BIM is based on the integration of all available information of a project in an interactive 3D virtual model, gathering at least the geometry and technical data of the elements, the construction system or the spatial relations among the elements, but even also allowing other necessary information to define as best as possible the construction project as follows:

BIM 3D or how to communicate the design intent

BIM revolves around an integrated data model from which various stakeholders such as Architects, Civil Engineers, Structural Engineers, MEP System Engineers, Builders, Manufacturers and Project Owners can extract and generate views and information according to their needs. 3D BIM's visualization capabilities enables participants to not only see the building in three dimensions before ground is ever broken, but also to automatically update these views along the project life cycle, from earliest conception to demolition. BIM 3D helps participants to manage their multidisciplinary collaboration more effectively in modelling and analysing complex spatial and structural problems. Furthermore because accurate data can be collected along the project life cycle, and stored in the Building Information Model, new value can be added to predictive models allowing to resolve issues proactively.

Changing the way of work in the construction sector – part 2: BIM experiences

To “BIM” or not to “BIM” – The precast concrete industry changes

It is recognized that the use of BIM in design and construction is evolving. As we could see in CPI, Issue 1/2017, Increasing introduction of BIM methodology should be an excellent definitive consolidation on the upcoming construction. We now review the main differences between processes in a BIM approach, look some experience of precast concrete construction projects and precast concrete products on BIM libraries.

■ Alejandro López Vidal, Technical Director of ANDECE, Spain ■

The “I” of BIM is not only information, but (it should be more) industrialization

Construction projects are now complex and involve highly specialized and fragmented professional services. They require strong interdisciplinary teams, with stakeholders willing to collaborate, including clients and their representatives, designers, contractors, and even construction product suppliers. Using BIM, all project collaborators are working around the same virtual model; any change in one component may not occur without all the players adjusting their systems simultaneously and with accuracy.

Moreover, it has to be pointed out that precast concrete construction solutions offer such a wide range of technical and functional advantages against the conventional use of concrete: faster, more quality control, less site impact, less waste, more durability or lower lifetime costs.

Above all, there is a significant factor in which BIM approach and the industrialized precast concrete construction coincide: the accuracy. Both concepts are required to fulfil the geometrical accuracy during the whole construction stages to reach the success of the work at the end.

It is indispensable to comply with the design product dimensions and production and installation tolerances in order to connect precast elements adequately without collisions among them, or even



Fig. 3: This construction quality assurance lists documented using PDF, CAD



Figures 1 and 2: (1) Precast concrete structure; (2) On-site concrete structure

NEWS

BIM, Digitalization and Industry 4.0

Great challenges of the next decade – great chances for the precast concrete industry

■ Alejandro López Vidal, Technical Manager ANDECE, Spain

“There's nothing like a challenge to get the best out of yourself”. Talking about challenges is talking about the future but applying measures right now. We are currently experiencing an exceptional situation due to the health emergency caused by the expansion of the Covid-19 virus, which is having multiple side effects at all levels. Some of the consequences have a very direct relationship with greater use of digitization, such as increased teleworking, meetings or online events, or an impressive increase in e-commerce. Perhaps when this situation is overcome, the most noteworthy consequences will be that various avenues of digitization that were already previously being introduced, have accelerated their implementation process.

The construction sector is one of the least in which technology has been introduced and is further from this inevitable digital transformation that almost any productive sector has been in place for the last years, especially if we focus it in its execution stage, which is usually carried out in a dynamic environment, with a high level of uncertainty and enormously dependent on the qualification of the available workforce at the site of the work. Against this model of action, the industrialization of construction is based on products and systems manufactured in a factory, offering a higher technical potential of automation as result of much more predictable tasks, with previously defined personnel and machinery, with greater experience effect and which are based on the systematic repetition of instructions, rules and calculations.

In this respect, prefabrication as a variant of industrialized concrete construction, is based on anticipating the factory, a much more controlled, planned and automated environment than the work itself, as many production processes as possible, so it is almost inevitable that the use of digitization will provide an additional impetus to consolidate all the advantages it brings: less waste, durability, optimized sections, less dependence on available on-site workforce, work safety, etc. - and further improve the efficiency in the design, manufacture or logistics of precast elements, as opposed to on-site construction.

Building the construction sectors' digital future: DigiPLACE Project [1]

The construction sector is a key driver for the economy, but it is one of the poorest performers in terms of productivity and innovation. It has yet to embrace digital innovations that could help improve productivity and profitability. The EU-funded DigiPLACE will create a common ecosystem of innovation, standardization and commerce to increase the construction sector's productivity and end products' quality in terms of buildings and infrastructure. It will also investigate what kind of digital transformation will improve productivity and efficiency. The project's results will impact the development and competitiveness of the construction value chain.

BIM and precast concrete

At the core of this technological evolution is found the BIM methodology, which consists in the creation of digital models of the project, whether a building or an infrastructure, through increasingly advanced software that allow to share these models among the different agents involved: architecture and engineering, builders, developers and suppliers.

As we already describe at two previous articles here [2], as it happens in prefabrication, BIM is based on setting an accurate and unequivocal definition of each construction component, ensuring geometric and spatial precision in such a way that errors that are normally emerged during the execution due to deviations or unforeseen events are minimized, which have unpredictable damage and that are especially inherent to the traditional construction being fundamentally conditioned to the good or poor execution of the on-site workforce, but that in the case of precast concrete must be avoided from the early design phase in order to guarantee the correct assembly among the different elements.

Thank you for the attention

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Any question?