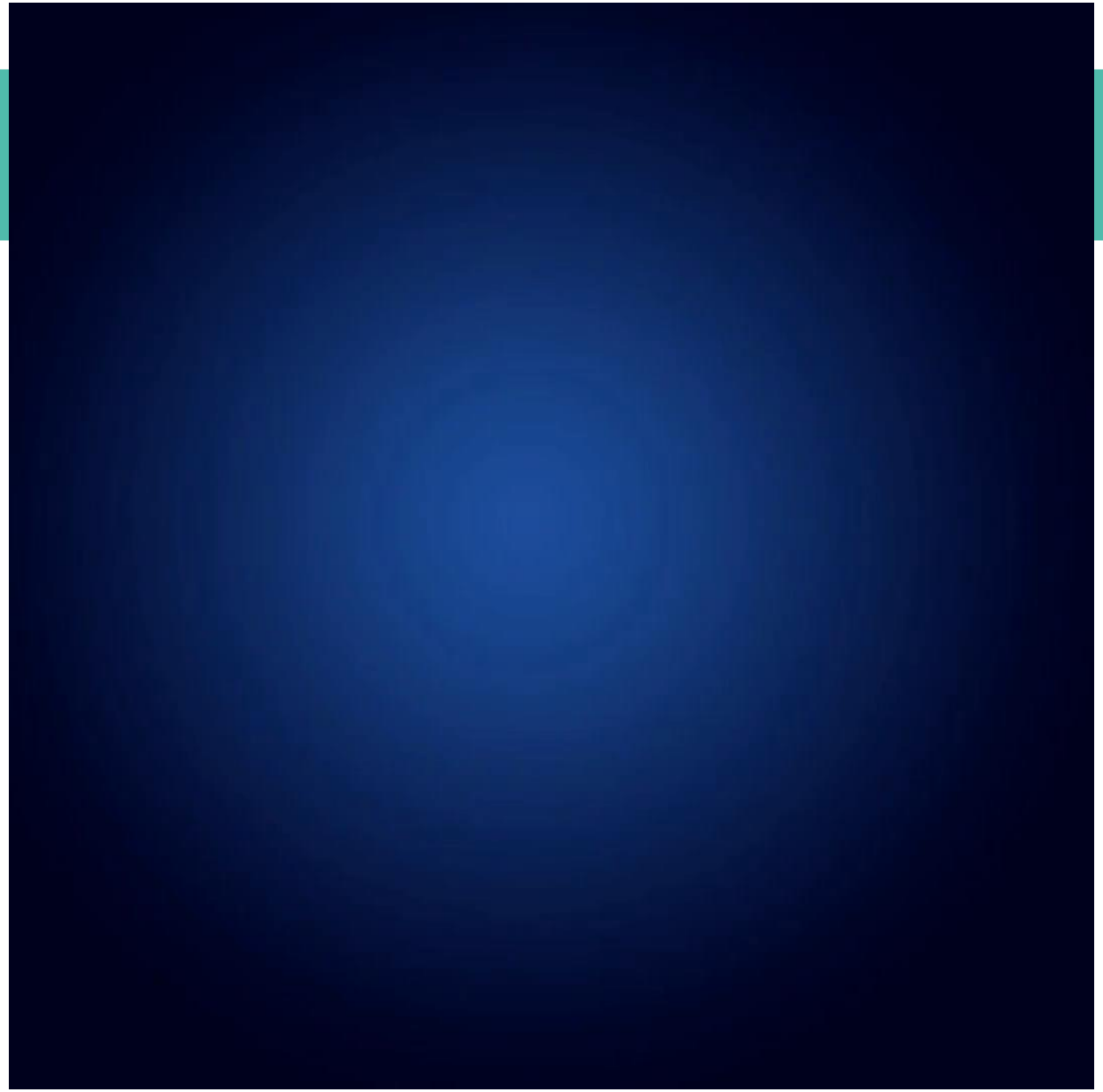
GREEN W!N
FROM INNOVATION TO BUSINESS

L'énergie d'un réseau pour concrétiser vos rêves d'innovation industrielle durable

Avec le soutien de la Wallonie

Wallonia.be



Olivier VANDOOREN
Directeur général
du CSTC

Véronique GRAFF
Directrice générale
de GreenWin

cstc.be
Recherche • Développe • Informe

GREEN W!N
FROM INNOVATION TO BUSINESS

AUJOURD'HUI ... & DEMAIN

> Première édition de Conférence Construction

> GreenWin au service de l'innovation dans le bâtiment

> Les projets innovants & collaboratifs

> La Recherche & le Développement constants

> Le GreenW'Innovation Challenge & le **Challenge Corner**

Avec le soutien financier de:

BUILD4WAL

Confédération Construction Wallonne
Construction, énergie & environnement

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Innovation numérique by INFOPOLE | digital wallonia .be

RenoWindow
A service by AGC

Avec le soutien de la Wallonie

Wallonia.be
EXPORT
INVESTMENT

en partenariat avec:

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GREEN WIN
FROM INNOVATION TO BUSINESS

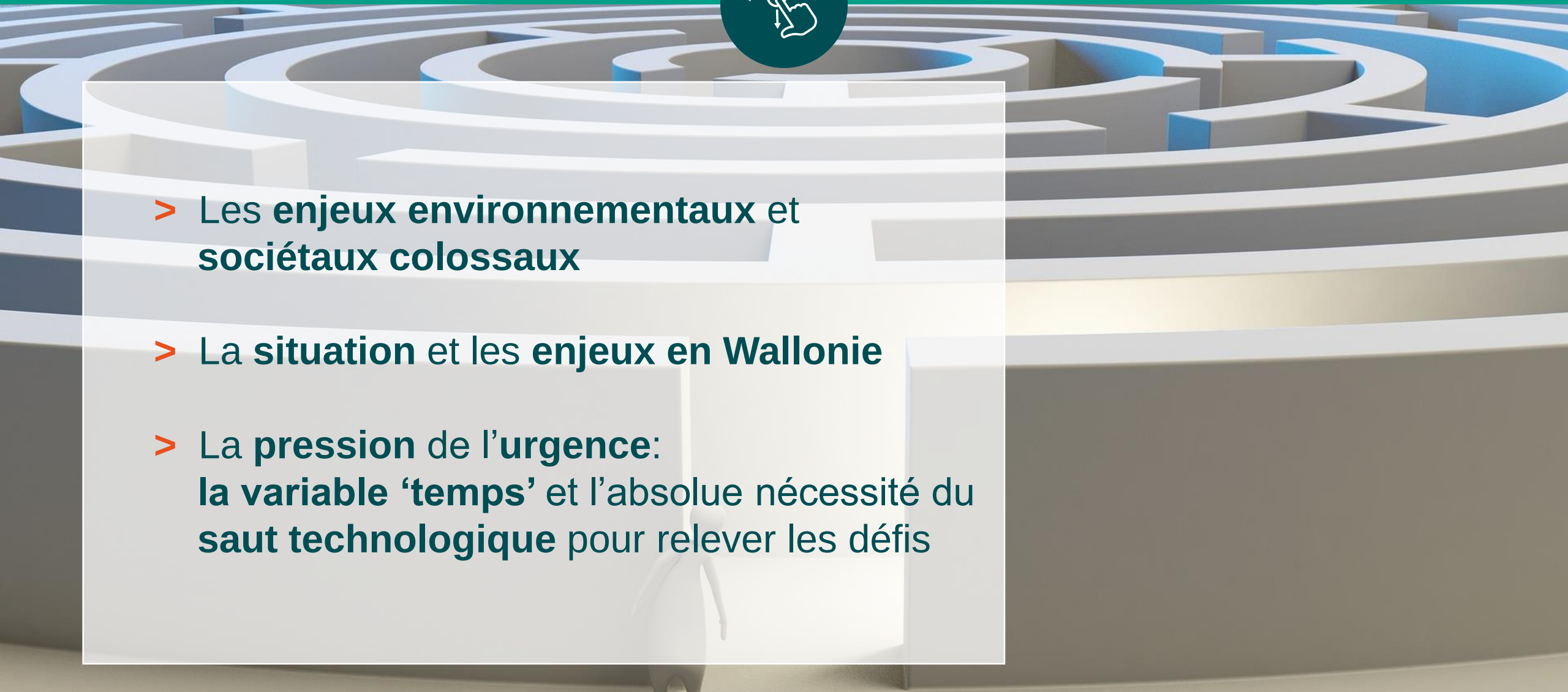
Marc VAN DEN NESTE

Président de GreenWin
CTO d'AGC Glass

Avec le soutien de la Wallonie

Wallonia.be

LES CONSTATS



- Les **enjeux environnementaux** et **sociétaux colossaux**
- La **situation** et les **enjeux en Wallonie**
- La **pression** de l'**urgence**:
  la variable 'temps' et l'absolue nécessité du **saut technologique** pour relever les défis

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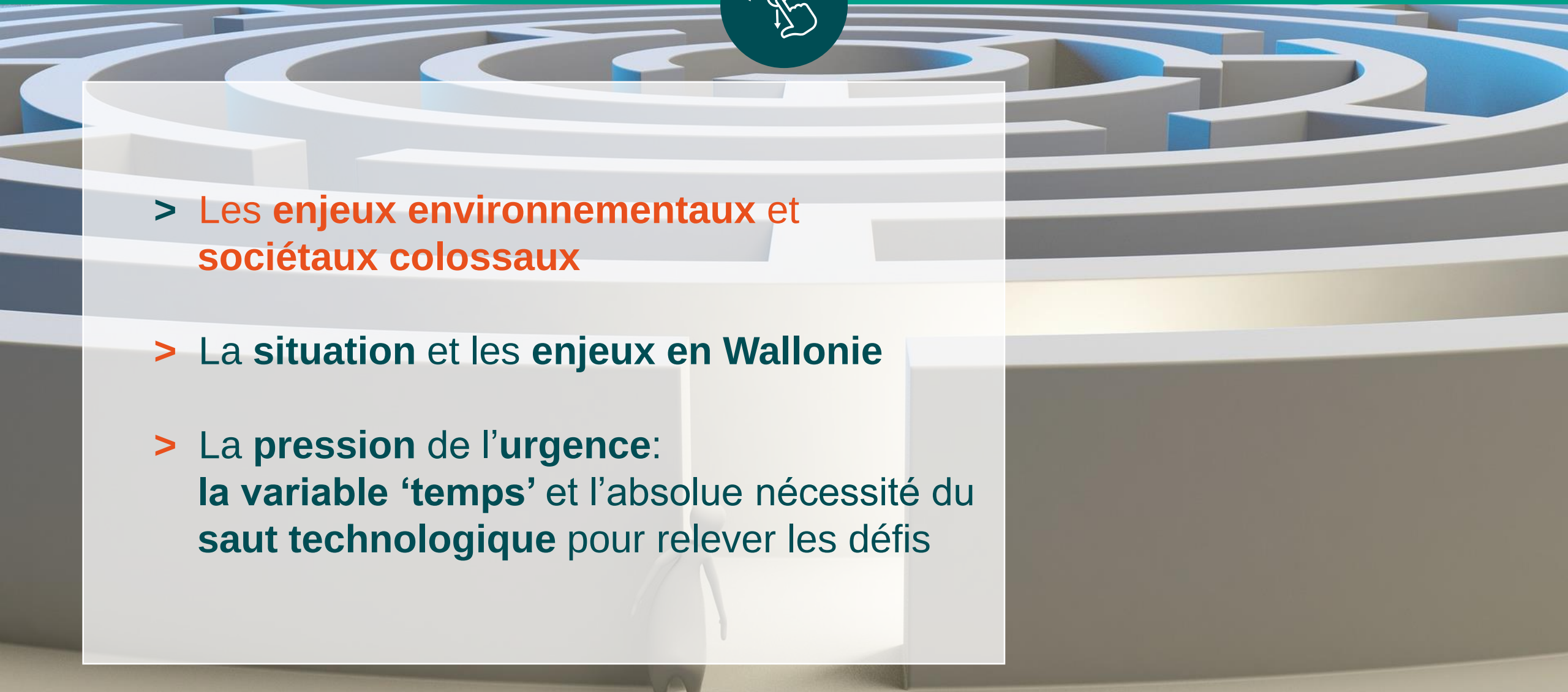

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LES DÉFIS ENVIRONNEMENTAUX DE LA CONSTRUCTION
en Union Européenne

2030

> 32,5 % de **réduction de la consommation énergétique**
> 40 % **de reduction** des **émissions de CO_2** par rapport à 1990

2050

En adéquation avec les Accords de Paris

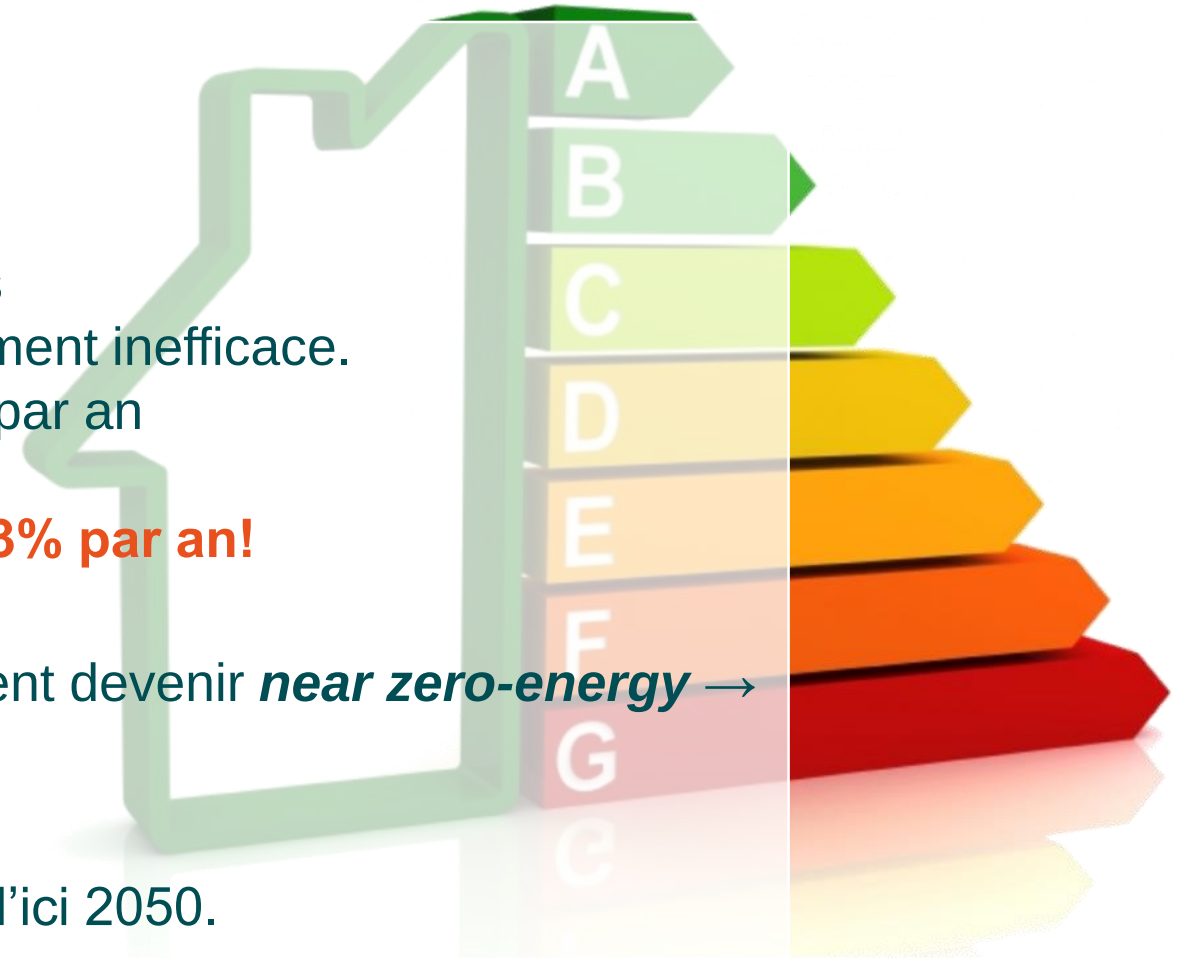
> **Augmentation mondiale de la température**:
- Réelle: bien en dessus de 2°C
- But: moins de 1,5°C

> **Réduction des émissions de 80 à 95%**

LES DÉFIS ENVIRONNEMENTAUX DE LA CONSTRUCTION
en Union Européenne

Les bâtiments en Europe =

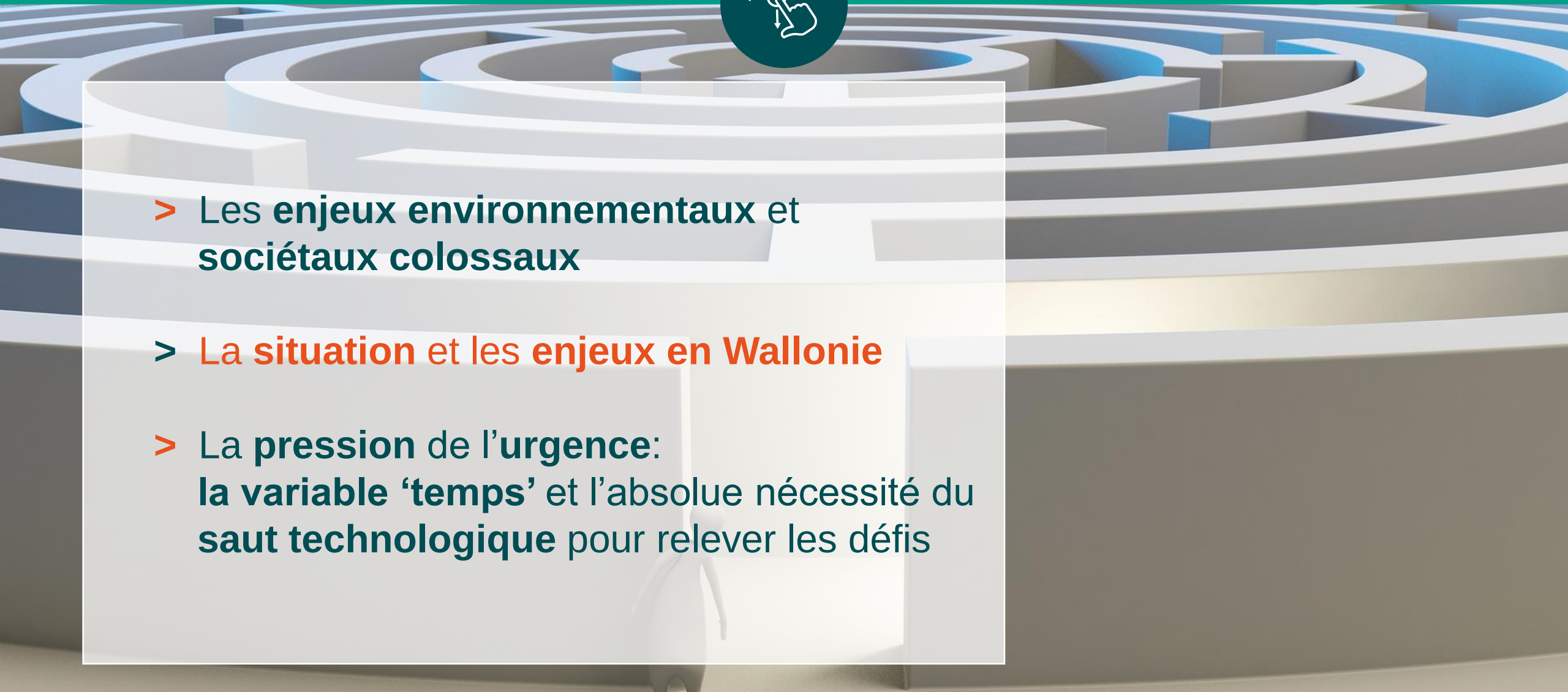
- 40% de consummation énergétique
- 36% des émissions de CO_2
- 35% du parc immobilier a plus de 50 ans
- 75% du parc immobilier est énergétiquement inefficace.
- Entre 0,4 et 1,2% de ce parc est rénové par an
- **En Wallonie, ce taux est de 0,7%**
- **Alors que l'objectif à atteindre est de 3% par an!**



> Tous les bâtiments (résidentiels ou non) doivent devenir ***near zero-energy*** → classe A de la certification PEB

> Plus de 97,5 % doit être rénové au niveau A d'ici 2050.

LES CONSTATS



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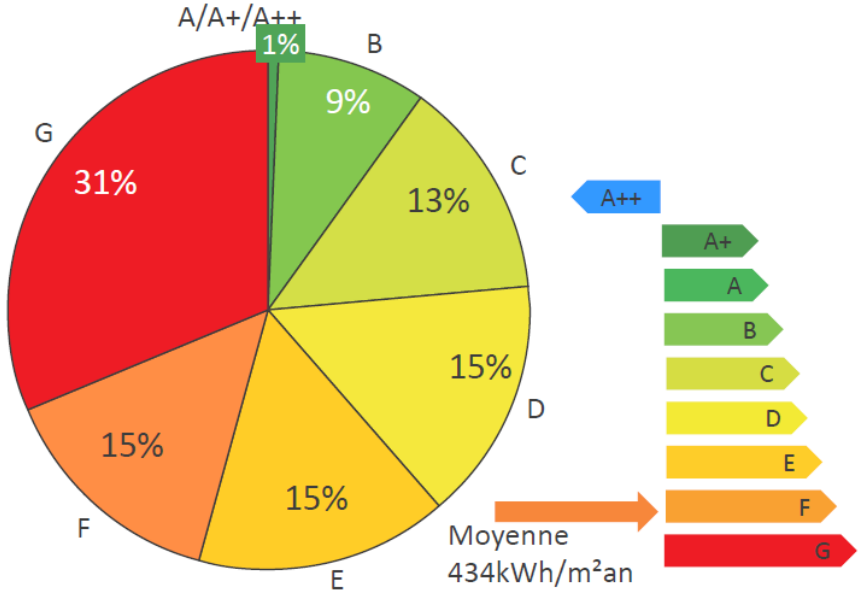
UN PARC IMMOBILIER WALLON VÉTUSTE

Etat du parc de bâtiments existants

RESIDENTIEL

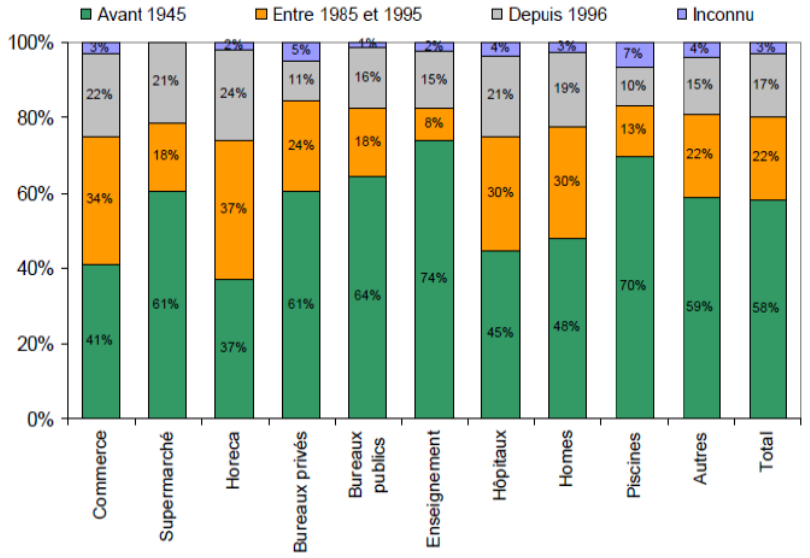
- Faibles performances énergétiques
- 75% des logements datent d'avant 1985
- Faible taux de rénovation (1%/an)



Répartition des logements wallons par catégorie PEB [%]

TERTIAIRE

Le parc de bâtiments tertiaire est également ancien et vétuste



Année de construction/grosse rénovation par tranche d'activité

Source: 2017-Climact

Wallonie énergie SPW

Service public de Wallonie territoire logement patrimoine énergie

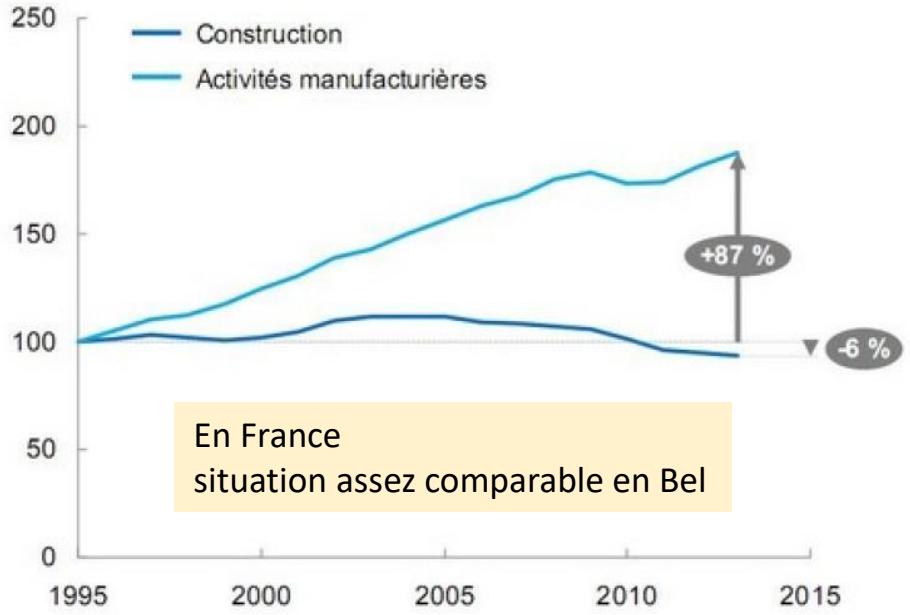
UN SECTEUR ENCORE TROP 'ARTISANAL' avec un grand potentiel d'amélioration dans sa transformation numérique

Le secteur de la construction et du BTP est le premier de ces secteurs passés au crible par les experts de McKinsey. La transformation numérique concerne les entreprises de construction au premier chef. Selon eux, « *une grande part des plans ne sont pas numérisés ; les processus restent largement dominés par le papier et le traitement manuel* ».

Etude McKinsey 2014

La productivité horaire dans le secteur de la construction a subi un net décrochage par rapport à celle de l'industrie manufacturière depuis 1995

Indice de productivité du travail en construction et activités manufacturières
Valeur ajoutée par heure de travail productive

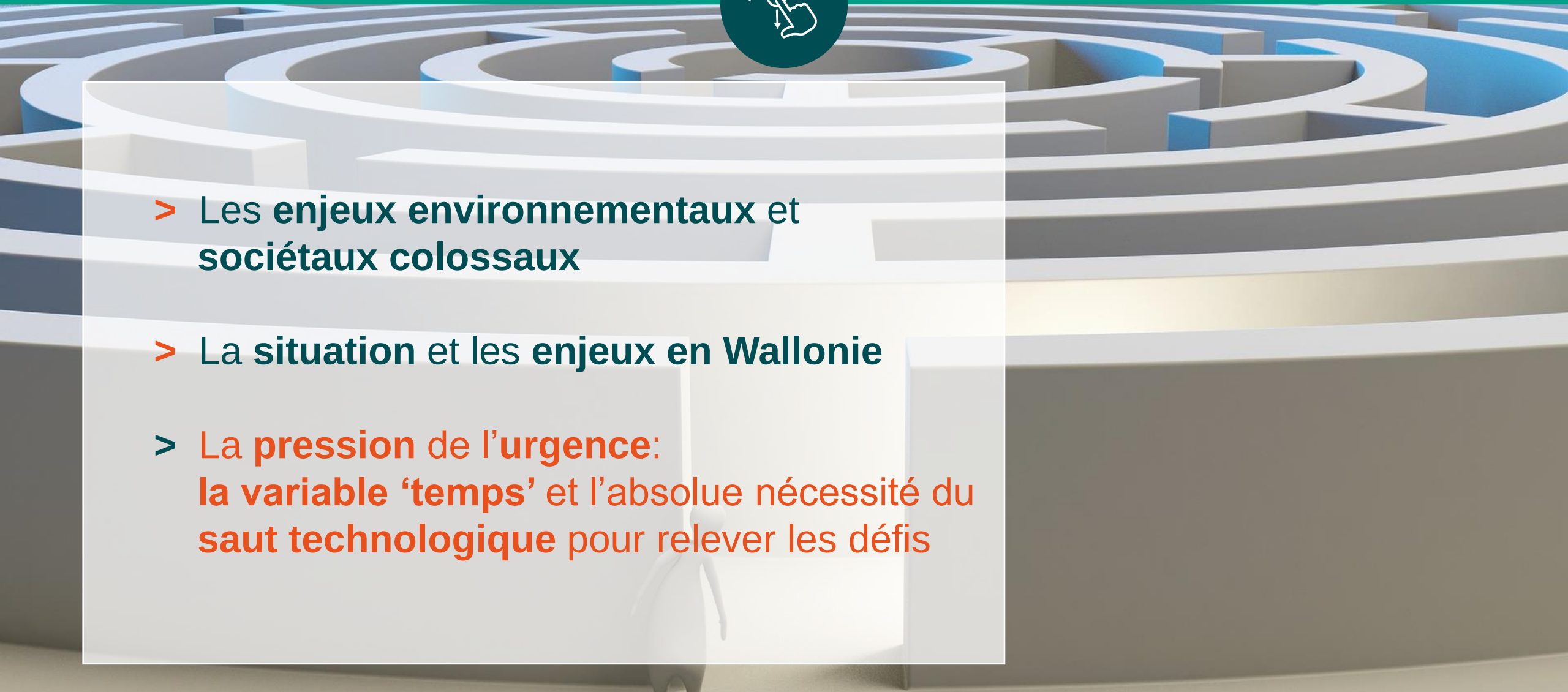


En France
situation assez comparable en Bel

Une productivité décroissante dans le secteur de la construction depuis 20 ans (-6 % en 2013 vs. 1995) ; croissante dans le secteur manufacturier (+87 % en 2013 vs. 1995)

SOURCE : INSEE, évolution de la productivité horaire apparente du travail par branche

LES CONSTATS



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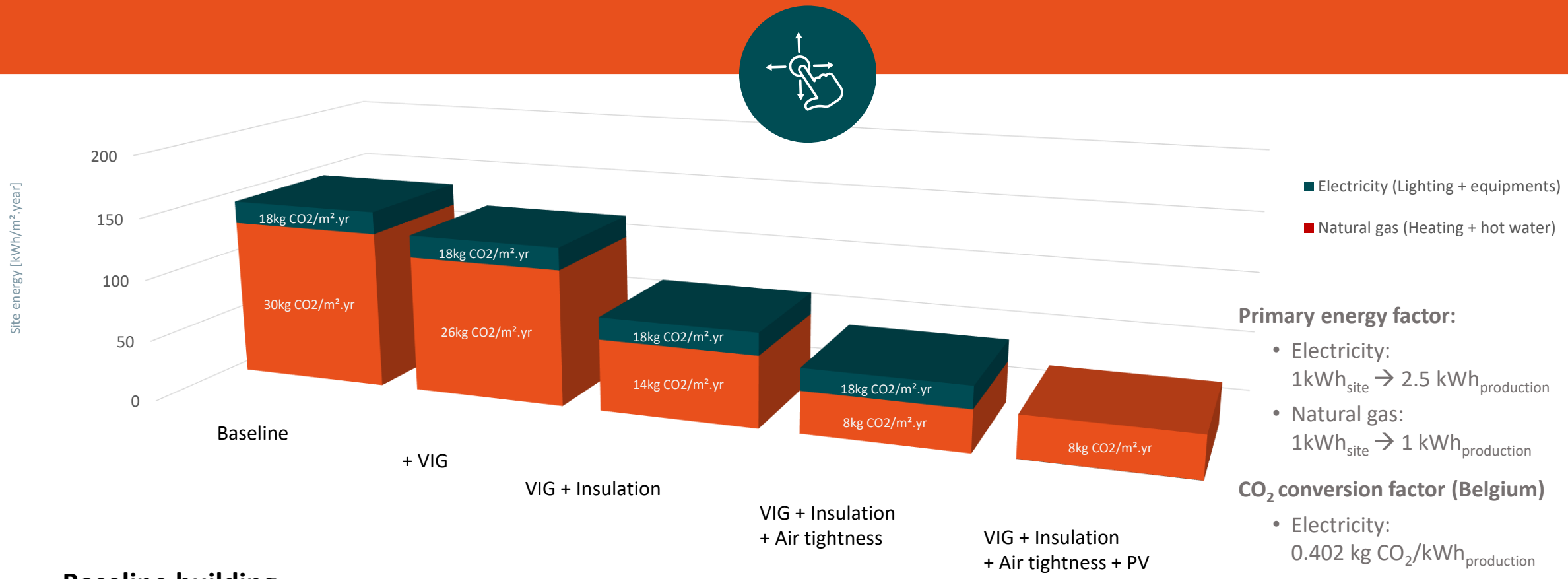
LA RÉPONSE aux DÉFIS: vers les SMART CITIES

> 50% de la population mondiale vit dans les villes et est responsable de 75% de la consummation d'énergie

> Besoin de solutions innovantes et intégrées pour répondre aux défis posés par les villes

DES SMART CITIES GRÂCE À LA RÉNOVATION



Primary energy factor:

- Electricity:
  $1kWh_{site} \rightarrow 2.5\ kWh_{production}$
- Natural gas:
  $1kWh_{site} \rightarrow 1\ kWh_{production}$

CO_2 conversion factor (Belgium)

- Electricity:
  $0.402\ kg\ CO_2/kWh_{production}$
- Natural gas:
  $0.237\ kg\ CO_2/kWh_{production}$

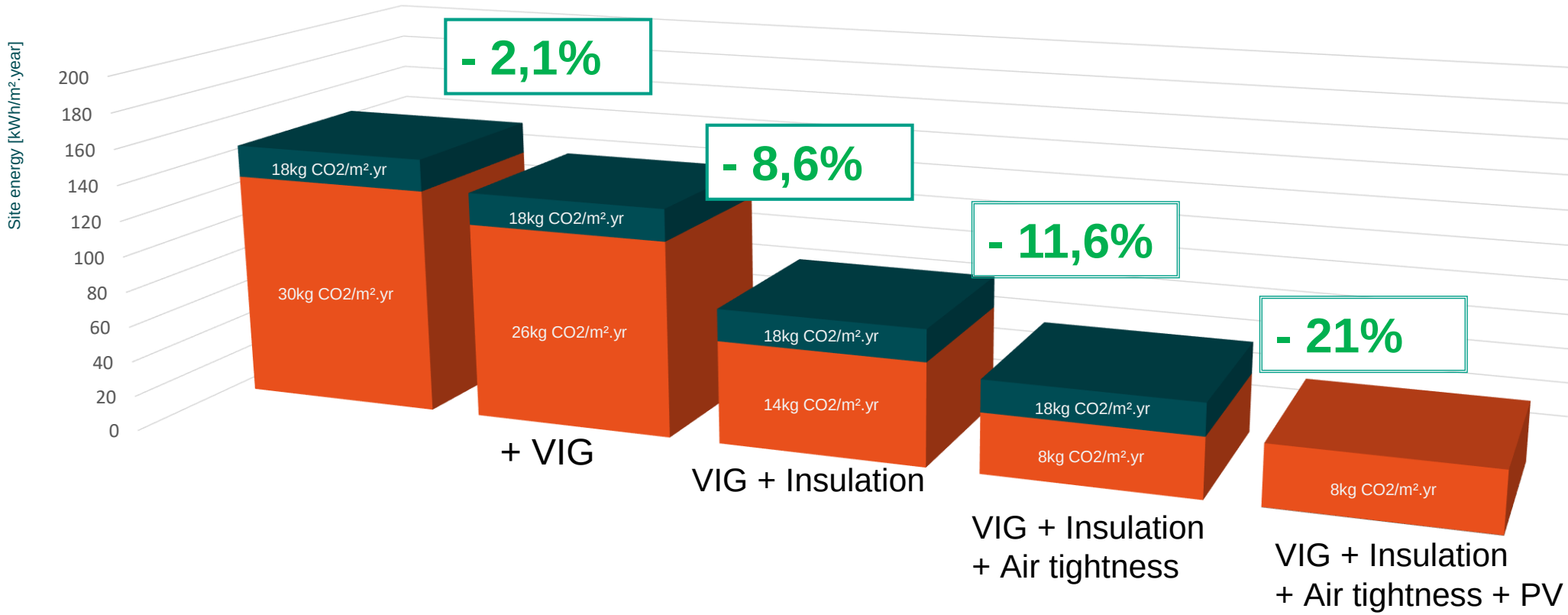
Baseline building

- Old residential building
- Glazed at 35% (single glazing)
- Uninsulated walls & roof
- 5 floors in Brussels

Building improvement (renovation)

- Vacuum Insulating Glass (VIG)
- Re-insulation
- Air tightness
- PV on roof

DES SMART CITIES GRÂCE À LA RÉNOVATION
Impact sur les émissions de CO2 en Europe

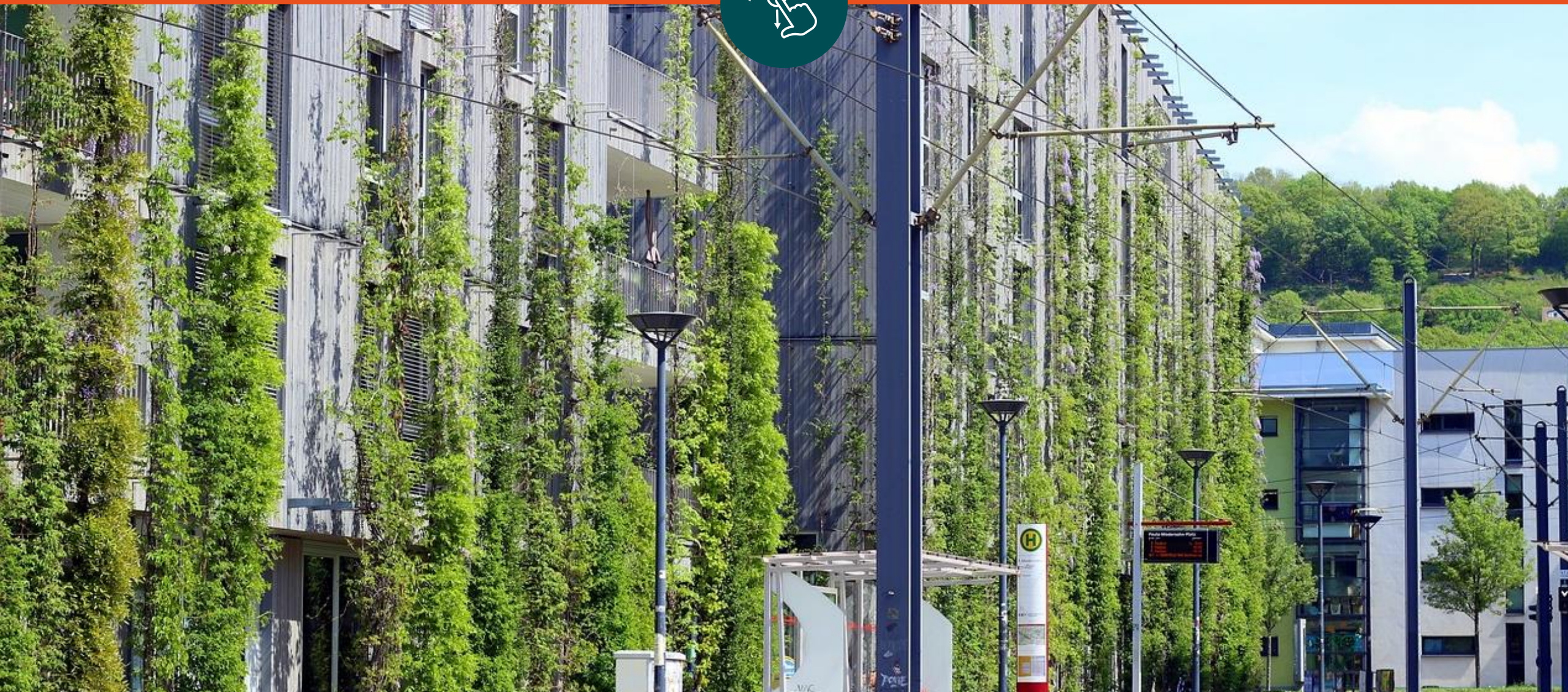


AMÉLIORER L'EFFICACITÉ ÉNERGÉTIQUE EN WALLONIE **PAR LA RÉNOVATION**

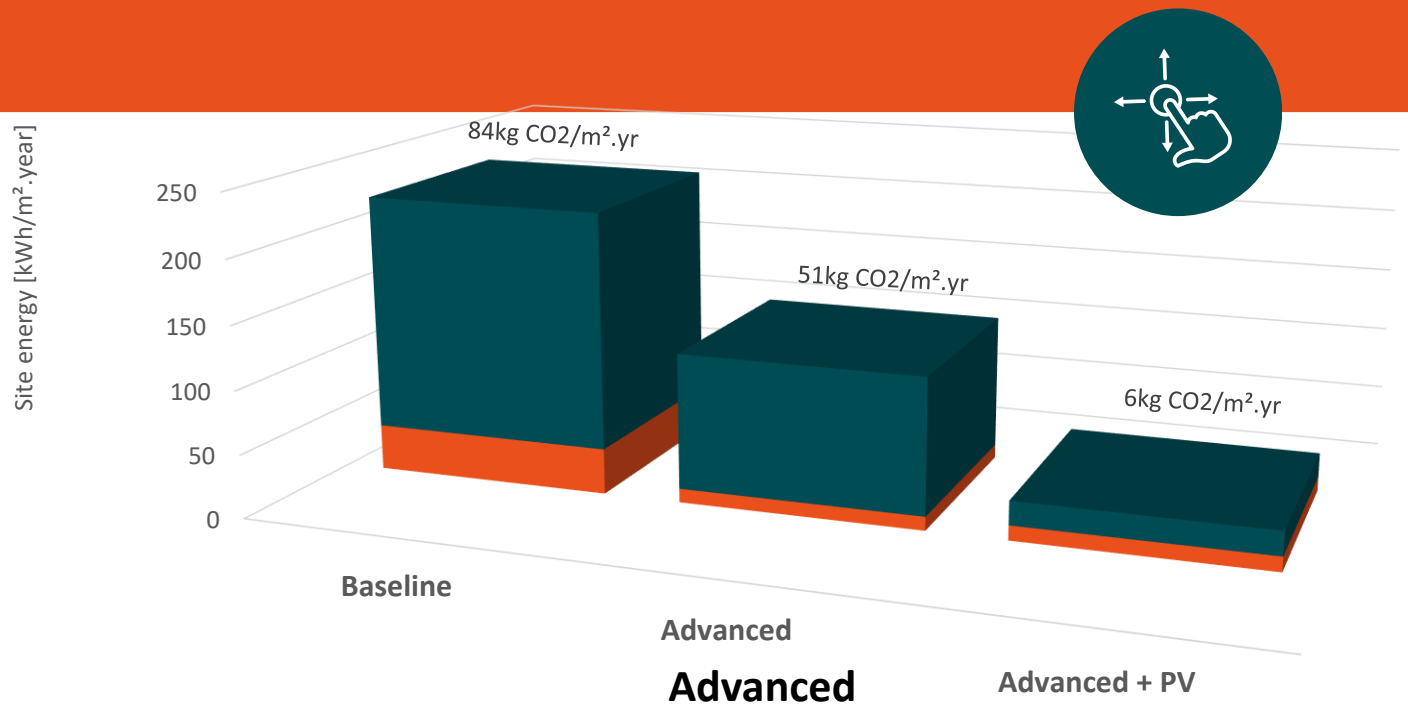
- Réduire sa consommation d'énergie
- Diminuer les émissions des CO2 et les gaz à effets de serre
- **tout en générant une activité économique productrice d'emplois**

> le projet structurant RENO+

AMÉLIORER L'EFFICACITÉ ÉNERGÉTIQUE EN WALLONIE **PAR LA CONSTRUCTION NEUVE**



DES SMART CITIES **GRÂCE AU CONSTRUCTION NEUVE**



Immeubles de base

- Immeubles à bureau modernes
- 70% verre transparent
- 30% spandrel area
- Haute isolation
- Verre à efficacité énergétique
- 5 étages à Bruxelles

Advanced

- Fineo verre isolant sous vide
- Halio verre teinté intelligent
- LED lumière+ dimming
- Ventilation heat recovery (dual flow)

Advanced + PV

- Production PV transparent
- Production spandrel PV opaque
- Production de toits PV

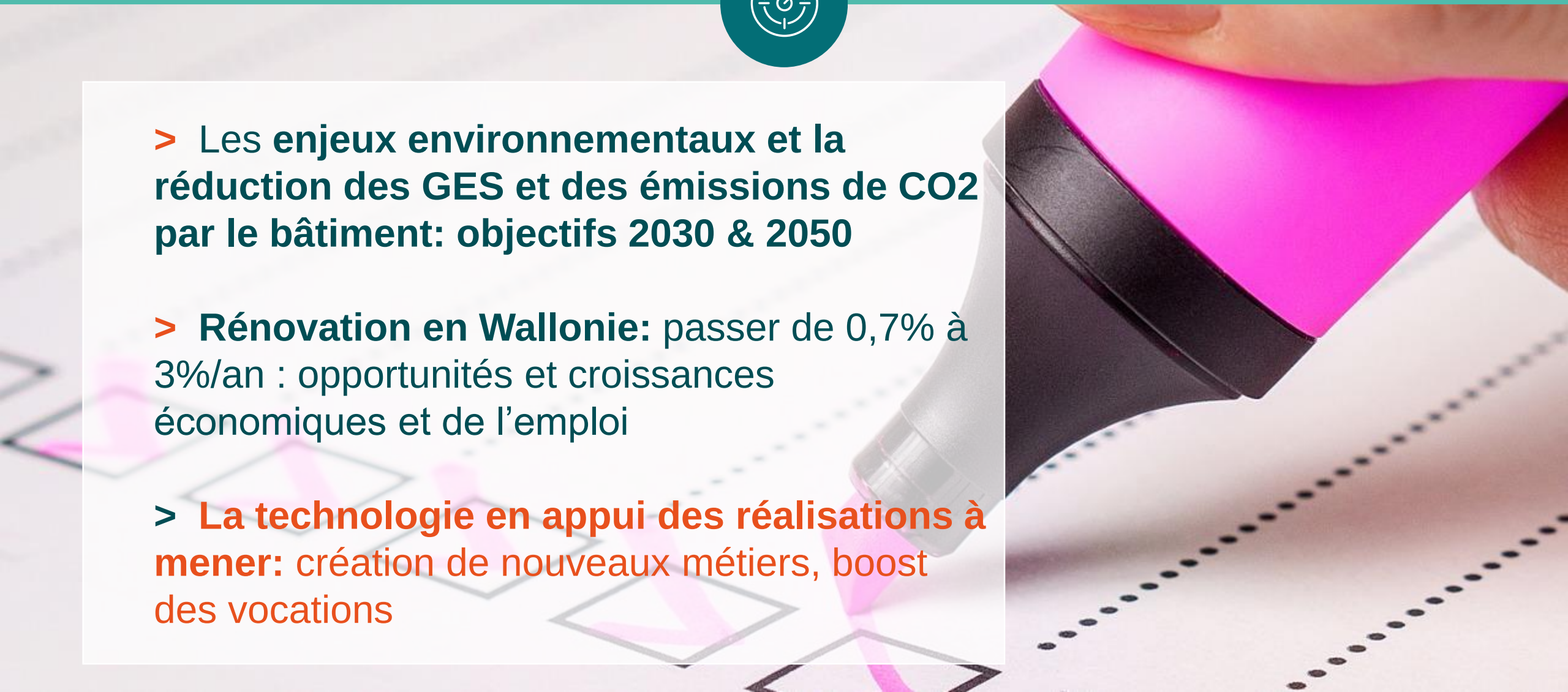
Facteur énergétique primaire:

- Electricité:
  $1kWh_{site} \rightarrow 2.5\ kWh_{production}$
- Gaz naturel:
  $1kWh_{site} \rightarrow 1\ kWh_{production}$

Facteur conversion CO_2 (Belgique)

- Electricité:
  $0.402\ kg\ CO_2/kWh_{production}$
- Gaz naturel:
  $0.237\ kg\ CO_2/kWh_{production}$

CONSTRUCTION 4.0 : L'INNOVATION AU SERVICE DU BÂTI



> Les **enjeux environnementaux et la réduction des GES et des émissions de CO2 par le bâtiment: objectifs 2030 & 2050**

> **Rénovation en Wallonie:** passer de 0,7% à 3%/an : opportunités et croissances économiques et de l'emploi

> **La technologie en appui des réalisations à mener:** création de nouveaux métiers, boost des vocations

S'APPUYER SUR LA CONSTRUCTION 4.0 POUR RÉALISER LES OBJECTIFS À TEMPS !

BONNE CONFÉRENCE À TOUTES & TOUS!

GREEN W!N
FROM INNOVATION TO BUSINESS
greenwin.be

THOMAS VANDENBERGH

COO - BESIX STAY, Chairman Innovation Board - BESIX Group

FRANCOIS LEDERER

Head of BIM, Digital & Sustainable

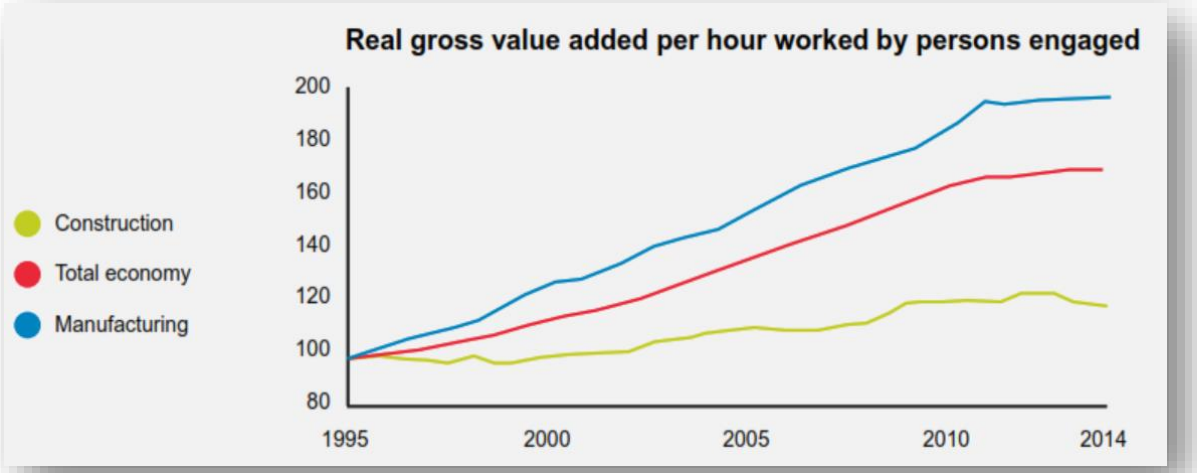
« L'état de l'art, le contexte, les enjeux, les défis de la construction 4.0 »

GREEN W!N FROM INNOVATION TO BUSINESS

« L'état de l'art, le contexte, les enjeux, les défis de la construction 4.0

Thomas Vandenbergh & François Lederer

Conférence Construction 4.0 – CSTC Limelette



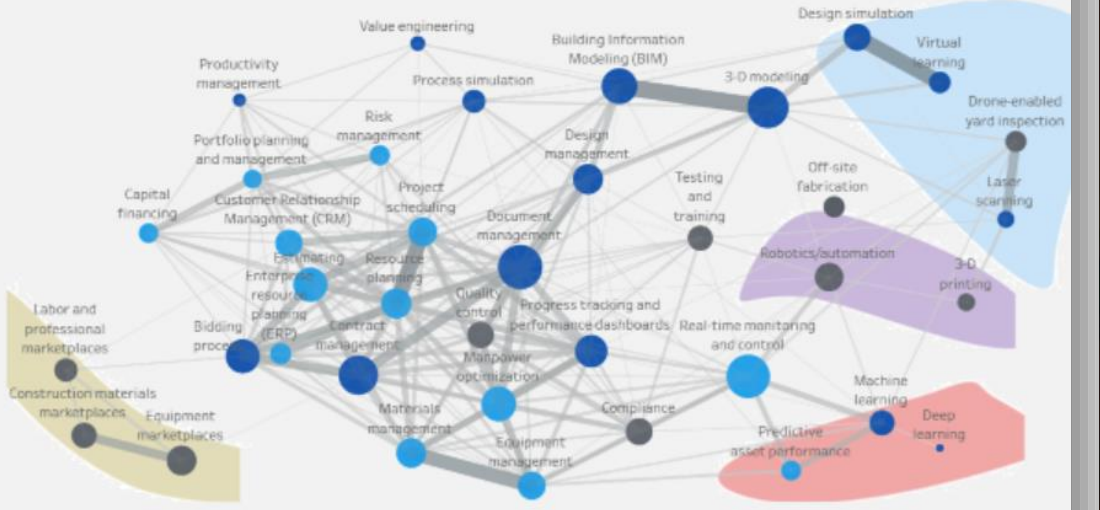
4 constellations of solutions emerging around established use cases

(1) Digital twin technology

(2) 3-D printing, modularization & robotics

(3) Artificial Intelligence & analytics

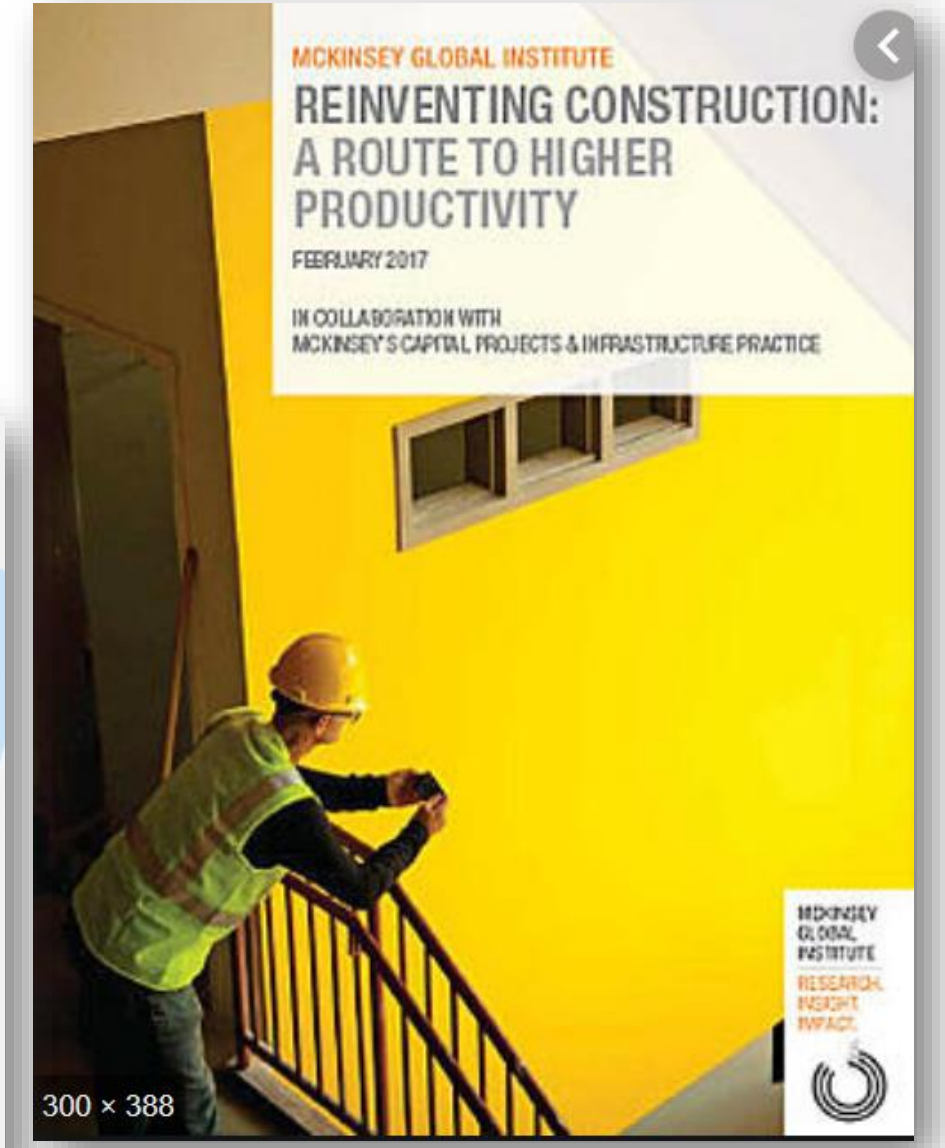
(4) Supply chain optimization & marketplaces

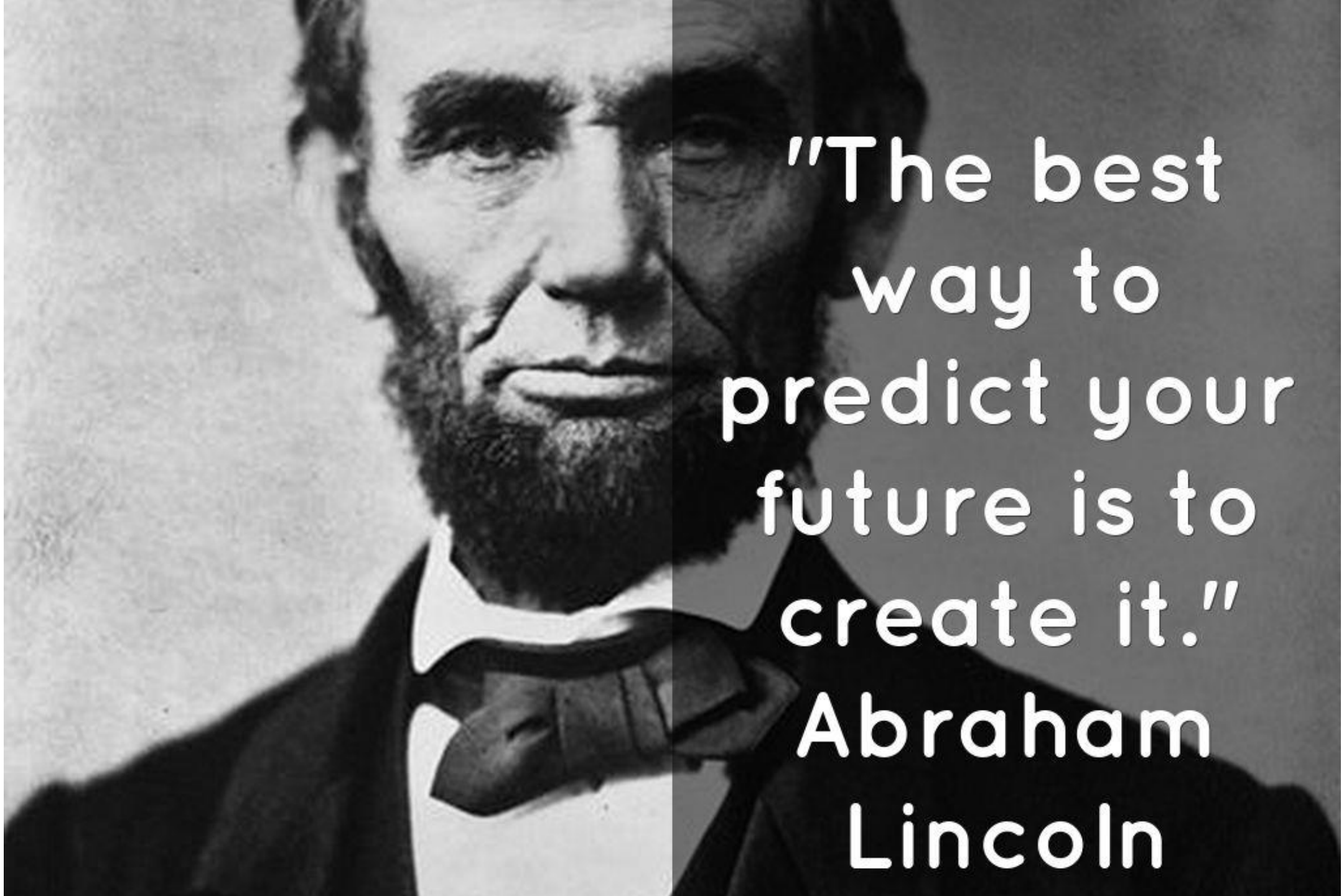


Back-office
Digital collaboration
On-site execution

→ Need of integration

Based on analysis of 2400 technology solution companies, distributed over 38 use cases




"The best way to predict your future is to create it."
Abraham Lincoln


BESIX Group
REAL ESTATE
CONTRACTING
CONCESSIONS & ASSETS
MARINE
LEISURE
INDUSTRY
ENVIRONMENT
CIVIL ENGINEERING
BUILDINGS

We are in a high risk, low **profit** (<3%) business

Facing a real war for **talents**

Impacting the world's economy and **environment**

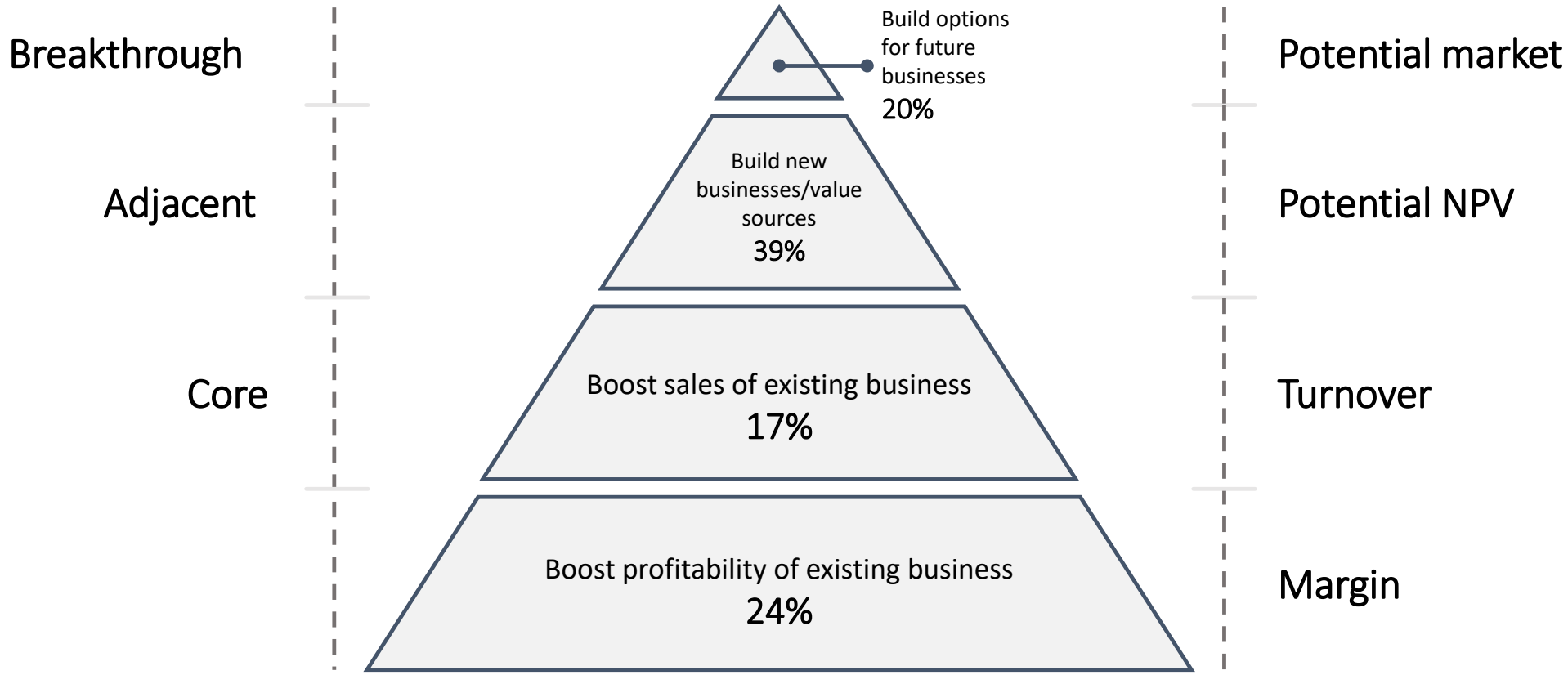
Our purpose

Excel in creating sustainable solutions for a better world.

Our strategic drivers

1. Leveraging on our **customer centricity**
2. Promoting a **great place to work**
3. Developing a "**one-stop-shop**" solution
4. Being a leader in **open innovation**
5. Synergizing **our ways of working**
6. Promoting **openness towards** new ventures & activities for business

Boost core business, diversify and sustain



Open innovation objectives 2022

1 3 new businesses with a cumulated value of +50M€ (NPV_5)

2 Being recognized as a top open innovation company in our markets (AECOM industry)

3 50% of our projects implement (reusable and scalable) innovative solutions. On each company level

Top Management signed innovation commitment

Summer 2016

Creativity workshops

It provides employees with the tools to think completely "Out of the Box".

2016-2017

Unleash on Stage

Unleash honored the finalist projects and inspired all employees

2017

Winter 2016

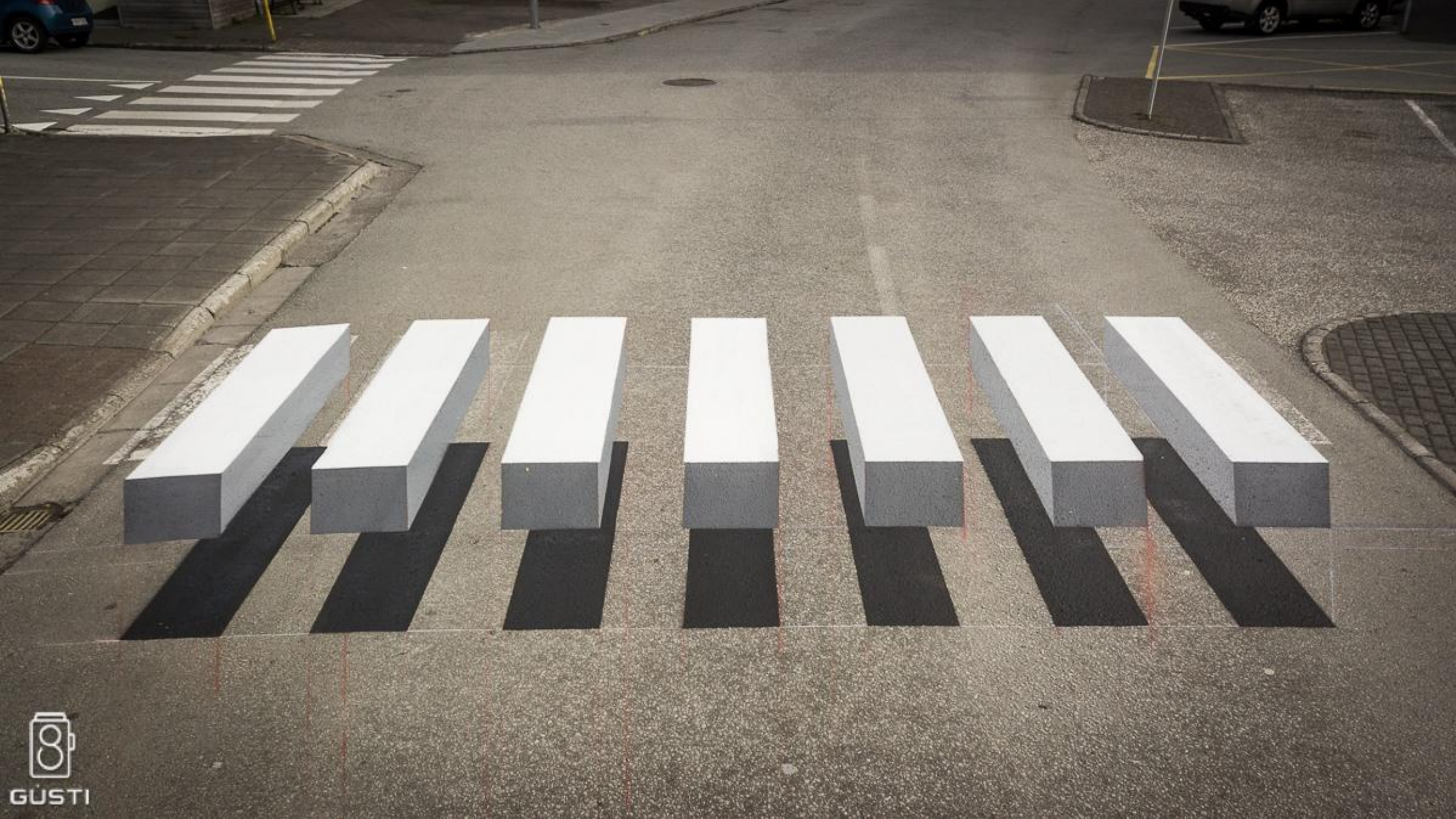
Cognistreamer

Unleash launched its ideation platform

2016-2017

2 internal ideation waves
324 + 112 ideas
2 bootcamps




GÜSTI


TOBACCO
Wine & Ch
TIME TO IMPRESS...
Schiphol
network CAFE
XPRESSSPA
Top Level • Bar • Restaurants
First aid
Airline lounges 40-52
AirportSpa
Meditation centre
EFGH
Gates
Gates BCD
Schiphol

2016

Launch of a new platform to foster innovation

Summer 2017

New challenges
&
New criterias

2018

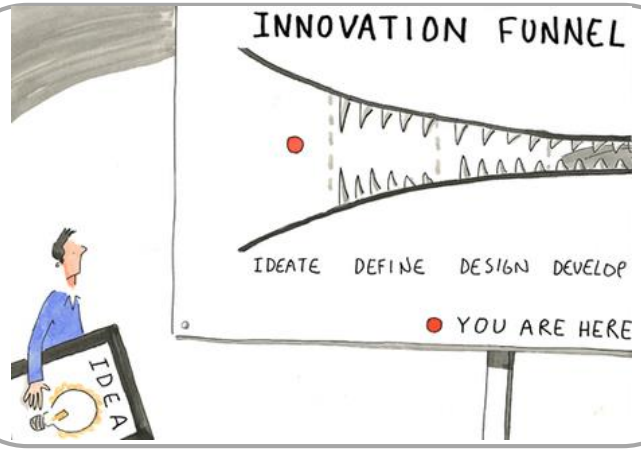
Open innovation

2019

Capture value

Unleash | BESIX

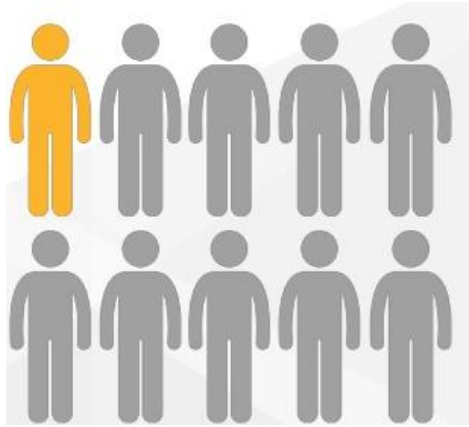
YOUR IDEAS MATTER



From the 436
submitted ideas

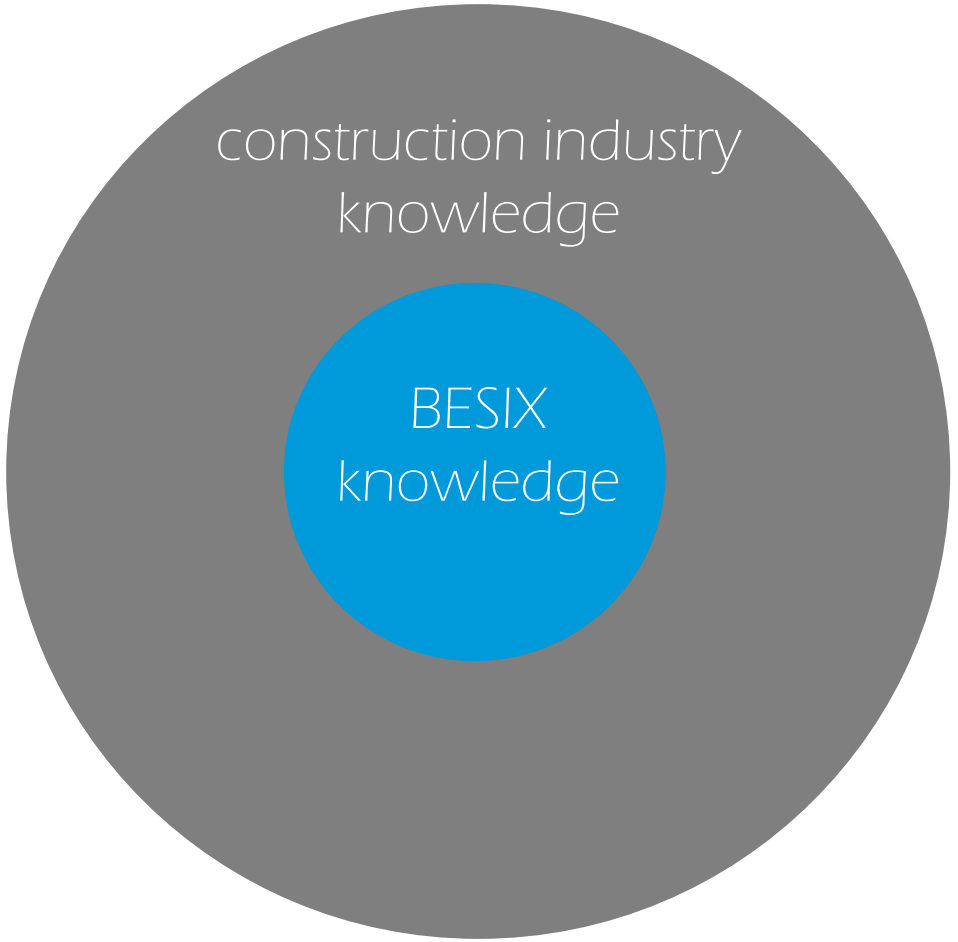
Less than 1%
are disruptive

1 out of 10
startups succeed

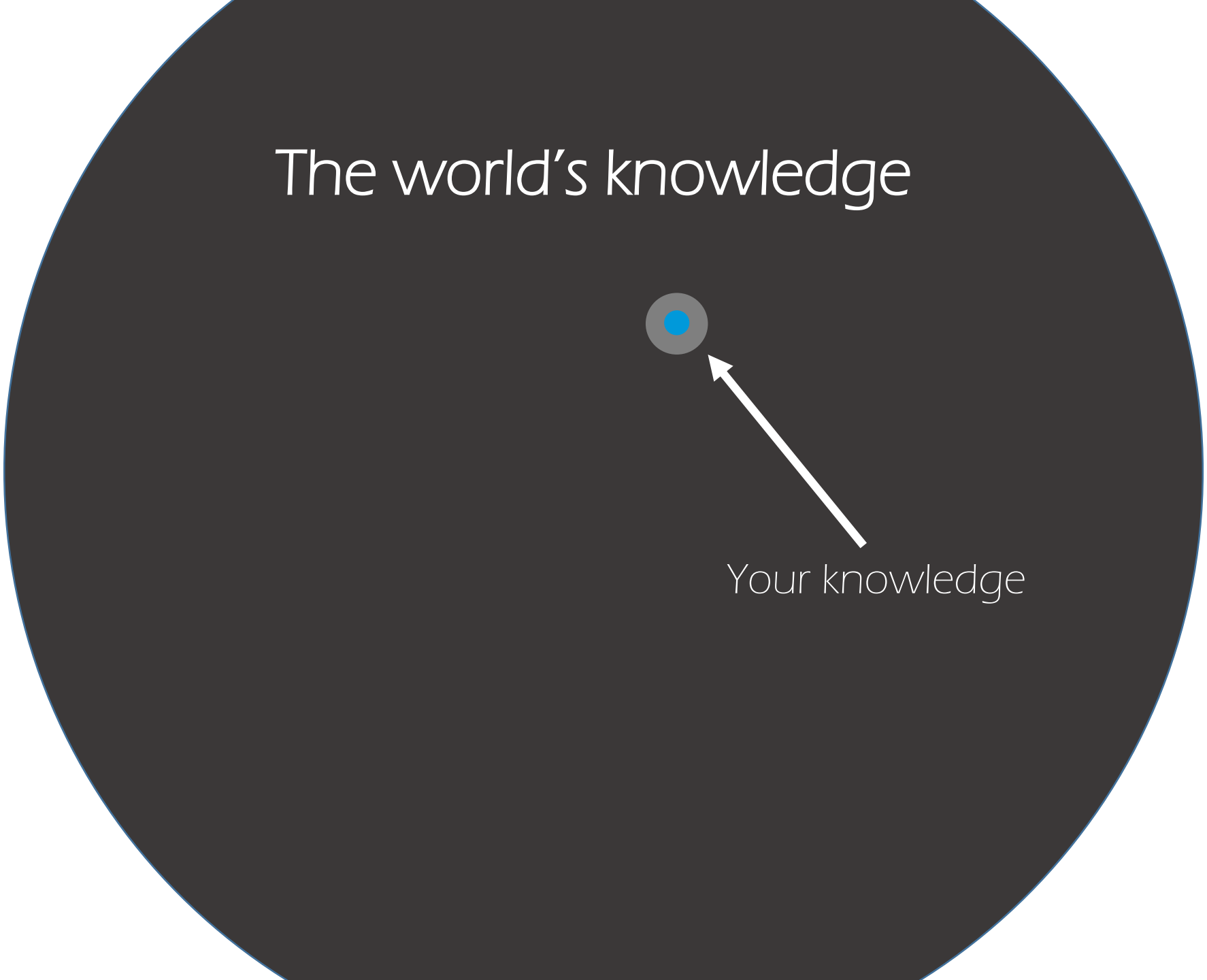


Unleash

BESIX



Unleash | BESIX

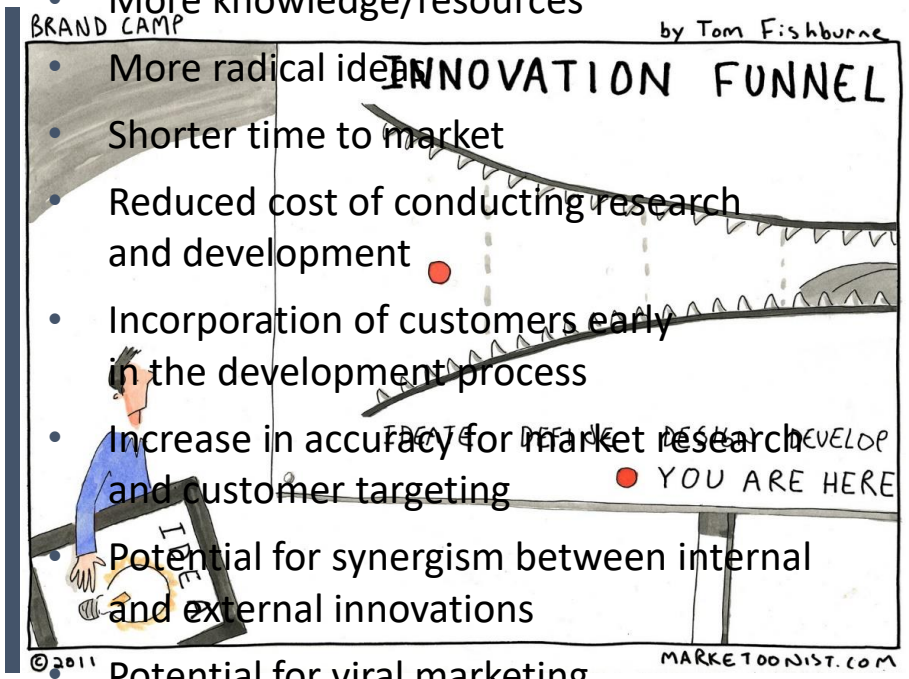


Unleash

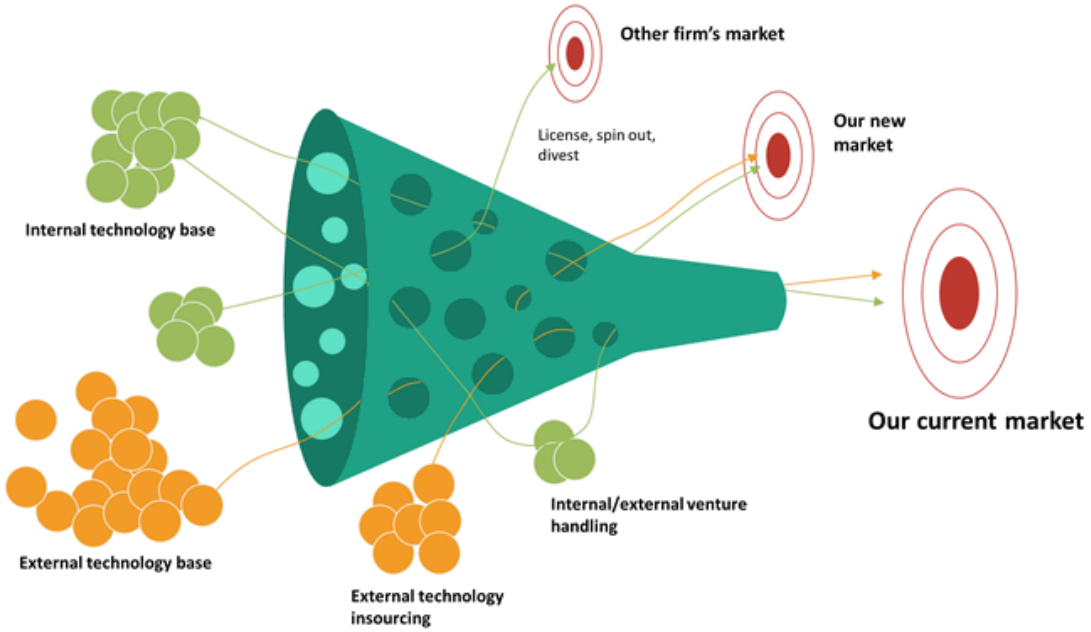
BESIX

What is open innovation?

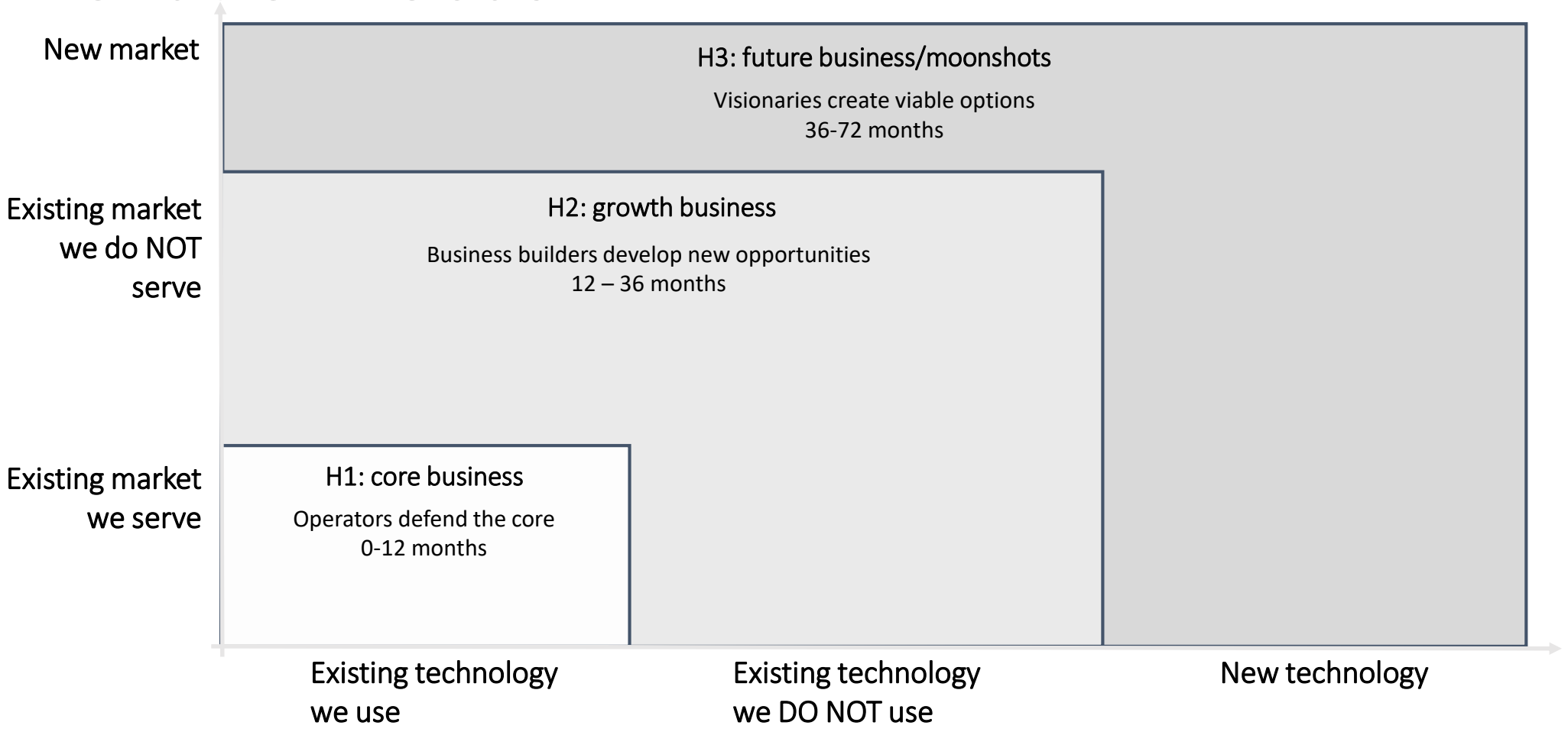
- More knowledge/resources
- More radical ideas
- Shorter time to market
- Reduced cost of conducting research and development
- Incorporation of customers early in the development process
- Increase in accuracy for market research and customer targeting
- Potential for synergism between internal and external innovations
- Potential for viral marketing



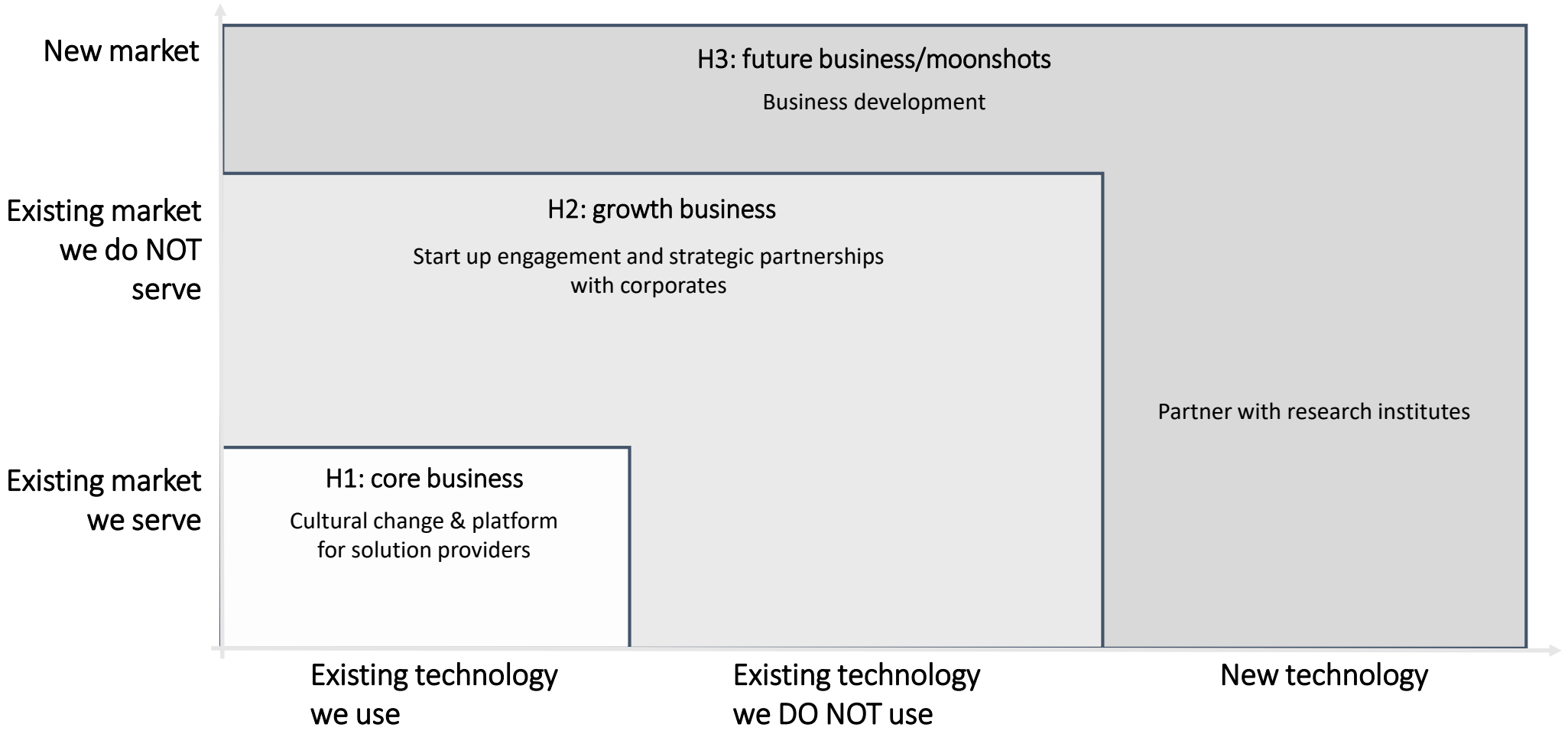
Not solely firm-centric it also includes creative customers and communities of innovators



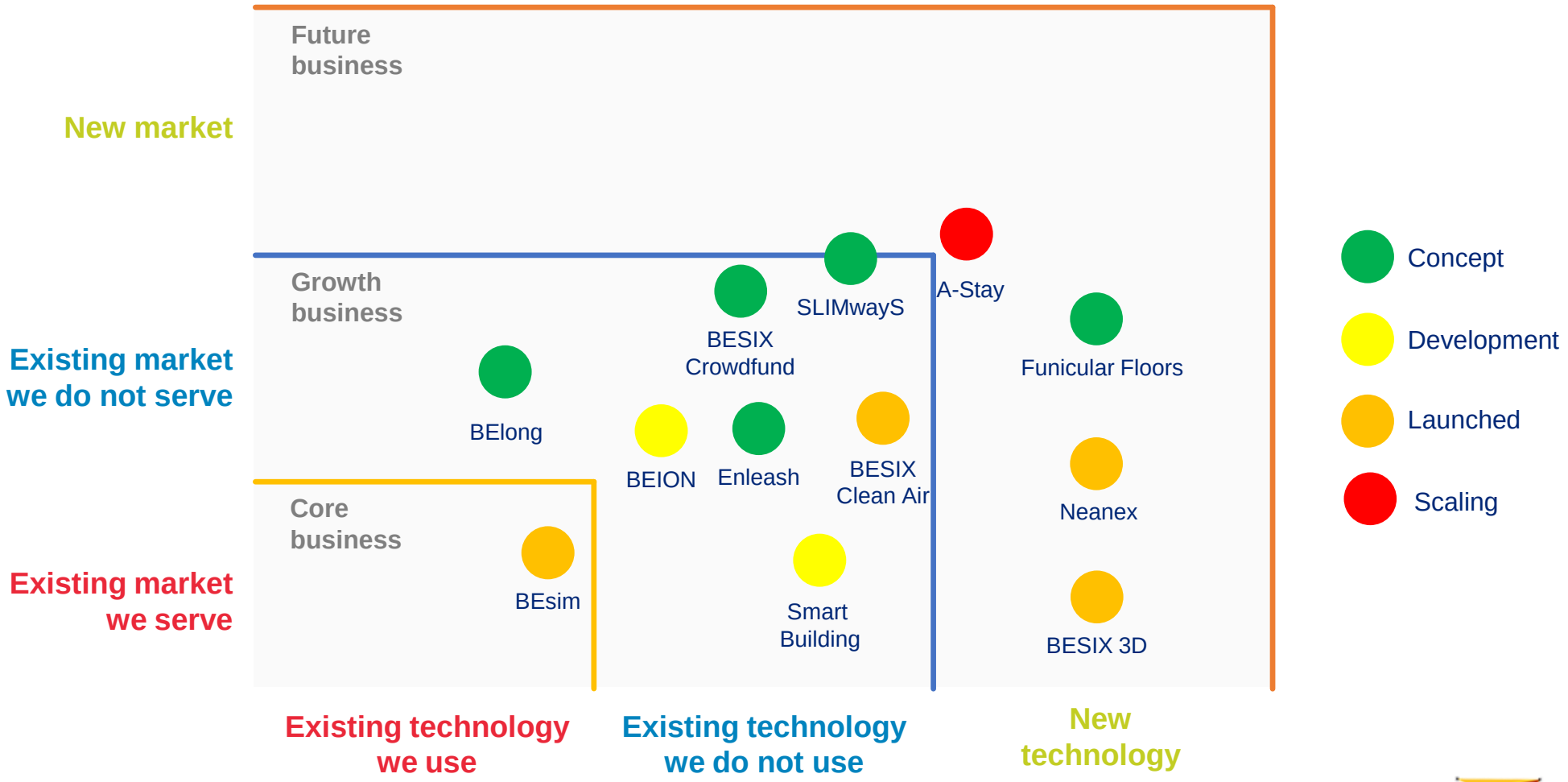
Innovation focus



Innovation focus



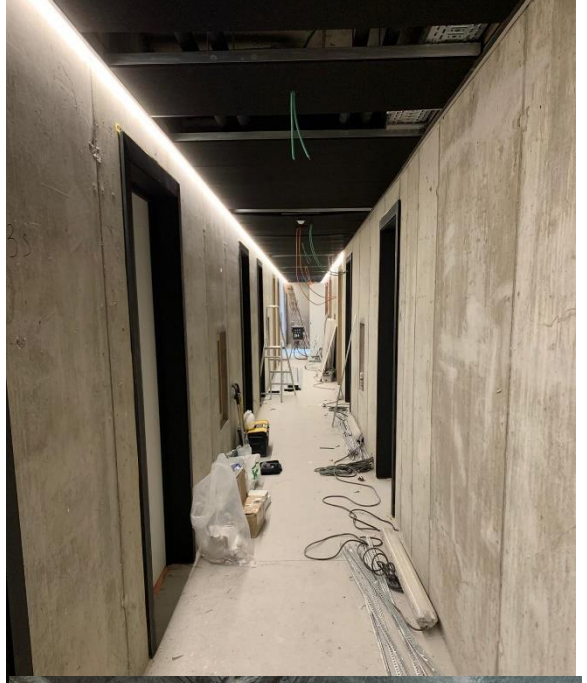
Innovation Group Portfolio

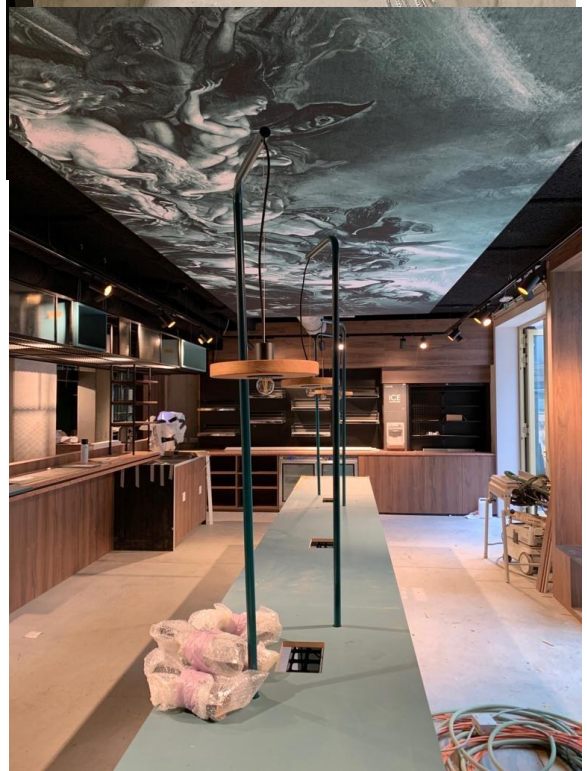


Unleash

BESIX


BESIX





Antwerp
November 15th 2019

2021: Diegem and Chisinau

7000 rooms in 35 cities by 2025

10 accelerated start ups

Scaling

1 design sprints

Product/
Market Fit

Value sustainability

Cash burning
1 → n

10 ideation workshops
1 innovation challenge

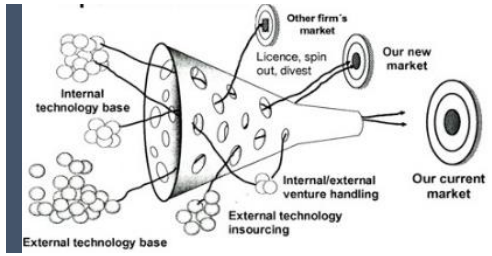
Problem/
Solution Fit

Value capture

Cash preservation
0 → 1

Ideas Stage

Value creation



Focus on prototype validation at each stage

BESIX Start-Ups Accelerator

BESIX Group is launching a start-ups accelerator but… what is it ?

	Accelerator	Incubator
Launch date	2005	1959
Some famous	Y AngelPad; START IT @KBC; Microsoft Accelerator	STATION F; MOLEN Geek; GSL GLOBAL STARTUP LABS; BESTARTER
Target	• Growing start-ups • Mature start-ups	• Early stage start-ups
Financing structure	• Mainly private • Profit center	• Mainly public • Cost center
Type of support	• Office space or virtual • Deep networking • Events & Demo day • Financial support • Dedicated mentoring • Business development,…	• Office space • Limited networking • Some events & Demo day • Generic training support

Our accelerator is the first of its kind in Belgium and one of only a handful in the rest of the world

Type of initiatives	Maturity level of the "acceleration" program: Low	Medium	High
Corporate		EIFFAGE, VINCI, BOUYGUES, acciona	
Private	PROPTECHlab, HOLLAND CONTECH & PROPTECH	IMPULSE LONDON Startups | Accelerator | Innovation	Startup Accelerator CONSTRUCTION & ENERGY by impulse Labs, Dreamit, PLUGANDPLAY
Public		CSTB lab accélérateur de start-up	

The number of start-ups in ConTech & PropTech is rising and…

… mainly “mature” start-ups…

	Business idea	Early stage	Mature	Scale-Up	Unicorn
Main features	• No company • 1 or 2 founders • Concept	• Company created • Problem/Solution fit • Prototype • Test the idea	• Employees rising • Product/market fit • MVP • 1st customers	• Validated BM • Growing phase • Expansion • Customers base • Revenues increase	• <10 years • > 1 Bio USD
Main funding	*Pre-seed (Love money)* • FFF	*Seed (~up to 1 Mio €)* • Business Angels	*Series A (~up to 5Mio €)* • Venture Capitalists	*Series B,C (~up to 20Mio €)* • Venture Capitalists	*Bank loan, IPO,…*
Business maturity					
Risk of failure					

IoT
for Safety on Site

CAD.42
SAFER & SMARTER

IoT for
Energy & Water
Monitoring

FLUVES

Robotic
in Scaffolding
Transportation System

KEWAZO

AI for Project
Delivery Prediction

nPlan

Urban Farming
in Real Estate

PEAS & LOVE

Logistic Coordination
Platform for
Construction Site

PROPERGATE

IoT for
Concrete Monitoring

sensohive

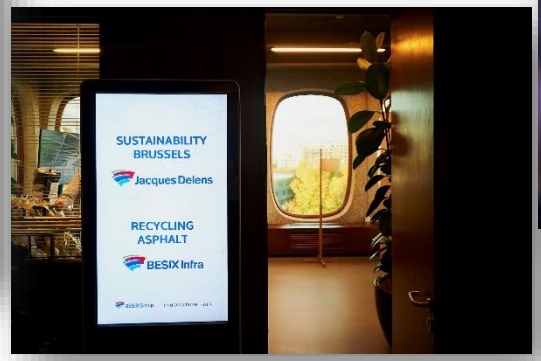
Robotic for
Project Monitoring

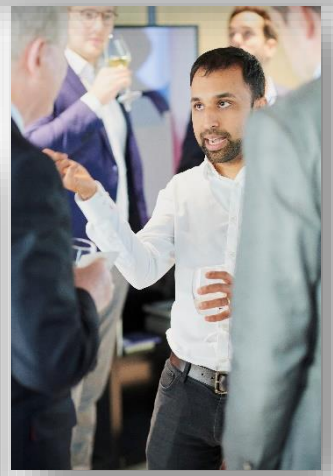
Scaled Robotics

Printed Circuit
on Floor Formwork

SMART CAST
Bâtisseurs d'innovations

Our Innovation Fair of Oct 10th 2019 – 383 guests – 2/3 external





… with 28 stands showcasing how we are innovative…

Ground floor

A-Stay	A-STAY is a fresh, intrinsically urban, any-length accommodation answer to the travelling needs of the millennial generation, with a serious tech twist. We are the co-living home base from which stayers unfold the city	A-STAY UNFOLD THE CITY
Accept Project	ACCEPT an Assistant for quality Check during Construction Execution Processes for energy-efficienT buildings	Jacques Delens · ASCORA · flink2go
BESIX Clean Air	A natural, intelligent solution that purifies the air in busy urban environments	BESIX Group
BIM	Fake it till you build it	BESIX Group
Digital Mapping	Efficient digital geometrical data capture for a better insight of your project	BESIX Group
Lito	Think inside the box! The Litobox® speaks for itself: all the technologies for a comfortable and convenient zero energy home in under 3m²	Litobox
Neanex	Digital Twin Portal for Lean Design and Digital Asset Management from initial design beyond the construction site	neanex
nPlan	We use artificial intelligence to predict the outcomes of construction projects in order to help contractors to identify schedule risks and improve construction planning	nPlan
Peas & Love	We set up farms producing organic food on unused urban spaces to help cities to become smarter, greener, more sustainable and to create more social interactions	PEAS & LOVE
PropChain	Our vision is to bring value to the property ecosystem by reshaping how information is stored, accessed, shared and certified. Ensuring transparency and re-establishing trust	

Scaled Robotics	Our autonomous mobile robot monitors progress and verifies the quality of works on construction sites	Scaled Robotics
Virtual Reality HTC Vive	Emerge yourself into the world of VR, walk around in live-rendered models; make clash checks in coordination models	BESIX Group
Virtual Reality Oculus Go	Wandering around inside 360 videos and photos of your site	BESIX Group
Yust Project	Building industrialized: a new way of collaboration between client, architect, general contractor and subcontractor	Vanhout

8th floor

BeSIM	Site Installation as a Service. One stop shop for sustainable site installation solutions	BESIX Group
BESIX 3D	Bringing concrete to a new dimension	BESIX 3D
BESIX Infra	Recycling asphalt, a new type of asphalt in which recycled materials are used in order to reduce the ecological footprint	BESIX Infra
CAD42	We connect, in real time, workers and machinery in order to optimize safety and operational performance	CAD.42 SAFER & SMARTER
Fluves	An efficient and smart energy & water management in real time through the combination of IoT and cloud solution	FLUVES
Franki Foundations	Digital production within Franki Foundations – Digital foundations with in Franki. The Martello Technique: a revolutionary piling system which enables the construction of large diameter piles in restricted access and low headroom conditions	Franki Foundations

KEWAZO	We provide Liftbot, smart, cost-efficient and safe robotic elevators for transporting scaffolding parts during assembly	KEWAZO
Propergate	We help logistics coordinators with smart assistance to better manage deliveries on construction sites	PROPERGATE
Sensohive	With Maturix, we provide a real-time solution for monitoring the concrete curing process and for optimizing concreting works	sensohive
Smart Building	Data at your service for smart experiences with endless capabilities in a vendor neutral eco-system	BESIX Group
Smartcast	We offer solutions for industrializing floor formworks for improving performance and simplifying the installation of networks for residential buildings	SMART CAST Bâtisseurs d'innovations
Smart Energy	We enable business owners to valorise energy flexibility in their buildings while increasing employee satisfaction	BESIX Group · Enleash · io.E
Sustainability Brussels	Jacques Delens S.A. has developed several innovative solutions to tackle waste generation on their construction sites. The objective is to create new products as from wastes	Jacques Delens

Greenwin 12/12/2019

Quality 4.0

François Lederer – Head of BIM, digital & Sustainable

BESIX Forward
DEEP ROOTS ▸ STRONG WINGS

1 Digitalisation within BESIX

2 Current application – construction 4.0

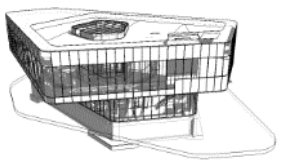
3 Ongoing developments

BESIX Forward

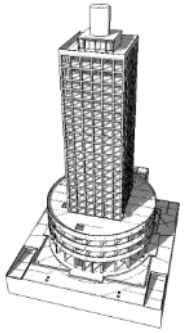
DEEP ROOTS ▶ STRONG WINGS

Digitalisation at BESIX

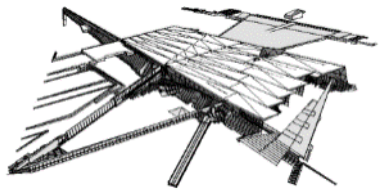
2010
1st External BIM
Regiocentrale Zuid, NLD



2011
1st Tower in execution
Sofaz Tower, AZE



2012
BIM on site with BEP
Grand Egyptian Museum, EGY

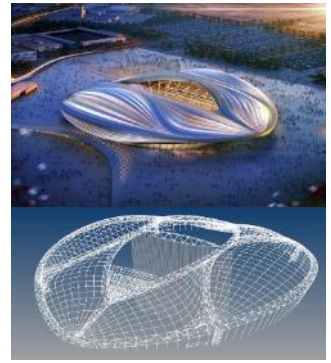


2017
Parametric design
Terraced Tower, NL

2018
PAS 1192-2 Certification
BESIX Group

bsi.
BIM Verified
Design & Construction
Capital/Delivery
PAS 1192-2

2019
5D BIM
Model based manufacturing

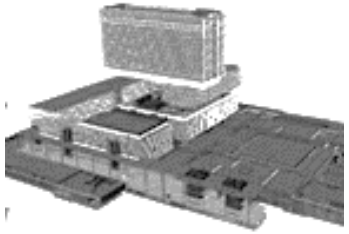


2010

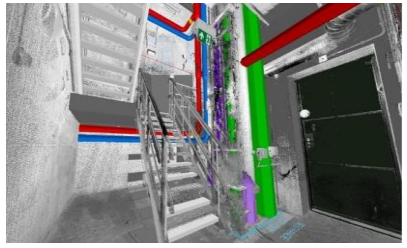
2020

2010
1st Internal BIM
Keersluis Heumen, NLD

2011
1st Mega Project
Cleveland Clinic Abu Dhabi

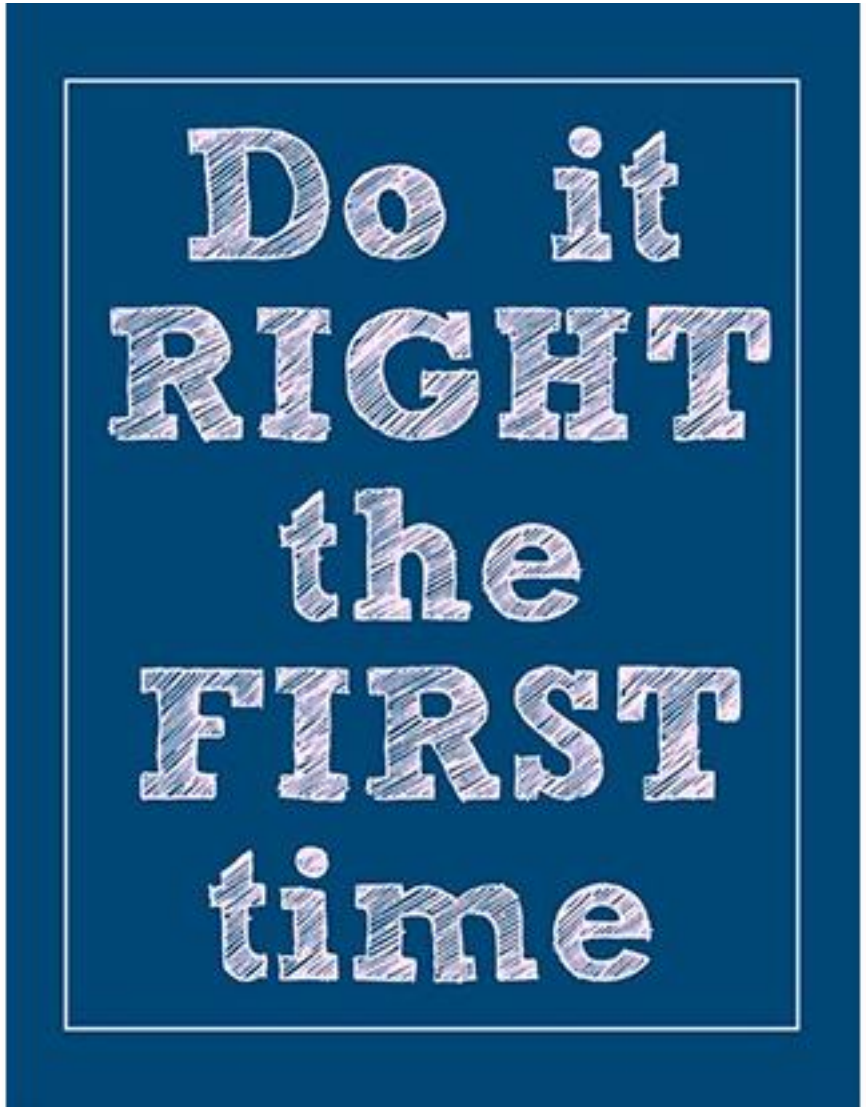


2015
Scan to BIM & SE
Velser Tunnel, NLD



2017
Drones on site

2019
Smartbuilings
Dordrecht, NL


Do it
RIGHT
the
FIRST
time

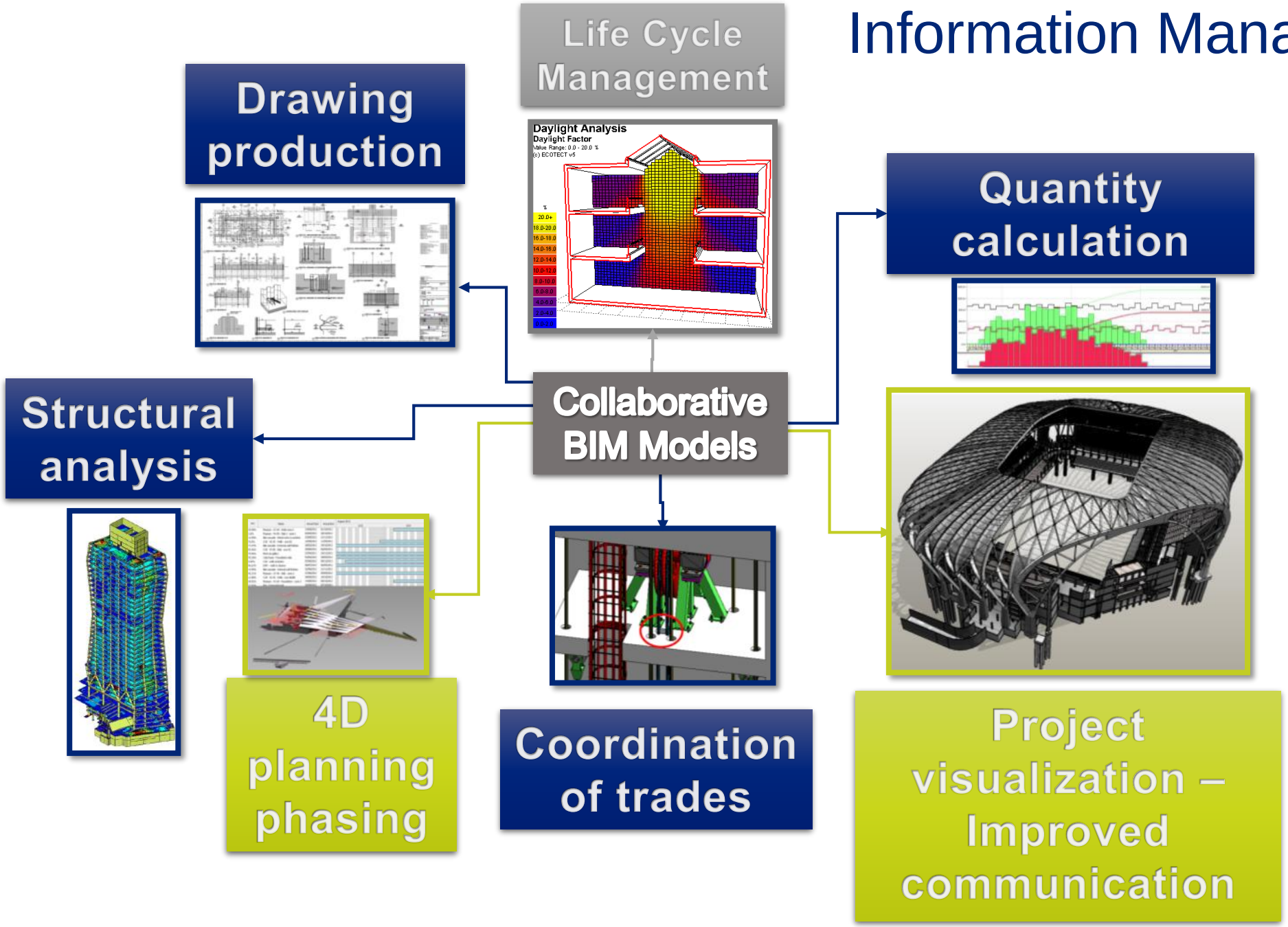
Building Information Management

“Process of generating and managing building data during its life cycle”

- *more than 3D modelling*
- *central data base*

Information Management

BIM



BESIX Digital development paths

- BiM
  - Tools to enhance communication
  - Integration of BIM into our ERP
  - Automation & parametric design
  - Create more « accurate » data
  - Digital sites
- BIM
  - Augmented reality
  - BIM for Facility Management
  - Smartbuildings

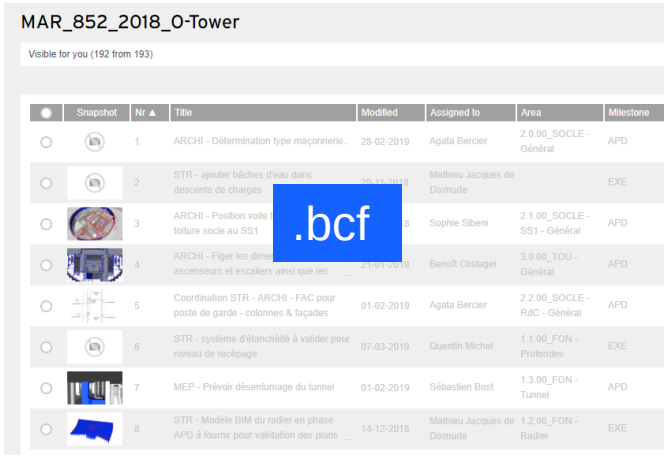
BESIX Forward
DEEP ROOTS ▶ STRONG WINGS

Current applications

- Tools to enhance communication
  - During design
    - Centralize issue
    - Enhance insight
    - Put right focus

BIMcollab

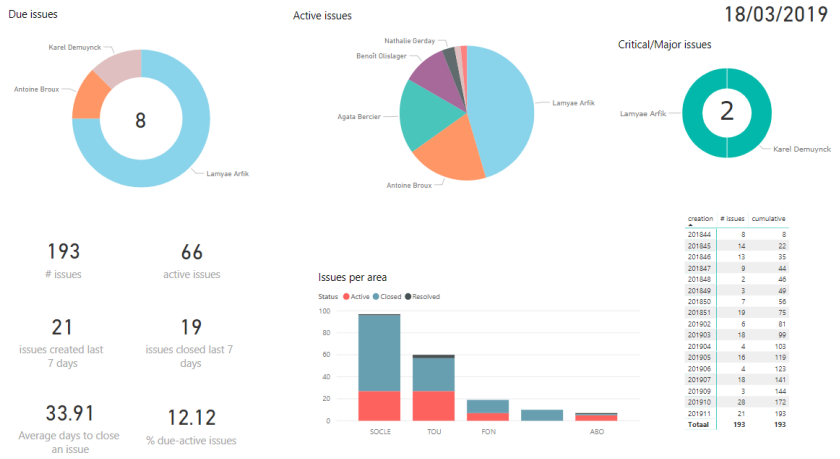
Coordination tool



Data

Power BI

Data Analysis tool



BESIX Forward

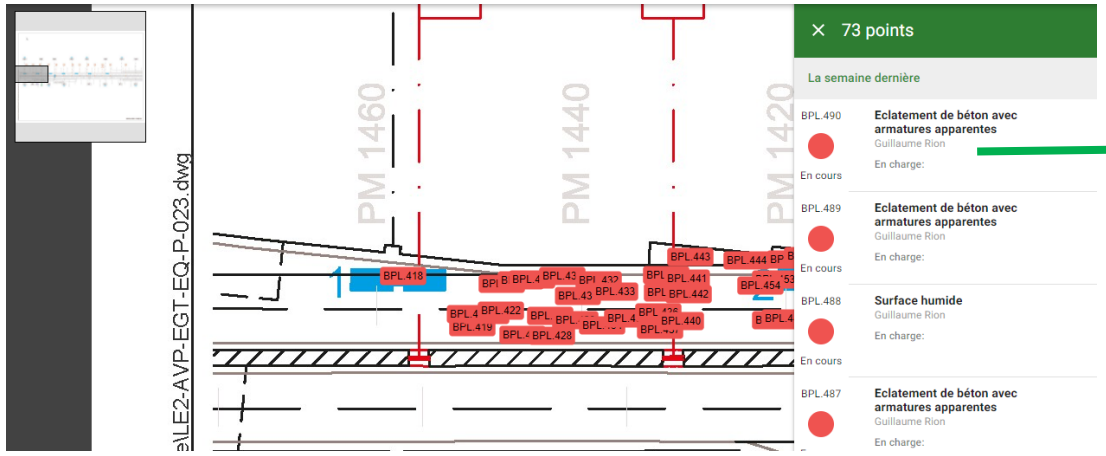
DEEP ROOTS ▶ STRONG WINGS

Current applications

- Tools to enhance communication

APROPLAN

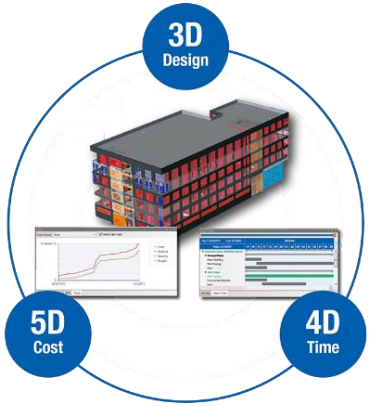
  - During construction
    - Snagging
    - Quality checks & inspection forms

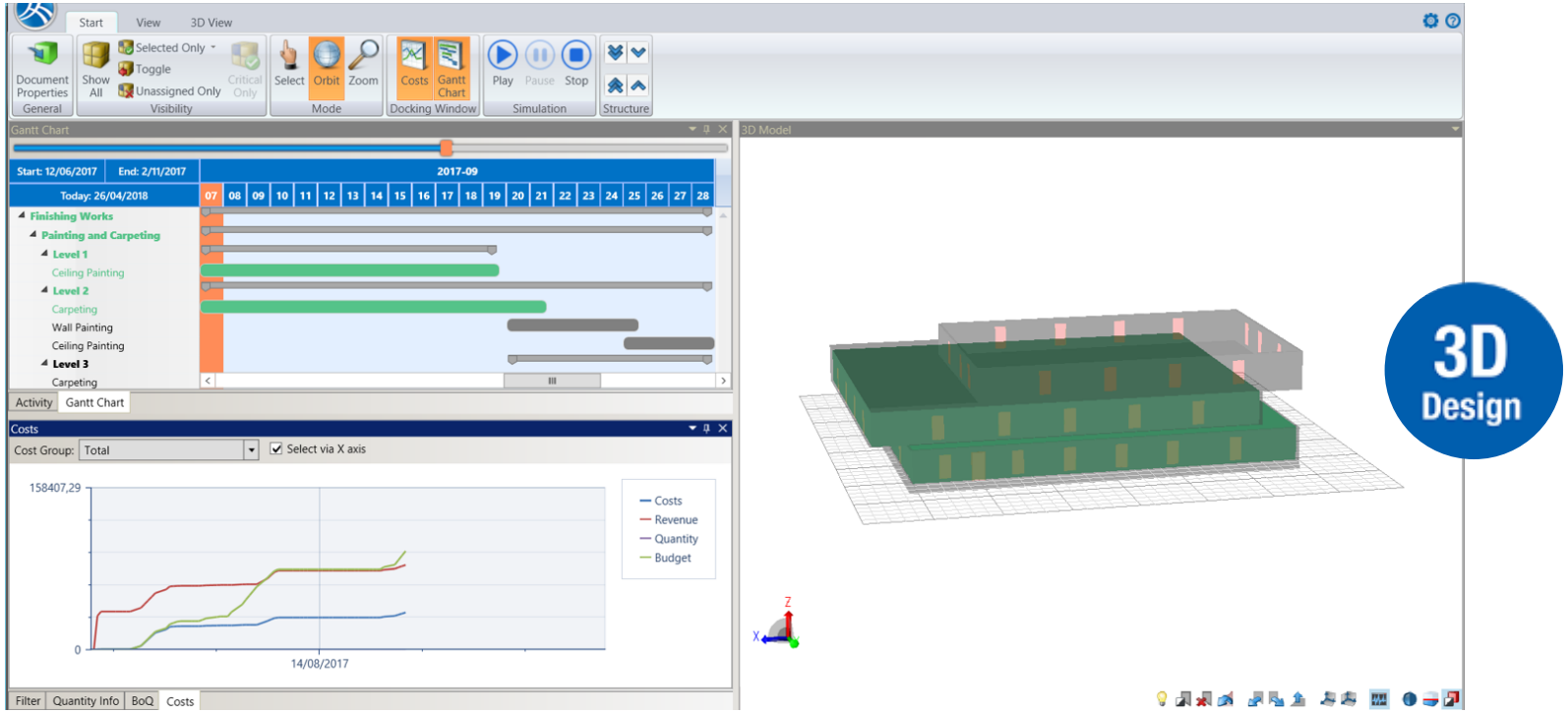


BESIX Forward
DEEP ROOTS ▶ STRONG WINGS

Current applications

- BIM = core of our ERP

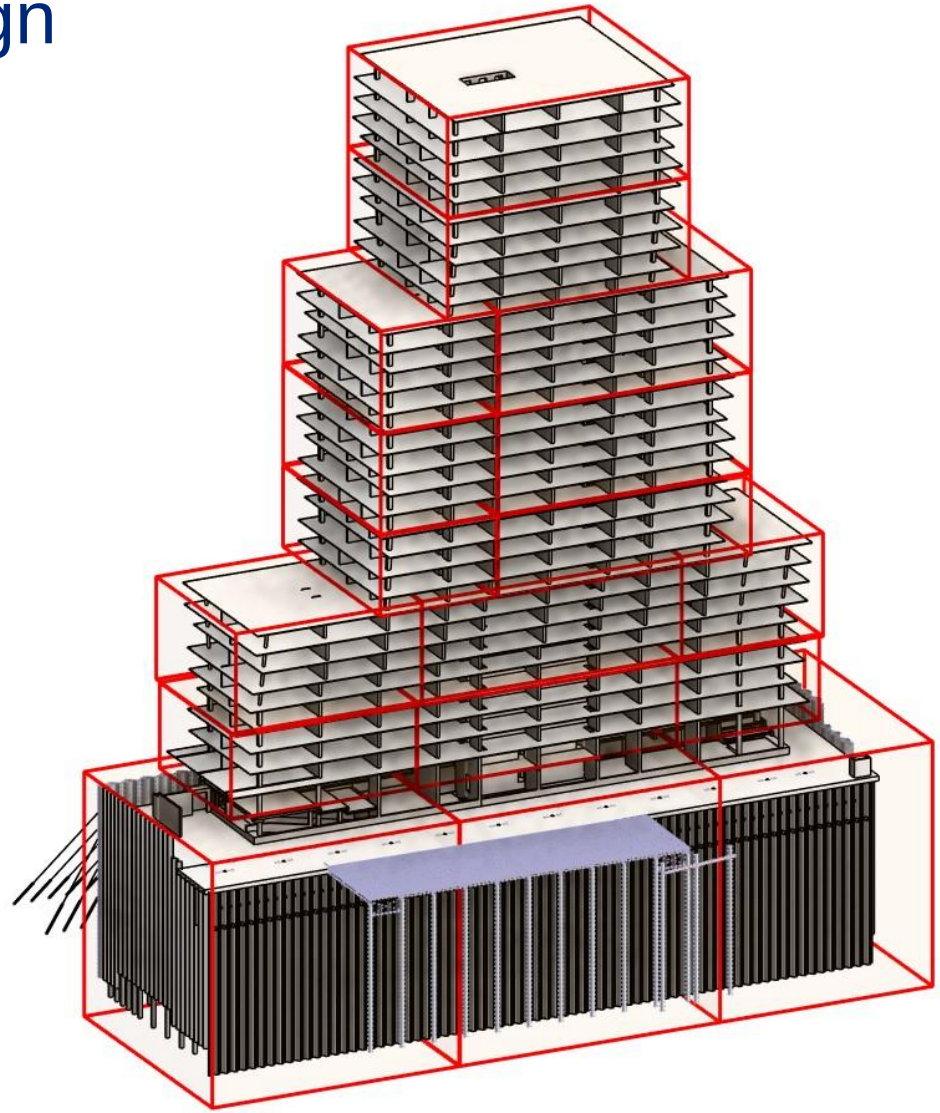




BESIX Forward
DEEP ROOTS ▶ STRONG WINGS

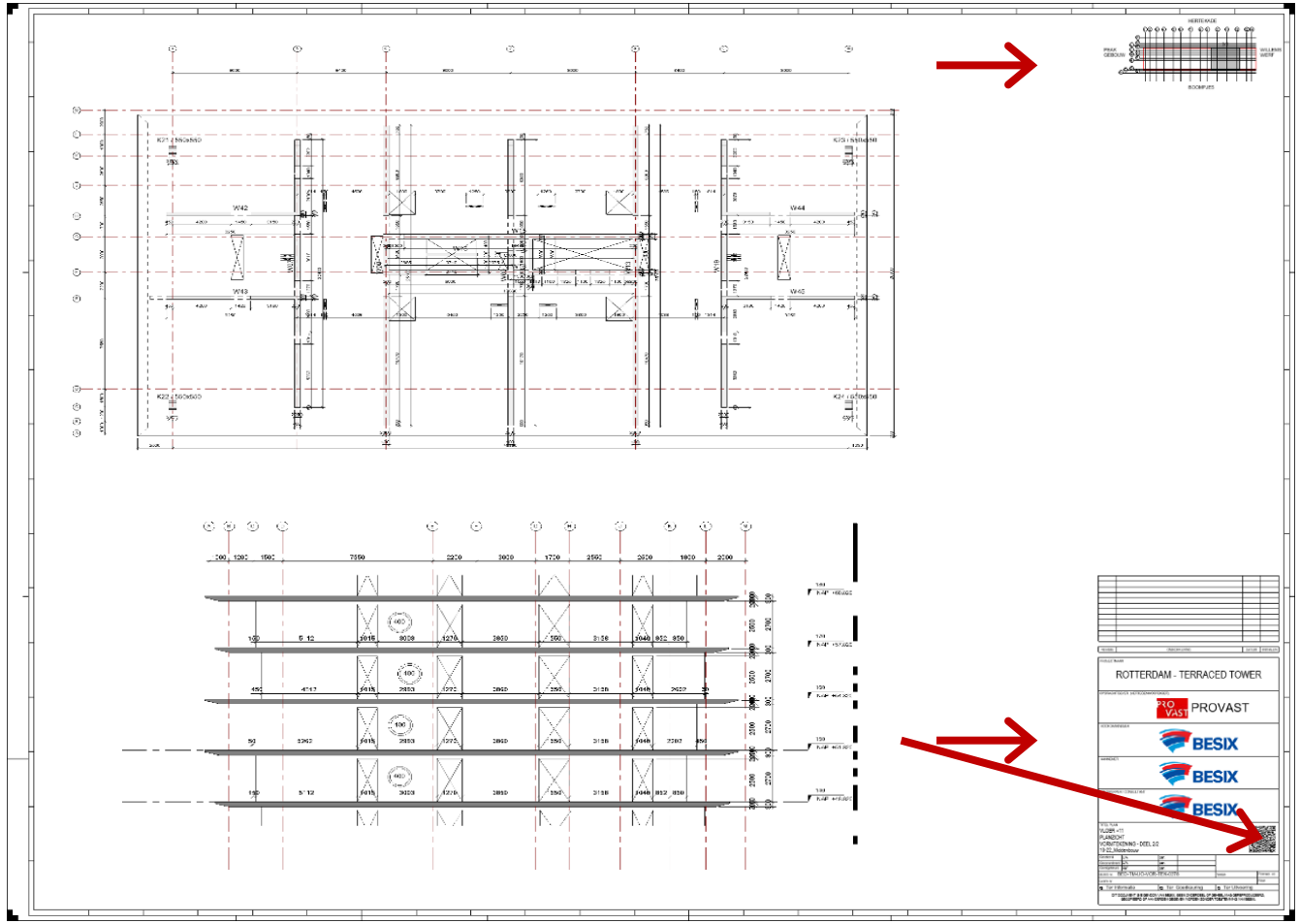
Current applications

- Automation and parametric design



Current applications

- Automation and parametric design
  - Sheets are swiftly created
  - Sheet and title block values are filled in correctly
  - Automatic tags and dimensions
  - QR codes are automatically generated and placed
  - Views places on sheets



BESIX Forward
DEEP ROOTS ▶ STRONG WINGS

Current applications

Use computational power to enhance the design workflow.

Input

- Parameters
- Constraints
- Relations

Algorithm

Grasshopper

python

C#

Dynamo

Output

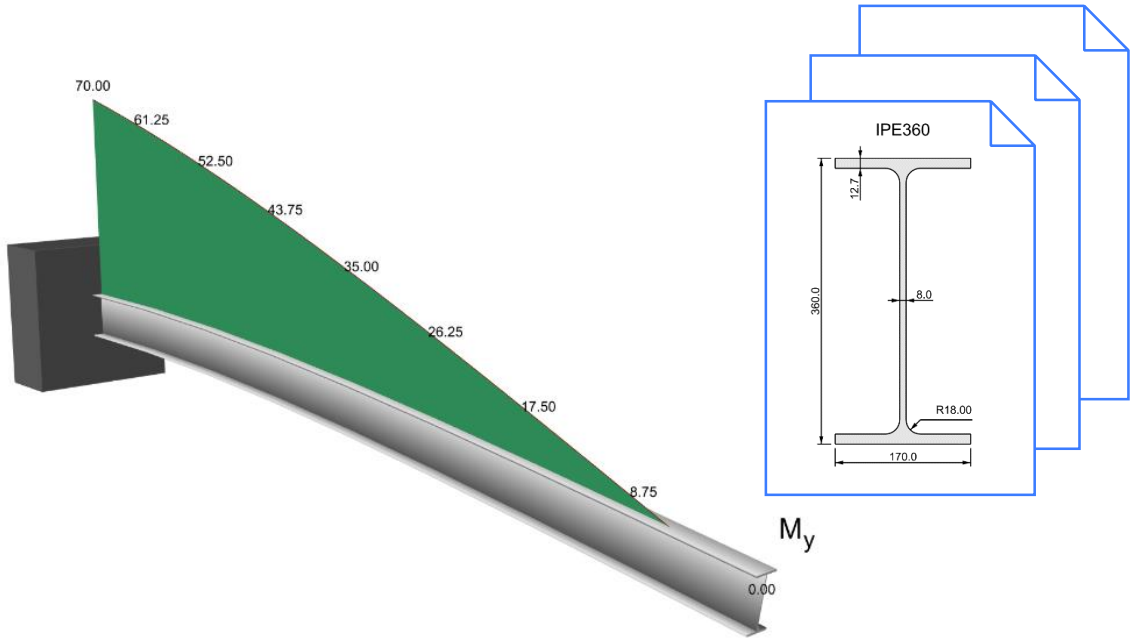
- Parametric model
- Reports
- Analysis

Optimize

Vizualize results

Automate

Be agile



Current applications

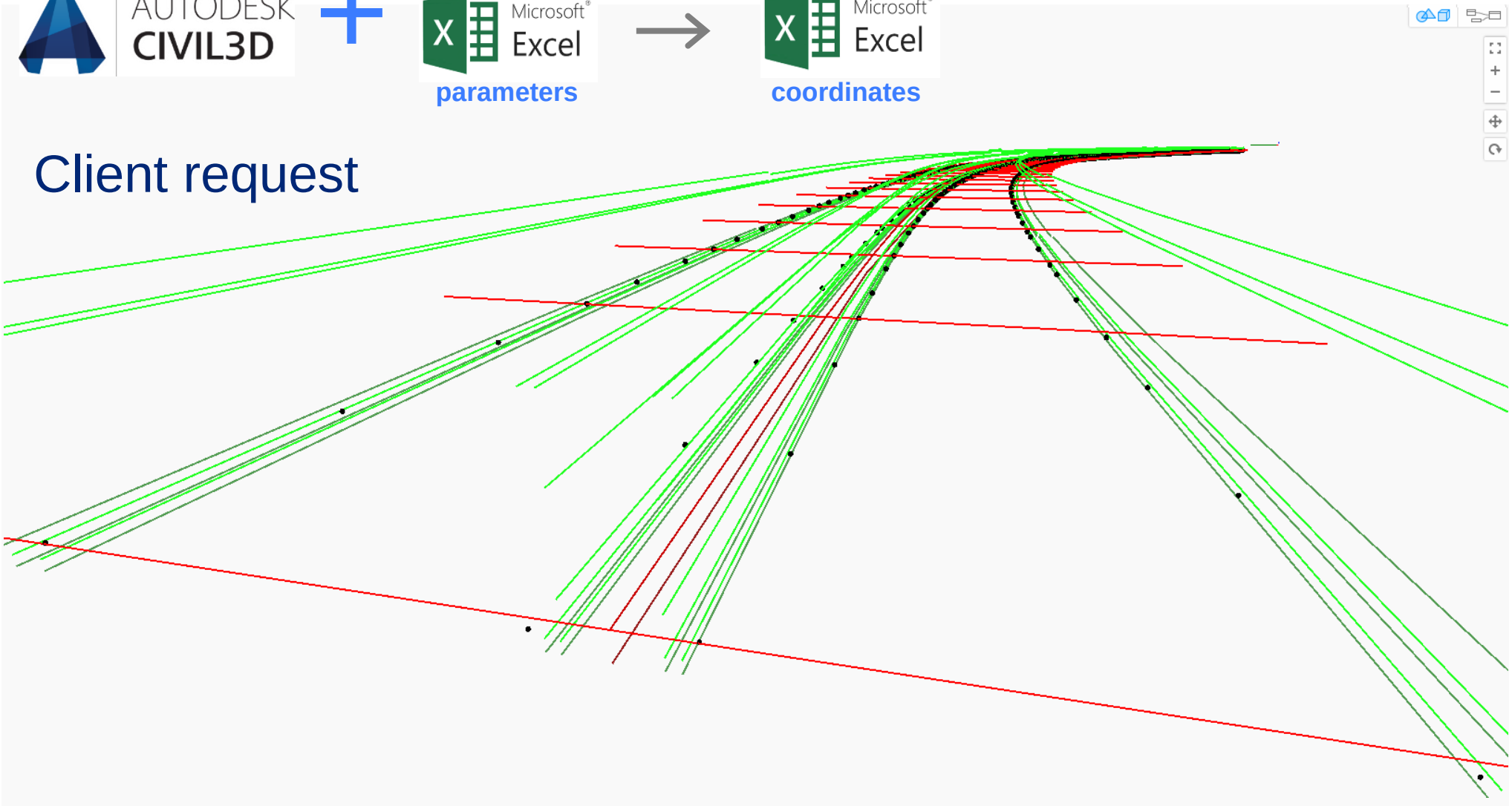
Current applications

AUTODESK CIVIL3D + Microsoft Excel → Microsoft Excel

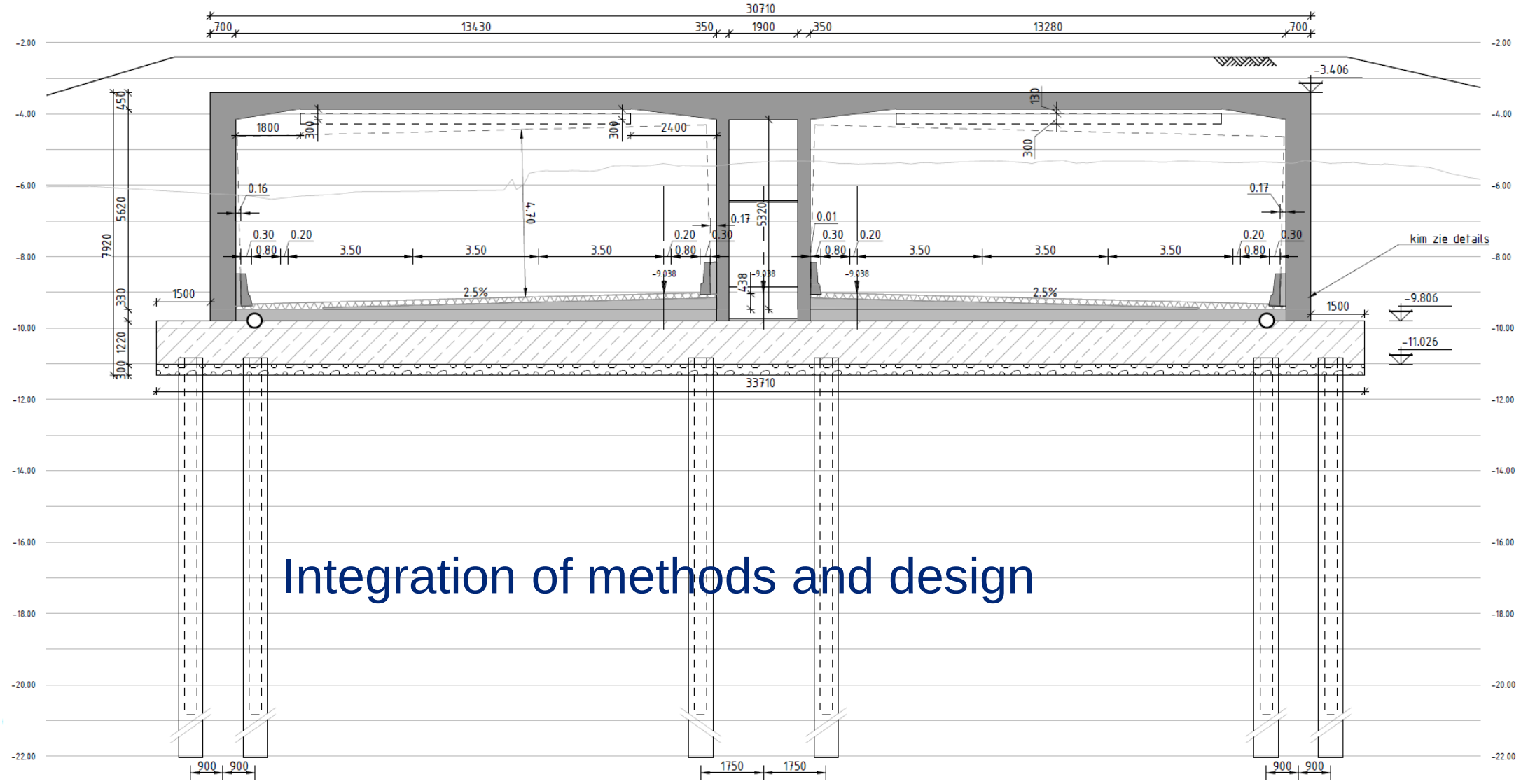
parameters

coordinates

Client request



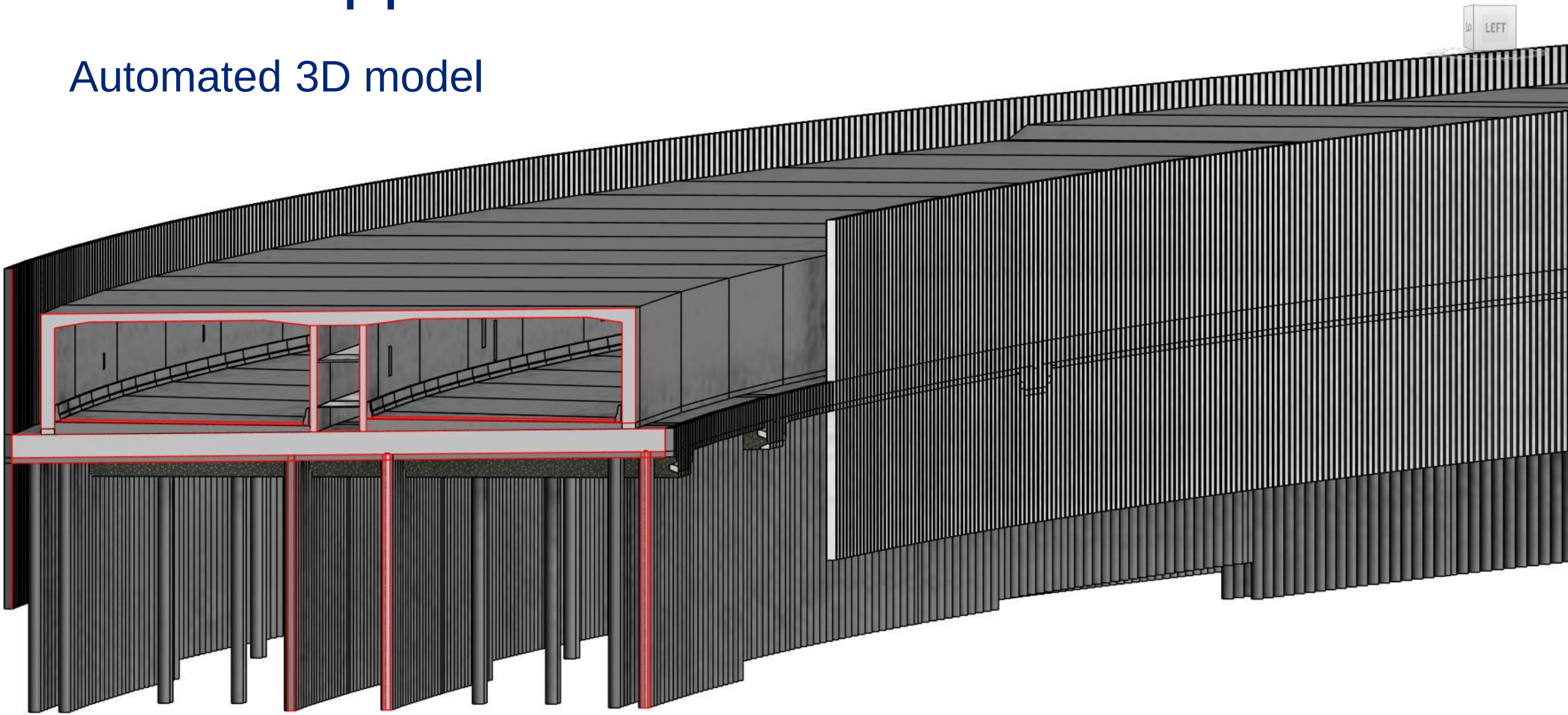
Current applications



Integration of methods and design

Current applications

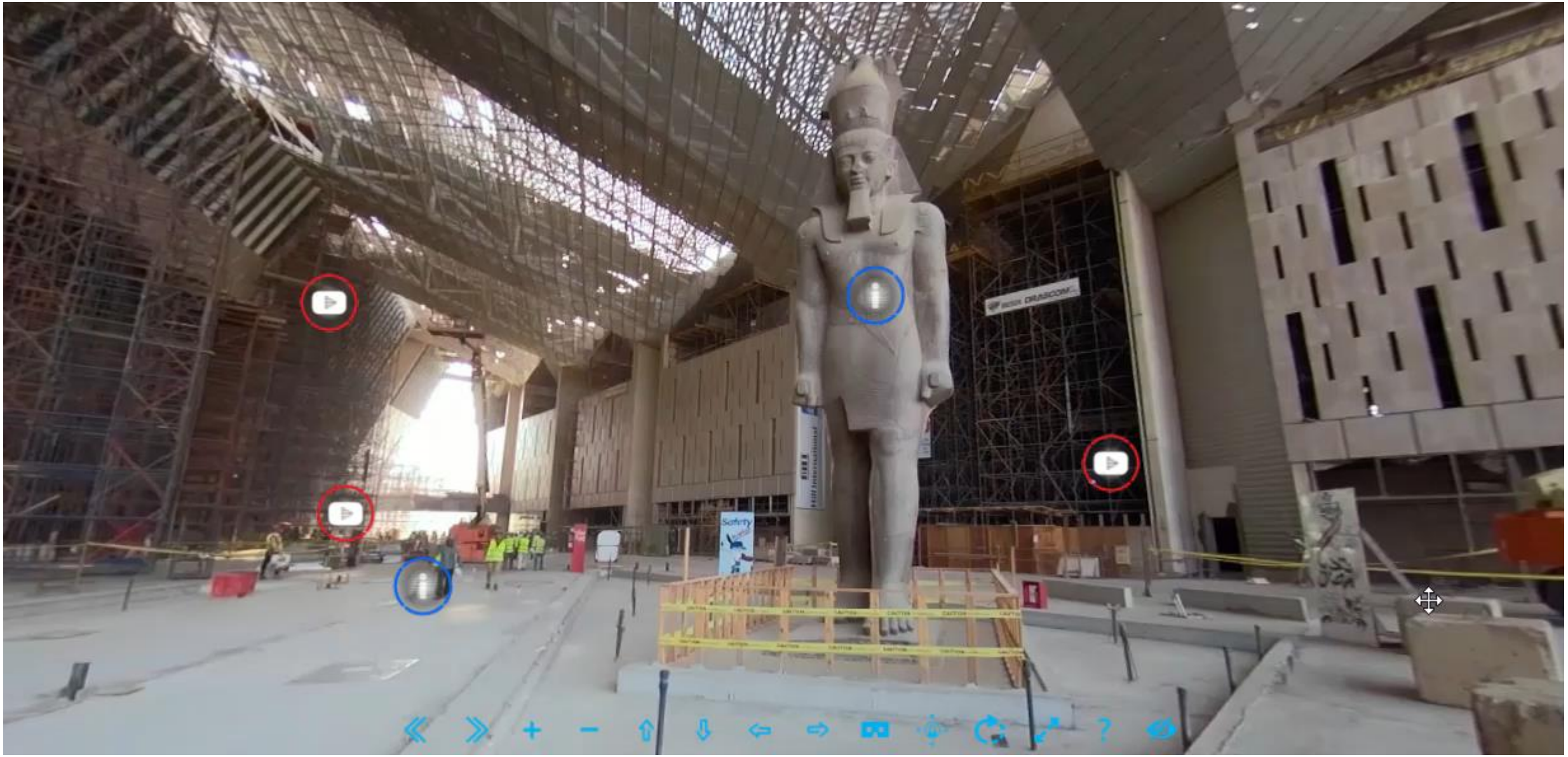
Automated 3D model



Current applications

- Digital Mapping
  - Map more, more often, faster and cheaper
    - Drones
    - SLAM - Simuleaneous Localization and Mapping
  - Give access to data
  - Challenges:
    - Exchange of large amount of data
    - Add intelligence to the model
    - Enhance access to the information
    - Compare asbuilt to BIM model (progress reporting, deviations,..)

BESIX Forward
DEEP ROOTS ▸ STRONG WINGS



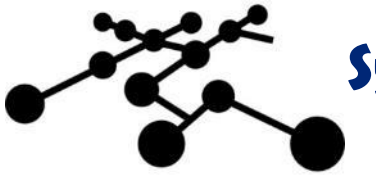
BESIX Forward
DEEP ROOTS ▸ STRONG WINGS

Current developments

Design Platform

BIM on field

Augmented/Virtual Reality

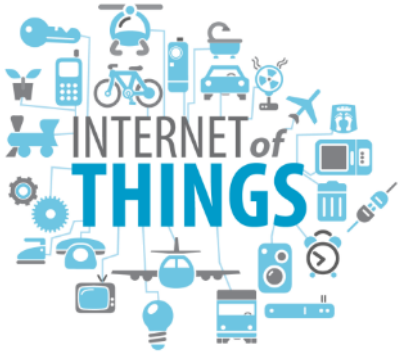


System Engineering

Drones / Lidar

3D/4D Printing

Internet of things



BIM & GIS

Digital sites - Current pilot projects

***3** LEVELS &*
***3** FIELDS OF OPERATIONS DATA*

1. Paper & “Silo’s”
- Manual input on paper
- Indirect data processing
- Excel reporting; multiple sources of truth = data silo’s

2. Mobile & Central
- Manual input on mobile devises
- Direct data processing
- Cloud/Digital reporting; single source of truth

3. Automatic & Big Data
- Automatic input via cloud
- Direct BIG data processing
- Cloud/Digital reporting; single source of truth

A. Material & Logistics

Logistics Log

PROPERGATE

RFID tagging, …

B. Equipment & Manpower

PERFORM

PERFORM

CAD.42 SAFER & SMARTER

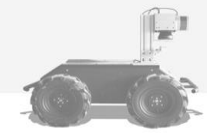
wakecap

C. Activities & Progress

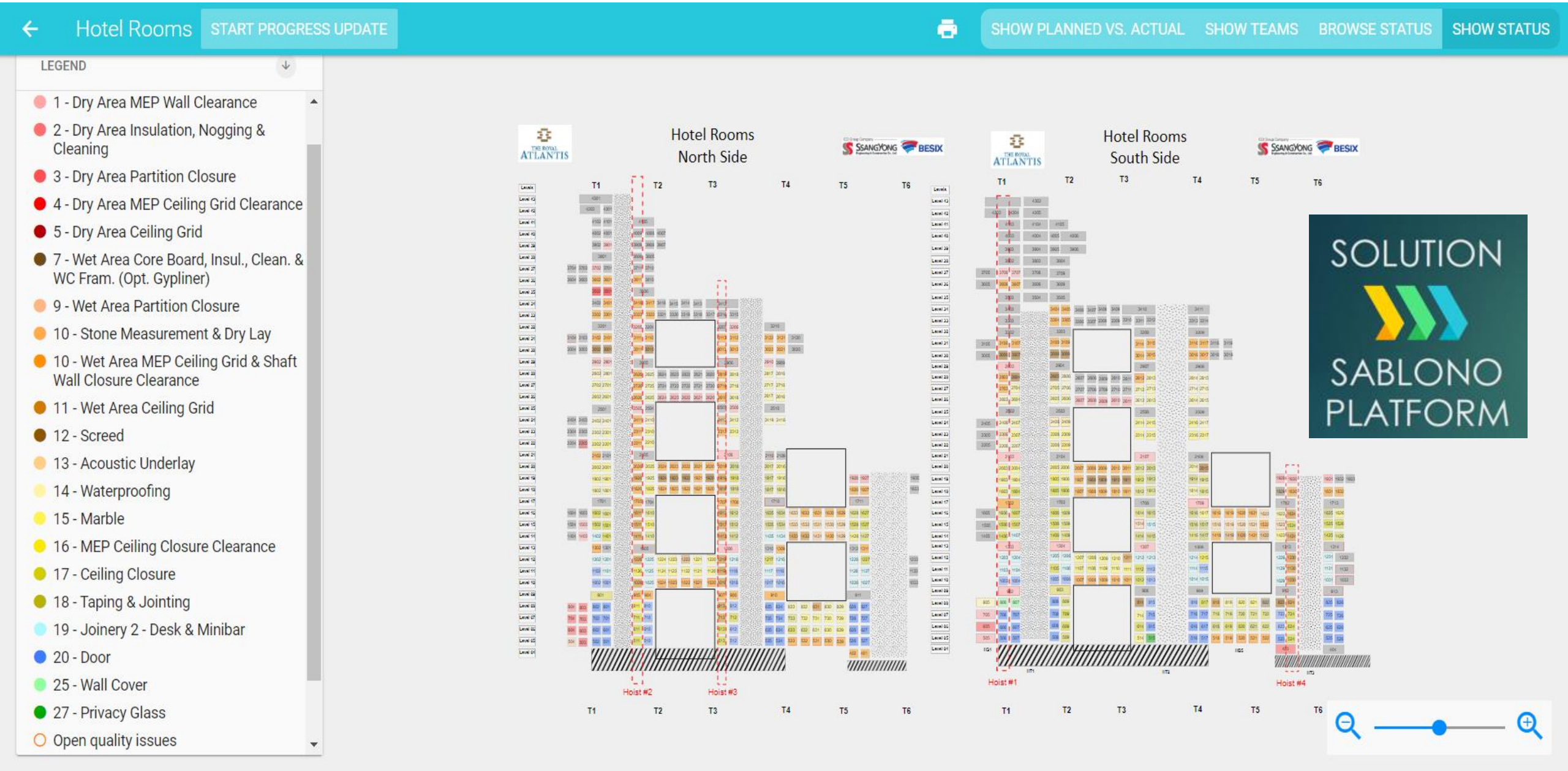
Weekly Progress Report

SABLONO

Scaled Robotics
Digitising the construction site



Progress – 2D/3D Visualizations.



Progress – 2D/3D Visualizations.

Hotel Rooms START PROGRESS

Search for an activity

Wet Area MEP Ceiling Grid & Shaft Wall Closure Clearance
Hotel Rooms

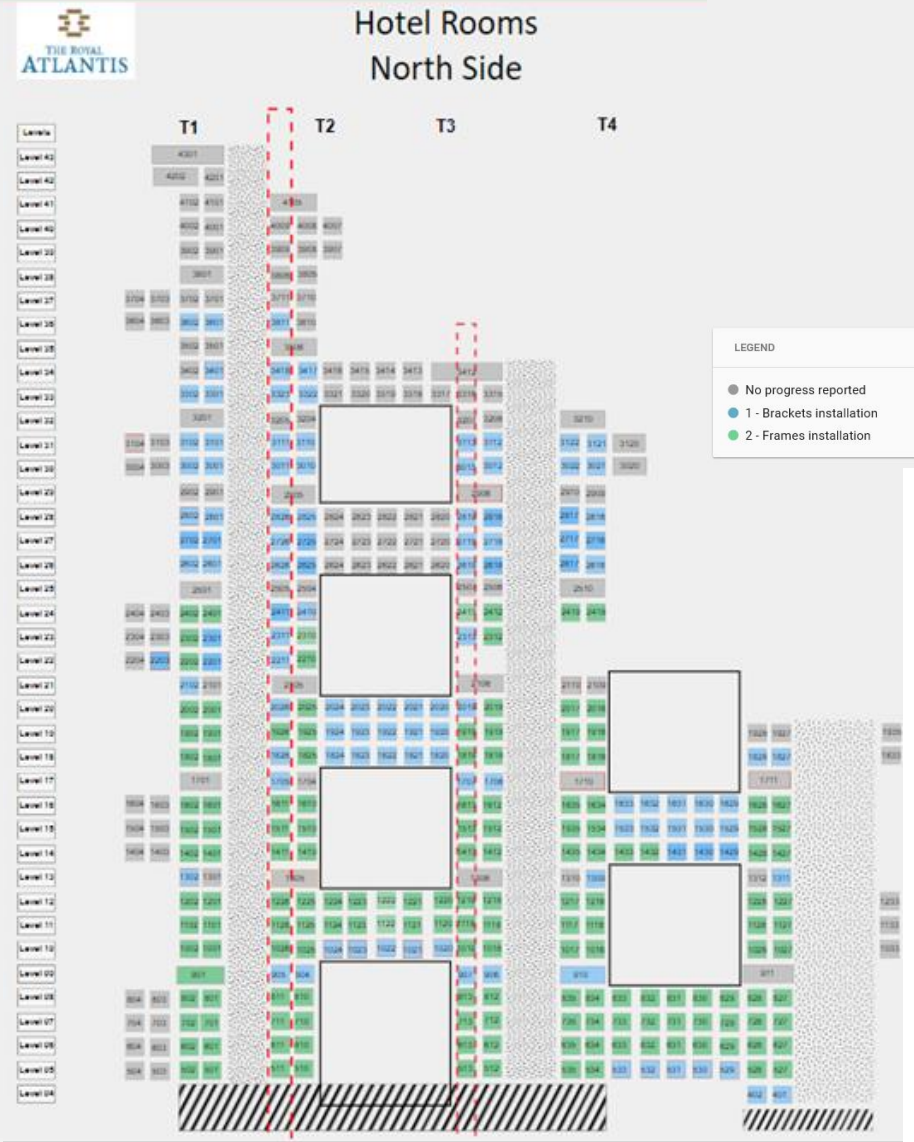
Wet Area Ceiling Grid
Hotel Rooms

Screed
Hotel Rooms

Acoustic Underlay

LEGEND

- Activity not applicable
- Not started
- Available - All predecessors finished
- Started
- Waiting for confirmation
- Rejected
- Finished & Confirmed
- Open obstructions
- Open quality issues

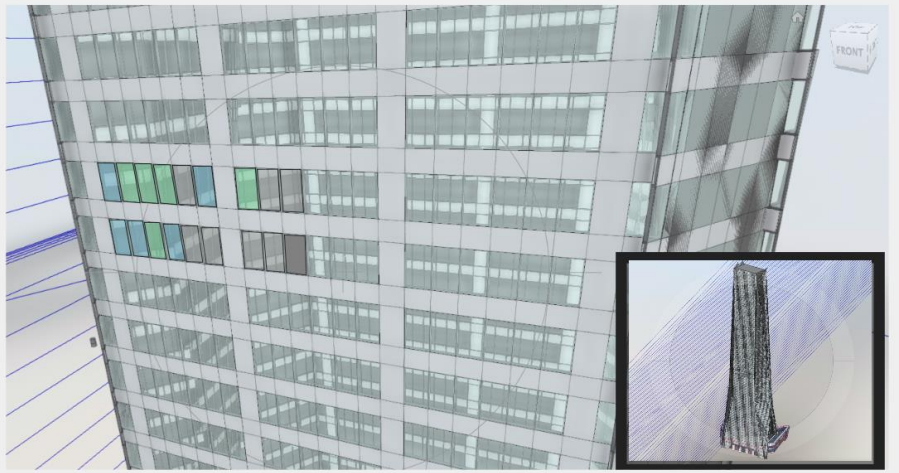


2D Progress Visualization

Facade Panels START PROGRESS UPDATE SHOW PLANNED VS. ACTUAL

Uptown Dubai P1 - Facade Progress

L20 -
L19 -



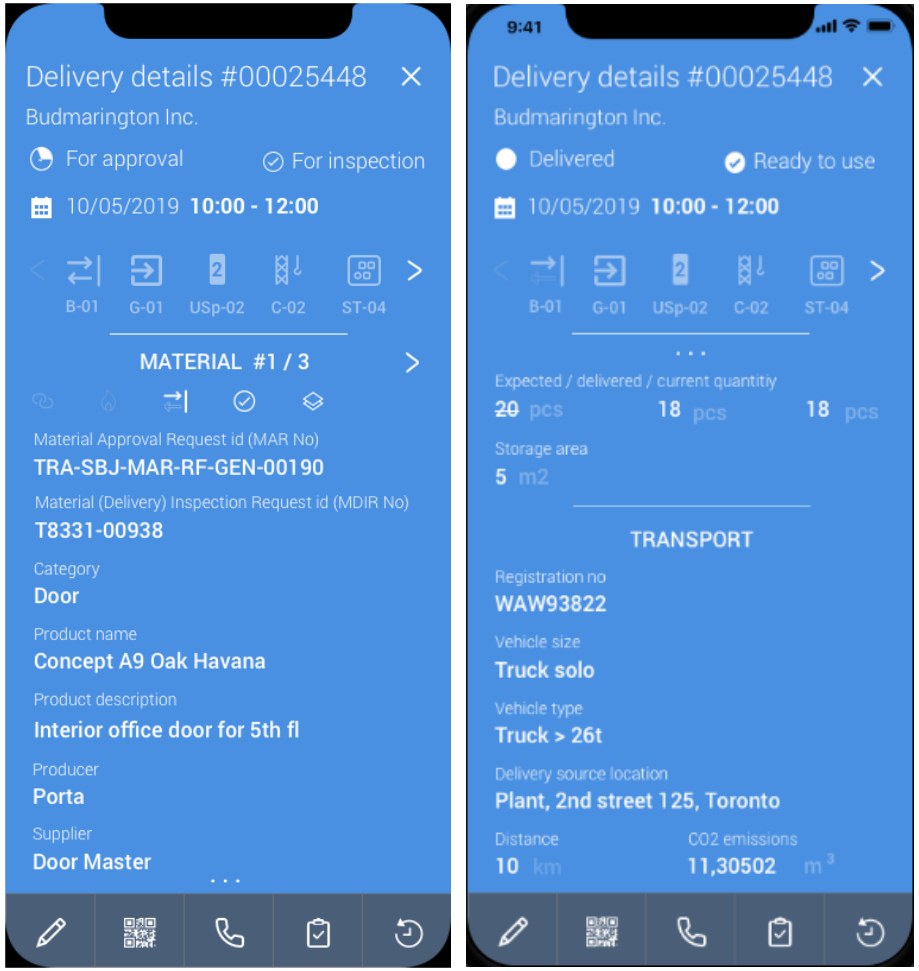
LEGEND

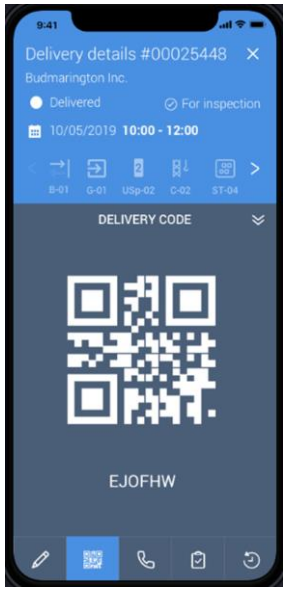
- No progress reported
- 1 - Brackets installation
- 2 - Frames installation

SOLUTION
SABLONO PLATFORM

Ongoing developments

- Just-in-time delivery





What is WakeCap?

WakeCap is a solution that allows to connect workers by simply wearing a hardhat!

WakeCap is a **safety & tracking** device integrated with construction helmets to provide real-time, cloud-based visibility into worker **attendance**, **location** and **accidents**

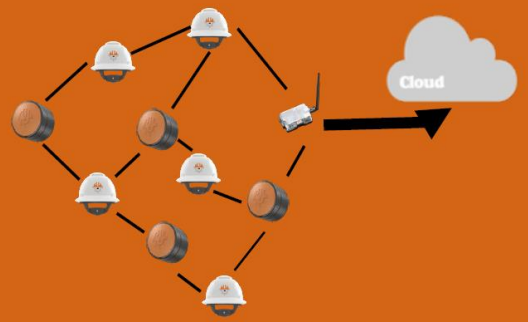
> **First-of-its-kind** solution to **overcome** all the challenges in digitizing the construction sector

HOW IT WORKS

Integrated Sensors + Wireless Mesh-Network

Sensors are integrated **seamlessly** with a construction hardhat without compromising the structural integrity of the helmet

wakecap



Nodes are placed across the jobsite to **expand connectivity** using a proprietary mesh network and to stream to the cloud via a gateway

USES CASES
CONSTRUCTION

Automate Attendance

Skip manual headcounts and tedious paperwork with automated workforce logistics; no more long check-in/out queues.

Evacuate Worksite Effectively

Alarm all workers on site simultaneously on their WakeCap hardhats no matter where they are located on the site.

Detect Falls Automatically

An accelerometer detects if any of your workers falls, slips or trips and alerts the response team in real-time for faster emergency response time.

Prevent Unauthorized Access

Your workers receive automatic alerts when entering pre-defined danger zones or unauthorized worksite areas

wakecap

BENEFITS

Intuitive
Requires zero worker training

Real-Time Communication
Two-way worker-management alerts in real-time

Intelligent
Collects data about your workers and processes it for you on an easy to read dashboard

Scalable
Scalable to be deployed across different types/sizes of construction sites

Seamless Integration
Works seamlessly with a construction hardhat without compromising the structural integrity of the helmet

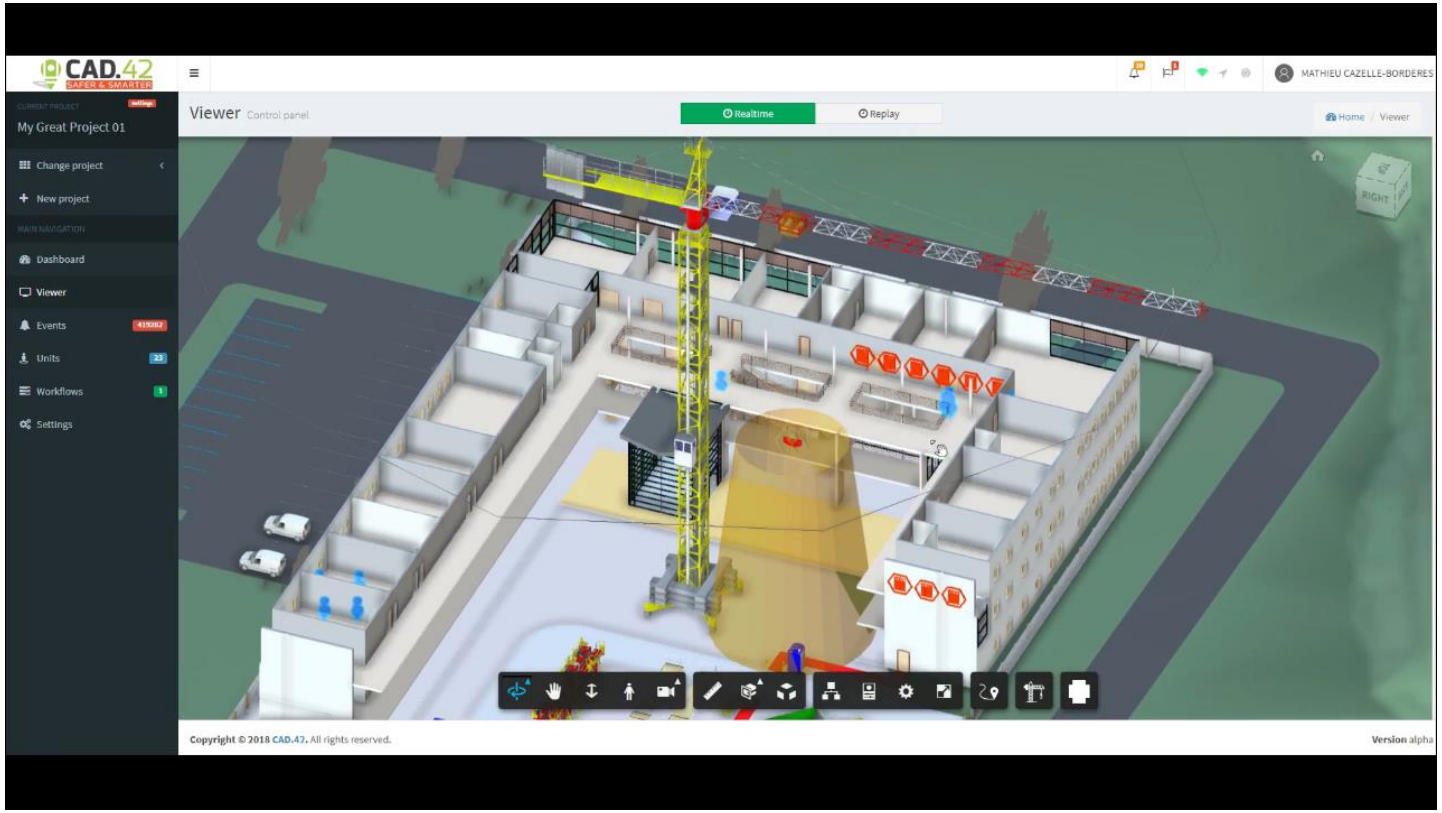
Easy to Install
Installed around construction site and functioning in less than an hour

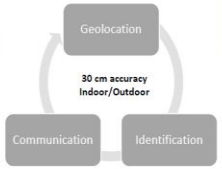
Low Maintenance
Year-long battery and minimal IT intervention

Non Intrusive
Does not obstruct worker's activity

Ongoing developments

- Wearables for Health & Safety + tracking





Ongoing developments

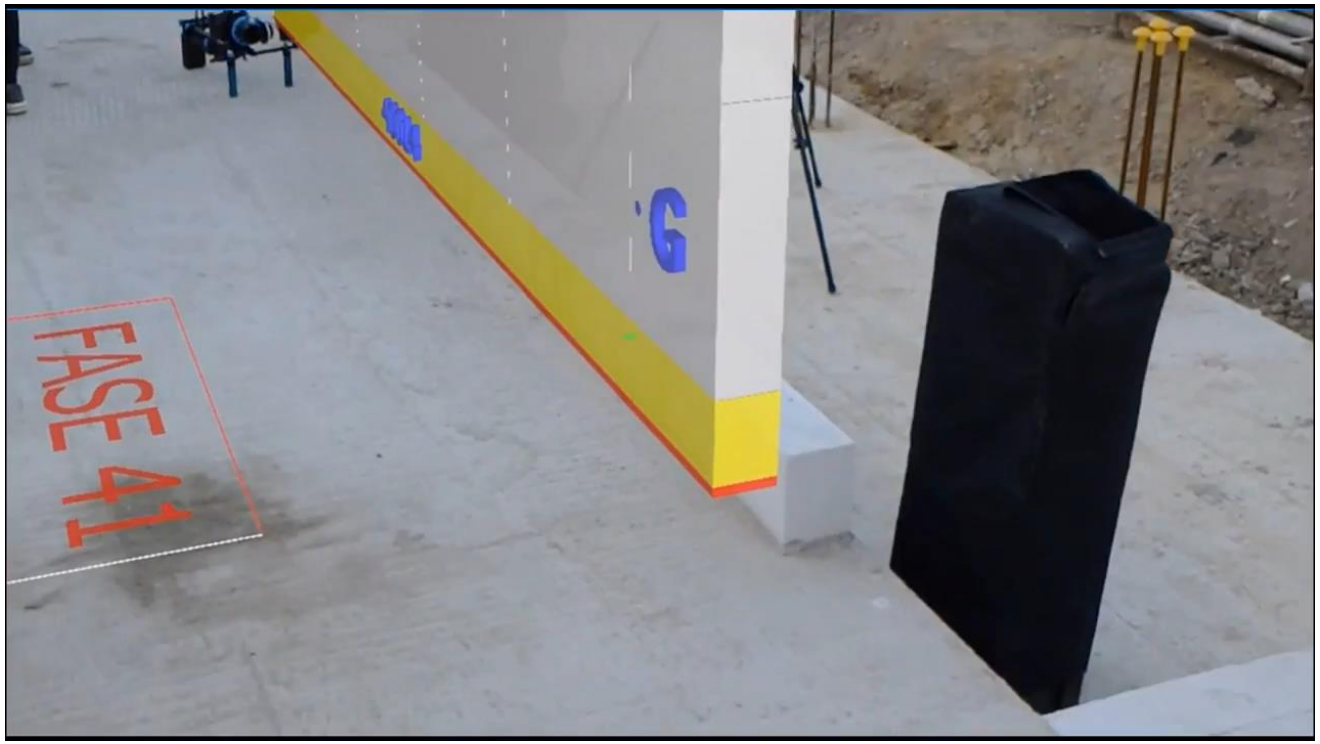
- Progress monitoring & as-built verification

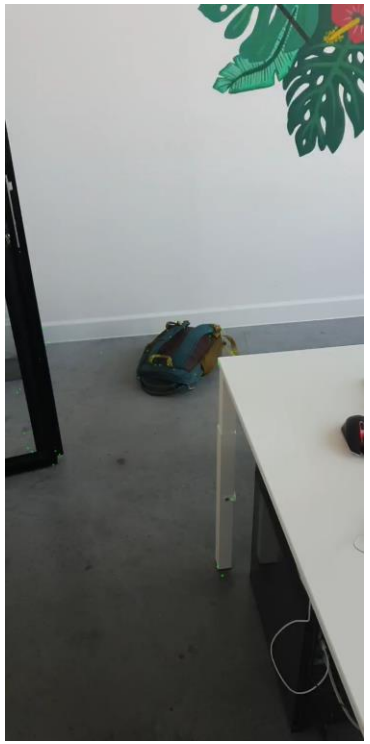
Scaled Robotics

BESIX Forward
DEEP ROOTS ▶ STRONG WINGS

Ongoing developments

- Improve access to information through AR





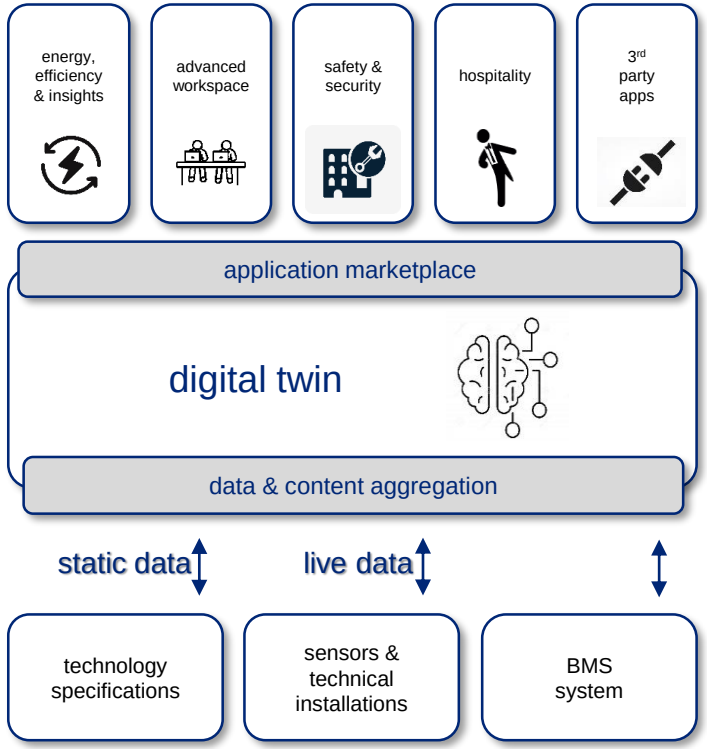
BESIX Forward
DEEP ROOTS ▸ STRONG WINGS

Ongoing developments

- Data management via Digital Twins

Reality

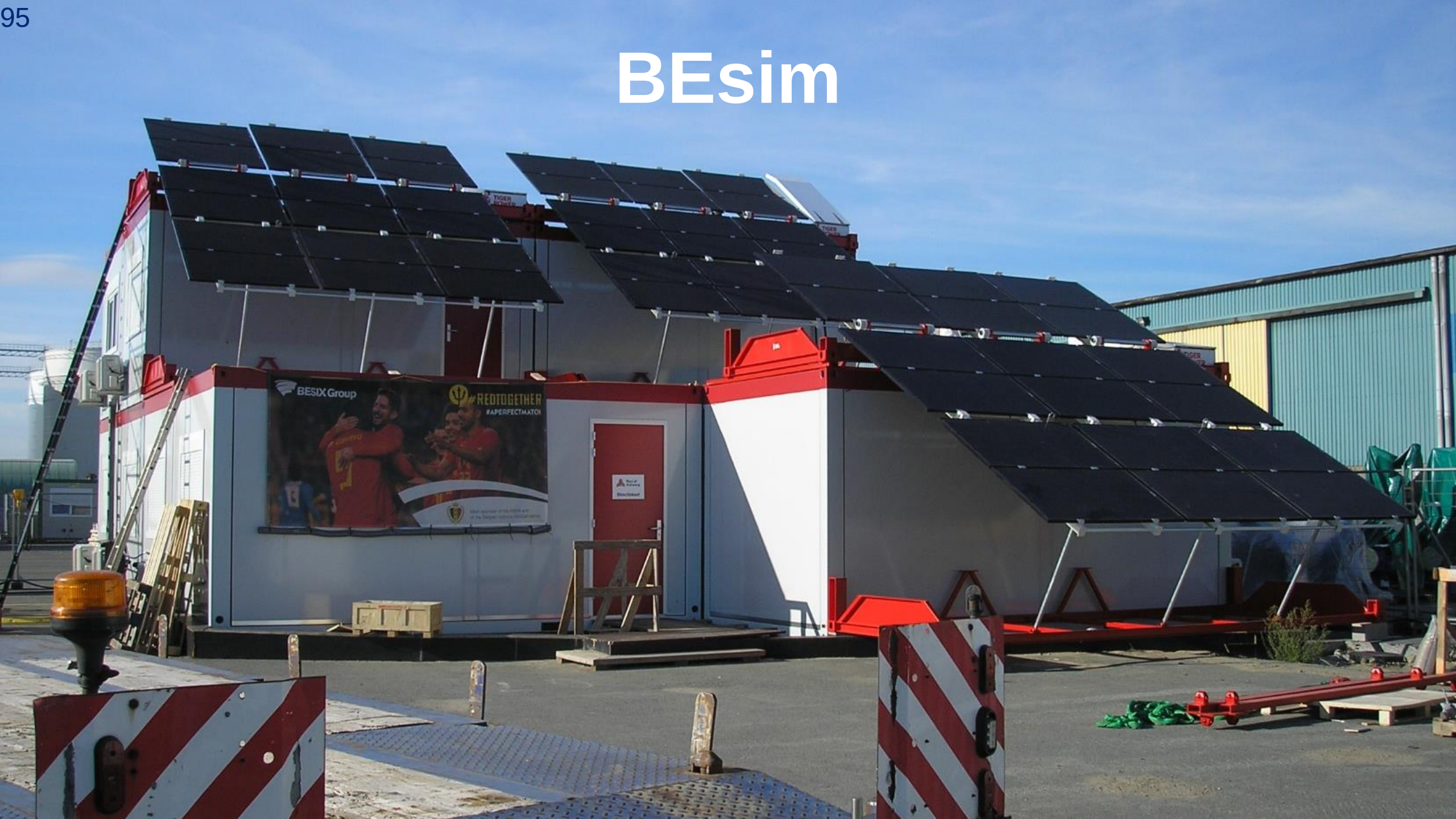
BIM



BESIX Forward
DEEP ROOTS ▶ STRONG WINGS


BESIX3D

BEsim



Thanks for your attention

François Lederer

flederer@besix.com

+32 478 477 089

tvandenbergh@besix.com & flederer@besix.com

12h30 - 13h30
Walking lunch

GREEN W!N
FROM INNOVATION TO BUSINESS

A vos agendas!

L'édition 2020 des conférences Construction

se tiendra les

18 & 19/11/2020

GREEN W!N
FROM INNOVATION TO BUSINESS

PANEL 1

« Construction du futur »

animé par

la Confédération de la Construction Wallonne (CCW)

et les contributions des panélistes suivants : Build4Wal, Jacques DELENS, IMAX Pro, Ewattch, Drag On Slide, B-Solutions

GREEN W!N FROM INNOVATION TO BUSINESS

Mathieu CHABOT

Ewattch

GREEN W!N
FROM INNOVATION TO BUSINESS

L'IoT, une innovation pour la construction ***4.0***

Introduction

Expert dans l'**IoT (Internet Of Things**), Ewattch développe des capteurs sans-fil et des services innovants principalement dédiés à la **maîtrise énergétique,** à destination de l'**Industrie, du secteur tertiaire** et des projets de **Smart buildings**.

Notre équipe d'ingénieurs développe depuis **2012** des capteurs simples et rapides à installer, communiquant en réseau sans-fil **LoRa®** (portée jusqu'à 15km) et **EnOcean**.

Les données collectées par ces capteurs vous permettent la mise en place d'une gestion de votre consommation énergétique simplifiée, dynamique et intuitive.

Dans un esprit d'ouverture des protocoles, nos capteurs sont compatibles avec notre plateforme **EwattchCloud** et d'autres plateformes partenaires de gestion énergétique.

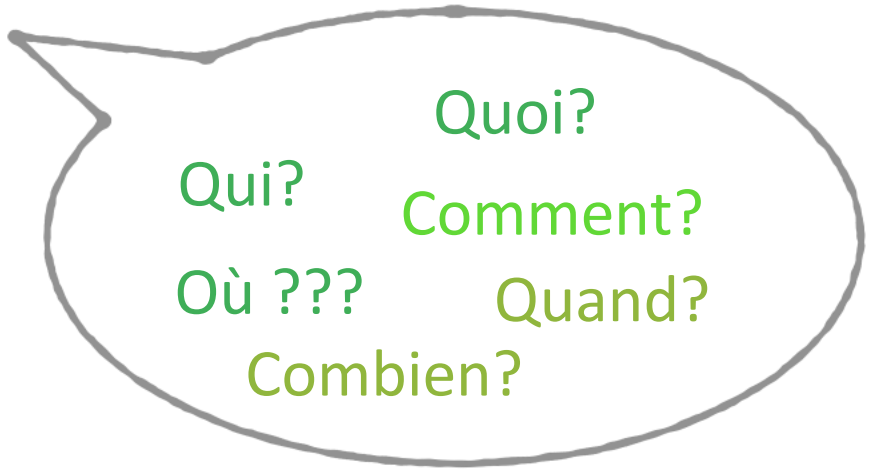
Un **réseau de partenaires** agréés et qualifiés par Ewattch peut vous accompagner dans la mise en place de nos solutions et les adapter à vos besoins.

Une solution IoT innovante pour la construction 4.0?

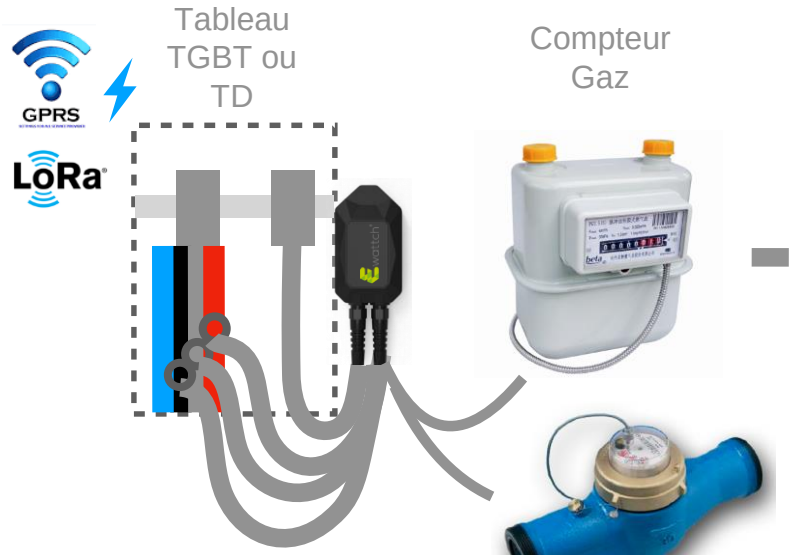
Se poser les bonnes questions?

- Quelle est ma consommation énergétique? En kWh ? En euro ?

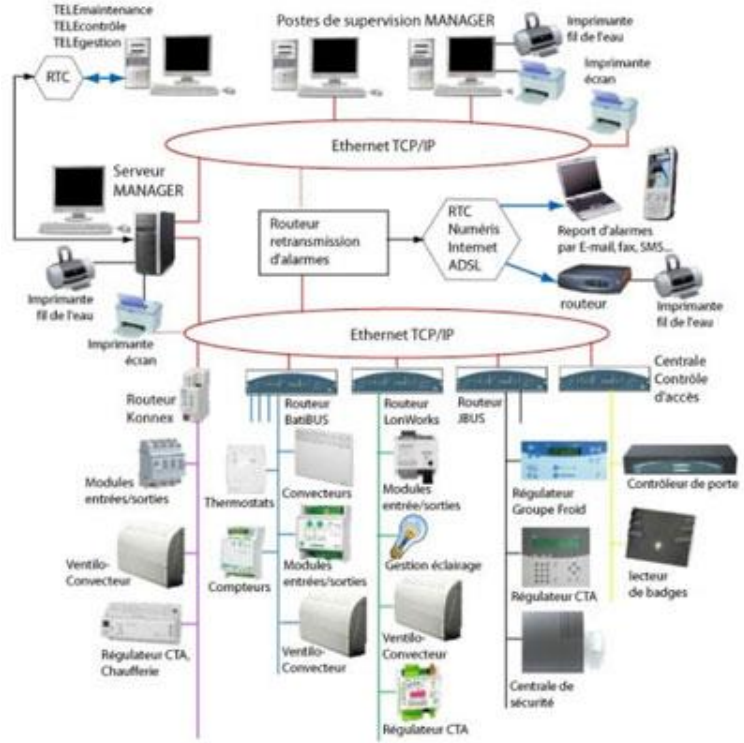
  - Que consomme mon groupe électrogène? Combien de temps a t-il fonctionné?
  - Ma pompe de relevage est-elle en fonction?
  - L'éclairage de chantier est-il en fonction?
  - Que consomme ma grue? Ma centrale a béton?
  - Y a t-il une consommation le WE?
  - Quel température fait-il dans un tableau électrique?
  - Quel température fait-il dans une roulotte de chantier?
  - Y a t-il une présence dans les bureaux?



IoT Vs Système centralisé complexe?



Avantage ! Se concentrer sur la donnée, pas le système à mettre en place



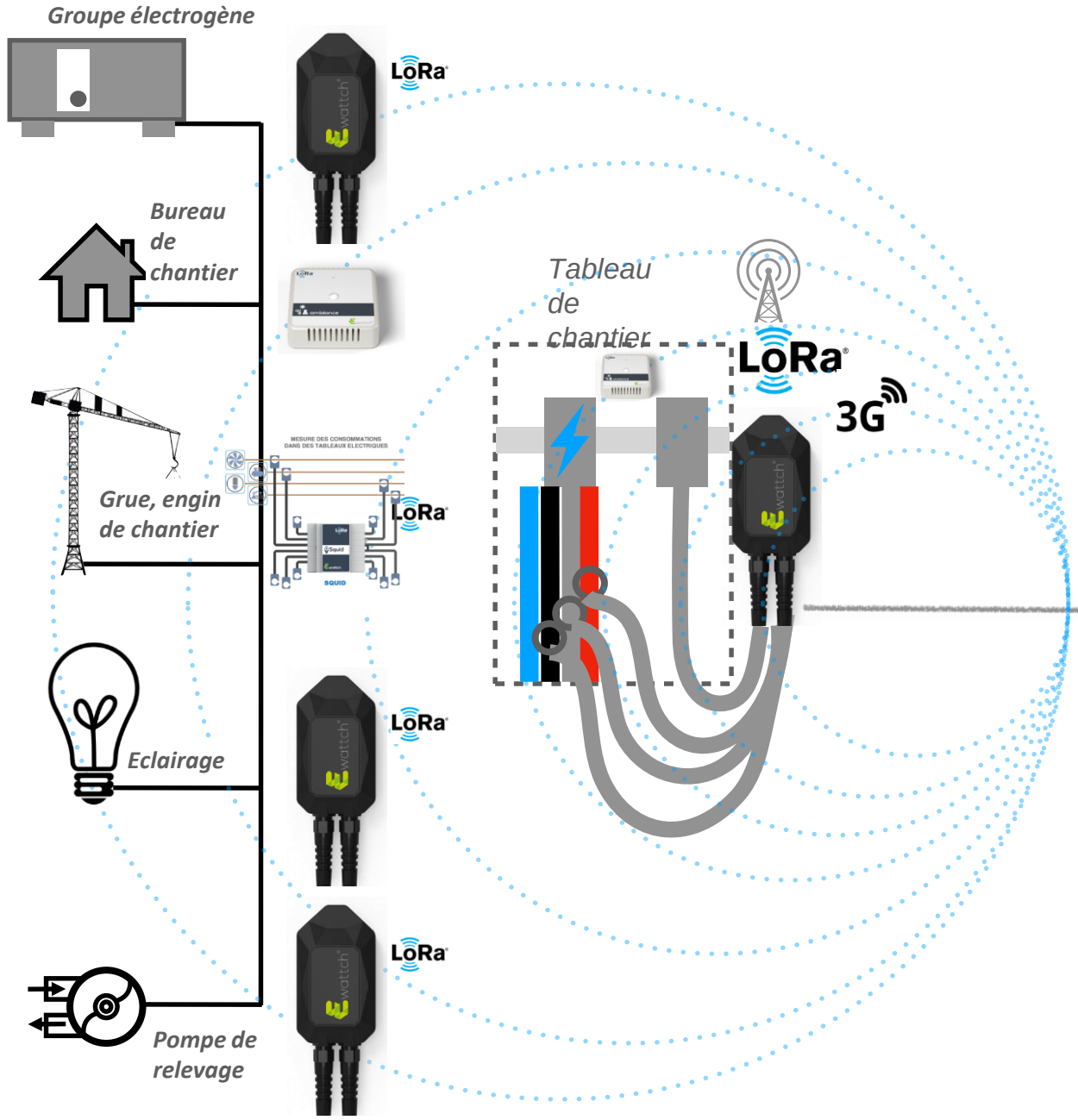
Simple, usage limité, accessible à tous

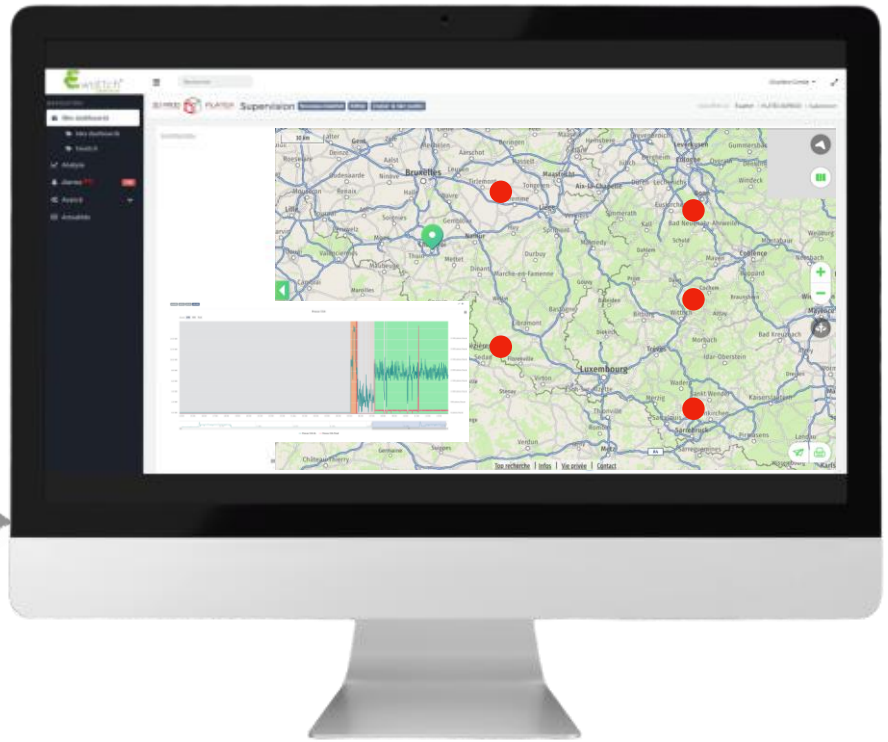
Prix à partir de 990€ht

Lourd, usage illimité, accès hautement sécurisé

Prix à partir de 10000€ht

Architecture type pour solution Ewattch
Construction 4.0



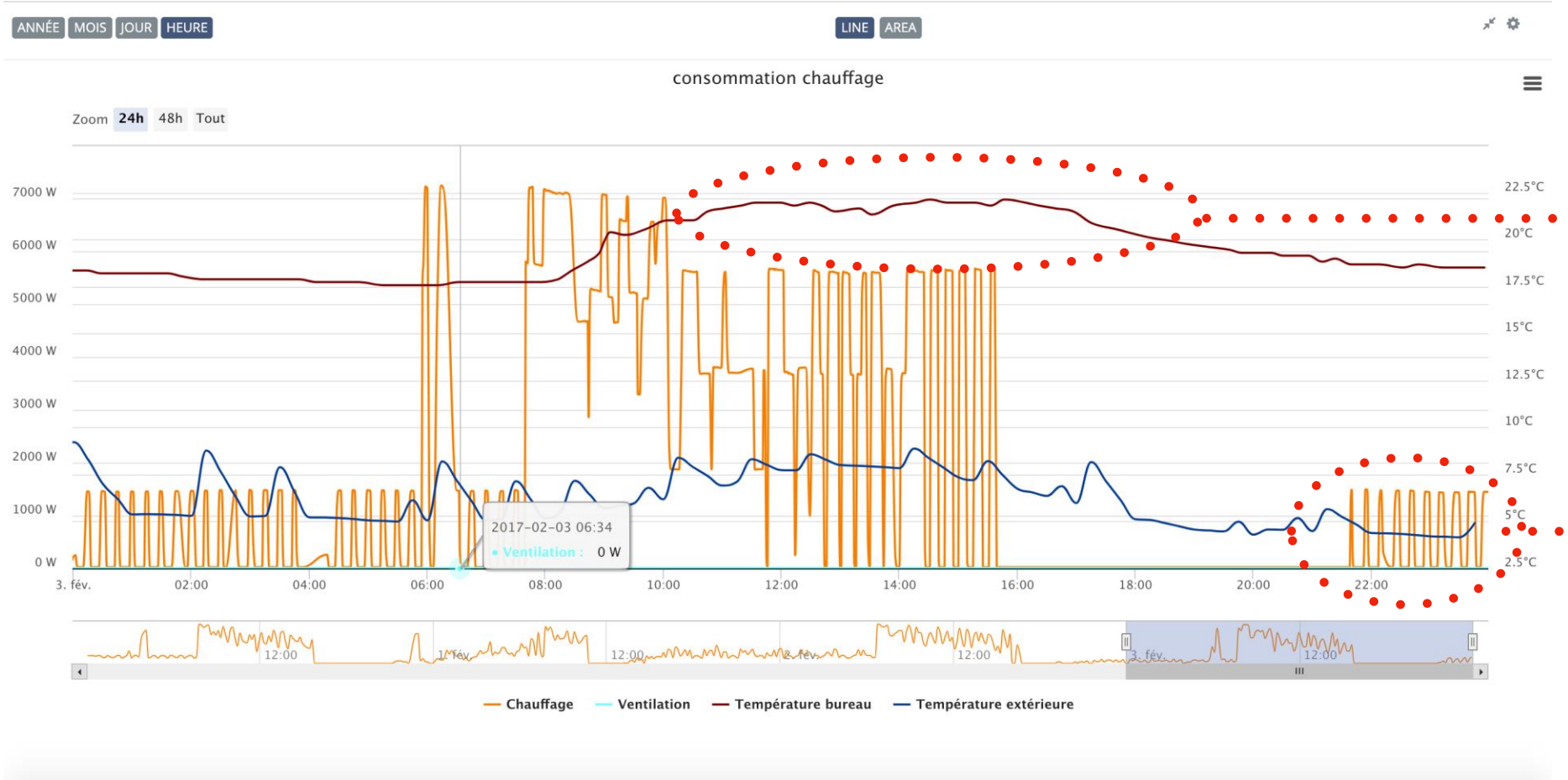


Ewatttchloud

- *Gestion, stockage et **traitement des données**.*
- ***Supervision** des machines et du chantier*
- ***KPI** instantannés*
- ***Alertes** par mail, sms.*

Ewattch Belgium
10, rue Del'no - 4671 Housse
info@ewattch.be
+ 32 4 266 79 89

Exemple de mesures continues



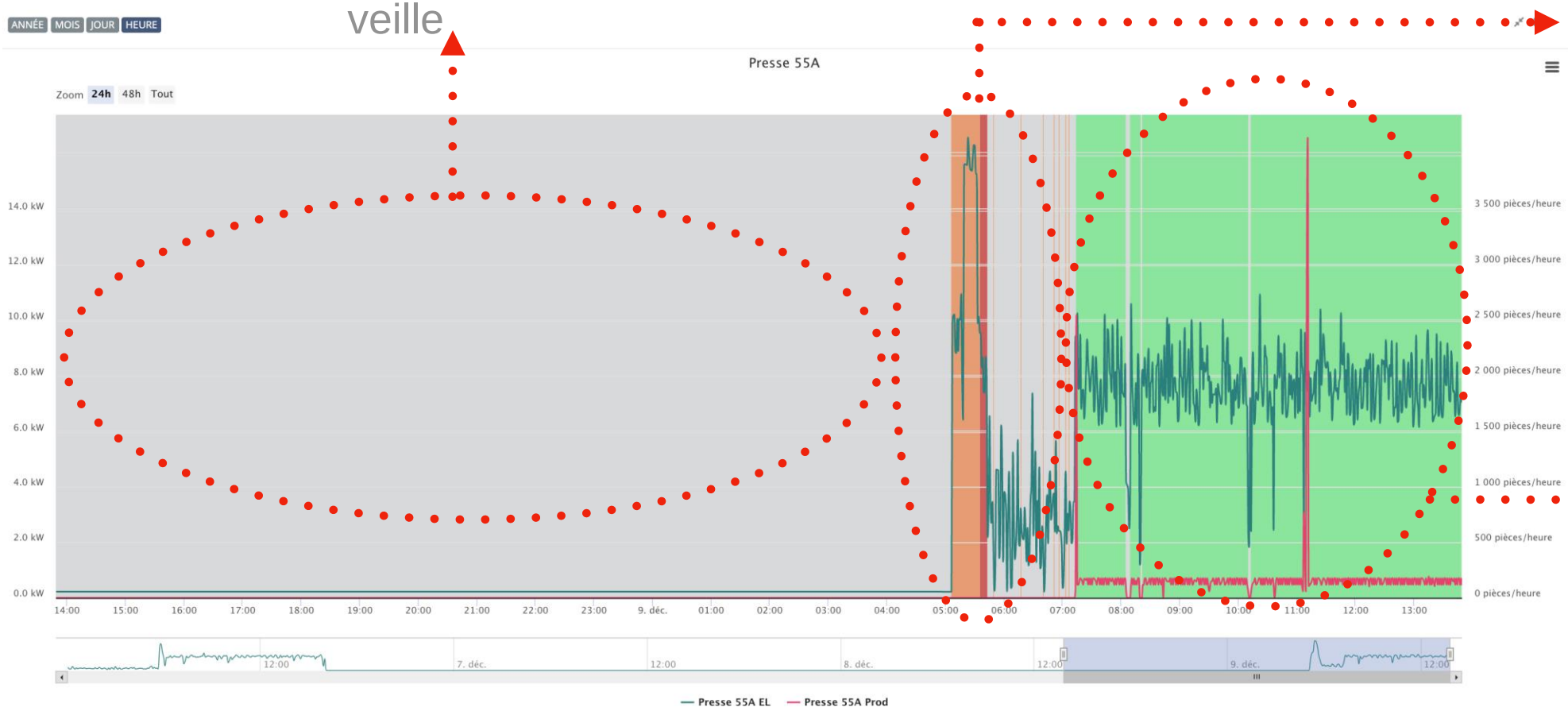
Maîtrise d'une température

Consommation nocturne anormale?

Exemple de mesures continues

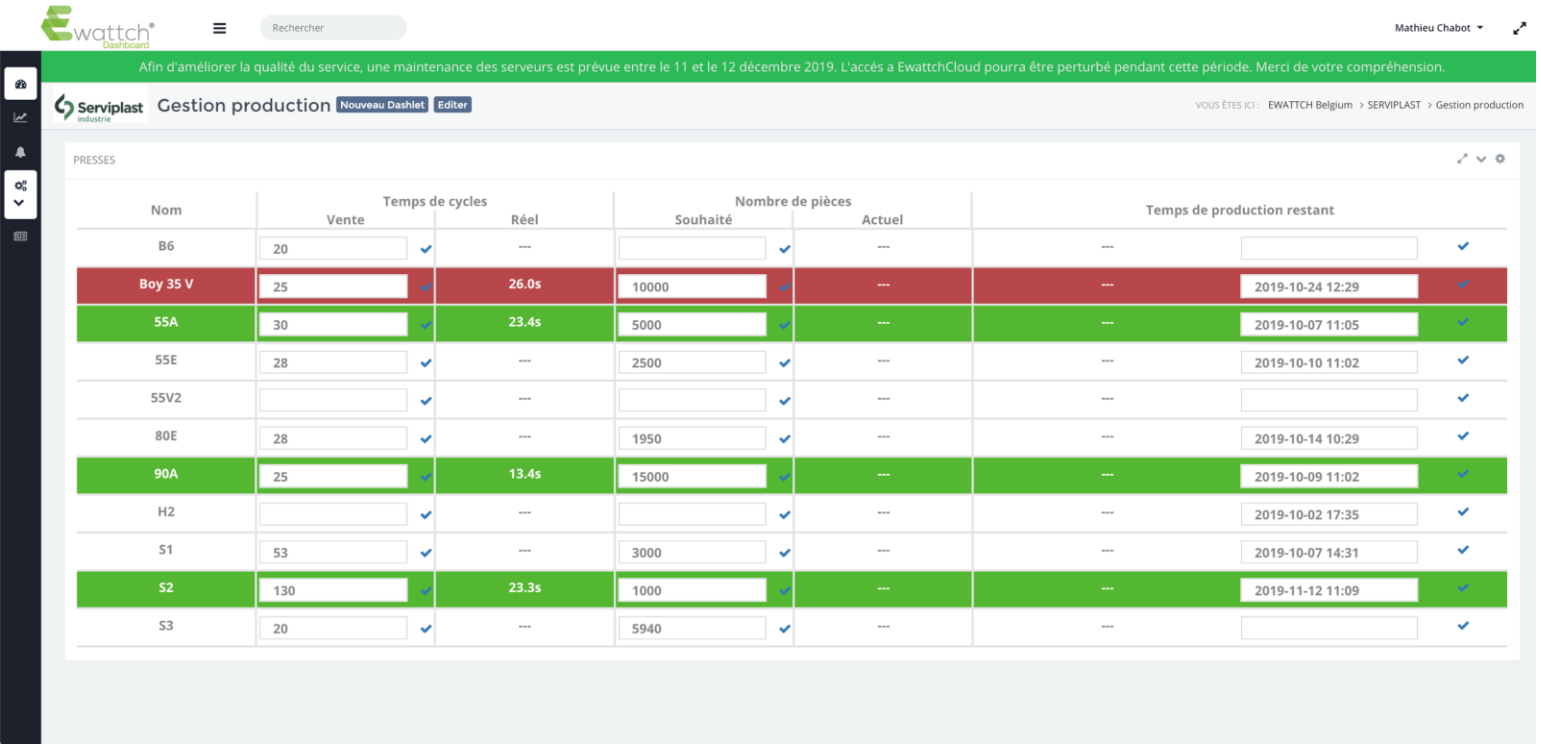
Temps de veille

Temps de chauffage d'une machine



Temps de fonctionnement normal.

Quels indicateurs? Quels KPI?



Nom	Temps de cycles Vente	Temps de cycles Réel	Nombre de pièces Souhaité	Nombre de pièces Actuel	Temps de production restant	
B6	20	---		---	---	
Boy 35 V	25	26.0s	10000	---	---	2019-10-24 12:29
55A	30	23.4s	5000	---	---	2019-10-07 11:05
55E	28	---	2500	---	---	2019-10-10 11:02
55V2		---		---	---	
80E	28	---	1950	---	---	2019-10-14 10:29
90A	25	13.4s	15000	---	---	2019-10-09 11:02
H2		---		---	---	2019-10-02 17:35
S1	53	---	3000	---	---	2019-10-07 14:31
S2	130	23.3s	1000	---	---	2019-11-12 11:09
S3	20	---	5940	---	---	

Exemple pour l'industrie 4.0,
La plasturgie

Et dans la construction 4.0?

- *Temps de fonctionnement*
- *Temps d'arrêt*
- *Temps de maintenance*
- *Puissance des groupes*
- *Maintenance*
- *Consommations totales*
- *Consommations spécifiques*
- *Température de confort*
- *Temps de présence…*
- *Etc…*

Les avantages de l'IoT

Mise en oeuvre simplifiée

Evolutif

Accessible financièrement

Ergonomique

Multisites

Gestion du parc machine

Economie d'énergie

Alerting (dépassement de seuil, feu, coupure,…)

Benchmarking interne (entre les différents chantiers)

ewattch Belgium

Partenaires

greisch
A+ CONCEPT
ENERSOL ENERGY SOLUTIONS
teen consulting
inasep
NRB DARING TO COMMIT
CORETEC ENERGY
Reno-solutions Économisez l'énergie
proximus
ZENOBE Save Money Control Energy
Beos Engineers and Consultants for People and Nature
BROPTIMIZE
PLANAIR

Références

beachcomber HOTELS

PLATEX

Région Alsace
es www.es-energies.fr
EDF

egis
Caisse des Dépôts
LA POSTE
NUMALLIANCE

Bouygues Immobilier
PATEK PHILIPPE GENEVE
beobank
Intermarché
Auchan RETAIL VIỆT NAM
Carrefour
socomec Innovative Power Solutions

Plateformes tiers compatibles

opinum
sobre
Energis
DAPESCO OPTIMISING ENERGY
setec international

Constructions

BOUYGUES CONSTRUCTION
Jacques Delens
bam galère

GREEN WIN FROM INNOVATION TO BUSINESS

ewattch
Belgium

5, esplanade de Cuypers-Beniest
4671 SAIVE
info@ewattch.be
www.ewattch.com
+32 4 266 79 89
+32 486 20 42 84

Arnaud DAWANS

Jacques Delens

GREEN WIN
FROM INNOVATION TO BUSINESS

Cédric MOUTSCHEN

IMAX Pro

GREEN WIN
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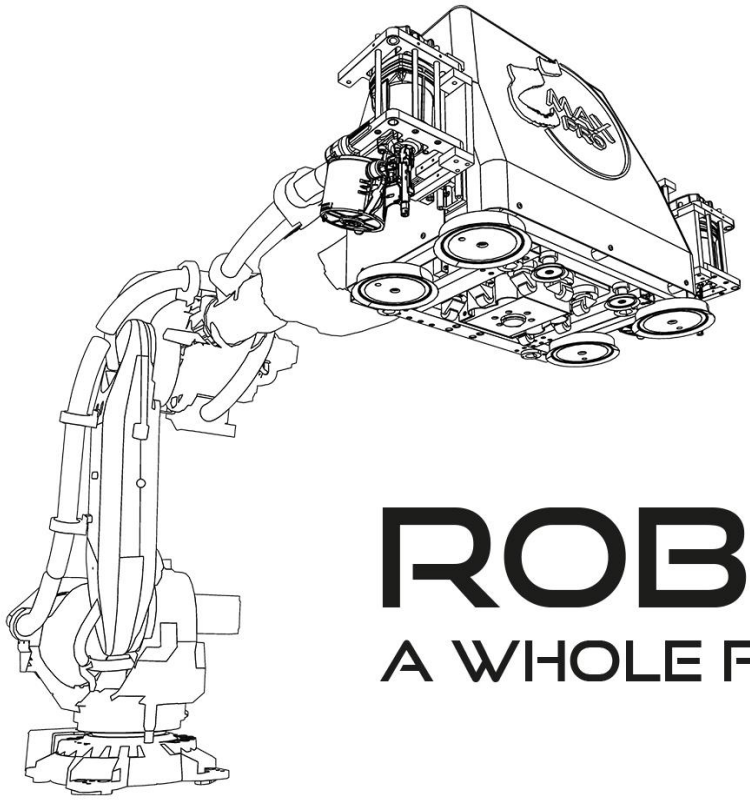
L'innovation de la filière bois par la robotique.



MAX PRO

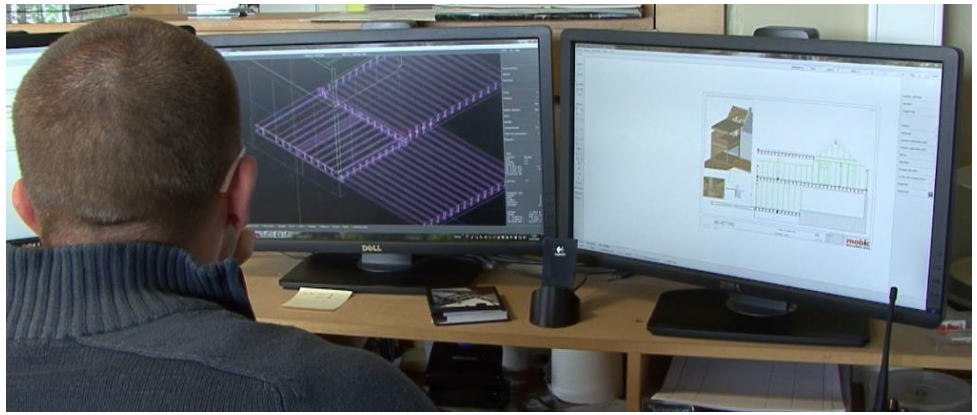
ROBOTMOB

A WHOLE FACTORY IN A BOX

bic ature bois

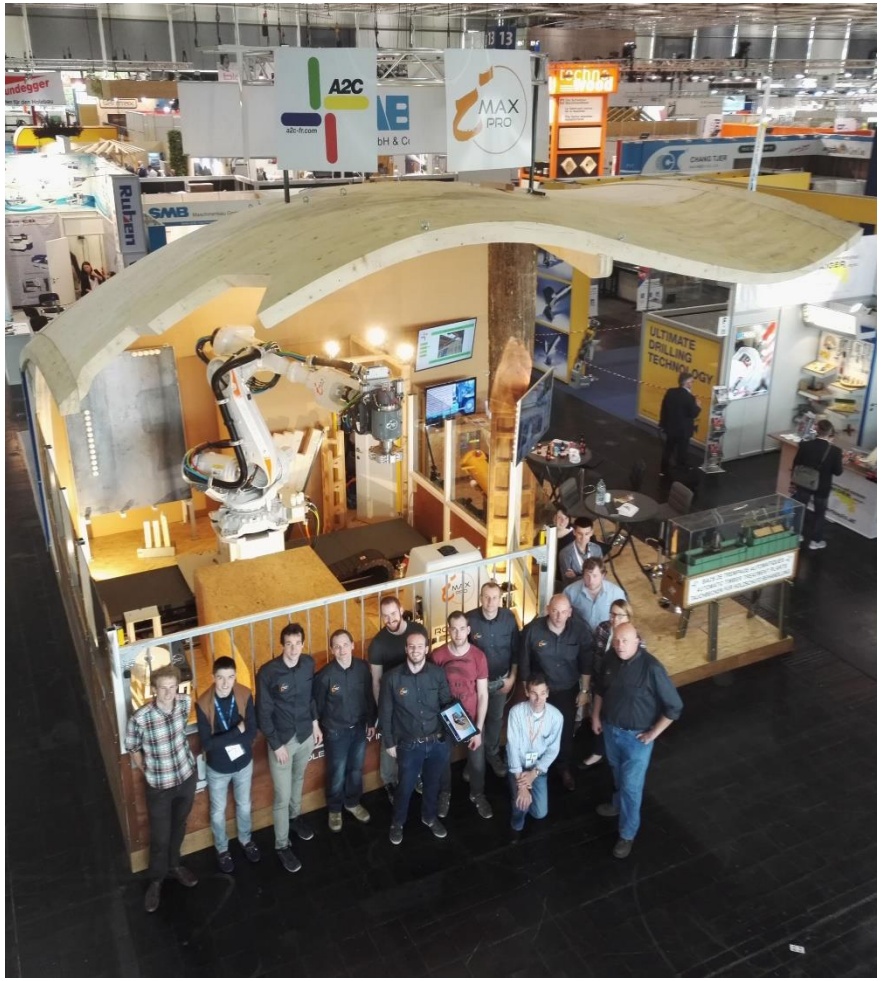
Mobic

- Création en 1998
- >180 employés
- 8 500 m² de halls de production et bureaux
- 1 centre de R&D
- 2 machines Hundegger
- 1 ligne aboutage
- 3 lignes robotisées



mobic
l'innovation en ossature bois

Imax Pro



- Intégration de robot dans l'industrie du bois
- Développement de systèmes et de logiciels pour l'industrie du bois

MAX PRO bic sature bois

Scidus

Juillet 2015: Rachat de la scierie

Sciage: résineux et feuillus
- 1 multilame
- 2 scies ruban
- 1 centre de tri 35 box
- 4 séchoirs

2016: Implantation d'un four BMT

2017: industrialisation des lignes par la robotisation et la mise en place d'un logiciel de gestion de production.

2018: Implantation:
Présechoir 700m2
Hall de production de 7000m2
…

SCIDUS L'innovation du sciage — bic sature bois

RobotMob 1

- ✓ Automatisation de tâches répétitives et pénibles
- ✓ Mise en place de panneaux, de clous, découpes et insufflation
- ✓ Murs : 10.000 m²/mois

RobotMob 2: film

IMAX PRO
ROBOTMOB - Surfaçage

RobotMob 2: exemples

RobotMob 2: exemples

RobotMob 2: exemples

RobotMob 2: exemples

RobotMob 2: exemples

RobotMob 2: exemples

RobotMob 2: exemples


CONVOI EXCEPTIONNEL


CONVOI EXCEPTIONNEL

RobotMob 2: demain

RobotMob 2: demain

- Référencement rapide
- Facile d’utilisation
- Correction des trajectoires
- Évolutif
- Présimulation
- Disponible à la location

Merci pour votre attention!

Benoit PARMENTIER

CSTC - Build4Wal

cstc.be ocetic Cenaero Confédération Construction

Avec le soutien de la Wallonie

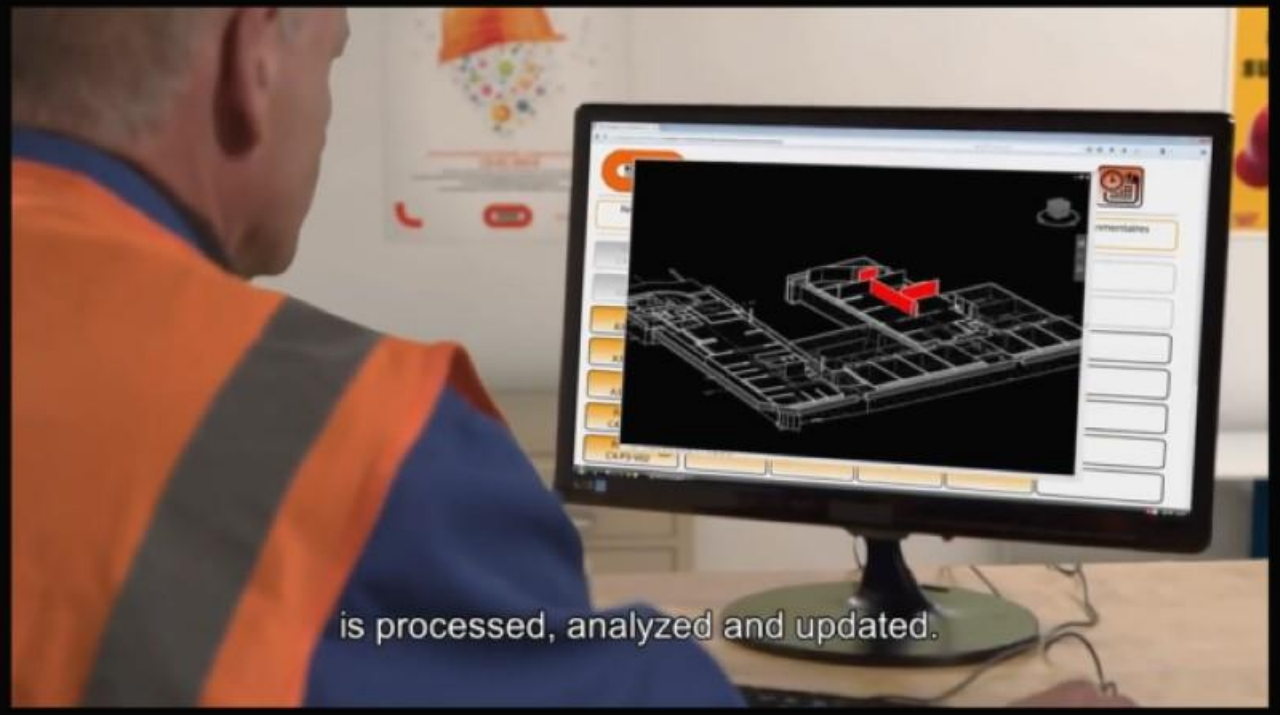
Wallonie digital wallonia .be

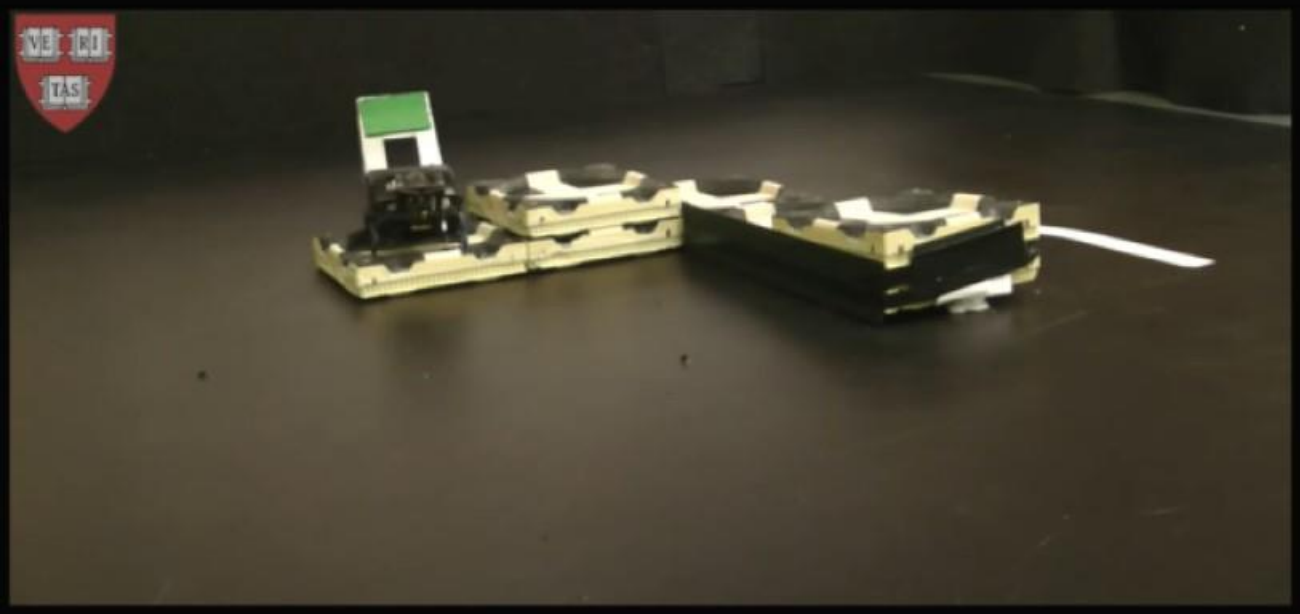
BUILD4WAL

Démonstrateur Construction 4.0

Benoit PARMENTIER
Coordinateur Stratégie & Innovation - CSTC

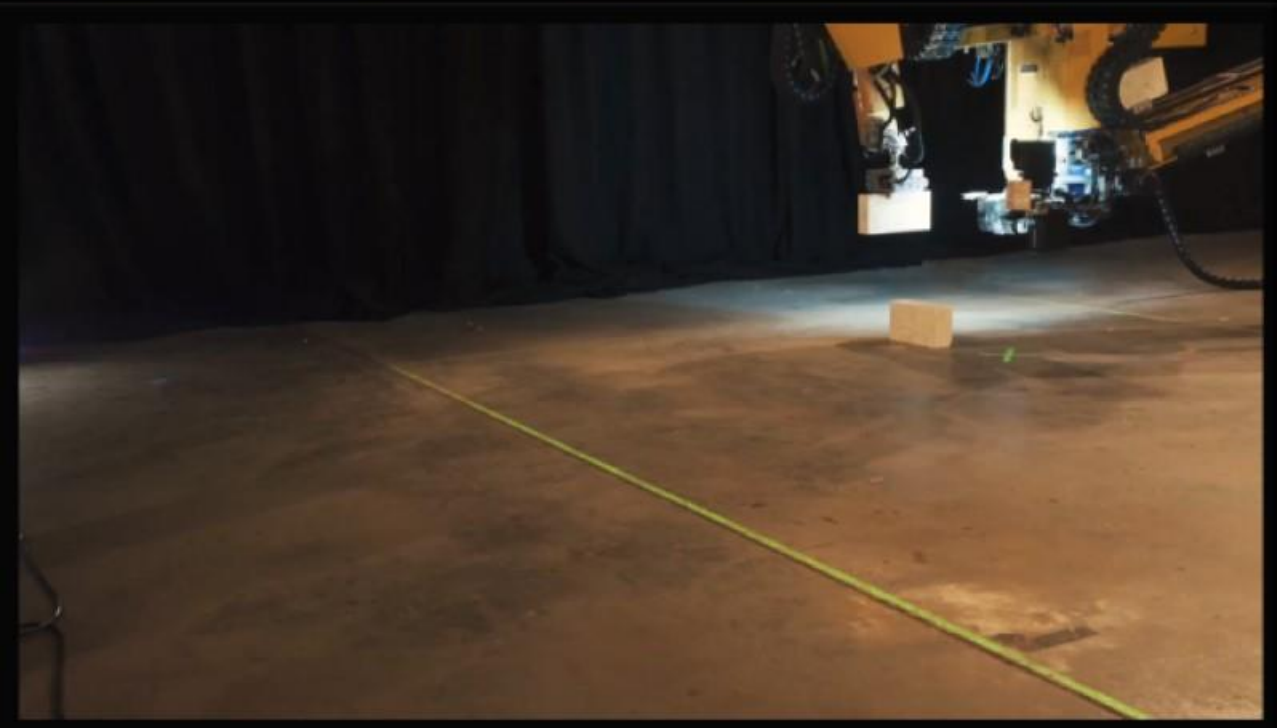

Before digital age


is processed, analyzed and updated.

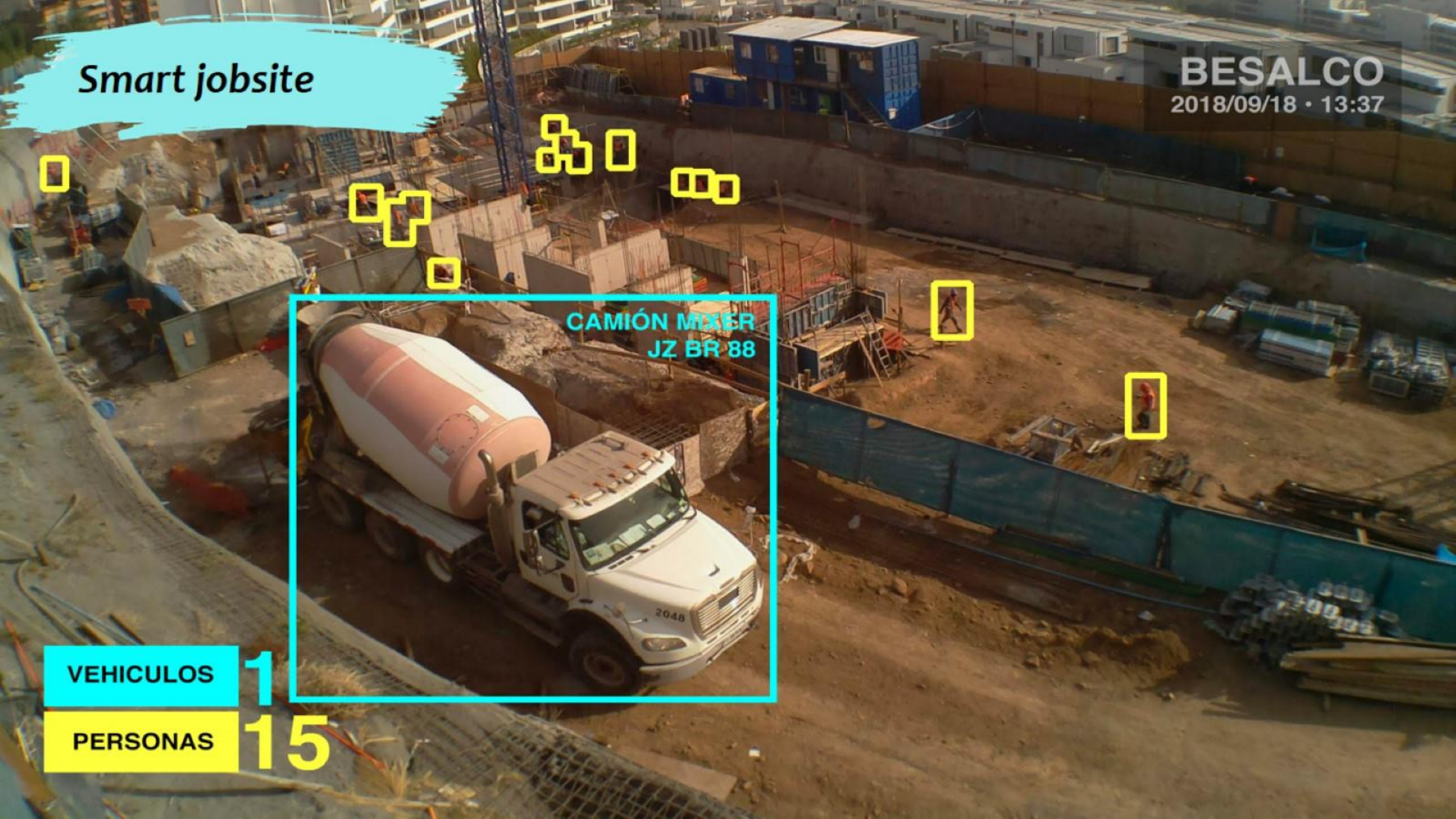

Robots react to their environment, using only onboard sensing,


MATAERIAL
ANTI-GRAVITY OBJECT MODELING


on-site mobile robotic system

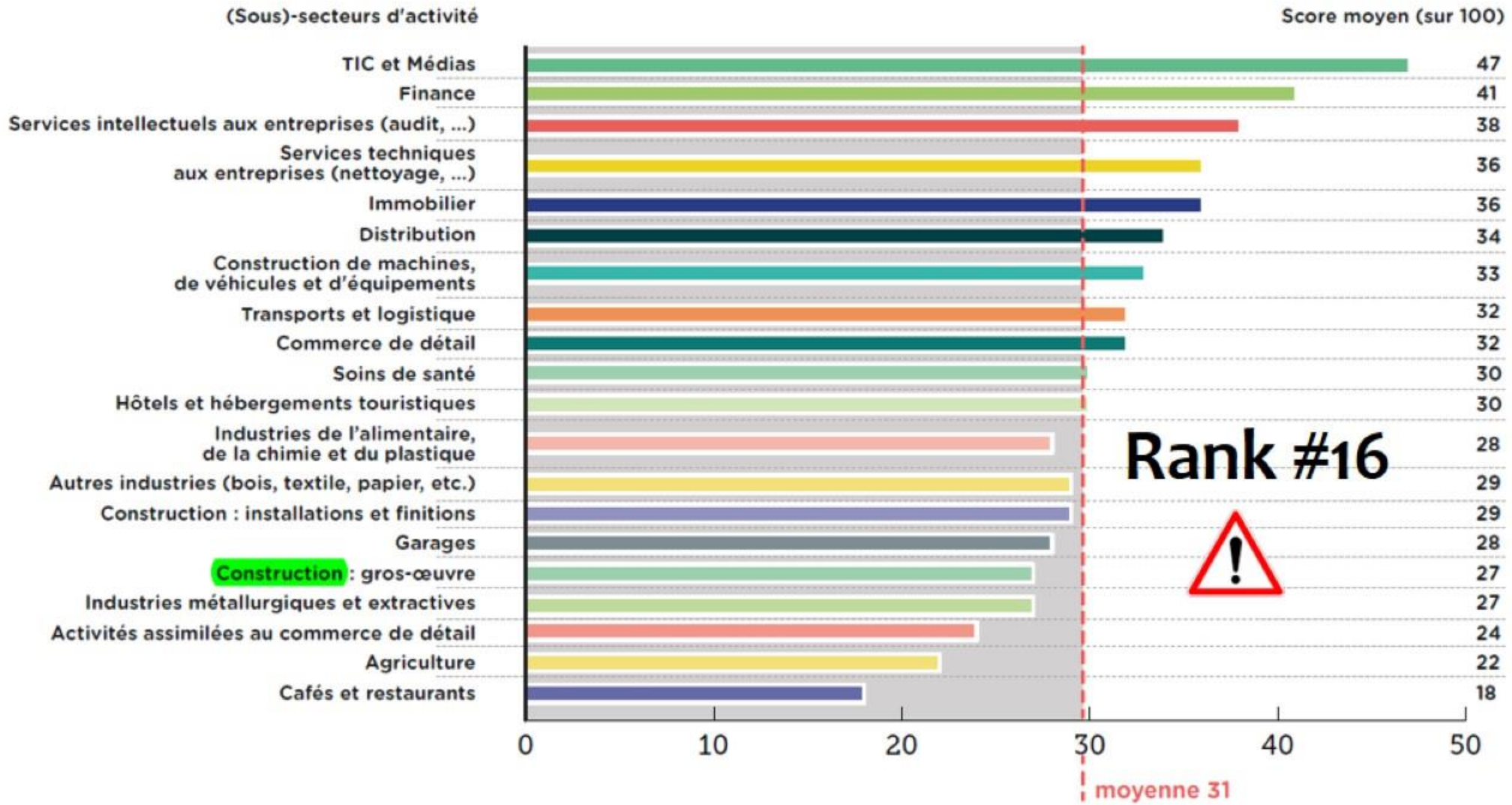


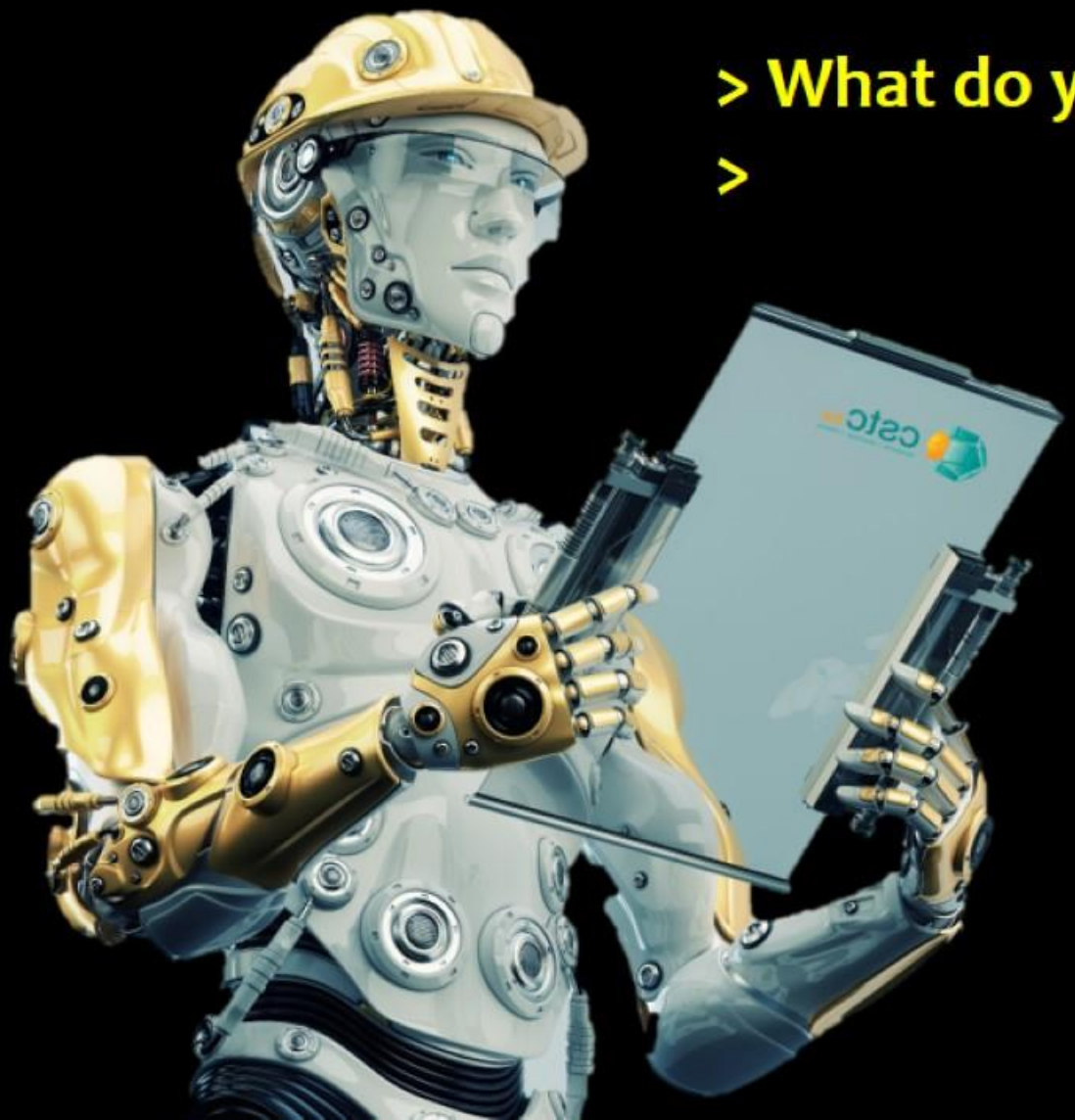

DASRI SMART HELMET


Smart jobsite
BESALCO
2018/09/18 • 13:37
CAMIÓN MIXER
JZ BR 88
VEHICULOS 1
PERSONAS 15

Construction is one on the less digitised sector in Wallonia

Score moyen de maturité numérique par (sous-)secteurs d'activité en 2015 [1]





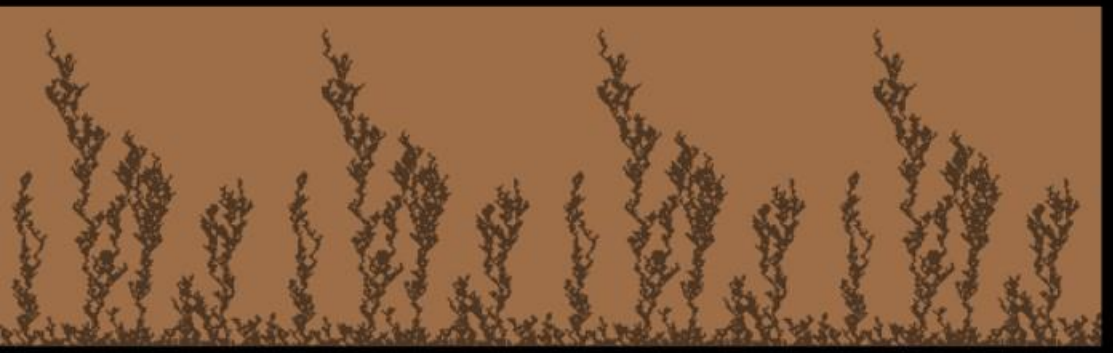
> What do you need to succeed in the digital transition ?
>

Confidence

Value for money

Added value

Costs



Percolation

Needs from the industry

- Assess ROI for digital innovations
- Assess Technological maturity assessment & confidence level
- Determine compatibility & interoperability issues of the systems
- Overcome a single (commercial) vision
- Benefit from a regional infrastructure (easy to reach)
- Make a link with education needs
- Demonstrate collectively economically supported technologies
- Reduce the environmental footprint of future buildings
- Use the infrastructure as a stepping stone to the (national/international) market : flag for companies

Demonstration Centre 4.0

Trois acteurs technologiques en RW s'associent…

- CRA Construction
- Processus constructifs
- Equipe BIM & ICT

cstc.be
Recherche • Développe • Informe

cetic
Your Connection to ICT Research

- CRA ICT
- Internet des Objets, Big Data, IA
- Smart Buildings

Cenaero

- CRA Simul. numérique
- Supercomputing infra
- Conception virtuelle & exploitation BIM & IoT

Confédération Construction Wallonne
Construction, énergie & environnement

PÔLE DE COMPÉTITIVITÉ WALLON
GREEN WIN

Le projet

Un nouvel outil wallon pour stimuler la transition numérique du secteur de la Construction

1

Un projet intégré de démonstration au service des entreprises du Secteur de la Construction

Hub mobile Chantier 4.0

Hub fixe démonstration Construction 4.0

Bâtiment démonstrateur 4.0

2 Les technologies en démonstration

3 Activités

1. *Démonstration chantier*
2. *Tests en conditions réelles*
3. *Animations sur le terrain*

1. *Démonstrations permanentes*
2. *Workshops, co-création*
3. *Visites Best practice*
4. *Bancs d'essais technologies émergentes pour entreprises*
5. *Formations avec partenaires*
6. *Veille technologique*

1. *Banc d'essai vraie grandeur pour Smart Product & Building*
2. *BIM, IoT, Sim. HPC, Big Data*
3. *Dissémination (OpenDATA), visites*
4. *Espaces de co-création*
5. *Ateliers HPC pour la conception et l'opération des bâtiments*

3 Activités

focus

FORMATION

BUILD4WAL

Identification des besoins en formation

Formation continue

Formation spécifique

Co-organisation de formations Construction 4.0

Formations ad-hoc (accès infrastructures de pointe)

Master classes

Espace de formation virtuel (*Gate to Knowledge*)

Toucher les petites entreprises (PME) dans la Construction

145 entreprises avec **+100** travailleurs en RW

4 Les moyens pour atteindre les objectifs ambitieux

Infrastructures

- Camion Chantier$^{4.0}$ équipé
- Hall industriel$^{4.0}$ de 750 m^2
- Bâtiment pour test en utilisation
- Supercomputing*

Equipement

- Machine impression 3D béton
- Scanner laser 3D, Drones
- Réseaux de capteurs, régulation, monitoring
- Interfaces BIM et simulation OpenSource

Team

- Maintenance & organisation, …


Every digital transformation
is a cultural one.


DIGITAL
CONSTRUCTION.HUB
powered by BUILD4WAL
cstc
Cenaero
celtic
digital
wallonia
.be

5 Contacts

DIGITAL CONSTRUCTION.HUB powered by BUILD4WAL

- Benoit Parmentier | Coordination générale — bp@bbri.be – 02/655.77.11
- Timothée Lonfils | Capteurs, Réseaux, Smart execution — tlo@bbri.be
- Angelo Buttafuoco | Automatisation & Robotique — abu@bbri.be
- François Denis | AR/VR — francois.denis@bbri.be
- Pauline Dewez | BIM — pauline.dewez@bbri.be
- Samuel Dubois | Drones & Relevé géométrique HD — samuel.dubois@bbri.be

Cenaero

- Cécile Goffaux | Simulation numérique, HPC, Smart equipment — cecile.goffaux@cenaero.be

cetic — Your Connection to ICT Research

- Benjamin Bernaud | IoT, Big Data — benjamin.bernaud@cetic.be
- Lotfi Guedria — lotfi.guedria@cetic.be

Confédération Construction Wallonne — Construction, énergie & environnement

- Mélanie Léonard, Florie Thomas | Formation — melanie.leonard@ccw.be

PANEL DE DISCUSSION

15h00 - 15h30
Pause-café

A vos agendas!

L'édition 2020 des conférences construction

se tiendra les

18 & 19/11/2020

GREEN W!N
FROM INNOVATION TO BUSINESS

PANEL 2

« Accélération de la rénovation »

animé par AGC Glass Europe

et les contributions des panélistes suivants : Energyville, GIM Smart Geo Insights, AGC Glass Europe, Knauf Energy Solutions, Société Wallonne du Logement, Ingestic.

GREEN W!N FROM INNOVATION TO BUSINESS

Willy BORSUS

Vice-Président de la Wallonie, Ministre de l'Economie, du Commerce extérieur, de la Recherche et de l'Innovation, du Numérique, de l'Agriculture et de l'Aménagement du territoire

LA STRATÉGIE WALLONNE DE LA RÉNOVATION, LES GRANDS CHANTIERS, LES ENJEUX, LES INCITANTS …

GREEN W!N FROM INNOVATION TO BUSINESS

Christophe ADRIAENSEN

GIM

GREEN WIN
FROM INNOVATION TO BUSINESS

L’apport du Digital twin dans le secteur de la construction

Greenwin conférence Industrie 4.0
Christophe Adriaensen - GIM

Digital twin

- Qu’est-ce?
- Quels sont ses composants?
- Comment le maintenir?
- Quels sont ses apports dans le secteur de la construction?

Qu’est-ce qu’un Digital Twin ?

Le jumeau numérique ou digital twin est le miroir virtuel des objets ou d’un système qui existe réellement

Les composants d'un Digital Twin

BASE DE DONNÉES GÉOGRAPHIQUES

- Modèle Numérique de Terrain (MNT)
- Bâtiments en 3D
- Réseaux de transports
- Infrastructure sous-terrain (impétrants)
- Infrastructure du domain public
- Utilisation du sol
- Végétation
- …

PLATEFORME DE SIMULATION

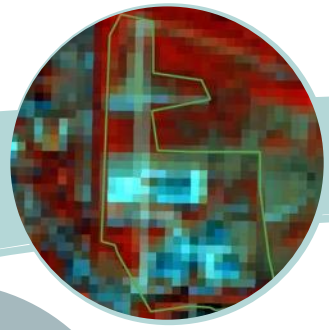
- Modèles de simulation en fonction de la problématique
  - Physique, mathématique, machine learning statique/dynamique
  - Déterministe ou basé sur l'IA

SENSEURS IOT

- Intégration des données en temps réel

Comment maintenir le Digital Twin?

BIM



Images aériennes/satellitaires

IoT et AI

Intégration de la donnée

BIM

Bentley

AUTOCAD

AUTODESK REVIT

CIVIL 3D

AUTOCAD UTILITY DESIGN

SOLIBRI

SketchUp

2D/3D

data

docs

CONNECTER TRANSFORMER AUTOMATISER

FME

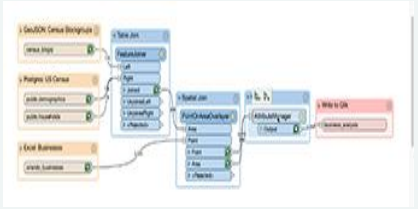
CONNECT

VALIDATE

LINK DATA

TRANSFORM

ANALYSE



SYSTEMES DESTINATION

BIM COMMON DATA ENV.

A360, AUTODESK VAULT, chapoo, relatics, BIMserver

GIS

QGIS, ArcGIS, GeoServer

ISSUE MANAGEMENT

BIMcollab, APROPLAN

VISUALISATION

CESIUM, three.js, ARCore, Adobe PDF, BIM surfer

ASSET MANAGEMENT

IBM MAXIMO, ORACLE E-BUSINESS SUITE, SAP, odoo

FACILITY MANAGEMENT

PLANON, TRIRIGA An IBM Company

Détection des changements sur base d'images satellitaires et aériennes

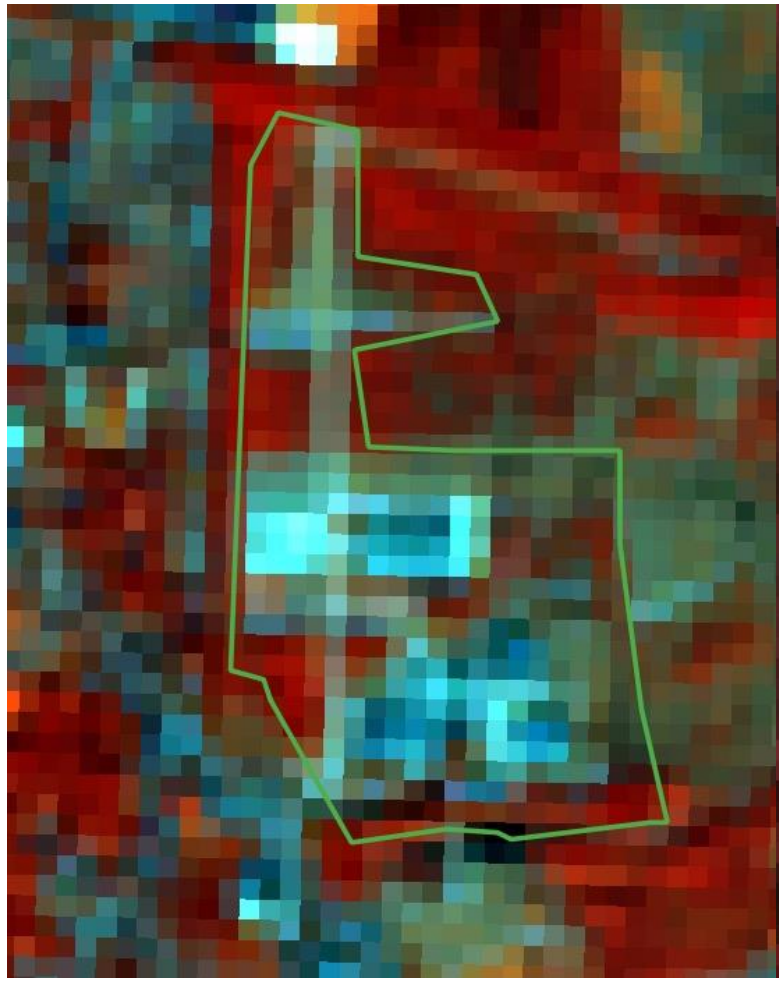
ETAPE 1 DETECTION EN CONTINU

Sentinel-1

- **Radar**
- Résolution: 1,5 à 20m

Sentinel-2

- **Optique**
- Résolution: 10 à 60m

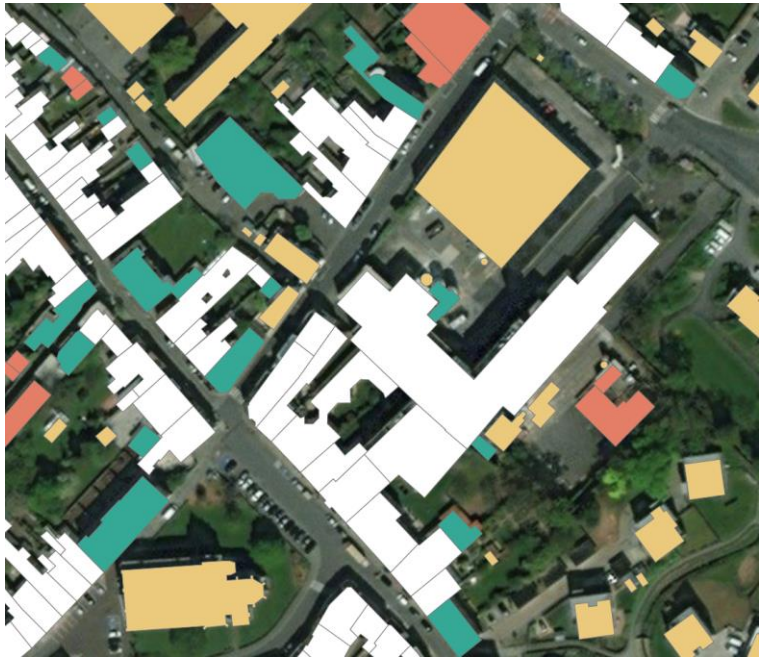


Détection des changements sur base d'images satellitaires et aériennes

ETAPE 2 ANALYSE DES IMAGES DE TRES HAUTE RESOLUTION OU ORTHOPHOTOS

- Segmentation sémantique en utilisant le Deep Learning

Intégration de thermographie aéroportée

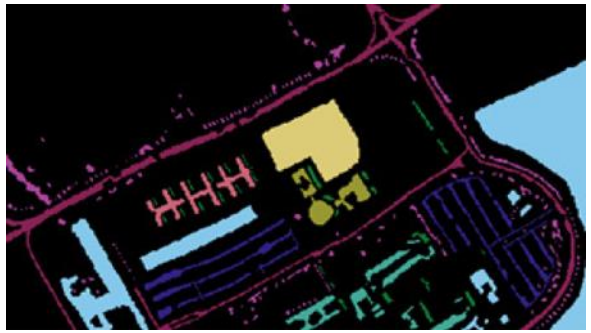


Du traitement de l’image vers le Digital Twin

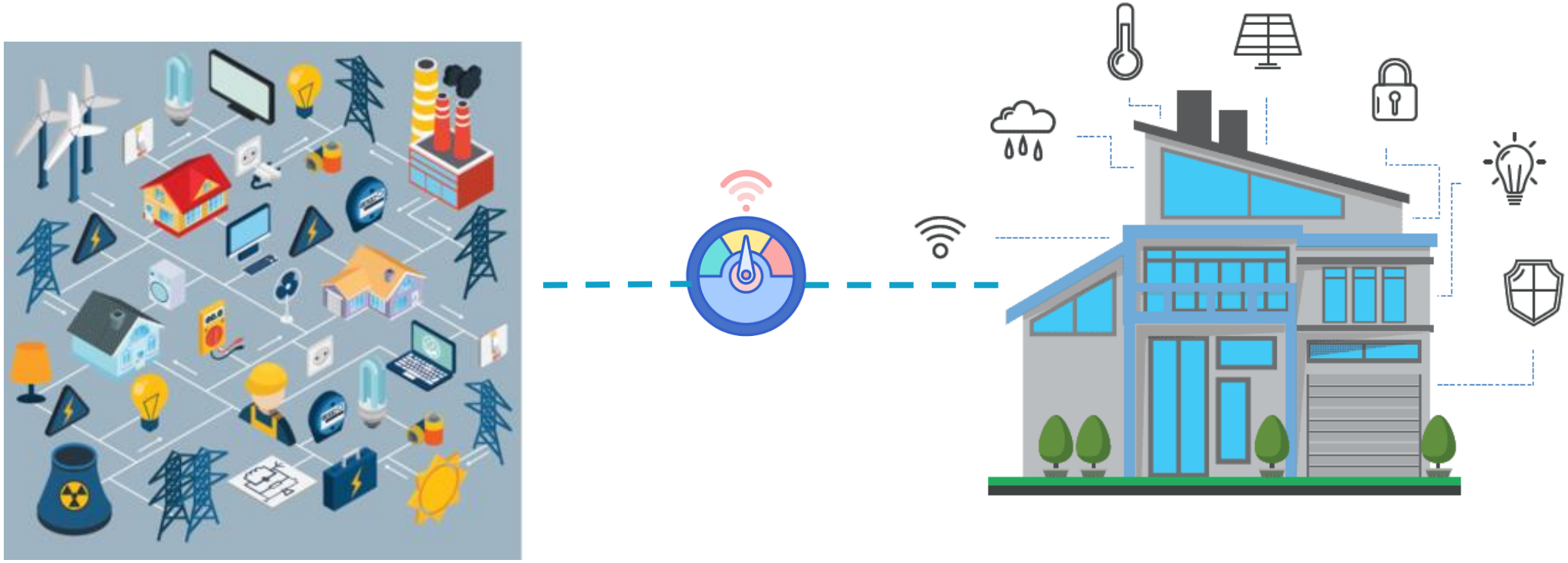
Images

Computer Vision

“Ready for GIS” information

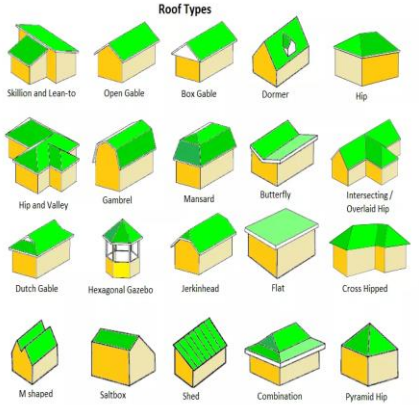


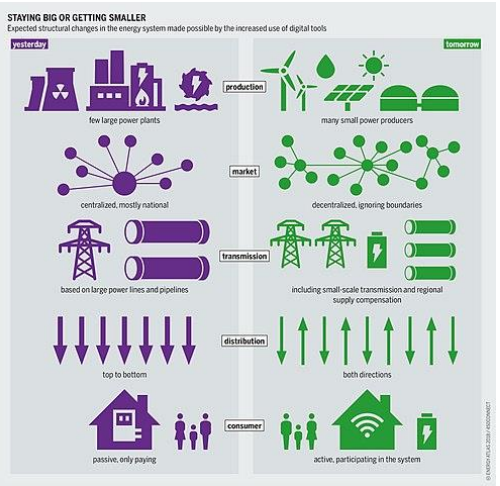
Intégration des données IoT



Quels sont les apports du Digital Twin pour le secteur de la construction et la rénovation?

- Choix de rénovation sur base d'une signature énergétique du bâtiment
- Evaluation de la pertinence de la mise en place de réseaux d'énergie (chaleur, gaz, autres)
- Evaluation de la faisabilité des énergies renouvelables
- Contribution au Smart Grid: prosumers
- Définition des politiques énergétiques à l'échelle d'un territoire et une simulation de la mise en place de ces politiques





GIM, acteur majeur dans la construction du Digital Twin

User

Portal Access

2D viewer

3D viewer

Up-&Download

Belmap Services API

- Search & view
- (Reverse) geocoding
- Mapping
- Address suggestion
- Linked data
- Routing & Drive times

Belmap Data

Buildings

Addresses

3D

Places

Traffic

Earth

People

Merci pour votre attention !

LEUVEN OFFICE

Ubicenter D
Philipssite 5 bus 27
3001 Leuven
Belgium
+32 (0)16 40 30 39
info@gim.be

GEMBLOUX OFFICE

Parc Scientifique Créalys
Rue Camille Hubert 13C
5032 Gembloux
Belgique
+32 (0)81 71 34 20
info_w@gim.be

Maarten DEGROOTE

Energyville

EnergyVille: driving the transformational change

Construction 4.0, 12 December 2019

Maarten De Groote, Coordinator Positive Energy Districts Programme

EnergyVille in a nutshell

Focus: sustainable energy and intelligent energy systems

Collaboration between research partners VITO, KU Leuven, imec and UHasselt

Expertise to industry and public authorities

Energy Ville

Driving the transformational change through a district eco-system

Intelligent district renovation

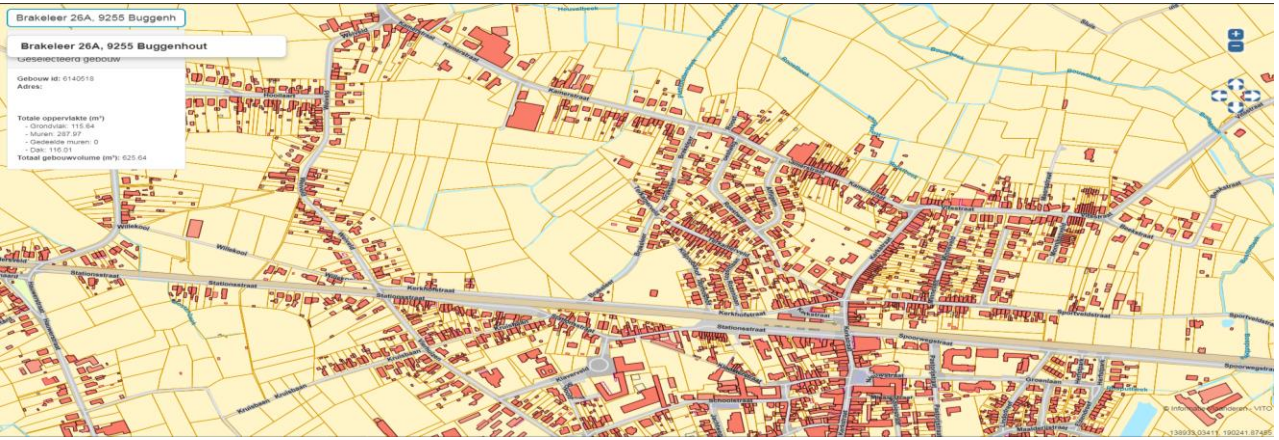
Community building

District energy systems

Energy grid end to end smartification

EnergyVille software applications

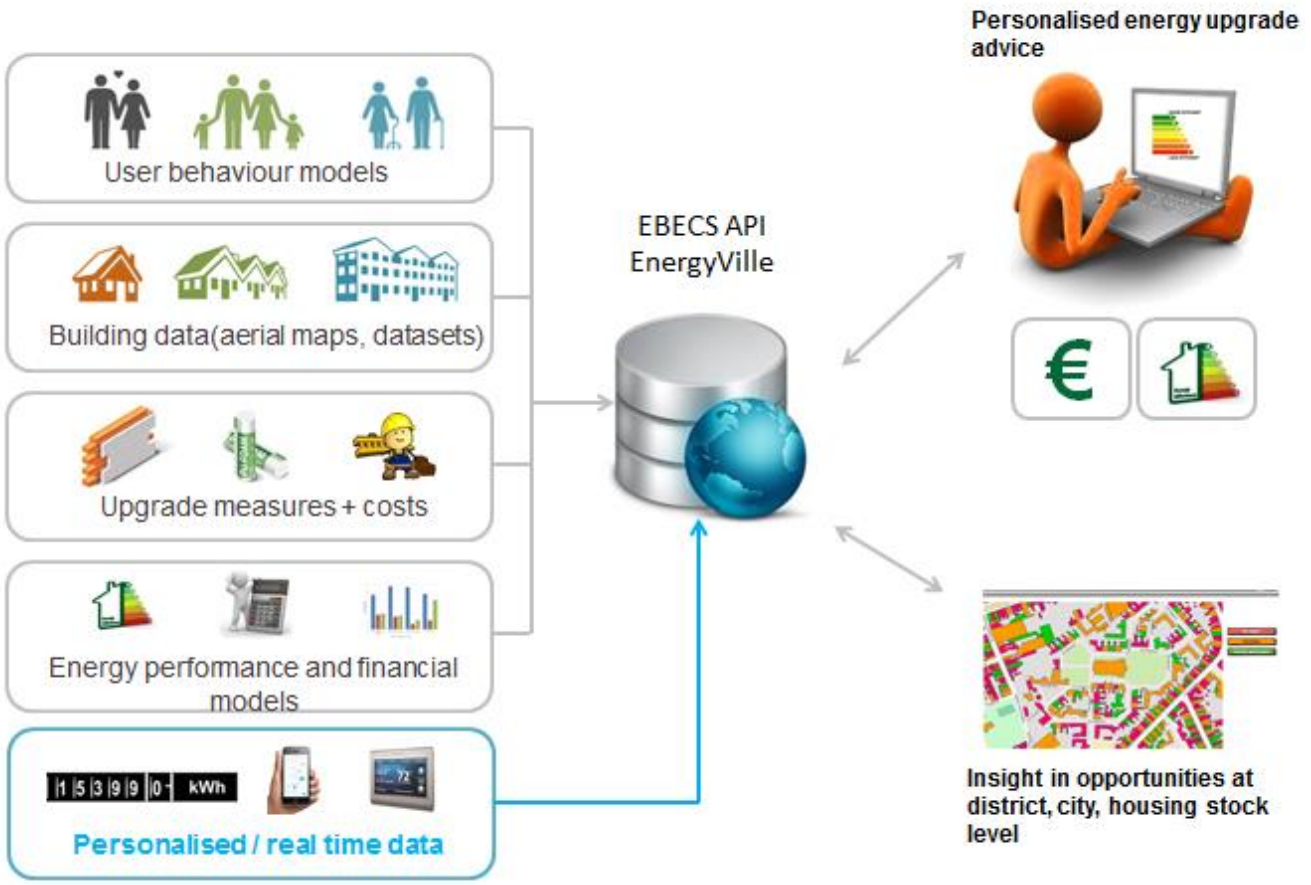
Building Geometry Service



- Based on Ground map and Lidar
- Residential and non-residential buildings
- Input for other tools: protected area (m^3), loss surface (m^2)
- Available for Flanders and Brussels in LOD2 (VITO)
- Soon available for Wallonia?
- High-resolution data available for NL, UK, Lux
- LOD1 available for EU (low resolution)
- Building Geometry Algorithm can be developed based on ground map and additional questions

EnergyVille software applications

EnergyVille Building Energy Calculation Service (EBECS)



- Quick & trustworthy home renovation advice
- Online application, offered as an API (application programming interface) to private and public clients
- Building geometry retrieved from aerial imaging and land registry data
- Results fitted to actual consumption data, including occupant behaviour
- Reliable advice on costs & benefits of a specific renovation

EnergyVille software applications

Energy Check up Tool – EBECS 2.0

EnergyVille software applications

Urban Energy Pathfinder

- Planning tool to develop local energy roadmaps for district and city-level
- How to meet climate ambitions towards 2050
- Calculates energy, CO_2 savings, and financial conditions for renovation scenarios
- Energy technology measures at building, district and city level

https://www.energyville.be/onderzoek/urban-energy-pathfinder

Back to overview

Old Berchem

345 buildings

Make simulation

Characteristics | Simulations (2)

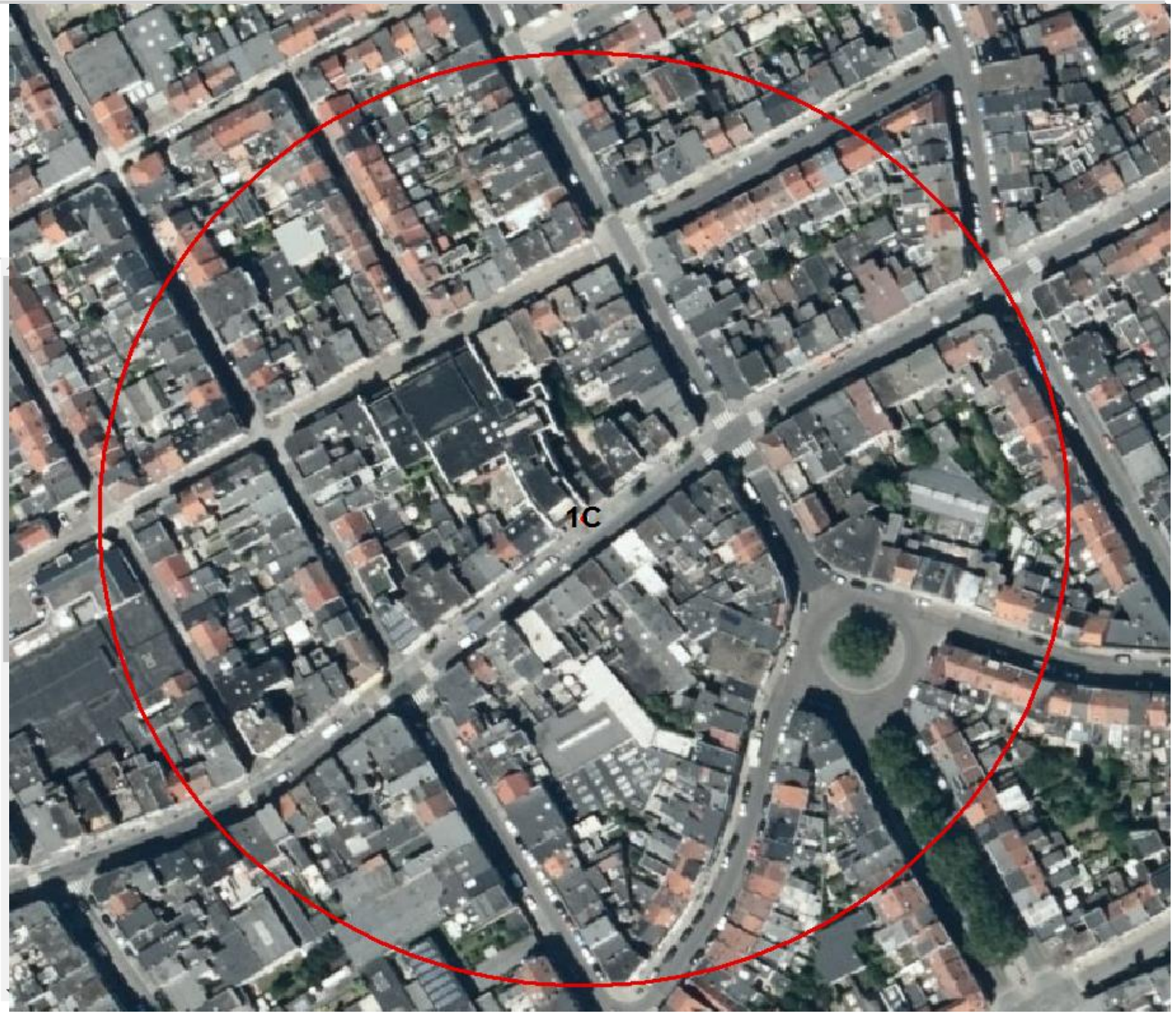
Building analysis

Total number of buildings:	345
Before 1970:	300
Apartment:	92
Terraced:	237
Semi-detached:	15
Detached:	1
1971 - 1990:	45

Spatial characteristics

Inhabitants:	1.102
Density of inhabitants:	220,4 ha
Households:	301
Density of households:	60,2 ha
Number of employment:	182,23
Surface of infrastructure:	13.400 m²

Energy state



Calculation succeeded

Thanks for waiting.

We've calculated and selected 8 scenarios.
2 scenarios complete all your goals.

2050 Goals
Zone: Old Berchem

60% CO2 savings - 40% renewable energy

New simulation

8 scenarios Compare on graph

Show cost by: total household investor

Heavy renovation

67% CO2 saving - 10% renewable energy

Scenario content

- Roof insulation
- Exterior wall insulation
- New windows
- Air-water heat pump
- PV panels
- Solar collector

What will it cost?

Total investment:
€ 25.287.817

Energy cost savings / year:
€ 558.522

Pay back time: 45 year

Our advice

UEP's advice about this option.

Simulation - **Historical centre**

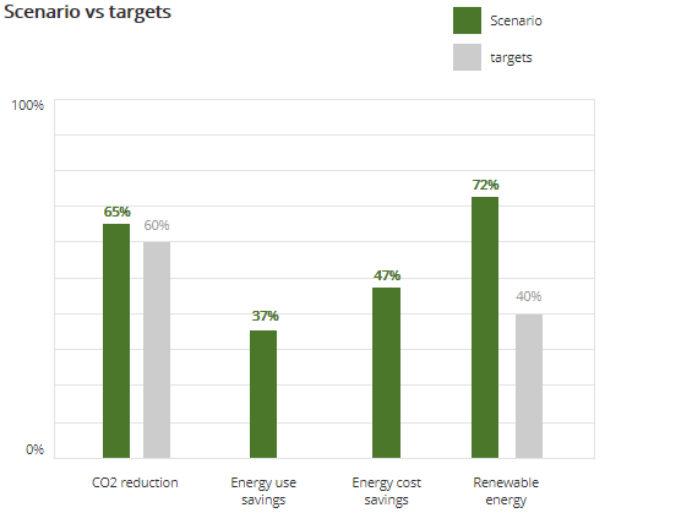
Demo

Renovation and 50% connection to district heating

Scenario package

345	50%	50%	50%
Buildings in this zone	**Light renovation**	**Heavy renovation**	**Connection to district heating**
	= 172 Buildings	= 173 Buildings	= 173 Buildings

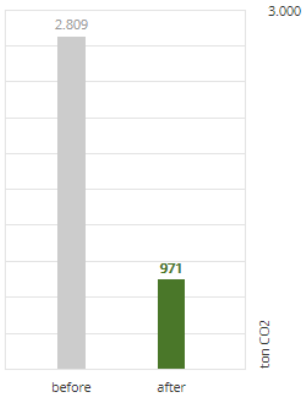
Scenario vs targets



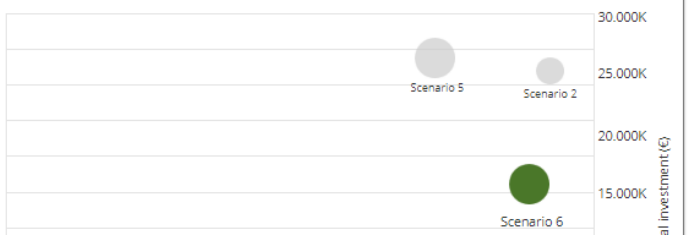
Co2 reduction / year

1.838 ton

Before - after scenario



Co2 reduction vs total investment vs uncertainty



Investment

District level | Building level

Total investment

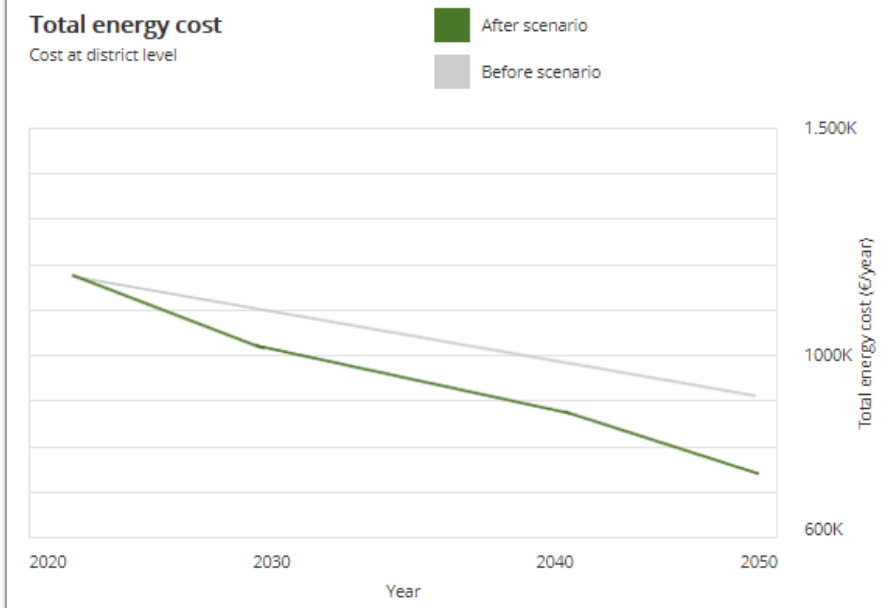
€ 15.768.650

Energy cost savings / year

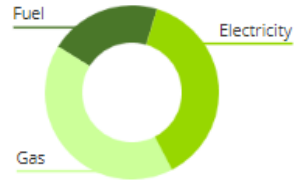
€ 441.761

Total energy cost

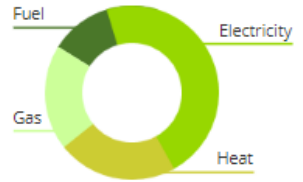
Cost at district level



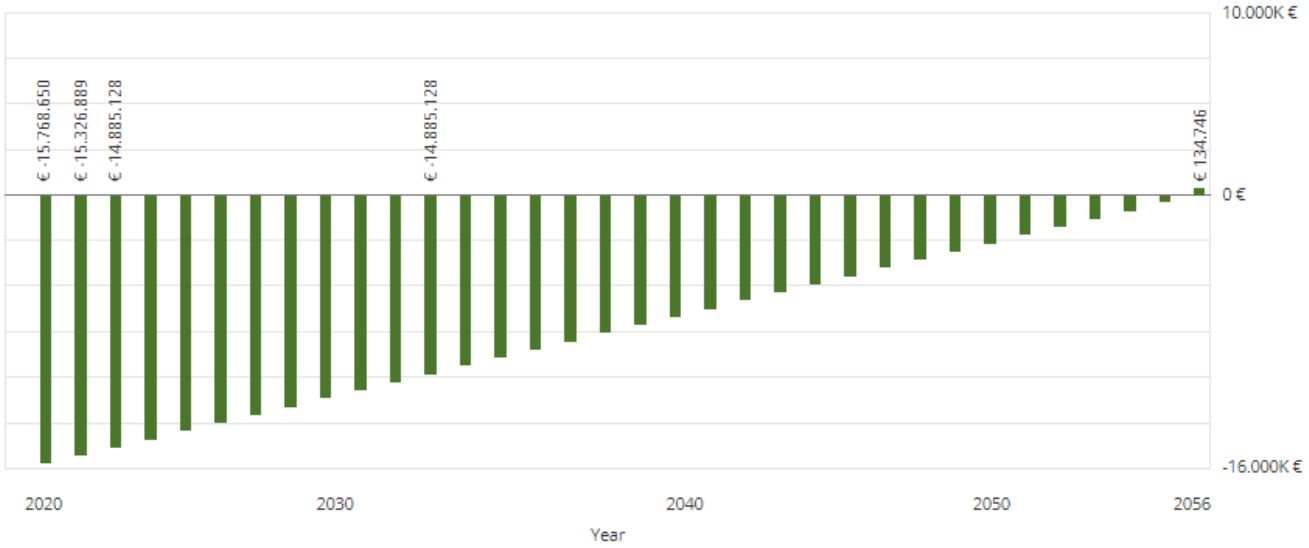
Energy mix before scenario



Energy mix after scenario



Return on investment



EnergyVille: future innovations & market collaboration

Urban Energy Pathfinder as market accelerator for Positive Energy Districts

More info?

maarten.degroote@energyville.be
www.energyville.be
@energyville

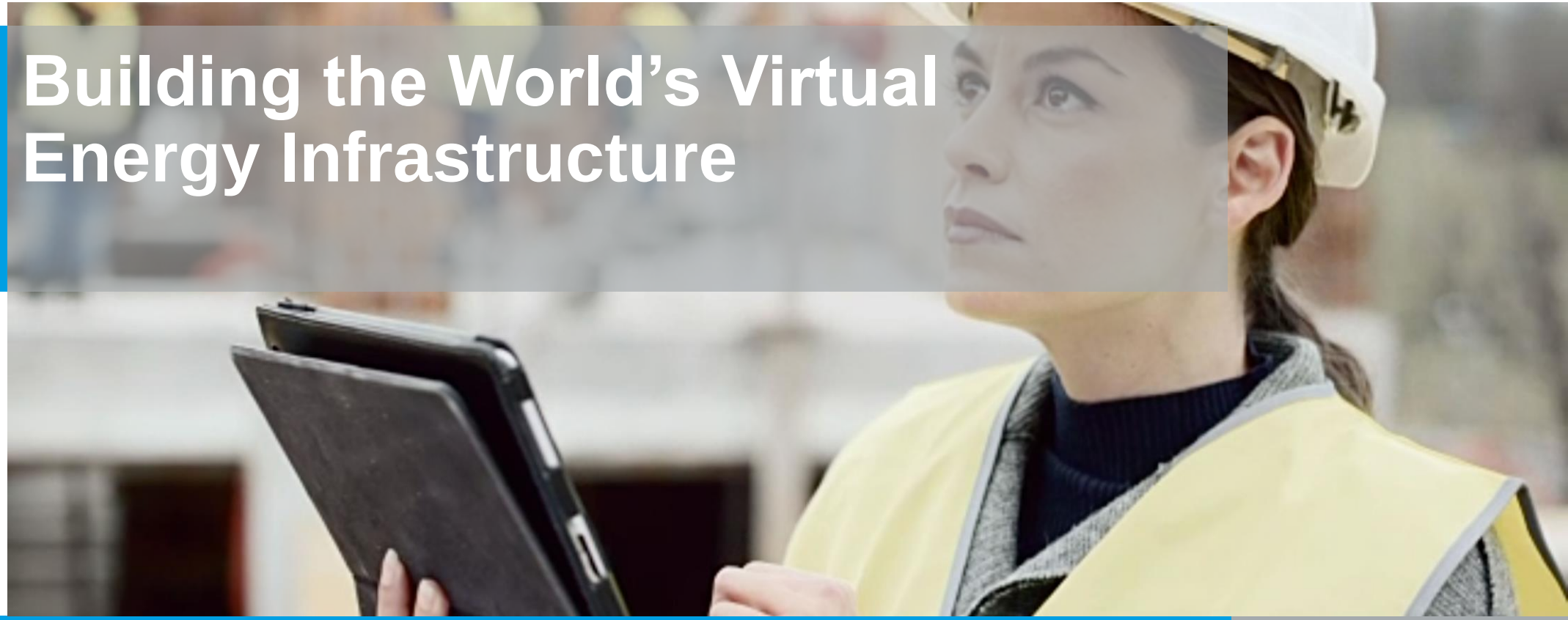
Barry LYNHAM

Knauf Energy Solutions

GREEN W!N FROM INNOVATION TO BUSINESS

KNAUF ENERGY solutions

Building the World's Virtual Energy Infrastructure



GREENW!N

12/12/2019

Building The World's Virtual Energy Infrastructure

KNAUF ENERGY solutions

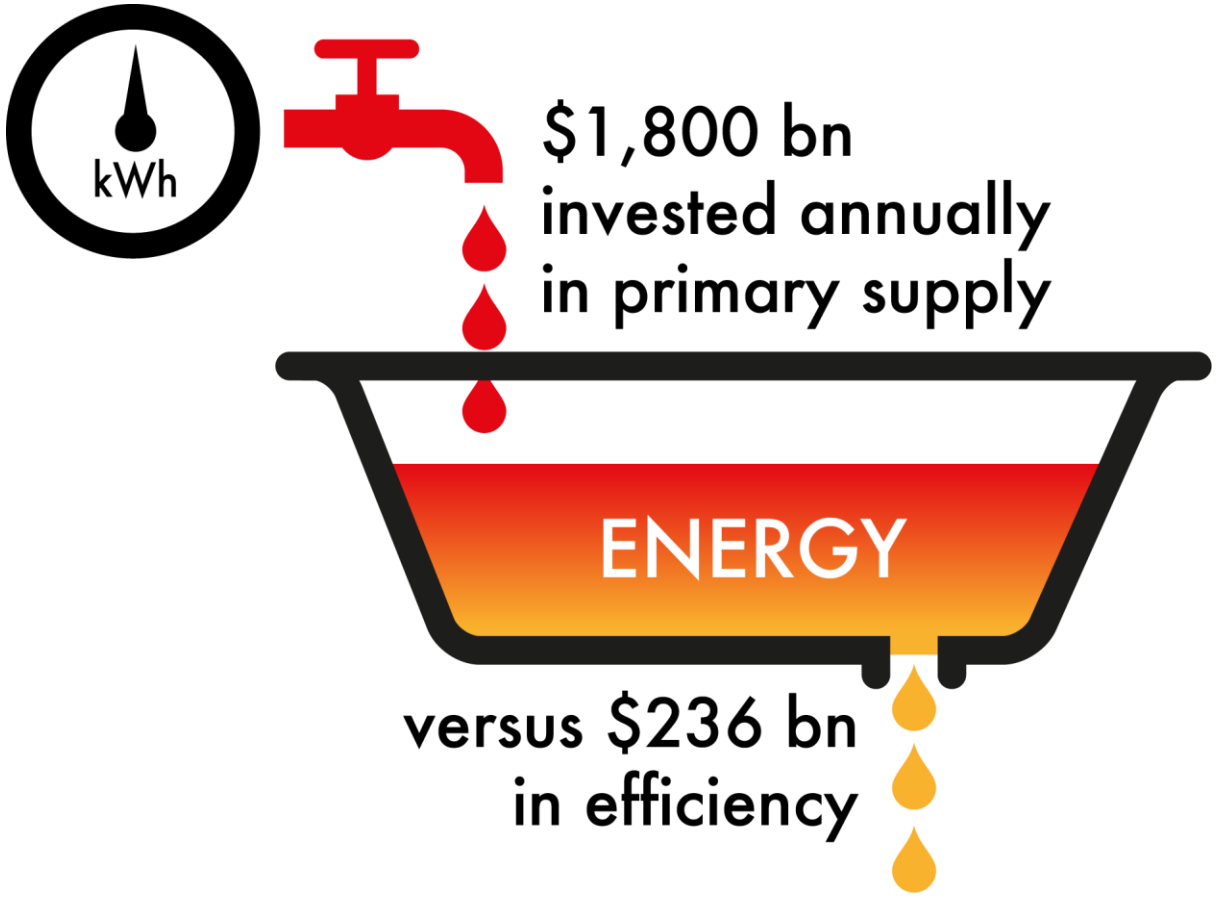
400,000 SMART RETROFIT HOMES

=

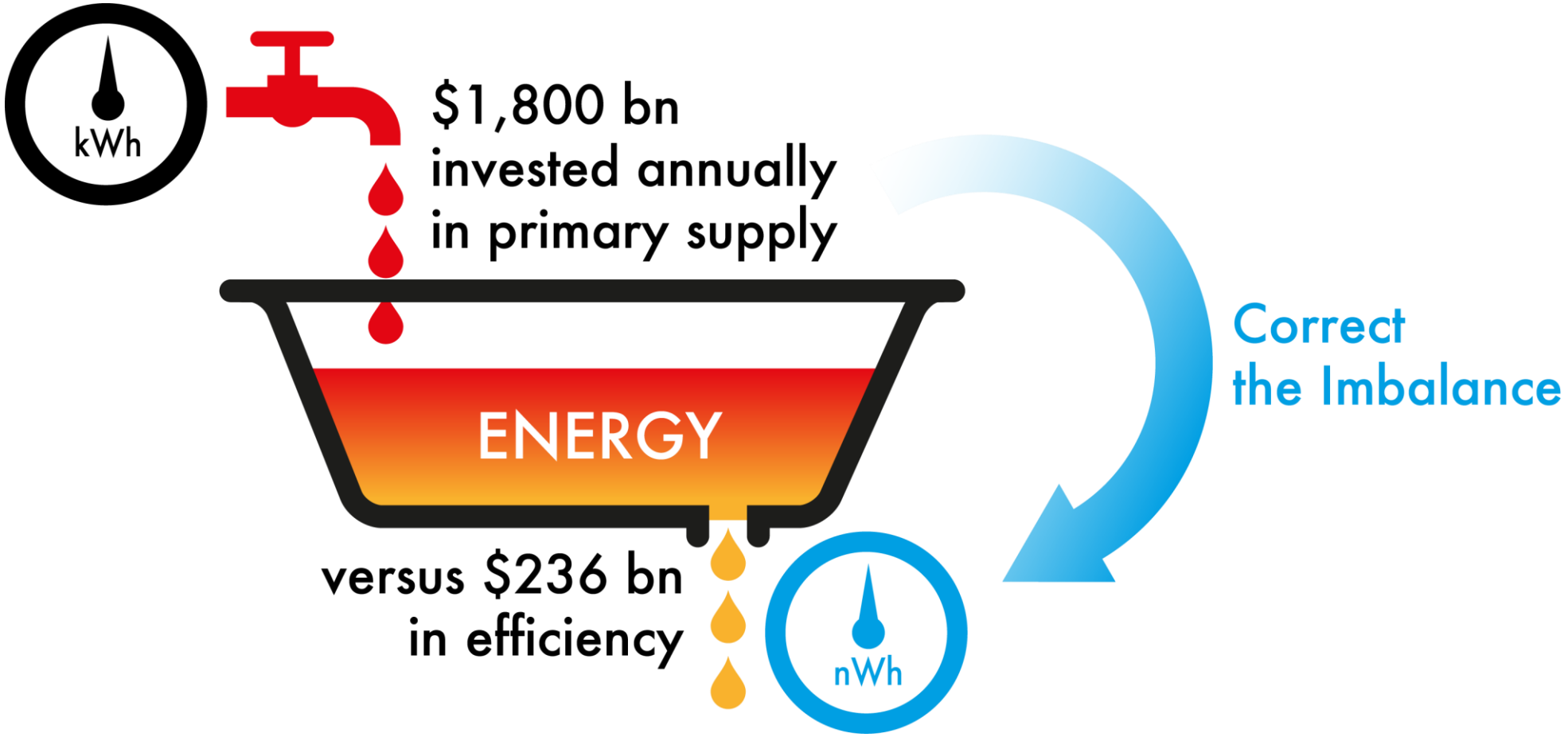
ONE POWER STATION

at an unbeatable price

Reorient Towards Our First Fuel



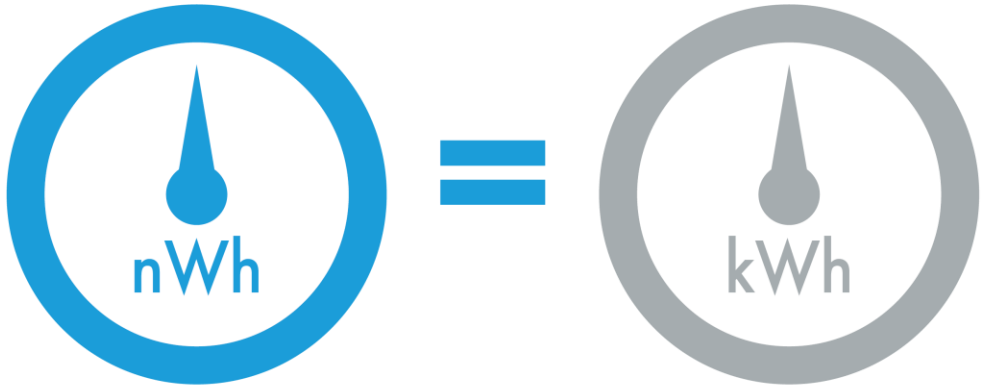
Reorient Towards Our First Fuel



Technology Breakthrough

FOR THE FIRST TIME

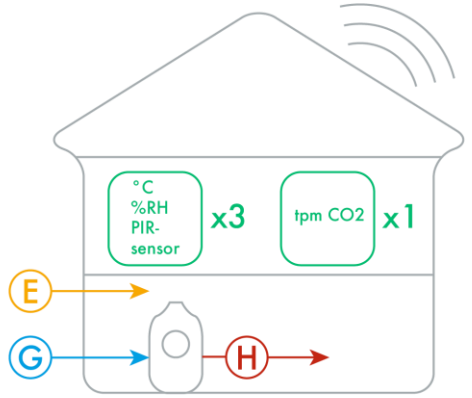
We can meter energy efficiency
the same way as energy generation



negaWatt hours
of energy

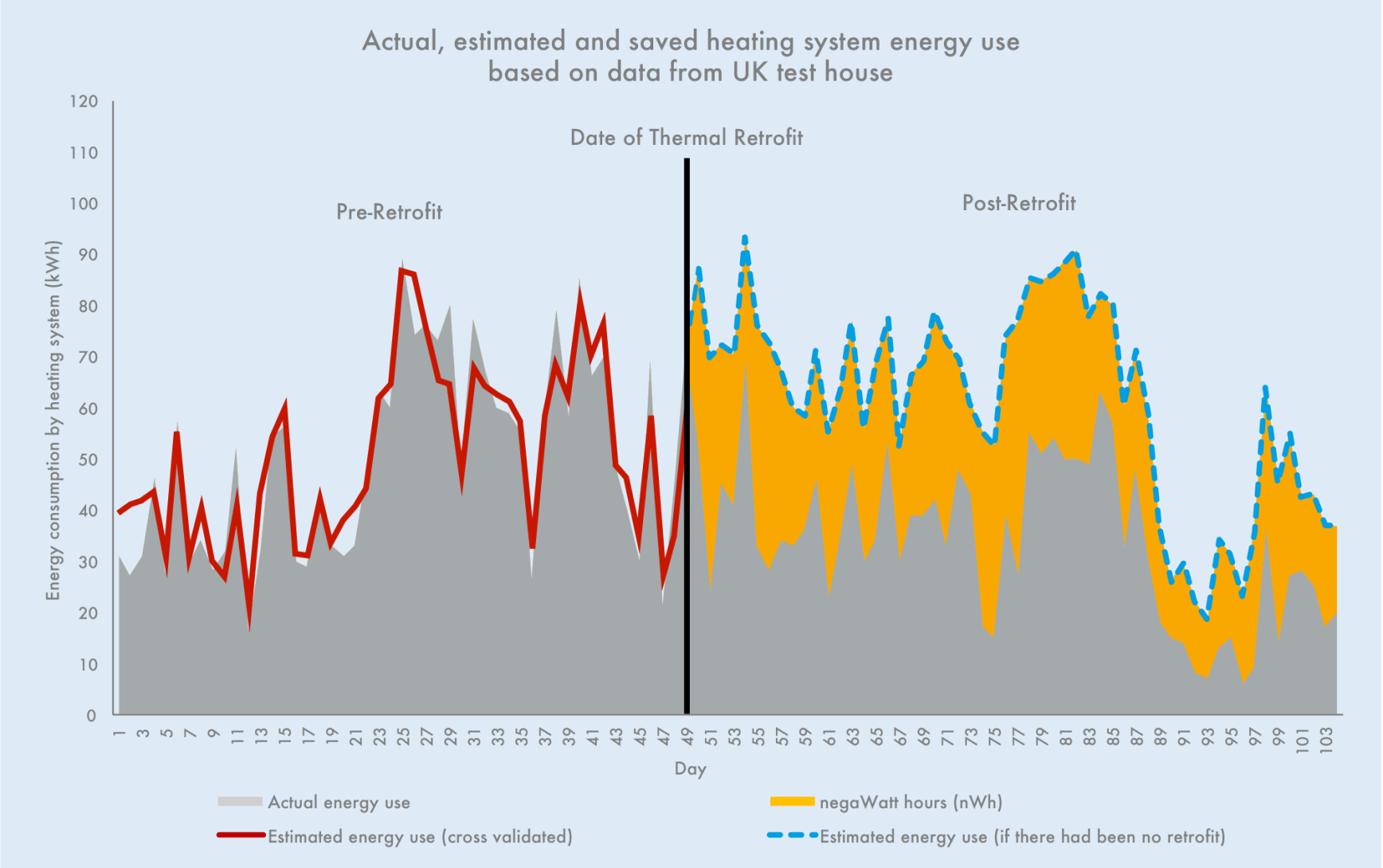
kiloWatt hours
of energy

Smart Connected Sensors

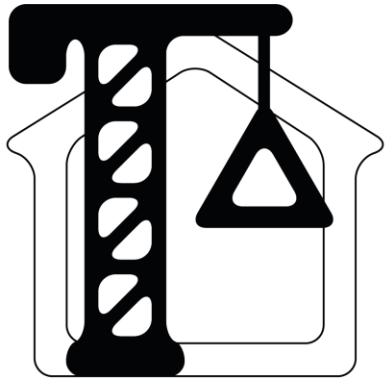


- (E) Electricity Meter
- (G) Gas Meter
- (H) Heat Meter on Central Heating Circuit
- Boiler (supplying domestic hot water and heating on separate circuits)
- tpm CO2 — Sensor boxes placed in representative zones according to house size and layout

The NegaWatt Hour (nWh) Meter



Measure and Mine



SMART BUILD

Optimise Design,
Control Construction
& Verify Results

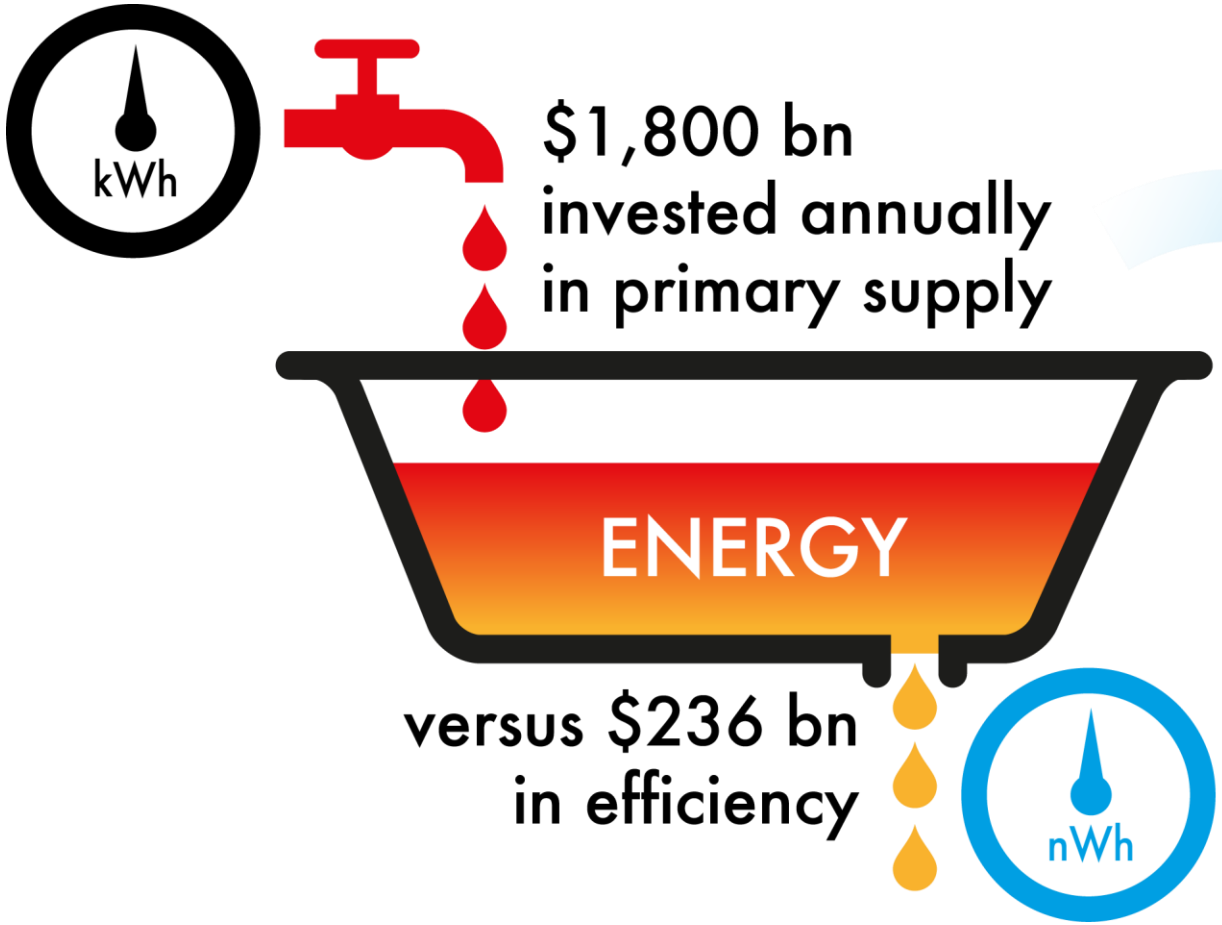
SMART RETROFIT

Optimise Strategy,
Control Works
& Verify Results

SMART HOME

Check Comfort,
Predict Maintenance
& Energy Services

Delivering a Renovation Wave



A Feed-Out-Tariff - correcting the imbalance

Building The World's Virtual Energy Infrastructure

KNAUF ENERGY solutions

400,000 SMART RETROFIT HOMES

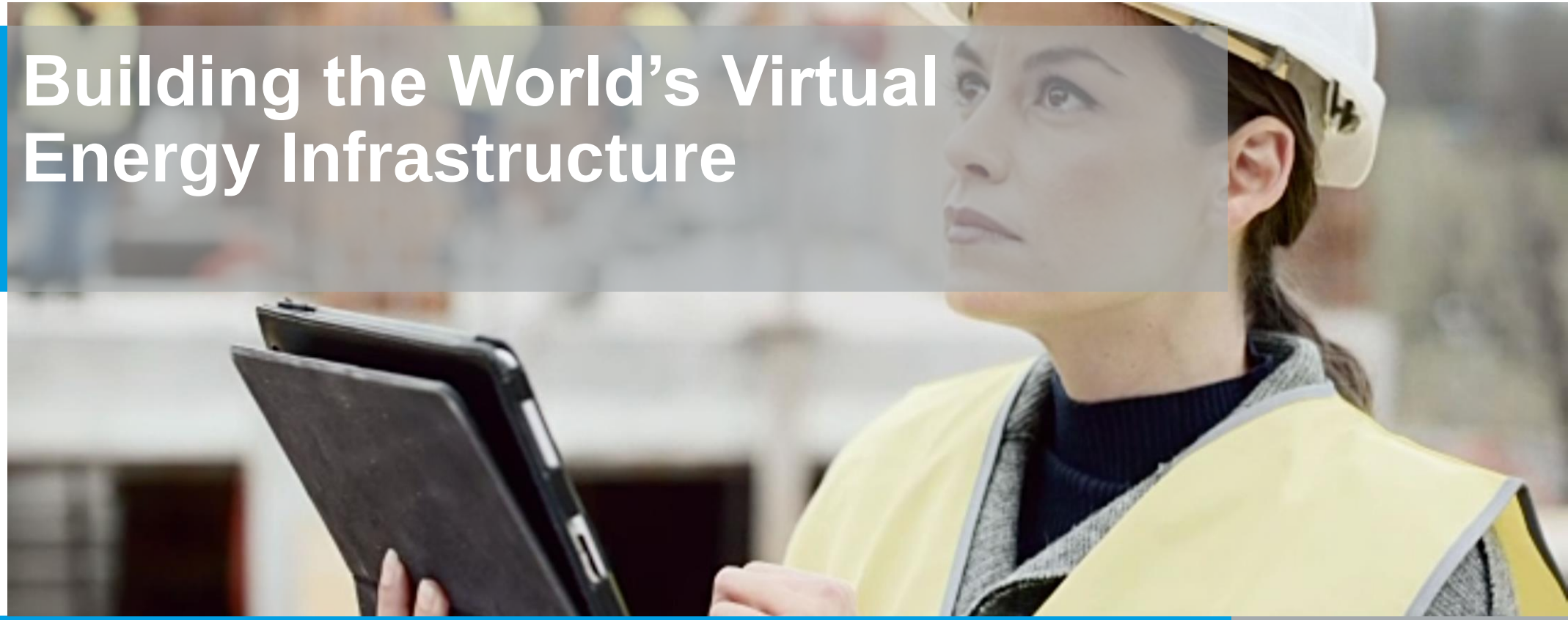
=

ONE POWER STATION

at an unbeatable price

KNAUF ENERGY solutions

Building the World's Virtual Energy Infrastructure



GREENW!N

12/12/2019

Serge MARTIN

AGC Glass Europe

GREEN WIN
FROM INNOVATION TO BUSINESS

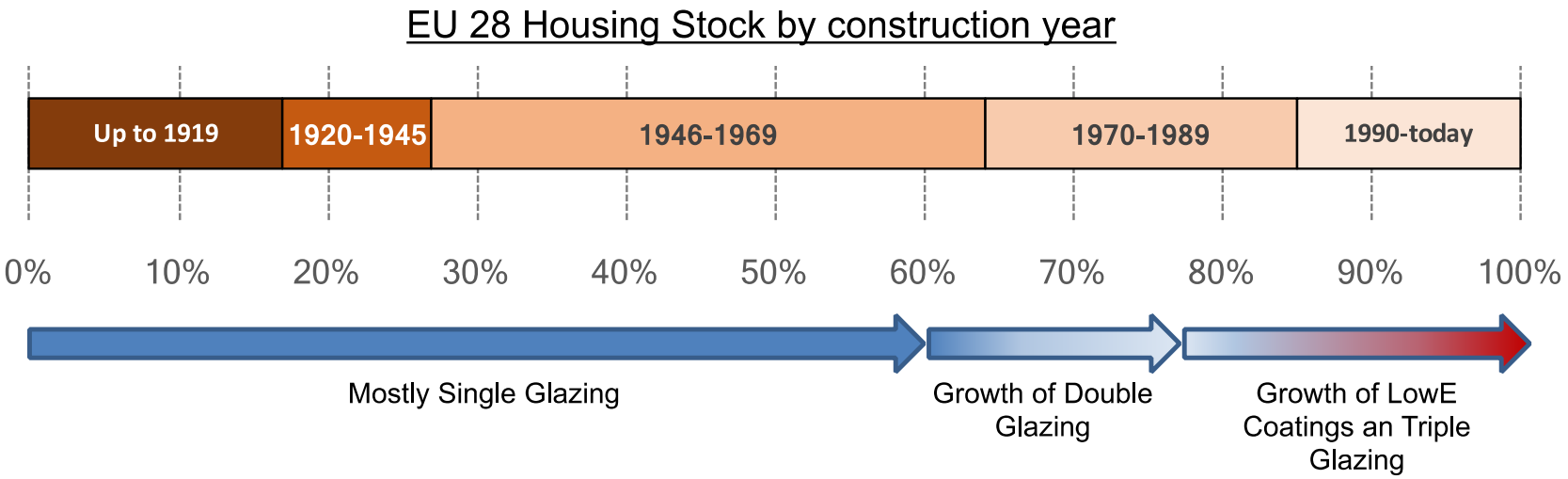
RenoWindow

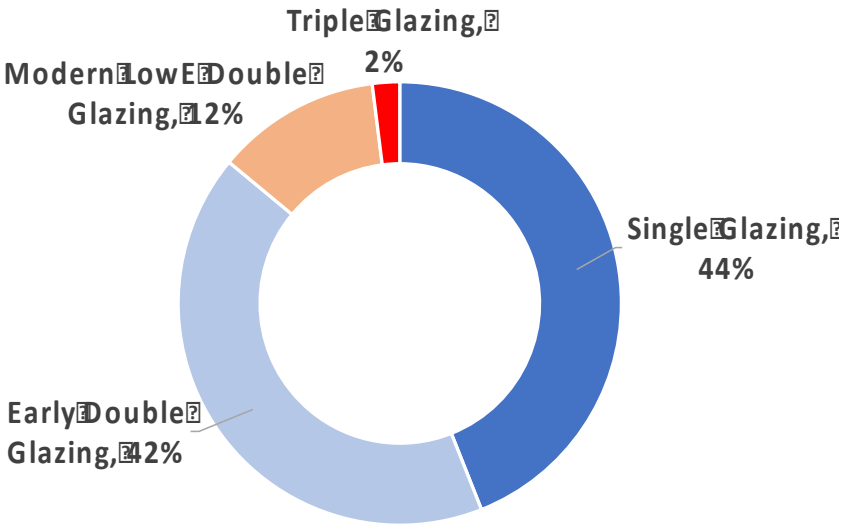
A service by AGC

Pragmatic Solutions for Effective Renovation

Construction 4.0 Conference, December 12th 2019

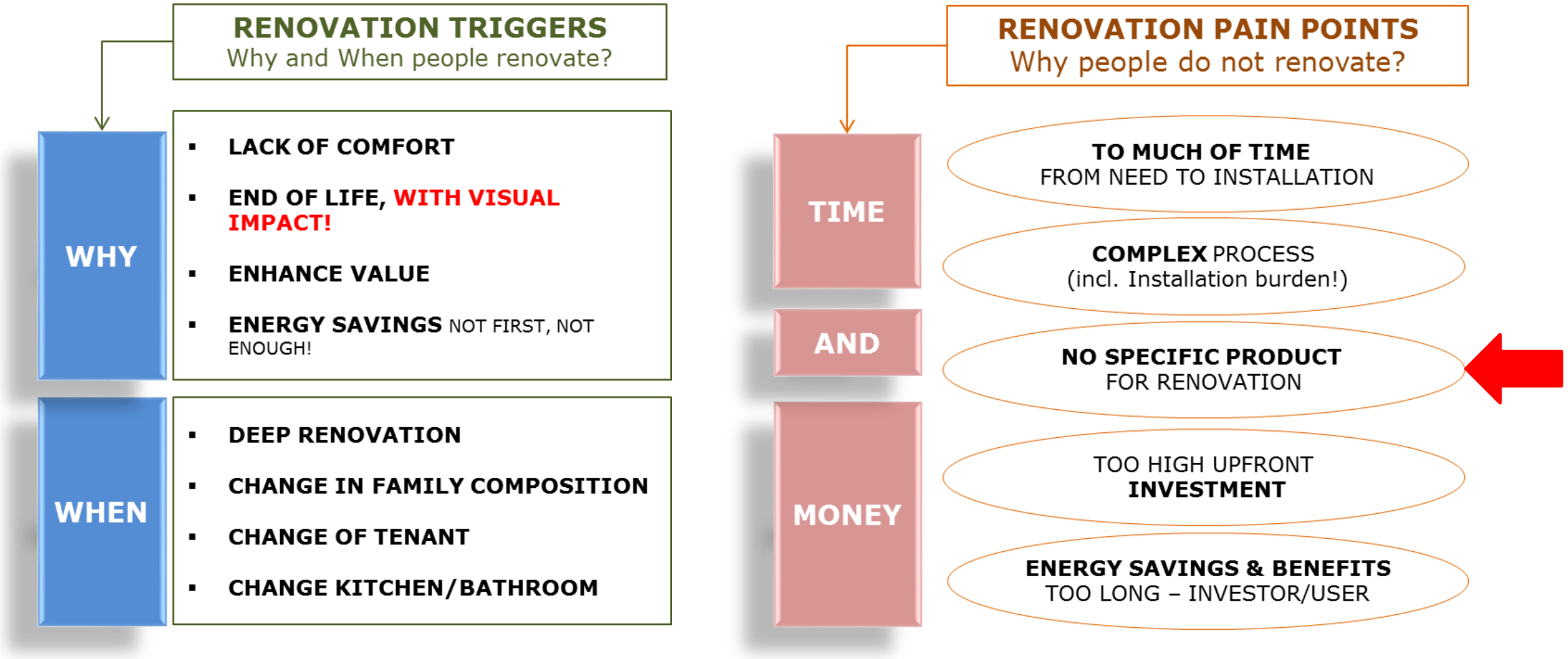
The European Windows Stock





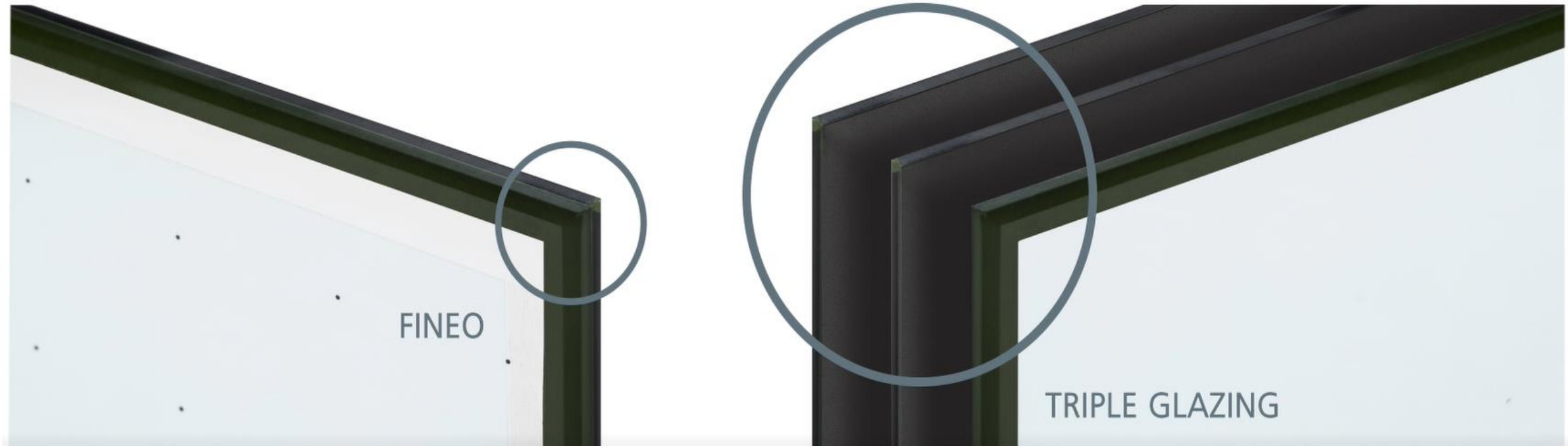
- Huge existing windows stock with single and 'early double glazing' : 86% of installed windows = **3,6 billion windows**
- Construction and window industry data clearly indicates that the **annual window replacement rate corresponds to 3% of the stock** (close to 5% if considering only 'old buildings') equivalent to a cycle of ~30 years
    - **More than 70% of the glass used in Windows goes into renovation projects**

Renovation Key Facts



New Glazing technology solutions : FINEO

- AGC and Panasonic have developed a Vacuum IG technology with breakthrough properties compared to regular insulating glazing



Ultimate Slim Design for Maximum Indoor Comfort

Sustainability

- better thermal performance
- 3 to 4 times thinner, less weight
- harnessing free solar heat
- lead free, 100% recyclable

Comfort & Well Being

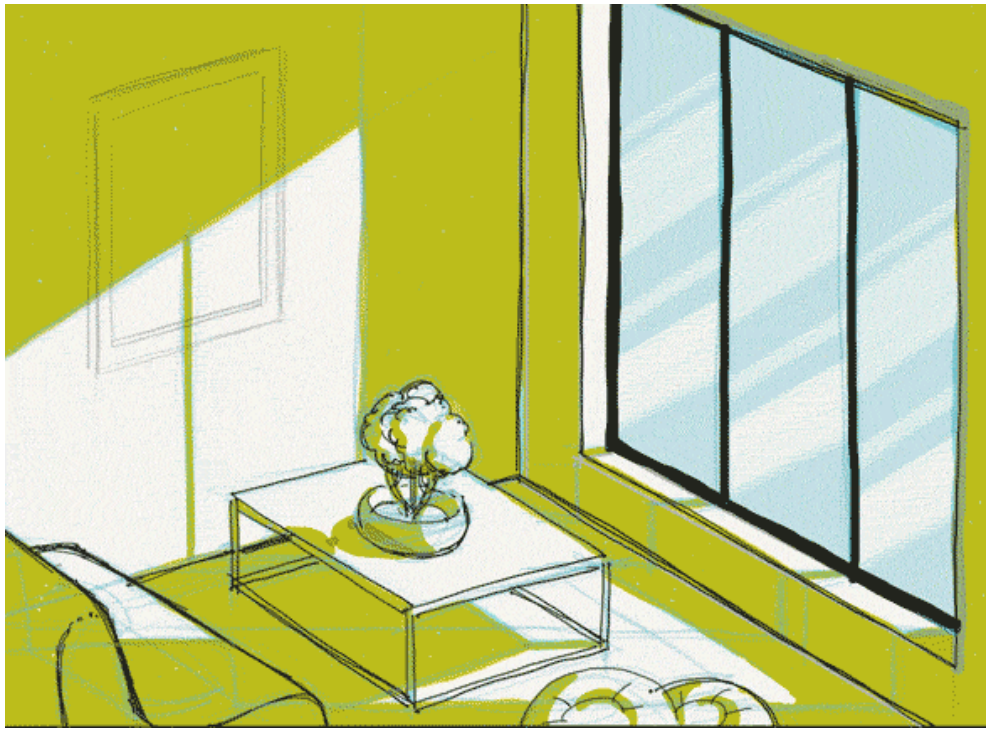
- increased daylighting
- better sound insulation
- superior aesthetics

Implementing new technologies through new solutions

- Basic concept:

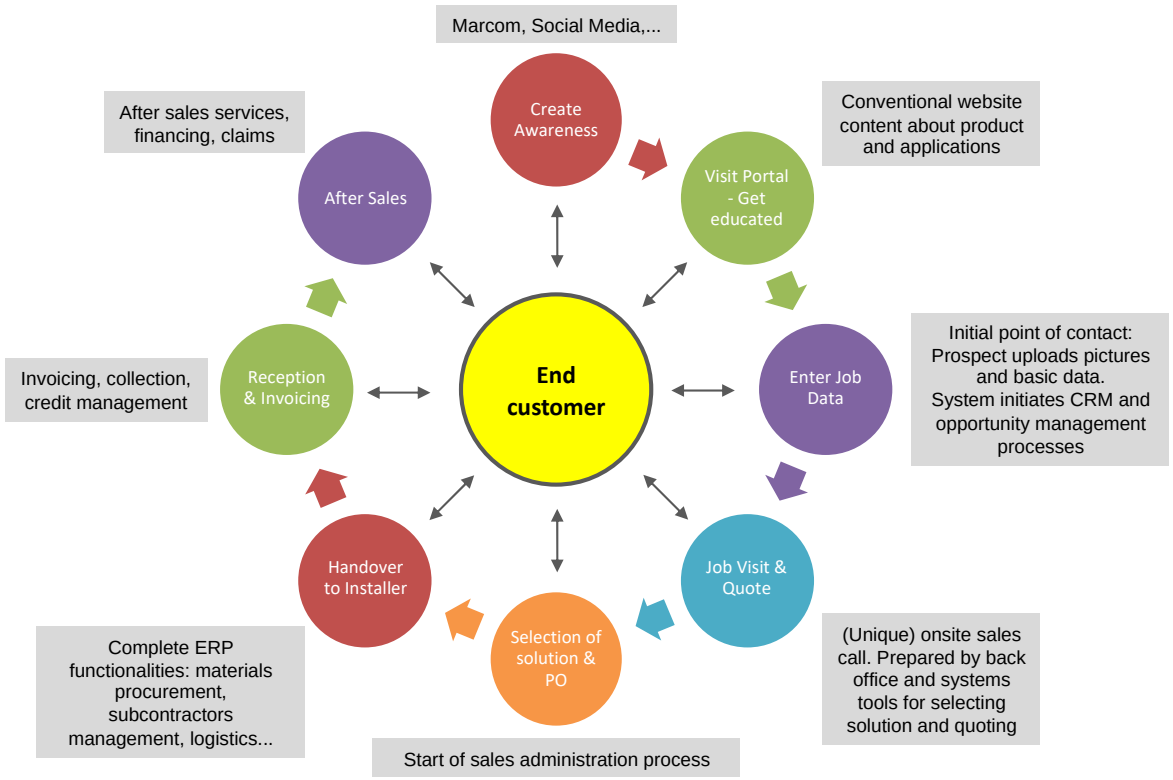
  Upgrade windows by replacing the glazing without changing the existing frame

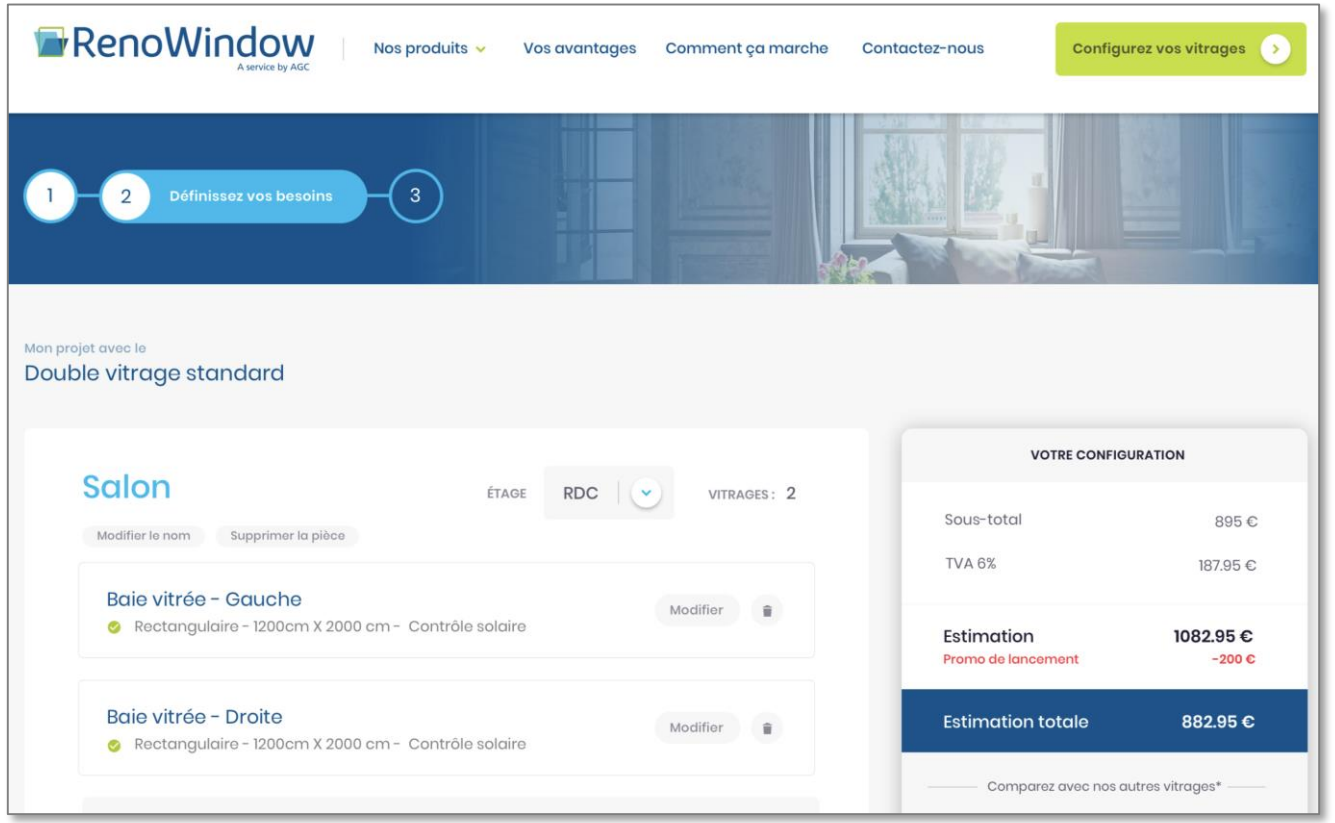
- Benefits :
  - Simplicity and speed of execution with minimum disturbance of occupants
  - Reduced costs (B2C)
  - Improved real estate value (B2B)
  - Professional & customized advice
  - Ecological approach, reduced waste



Embrace digital technologies through the supply chain

- B2C sales process making extensive use of an integrated digital platform : e-Commerce, CRM, ERP, field management…



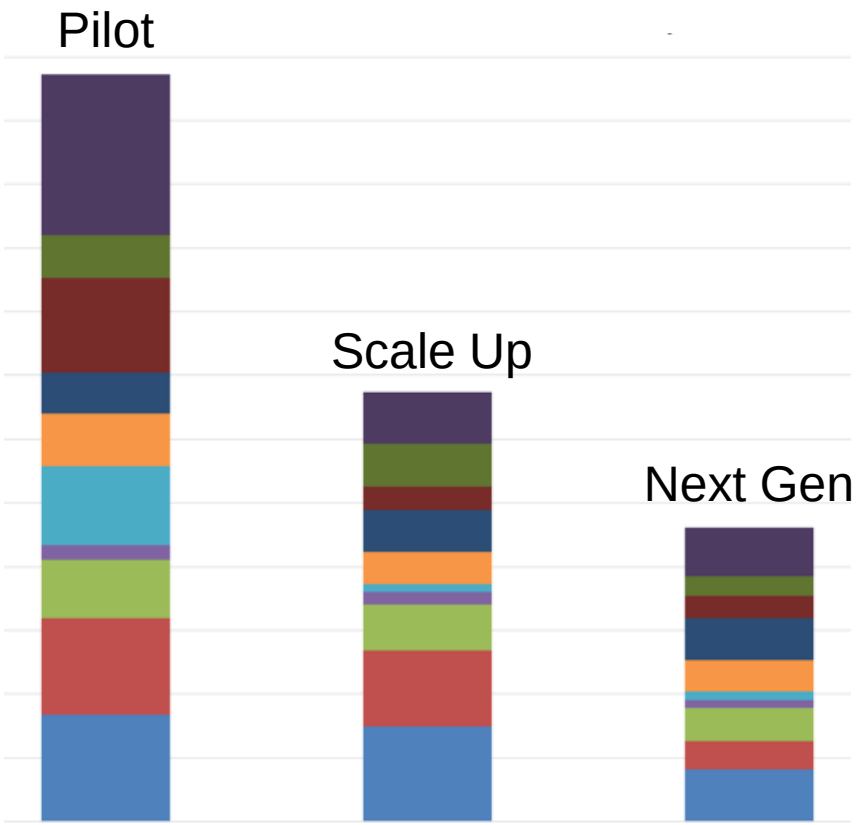



Challenges

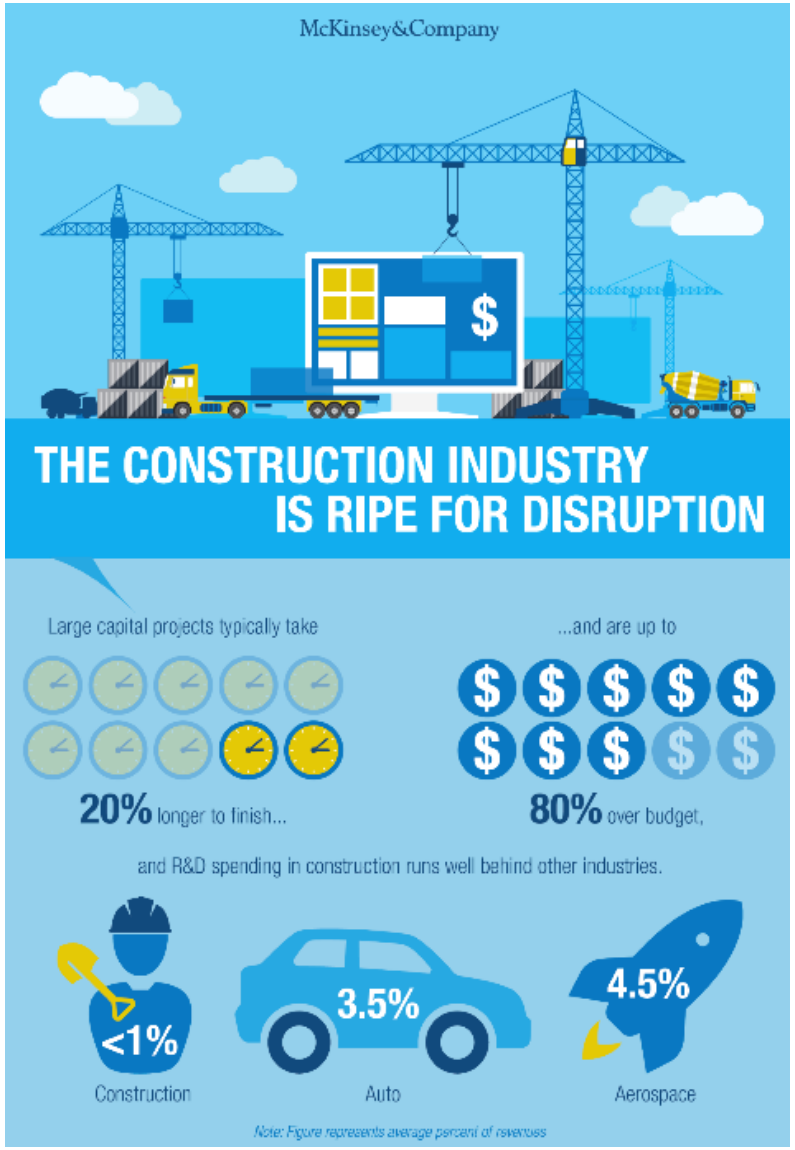
Challenge #1 : The Internal Company Challenges…

- Overcome resistance to change:
  - Disruption of existing supply chain
  - Internal competition between established business and promising but more risky venture

- Ensure long term viability through cost reduction



Challenge #2 : The Construction Industry



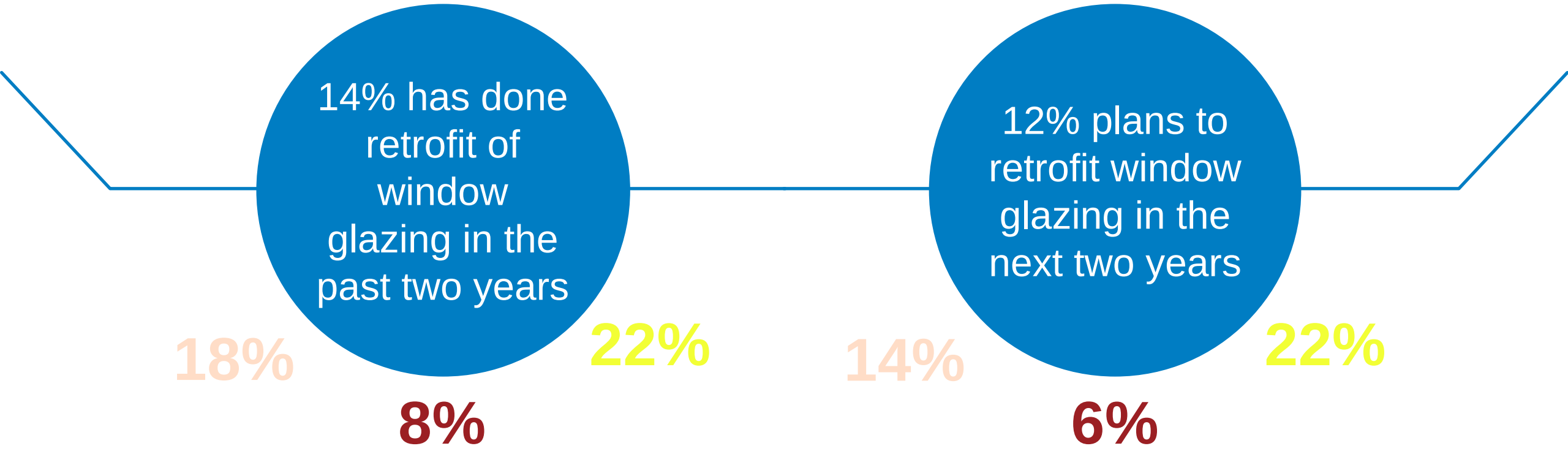
- The construction industry is at the same time:
  - Risk averse
  - Often not sophisticated
  - Lacking qualified workforce

- Do we address the issue through education, a framework that promotes innovation and allocation of resources to most effective solutions

  OR

- Do we wait for the industry to reinvent itself …some day

Challenge #3 : ‘Cultural’ acceptance



- **Awareness and adoption of reglazing as a viable option shows discrepancies between countries and has to be improved overall**

Challenge #4 : Regulations & Incentive Plans

Complete Window Replacement

Reglazing with Fineo

Similar Energy Performance

Higher Cost, More Waste

Lower Cost, Less Waste

Government incentives must not discriminate new solutions

A wide adoption of these pragmatic solutions could deliver 10% of the emission reduction goals by 2050 in Belgium

PANEL DE DISCUSSION

Wrap up

Focus sur le futur de la construction et présentation du plan d'actions des futurs GT

par les centres de recherche Centre Scientifique et Technique de la Construction (CSTC) et le Centre de Recherche en Aéronautique (Cenaero).

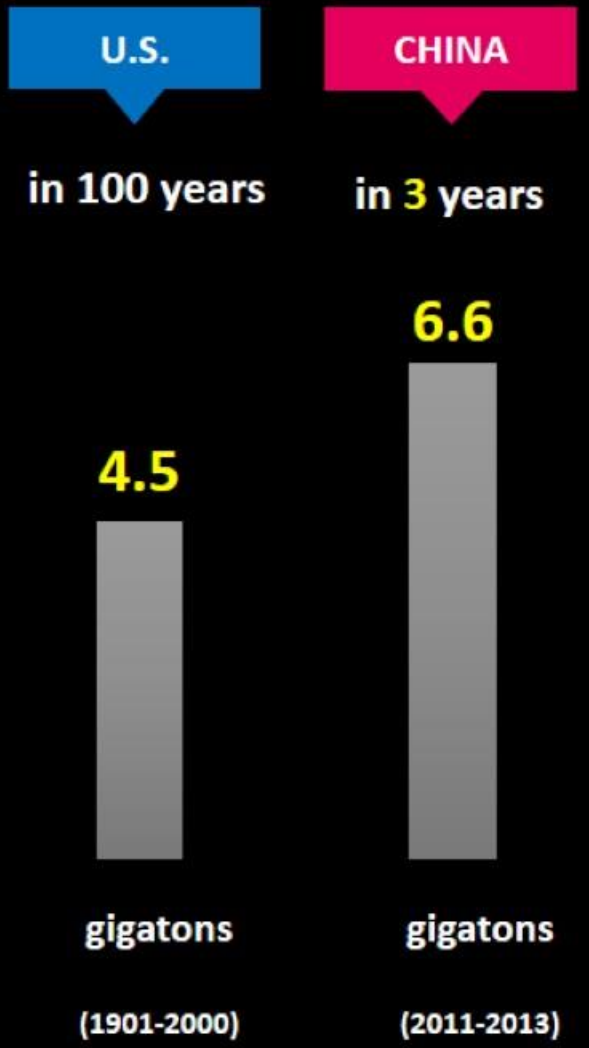
GREEN W!N FROM INNOVATION TO BUSINESS

WRAP-UP

C. Goffaux (Cenaero) & B. Parmentier (CSTC)

Reduce Environmental Impact

China used more cement in **3** years than the U.S. used in the entire 20th century

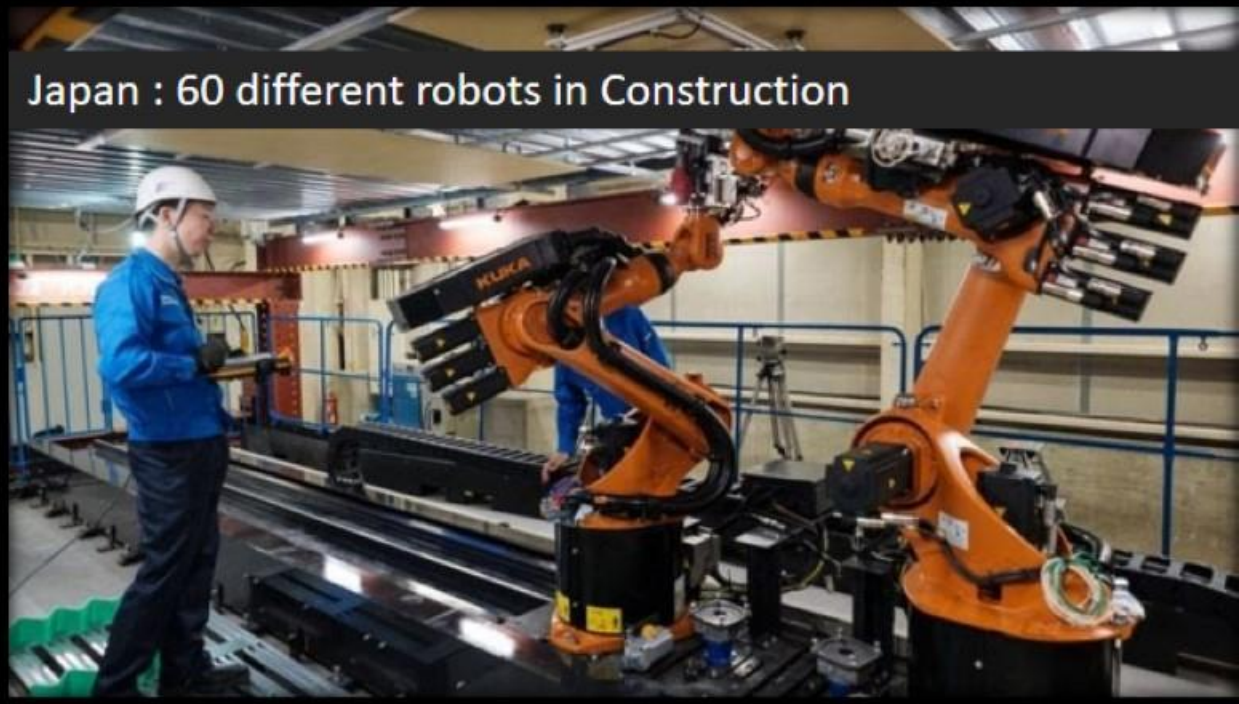


The Context

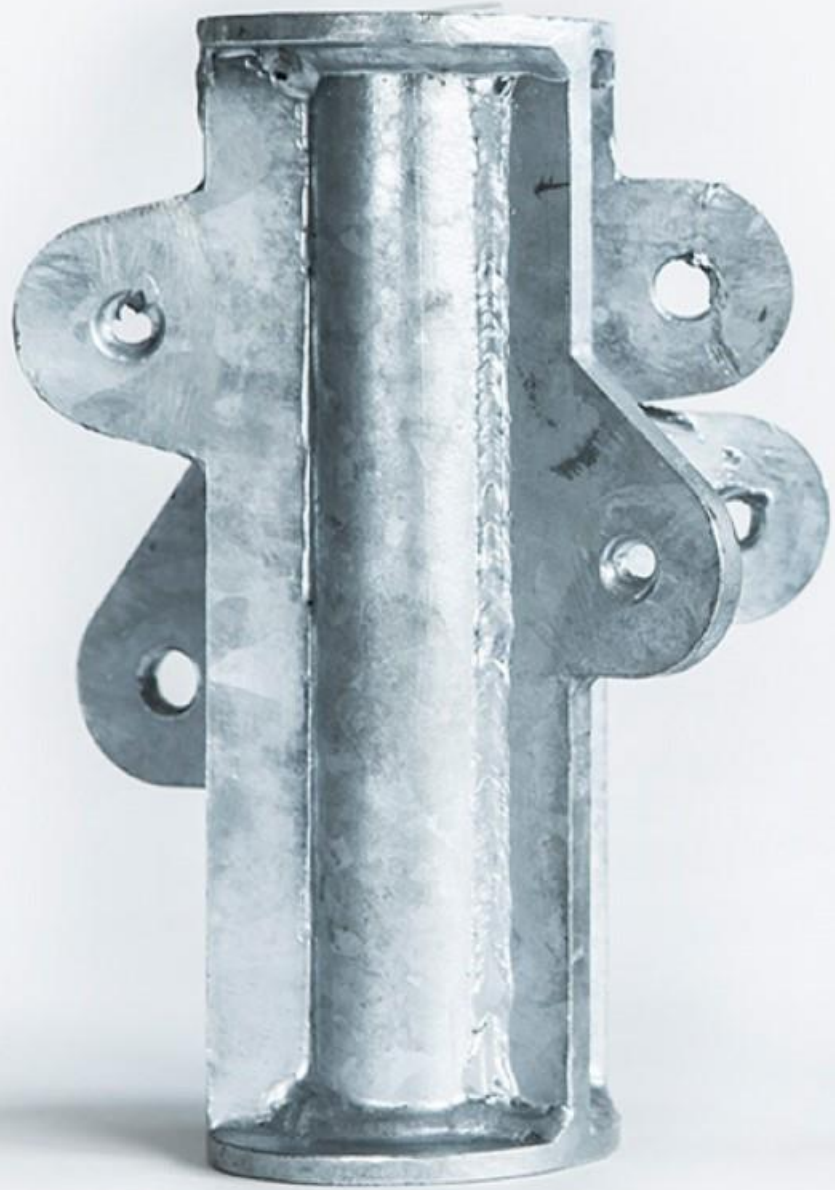
Drivers

- Lack of workforce (ageing, shifting, …)
- Low productivity
- Better safety
- Environmental issues
- Reduce work painfulness
- Manage scarcity of resources
- Connectivity based (millennials…)

- Technology push



Topology Optimization

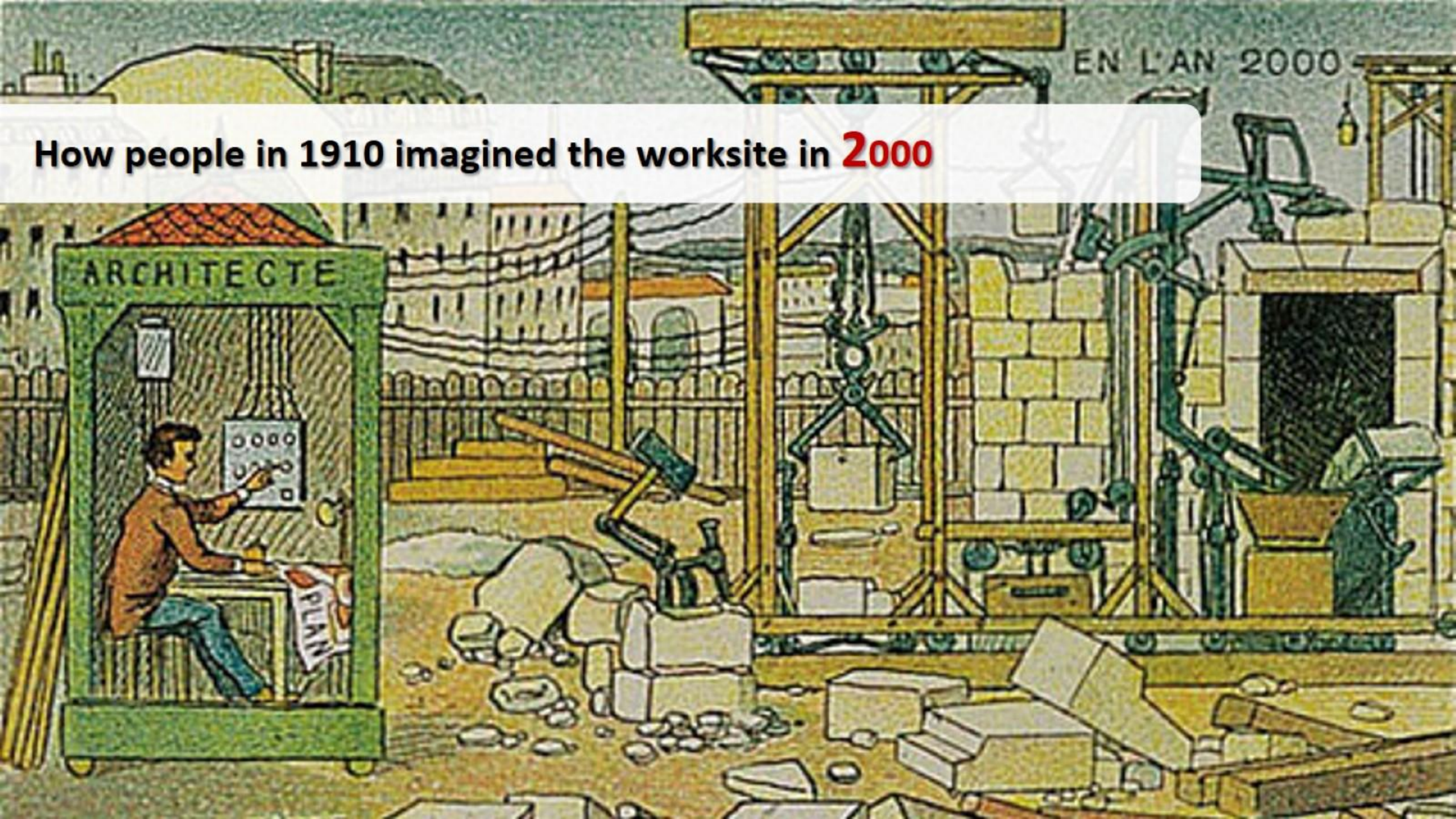


-75% weight
for steel connexions

Arup

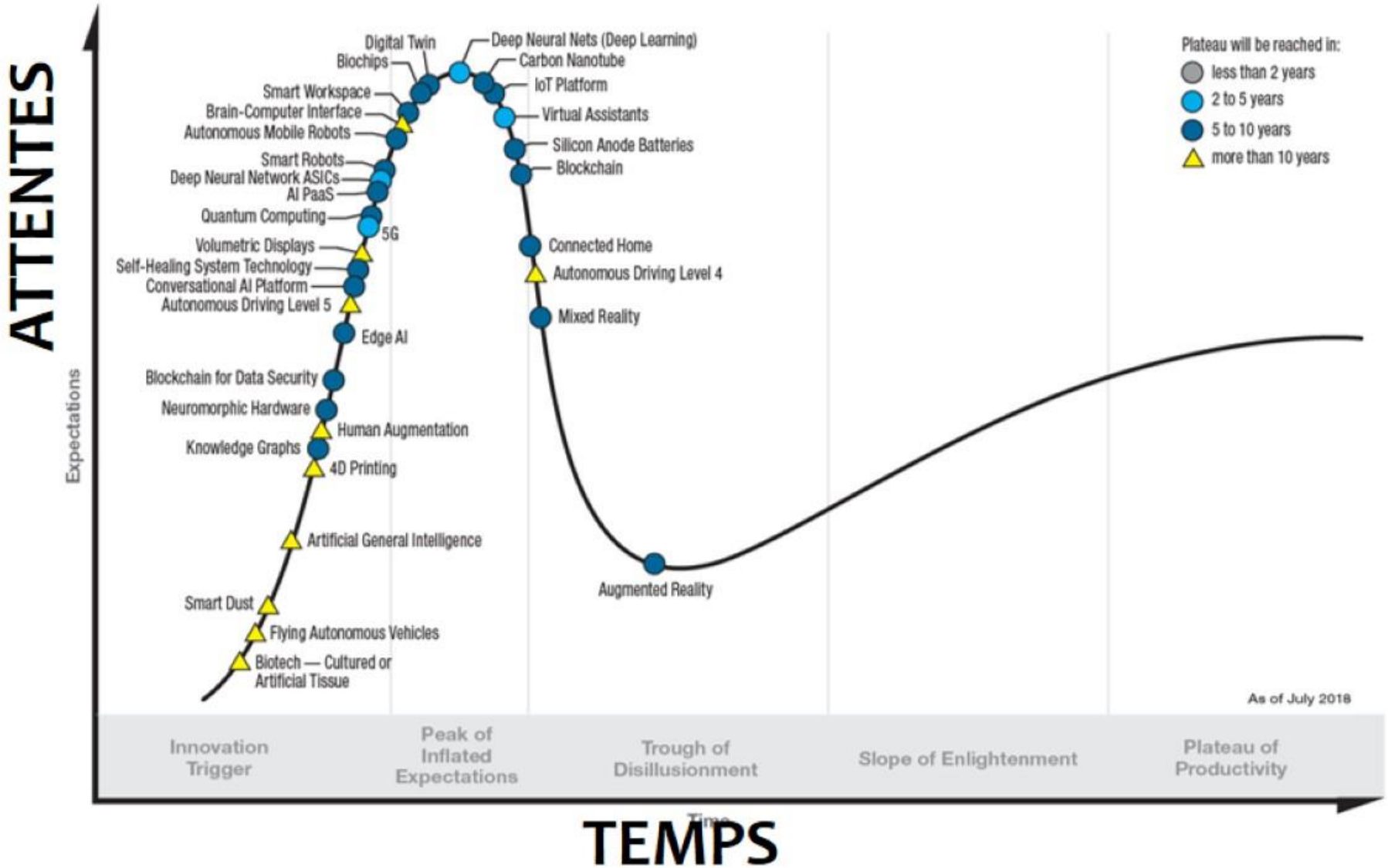
The Technology push

Your smartphone is today more powerful than the computers used to send N. Armstrong on the moon.

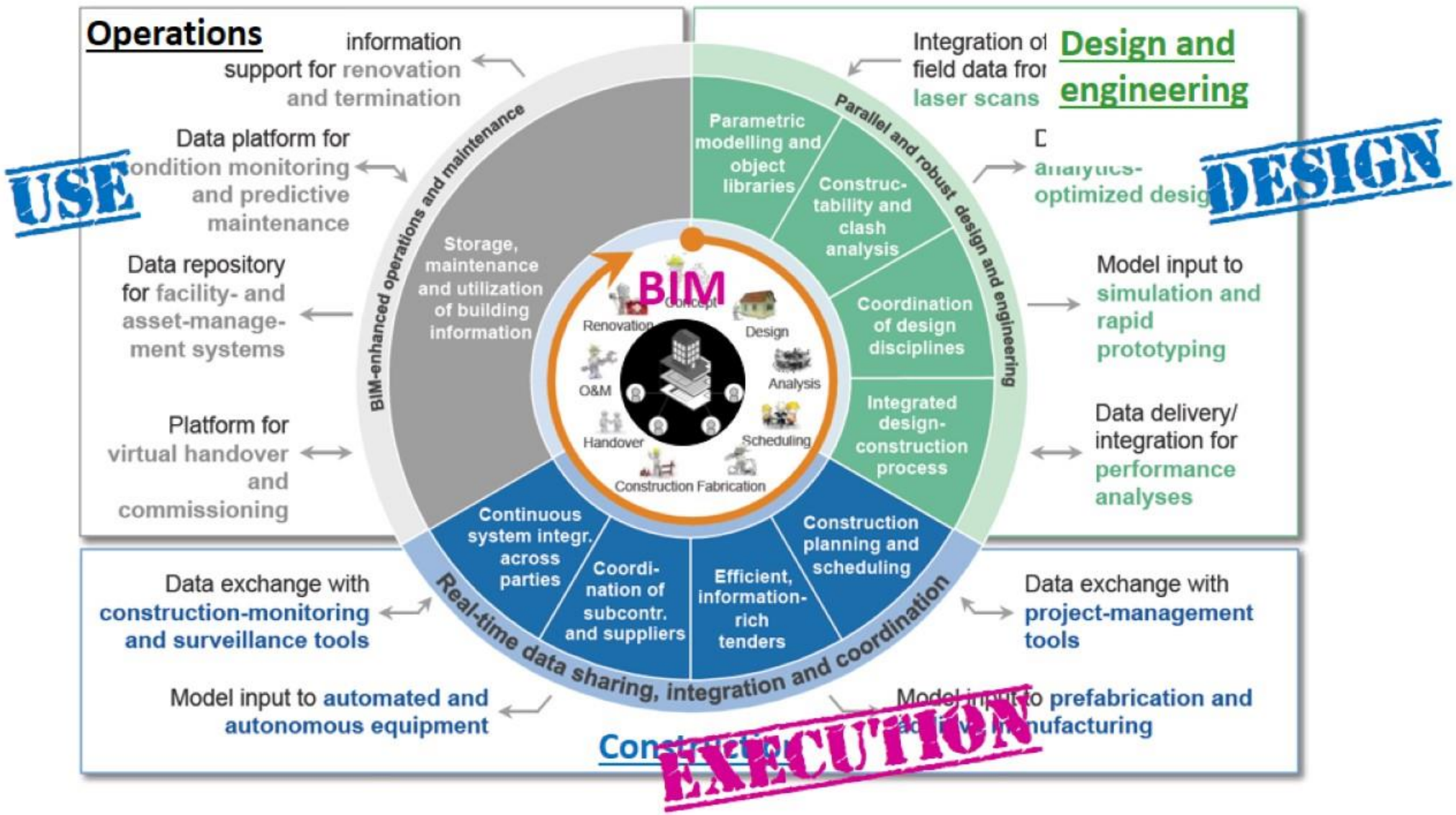


How people in 1910 imagined the worksite in 2000

Emerging technologies hype cycle



Digital construction at every stage…



Digital twin

DISTRICT ECO-SYSTEM

Intelligent district renovation

EnergyVille

capture communicate

proceed analyse

50 milliards

objets connectés en 2020

RenoWindow

A service by AGC

Pragmatic Solutions for Effective Renovation


CONSTRUCTION UNIT
ype : HUANGHE MCHM 01 - 03
medium grade humanoid
e.
TIAN
HEAVY
JAROLD

DIGITAL TIMBER

Industrialisation 2.0

- 30 levels
- 17000 m²
- 200 workers

15 days

Renovation - Massification

Changement de paradigme ??

Disruptive technologies

3D Printing

Artificial Intelligence

Blockchain

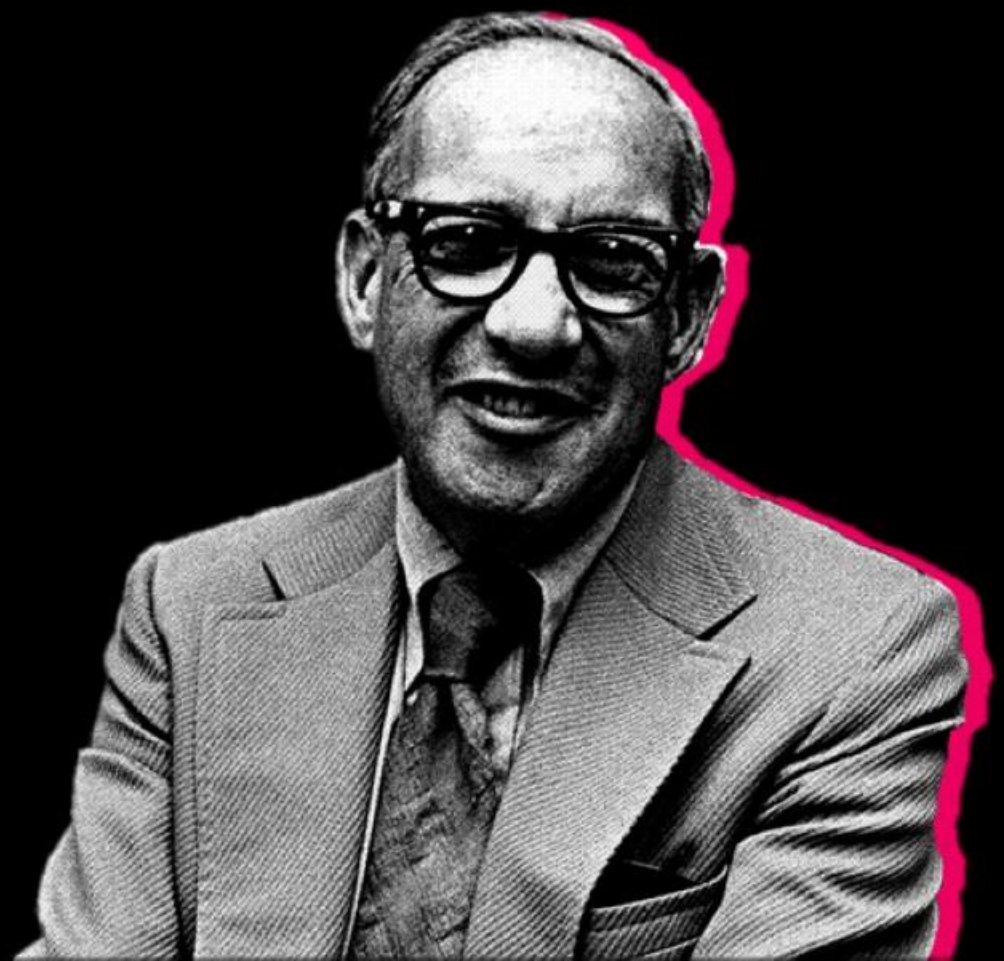
Stay in control...

“

THE BEST WAY TO PREDICT THE FUTURE IS TO CREATE IT.

- Peter Drucker

”



So let's be **CREATIVE**

17h45 - 19h30
Networking drink

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A vos agendas!

L'édition 2020 des conférences construction

se tiendra les

18 & 19/11/2020

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