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BIM

Palestra

BIM na Indústria AEC
- um novo conceito
Arquitetura, Engenharia e Construção

05 DEZ 2018
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BIM

Fundamentos, conceitos e tecnologias

BIM Palestra

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Rui Gavina

Civil Engineer | BIM Manager at CCAD

Visualizar perfil

LinkedIn

BIM Manager
Projectista de Estruturas

CCAD Serviços de Engenharia, Lda.

Structural BIM Advisor

DiRoots. connecting the dots

Co-Fundador

ISEPBIM

Speaker Manager
Sponsorship manager

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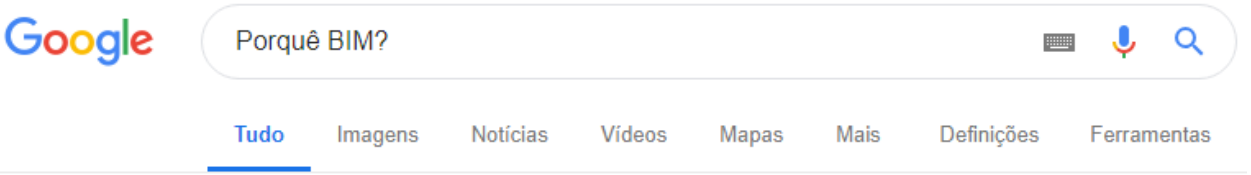
Porquê BIM?



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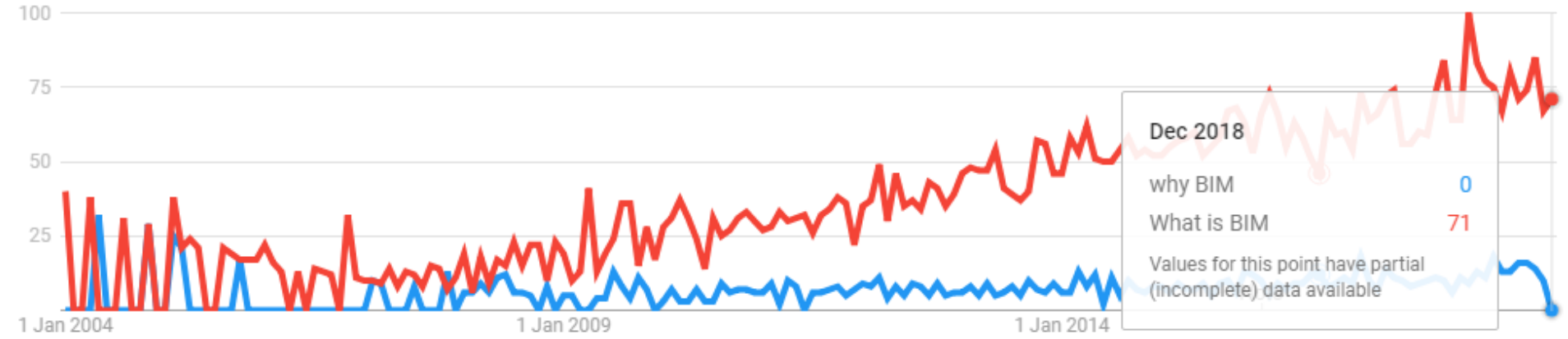
Google Trends | Compare

why BIM
Search term

What is BIM
Search term

Worldwide | 2004 – present | All categories | Web Search



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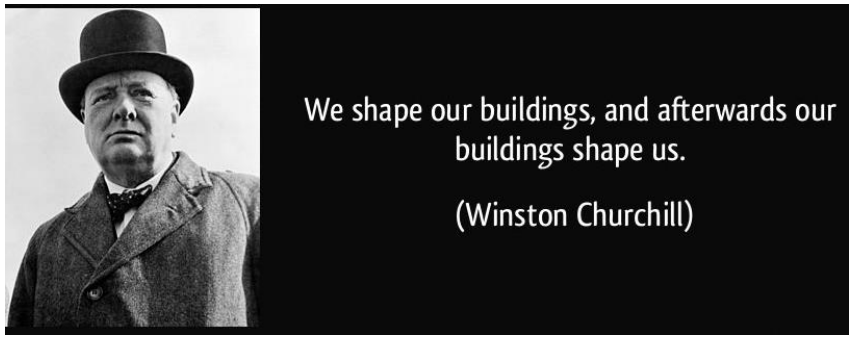
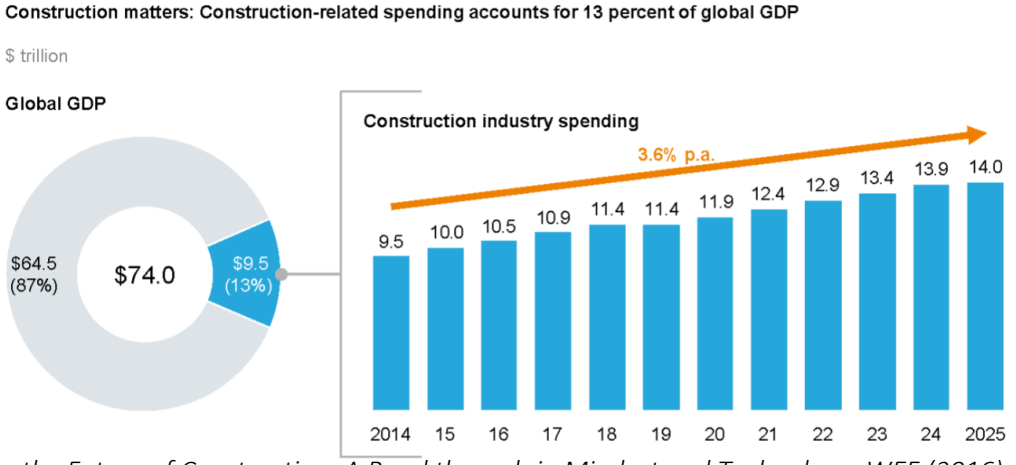
SOCIEDADE



ECONOMIA



Shaping the Future of Construction: A Breakthrough in Mindset and Technology, WEF (2016)

AMBIENTE

http://www.greenairmonitoring.co.uk/
(Consultado em 2018)

http://www.usgbc.org/community/
(Consultado em 2018)

A Relevância da Indústria da Construção

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Shaping the Future of Construction: A Breakthrough in Mindset and Technology, WEF (2016)

Market and customers

Demand in developing countries
65% of the next decade's growth in construction will happen in emerging countries

Globalized markets
1 in 2 E&C companies plan to move into new geographies

Bigger, more complex projects
123km (76 miles) is the length of the Undersea tunnel that will connect Dalian and Yantai in China

Ageing infrastructure
1 in 3 German railway bridges are more than 100 years old

Massive financing need
$1tn annual investments are needed to close the global infrastructure gap

Sustainability and resilience

Resource scarcity
No. 1 consumer of global raw materials is the construction industry

Sustainability requirements
50% of the solid waste in the United States is produced by the construction industry

Energy and climate change
30% of global greenhouse gas emissions are attributable to buildings

Resilience challenges
3× as many disasters were reported last year as in 1980

Cyberthreats
90% of firms agree that information controls have an impact on front-line employees

Society and workforce

Urbanization and housing crisis
200k people are added daily to urban areas and need affordable and healthy housing

Health/comfort needs of citizens
2-5× higher than outside are the levels of volatile organic compounds found inside US homes

Talent and ageing workforce
50% of general contractors are concerned about finding experienced crafts workers for their workforce

Stakeholder pressure and organization
67k signatures were collected opposing the construction of the Stuttgart train station

Politicization of construction decisions
In 2011 the Portuguese government cancelled a 165km (103 mile) high-speed train line project as an austerity measure

Politics and regulation

Complex regulatory requirements
25 different procedures are required for a typical warehouse construction permit in India

Stricter HSE and labour laws
10% of the workforce in a public project in California had to come from the "otherwise unemployable"

Slow permit and approval process
$1.2tn of infrastructure could be added by 2030 if all countries committed to specific time limits for approvals

Geopolitical uncertainty
18 Turkish construction workers were kidnapped by militants in Baghdad in September 2015

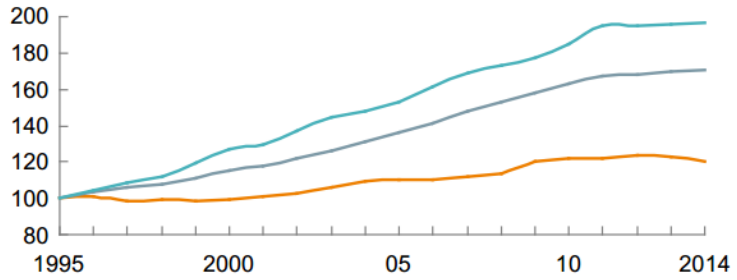
Tendências no Sector da construção

Globally, labor-productivity growth lags behind that of manufacturing and the total economy

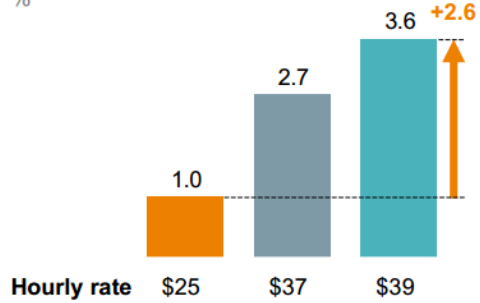
Global productivity growth trends[1] — Construction — Total economy — Manufacturing

Indústria tradicionalista

Real gross value added per hour worked by persons engaged, 2005 $
Index: 100 = 1995



Compound annual growth rate, 1995–2014
%



1 Based on a sample of 41 countries that generate 96% of global GDP.

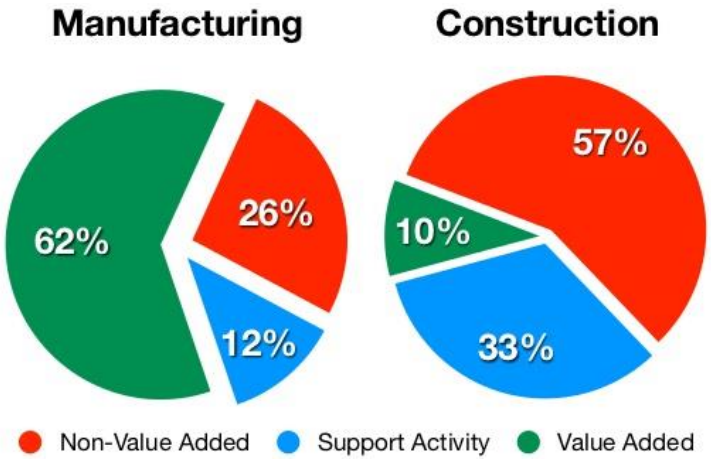
SOURCE: OECD; WIOD; GGCD-10, World Bank; BEA; BLS; national statistical agencies of Turkey, Malaysia, and Singapore; Rosstat; McKinsey Global Institute analysis

Adopção e desenvolvimento tecnológico lentos

Sem ainda ter passado por qualquer mudança disruptiva

índices de productividade com crescimento muito ténue na ordem de 1%, contra 3.6% da indústria de fabrico durante o mesmo período

Construction Industry Institute (2011)



Mais de metade do tempo de trabalho é considerado sem valor acrescentado

Sem valor acrescentado não significa tempo de inactividade

Productividade na Indústria da construção

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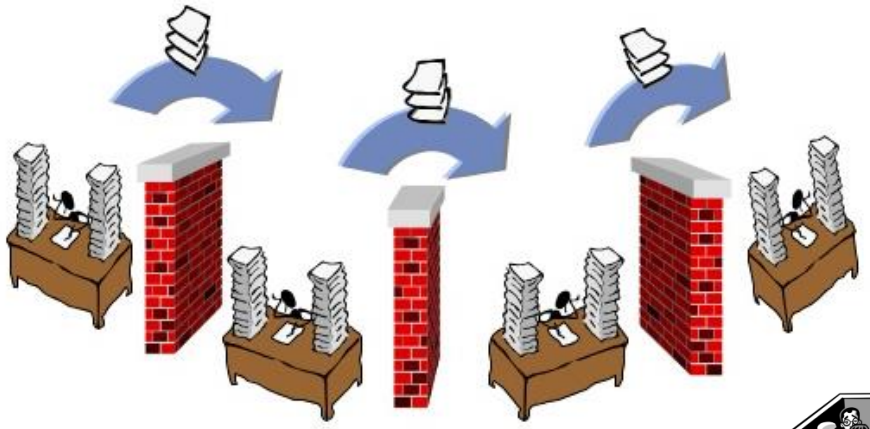
Handbook for the introduction of Building Information Modelling by the European Public Sector, EUBIM Task Group (2017)

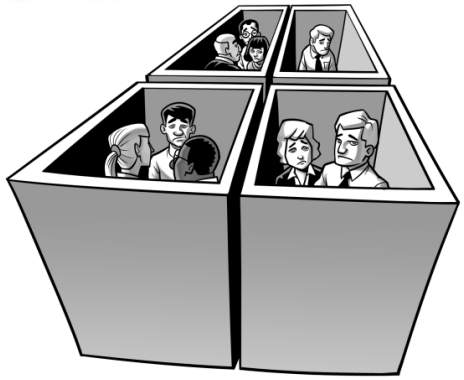
EUBIM TASKGROUP

Co-funded by the European Union

The construction sector is strategically important to economies in terms of output, job creation and for the delivery and maintenance of the built environment. The European construction sector output of €1.3tn[4] (trillion) is approximately 9% of the region's GDP and it employs over 18 million people; 95% of which are employed by small and medium sized enterprises (SME)[5]. However, it is one of the least digitalised sectors with flat or falling productivity rates[6]. The sector's annual productivity rate has increased by only 1% over the past twenty years[7]. Several industry reports[8] identify systemic issues in the construction process relating to its levels of collaboration, under-investment in technology and R&D; and poor information management. These issues result in poor value for public money and higher financial risk due to unpredictable cost overruns, late delivery of public infrastructure and avoidable project changes.

Colaboração/Comunicação Ineficiente





Causas atribuídas para a falta de productividade

Colaboração/Comunicação Ineficiente

Causas atribuídas para a falta de productividade

Colaboração/Comunicação Ineficiente - Novo Aeroporto de Berlim

Factos

- Projecto começou em 2006
- Abertura prevista para 2011
- Ainda em construção com abertura prevista para final de 2020
- Derrapagem financeira de mais de 7 mil milhões de euros

Causas

- 90 km de cabos foram incorrectamente instalados
- 4000 portas foram incorrectamente numeradas
- Escadas rolantes muito curtas
- Cobertura com o dobro da carga prevista
- Sistema de segurança contra incêndios excessivamente complexo
- Corrupção e questões politicas

Causas atribuídas para a falta de productividade

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Gestão de informação ineficiente

Causas atribuídas para a falta de productividade

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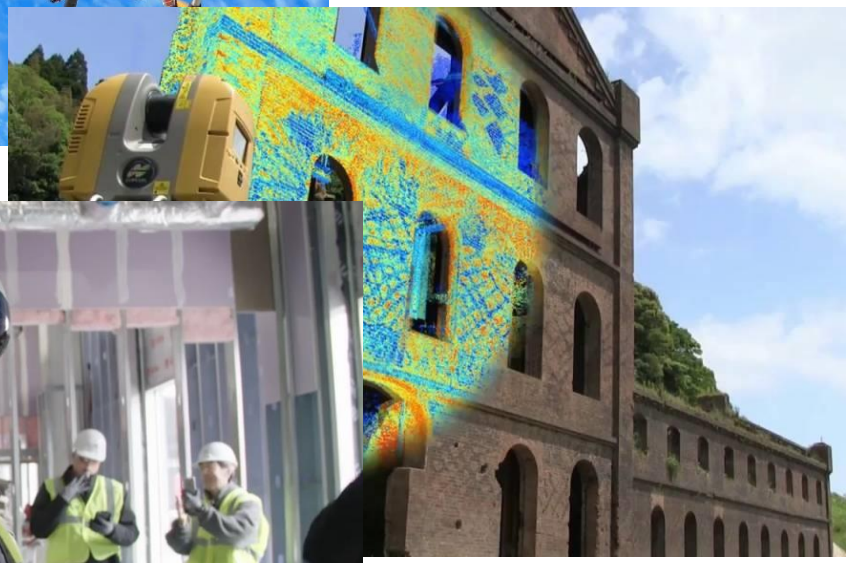
Reduzido Investimento em Tecnologia e I&D



Causas atribuídas para a falta de productividade

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EUBIM TASKGROUP
Co-funded by the European Union

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Reports estimate the financial opportunity for digitalising engineering, construction and operations processes to be in the range of 10%–20% of capital project expenditure across vertical construction (buildings) and infrastructure projects[9]. Even using the lower threshold, a 10% productivity improvement of the European construction sector would generate savings of €130 billion. This is a prize worthy of Europe's investment and one that requires a coordinated and common approach. This will require leadership and the procurement leverage from Government and public sector clients across Europe who represent the construction industry's single biggest client.

Insuficiente desmaterialização de processos/digitalização

Causas atribuídas para a falta de productividade

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O que é BIM?

Building Information Model

Building Information Modelling

Building Information Management

Fundamentos e Conceitos

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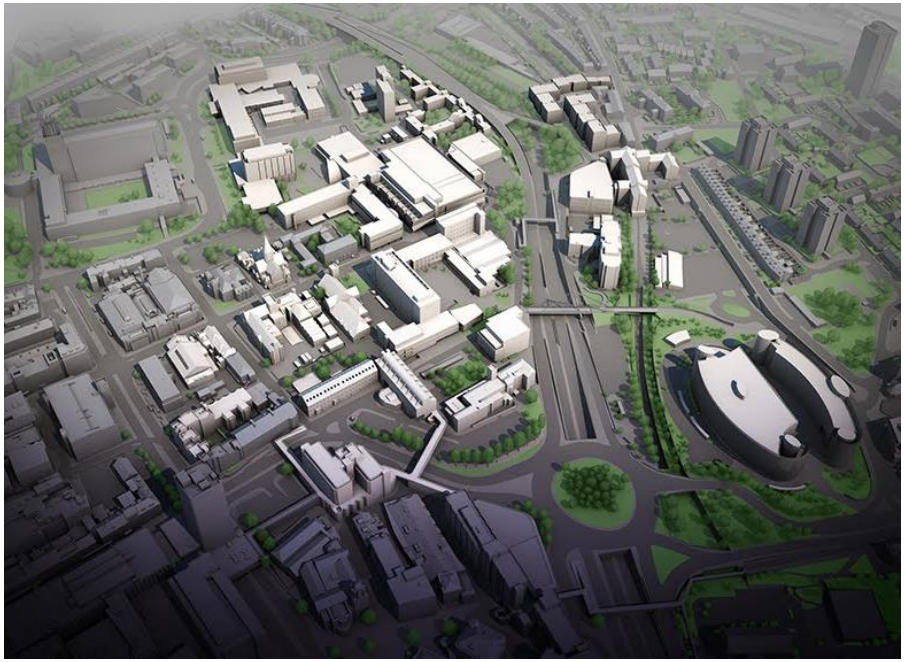
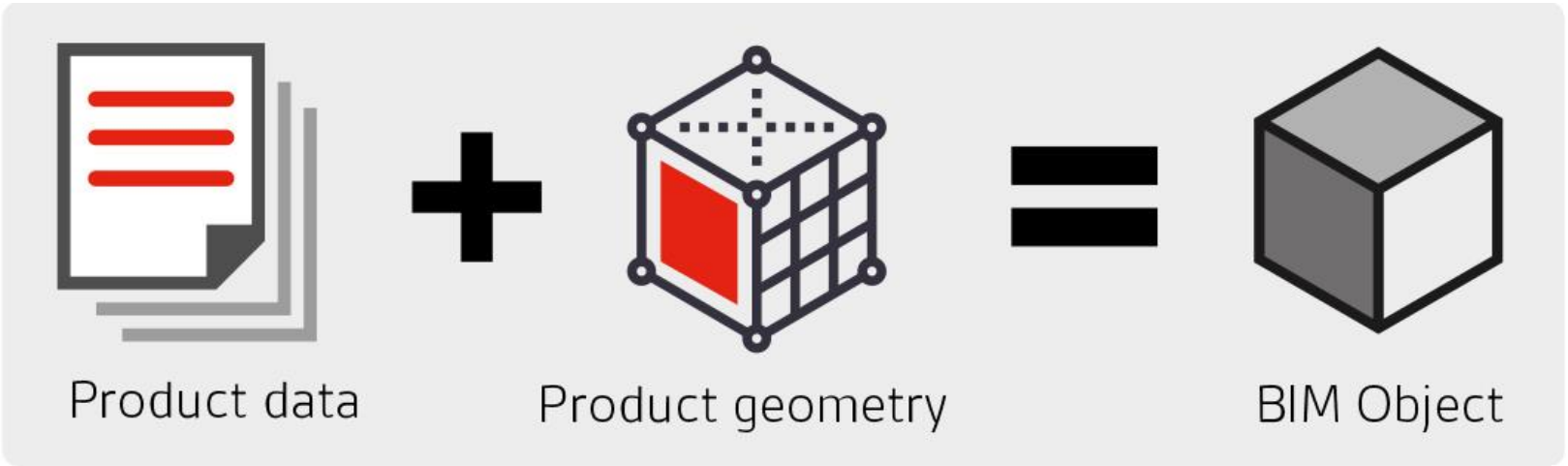
O que é BIM?

Building



Fundamentos e Conceitos

O que é BIM?



Fundamentos e Conceitos

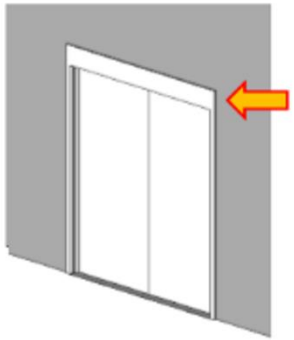
O que é BIM?

Model

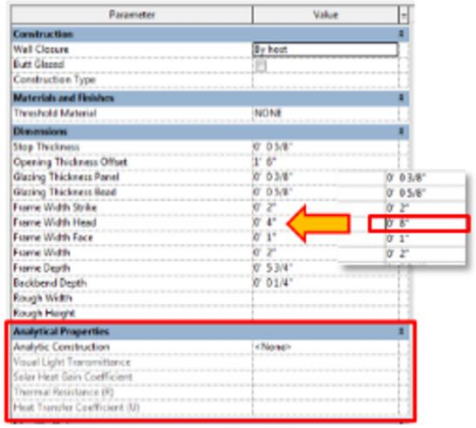
Building Information Model

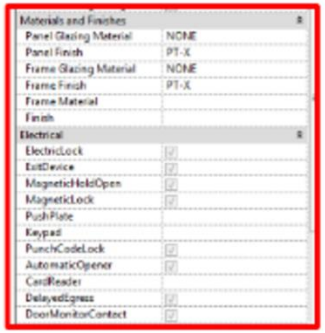
3D Geometry + Data Parameters (Information) = Smart Objects

GEOMETRY:



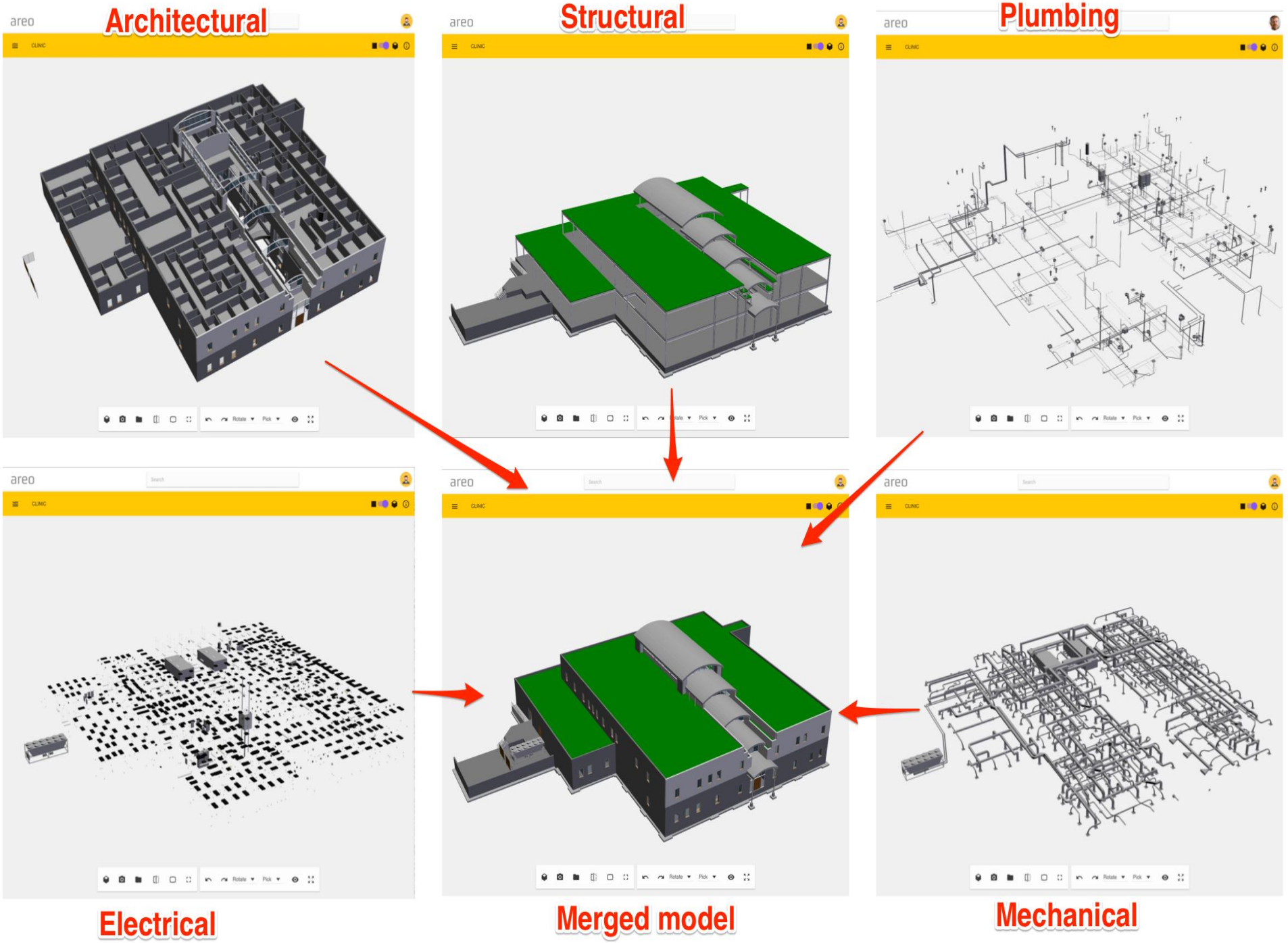
DATA:





Additional parameters

If the data changes, the geometry changes, and vice versa


Architectural
Structural
Plumbing
Electrical
Merged model
Mechanical

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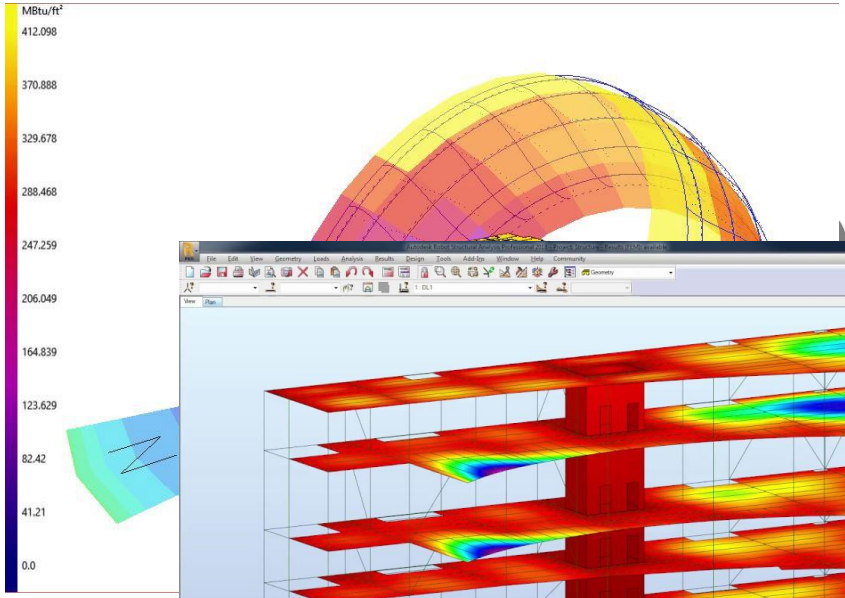
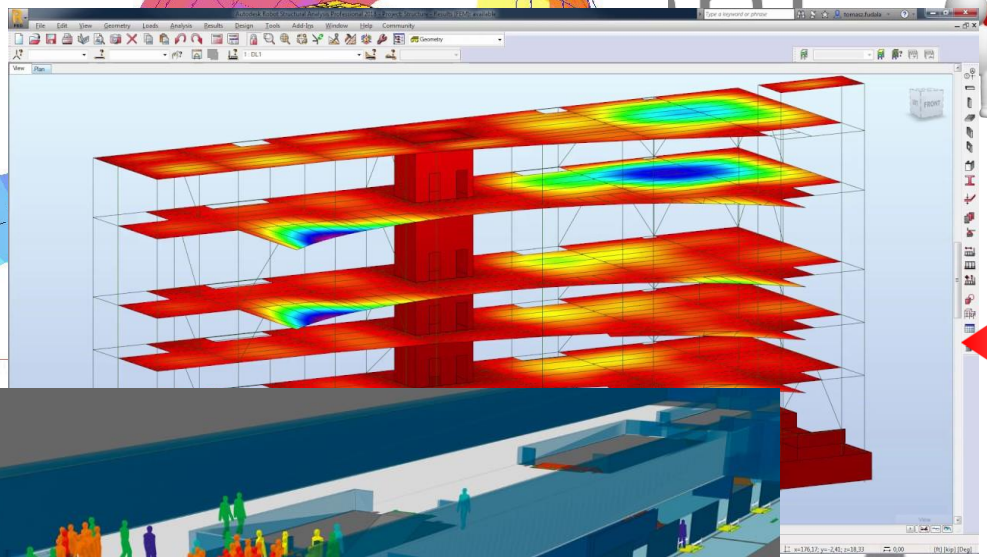
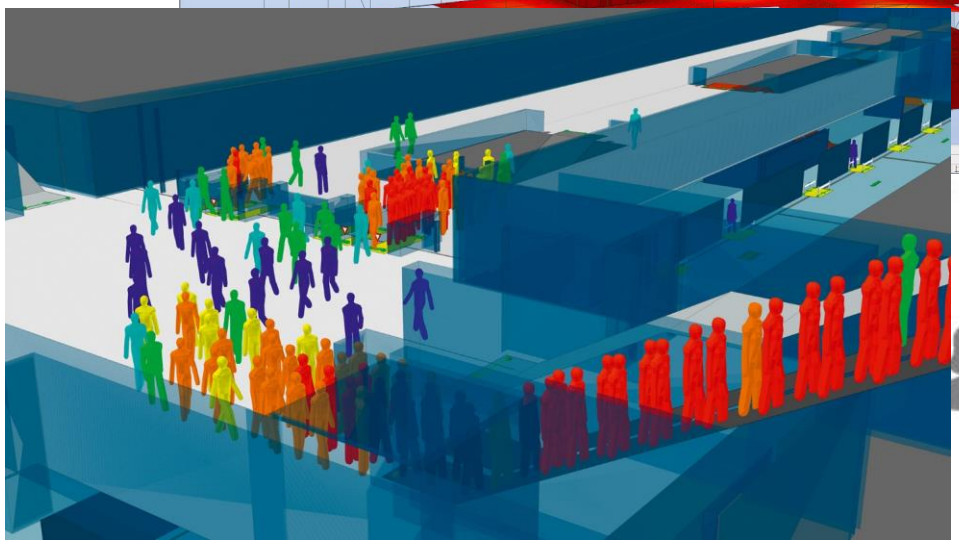


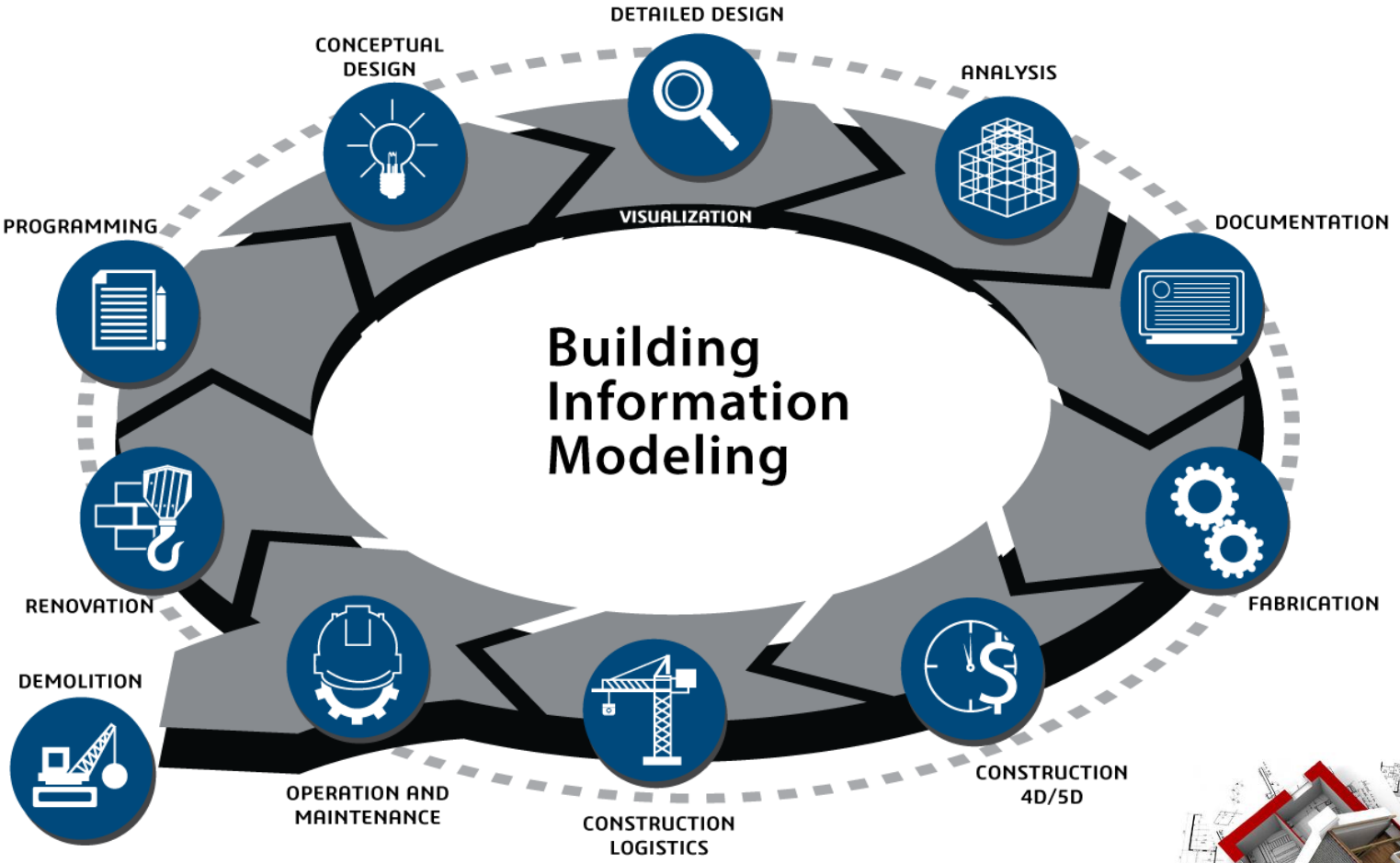




Human Resources and Accounting

Professionals

O que é BIM?


DETAILED DESIGN
CONCEPTUAL DESIGN
ANALYSIS
PROGRAMMING
VISUALIZATION
DOCUMENTATION
Building Information Modeling
RENOVATION
FABRICATION
DEMOLITION
OPERATION AND MAINTENANCE
CONSTRUCTION LOGISTICS
CONSTRUCTION 4D/5D

O que é BIM?

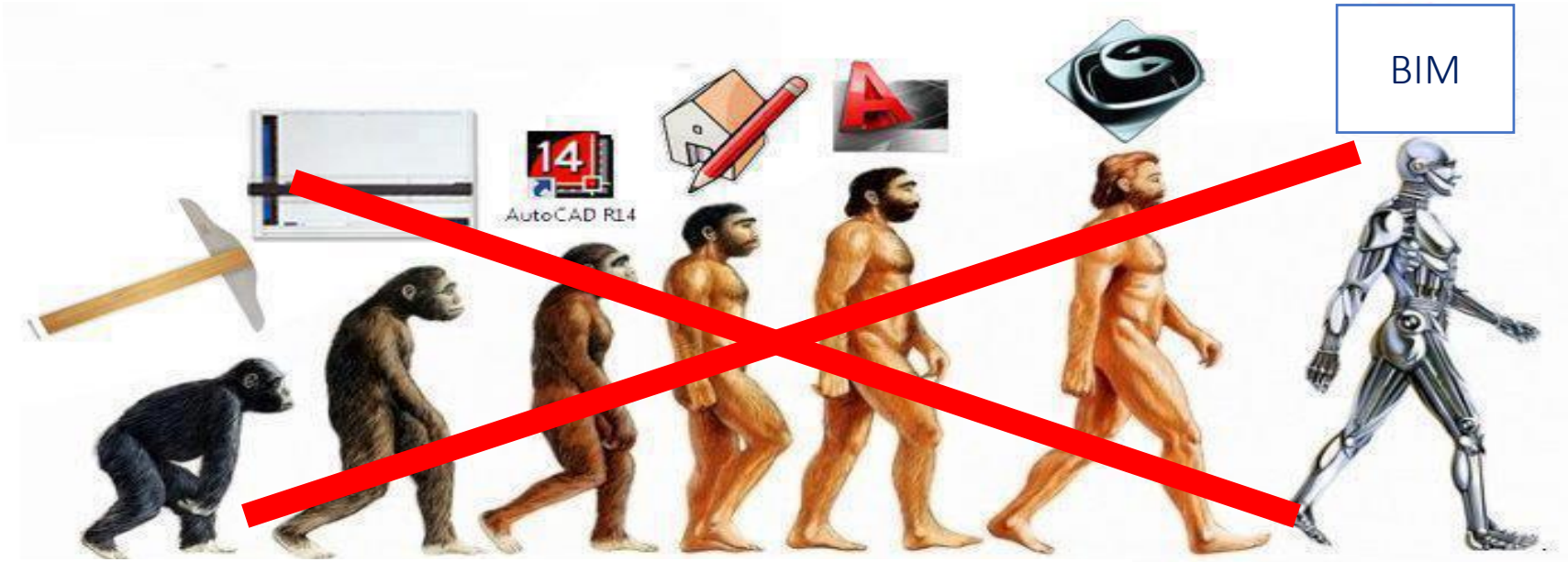
Modelling shaping forming presenting, scoping

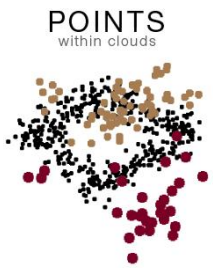
Information an organised set of data: meaningful, actionable

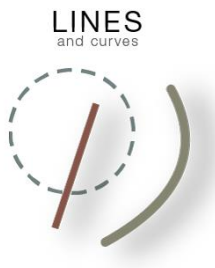
to **virtualy construct** a
to **extend the analysis** of a
to **explore the possibilities** of
to **study what-if scenarios** for a
to **detect possible collisions** within a
to **calculate** construction **costs** of
to **analyse constructability** of a
to **plan the deconstruction** of a
to **manage** and **maintain** a

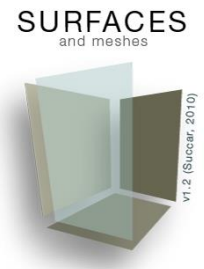
Building a structure, an enclosed space, a constructed environment
(Succar, 2008)

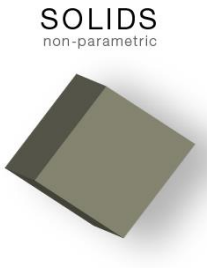
O que NÃO é BIM?



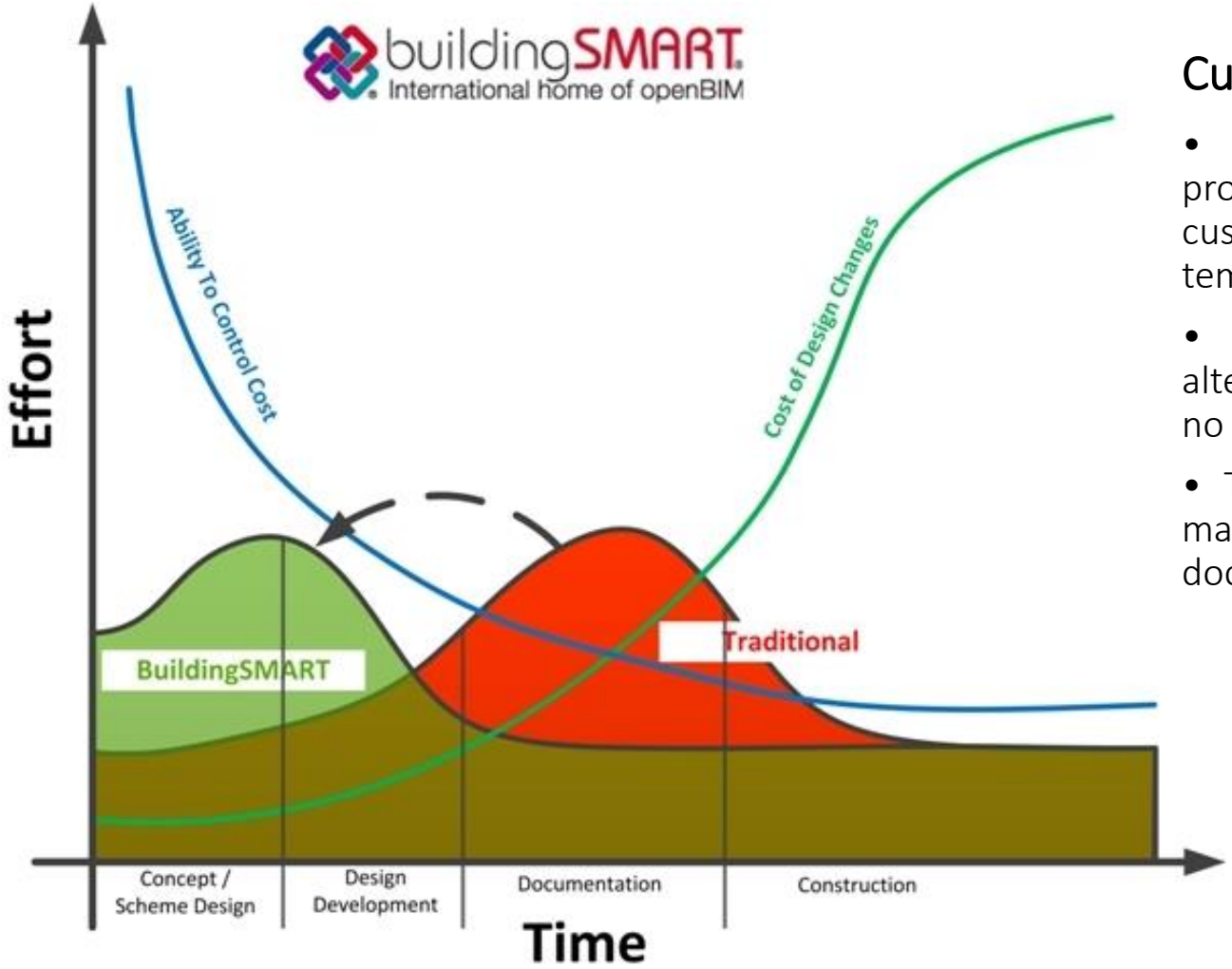








Tradicional Versus BIM

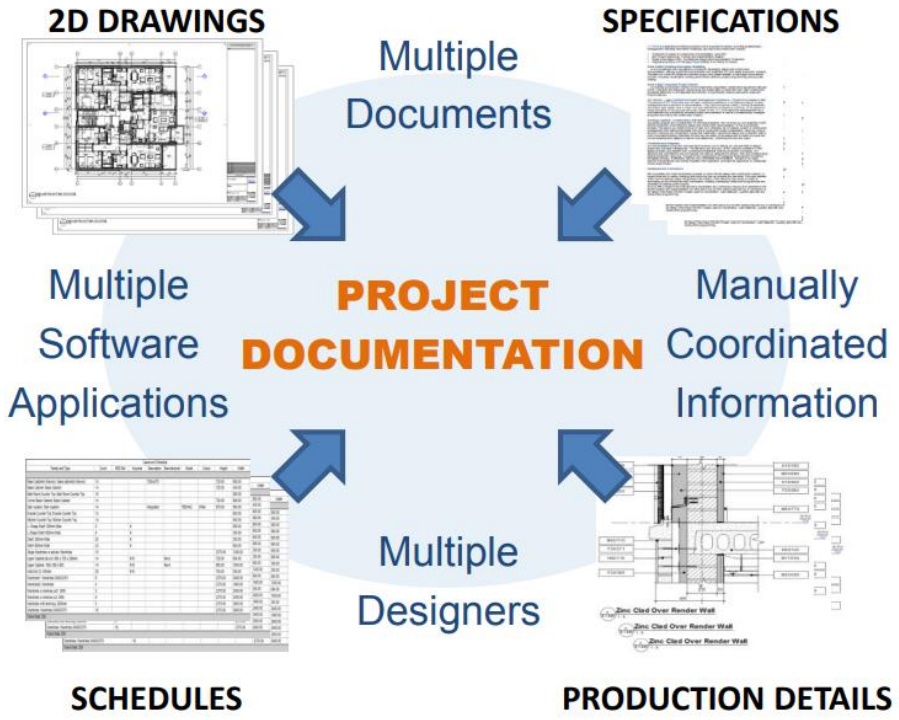


Curva de Patrick MacLeamy

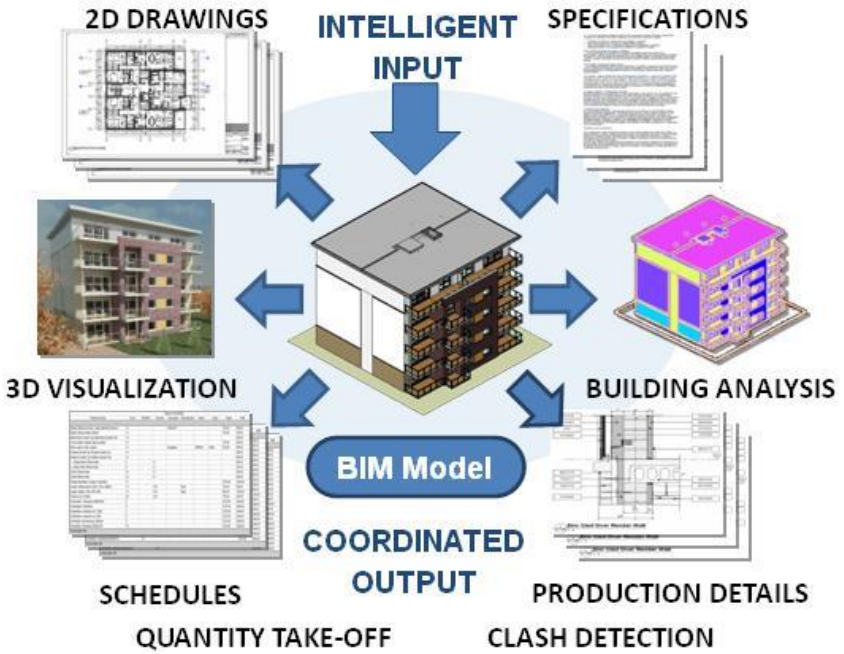
- A capacidade para alerar o projecto melhorando o controlo de custos de uma obra diminui no tempo
- Os custos inerentes a uma alteração de projecto aumentam no tempo
- Tradicionalmente concentramos maiores esforços no moimento de documentação

Tradicional Versus BIM

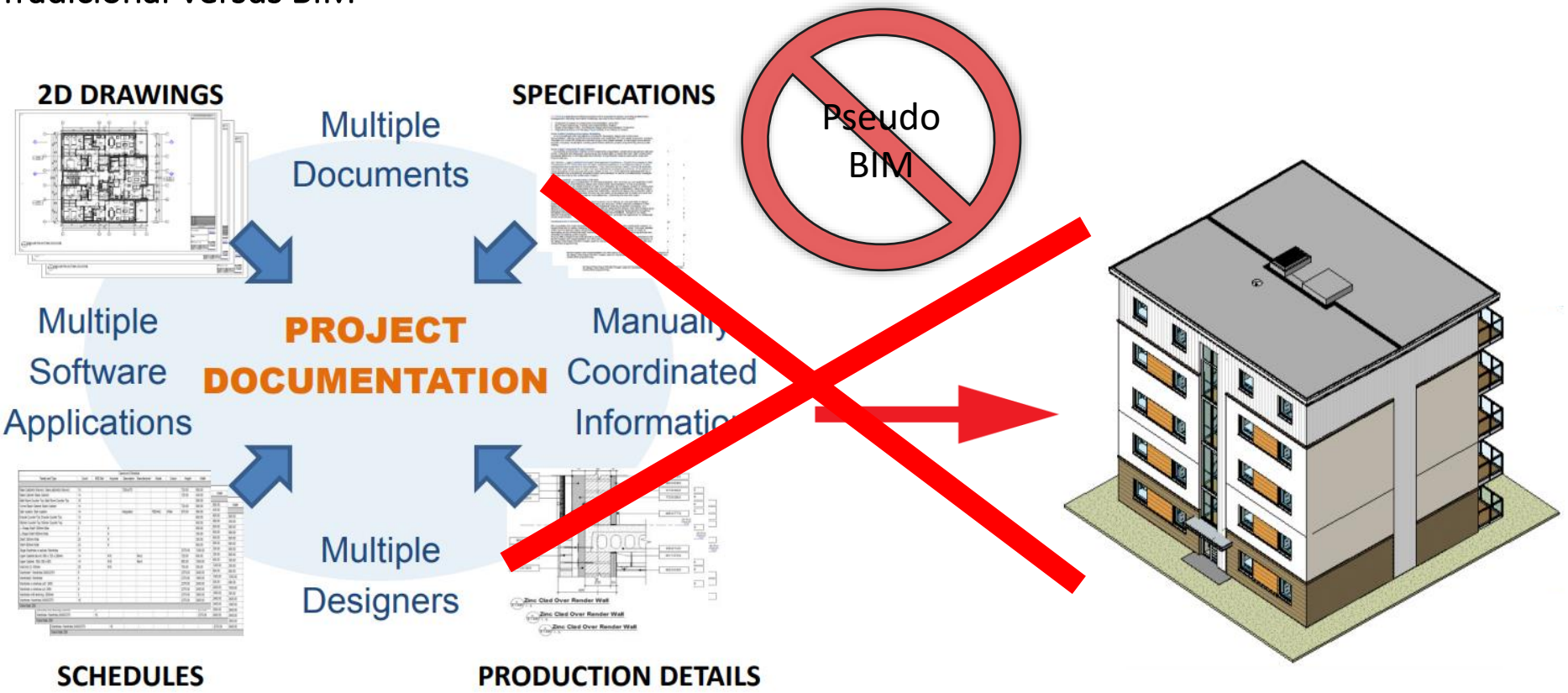
Metodologia Tradicional



Metodologia BIM



Tradicional Versus BIM



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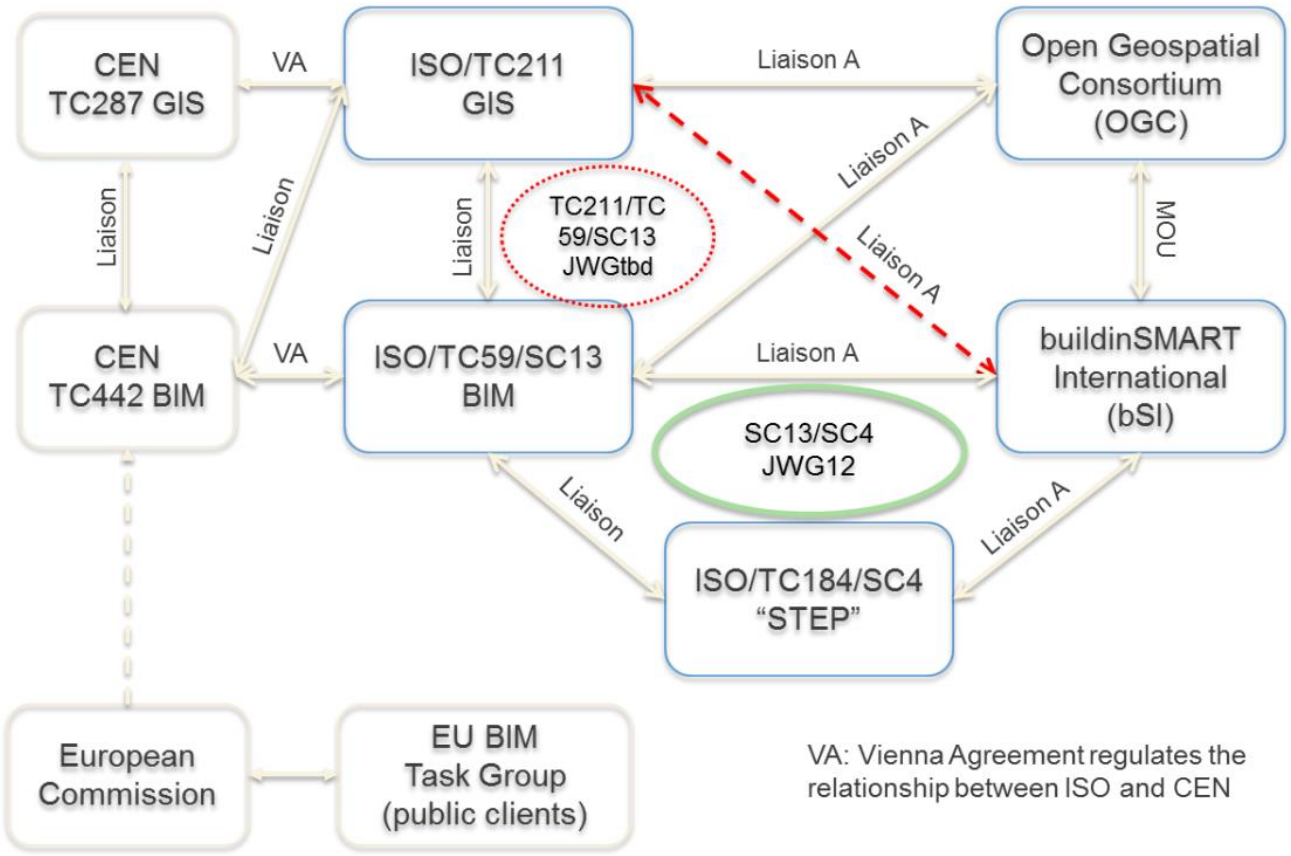
Normalização



VA: Vienna Agreement regulates the relationship between ISO and CEN

CT197 BIM

building SMART Portugal

Normalização

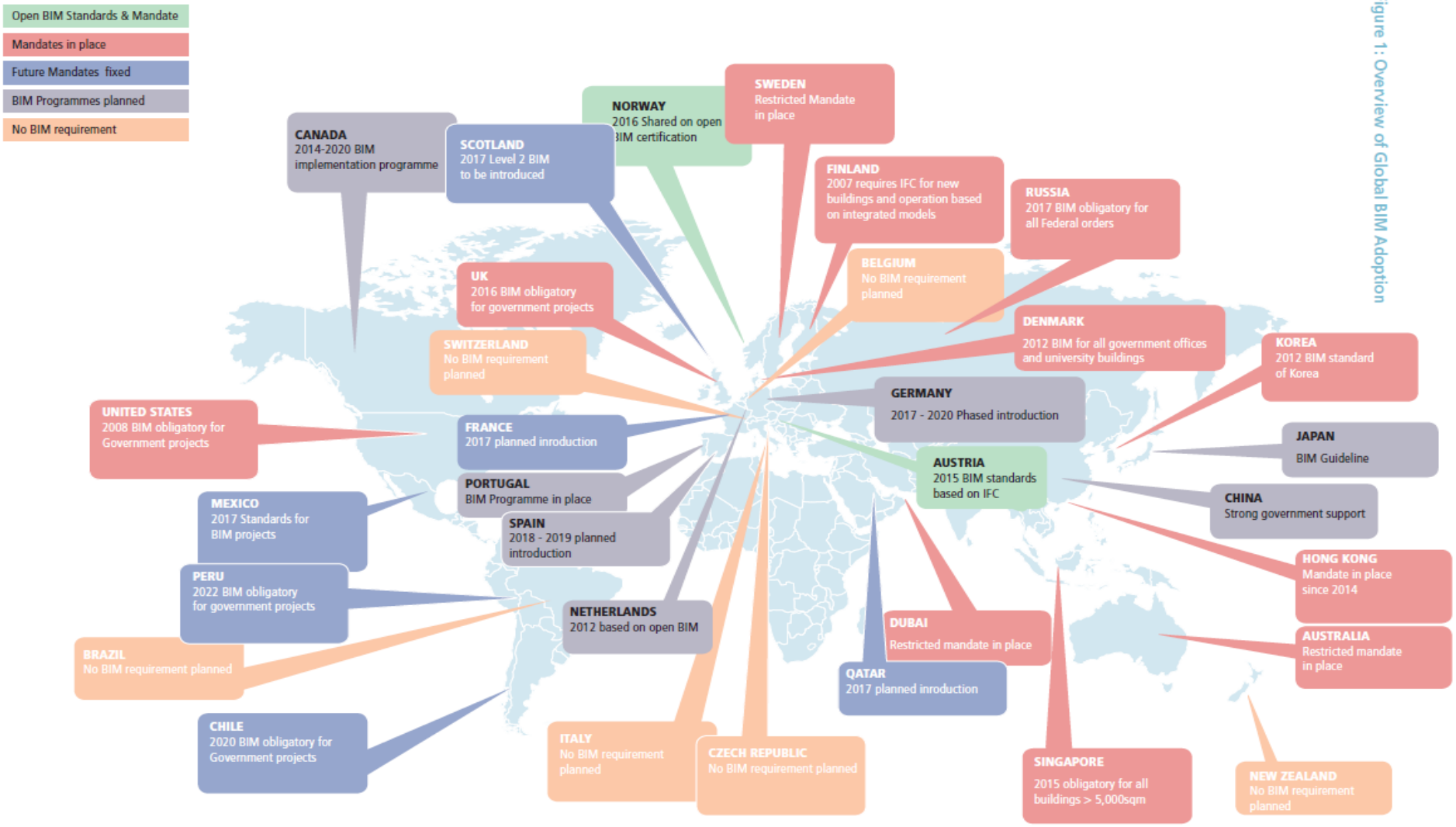


Figure 1: Overview of Global BIM Adoption

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Software

3D VISUALISATION & COMMUNICATION
Enscape · Fuzor · Autodesk Live

VR & AR SOFTWARE
Iris VR · Fuzor · Autodesk Stingray

MOBILE 3D REVIEW
BIM 360 Glue · Revitzo · Fuzor · BIM anywhere · Rendra · Dalux

DOCUMENT MANAGEMENT SYSTEM (COMMON DATA ENVIRONMENT)
Aconex Field · A360 Teams · Newforma · A360C4R

AUTOMATION
Dynamo · iConstruct · Flux · Kiwi Codes · UNIFI · Xrev · Coins · RTV Tools · Autodesk Model Checker · Colour Splasher

AS-BUILT HANDOVER DOCUMENTATION
Zutec · Dome Connect · WebFM

3D DESIGN *(ARCHITECTURAL)*
Autodesk Revit · ArchiCad

3D REVIEW & COORDINATION & CLASH DETECTION
BIM 360 Glue · A360 Teams · Fuzor · BIM collab · Revitzo · BIM Track · Solibri Model Checker · Navisworks Manage

2D ACCESS / MARKUP TOOLS
Field Wire · Bluebeam Revu · ShapeDo · Procore · PlanGrid · Drawboard Bullclip

CONNECTED CONSTRUCTION FIELD DATA
Field Wire · OnTarget · Fieldlens · Procore · BIM 360 Glue · Aconex Field

DATA VISUALISATION
Tableau · Kibana Elastic

4D PLANNING
Asta Power Project · Synchro · Navisworks Simulate/ Manage · Fuzor Construction · C3D Interactive

5D COSTING
CostX · Rib iTWO · C3D Interactive

6D FACILITIES M
Ineni & iViva Workds · EcoDo

SAP2000®

cype

Tecnologias

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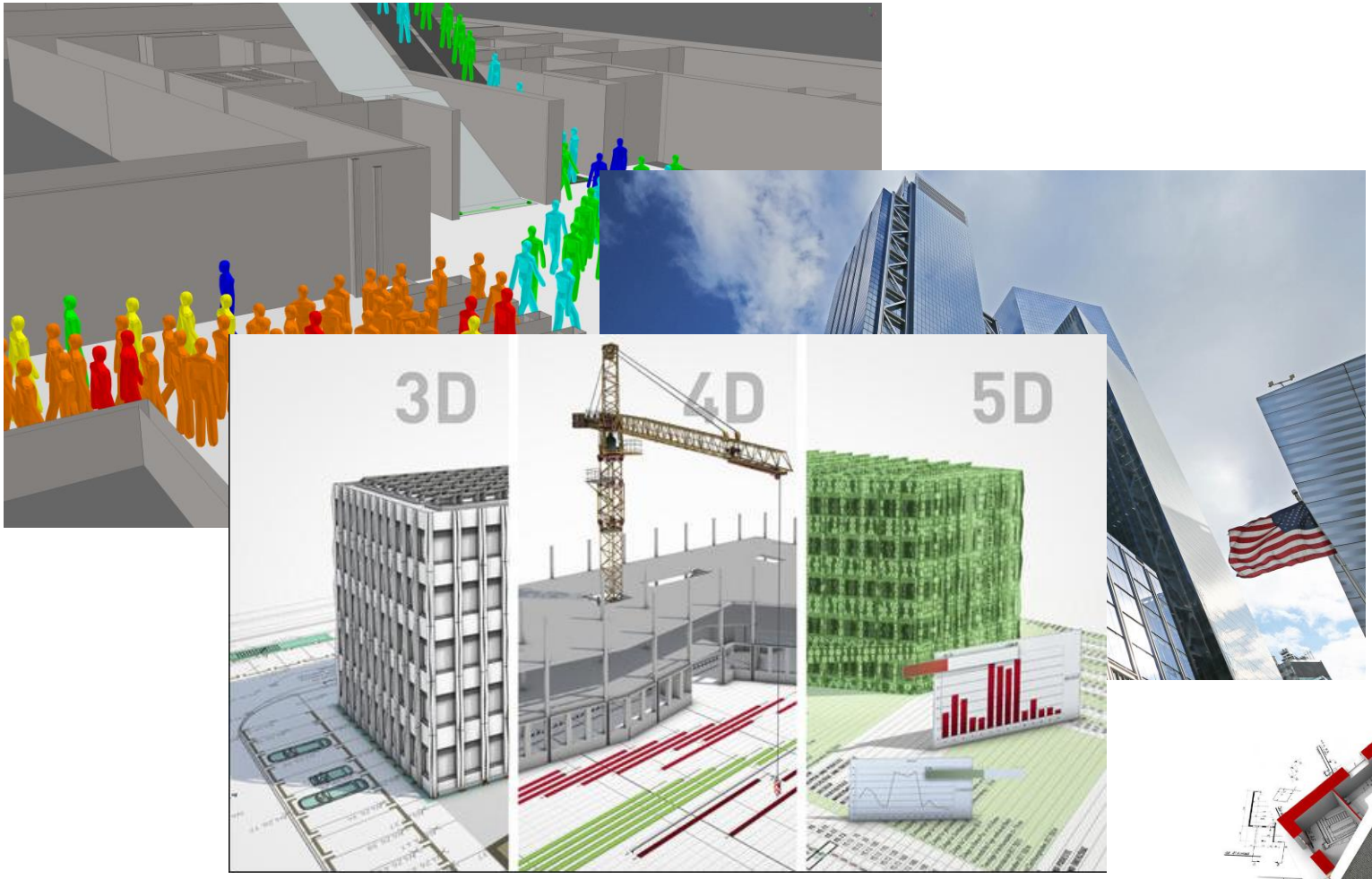
estt.ipt Escola Superior de Tecnologia de Tomar Instituto Politécnico de Tomar

Software – Usos BIM



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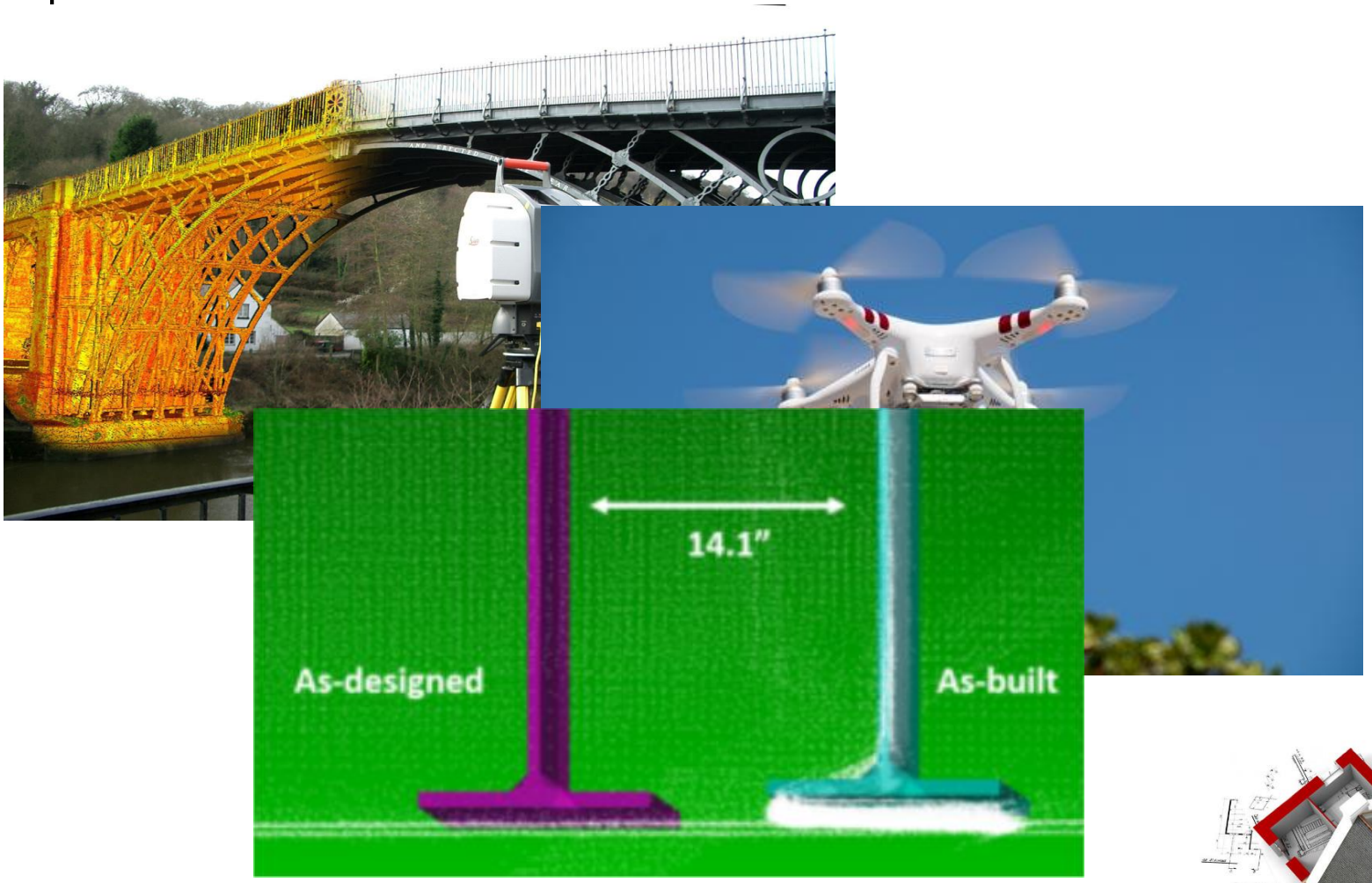
Captura da realidade



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Realidade Aumentada

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Impressão 3D aditiva e Inteligência Artificial

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BIM

Palestra

BIM na Indústria AEC
- um novo conceito
Arquitetura, Engenharia e Construção

05 DEZ 2018
Instituto Politécnico de Tomar

OBRIGADO!