BIM

BIM

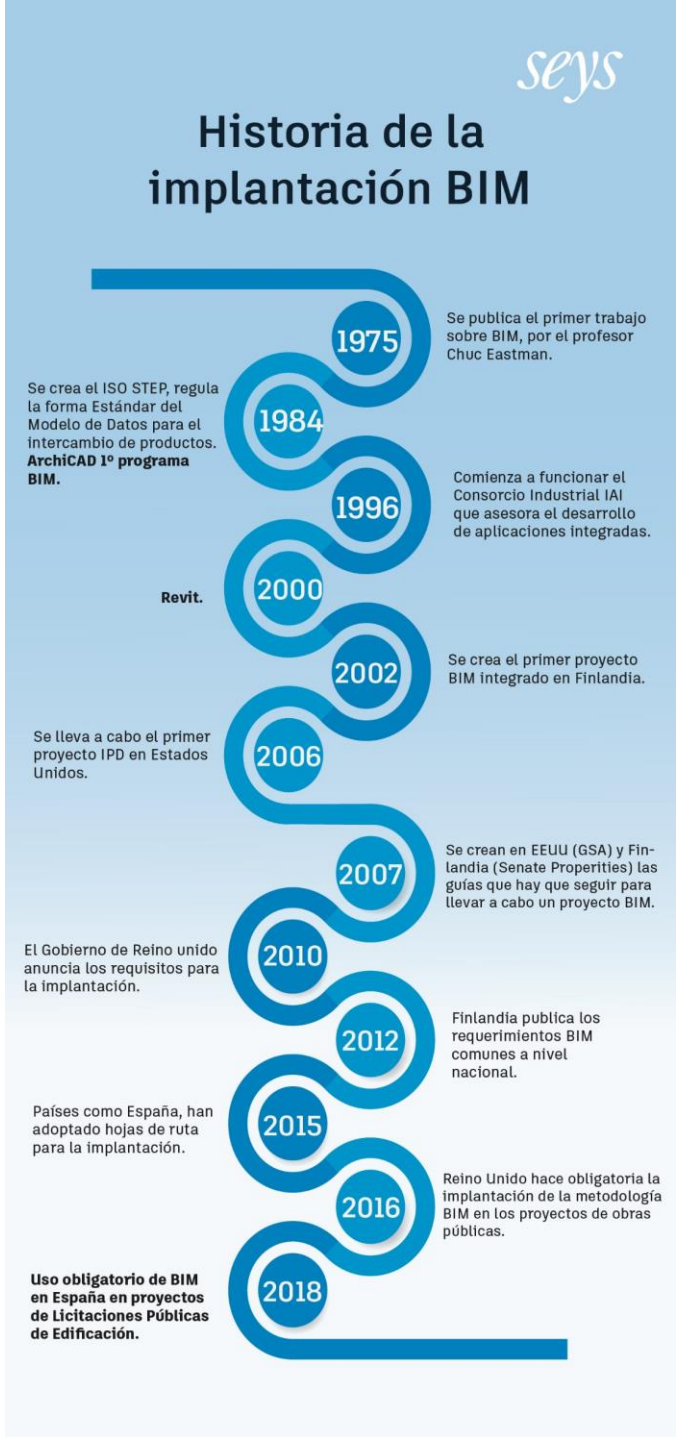
BIM

# What is BIM ?


What is BIM ?

# Origins of BIM

- In 1974 the first work on Computer Aided Design was published by Professor Charles M. Estman of Carnegie-Mellon, University of Pittsburgh.
- In 1981, the Graphisoft Company of Hungary developed ArchiCAD, "Virtual Building".
- In 1985 it was developed VectorWorks
- En 1985 Simon J. Ruffle used the term Building Model
- Revit was born in 2000. After buying it, Autodesk introduced the term BIM.
- In 2002, Jerry Laiserin, led a debate between Autodesk and Bentley Systems. He began to use the term BIM.
- Later, Graphisoft also began using the term BIM.
- In 2002, the first integrated BIM project was created in Finland.
- The first IPD project is carried out in the United States.



# BIM

## Building Information Modelling

BIM is the acronym for Building Information Modeling, although it could just as easily be Building Information Management, since BIM has a lot to do with INFORMATION management and not just modeling.

The initial perception of BIM is that some people focus on choosing and using BIM software tools rather than thinking of BIM as a collaborative process supported by technology.

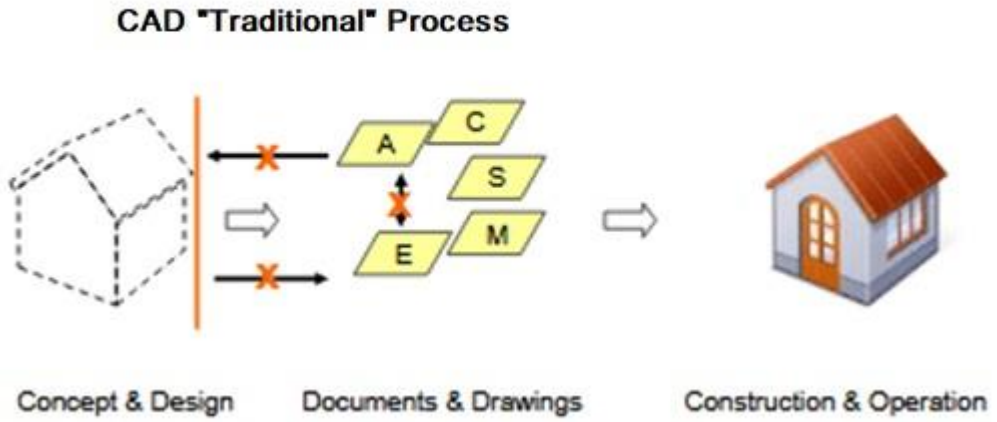
# What is NOT BIM.?

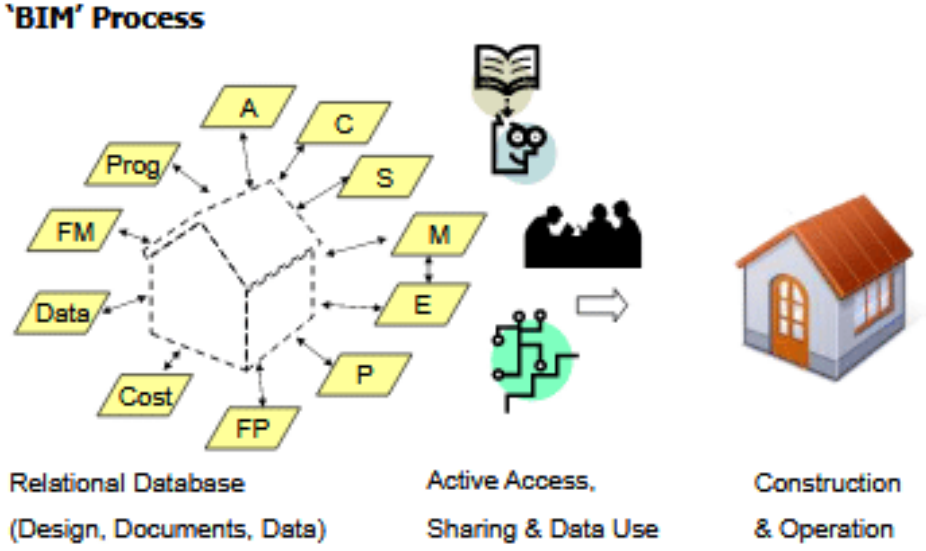
- BIM is not a Product, it is not a Software.
- Autodesk Revit is not BIM. BIM is a process, a methodology, and Revit is a tool to leverage that process.
- 3D models that only show geometry, but do not communicate content information.
- 3D models that are made up of isolated objects and do not understand the relationship between them.
- 2D CAD drawings that have to be manually overlaid, to give an understanding of the 3D.
- Models where changes to a view or element are not automatically propagated to other views.

# What IS BIM.?

- It is a set of **methodology**, techniques and standards.
- It is a construction site management system that is based on the use of a **virtual three-dimensional model linked to a database.**
- We do not deliver BIM at the end of the project.
  We deliver the products of the BIM process.
- BIM models are obtained by creating **objects with their own attributes**.
- **BIM** encourages collaboration between all parties involved in project. Is a **collaborative work methodology.**
- **BIM** is a digital process that uses 3D models to plan, design, construct, and manage buildings and infrastructure.

# Old process vs New process

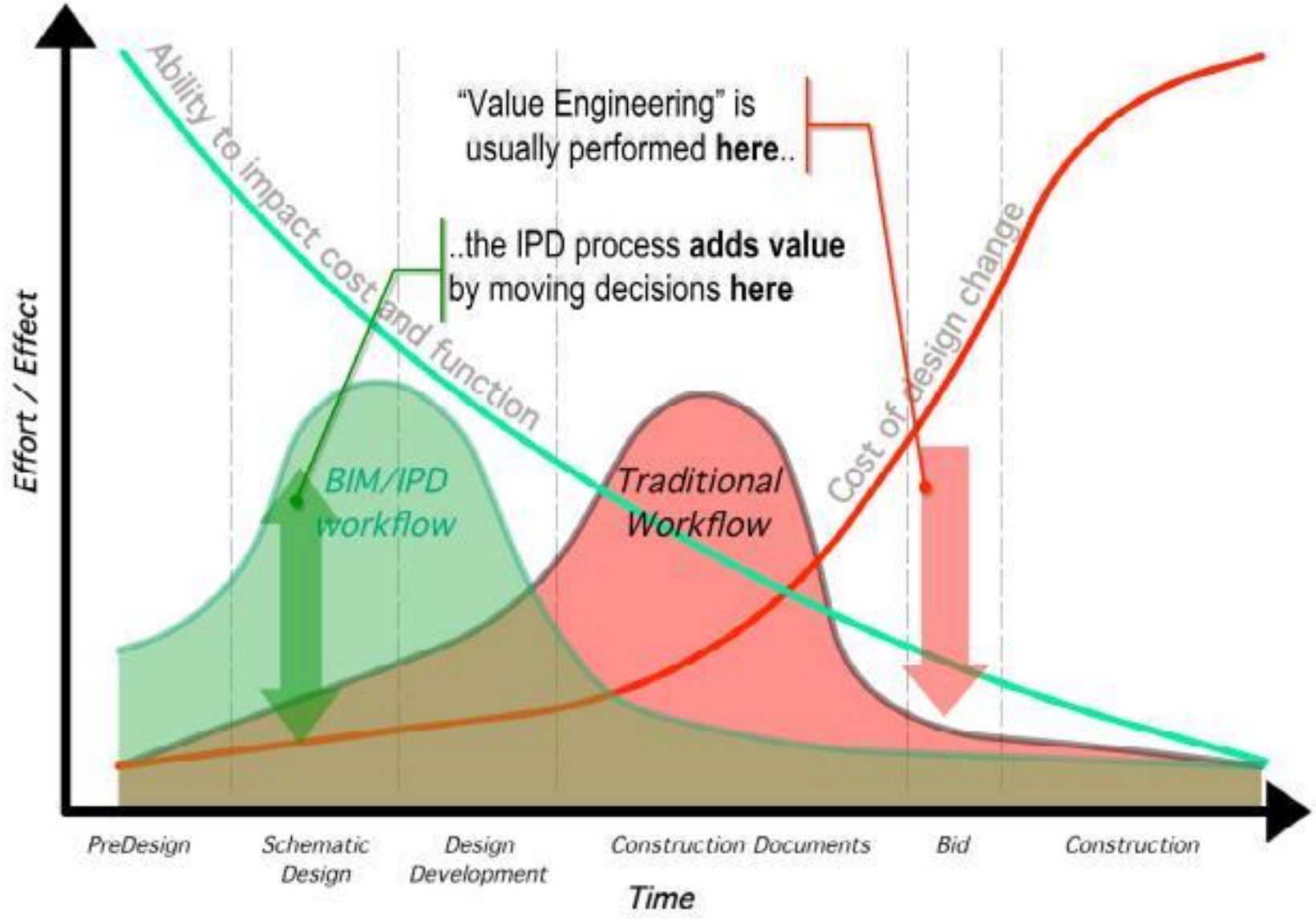



The digital model provides us with all the information necessary to generate the products for execution on site: plans, 3D, reports, details, videos, costs, planning, calculations, routes, analysis…

# Old process vs New process


# Old process vs New process

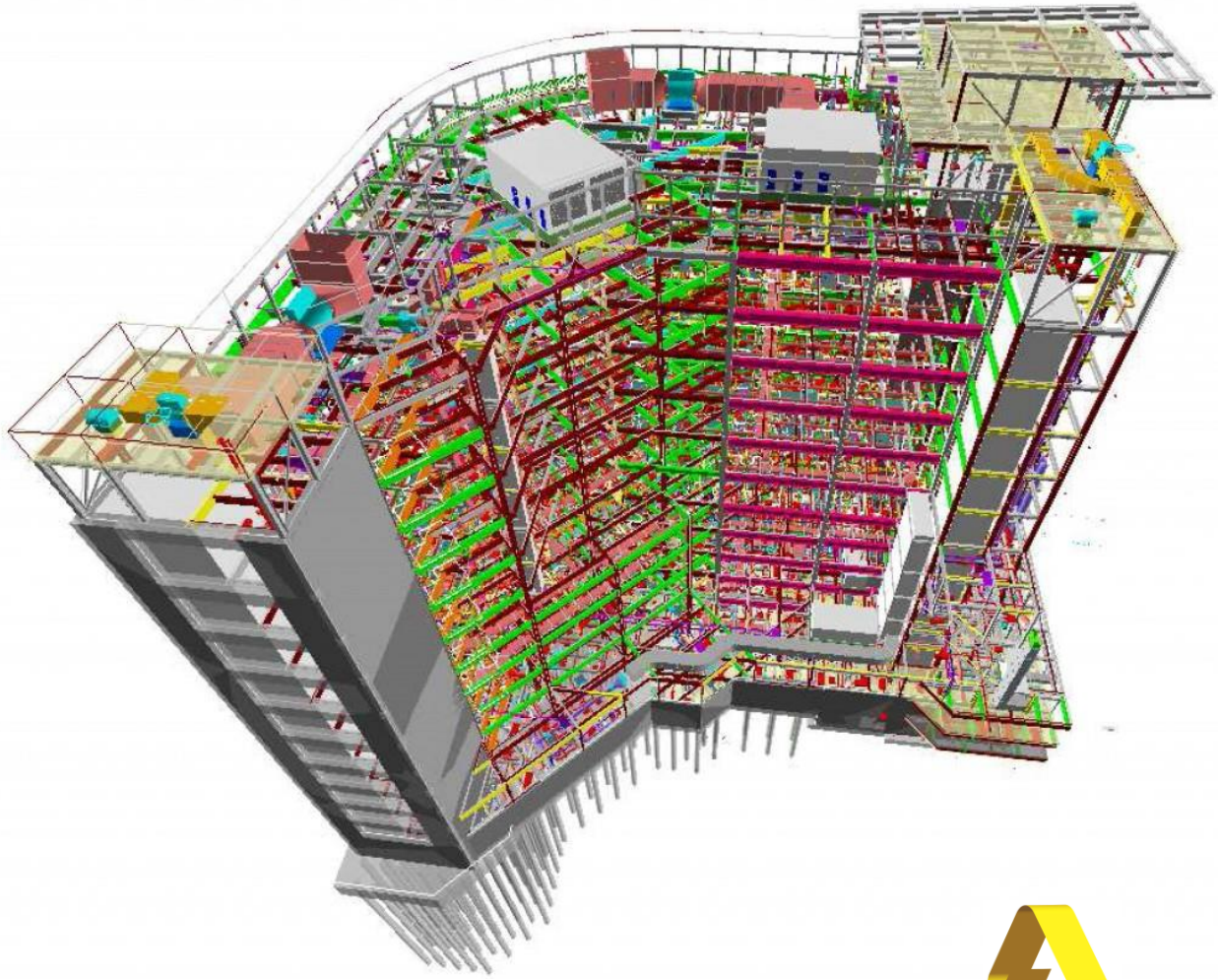



## BIM - CAD

# New process

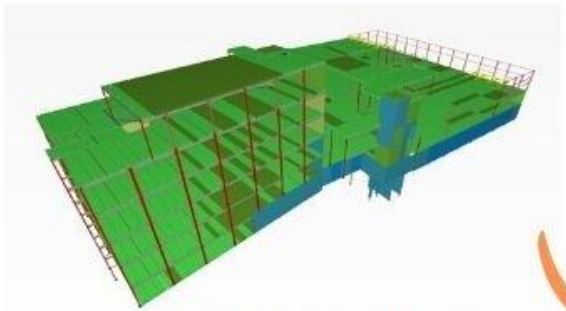

Geometric Information
Textures
Shades
Lightning
Shades
Transparencies
3D Model
Parametric Information
Programming
Analysis
Manufacturing
4D/5D Construction
Logistics
Maintenance
BIM Model
Design

# New process

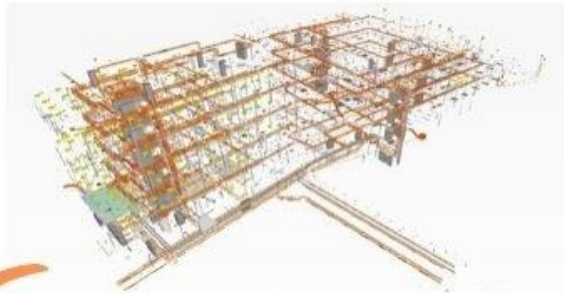


Cars are built using digital models and so are Buildings.

# New process



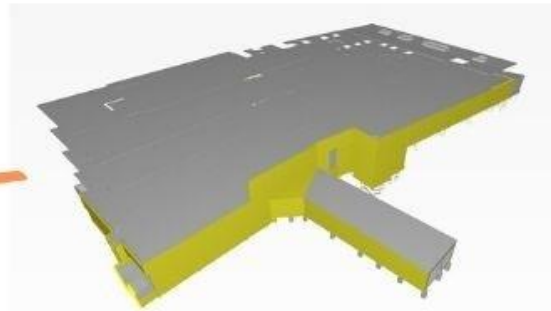
PREFABRICATED MODEL



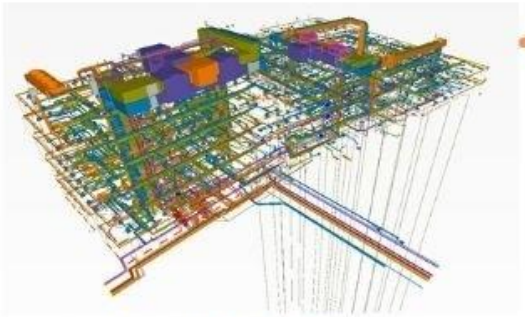
ELECTRICITY MODEL

MULTIDISCIPLINARY MODEL

EXT. ARCHITECTURE MODEL



STRUCTURAL MODEL



MECHANICAL MODEL

LANDSCAPING MODEL

INT. ARCHITECTURE MODEL

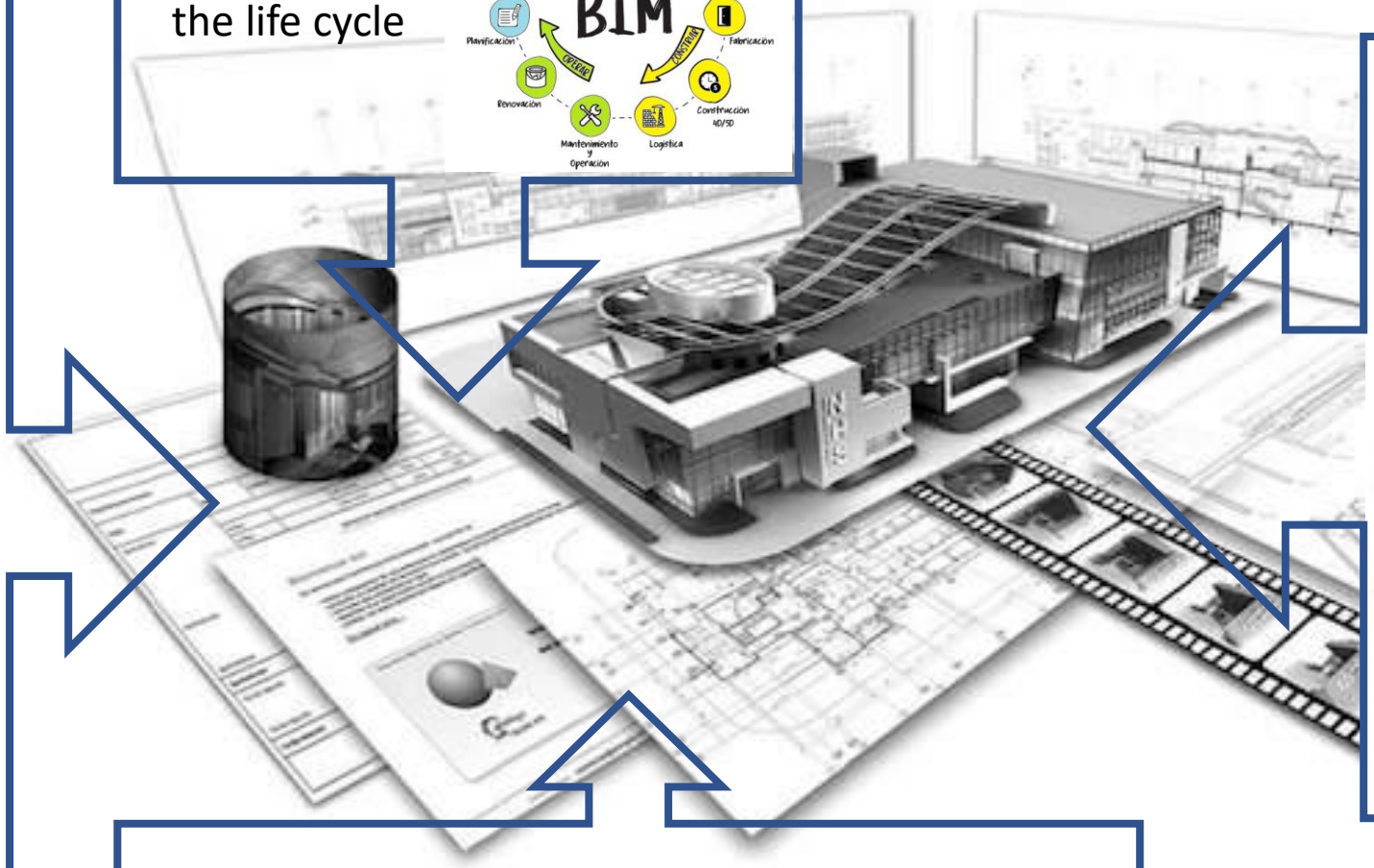
# BIM

Multidimensional, Collaborative, Centralized, Concurrent, Integrated, Normative Method.

# New process

CONTAINS
Data
Programming
Files
Equipment
Costs
Reports
Contracts
Locations
Communication
Processes
Designs
Images
Videos
Plans
Sections
Facades
Details
Materials

Throughout the life cycle

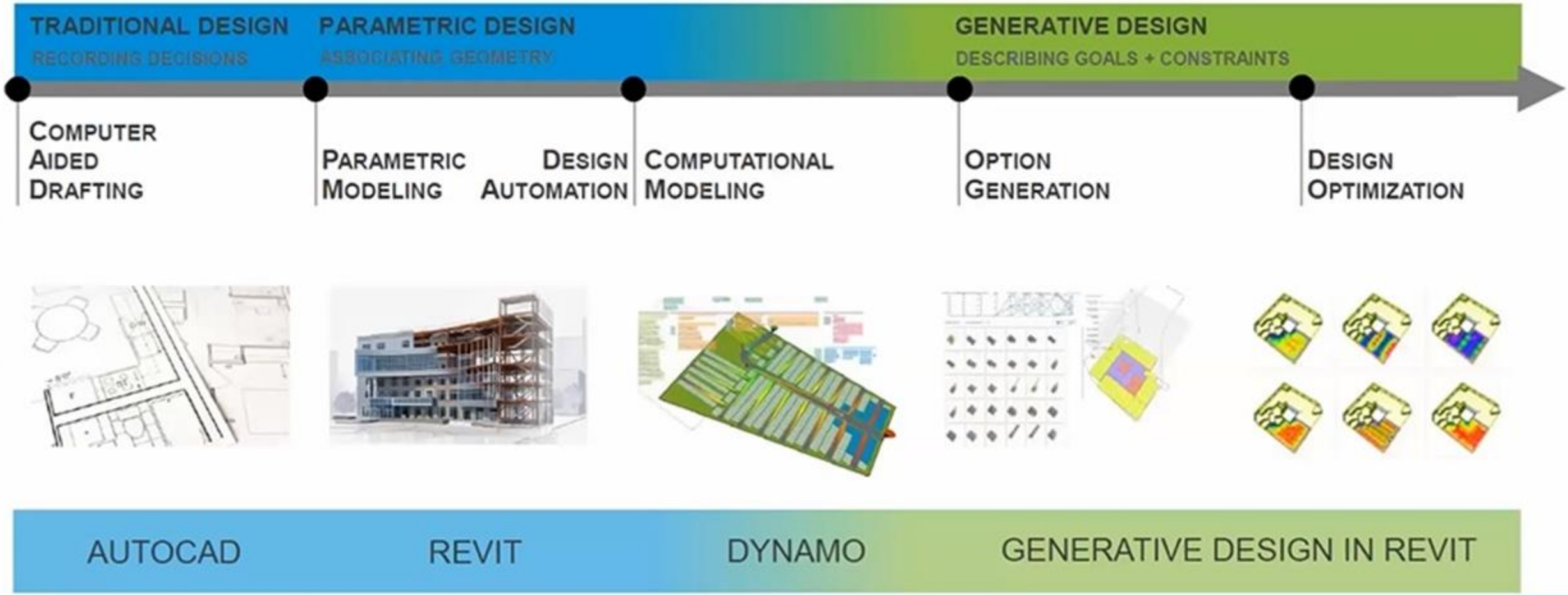
ACCESSED from anywhere, anytime

CONSULTED BY Owners, Architects, Engineers, Contractors, Consultants, Clients, Developers.

# New process

## Design technology

From traditional design to generative design.



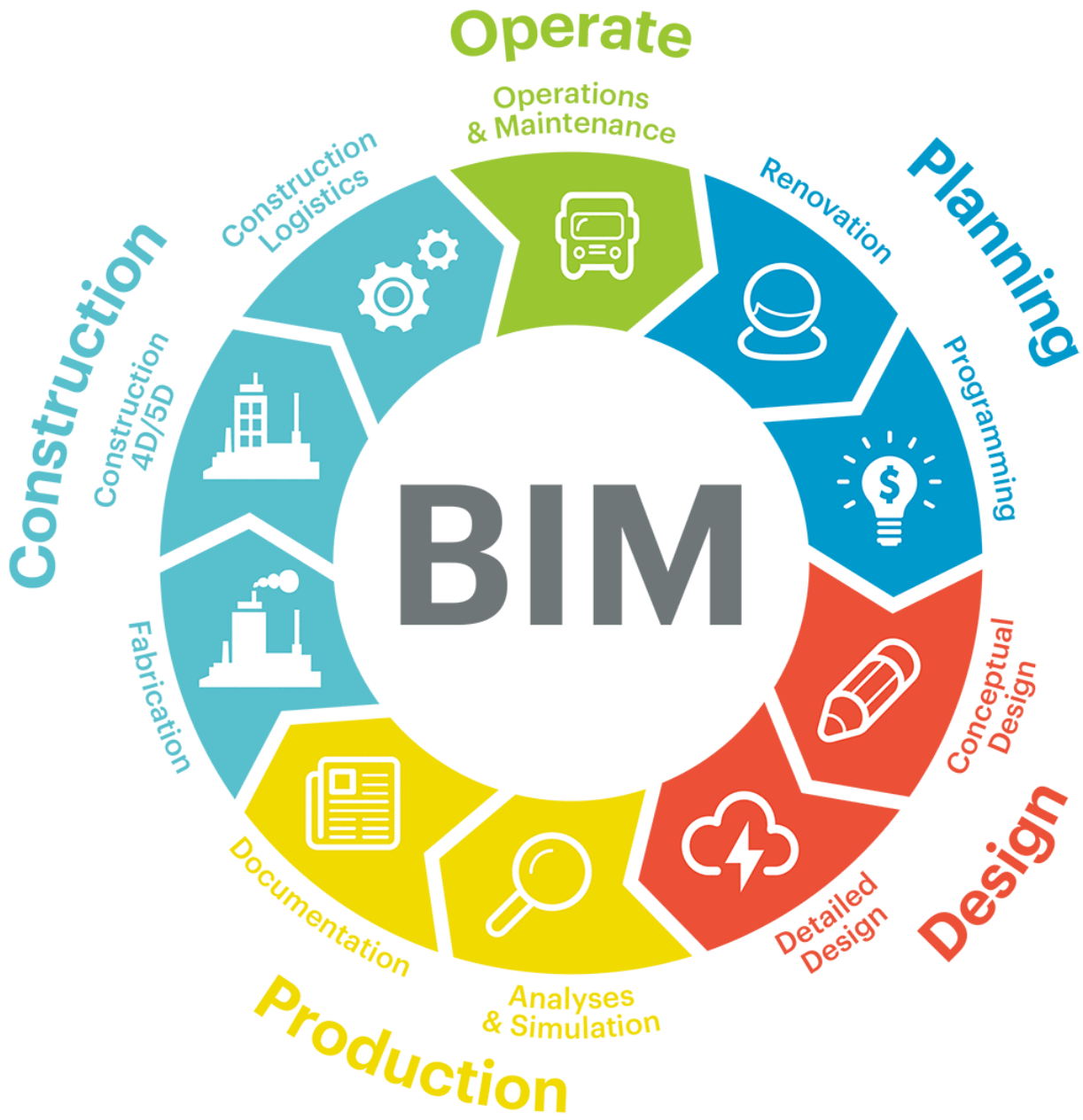
# BIM and resistance to change

# Life cycle

BIM allows for the creation of a virtual replica of the project for all stages of its life cycle, using intelligent elements such as walls, windows, roofs, making use of libraries of these, which contain physical and technical characteristics associated with their products.

These models bring together information from different specialties, which makes it possible to ensure the quality of projects, manage interference, correct collisions and anticipate possible conflicts, coordinating their solutions in time.

If something is changed in the model design, all the elements involved are automatically updated.



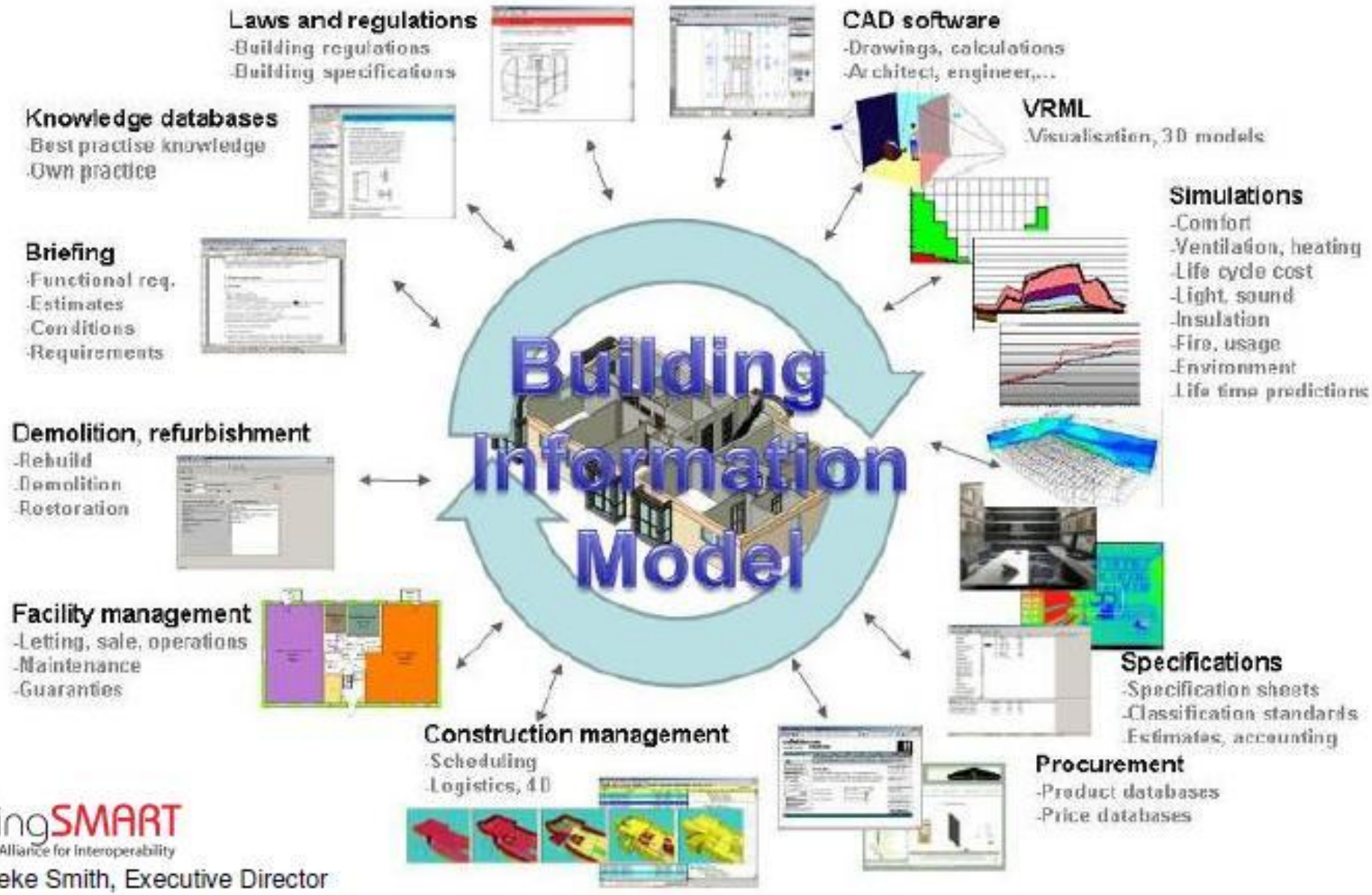
# Life cycle

The information contained in the models allows measurements and budgets to be extracted, facilitating the planning and administration of works and production processes during reconstruction and maintenance.

By using BIM, errors resulting from manual data entry become a thing of the past.

Simulations allow for optimizing future energy consumption and sustainable process behavior when it is inhabited.

# BIM Lifecycle View




buildingSMART
International Alliance for Interoperability

Courtesy of Deke Smith, Executive Director

# BIM Phases

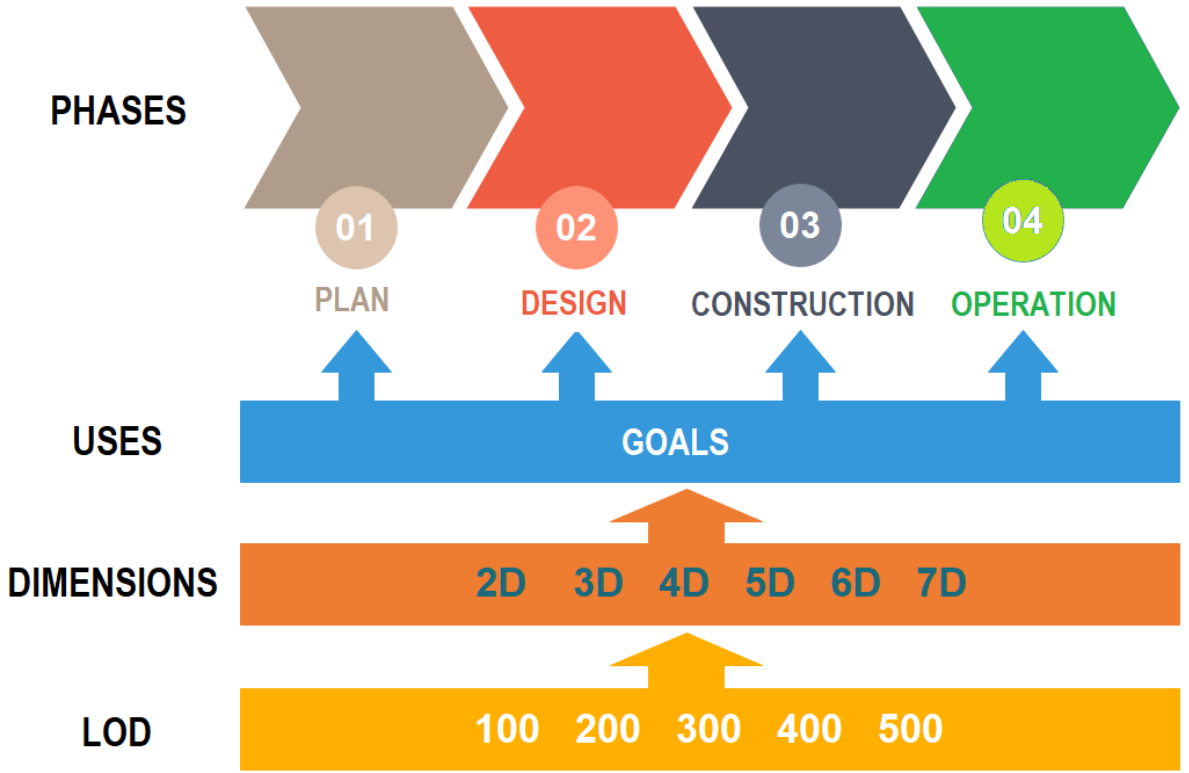
Among the PHASES of the life cycle of a BIM project, we can mention:

1- **Planning / Feasibility** Phase
2- Analysis Sub-phase
3- Conceptual / Preliminary Design Sub-phase
4- **Design** Phase
5- Programming and Cost Sub-phase
6- **Construction** Phase
7- **Operation and Maintenance** Phase
8- Sustainability and Efficiency Sub-phase
9- Renovation or Demolition Sub-phase.

They are traditionally grouped into four Phases, which are then divided into Sub-Phases and Tasks.

All these BIM PHASES and DIMENSIONS are executed sequentially since where there is a BIM USE of the life cycle, they are applied in the BIM PHASES.

**BIM life cycle process**



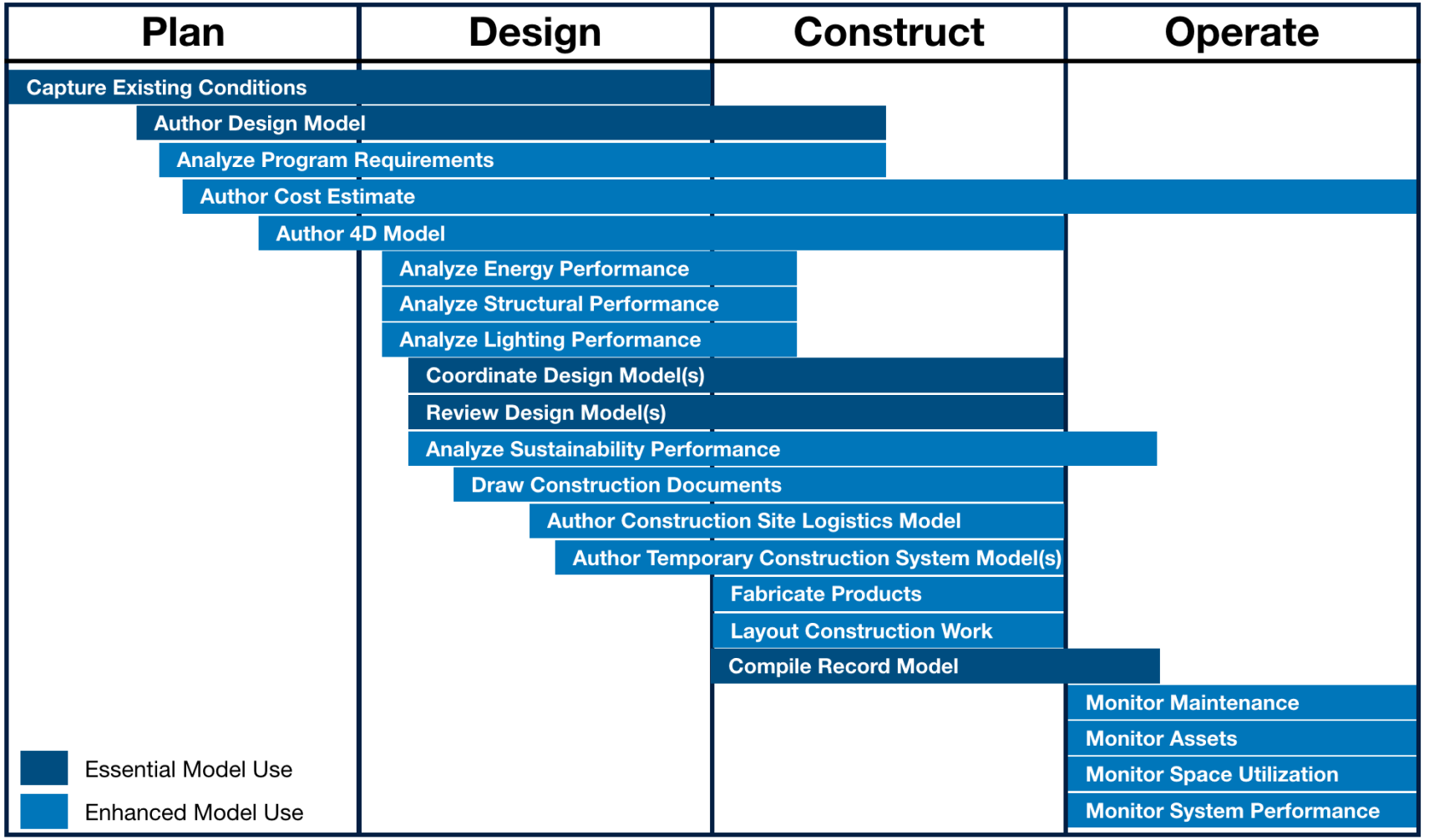

For each of these PHASES, OBJECTIVES to be met are generated and for this purpose the different BIM USES are used, which are contemplated as tools that will help in the different BIM DIMENSIONS and objects with different LOD.

# BIM Uses

When starting a project, the BIM USES or scopes necessary to meet the proposed OBJECTIVES must be selected.

BIM USES must be developed by people who have the specific capabilities for their execution. Who have defined responsibilities regarding the project information.

Depending on the phase we are in, we will have specific USES for this phase and other USES common to the different phases.



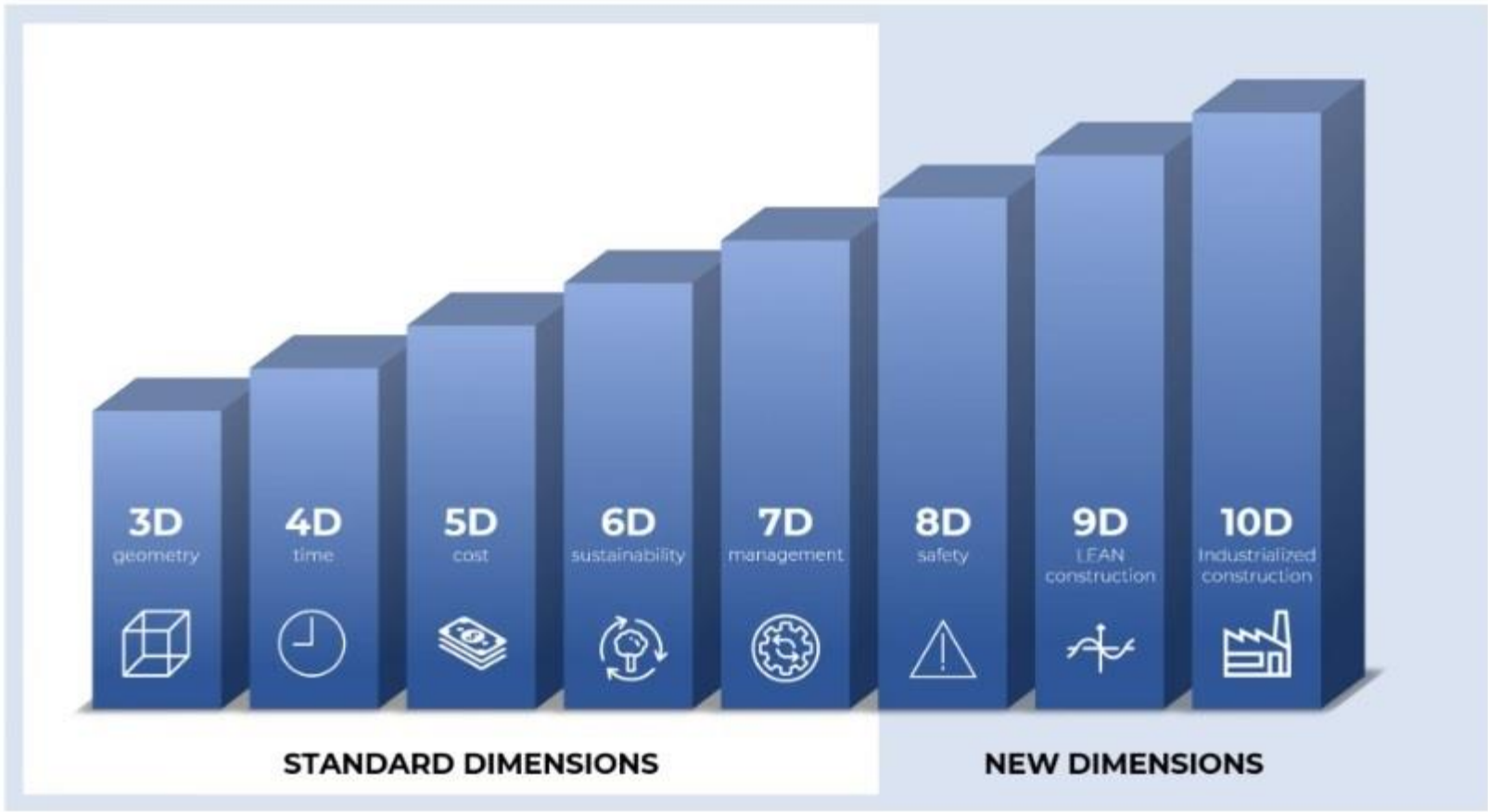

**Common Model Uses by Project Phase**

*Note: Dark Blue are Essential Model Uses as defined in the National BIM Guidelines for Owners*

# Dimensions

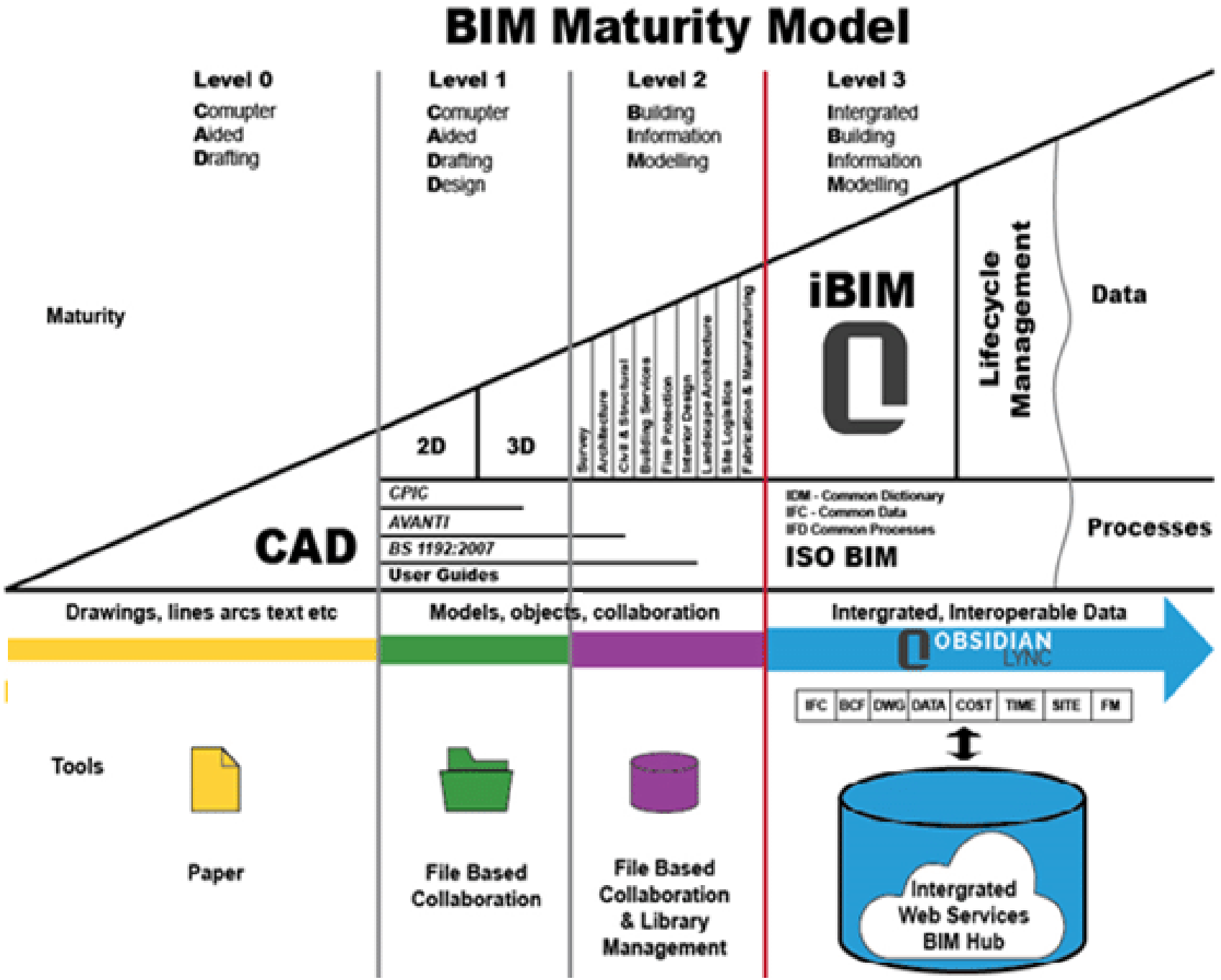
3D Virtual model.
4D Time.
5D Cost.
6D Sustainability.
7D Operation & Manitenance.

8D Security.
9D Lean Construction.
10D Industrialized Construction.




In addition to the standard dimensions, there is now a debate about three new dimensions of BIM.

# Levels of maturity



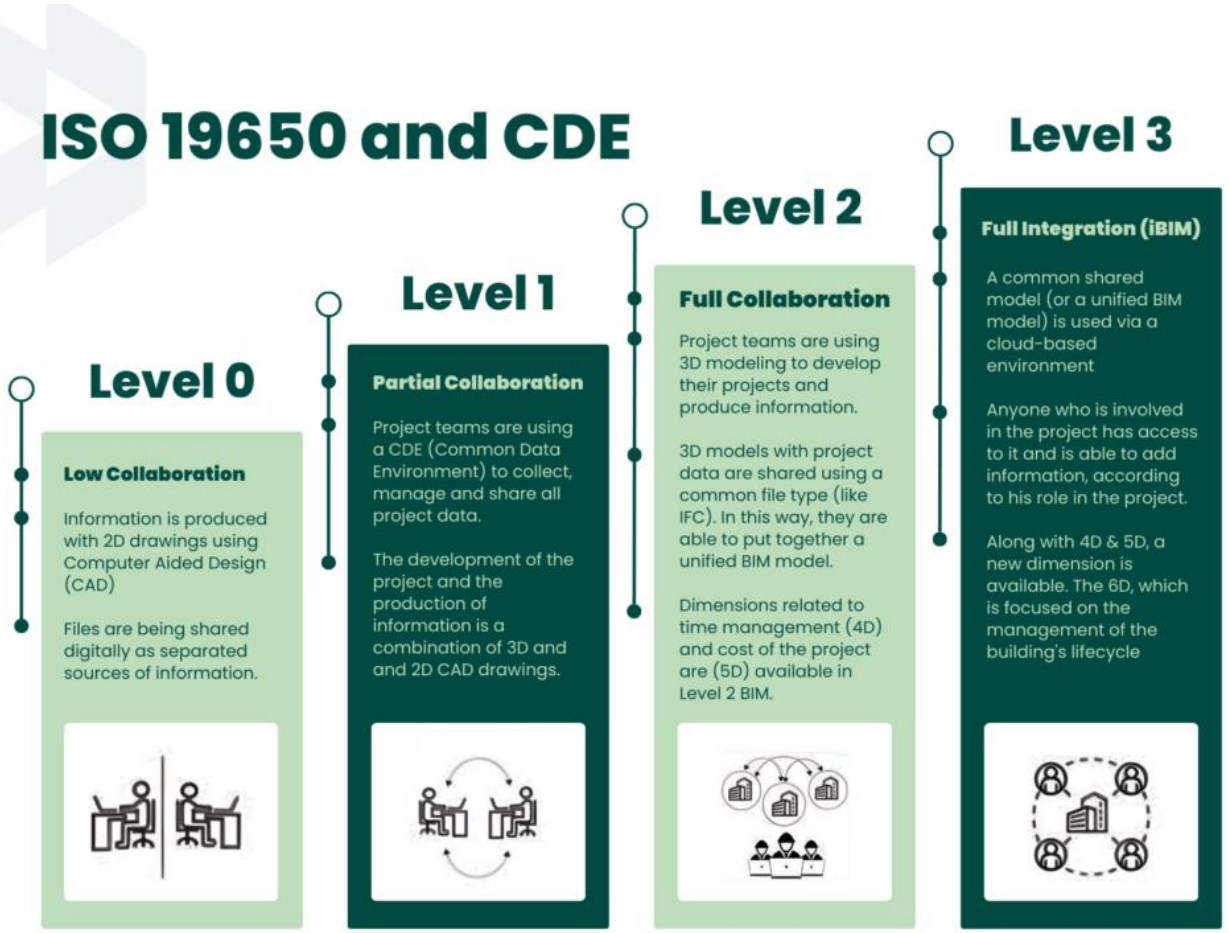
# Levels of collaboration

There are several levels of shared collaboration in a construction project: these are known as BIM maturity levels. As we move up the level, collaboration between all parties is greater.

The digital maturity stages of the ISO 19650 standard have suggested new regulatory scenarios at international, community and state levels. Today, the standard is the main reference for all other existing standards.

In essence, it identifies 3 stages of BIM maturity

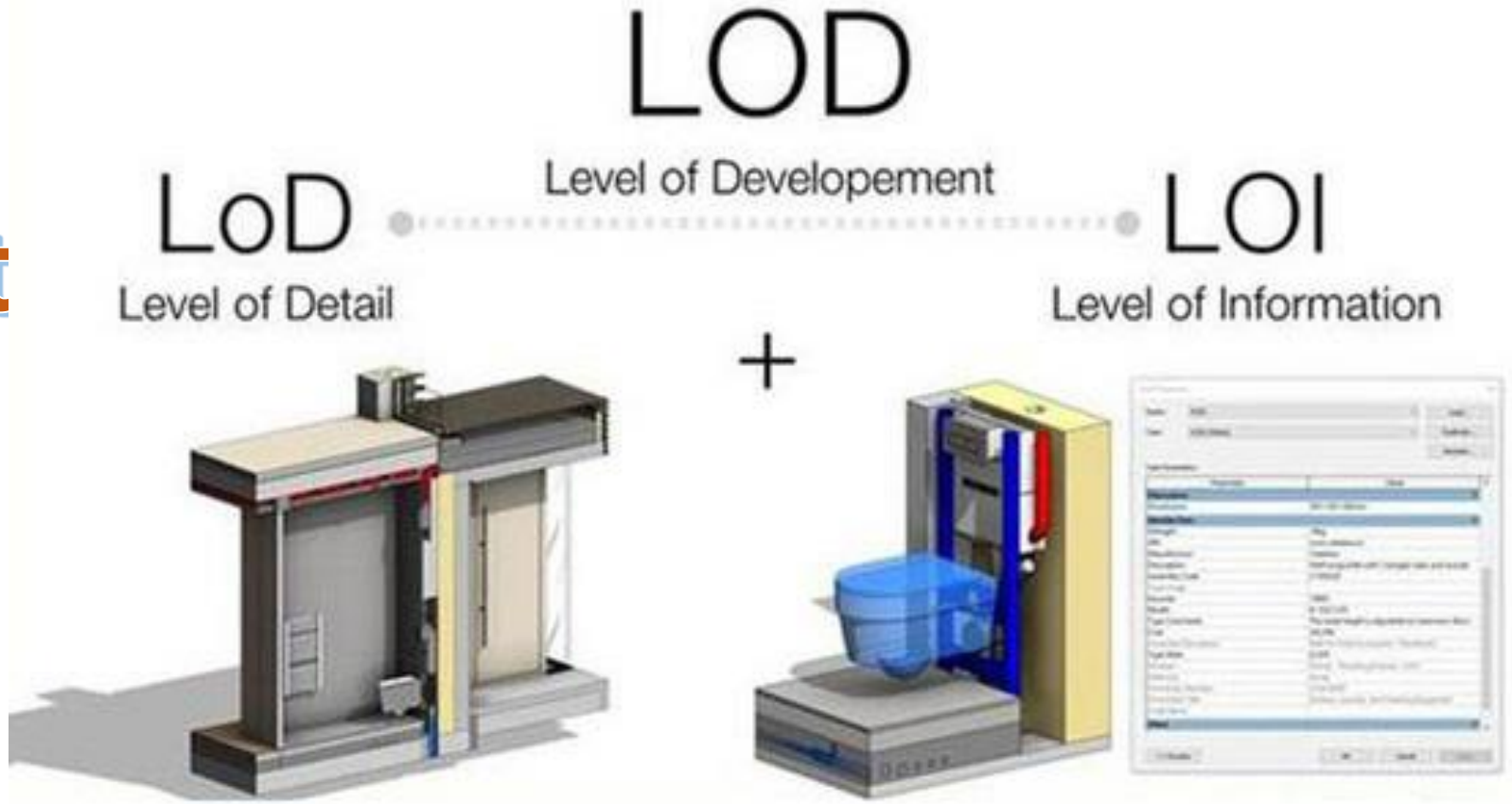
LEVEL 1, in which 2D CAD drawings and 3D BIM models are combined.
LEVEL 2, in which the information models of the different disciplines guarantee the integrated management of the construction project.
LEVEL 3, in which the structured database systems of the information models allow the imposition of OPEN BIM as a management system.



# Level of Development

AIA
LOD 100 Pre-design.
LOD 200 Conceptual.
LOD 300 Documentation.
LOD 400 Construction.
LOD 500 As-Built

LOMD = Level of Model Definition
LOMD 1 Brief
LOMD 2 Concept
LOMD 3 Developed design
LOMD 4 Production
LOMD 5 Installation
LOMD 6 As Constructed
LOMD 7 In Use

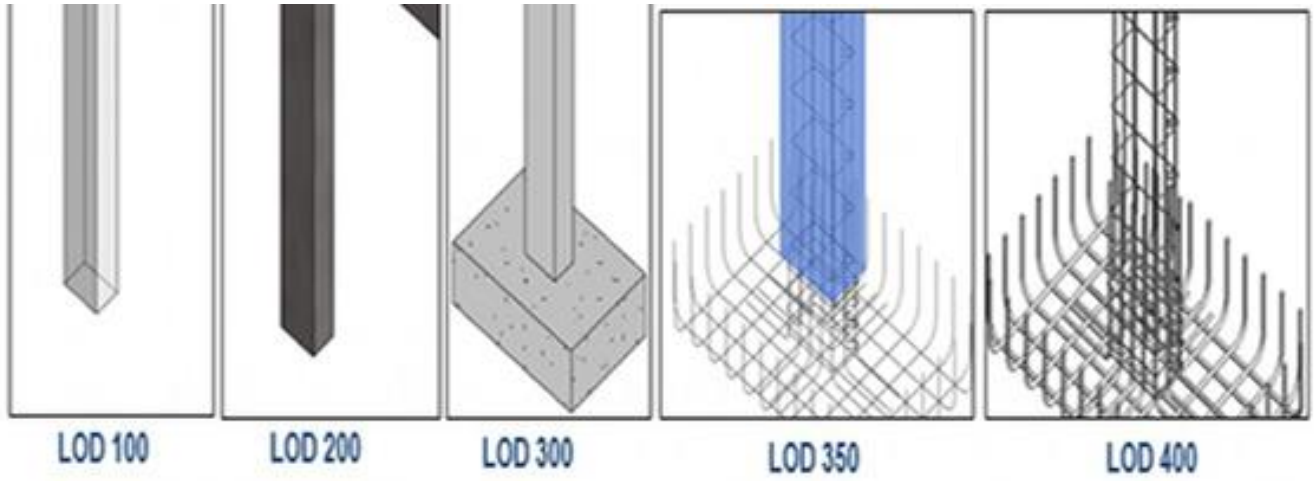



# LOIN

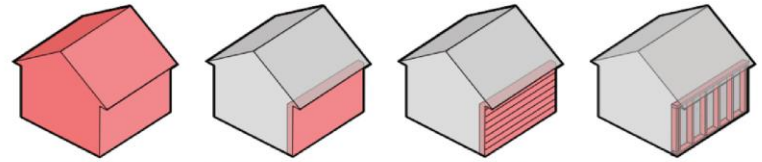
**LOD**_Level of Develoment_AIA-2008
**LOMD** = **LoD** y **LoI**_Level of Detail y Level of Information_PAS 1192_2013
**LOIN**_Level of Information Need_ISO 19650_2018

# Level of Development


It is the level at which the element is graphically defined, precisely specifying quantities, size, shape and/or location in relation to the project as a whole. Development level has been reached when the Execution Project has been developed.

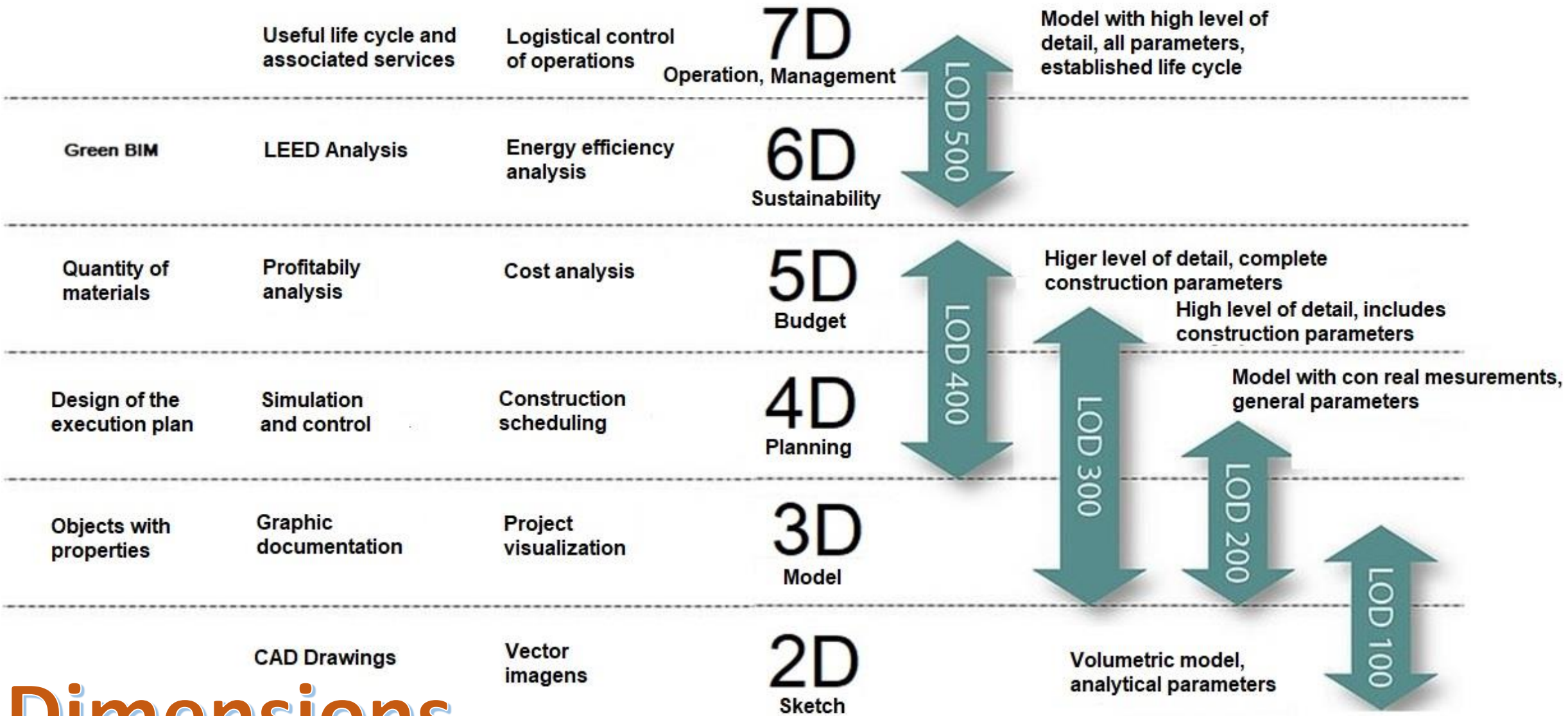



## Level of Development (LoD)



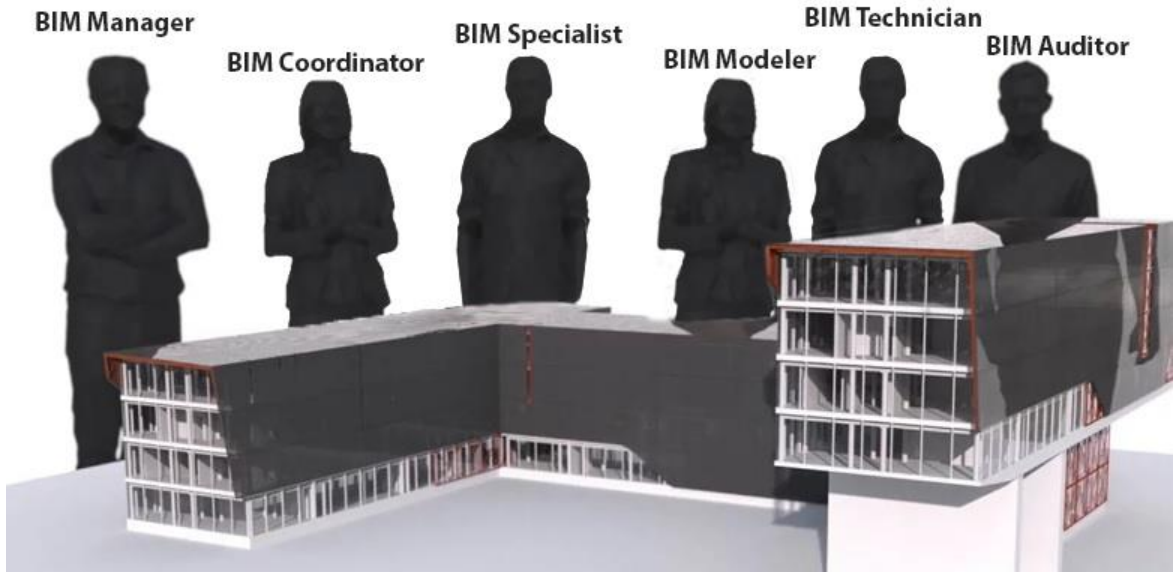
100 200 300 400

| OUTPUT | CAD floor plan | CAD drawings | BIM/CAD | BIM/CAD |
|---|---|---|---|---|
| ACCURACY | Conceptual | Architectural | Architectural | Architectural |
| MEP | No | Option | Option | Option |
| STRUCTURAL | No | No | No | Yes |
| AutoCAD | Yes | Yes | Option | Option |
| 3D TOUR | Yes | Option | Option | Option |




# Dimensions and Levels

# BIM Roles



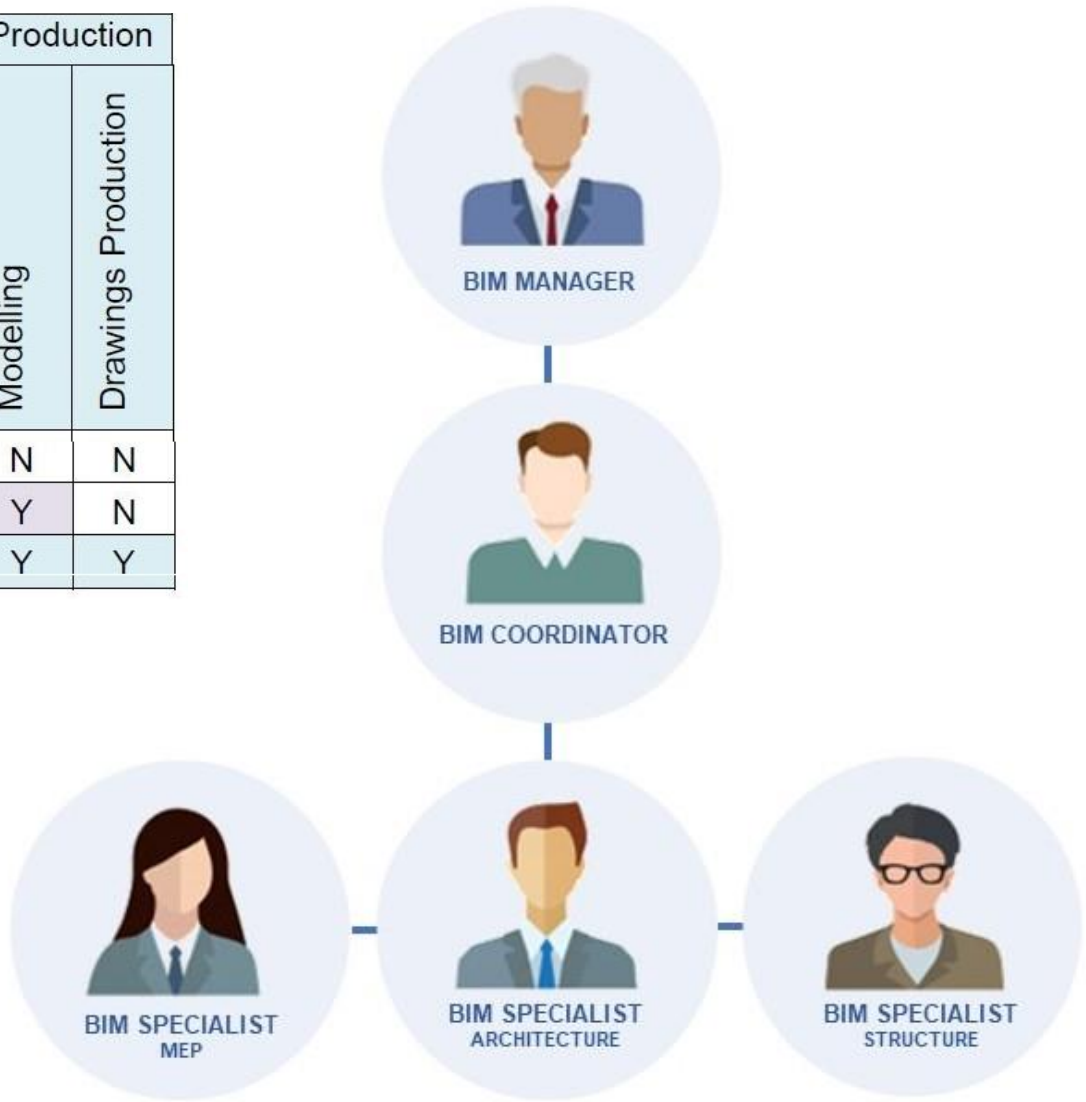

- A function that is performed at some stage of the planning, design, construction and/or operation of a building or infrastructure, based on BIM capabilities that are added to non-BIM capabilities.
- Roles do NOT define a new discipline.
- Roles are NOT a position; they are responsibilities for certain actions.
- A person CAN perform more than one Role.
- Roles CAN be performed by several people.
- Roles can move from one activity to another during the project life cycle.
- Roles define BIM capabilities that are added to the competencies of each discipline.
- Roles are performed throughout the project life cycle.
- Roles can be performed by existing people in a team, through training.
- Roles must be performed by competent people.

PROJECT INFORMATION MANAGER BIM AUTHORS
BIM TECHNICIAN BIM MANAGER
BIM COORDINATOR TASK TEAM MANAGER
MODELLER REVIT TECHNICIAN
INTERFACE MANAGER TASK INFORMATION MANAGER

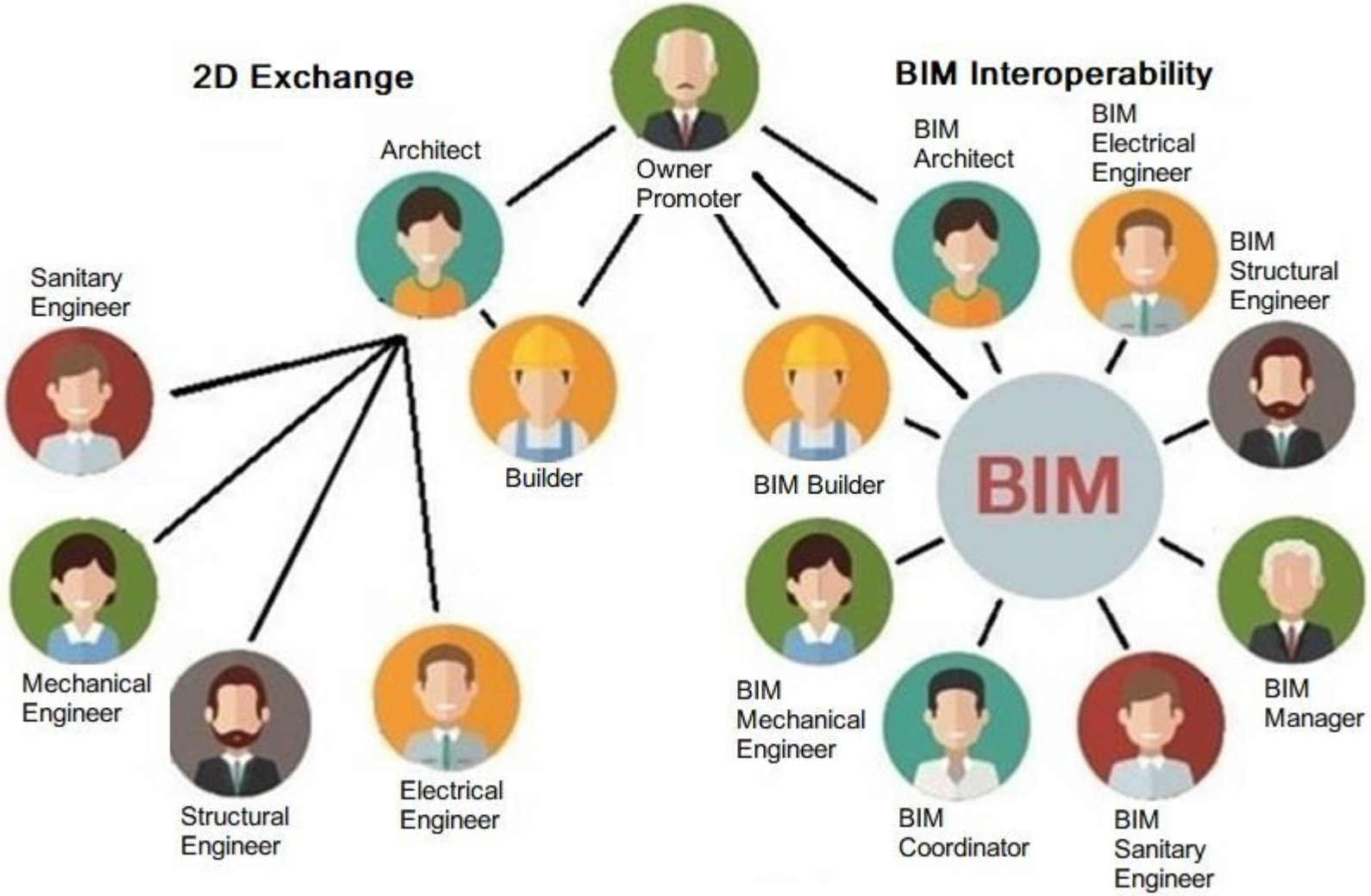
# BIM ROLES
## AND RESPONSIBILITIES

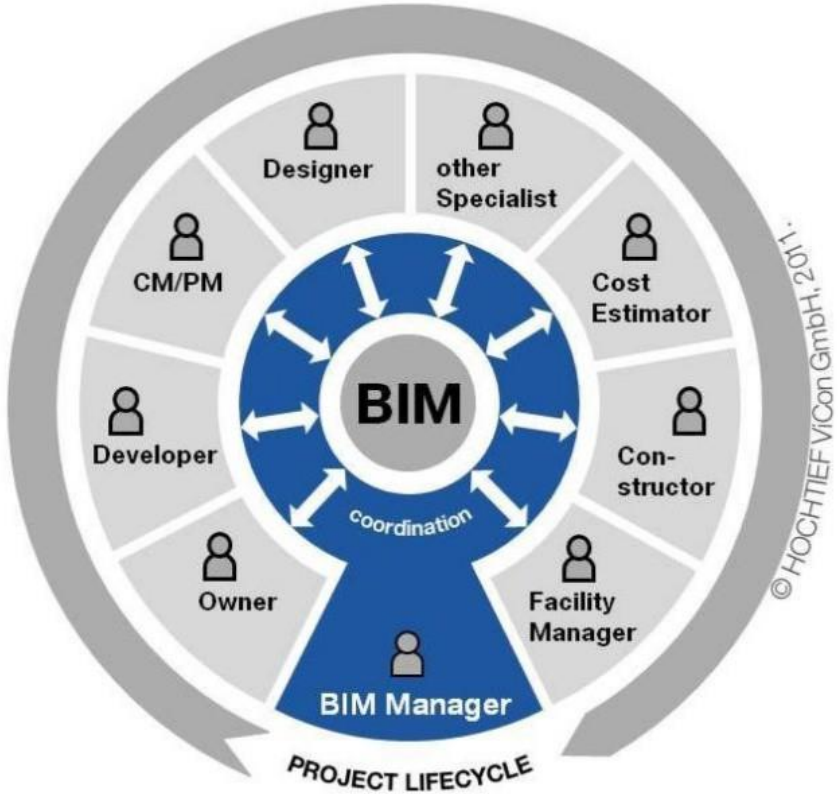
| | Strategic | | | | | | Management | | | | Production | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BIM** Role | Corporate Objectives | Research | Process + Workflow | Standards | Implementation | Training | Execution Plan | Model Audit | Model Co-ordination | Content Creation | Modelling | Drawings Production |
| **Management** | Y | Y | Y | Y | Y | Y | Y | N | N | N | N | N |
| **Coordination** | N | N | N | N | N | Y | Y | Y | Y | Y | Y | N |
| **Modelling** | N | N | N | N | N | N | N | N | N | Y | Y | Y |

- Client/Promoter
- BIM Project Manager
- BIM Information Manager
- **BIM Manager**
- BIM Lead Designer
- BIM Lead Construction
- BIM Task Team Manager
- **BIM Coordinator**
- **BIM Modeler**
- BIM Analyst
- IFC Specialist
- BIM Facilitator
- BIM Consultant
- BIM Research
- BIM Facility Management
- **BIM Specialist**



# BIM Roles



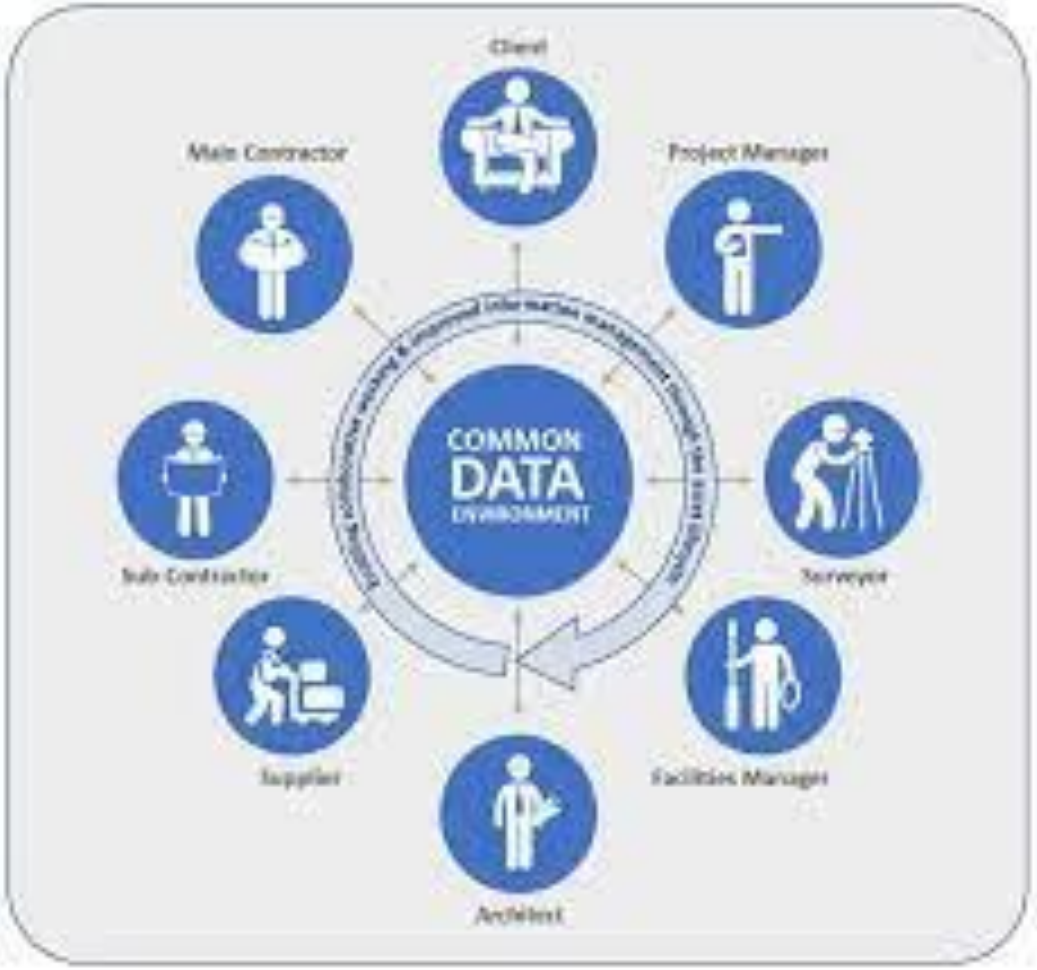

BIM redefines our traditional way of individual and fragmented work, in favor of a collaborative work methodology

This puts the generation of consistent information about a project and the fluid exchange of this information between the different actors involved at the center of interest.

# CDE Common Data Environment

- PAS1192-*2:2013 defined a CDE as: "A single* source of information for any given project, used to collect, manage and disseminate all relevant approved project documents to multidisciplinary *teams through an administrative process."*

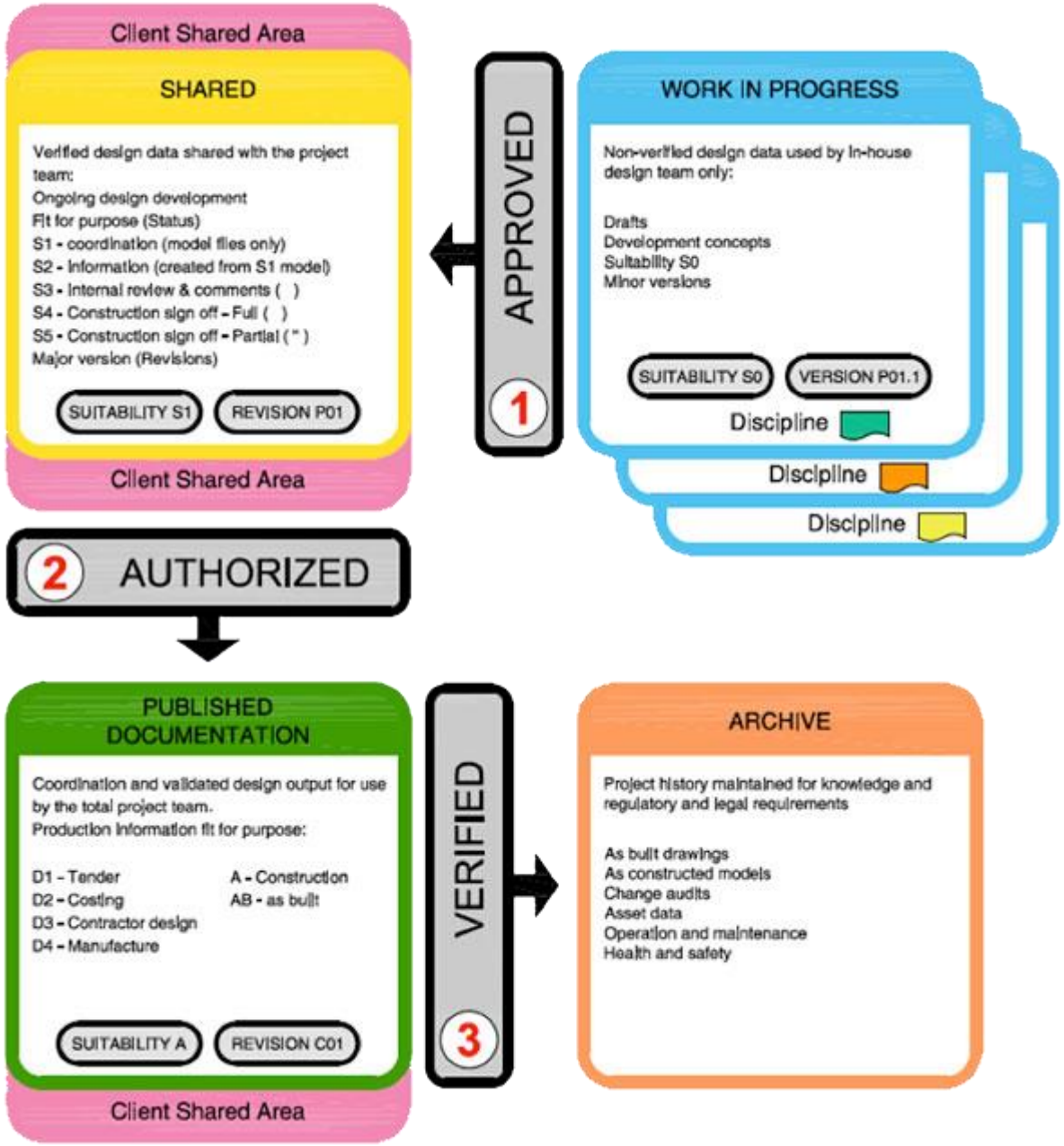
- According to **ISO 19650**, (3.3.15) the common data environment (**CDE***) is defined as: "An agreed* source of information (3.3.1) for a given project or asset (3.2.8) for the purposes of collection, management and distribution of each information-containing element (3.3.12) by means of a *managed process."*



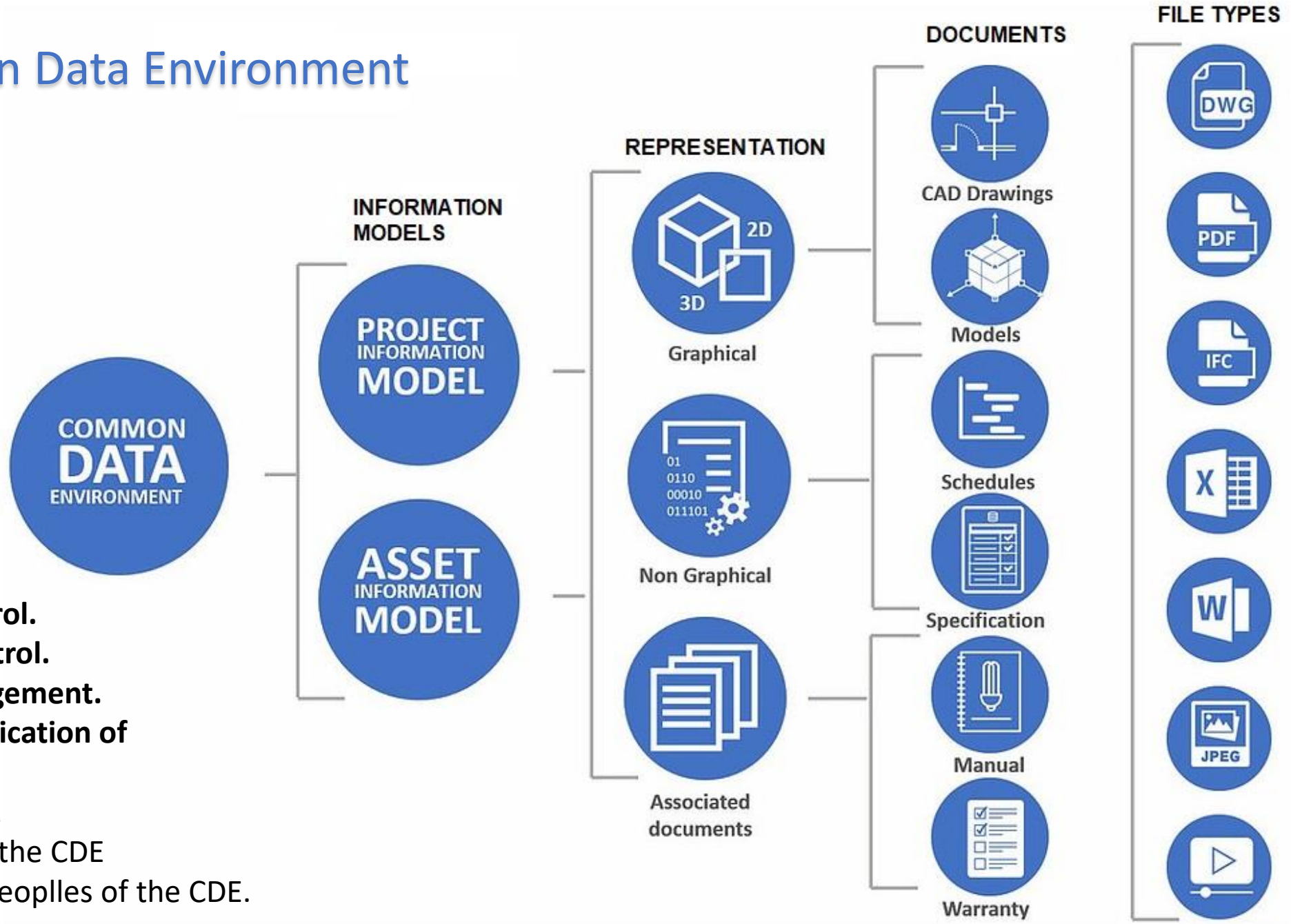
# CDE Common Data Environment

- **CDE**s are generally divided into four sectors that identify the progressive stages of information sharing: **Progress, Shared, Published, Archived.**

- Ownership of the information remains with the originator, even if it is shared and reused, only the originator can change it



# CDE Common Data Environment




## Characteristics

- **Information access control.**
- **Information version control.**
- **Information state management.**
- **Management and classification of information containers.**
- Document approval flow.
- Traceability of actions in the CDE
- Comunication with the peoplles of the CDE.

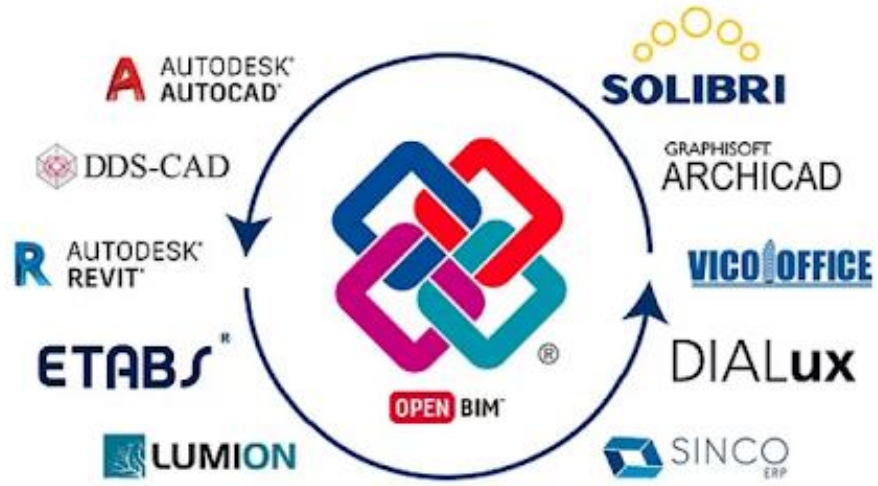
# Interoperability

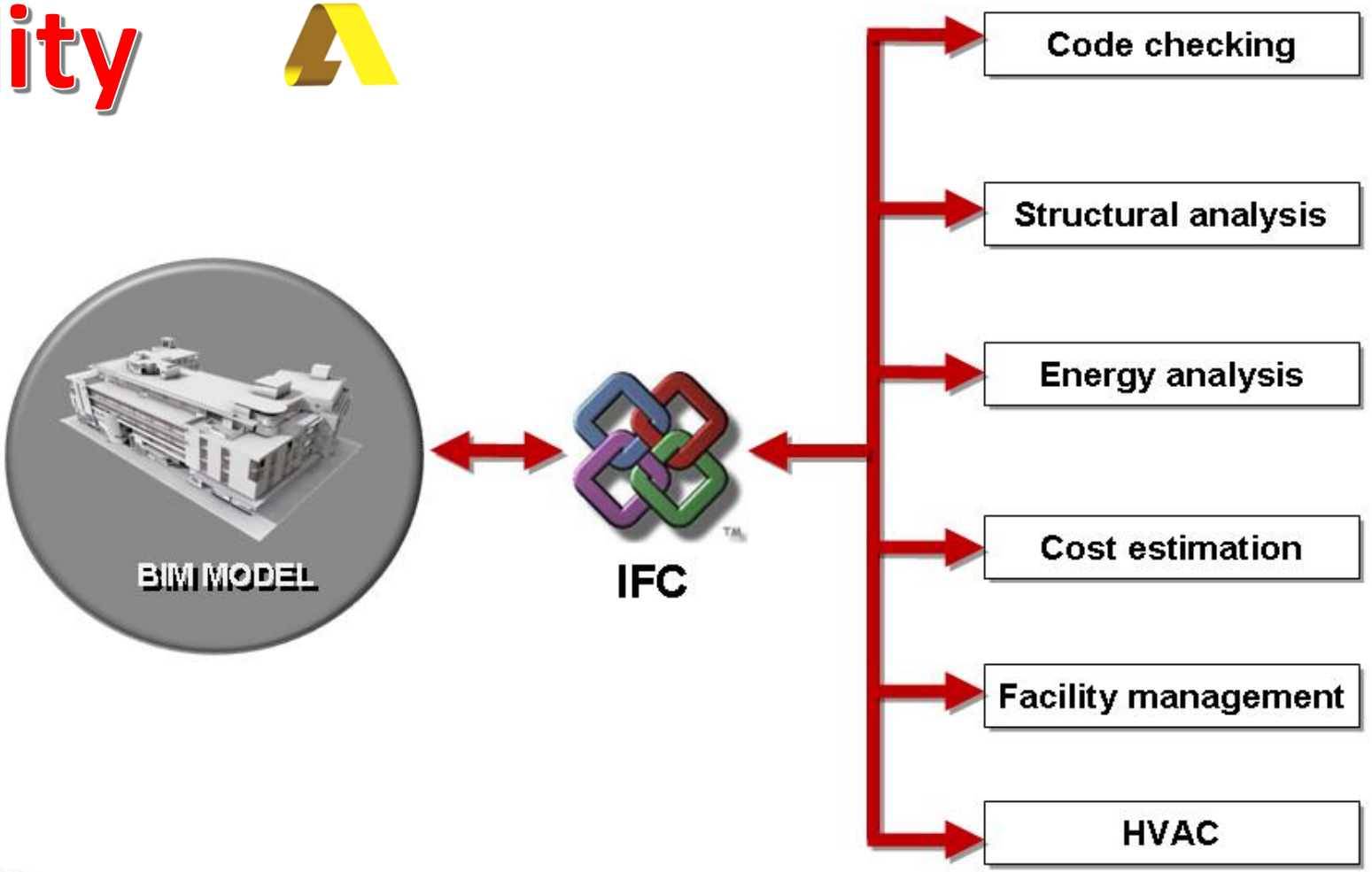
1994 IAI
International Alliance for Interoperability

1997 IFC
Industry Foundation Classes
ISO 16739-2013

2005 building SMART
International home of open BIM
before IAI

2009
BIM Collaboration Format



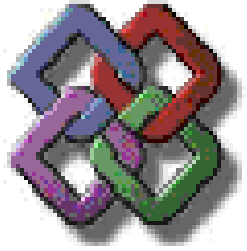

**IFC**: is a data format that aims to allow the exchange of an information model without the loss or distortion of data or information, allowing collaboration and transmission of information between the different agents involved in a project.

The information in the IFC format models is **durable** over time

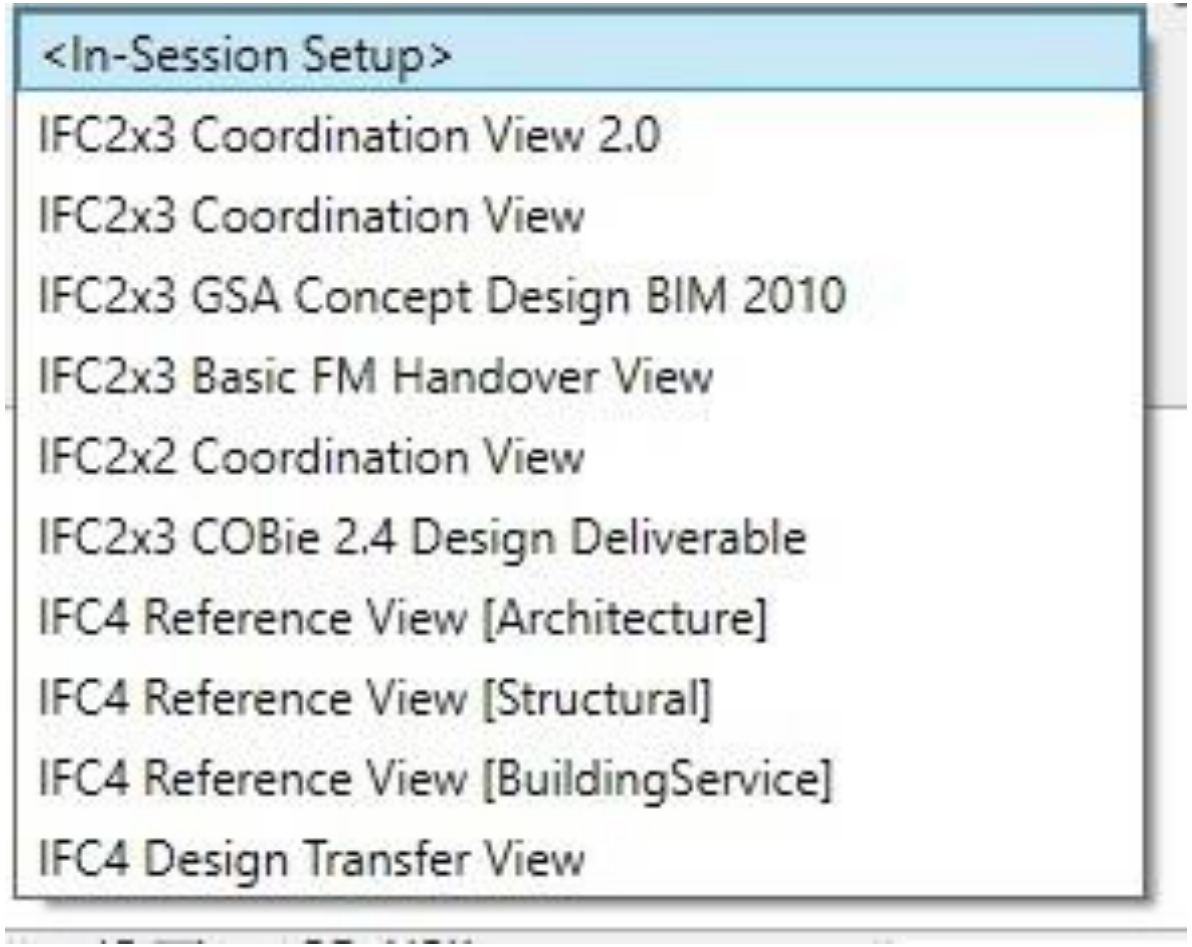
# Interoperability

In all the legislations currently in force for projects with public funds, the following are required among the deliverables:

- Native files of the software used.
- The generated IFC files.



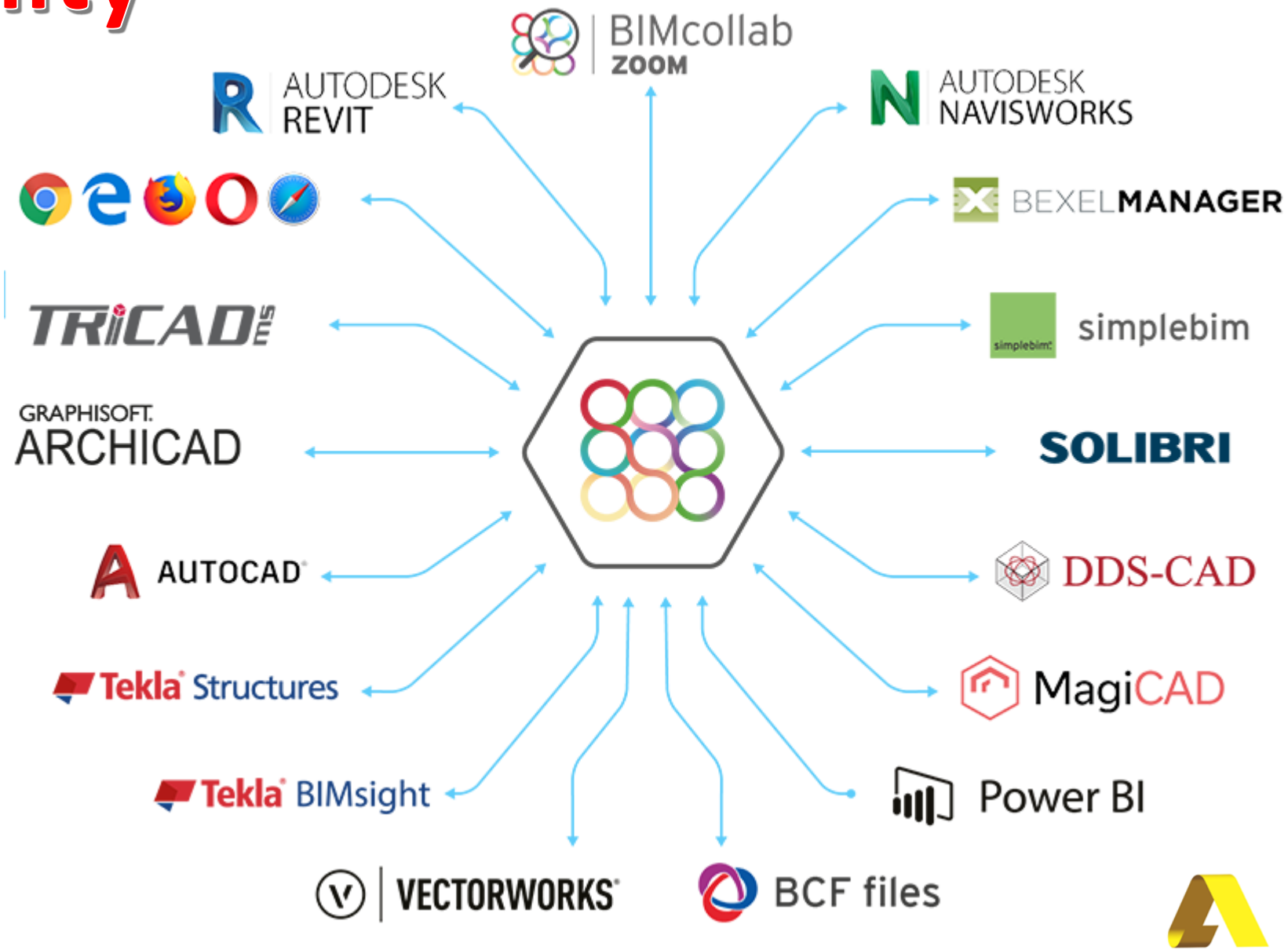
Types of IFC Formats that Revit can export:



# Interoperability

Through interoperability formats generated by different software, it is possible to exchange and share information, facilitating synergistic collaboration processes.

For this reason, buildingSMART proposes that the creation, notification and management of incidents be carried out through BCF. **BCF** stands for **BIM Collaboration Format**. It is an international open standard, developed and maintained by buildingSMART International.

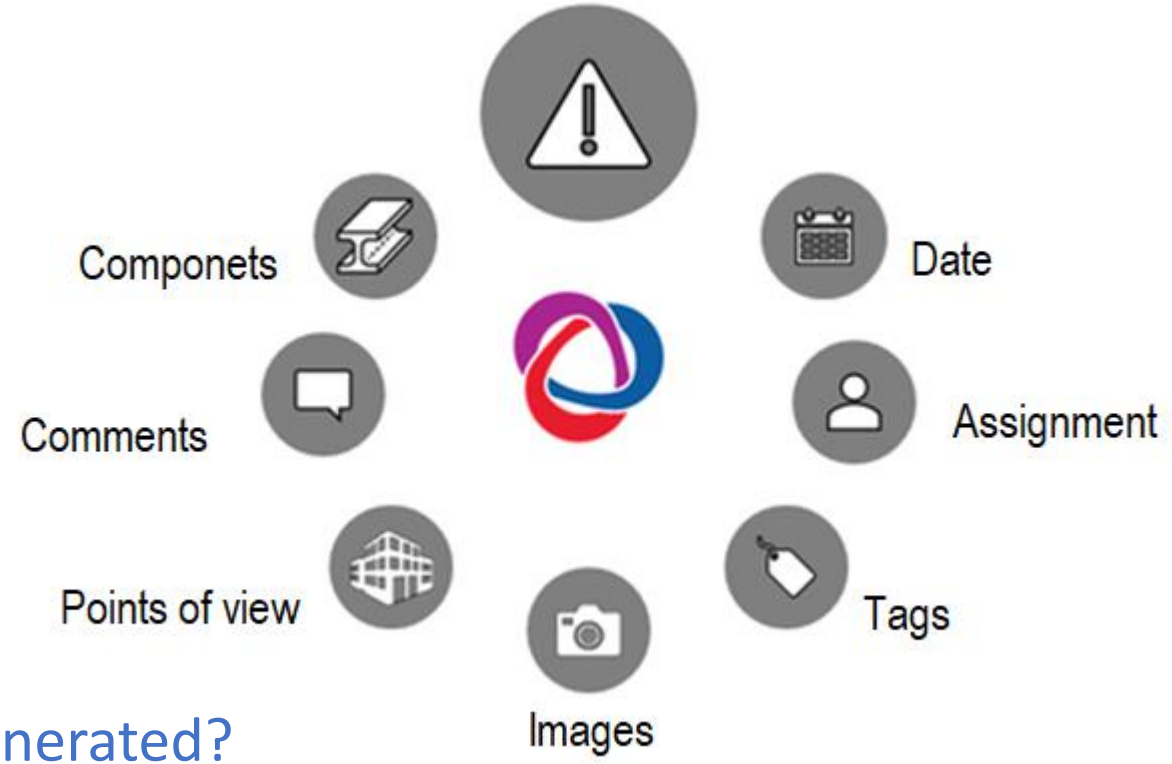


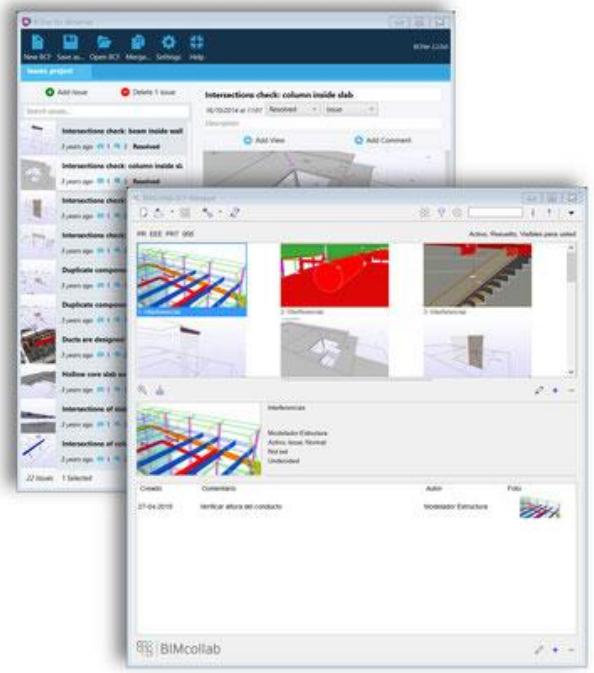

OPEN BIM™

# Interoperability

## What is BCF?

A **BCF** file is a project comment file that reflects the history of interactions between agents and allows for managing the back and forth of information, requirements, collisions, etc.




## And how is a BFC generated?

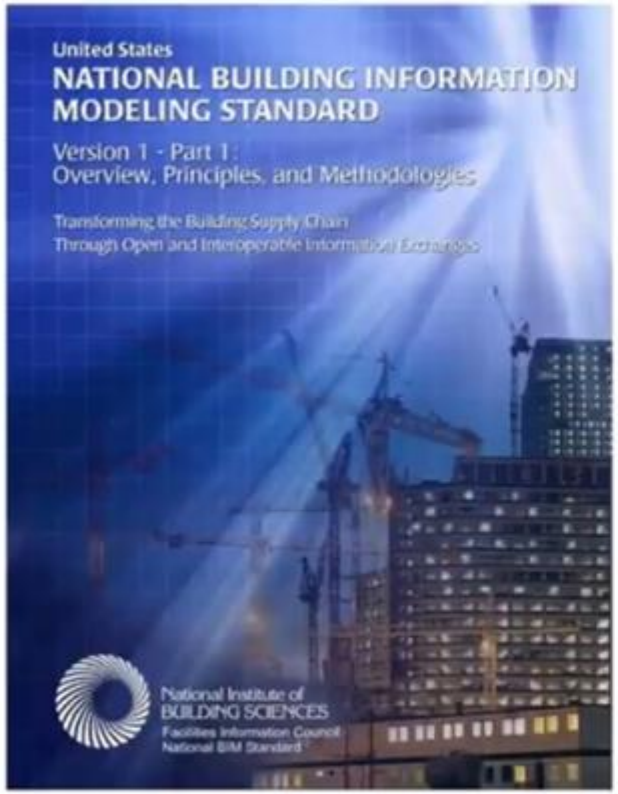
There are various softwares to generate and manage BCFs:

• Tecla BIMsight or Solibri allow you to open and generate BCFs.

• BCFier is an opensource program with a desktop versión that allows you to opne and generate BCFs as well as plugins for Autodesk Revit in its versions from 2015 to 2022.

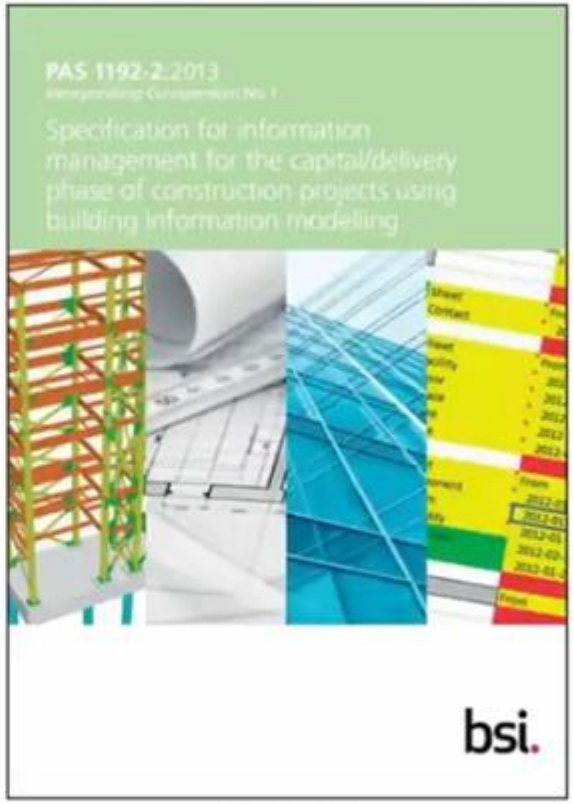
• BIMCollab. Without a doubt, for my taste, the most powerful.

# BIM Standards




NBIMS - US

www.nationalbimstandard.org

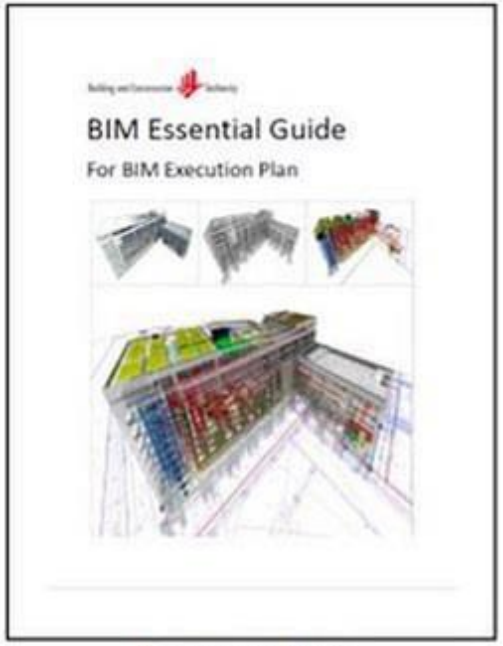



PAS-1192

www.bsigroup.com

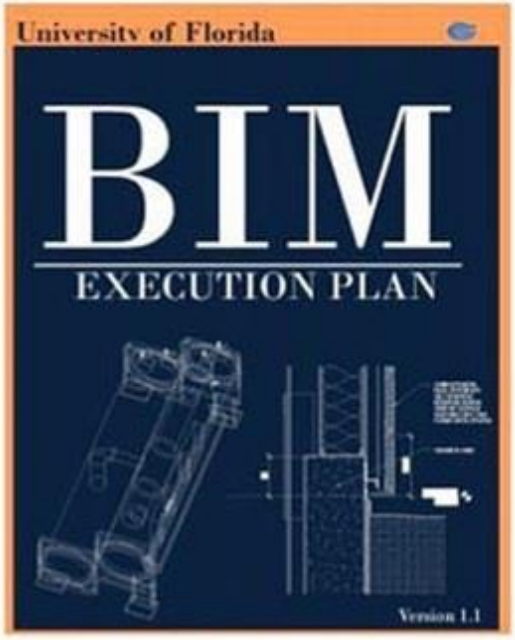
Standard_AEC_UK
Standard_ASPEC_USA
Standard_BFC
Standard_CIC_HK
Standard_COBie
Standard_eCOB
Standard_GDO_BIM
Standard_GSA_USA
**Standard_ISO**
Standard_NBIMS_USA
Standard_NBS_UK
Standard_NCS_US
Standard_PAS_UK
Standard_SIMP_Scottis
Standard_uBIM Spain
Standard_UNE Spain
*Standard_COVENIN_Ve*

# BIM Standards




*Singapore Guide*

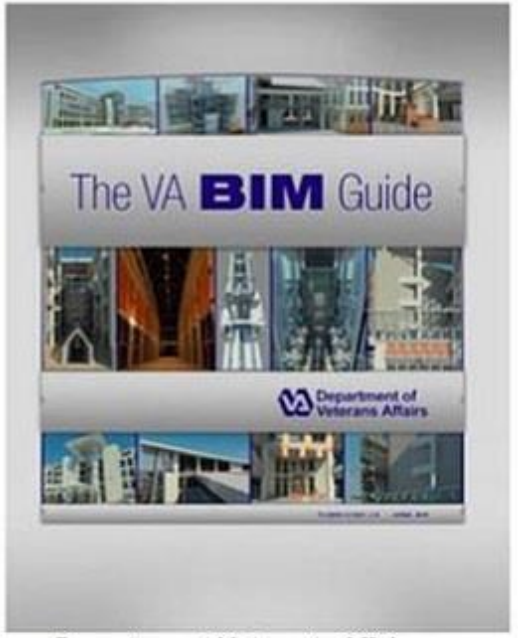

*University of Pennsylvania*




*University of Florida*


*University of South Florida*


*Hong Kong Guide*




*Departamnet Veterants Affairs*

# BIM Standards


**ISO 24981: 2016**

Building Information Models

Information Delivery Manual

ISO 12006 …….Classifications

ISO 14001 …….Enviroment

**ISO 19650 …….BIM**

ISO 27001 …….Computing

**ISO 29481-2: 2012** ……It aims to facilitate interoperability between software applications used in the construction process, promote digital collaboration between actors in the building construction process and provide a basis for accurate, reliable, repeatable and high-quality information exchange.

ISO 55001 …….Assets

# BIM Standards

- The **ISO 19650** standard contributes to strengthening the BIM methodology and lays the foundations for a progressive transition towards digital transformation.
- This standard provides **instructions and recommendations** to guide project members in terms of information management and security, from the beginning to the delivery of the project, and ensures an efficient and reliable workflow.
- In addition, this standard also **encourages the use of a common language in the Common Data Environment**, an essential element for achieving process standardization.
- In short, the **ISO 19650** standard is an indispensable component for the coordination and centralization of files, **interoperability** between professionals and the **traceability** of information throughout the project life cycle.


ISO 19650-1, 2, 3, 4, 5

BIM

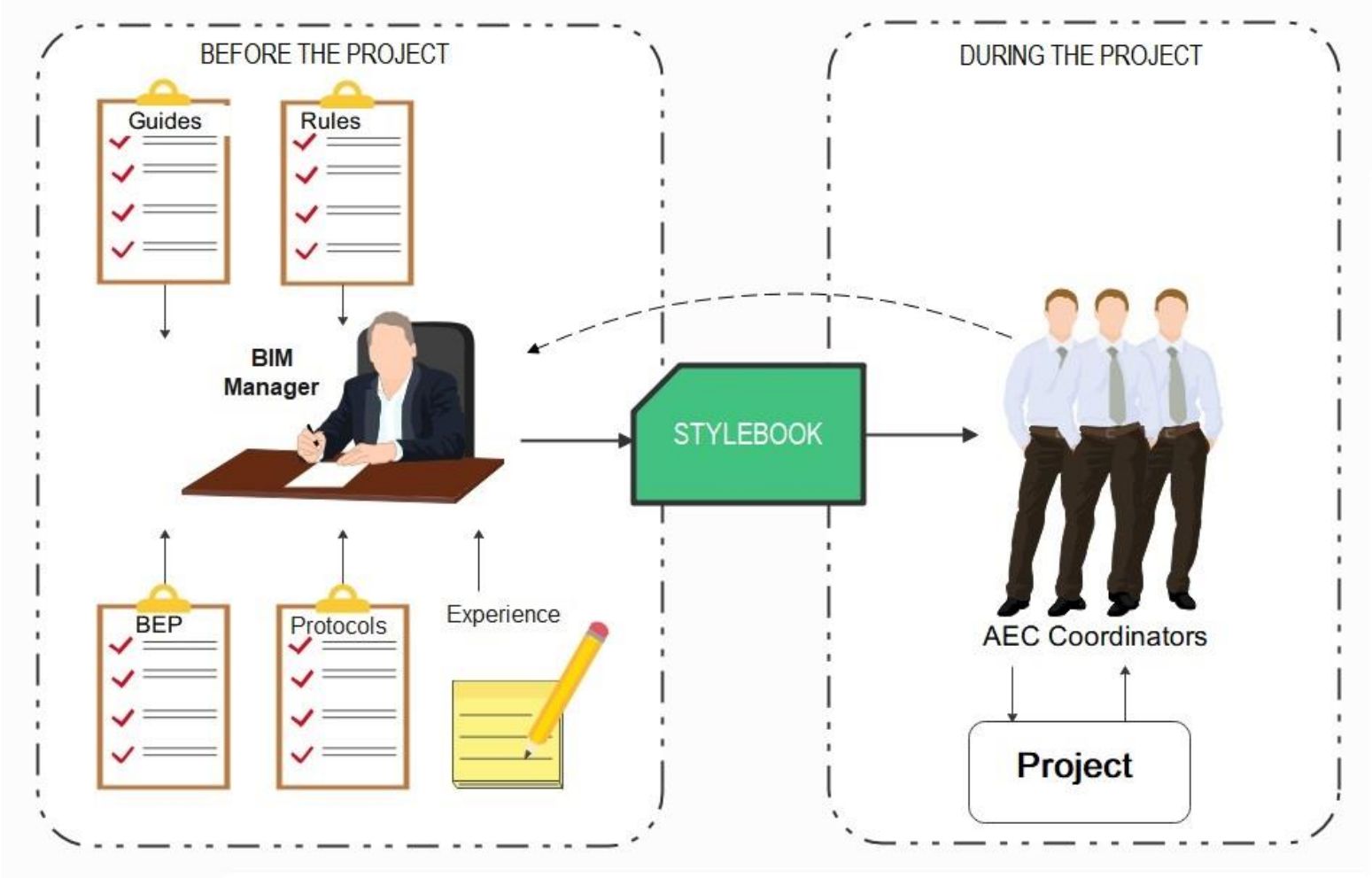
# Stylebook

***The Style Book*** in an AECO organization “Architecture, Engineering, Construction and Operation” is the document that contains the criteria and guidelines necessary to standardize, normalize and homogenize the graphic representation of a project.

**The Style Book**: This is the document that contains the criteria and guidelines necessary to **standardize, normalize, and homogenize** the graphic presentation of a project.
It is adopted by the company for the development of projects and gives rise to **the templates** of the different BIM software.

**The Style Book** is composed of:

- General Guidelines
- Organic Guidelines

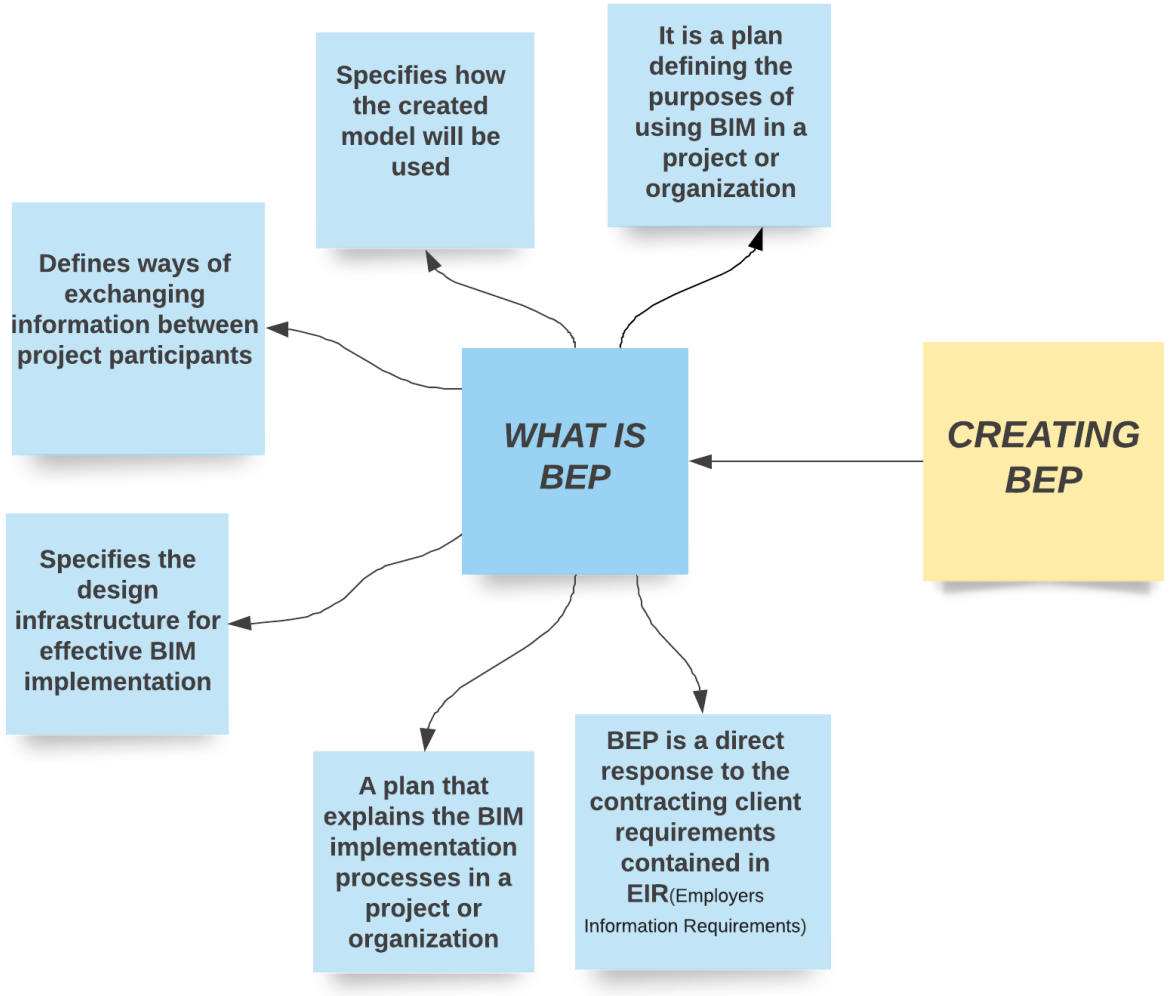


# BEP

A **BIM Execution Plan** (BEP) is a document that outlines how to use Building Information Modeling (BIM) for a construction project. It's a roadmap that guides the project from start to finish.

## What does a BEP include?

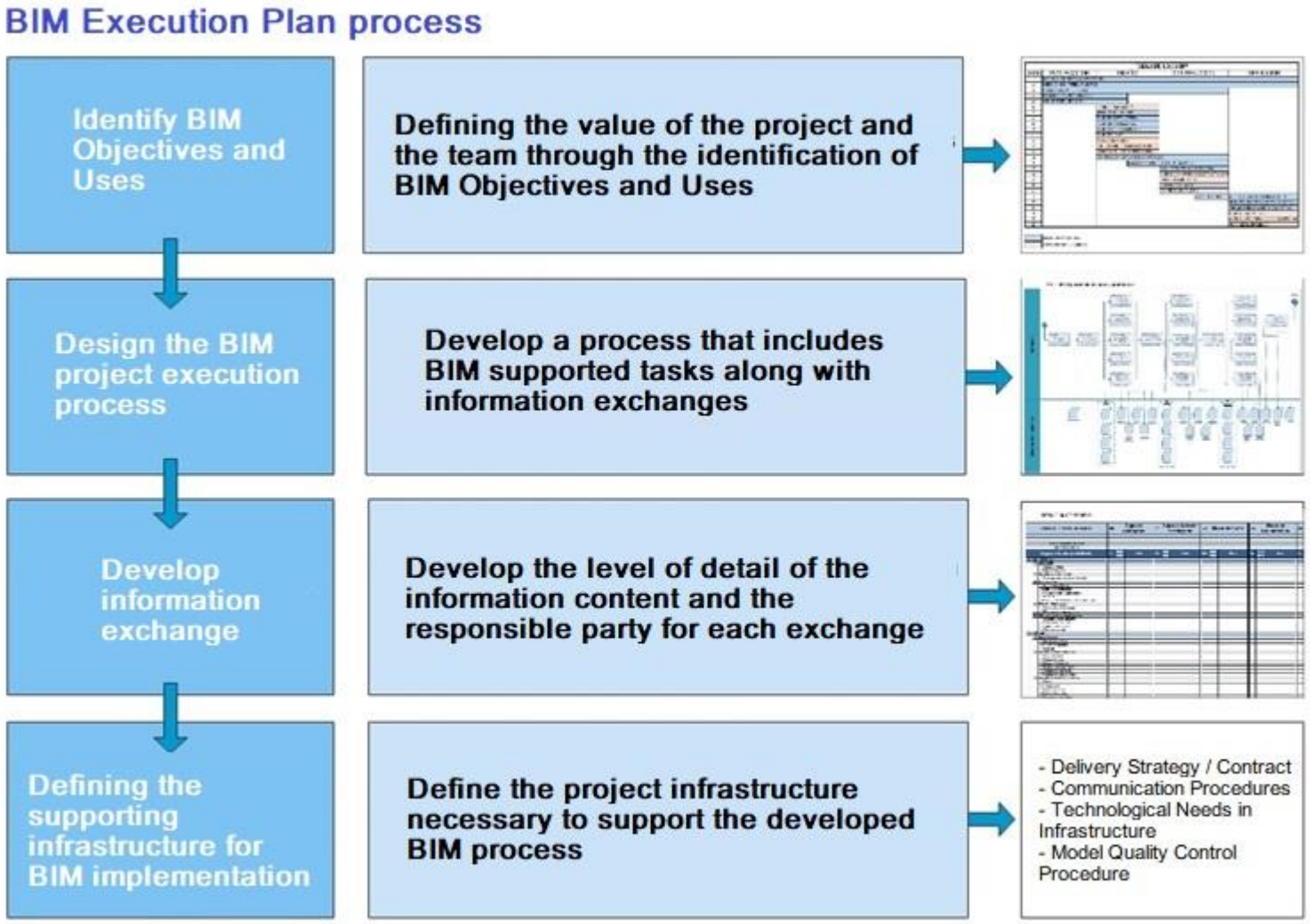
- Objetives
- Roles and responsabilities
- Processes
- Deliverables
- Timeline
- BIM quality management system
- Software and hardware



# BEP

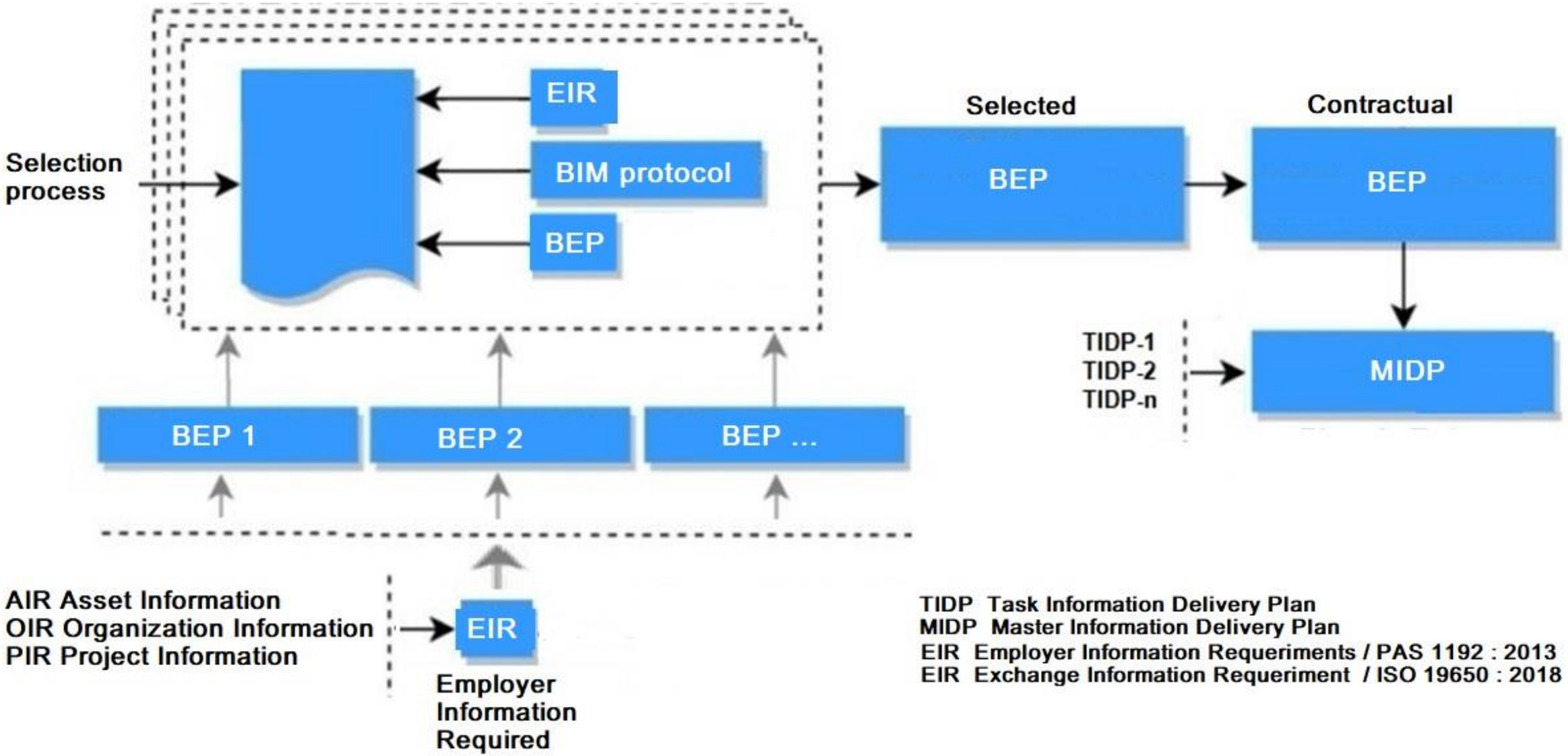
A BIM Execution Plan (BEP) is a valuable and necessary part of any construction project. One of the main reasons why the BEP is essential is that it ensures that all stakeholders involved in a project are collaborating and cooperating.

It is the document that defines the way in which the BIM methodology is applied in a project, developing the BIM objectives and uses, processes, tasks, information exchange protocols, necessary infrastructure and the roles/responsibilities of the different agents that participate in the process.

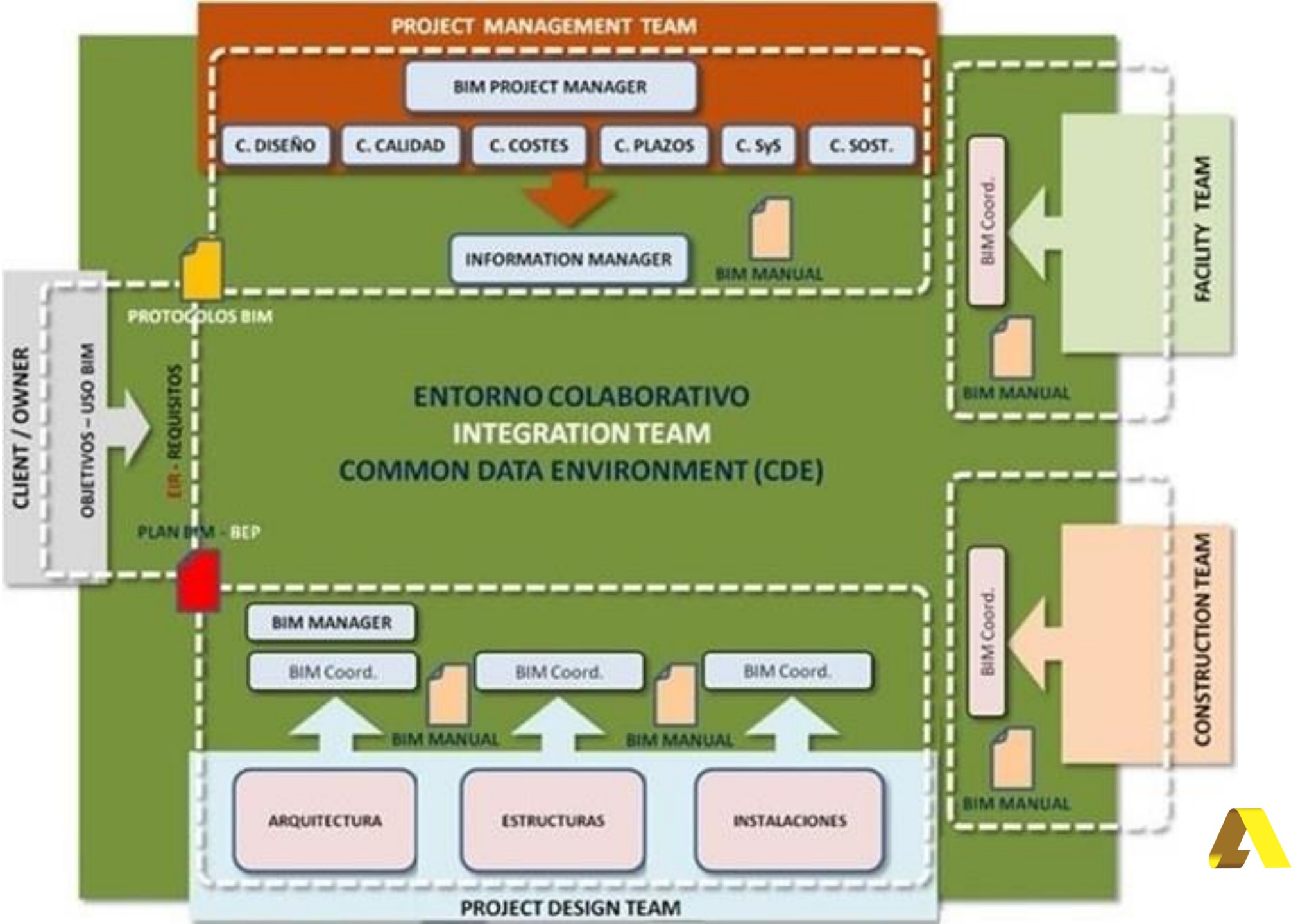


# BEP

## EIR > BEP > Selected > Contract > MIDP



# Collaborative Enviroment



# Advantages of BIM

## THE 10 ADVANTAGES OF BIM

1. REDUCTION OF DATA DUPLICATION
2. CONTROL OF INCONSISTENCIES BETWEEN DIFFERENT MODELS
3. OPTIMIZATION OF COSTS AND RESOURCES
4. AUTOMATIC UPDATE OF THE OVERALL MODEL
5. INTEROPERABILITY
6. BETTER COLLABORATION BETWEEN TEAMS
7. SHORTER PROJECT LIFECYCLES
8. IMPROVED FACILITY MANAGEMENT
9. SAFER CONSTRUCTIONS SITES
10. VISUALIZATION OF THE SUPERCHARGED PROJECT

# Advantages of BIM

## PRE-CONSTRUCTION

- Concept, feasibility and design
- Improved building performance and quality
- Improved organizational costs (ROI)
- Reduced uncertainty
- Collaborative work (BEP)
- Promoter, Designer, Constructor (CDE) collaboration

## DESIGN

- Earlier and more accurate visualizations of a design
- Automatic low-level corrections when changes are made to the design
- Generates accurate and consistent 2D drawings at any stage of the design
- Centralizes information (CDE)
- Detects incompatibilities (3D)
- Extracts cost estimates during the design stage (5D)
- Improves energy efficiency and sustainability (6D)

# Advantages of BIM

## Construction and Manufacturing

- Synchronize Design and Construction Planning
- Discover design errors and omissions before construction(Collision Detection)
- React quickly to design or site issues
- Use the design model as a basis for manufactured components
- Best Implementation and Construction Techniques.
- Synchronize procurement with design and construction

## Pos-Construction

- Manage and operate facilities better
- Integration with facility management and operation systems

## Note

- From an institutional point of view, the use of the BIM methodology is a facilitator of a sustainable construction and building policy and of the efficiency of public spending.

# BIM Benefits


## Design Phase:

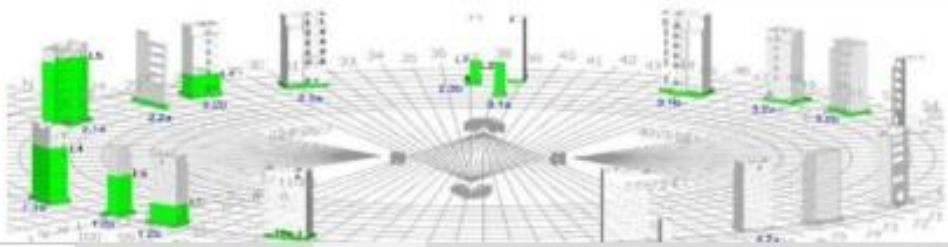
- Virtual view of the building (3D)
- Design Review processes (3D)
- Clash detection for services (3D)
- Time planning (4D)
- Cost planning (5D)

## Construction Phase:

- Buildability (3D+4D)
- Laser set-out (3D)
- Clash detection (3D)
- Schedule based clash detections (4D)
- Quality Assurance (3D)
- Time planning (4D)
- Safety (3D)
- Quantities 5D

## Maintenance and Operations Phase:

- As-built information (3D + 6D)
- Asset barcoding and ID tracking (3D + 6D)
- Linked systems and documentation (3D + 6D)



# BIM y sus Beneficios

## + Benefits

- Shorter resolution times for incompatibilities.
- Computations obtained directly from the Model (5D).
- Comparative for Bidding (BEP).
- Virtual tour and visualization of the Design (3D).
- Value engineering Visualization for construction management (3D).
- Integration with Lean Construction for planning and programming (9D).
- Control of progress of valuations (5D).
- Accurate plans and documents for construction.
- Reduces construction cost (5D).
- Active bar code and identification tracking (3D+6D).
- Linked systems and documentation (3D+6D).

# What advantages does BIM bring me.?

Has increased your ability to participate in the design process



Produce better construction documents

Has improved his ability to plan construction



Has your ability to manage the scope of the project

Increase your ability to understand design

# BIM Adoption, Implementation e Implantation

**BIM ADOPTION:** “The action of acquiring, becoming affiliated with or taking as one’s own”. The information, experiences, methodologies, technologies and **standards to implement BIM.**

**BIM IMPLEMENTATION** refers to the set of activities undertaken by an organizational unit to prepare for, deploy or improve its BIM deliverables (products) and their related workflows (processes). BIM implementation is made of three phases: **BIM Readiness**, **BIM Capability**, and **BIM Maturity.**

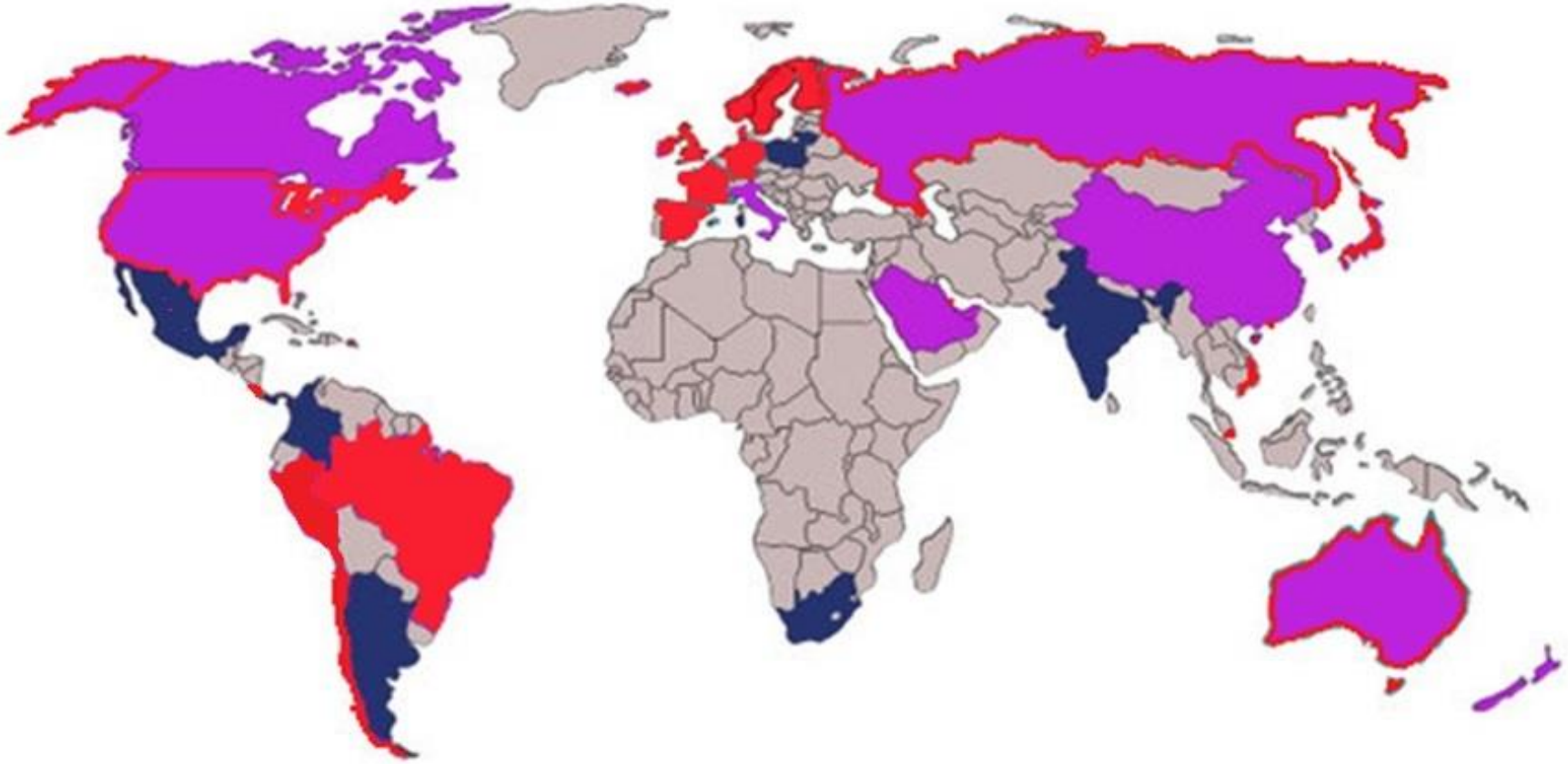
“Action of establishing something new in its place”. Once the Implementation phases are completed, the implementation schedules of the methodology are established in all new projects and constructions. According to the cost, volume and importance, PUBLIC OR PRIVATE. This Implementation will be supported by REGULATIONS, ORDINANCES and LAWS; Regional, National.
A REGIONAL AND NATIONAL **BIM PLAN** is established.

La ISO 19650 : Estandarización de términos y procesos en la **Implementación**.

**BIM IMPLANTATION:** “Action of establishing something new in its place”. Once the Implementation phases are completed, the implementation schedules of the methodology are established in all new projects and constructions. According to the cost, volume and importance, PUBLIC OR PRIVATE. This Implementation will be supported by **REGULATIONS, ORDINANCES and LAWS;** Regional, National.
A REGIONAL AND NATIONAL **BIM PLAN** is established.

https://bimdictionary.com

# BIM Implementation in the World



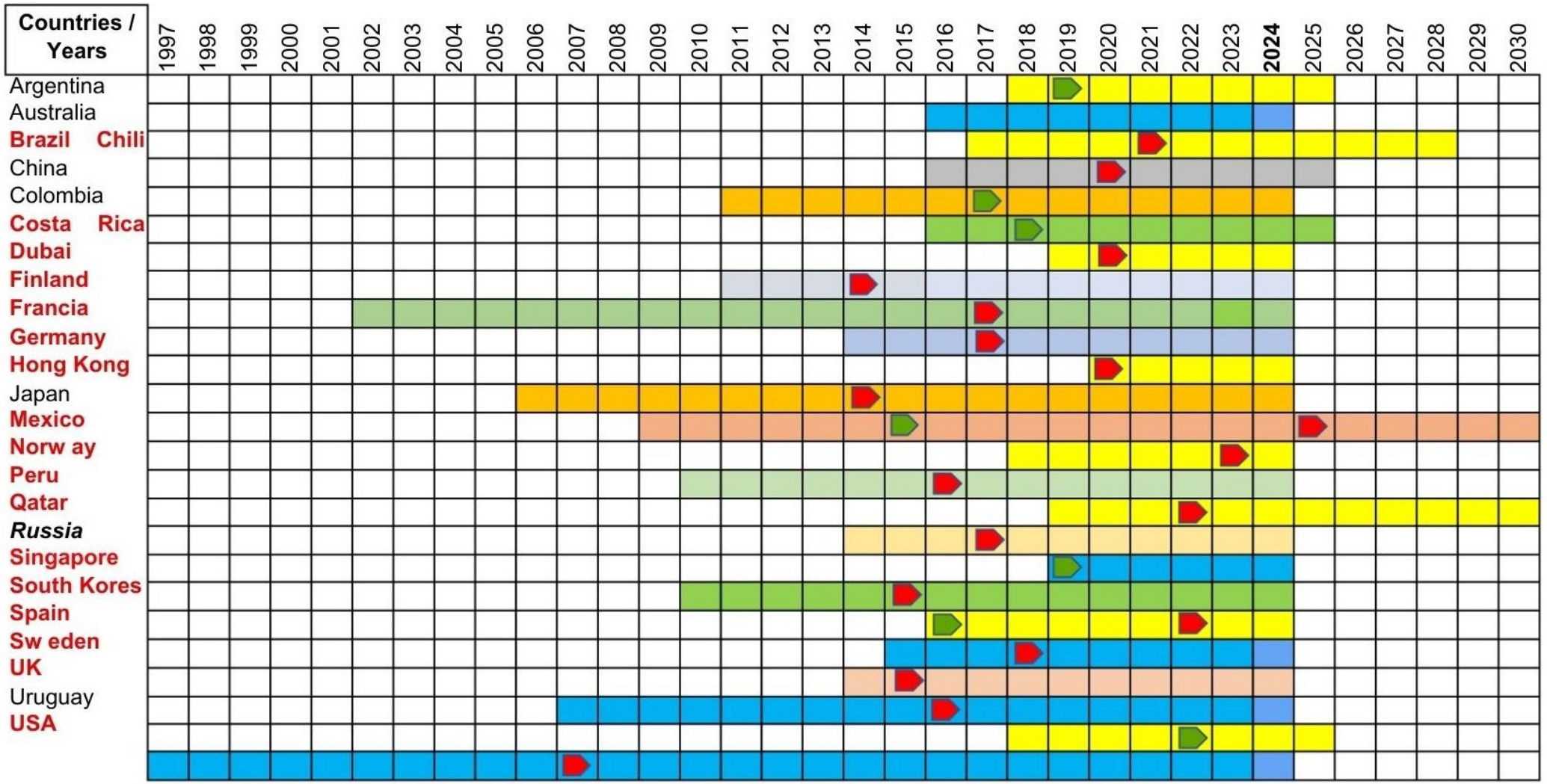
Over the last decade, the BIM methodology has been progressively implemented in different countries, and for some of them it has been a priority objective for their Public Administrations, which have imposed or valued its use in public works.

**Mandatory use of BIM in public projects**

**Common use of BIM**

**Emerging use of BIM**

# BIM Implementation, Promoted and Mandatory Use




Note: = Mandatory use of BIM in publicly funded projects from this date.

= The use of BIM is beginning to be promoted

# ROI

Formula

ROI can refer to Return on Investment or Release of Information.

**Return on Investment (ROI)**

- A financial ratio that compares the profit of an investment to its cost
- A popular way to measure the attractiveness of an investment
- Typically expressed as a percentage
- Calculated by dividing the net profit by the initial investment cost

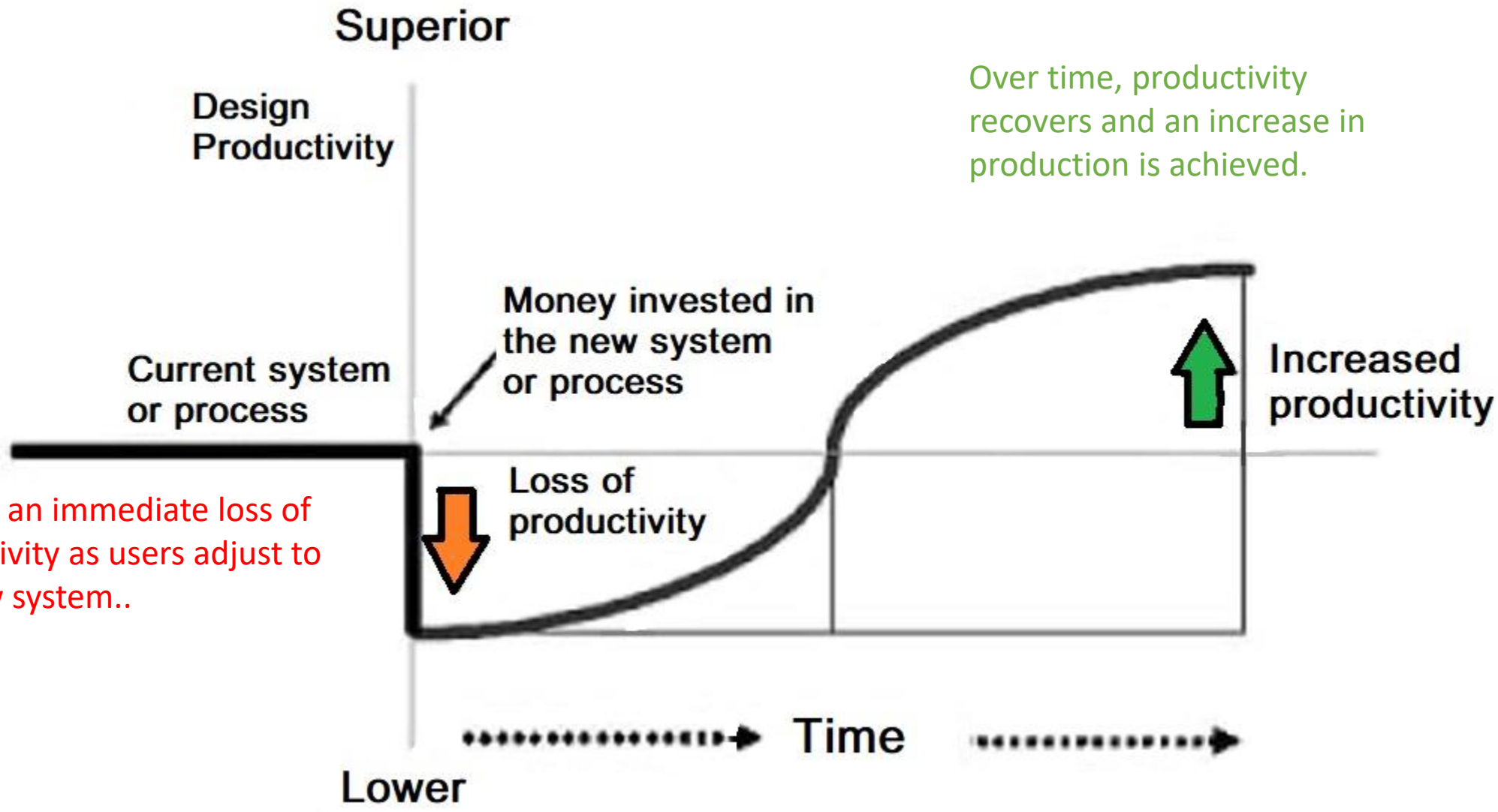
**How to calculate ROI**

- For example, if an investment costs $100 and makes a profit of $100, the ROI is 1 or 100%
- ROI can be used to compare investments and determine if they are making efficient choices

$$ROI = \frac{\text{Income - expenses}}{\text{Total Investment}} \times 100\%$$

# ROI

S-Curve



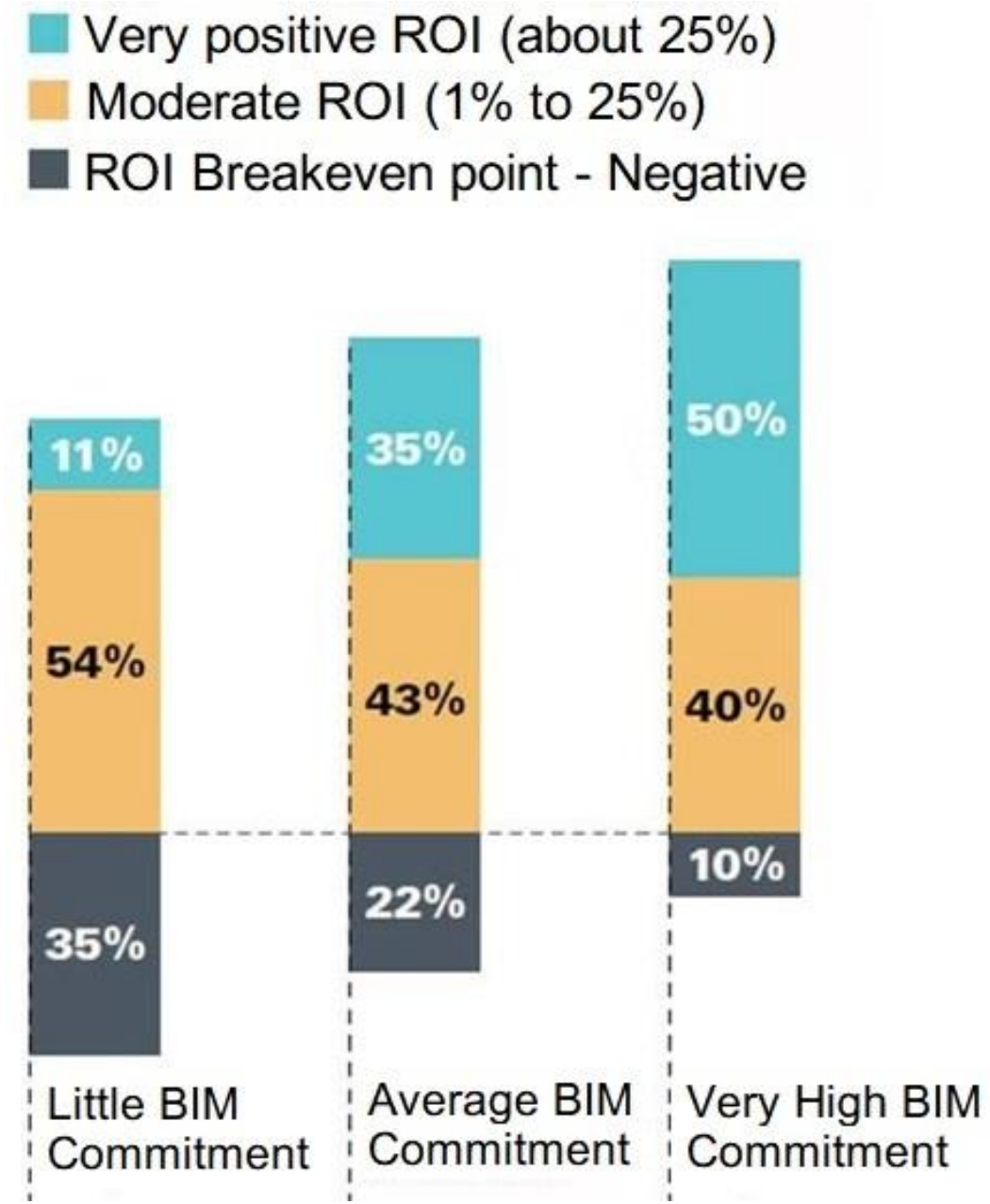

Over time, productivity recovers and an increase in production is achieved.

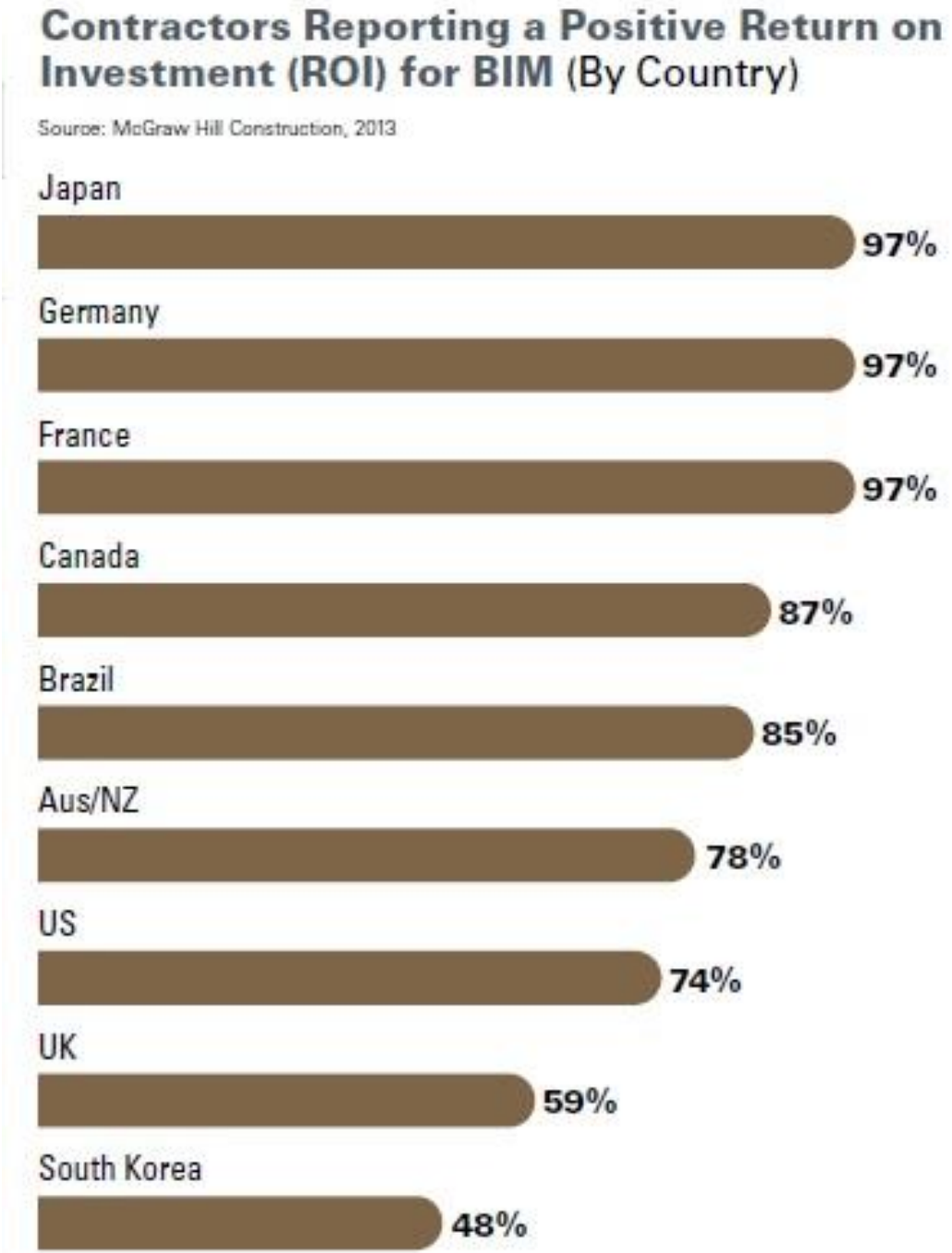
There is an immediate loss of productivity as users adjust to the new system..

NIBS-US highlighted that thanks to BIM the following was achieved:

- 5% reduction in the final cost of construction
- 5% increase in the speed of completion of the work
- 25% increase in productivity in the AEC sector25% reduction in the workforce used

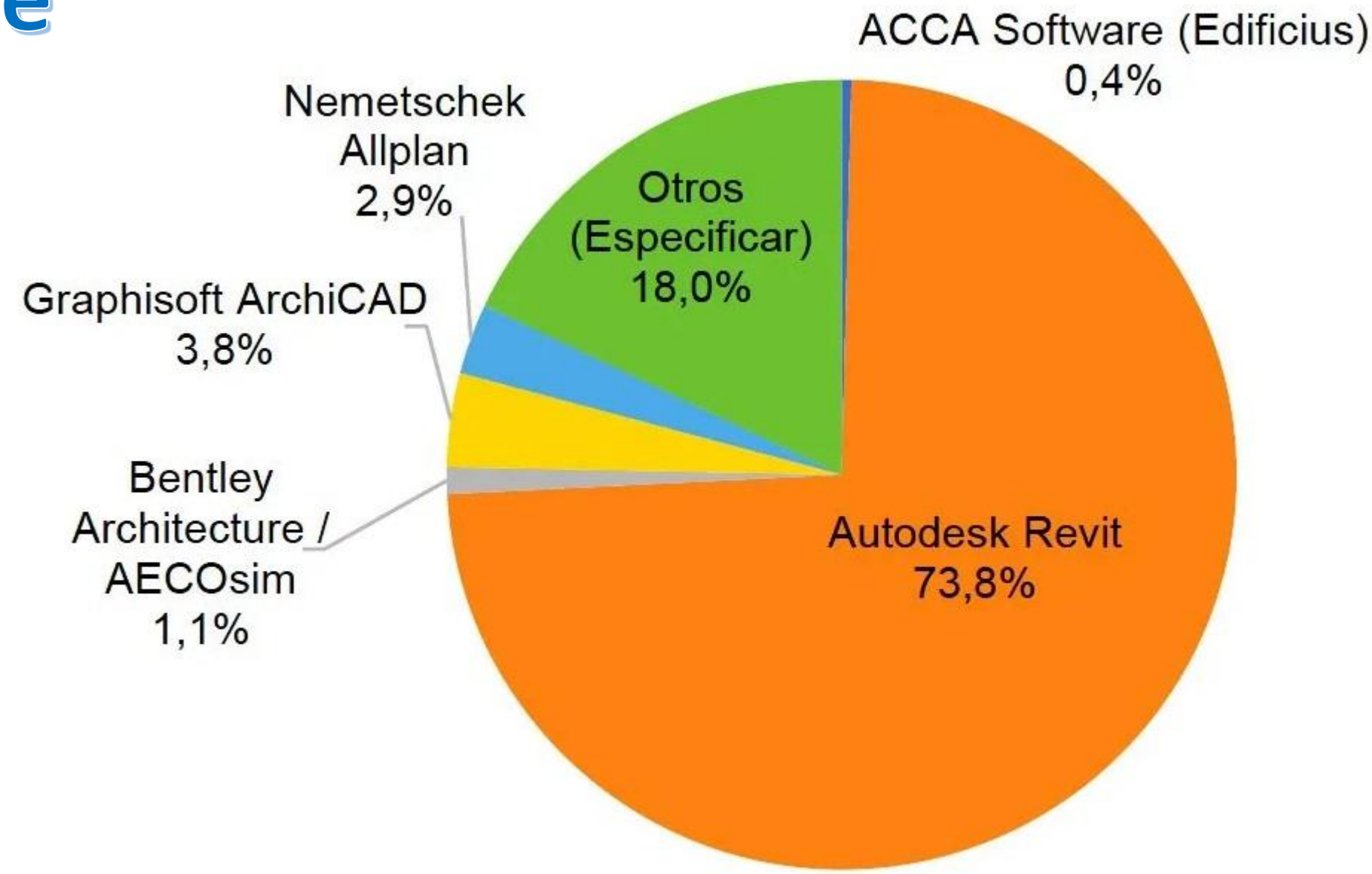
# ROI


Very positive ROI (about 25%)
Moderate ROI (1% to 25%)
ROI Breakeven point - Negative
11%
54%
35%
35%
43%
22%
50%
40%
10%
Little BIM Commitment
Average BIM Commitment
Very High BIM Commitment

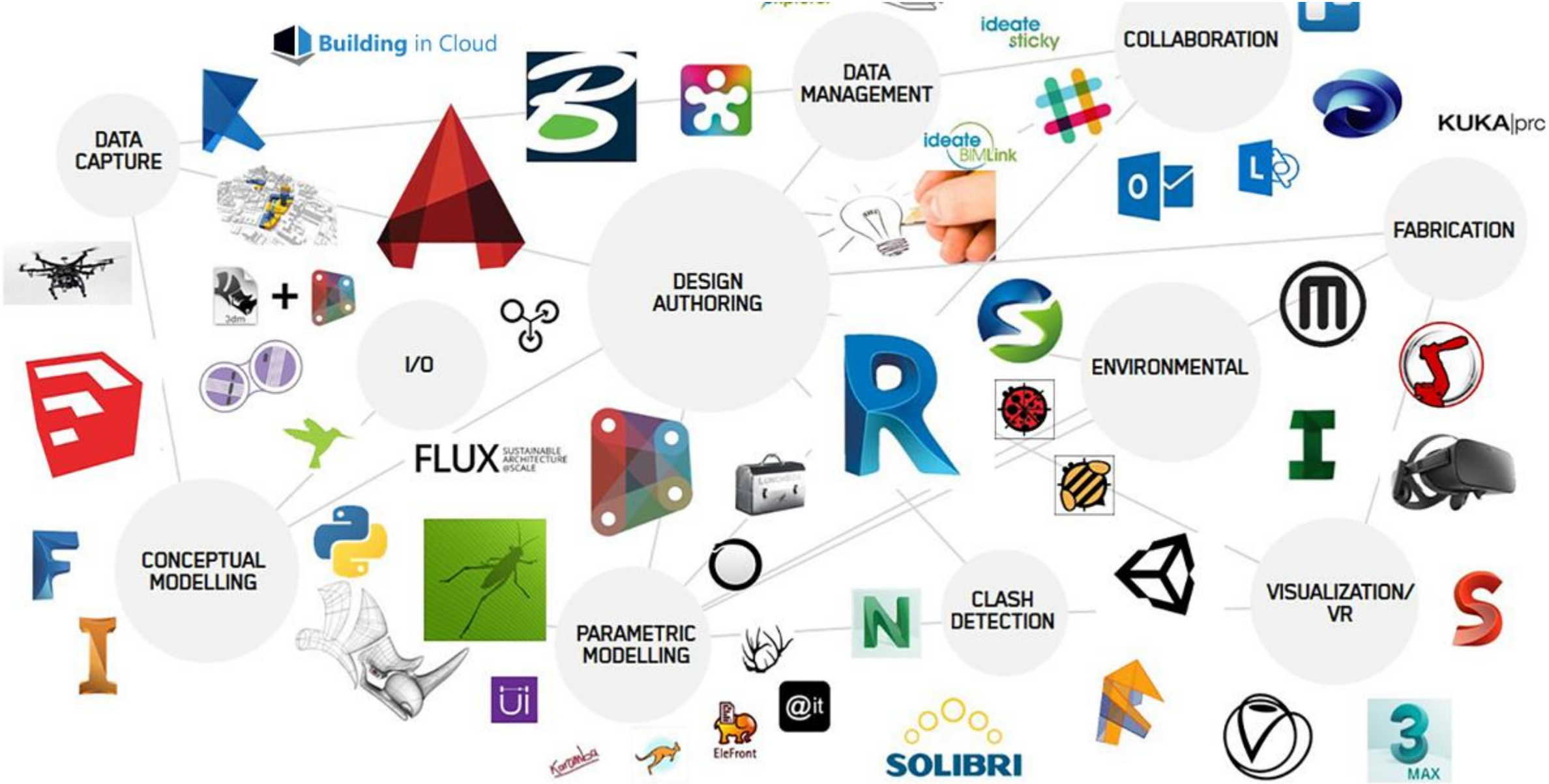

Contractors Reporting a Positive Return on Investment (ROI) for BIM (By Country)
Source: McGraw Hill Construction, 2013
Japan 97%
Germany 97%
France 97%
Canada 87%
Brazil 85%
Aus/NZ 78%
US 74%
UK 59%
South Korea 48%

# Software

18% use other programs for production, project and/or construction management. The most commonly used: Project Office, Word, Excell, Naviswork, Synchro, Tekla Solibri, Various viewer, Enscape…



# Software


Building in Cloud
DATA CAPTURE
DATA MANAGEMENT
COLLABORATION
ideate sticky
ideate BIMLink
KUKA|prc
DESIGN AUTHORING
FABRICATION
I/O
ENVIRONMENTAL
FLUX
SUSTAINABLE ARCHITECTURE @SCALE
CONCEPTUAL MODELLING
PARAMETRIC MODELLING
CLASH DETECTION
VISUALIZATION/ VR
SOLIBRI
EleFront
MAX

# Software

### Design BIM_3D

- Autodesk, **Revit**
- Graphisoft, **ArchiCAD**
- Bently, **AECOsim**
- Nemetschek, **ALLPLAN**
- ACCA, **Edificius**
- AsuniCAD, **VisualARQ**
- Vectorworks, **Vectorworks**
- Bricsys, **BricsCAD BIM**
- Bently, **MicroStation**
- Autodesk, **Civil 3D**

### Planning BIM_4D

- Autodesk, **Navisworks**
- Bentley, **Synchro**
- **TCQi**
- Microsoft, **Project**
- Asta, **Powerproject**
- Hyper, **Hyper Plan**
- Microsoft, **PPM Express**
- Construsoft, **Vico Office**

### Cost Management BIM_5D

- Clubdeinnovacion, **Qwikcost**
- Apvsoftware, **APV Control de Obras**
- DataLaing, **MaPreX**
- Lulo, **LuloWinNG**
- IP-3, **IP3-Control de Obras**
- Oracle, **Primavera**
- Cost it, **Presto**
- Cype, **Arquimides**

# Software

**Energy efficiency calculation/analysis, BIM_6D**

- CYPECAD MEP, **MEP**
- DDS – CAD, **DDS-CAD**
- Design Builder, **DesignBuilder**
- Therm, **Therm**
- Graphisoft, **Ecodesigner**
- Autodesk, Insight 360
- MSC Software, **Nastra**
- Autodesk, **Green Building Studio** in Cloud
- Trimble Connect
- Sefaria
- Hevacomp

**Facility Management, BIM_7D**

- Allplan, **Allplan Allfa**
- Archibus, **Archibus**
- Archidata, **Archidata**
- Archi FM, **ArchiFM**
- Autodesk, **Building OPS**
- Bently, **Bently Facility**
- YouBIM, **YouBIM**
- Daluxk, **DALUX**
- Drofus, **dRofus**
- Ecodomus, **ecodomus**
- IBM Tririga, **Tririga**
- Interact, **FM Systems**
- Onuma System, **Onuma System**

# Software

### Process Design

- Microsoft, **Visio**
- Xmind, **Xmind**
- Ywork, **yEd Graph Editor**
- Smartdraw, **Smartdraw**

### Web Enviroment

- Trello, **Trello**
- Wrike, **Wrike**
- Tomsplanner, **Tomsplanner**
- MeisterTask, **MeisterTask**

### Common Data Enviroment (CDE)

- Dropbox, **Dropbox**
- Google, **Google Drive**
- OneDrive, **OneDrive**
- **Autodesk** Construction Cloud
- FTP, **FTP**
- VPN, **Hamachi**

### Interference Detection

- Autodesk, **Naviswork**
- Nemestchek, **Solibri**
- Kubus, **Bimcollab**
- Bentley, **Navigator**
- Tekla, **BIMsight**

### (CDEA) Advanced CDE

- Aconex, **Aconex**
- Bently, **ProjectWise**
- Bently, **ProjectWise**, **Connect**
- EN-GB, **4Projects**
- Nemetschek, **Allplan BIM+**
- Graphisoft, **Graphisoft BIM Cloud**
- Trimble, **Trimble Connect**
- Autodesk, **Construction Cloud**
- Autodesk, **Revit Server**
- Kubus, **Bimcollab**
- Procore, **Procore**

# Software

### IFC Viewers

- BIM Vision 64
- UsBIM.viewer
- IFC BIM browserer
- FZXViewer
- Dalux BIM Viewer+
- Solibri Anywhere
- Autodesk Viewer
- Xbim Xplorer
- BIMcollab ZOOM
- Trimble Connect
- Openifc Viewer
- Edificius v.BIM 3
- BIMx Desktop Viewer

### Structural

- Autodesk, **Robot Structural**
- Midas
- Tekla
- Autodesk, **Advance steel**
- Cype, **CYPECAD/MEP**
- Tricalc, **Trical.7**
- SAP 2000, **SAP 2000**

### Diseño Civil

- Bentley, **Inroad**
- Bentley, **Geopak**
- Autodesk, **Civil 3D**

### Others

- Revizto – BIM Collaboratte
- Sketchup – Modeling 3D
- Buildertrend – Construction and Remodeling
- Trimble Connect – Exchange of Information
- Sefaria – Energy Analysis
- Hevacomp – Energy Analysis
- Kreo – Advantage of AI
- Procore – Construction Management
- Tekla BIMsight - Procore – Const. Management
- Bexel – Construction Management
- Primus IFC – Automatic Invoices

# MAIN USES OF BIM

**91%**

## Display

Parametric Modeling
Augmented Reality
Virtual Reality

**80%**

## Clash Detection

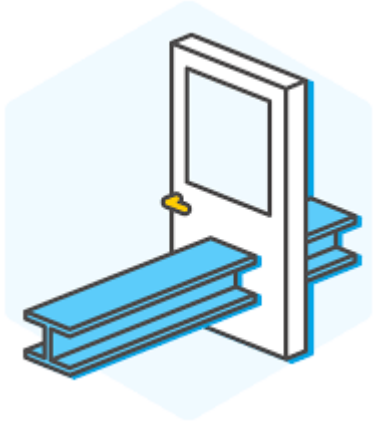
Common Data Environment
MEP/Structure
Simulations

**57%**

## Performance Analysis

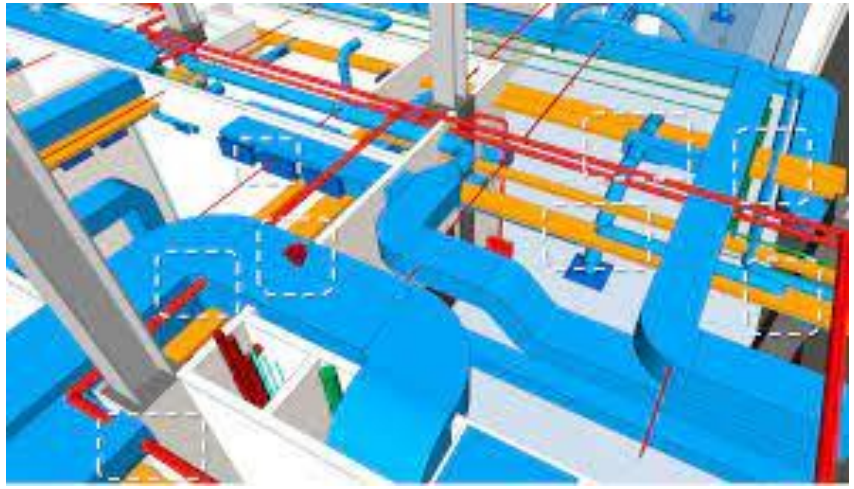
Planning and Costs
Logistics
ROI

# Interference Detection



**Clash Detection:**

- Autodesk, **Naviswork**
- Nemestchek, **Solibri**
- Kubus, **Bimcollab**
- Bentley, **Navigator**
- Tekla, **BIMsight**



CLASH MATRIX

| | ARCHITECTURAL | STRUCTURAL | HVAC | PLUMBING | ELECTRICAL |
|---|---|---|---|---|---|
| ARCHITECTURAL | 1 | 3 | 5 | 10 | 12 |
| STRUCTURAL | | 2 | 6 | 8 | 13 |
| HVAC | | | 4 | 9 | 14 |
| PLUMBING | | | | 7 | 15 |
| ELECTRICAL | | | | | 11 |

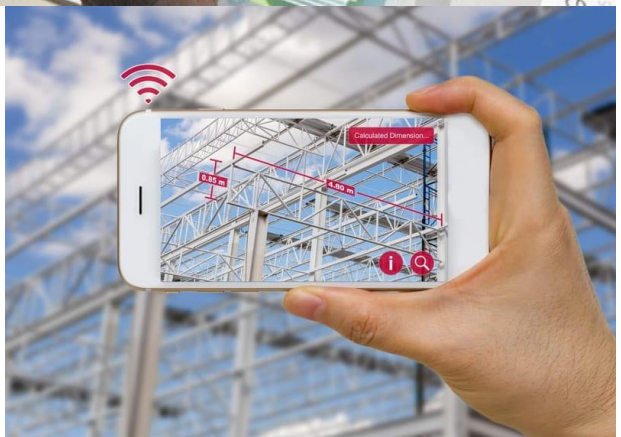
# o Collision

# Virtual Technology

**Virtual reality (VR)** is a computer-generated environment that simulates reality, allowing users to feel inmersed in a 3D space. VR is often experience through a headset or helmet.

**Augmented reality (AR)** is an interactive experience that enhances the real world computer-generated perceptual information. AR can enhance the user's experience by overlaying digital information onto the real world.

**Mixed reality (MR)**, is a term used to describe the merging of a real-world enviroment and computer-geneeated one.



# Software

- Enscape, **Enscape**
- Unity, **Unity**
- IrisVR

- Morpholio AR, **Sketchwalk**
- DAQRI, **Smart Helmet**

- Google, **ARCore**
- Windows, **Mixed Reality**
- Apple, **ARKit**
- Unity, **Unity 3D**

# Virtual Technology

**Extended Reality (XR)**
is an umbrella term for technologies that Blend the physical and virtual worlds. XR Includes virtual reality (VR), augmented reality (AR), and mixed reality (MR).

**Collaborative Virtual Reality (VR)**
is a technology that allows multiple users to interact in a virtual environment. This technology is also known as a collaborative virtual environment (CVE) or social VR.

**Semi-inmersiva virtual reality (VR)**
Is a partially virtual enviroment that blends the virtual and physical worlds. It's often used for training and education.

# Software

- Enscape, **Enscape**
- Unreal Engine
- Iris VR
- Storyboard VR
- Smart RealityStoryboard VR
- Lumion
- Twinmotion
- Fuzor

- Flight Simulador
- Elite
- Elaborado por fabricantes de aviones

# Virtual Technology

**3D Scanner, Point Cloud**

Point clouds are usually created with a three-dimensional laser scanner. This instrument automatically measures a large number of points on the surface of an object, and generates a data file with a point cloud. The point cloud represents the set of points that the device has measured.

**Topographic drone**

In the field of topography, **drones** are used to perform many functions, including the following: To carry out **topographic** surveys and make precise digital models of land, with any relief. To calculate volumes and movements of land.

**3D Printing**

3D printers, or additive manufacturing processes, employ machines that spin off thin layers of plastic, metal, cement and other materials and deposit them on top of each other, **producing three-dimensional objects** from the bottom up.

# Virtual Technology

**Digital Twin**

*The Digital Twin* is a virtual and dynamic replica of a real object, equipment, machinery, buildings, cities, modeled in 3D and VR, and connected to the data and management systems of the same, to which **data is incorporated in real time**, which can be captured through sensors or technology related to *Big Data*

Once this information is collected, it is processed with **Artificial Intelligence**, allowing for more efficient and optimized management in the twin's operation phase.

The digital model offers unparalleled capabilities for tracking, monitoring and diagnosing assets.

One of the main advantages is that it allows **problems to be detected in advance and resolved more quickly.**


# In this presentation we talk about:

- What is and what is not BIM.
- Old process, New process.
- Design Technology.
- Life Cycle.Dimensions.
- Maturity Levels.
- Development Levels.
- BIM and Value Engineering.Roles.
- CDE.
- Interoperability.
- Uses in BIM.Standards.
- Style Book.BIM Execution Plan (BEP).
- Collaborative Environment.
- BIM and its improvements.
- BIM and its advantages.
- BIM in Latin America.
- BIM in the World.
- Adoption, Implementation, Implantation.
- BIM Plan.
- ROI.
- Softwares and their uses.
- Main uses of BIM.
- Interferences or Collisions.
- Virtual, Augmented and Mixed Reality.
- Virtual Technology.
- What is BIM?

# What is BIM ?

- BIM (Building Information Modeling) is a collaborative work methodology for managing building or civil engineering projects through digital models. This digital model forms a large database that allows the elements that make up part of the infrastructure to be managed throughout its entire life cycle.

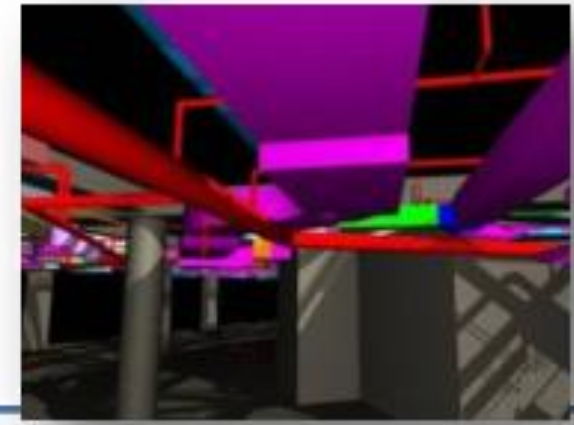
- From an institutional point of view, the use of the BIM methodology is a facilitator of a sustainable construction and building policy and of the efficiency of public spending.

# What is BIM ?

- It is a set of **methodologies**, technologies and **collaborative work** standards that allow the design, construction and operation of a building or infrastructure, **generating a virtual model** that contains all the relevant information about the asset and enables **management throughout its entire life cycle**.

- This **interoperability working method integrates all the agents involved in the building process**, architects, engineers, builders, developers, sustainability and maintenance managers, etc., and **establishes a transversal communication flow between them**.

- **BIM is modeling information to build virtually.**



## Building

# B

Residential
Commercial
Healthcare
Institutional
Sports
Entertainment

## Information

# I

Spatial
Elements
Systems
Quantities
Schedule
Operations

## Modeling

# M

Site
Architectural
Structural
MEP Systems
Sustainability
Management

Program-ming → Design → Pre construction → Construction → Operations → Demolition


BIM
information
data
Information
project
construction
Building
LOD
MIDP
time
aware
well
design
work
coordination
things
3D
wrong
ISO 12006
Modeling
2D
ISO
models
LOD
AECO
thermal
identifying
Modeling
BFC
process
require
IFC
concepts
systems
CAD
Burrell
gave
asset
facility
provides
future
electronic
experiences
integrated
less
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OIR
documentation
useful
communication
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ISO 19650
shared
spent
Lonely
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PassivHaus
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4D
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BREEAM
AdaptCBE
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# Thank you for your interest

## BIM PROJECTS AND CONSULTANCIES


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