

II CONGRESO INTERNACIONAL DE DERECHO DE LA CONSTRUCCIÓN

16 Y 17 DE OCTUBRE

IMPLEMENTACIÓN DE BIM A NIVEL NACIONAL

Tendencias y nivel de implementación de BIM en Chile, mandato nacional BIM 2020

Roberto Rojas G. – Gerente Desarrollo Negocios / Microgeo S.A.



Universidad de
los Andes

30 años



Roberto Rojas G.

Arquitecto Universidad de Chile
Magíster en Economía Energética - UTFSM
Gerente Desarrollo de Negocios

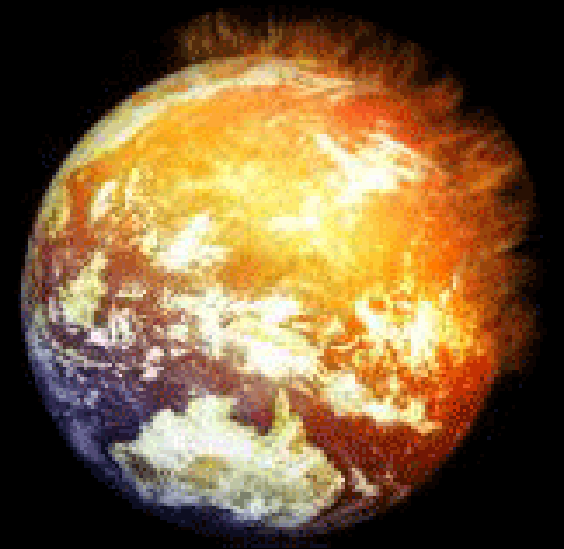


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30 años

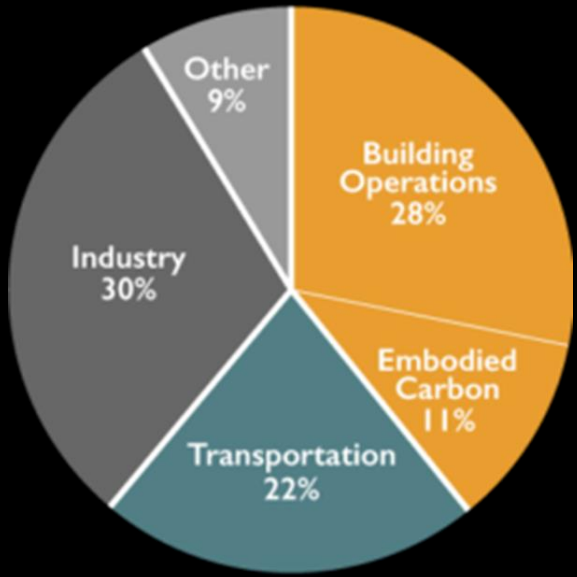


 **microgeo**®



Global Warming Warning

Emisiones Globales de CO2 por sector

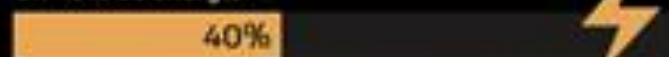


“Buildings use 40% of raw materials globally.”

World Economic Forum report on the Real Estate Industry

Actualmente nuestro entorno
construido utiliza a nivel mundial:

Un 40% de energía



Un 40% de emisiones de dióxido de carbono



Un 50% de recursos naturales

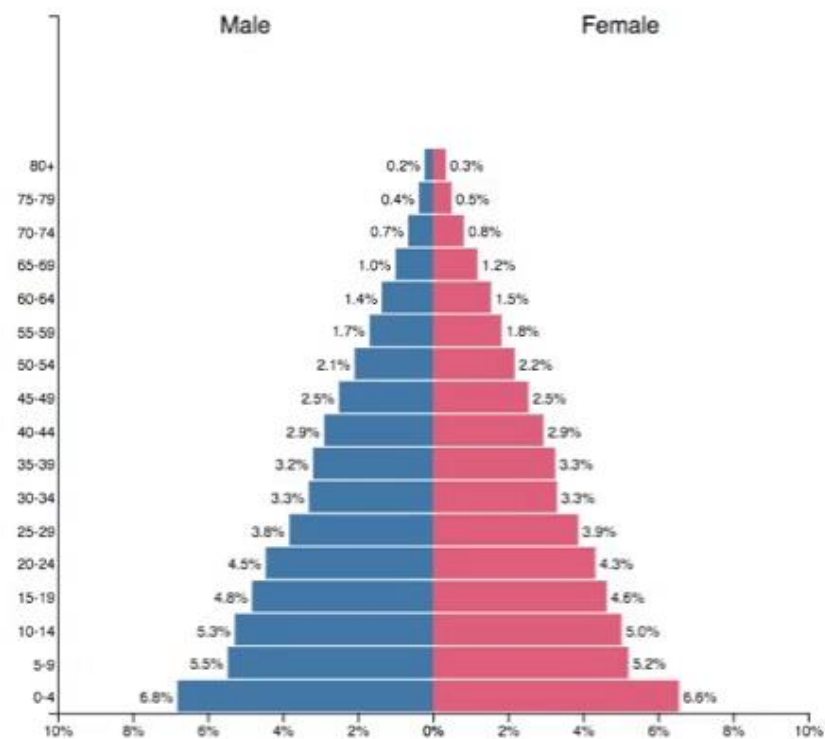


El perfil demográfico del mundo cambiará.

A 2050 se proyecta que la población mundial será de **9,1 BILLONES DE PERSONAS.**

WORLD ▼
1950

Population: 2,525,149,312



Más y nuevas **necesidades** de **infraestructura** y **servicios** para los jubilados y adultos mayores

Ageing and Health

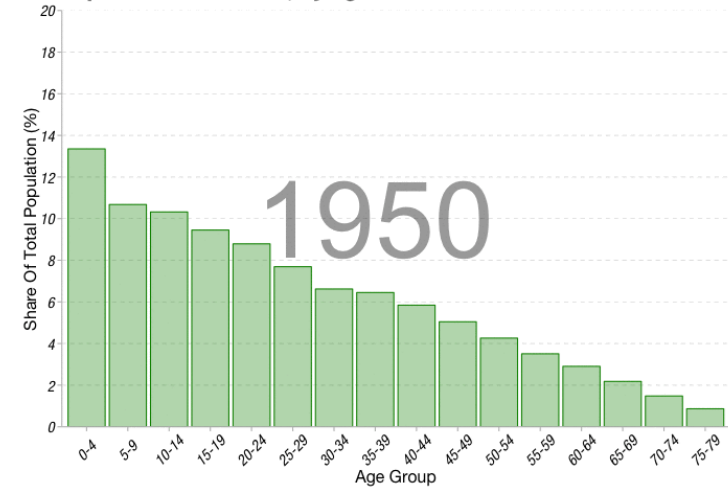
#yearsahead

People live on average 20 years longer than 50 years ago

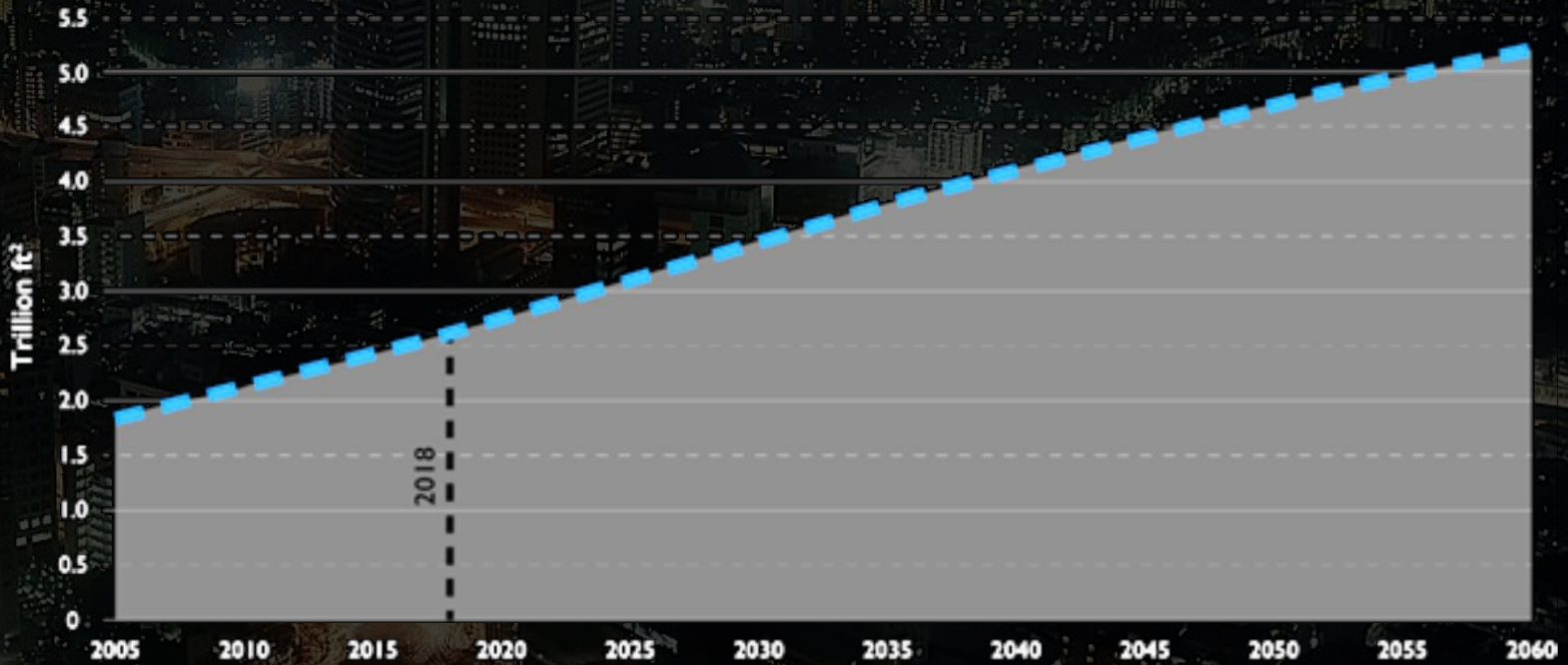
60 years



Population Breakdown, By Age: World



MEGA URBES



Global Floor Area Growth



THE EVOLUTION OF THE SHARING ECONOMY

The Sharing Economy was started by companies seeking an easy way to share goods and services. It's now a multi-faceted industry that touches on nearly every aspect of everyday life. The latest development?

Not simply sharing goods or services, but rather expertise.

Founded: 1995

Offering: **Online classified advertisements** for jobs, personals, for sale and wanted items, resumes and discussion forums.¹

Individual earnings vary.

Founded: 2008

Offering: Rentals of homes and apartments around the world, including 3,000 castles, 2,000 treehouses, 900 islands and 400 lighthouses.² Average host makes: **\$7,530** per year (New York City).³

Founded: 2008

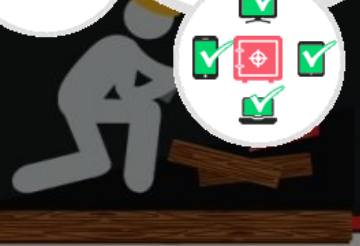
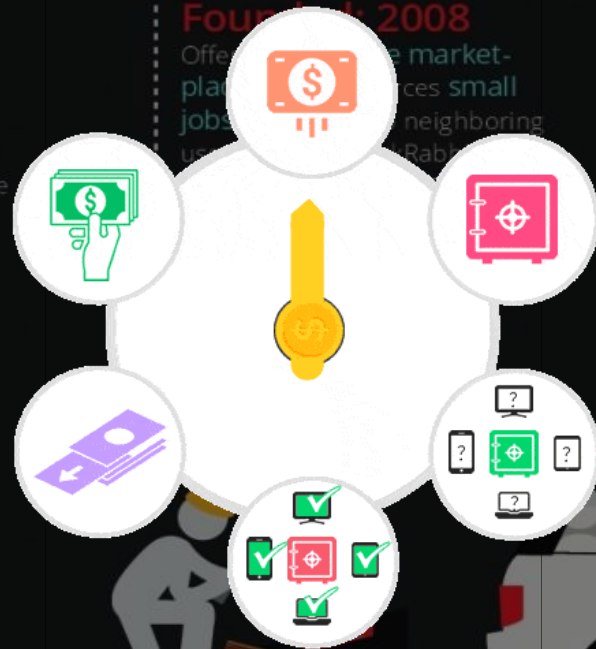
Offering: A market-places small jobs and neighboring users. Rabbits

Founded: 2009

Offering: An application that allows passengers to connect with drivers of vehicles for hire, and then track and pay for their rides, all from their smartphone. Drivers can make: **\$20-35** an hour.⁷

Founded: 2010

Offering: A global marketplace for learning and teaching online, enabling everyday experts to share their skills with the people who want them. **The average instructor earns \$7,000. Some have made more than a million dollars.**



GOODS

Craigslist

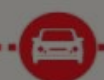


Airbnb



TaskRabbit

SERVICES



Uber

EXPERTISE



Udemy

TRANSFORMACIÓN DIGITAL



NO ES:

*Página web
App y RRSS
CRM
Big Data
Tecnología*

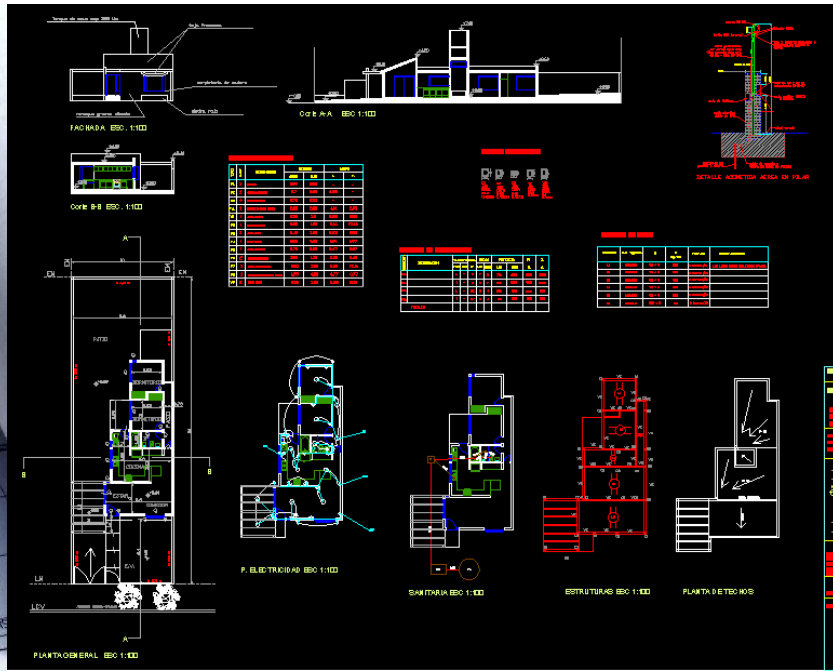
Digitalizar **NO** es
Transformación Digital



SI ES:

*Un cambio **Cultural y Estratégico** que afecta a toda la organización y a sus Stakeholders*

*Es el proceso de cambio, para competir con empresas **Nativas Digitales** que ponen al **Cliente en el Centro** de su organización y **simplifican** el trabajo*

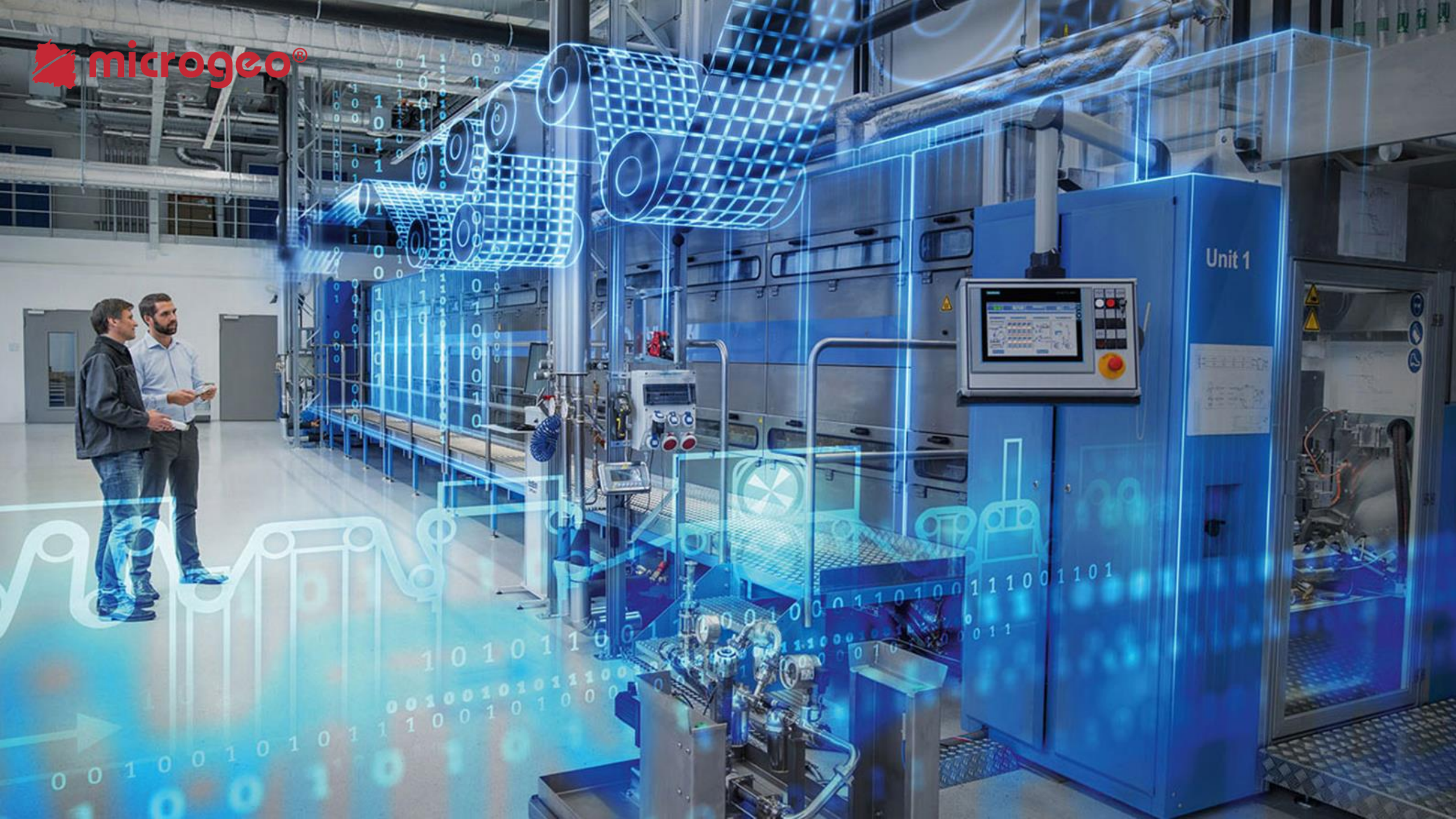


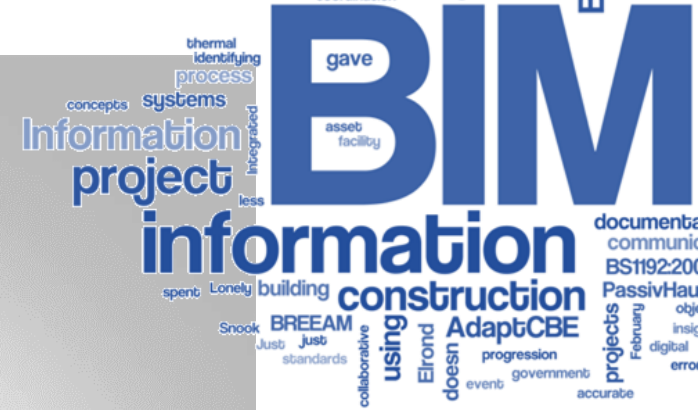


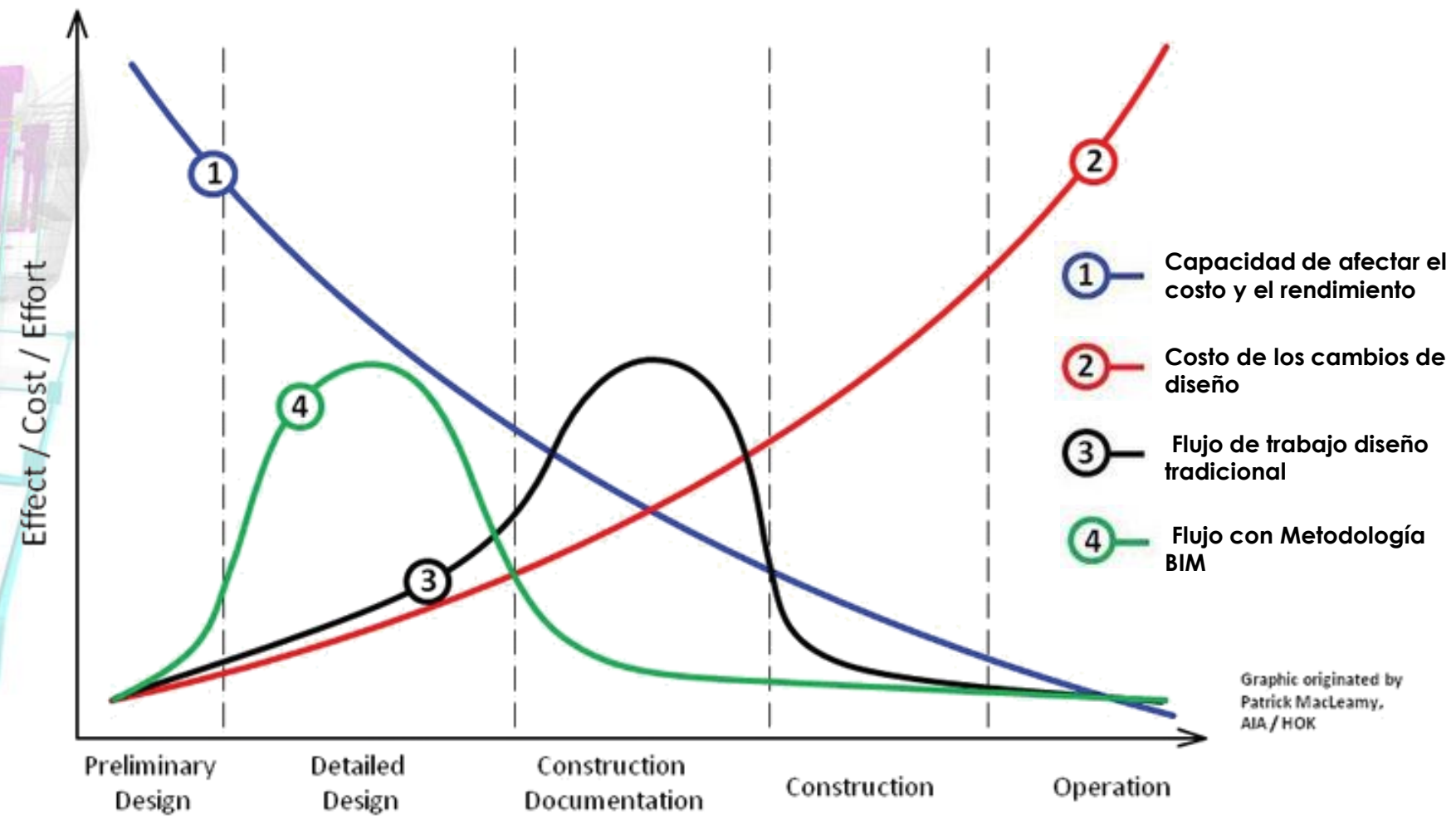
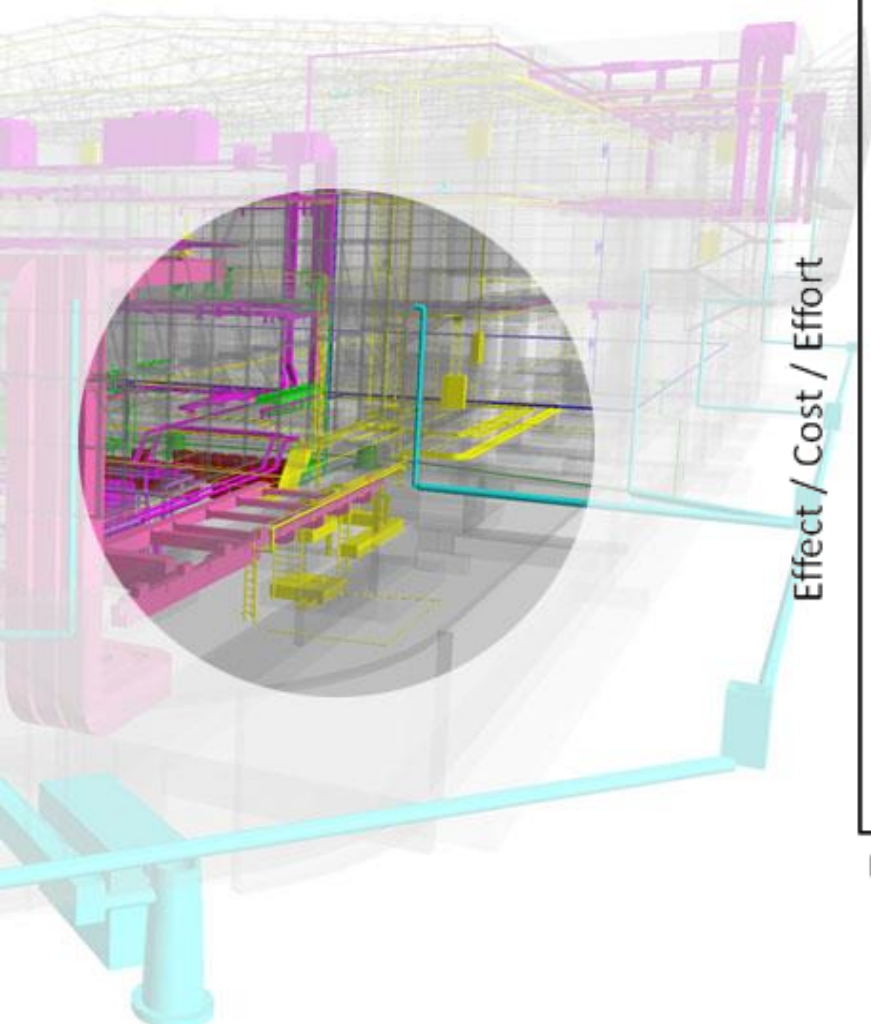




 microgeo®

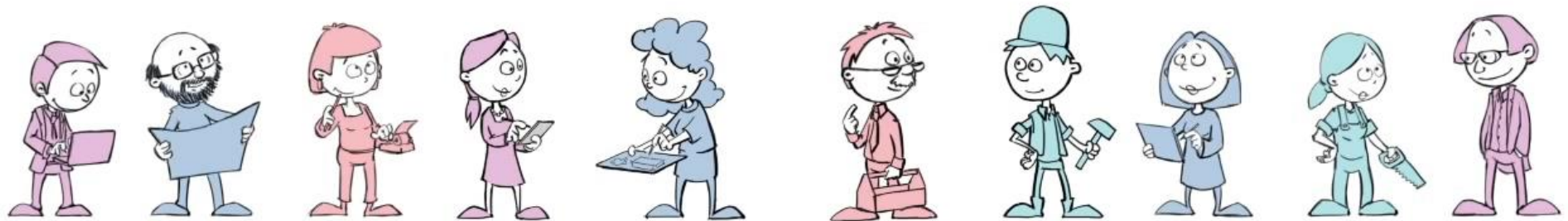


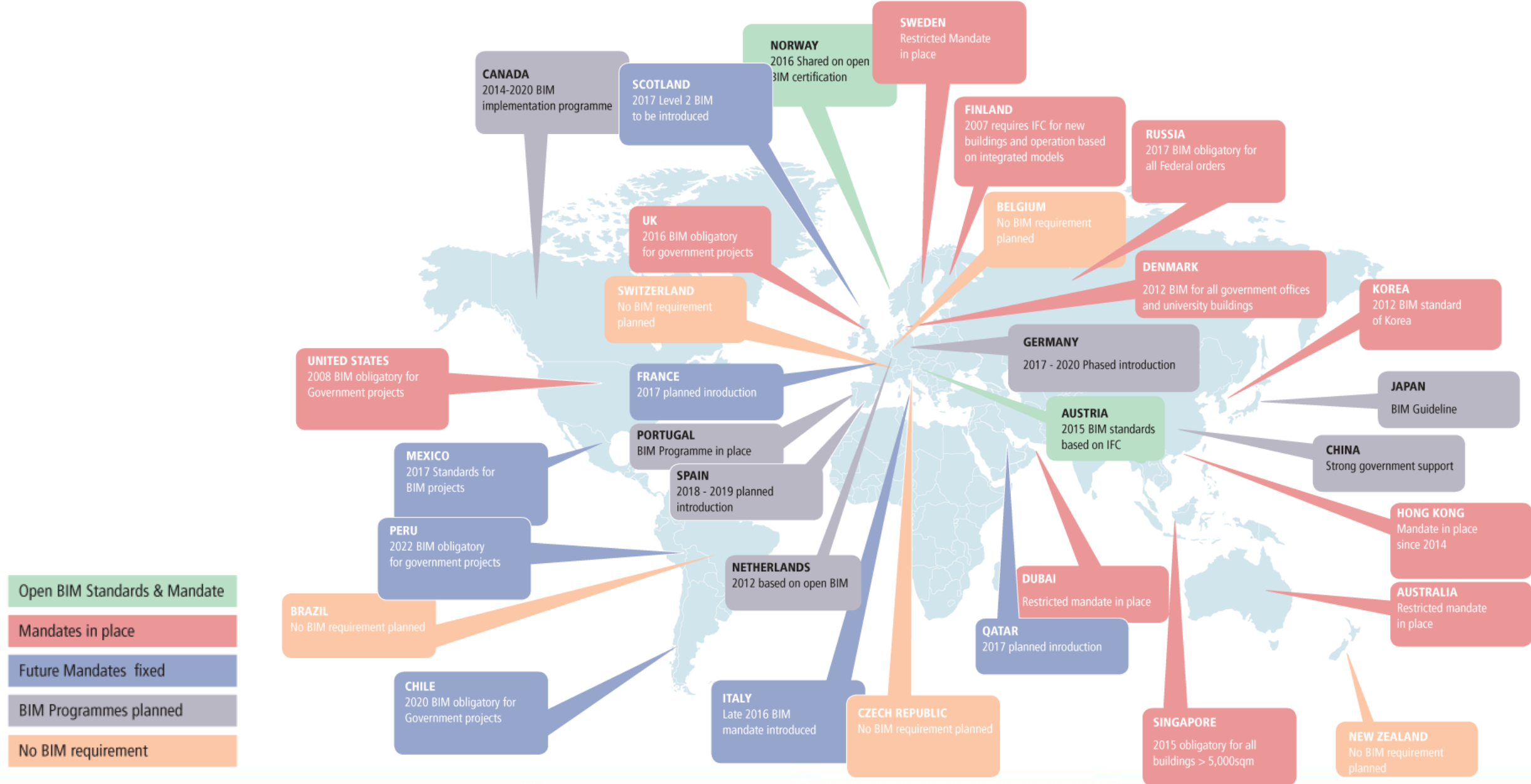




Graphic originated by Patrick MacLeamy, AIA/HOK

Fuente: Patrick MacLeamy, CEO de HOK (Hellmuth-Obata-Kassebaum)





CONSTRUYE 2025 - PLANBIM



Ministerio de Economía, Fomento y Turismo



Corporación de Fomento de la Producción



Transforma



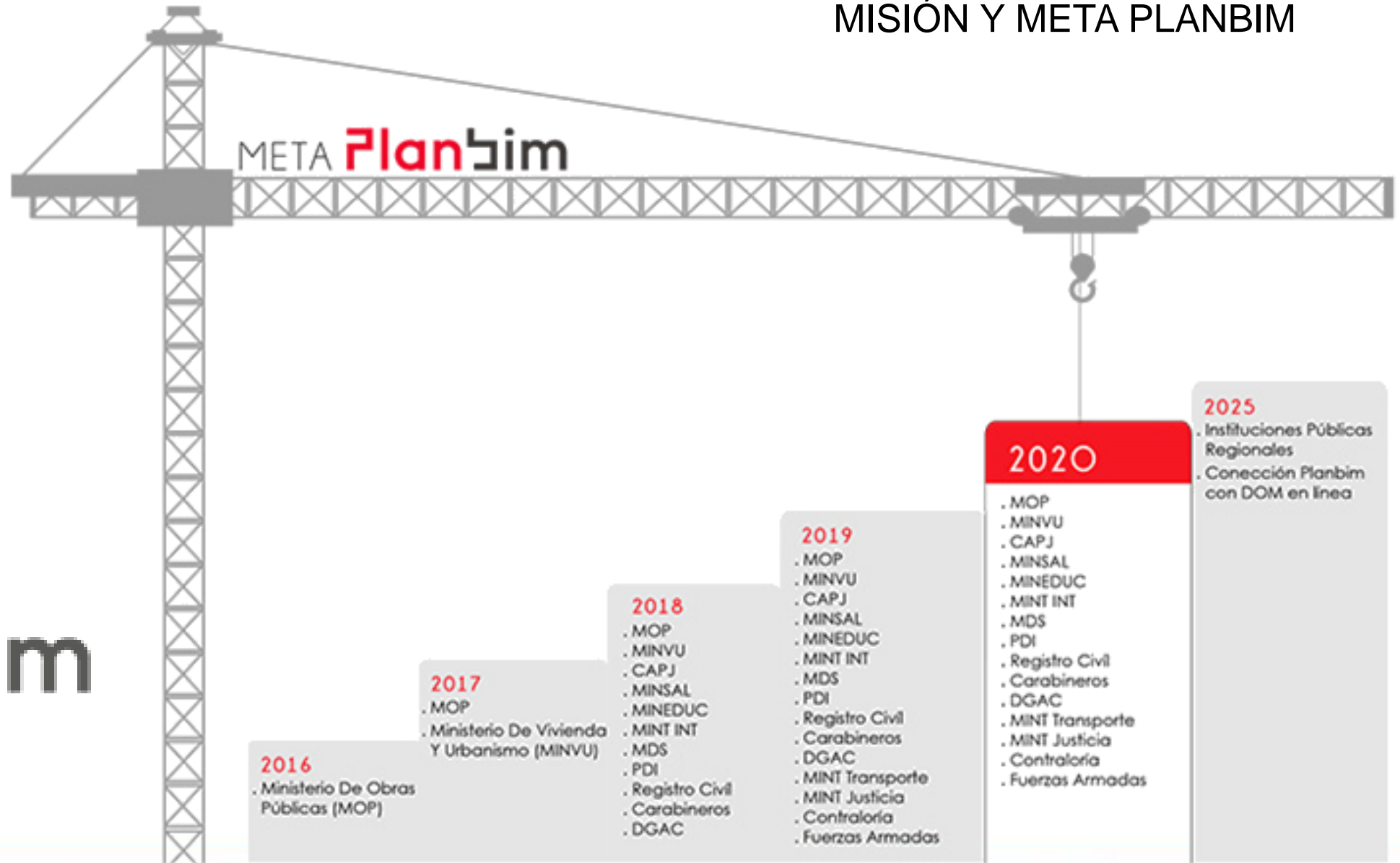
Construye 2025



Plan BIM



MISIÓN Y META PLANBIM



ESTANDAR
NACIONAL BIM

INDUSTRIA
NACIONAL
CHILENA



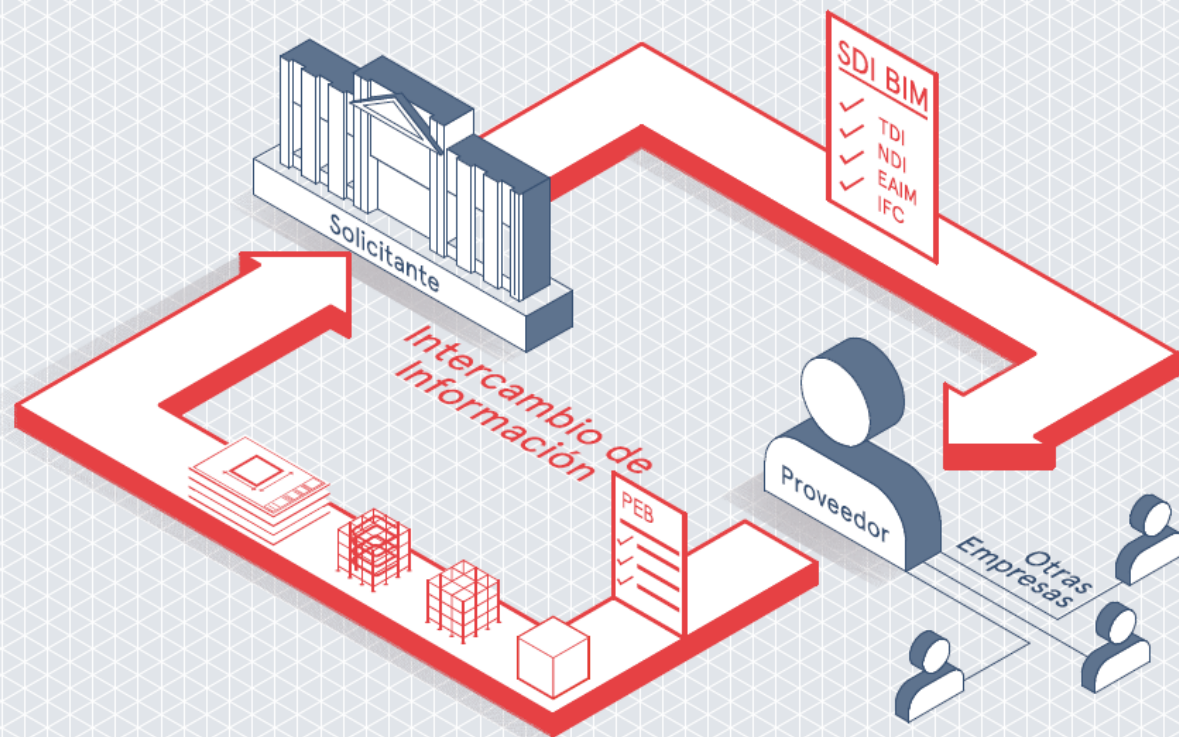


Figura 1. Ámbito de acción del estándar



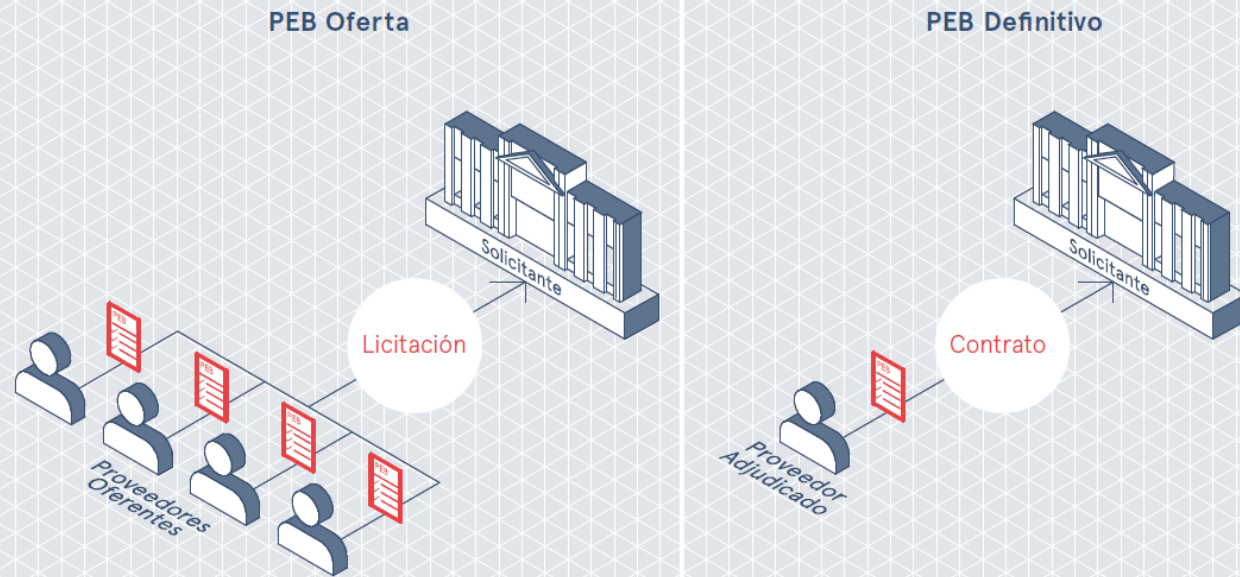




















Figura 2. Plan de Ejecución BIM de los Proveedores Oferentes y del Proveedor Adjudicado



| Modelos BIM | Entidades | | Ejcs (IfcGrid) | Terreno (IfcSite) | Elementos Civiles (IfcCivilElement) | Elementos Geográficos (IfcGeographicElement) | Fundaciones (IfcFooting) | Zonas / Espacios (IfcSpace-IfcZone) | Columnas (IfcColumn) | Vigas (IfcBeam) | Losas / Radler (IfcSlab) | Muros (IfcWall) | Muros Cortina (IfcCurtainWall) | Ventanas (IfcWindow) | Puertas (IfcDoor) | Cubiertas / Techumbre (IfcRoof) | Cielos Falsos / Acabados (IfcCovering) | Sistemas de Circulación / Escaleras / Rampas (IfcTransportElement - IfcStair - IfcRamp) | Equipos e Instalaciones (IfcSanitaryTerminal- IfcMedicalDevice- IfcLamp) | Muebles (IfcFurniture- IfcSystemFurnitureElement) | Estructuras Especiales (IfcElementAssembly) | Equipamiento y Tableros MEP (IfcEnergyConversionDevice - IfcDistributionControlElement) | Distribución y Tuberías MEP (IfcDistributionFlowElement) | |
|--|---|---|-------------------|----------------------|--|---|-----------------------------|--|-------------------------|--------------------|-----------------------------|--------------------|-----------------------------------|-------------------------|----------------------|------------------------------------|---|--|---|--|--|--|---|---|
| Sitio |  |  | | ● | * | * | * | ● | * | * | * | * | * | | | * | | | | | | | | |
| Volumétrico |  |  | | ● | * | * | | ● | | | | | | | | | | | | | | | | |
| Arquitectura o Diseño de Infraestructura |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Estructura |  |  | ● | ● | ● | | ● | | ● | ● | ● | ● | * | | | ● | | ● | | | | ● | | |
| MEP |  |  | ● | ● | | | | ● | | | | | | | | | | | | ● | | | ● | ● |
| Coordinación (**) |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | * | ● | ● | ● |
| Construcción (***) |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| As-Built |  |  | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| Operación |  |  | * | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | |

Usos BIM

Basada en Project Execution Planning Guide version 2.1, mayo 2011, Penn State University

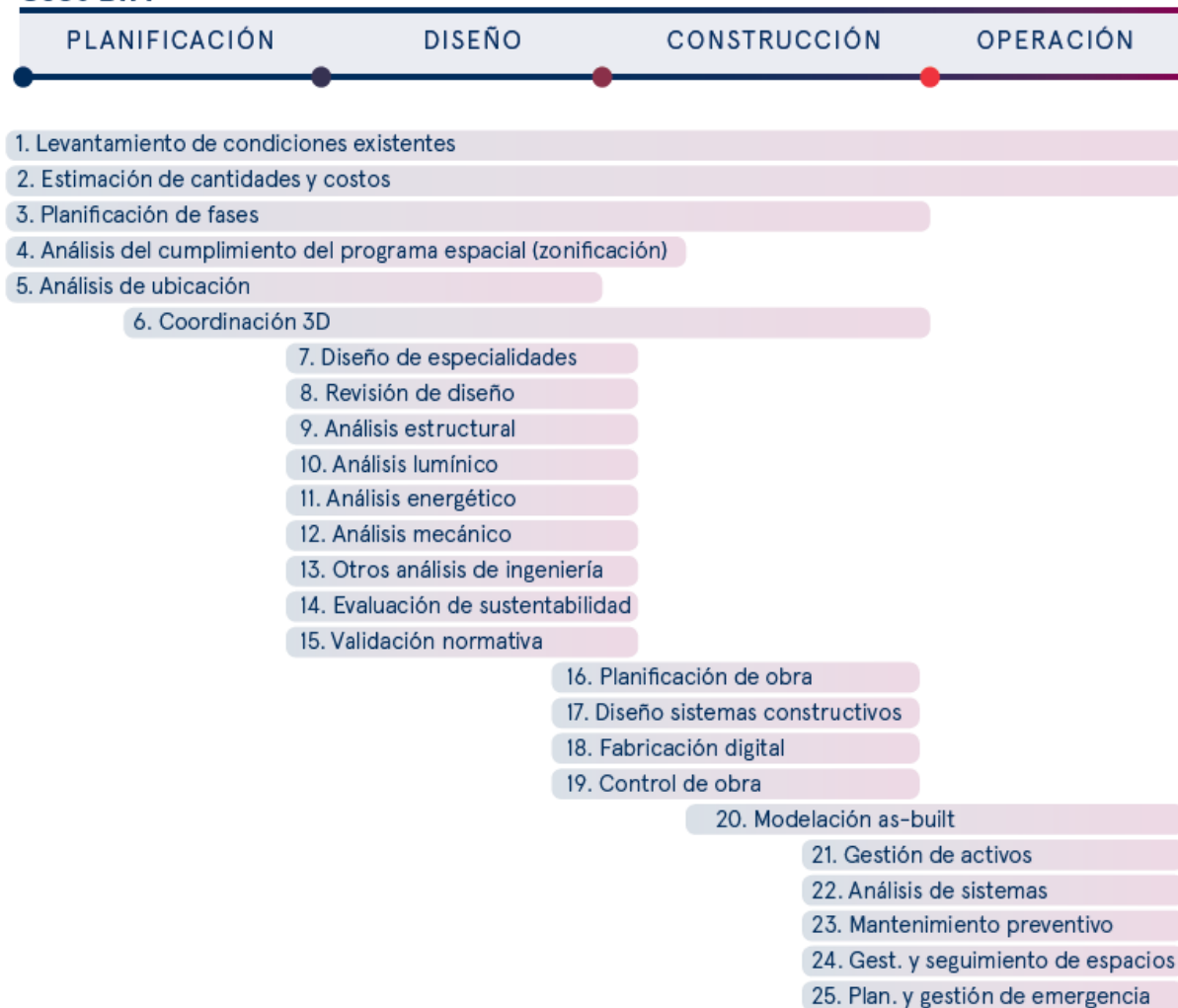
























Figura 5. Simultaneidad de distintos NDI de las entidades en un modelo BIM

Niveles de Información (NDI)



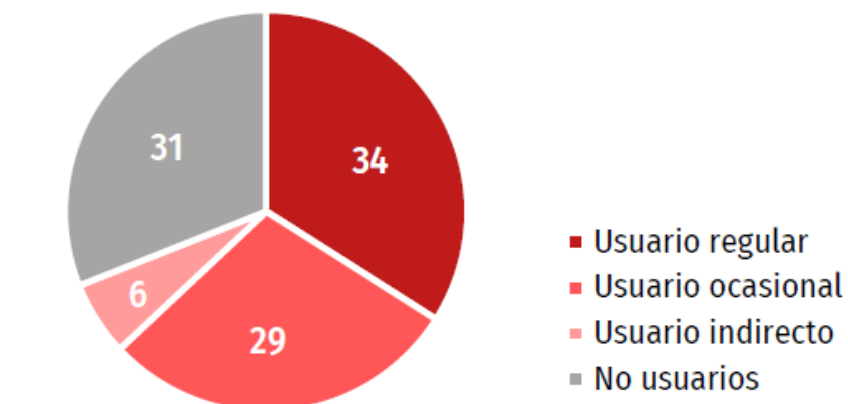
| Estados de Avance de la Información de los Modelos (EAIM) | | Entidades | | | | | | | | | | | | | | | | | | | | |
|---|----|---|---|---|---|---|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|-------|
| | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |
| Información de Planificación | DC | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | |
| | DA | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | NDI-1 | |
| Información de Diseño | DB | NDI-2 | NDI-2 | NDI-2 | NDI-1 | NDI-1 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-2 | NDI-1 | NDI-1 | NDI-2 | NDI-2 | |
| | DD | NDI-3 | NDI-2 | NDI-3 | NDI-2 | NDI-2 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-3 | NDI-2 | NDI-2 | NDI-3 | NDI-3 | |
| Información de Construcción | CC | NDI-3 | NDI-3 | NDI-4 | NDI-3 | NDI-3 | NDI-4 | NDI-3 | NDI-3 | NDI-4 | NDI-3 | NDI-3 | NDI-4 | NDI-4 | NDI-3 | NDI-4 | NDI-3 | NDI-4 | NDI-3 | NDI-4 | NDI-4 | |
| | CM | NDI-3 | NDI-3 | NDI-5 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-4 | NDI-4 | NDI-4 | NDI-4 | NDI-4 | NDI-4 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-4 | NDI-5 | NDI-5 | |
| Información de Operación | AB | NDI-3 | NDI-3 | NDI-5 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-5 | NDI-5 | NDI-5 | NDI-4 | NDI-5 | NDI-4 | NDI-5 | NDI-5 | NDI-5 | NDI-5 | |
| | PM | NDI-3 | NDI-3 | NDI-5 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-5 | NDI-5 | NDI-5 | NDI-4 | NDI-5 | NDI-4 | NDI-6 | NDI-5 | NDI-5 | NDI-6 | NDI-6 |
| | GM | NDI-3 | NDI-3 | NDI-6 | NDI-4 | NDI-4 | NDI-6 | NDI-4 | NDI-4 | NDI-5 | NDI-4 | NDI-6 | NDI-6 | NDI-6 | NDI-4 | NDI-5 | NDI-4 | NDI-6 | NDI-5 | NDI-5 | NDI-6 | NDI-6 |

¿CÓMO ESTAMOS?

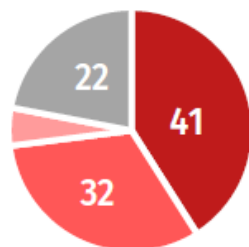


Niveles de adopción

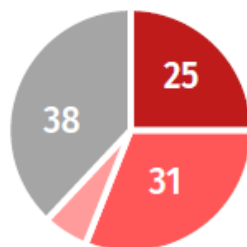
% que tiene el siguiente nivel de adopción BIM
& comparativo entre disciplinas



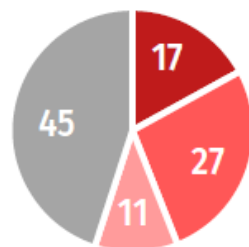
Arquitectura



Ingeniería

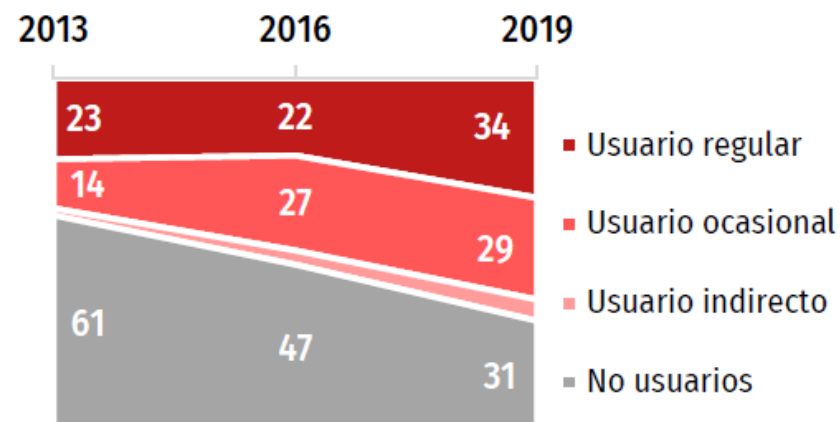


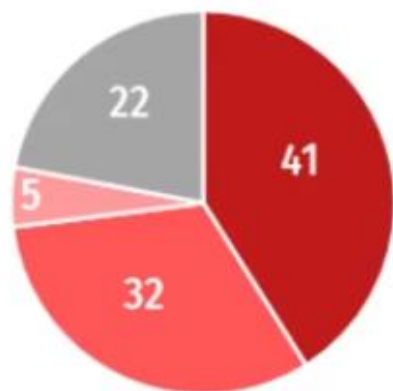
Construcción



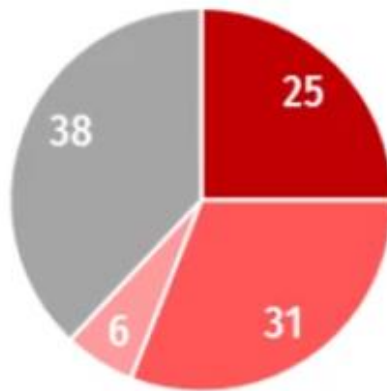
Niveles de adopción, 2013-2019

% de usuarios

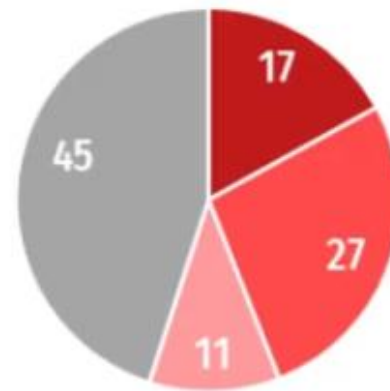




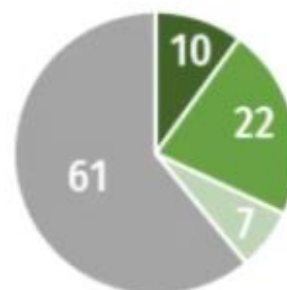
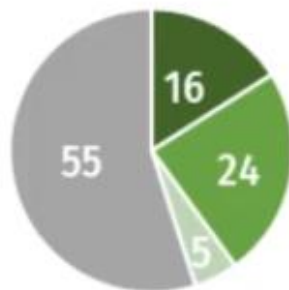
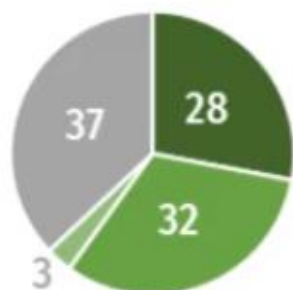
Arquitectos



Ingenieros



Constructores



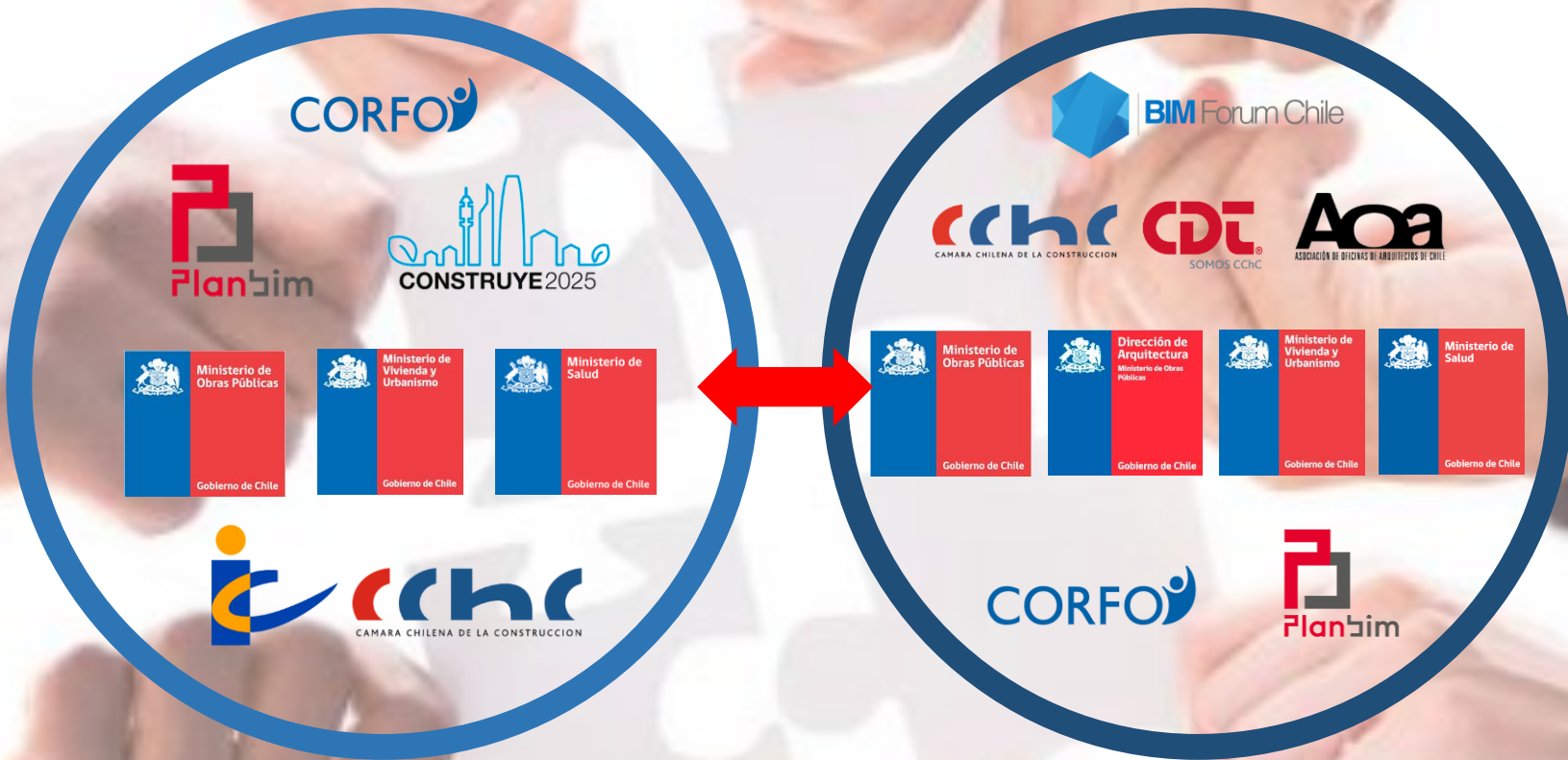
2016

“... de nada sirve comprar herramientas colaborativas, si luego no existe una cultura que privilegie compartir información o si no existe transparencia en la comunicación interna de la compañía.”

MIT Sloan Management Review / Deloitte

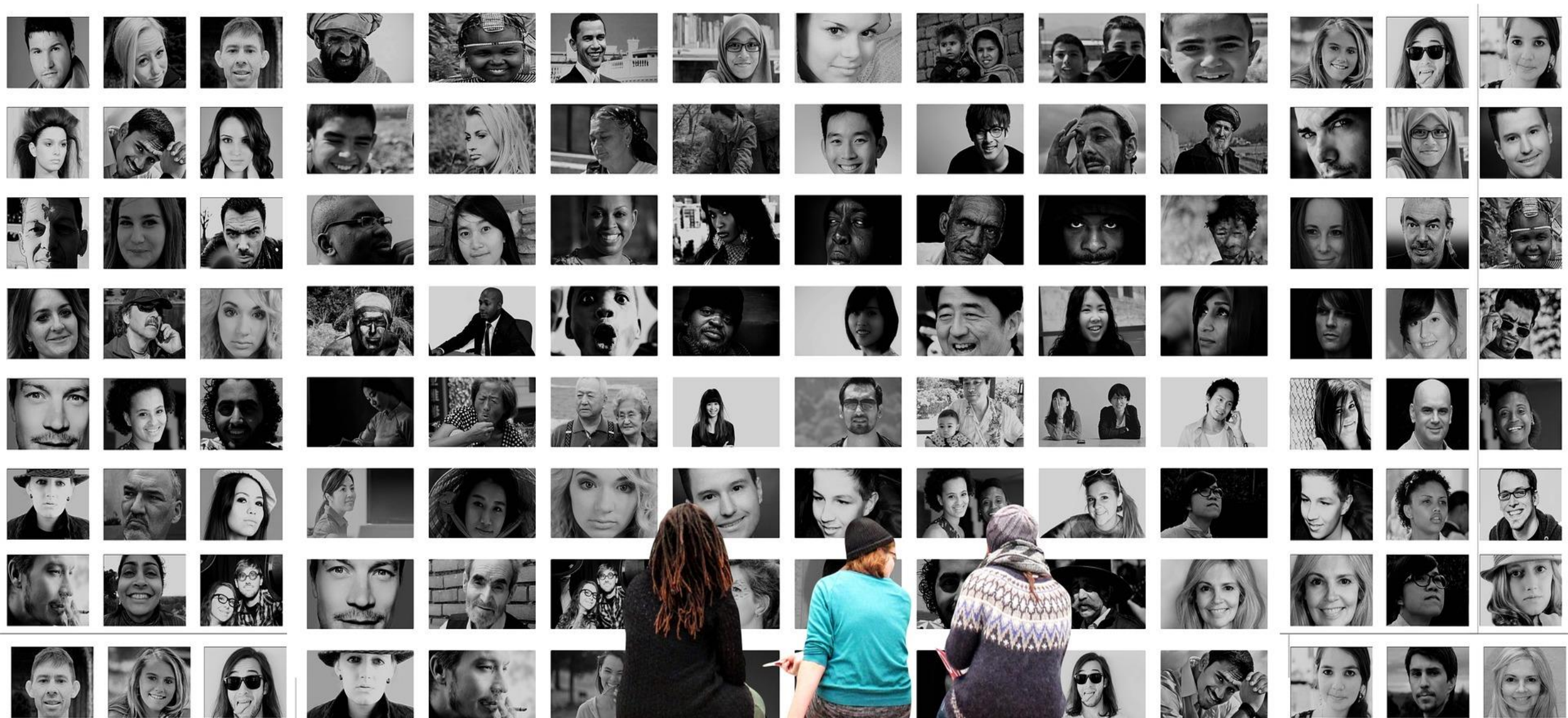






PÚBLICO

PRIVADO





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