CitA
BIM GATHERING

Building Capabilities in Complex Environments

CitA BIM Gathering 2017, Croke Park, November 23rd & 24th, 2017

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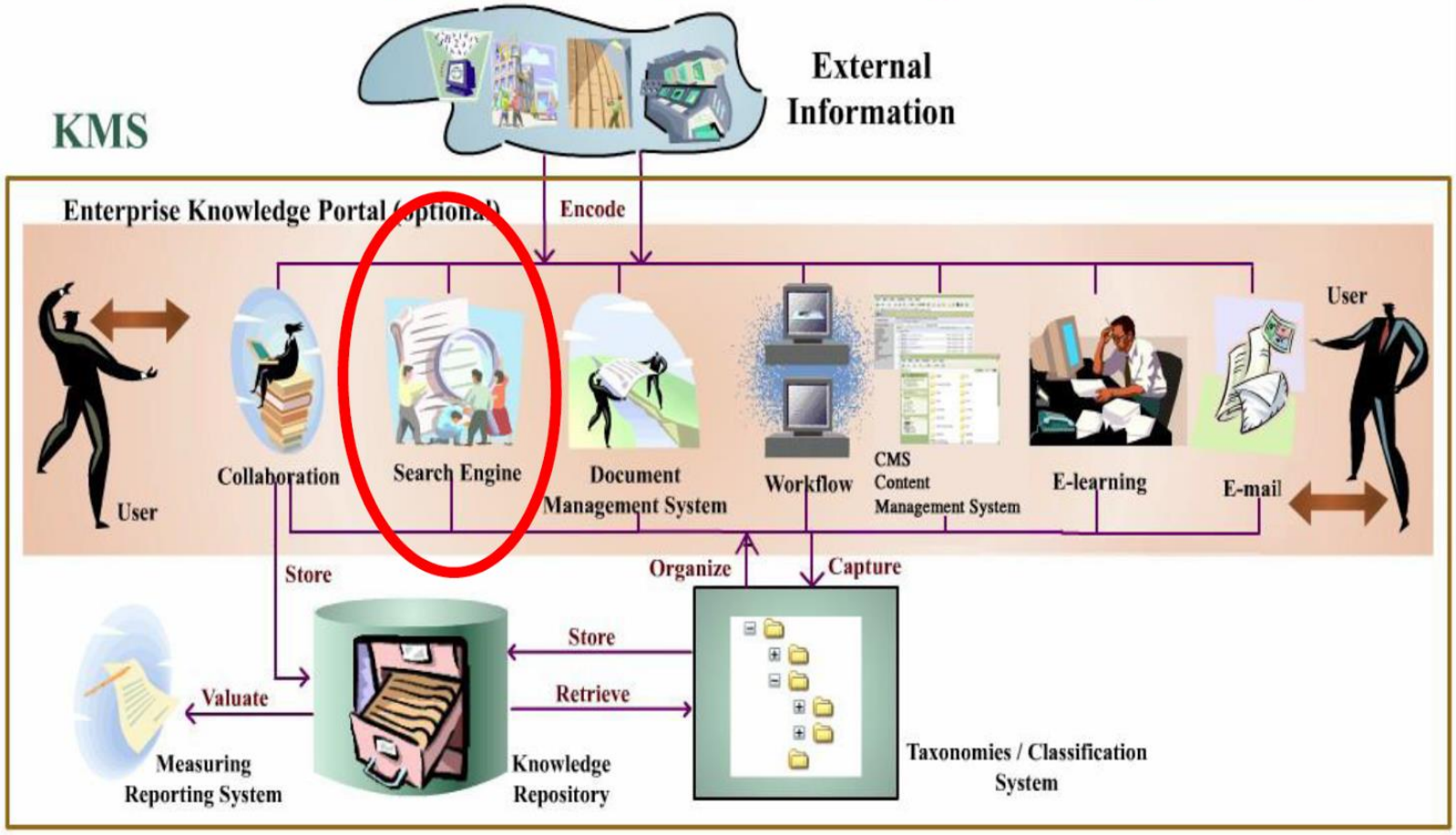
BIM in Education

- Objective of the parent project: to make previously created BIM and associated information accessible and reusable

- Objective of the paper:
  - Demonstrating the need for BIM search
  - Reviewing the state-of-the-art in BIM search
  - Identifying (and proposing possible) approaches for BIM search

Problem	Solution
Information overload	Knowledge Management
Re-inventing the wheel or having no job experience	Design recycle: using previous solutions from corporate memory
Repeating mistakes	Kaizen (改善): Building on previous work and improving them
Poor utilization of investments	Turning previous works into assets using KM

A Knowledge Management System (KMS)



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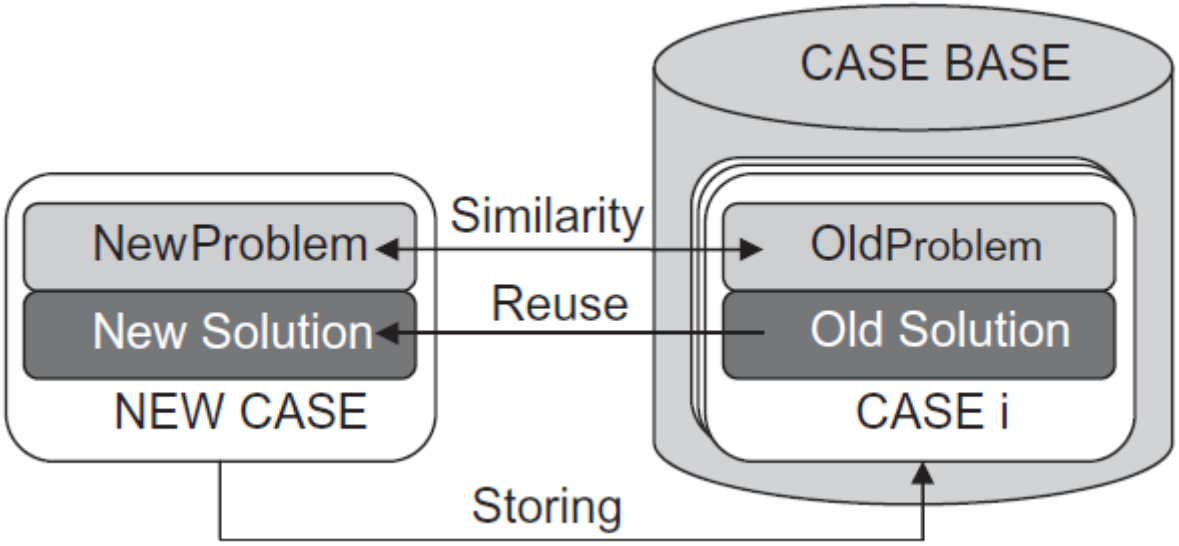
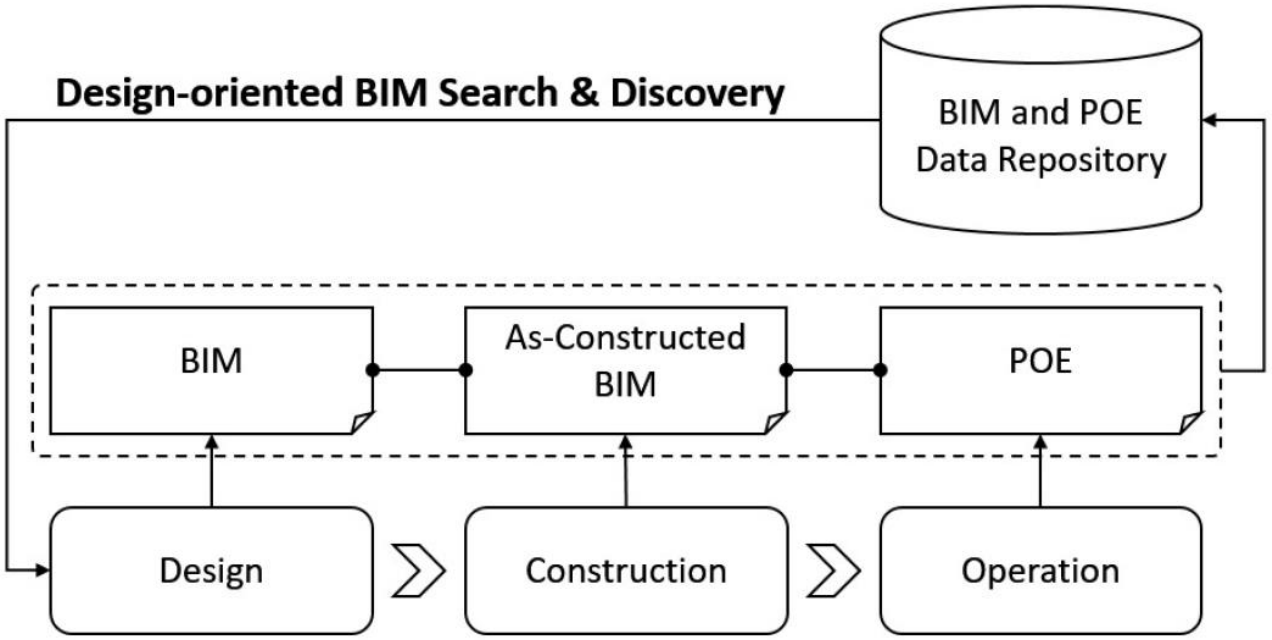
Design Recycling

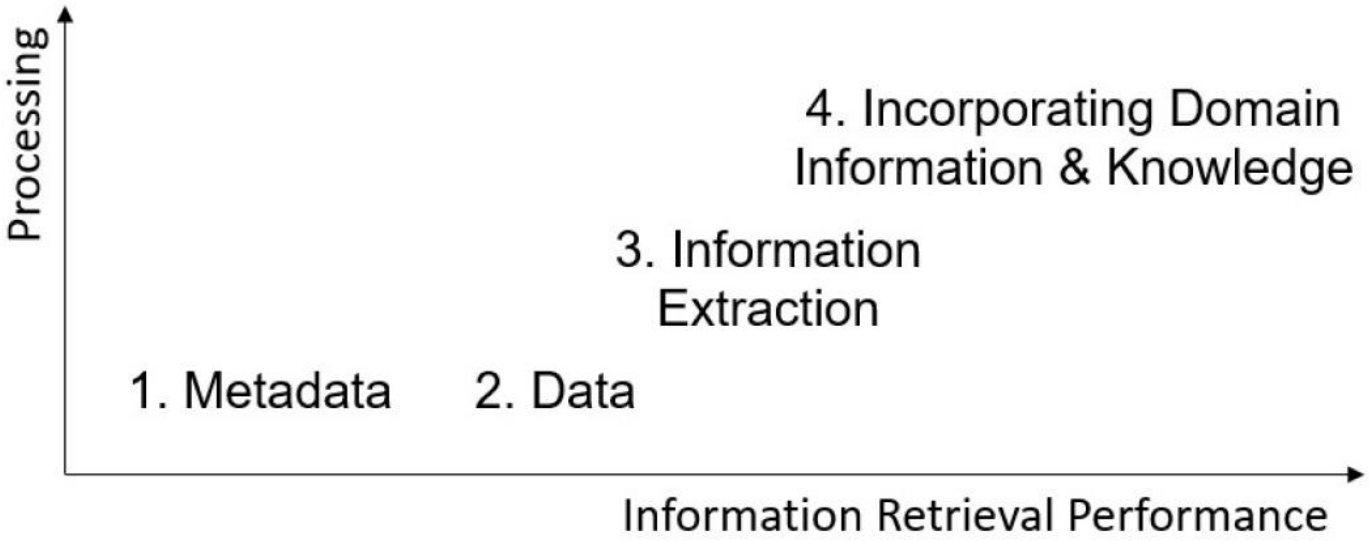


Ref.: Langenhan et al. 2013 “Graph-based retrieval of building information models for supporting the early design stages”

Kaizen (Continuous Improvement)



Indexing Depth



Approaches to BIM Search

Context-Based BIM Retrieval

Geometry-Based BIM Retrieval

Content-Based BIM Retrieval

Context-based BIM Search

Category	Items
Site	• Shape • Orientation • Ground Properties • Latitude (GIS)
Urban	• Fabric • Social • Utilities • Amenities
Climate	• Temperature • Humidity • Wind speed • Precipitation • Sky conditions

Category	Items
Project	• Users • Functions & Activities • Budget • Time • Sustainability
Market	• Material • Construction Technology
Regulations	• Mandatory Standards • Optional Certificates

Geometry-based BIM Search

Categories	Items
Graphical search (shape, dimensions & orientation)	• 2D • 3D
Topological search (space composition)	• Space set • Space adjacency • Space accessibility
Combined graphical and topological	• Taking into account all the above items

Content-based BIM Search

Category	Items
Envelope energy efficiency (e.g. dimensions & form, material, thermal properties)	• Window-to-wall ratio • Window • Exterior wall • Roof • Bottom floor/slab • Facade

Category	Items
HVAC systems	• Heating & cooling source • HVAC equipment efficiency • Air leak • Occupancy control • Operating schedule • Lighting efficiency Heat from equipment • Overall heating and cooling quality and performance

Content-based BIM Search

Category	Items
Lighting systems	• Daylighting Efficiency • Occupancy control • Operating schedule • Shading System • Overall performance and quality
Structural systems	• Material • Structural systems • Foundation properties

Category	Items
Building	• Performance (standards and certificates) • Aesthetics and architectural style • Vertical Transportation • Accessibility for special needs • Fire safety standard • Electricity source

Summery

- Why we need BIM Search: Design Recycle, KM System, Kaizen
- Indexing Depth: metadata, data, information, knowledge incorporation
- Approaches: context, geometry, content

Conclusions

- Despite having the advantage of structured data, BIM search is in its infancy
- Contextual search is especially relevant in AECO industry
- BIM search can enable a new market, stock BIM, similar to stock photography

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THANK YOU