

COSCH Knowledge Representation using semantic technologies to link optical techniques and user needs

Ashish Karmacharya

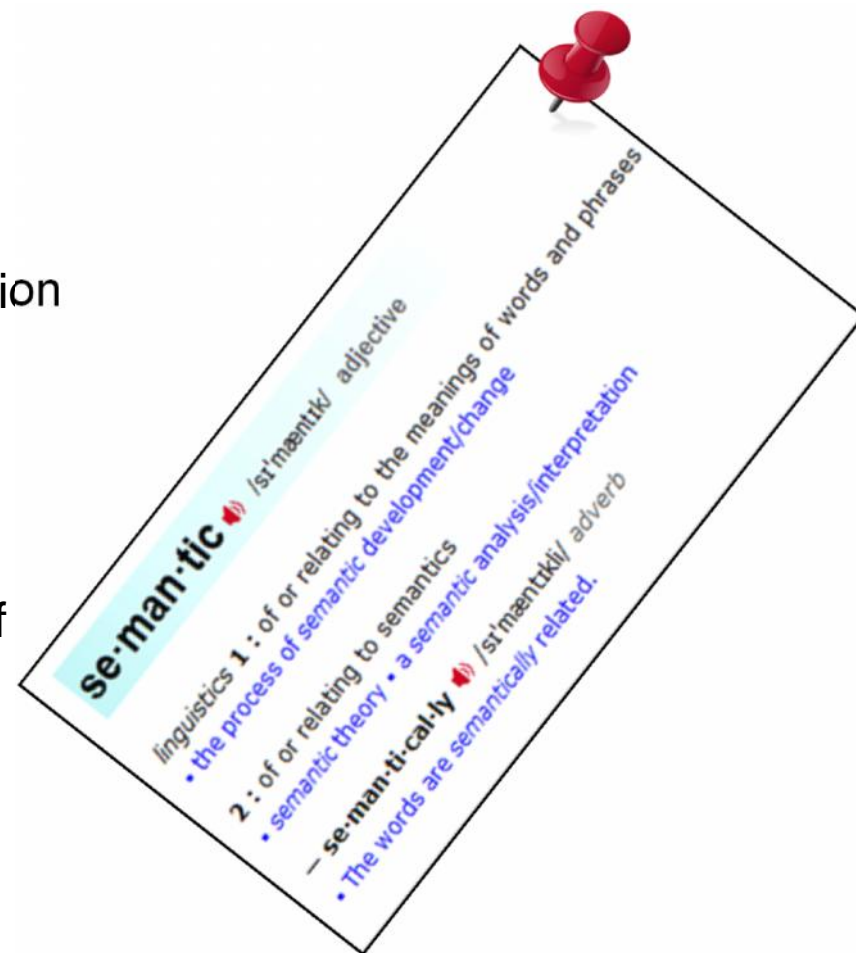
i3mainz, FH Mainz

ashish.karmacharya@geoinform.fh-mainz.de

Riva del Garda, 23.06.2014

Semantic: An Introduction

- Literally: meaning
- **Information Science:** A base for Knowledge Representation
- **Knowledge Representation:** Logical expression of statements for machines to understand
- **Semantics define logics** and are used for reasoning (through inference)
- **Inference:** logical conclusions through a set of facts
 - All trains run in tracks
 - ICE808 is a train
 - Inference: ICE808 runs in tracks



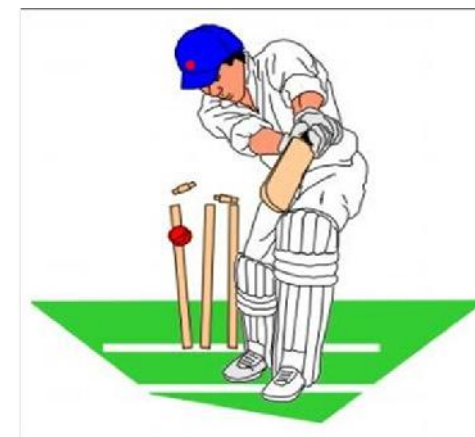
Semantics
(cricket)



Context
(cricket)



Knowledge
(cricket)



Family: Gryllidae, Species=900,
Behavior: nocturnal,,

River

Rivier



Semantic

- A watercourse
- Flows towards an ocean or a lake or a sea or another river
- Part of hydrological cycle



Fluss



川

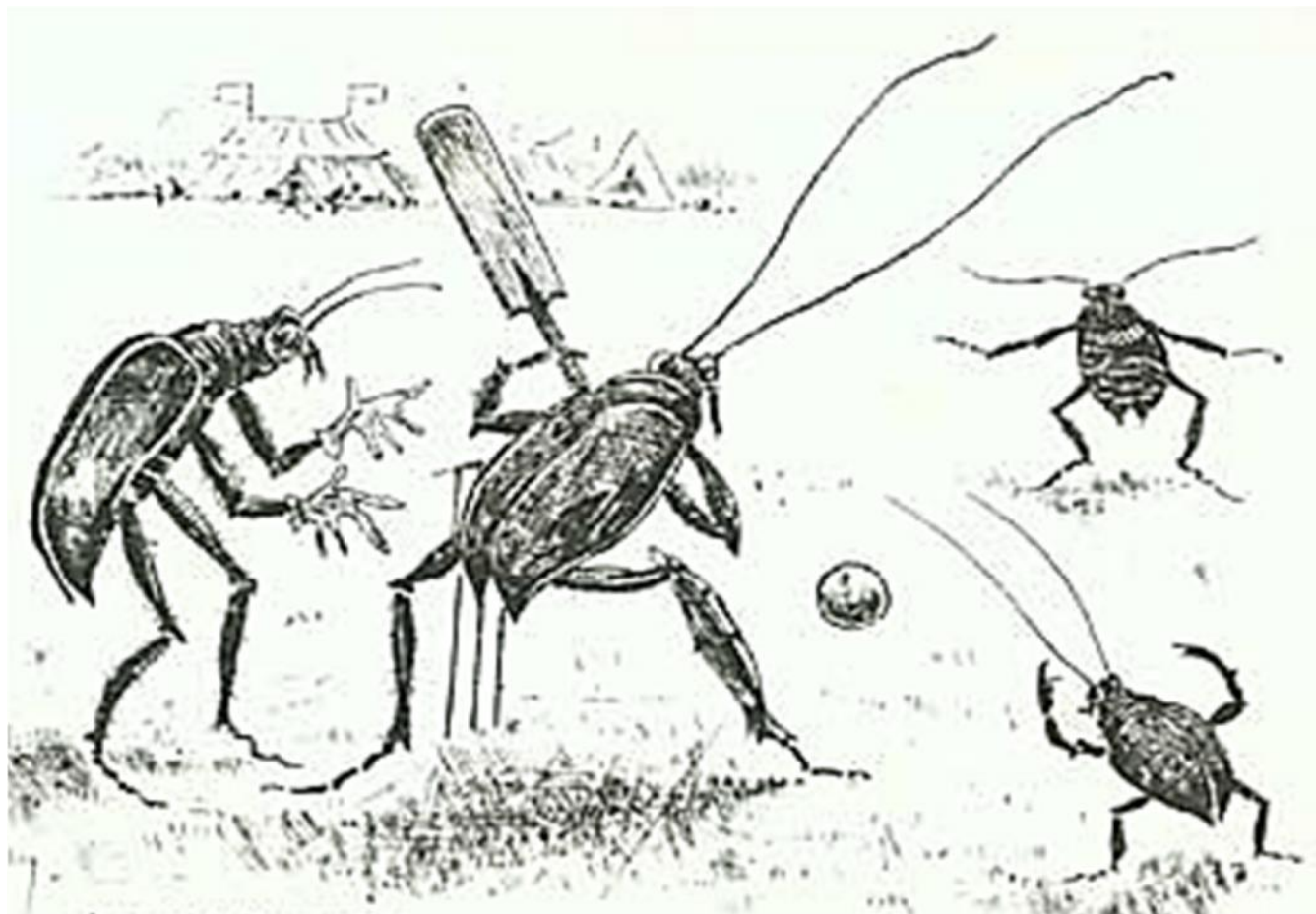


नदी



River is same as Fluss is same as Rivier is same as 川 is same as नदी.....

No Semantics – No Context – No Knowledge



An Example of Expression

- General description of a house – Description Logic

A House

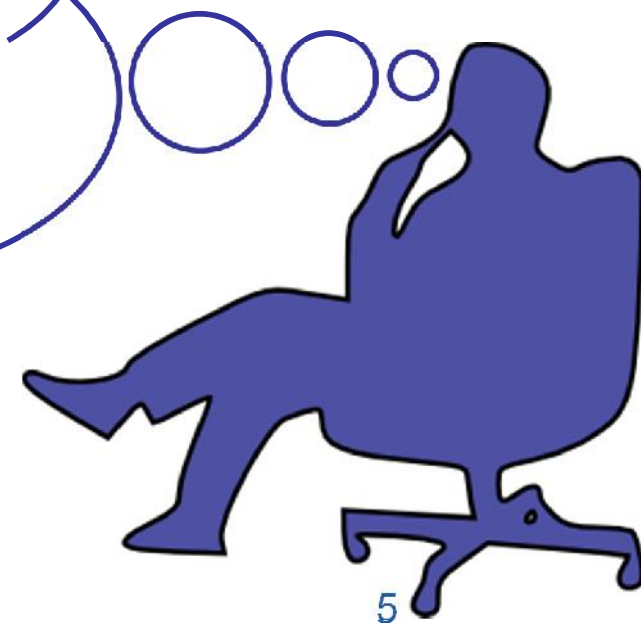
Concepts: Windows, Doors, Rooms, Walls

Relations: hasWindow, hasDoor

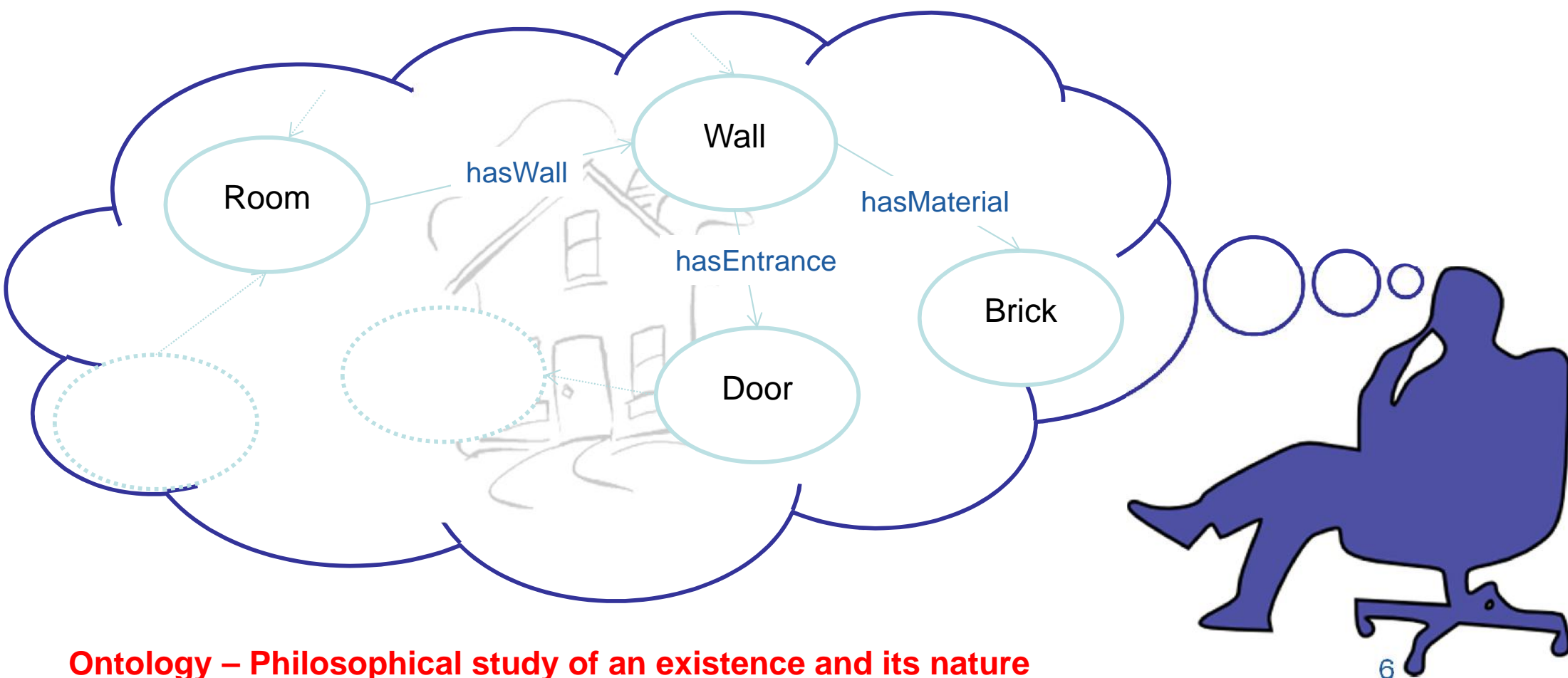
Attributes: Shape, Size, Color

Individuals: Bedroom, Kitchen

Constraints: Room must have four walls



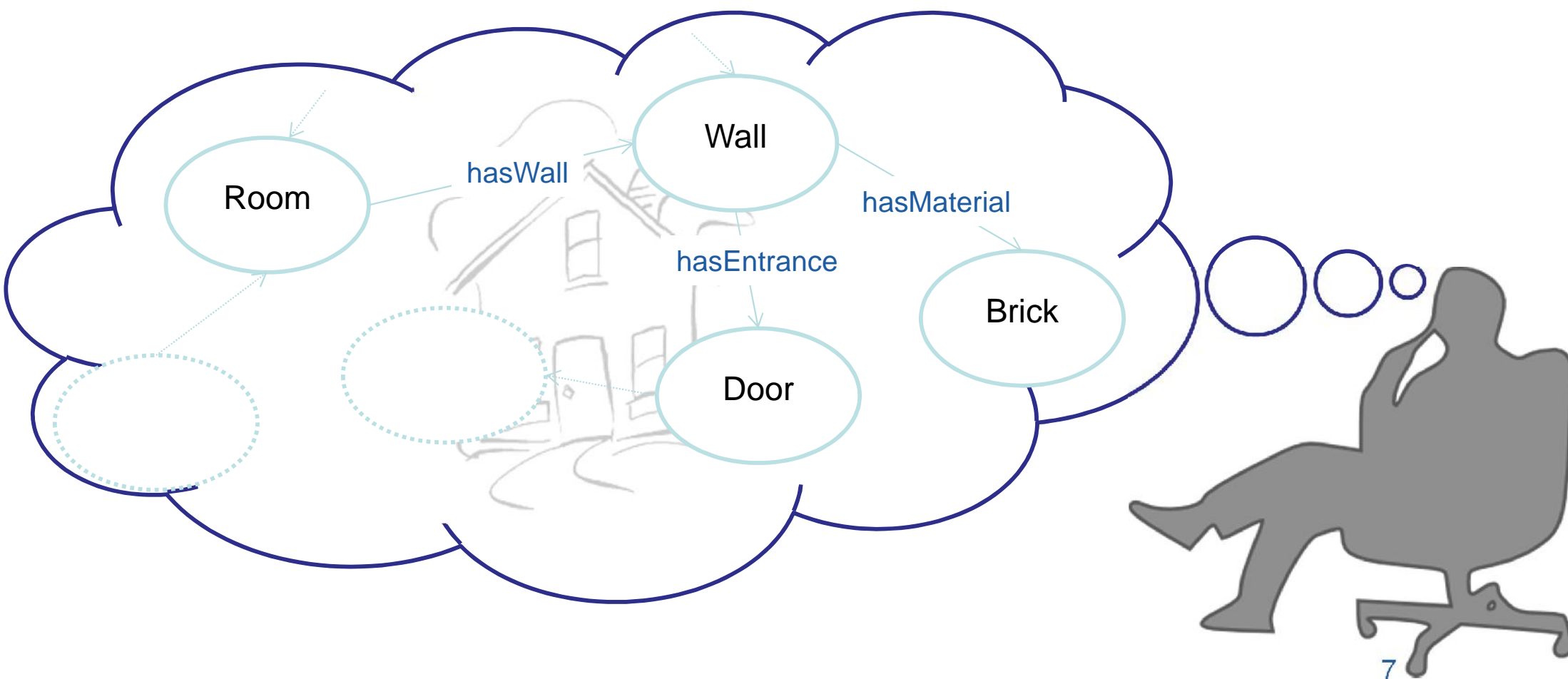
An Example of Expression



Ontology – Philosophical study of an existence and its nature

6

An Example of Expression



7

The Semantic Web

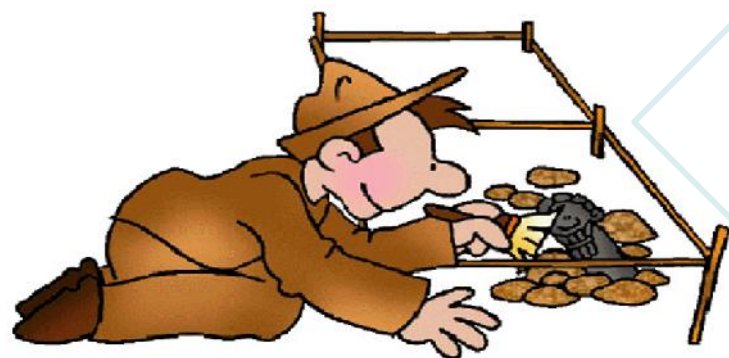
- Set of technologies
- Purpose
 - Formalizing knowledge
 - Knowledge acquisition
 - Semantic Annotation
 - Semantic view to data and documents
 - Data Integration
 - Knowledge manipulation
 - **Inference (Man has two eyes, Ashish is a man \rightarrow (infers) Ashish has two eyes)**
 - Query



The Semantic Web usages

- Information interoperability
 - *Controlled vocabularies*
 - *Foundational ontologies*
- Link data
- Data integration
- and emerging

– **Knowledge Discovery**



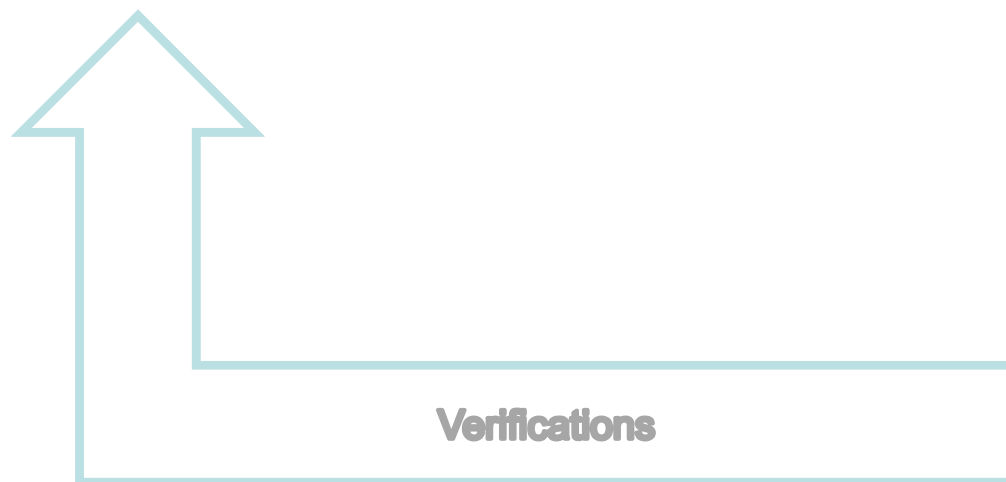
Interaction



Acquisition



Verifications



All we want is.....

the **exact data** with **highest degree of accuracy** and **high resolution** costing **minimal price** to.....



Publish on my blog 😊

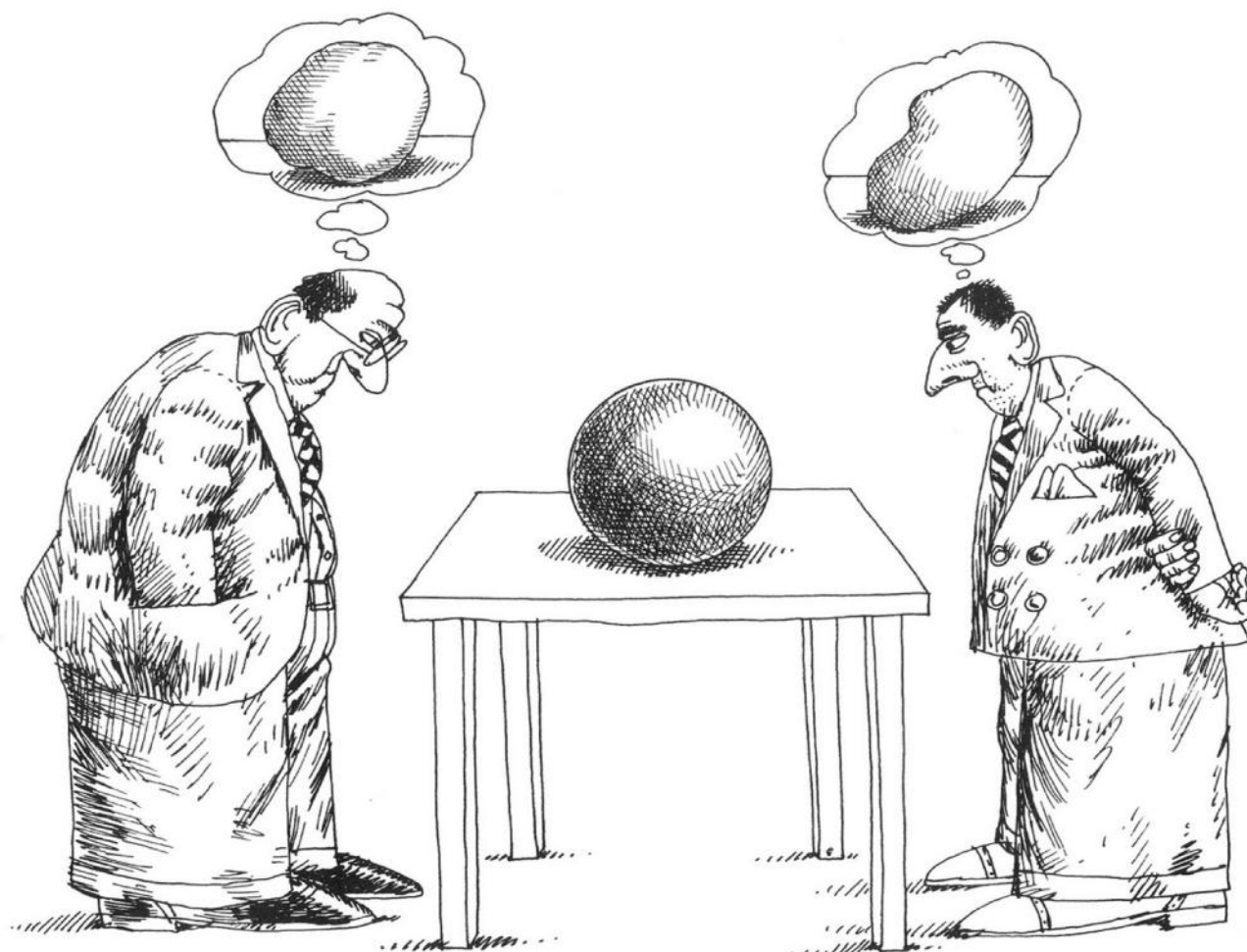
What????



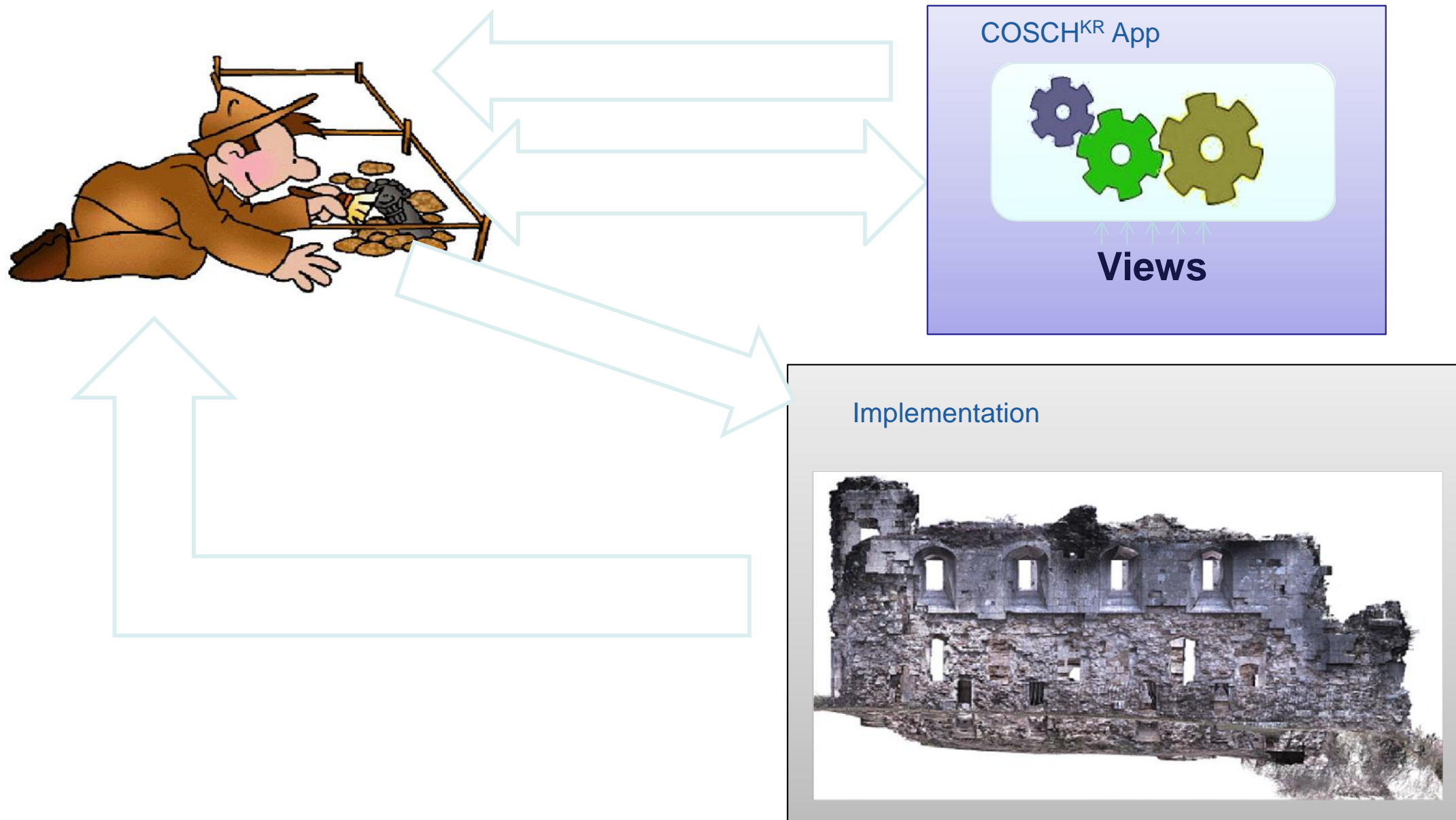
You **don't need high accurate**
documentations to publish on your
blog and can do with **simple and**
cheap technology



Views



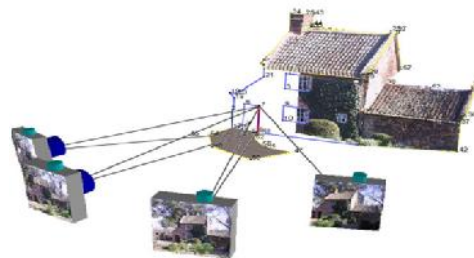
Different groups of people have different views on the same topic



Prior Knowledge on



Sites



Technologies



Instruments



CH Experts

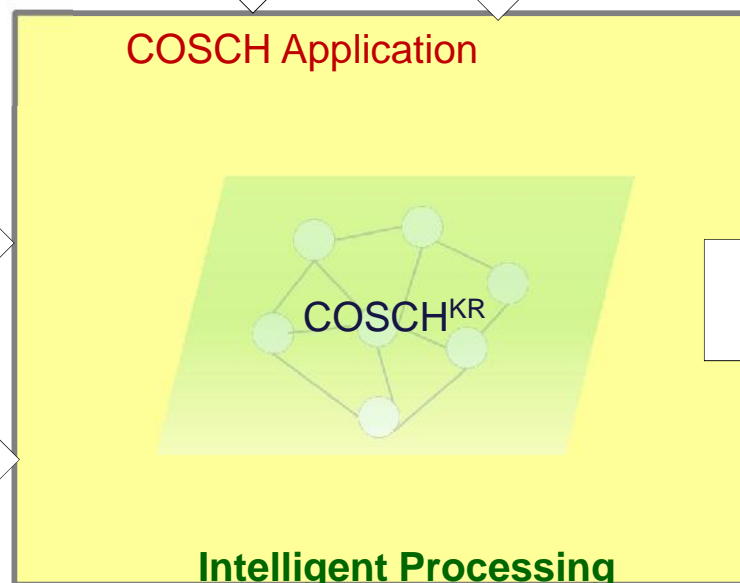


Engineers



Decision Makers

Queries



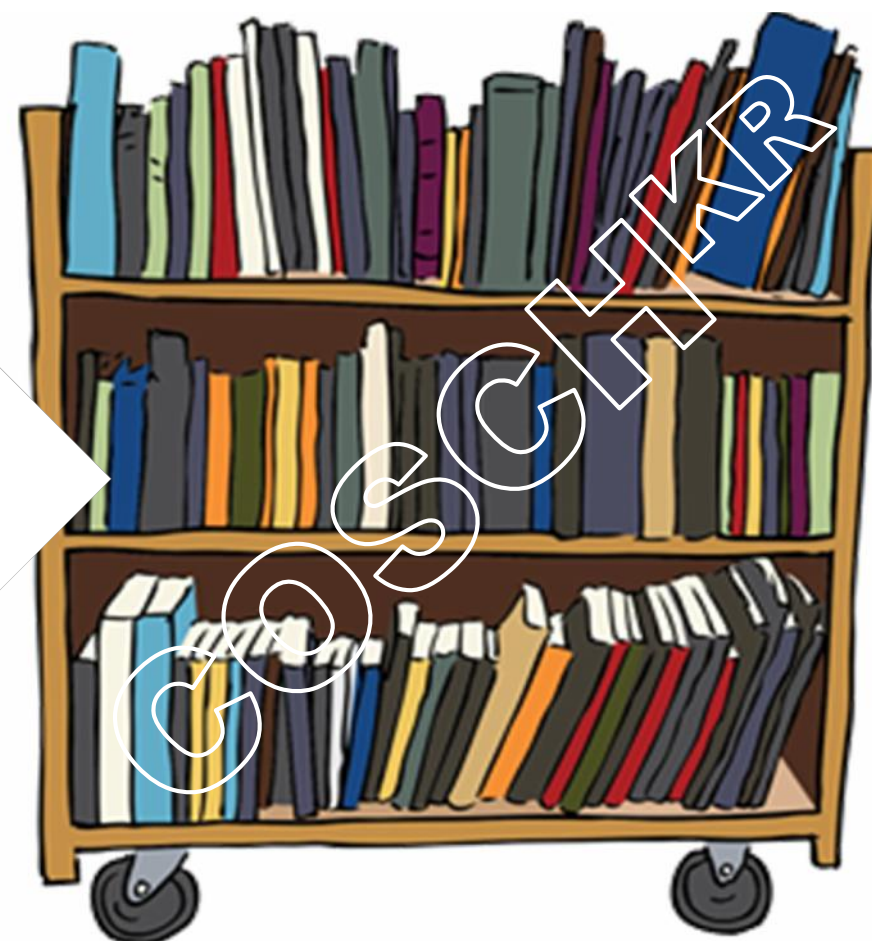
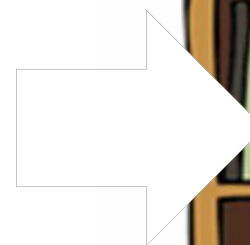
Recommendations/Answers

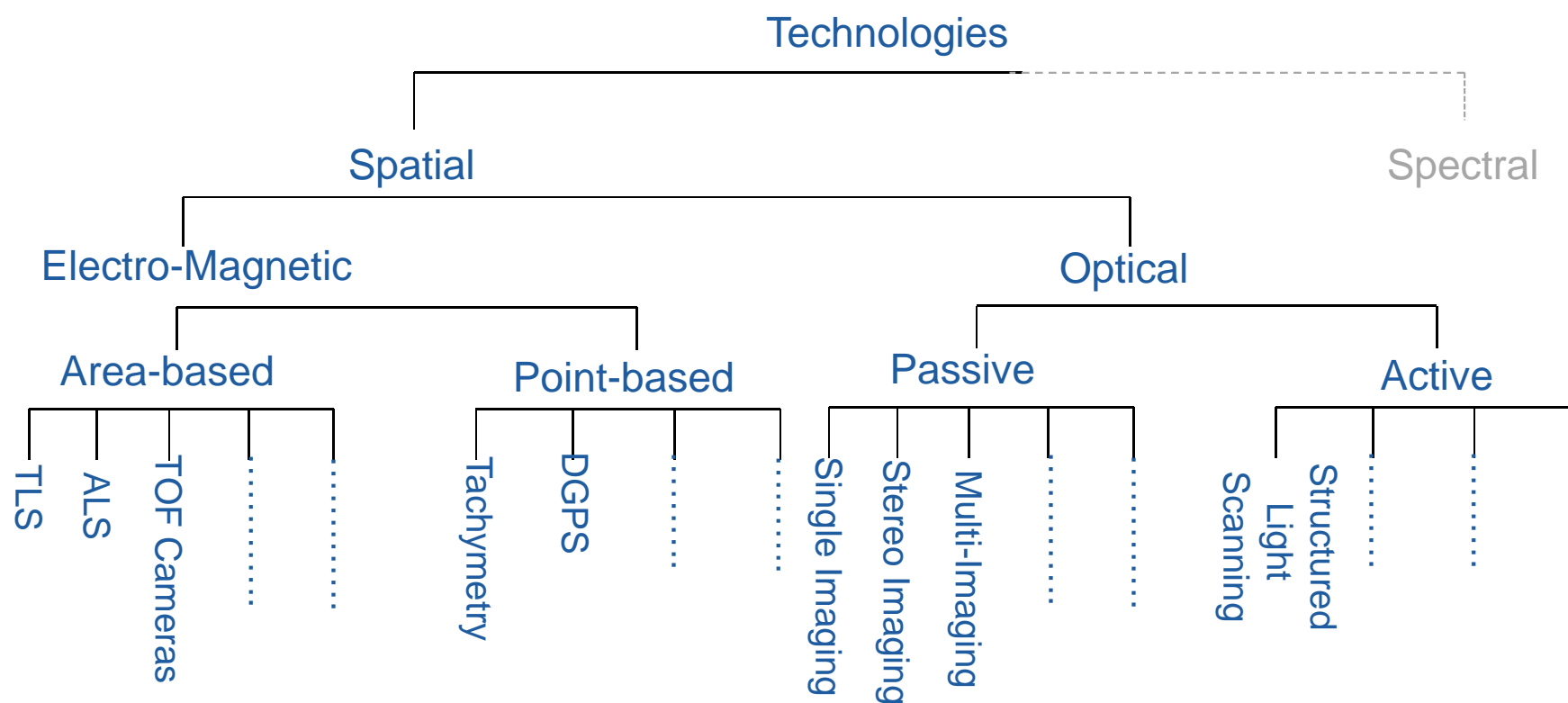
COSCHKR Organization



COLOR & SPACE IN
CULTURAL HERITAGE

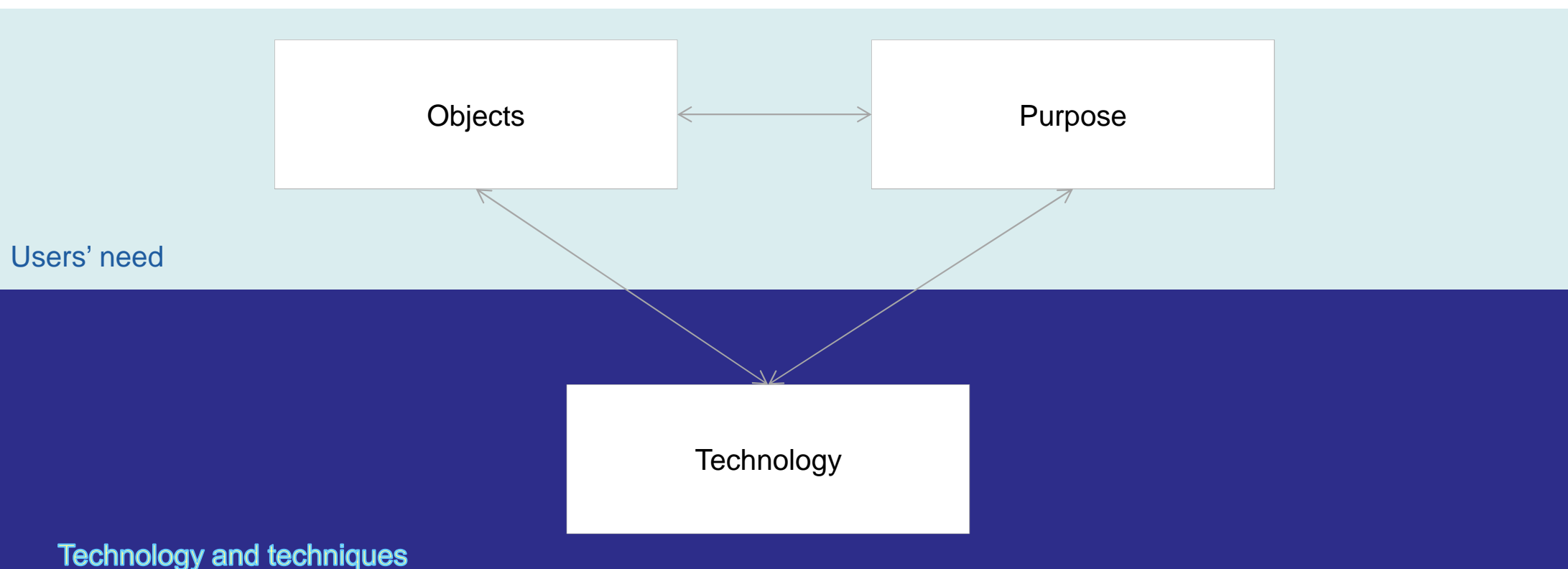
Spectral
Technologies
Spatial
Documentation
Measurement
Large Individual
CH Objects
Composite Small
Data 1D 2D
Supporting Users Scanners
Instruments Spectral
Recorders



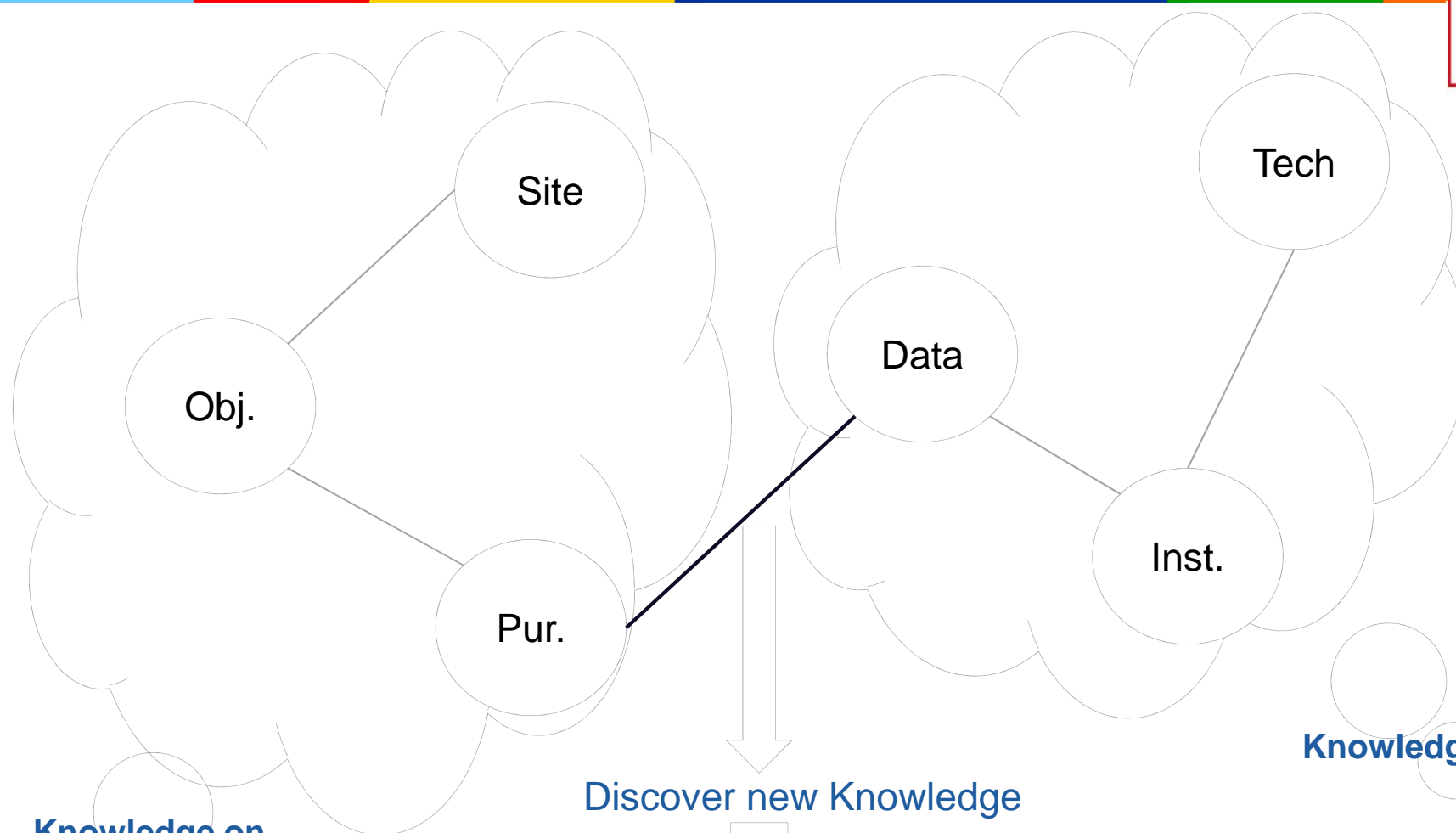


TLS: Terrestrial Laser Scanning; ALS: Airborne Laser Scanning; TOF Camera: Time-off-Flight Camera; DGPS: Digital Global Positioning System

Basic COSCHKR Organization



Technology *is best suited for documenting* **CH Objects** *having specific* **Purpose**



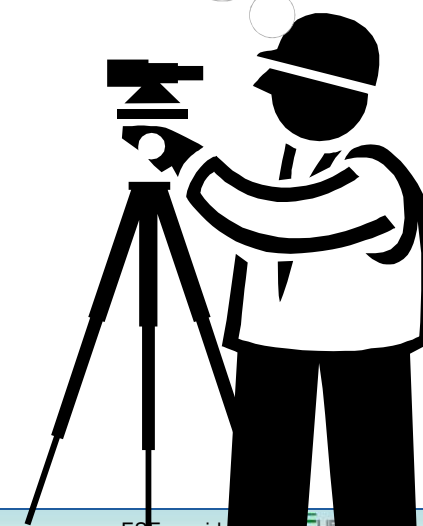
Knowledge on

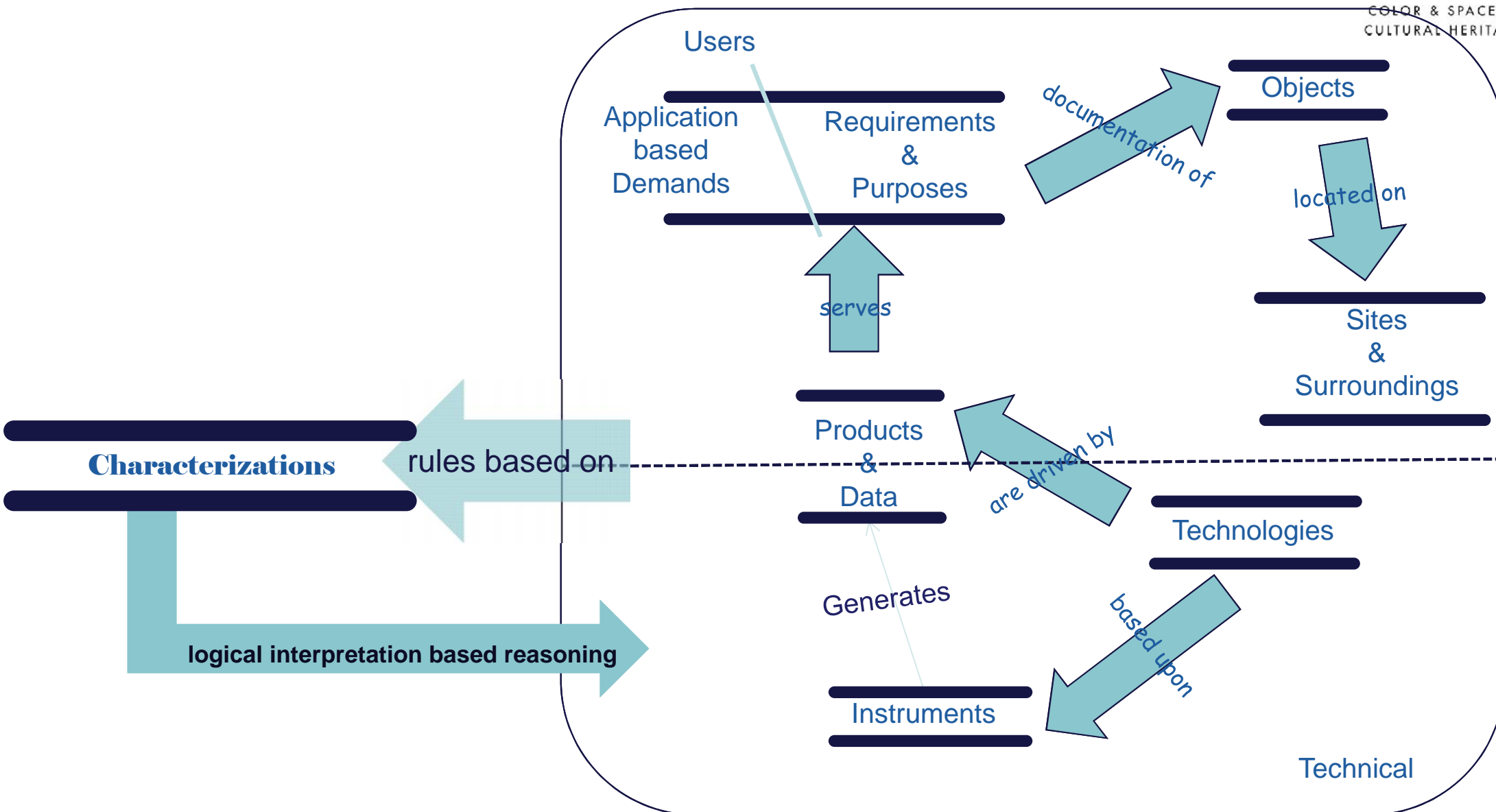


Discover new Knowledge

Data X is suitable of **Purpose X**
and
Instrument X when applied with
Process X generate **Data X**

Knowledge on





Knowledge Process

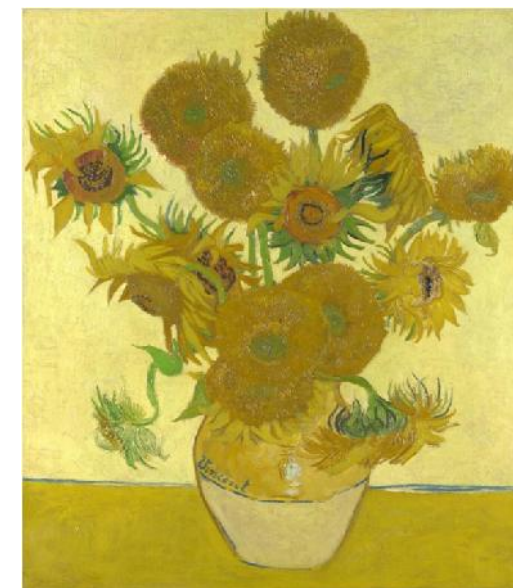
Knowledge Assertion

Example:

- Vincent van Gogh *is a Painter*
- Vincent van Gogh *has Painted Painting* Sunflowers
- Sunflowers *is a Great Painting*



Knowledge Rule
Example:
 Painters with at least one Great Painting is
 a Great Painter



Knowledge Inference & Discovery

Example:

Vincent van Gogh *is a Great Painter*
because Vincent van Gogh painted
Sunflowers which is a Great Painting

Knowledge Process

Knowledge Assertion

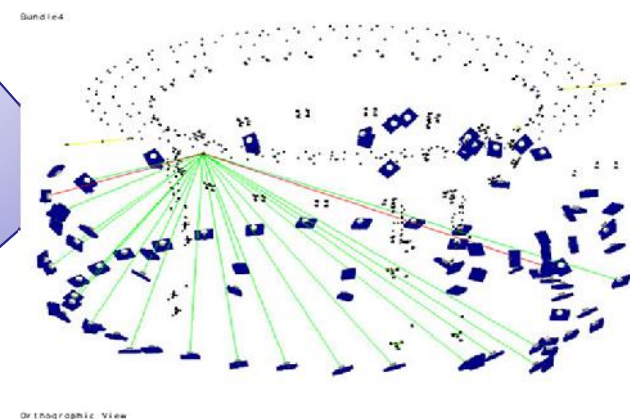
Example:

- **Watermill** is an Arch. Obj
- **Watermill** has Location **Turkey** with Accessibility **Low**
- **Watermill** has Size **Large**
- **Photogrammetry** does not need On Site so can be used in **Low Accessible**



Knowledge Rule

Example:
Technology that can be used in Low Accessible Areas is suitable Technology to document Arch. Obj. with Low Accessibility



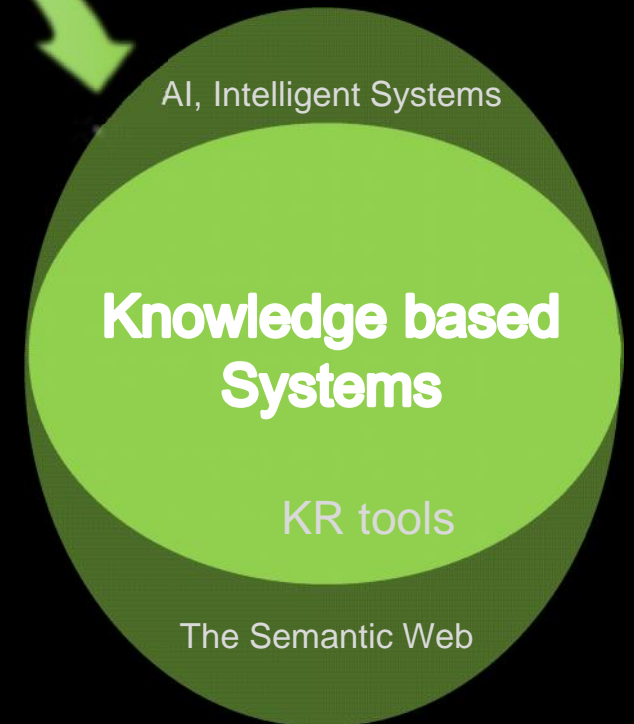
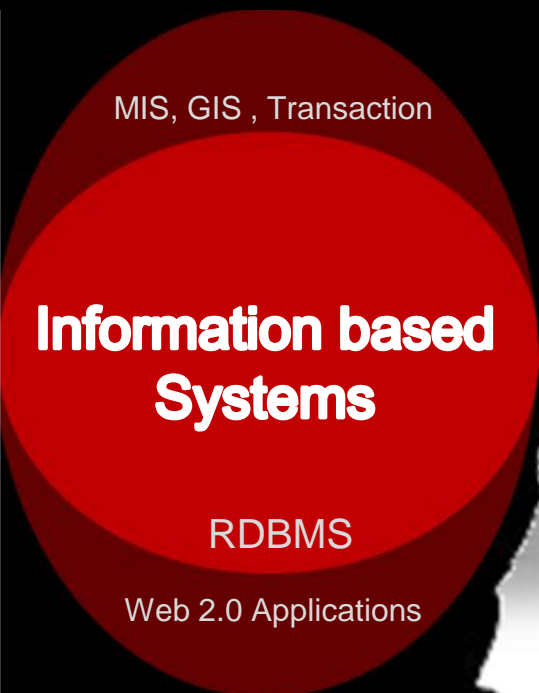
Knowledge Inference & Discovery

Example:

Photogrammetry is suitable Technology to document **Water Mill**



The leap



Thank you for your attention