

COSCH - a Cost Action bridging technology and user interests in optical documentation of Cultural Heritage objects

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COSCH^{KS}

WHY COSCH?

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are impor

heritage

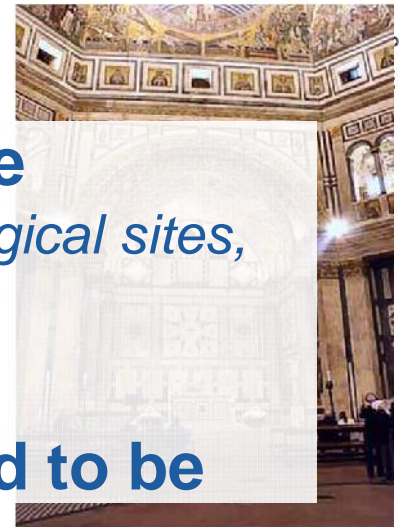
archaeological sites,

and need to be



Samstag, 29. September 2012

Weltkulturerbe fällt dem Krieg zum Opfer
Aleppos historische Altstadt brennt



PLACE IN
RITAGE



moveable and
must be treated as a
initiatives including

“The EU Treaty (Ar
immoveable cultur
priority for the EU
research on cultura

WHY COSCH?

What is one of the most important factors except of the original object itself ?

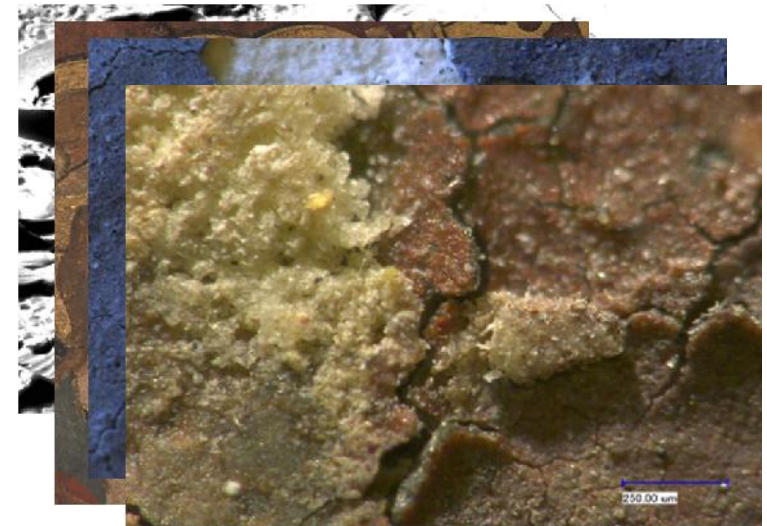
An **optimal** documentation of it's

spatial shape

visual appearance (real color, texture)

surface structure

physico - chemical composition

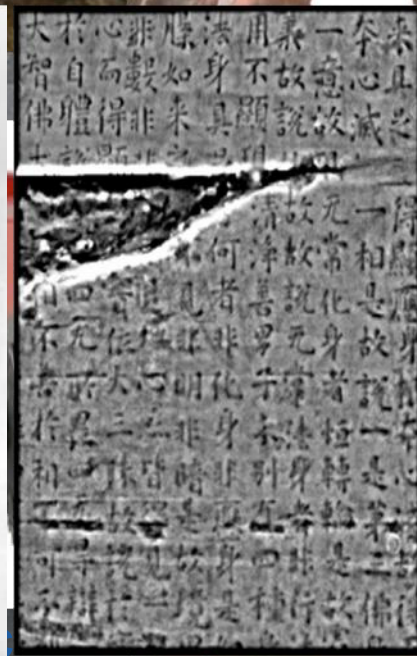


WHY COSCH?

in order to get a **reliable base** allowing to

- **monitor** the condition of objects for enhanced preventive conservation
- make the resulting **e-documentation** accessible globally to specialists and the general public
- enhance the **knowledge base** for **art-historical analysis** and other scholarly activities
- support routine applications with **specialist know-how** and **state-of-the-art equipment**

What implies documentation?



of

sele

Output

Laserscane

Preprocessing & data enhancement

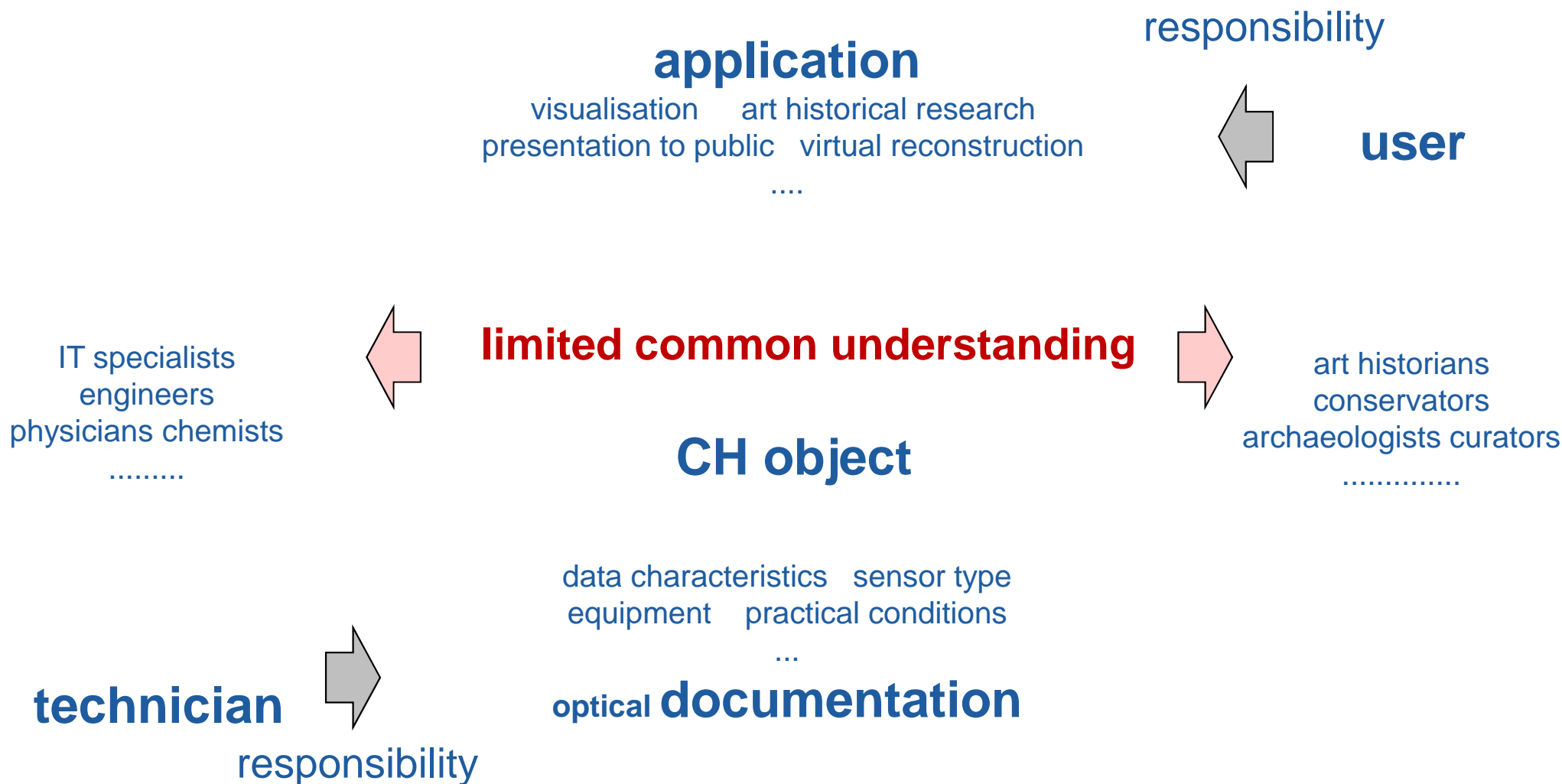
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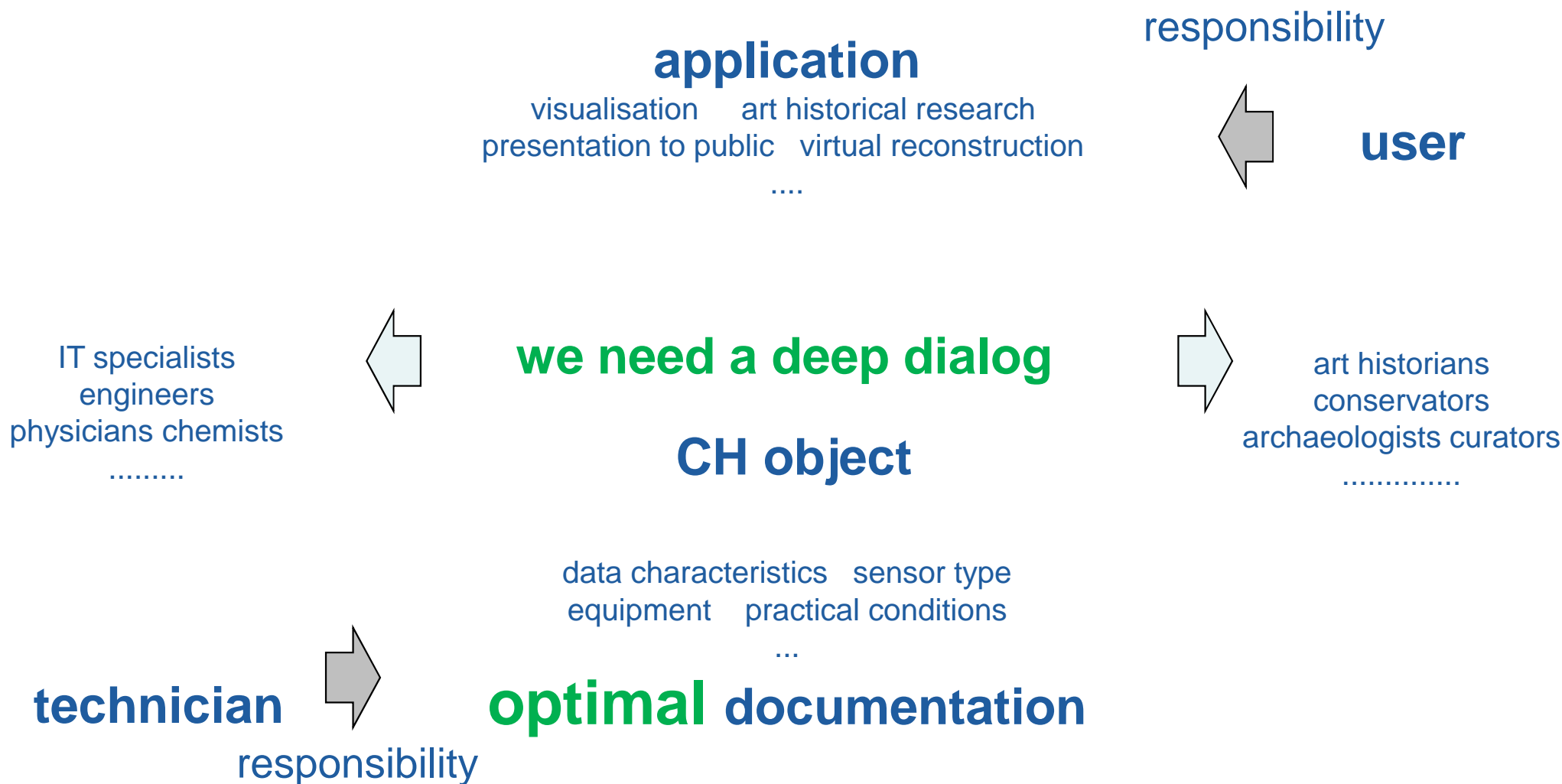
Shading

ultraviolet photograph
<http://katherineara.com>

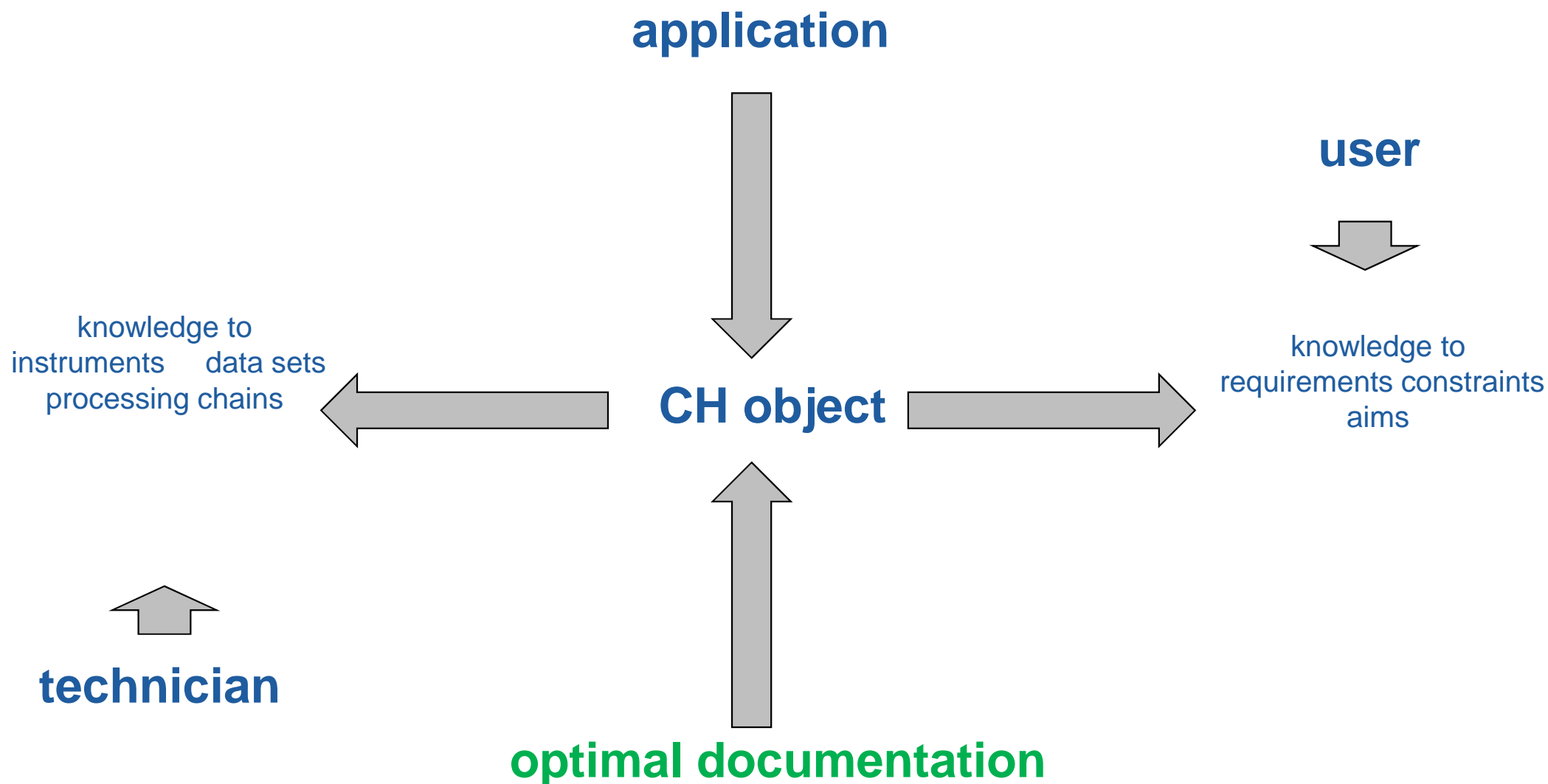
WHY COSCH?



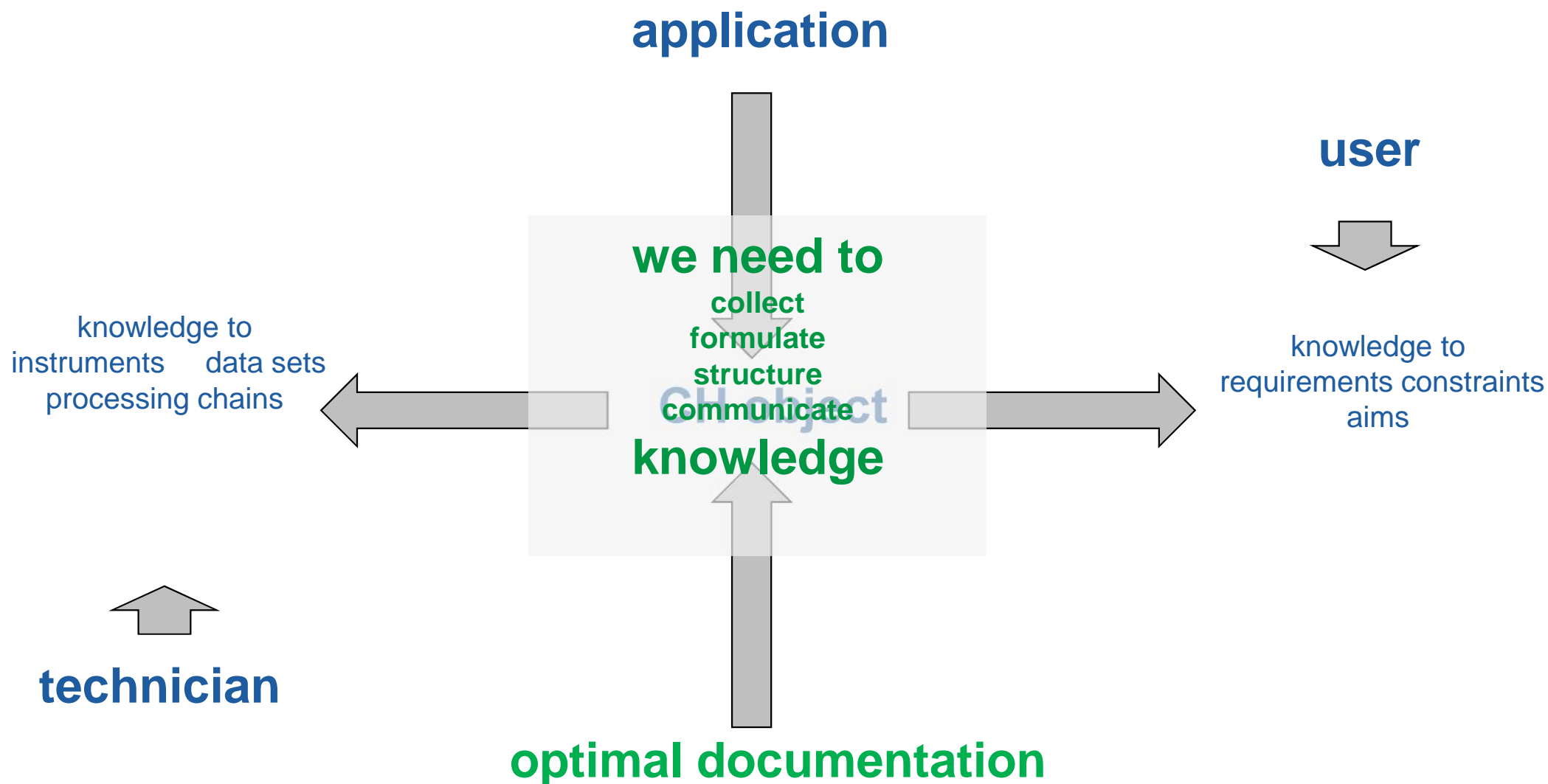
WHY COSCH?



WHY COSCH?



WHY COSCH?




WHY COSCH?

application

user

knowledge to
instruments data sets
processing chains



we need to
exchange analyse explain verify apply
mutual knowledge



knowledge to
requirements constraints
aims

technician

optimal documentation

WHY COSCH?

COSCH builds an

interdisciplinary
European

Network

allowing to

discuss + exchange ideas + work
together + make experiments
in order to improve the base for
future applications in our European
CH

user

knowledge to
requirements constraints
aims

knowledge to
instruments data sets
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technician

COSCHs Objectives And Benefits

Promote research, development and application of optical measurement techniques

adapted to the needs of heritage documentation

based on an interdisciplinary cooperation

on a concerted European level

Offer a novel and reliable, independent and global knowledge base

facilitating the use of today's and future optical measuring techniques to support the documentation of European heritage

COSCHs Scientific focus

Primary tasks of work program:

- PT1: **Theoretical** identification and **practical** exploration of important **characteristics of instruments** and their potential impact on **data quality, usability and information content** with respect to typical surfaces
- PT2: Identification and definition of **typical application/object requirements** and their **impact** on the characteristics of data to be able to **support these applications**
- PT3: **Theoretical** analysis and **practical** investigation of typical and necessary **processing tasks** and their **potential** or real **impact** on quality and information content of results

COSCHs Scientific focus

Primary tasks of work program:

- PT4: Selection of **typical applications** and/or **objects** to be subject of implementation of **optimal processing chains**, from data capture up to the final results, guided by all the **interdisciplinary** expertise available to COSCH
- PT5: Establishment of the **conceptual** and **practical frameworks** for **multisensory data acquisition**, its implementation and evaluation
- PT6: Development of **recommendations** for **solution providers** as well as **end users**. These recommendations would facilitate a **deeper integration of optical technology into CH applications** through an improved correlation between optical means and requirements

COSCHs Scientific focus

Working groups:

WG 1: Spectral object documentation

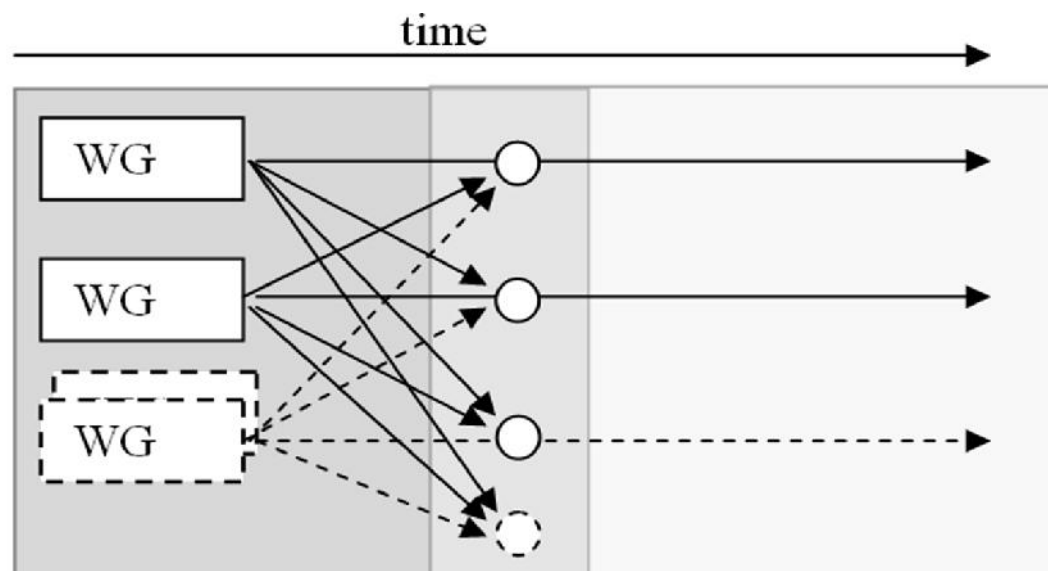
WG 2: Spatial object documentation

WG 3: Algorithms and procedures

WG 4: Analysis and restoration of CH surfaces and objects

WG 5: Visualisation of CH objects and its dissemination

How will COSCH work



Short term scientific missions

Training schools

Young Researchers support

Various dissemination axes

Activities: Use of COST Instruments

Activity (No.)	Year 1	Year 2	Year 3	Year 4
MC/WG Meetings	2MC 2WG	1MC 2WG 10 TFG		
STSMs	20	15		
Training Schools	1	1		
Workshops or Conferences	2	3		
Joint Publications	1	?		
Web Site <i>cosch.info</i>	x	X		
ISSN registered COSCH e-Bulletin	x	x		

Activities in Science and Networking

COLOUR & SPACE IN

Scientific focus	WG1	WG2	WG3	WG4	WG5
Acquisition	Calibration is required Categorization: <ul style="list-style-type: none"> typical features of instruments relevant object (surface) features relevant illumination features critical impact factors 	Calibration is required; specification of desired resolution and measurement uncertainty Categorization: <ul style="list-style-type: none"> typical features of instruments relevant object (surface) features relevant illumination features critical impact factors 	Categorization of typical output of instruments and its impact on following processing Possibilities to improve data quality	Creation of reproducible baseline capture : resolution for future typical applications for the shape and multispectral measurements	Categorization of object features and their impact on visualization & analysis Categorization of techniques and methods used
Processing in general	Registration, Normalisation, BRDF, spectral interpolation, fusion of spectral & spatial data	Registration, data fusion, Filtering, view integration, fusion of spectral & spatial data	State of the art (processing chain in general – spatial / spectral / combined)		
Analysis	Classification, feature calculation	Geometrical features, volumes, surfaces, cross-sections, others		Consideration and recommendation of the required accuracy in regard to the need of the conservation field, standardized algorithm to address conservation, monitoring issues	
Standardized characterisation		Calibration and its validation during measurement sessions	Calibration accuracy: development of a calibrated and automated 3D digitization system easy to use whatever the object surface. To achieve: state of the art (preconditions, constraints, limits, performance robustness etc. of calibration methods used by 3D digitization systems) -> related to deciding factors collected for acquisition	Taking into account the optical properties of the object	

Activities in Science and Networking

Development of a knowledge representation (= COSCH^{KR})

COSCH Memorandum of Understanding

2. The main objective of the Action is to realize an interdisciplinary cooperation, on a concerted European level, to prepare a **novel, reliable, independent** and **global knowledge base facilitating the use** of today's and future **optical measuring techniques** for the documentation of European heritage

What's the problem ?

COMPLEXITY (acquisition / processing / usage of data / characteristics of objects)

Acquisition: Digital photography, Infrared reflectography, Traditional colorimetry and spectrophotometry, Imaging systems for specialist analyses, Colour, multi- and hyperspectral imaging, Structured-light-based techniques, Passive 3D imaging techniques, 3D laser scanning techniques, Integrated multi-imaging systems, ...

Objects: size, texture, color, material, appearance, geometry, roughness,

Environment: indoor, outdoor, lighting conditions, humidity, stability, accessibility,

Views: engineer, computer scientists, user (archaeologist, curator, conservator, social scientist, art historian,.....) [some related work](#)

What's the problem ?

Different vocabulary

Partly unclear / not precisely defined semantics

Different views (Many technical details <-> global description of a desired result)

Impossible to easily match user view with technical expert view

A long way to go

Open tasks: formalize & structure content, map views

What could help?

User has a problem:

I have found an marble object of medium size laying in a tomb from 2000 BC. The object has to stay there. But I want to get a real copy of it for an exhibition in a museum at home.



He asks a “system” and get’s the answer:

Take a calibrated camera with you into the tomb, take images following strategy XY, process it with software package Z, check the result based on rules A, B and C, send it to company T and get your copy.

What’s the key?

The system models his user understanding (medium size is .., marble has a smooth surface, a tomb is difficult to access, it is humid, there is not much space,) and relates it to the characteristics of instruments, processing,

What do we need?

Collect relevant knowledge :

acquisition, objects, environment, application, ...

Structure this knowledge :

what are characteristic features, what is more / less important, which dependencies exist, what can be grouped,.... ?

Build a bridge between views:

vocabulary, understanding, priorities, identify common elements, develop a mapping (relate concepts from all domains),....

Realisation of an appropriate knowledge schema, using state of the art technologies (Semantic Web)

-> **COSCH** ^{KR}

What do we need?

Broad base for its work

Active participation of researchers, users and companies

Actual community: 26 European Countries with more than 200 researchers associated

Kick Off: 7.11.2012
Start of work: spring 2013

The door is **open** to every **motivated** person

Thank you for your attention