COSCH^{KR}: how does the inference work

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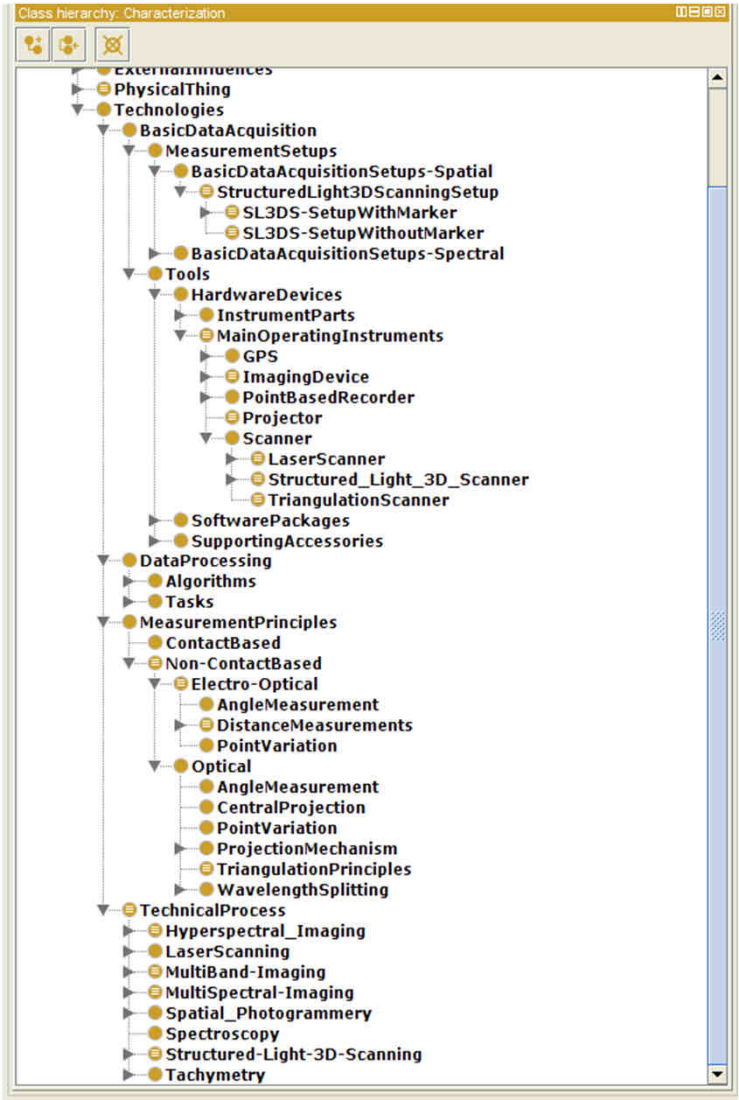
Technologies

- **Measurement Principles**
  - those actually are responsible for data generation
- **Tools**
  - Instruments
    - based on measurement principles and responsible for data generations
  - Setups
    - setups with instruments and necessary accessories for optimal data generations
- **Data Processing**
  - post processing algorithms and tasks for end data product
- **Technical Process**
  - packages all technical components



Technologies: Principles

- **Measurement Principles**
  - **Triangulations**

Description: TriangulationPrinciples

Equivalent To

hasBaseHeightRatio only
(HighBaseHeightRatio
or MediumBaseHeightRatio
or SmallBaseHeightRatio)

hasGenerationOnData some 3D_Data

SubClass Of

(hasBaseHeightRatio only HighBaseHeightRatio)
and (hasGenerationOnData only
(3D_Data
and (hasLocalSpatialDataAccuracy some
(HighLocalAccuracy-in-3D
or LowLocalAccuracy-in-3D
or MediumLocalAccuracy-in-3D))))

Optical

  - **Angle Measurement / Distance Measurement**

Description: AngleMeasurement

Equivalent To

SubClass Of

Electro-Optical

hasInCombination only (DistanceMeasurements and (hasGenerationOnData only ((3D_Data
and (hasLocalSpatialDataAccuracy some
(HighLocalAccuracy-in-3D
or LowLocalAccuracy-in-3D
or MediumLocalAccuracy-in-3D))))))

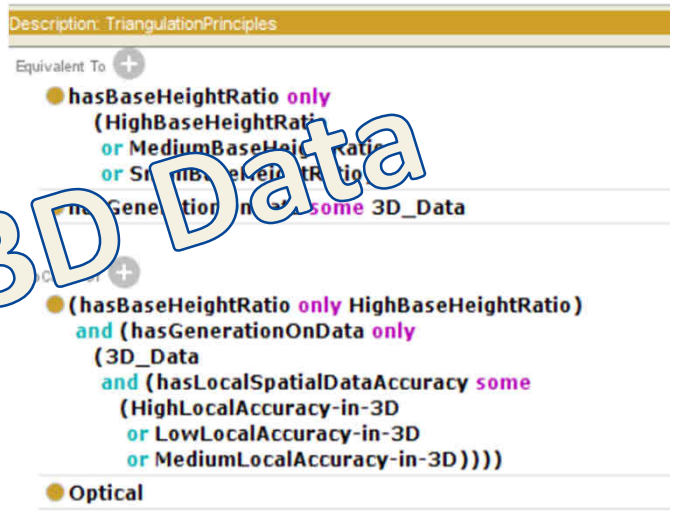
Optical

  - Central Projection

hasGenerationOnData only
(2D_Data
and (hasLocalSpatialDataAccuracy
some
(MediumLocalAccuracy-in-2D
or LowLocalAccuracy-in-2D)))

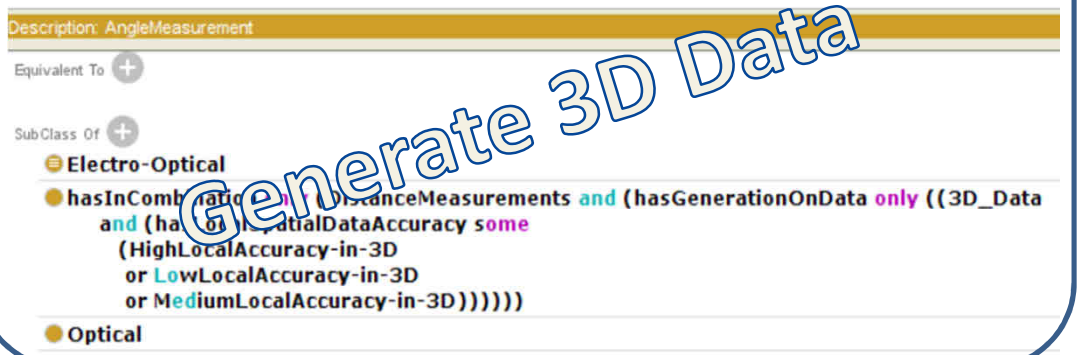
Technologies: Principles

- **Measurement Principles**
  - **Triangulations**



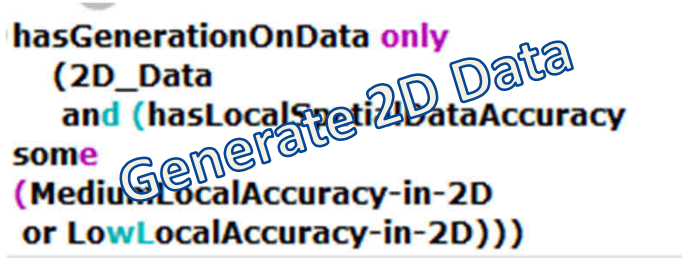
Generate 3D Data

  - **Angle Measurement / Distance Measurement**



Generate 3D Data

  - Central Projection

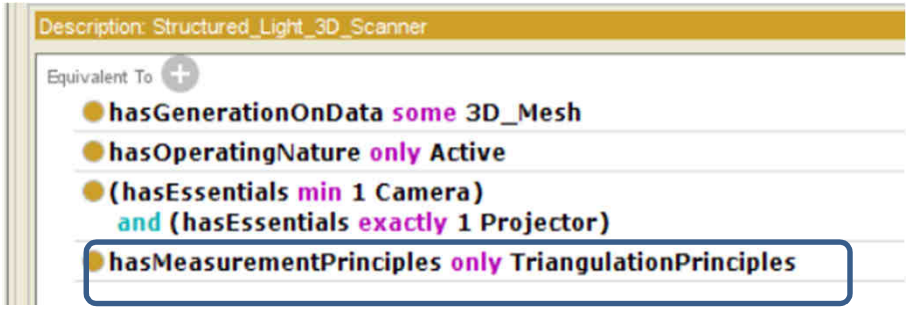


Generate 2D Data

Technologies: Instruments

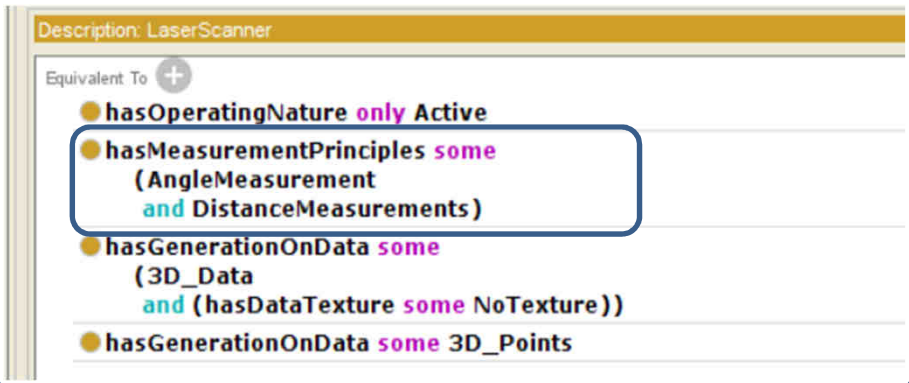
- **Main Hardware**
  - **Structured Light Scanner**

    (Triangulation)



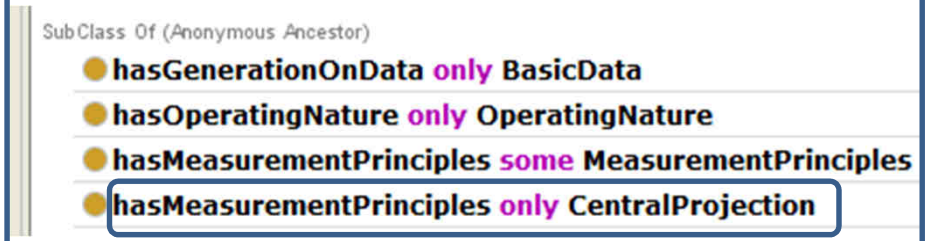
  - **Laser Scanner**

    (Distance/Angle Measurement)



  - **Camera**

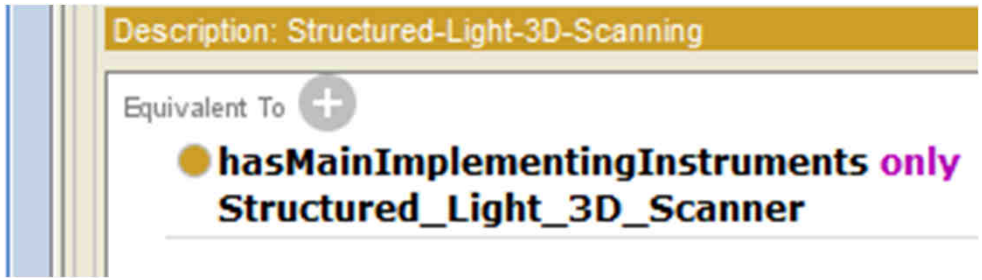
    (Central Projection)



Technologies: Technical Process

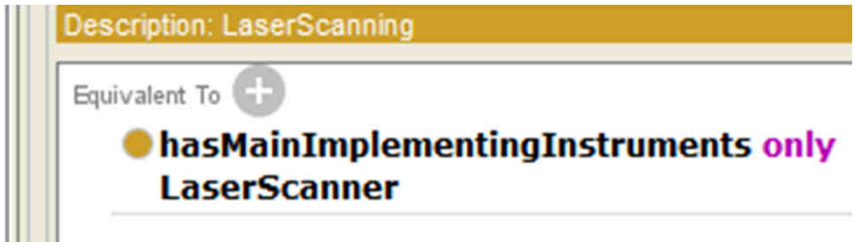
- **Structured Light Scanning**

  (Structured Light Scanner)



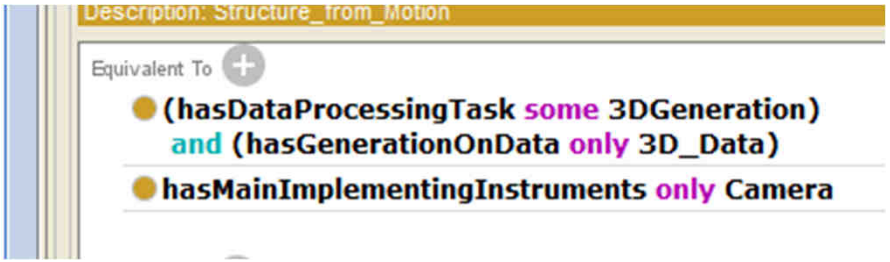
- **Laser Scanning**

  (Laser Scanner)



– **Structure from Motion**

(Camera)



Technologies: Technical Process

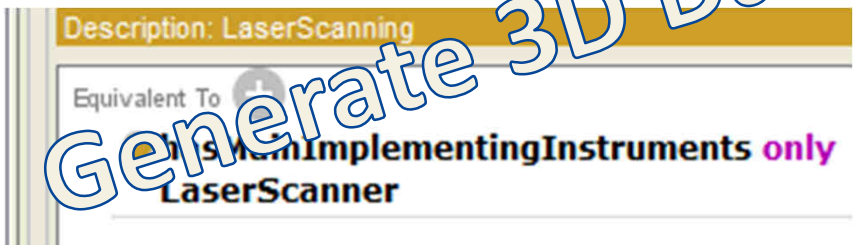
- **Structured Light Scanning**

  (Structured Light Scanner)

Generate 3D Data

- **Laser Scanning**

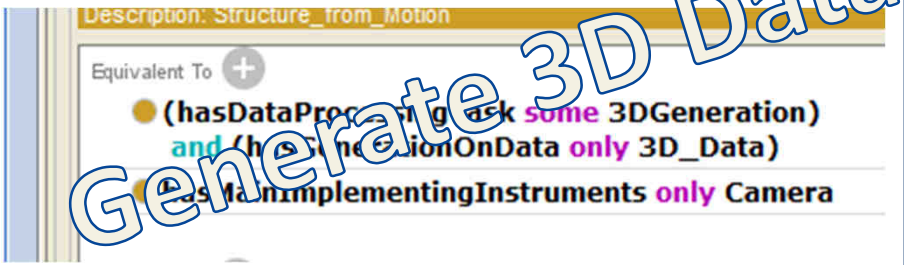
  (Laser Scanner)



Generate 3D Data

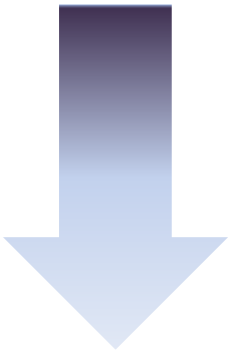
- **Structure from Motion**

  (Camera)

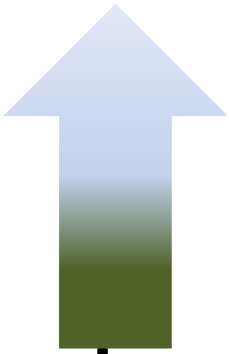


Generate 3D Data

CH Application (Deformation Analysis)



Data (High Quality 3D Data)



Technology

(Structured Light Scanning, Laser Scanning, SfM)

Technologies: Technical Process

- **Structured Light Scanning**

  Instrument: Structured Light Scanner

  Principle: Triangulation

- **Laser Scanning**

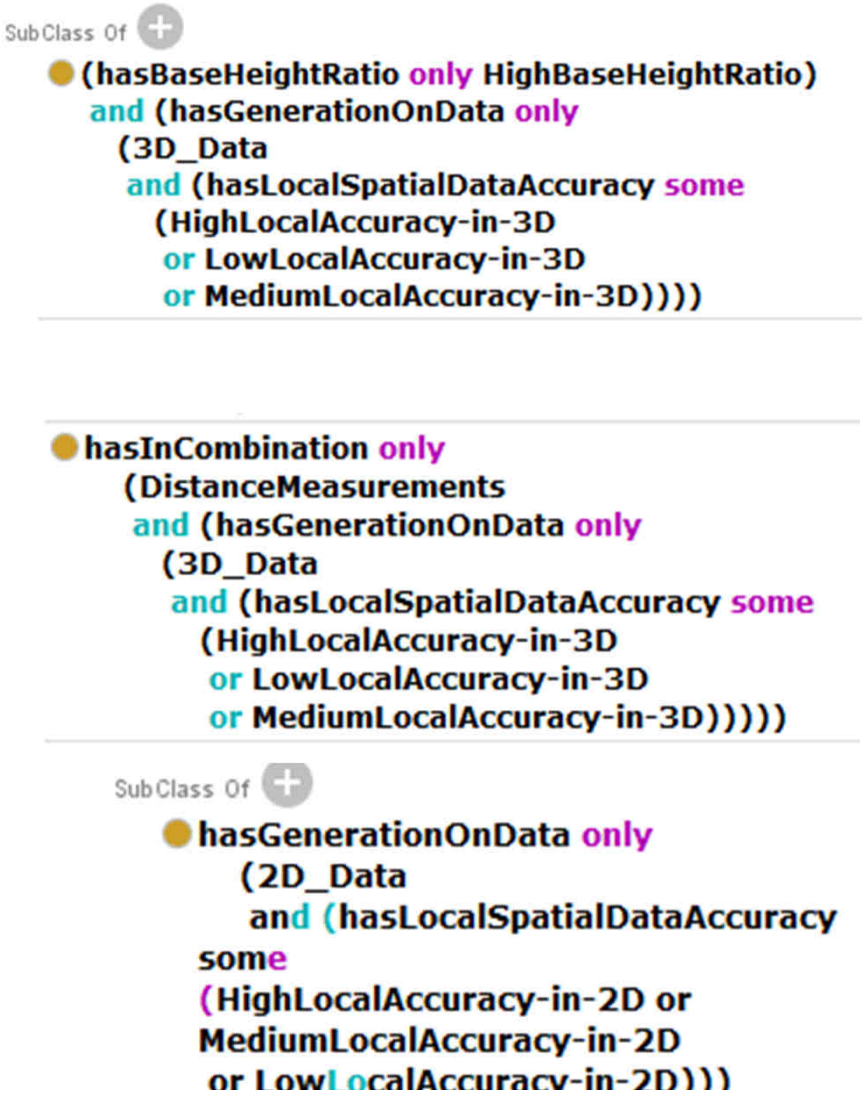
  Instrument: Laser Scanner

  Principle: Distance/Angle Msmnt

- **Structure from Motion**

  Instrument: Camera

  Principle: Central Projection



Technologies: Technical Process

- **Structured Light Scanning**

  Instrument: Structured Light Scanner

  Principle: Triangulation

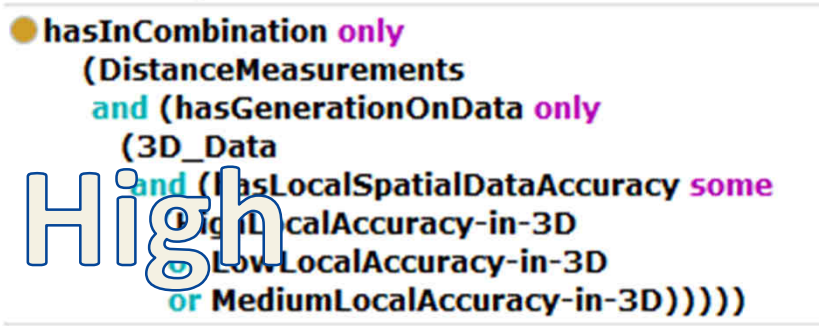
Quality – High

- **Laser Scanning**

  Instrument: Laser Scanner

  Principle: Distance/Angle Measurement

Quality – High

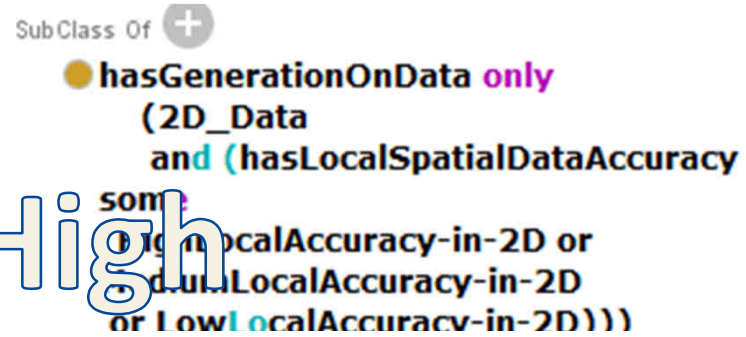


- **Structure from Motion**

  Instrument: Camera

  Principle: Central Projection

Quality – High



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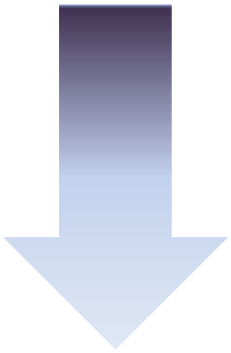
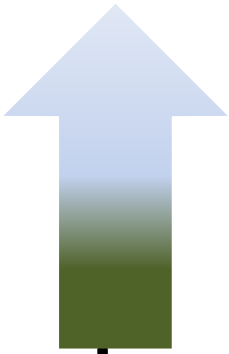


Data (High Quality 3D Data)

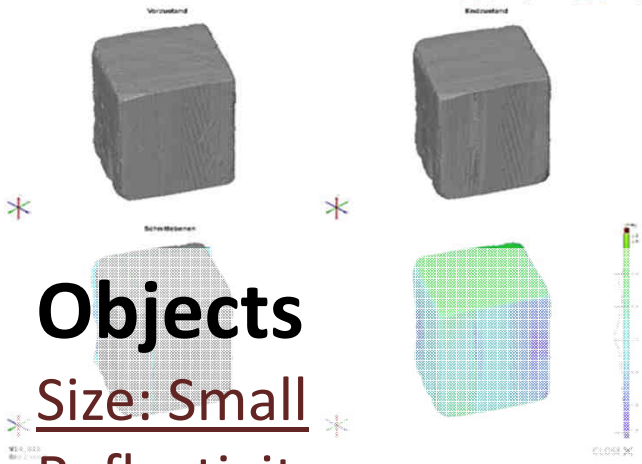


Technology

(Structured Light Scanning, Laser Scanning, SfM)

USERS INPUTS

CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity:

Quantity:

Texture:

Condition:

Data (High Accuracy 3D Data)

Technology

(Structured Light Scanning, Laser Scanning, SfM)

Technologies: Instruments

- **Main Hardware**
  - **Structured Light Scanner**

Description: Structured_Light_3D_Scanner

(hasEssentials min 1 Camera)
and (hasEssentials exactly 1 Projector)
hasMeasurementPrinciples only TriangulationPrinciples

SubClass Of

(hasCost some High_Cost)
and (hasOperatingProject some
(Projects
and (hasProjectBudgetRange some High_Budget)))
isSuitabilitiesFor some
(PhysicalThing
and ((hasObjectSize some 2DSize_Small)
or (hasObjectVolume some 3DVolume_Small)))

  - **Laser Scanner**

SubClass Of

(hasCost some High_Cost)
and (hasOperatingProject some
(Projects
and (hasProjectBudgetRange some High_Budget)))
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectTexture some
(Non-Textured
or Textured)))
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectVolume some
(3DVolume_Big
or 3DVolume_Medium)))

  - Camera

SubClass Of

ImagingDevice
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectVolume some
(3DVolume_Big
or 3DVolume_Medium
or 3DVolume_Small)))

Technologies: Instruments

- **Main Hardware**
  - **Structured Light Scanner**

Description: Structured_Light_3D_Scanner

(hasEssentials min 1 Camera)
and (hasEssentials exactly 1 Projector)
hasMeasurementPrinciples only TriangulationPrinciples

(Projects
and (hasProjectBudgetRange some High_Budget)))
isSuitabilitiesFor some
(PhysicalThing
and ((hasObjectSize some 2DSize_Small)
or (hasObjectVolume some 3DVolume_Small)))

Suitability: Small Objects

  - **Laser Scanner**

SubClass Of
(hasCost some High_Cost)
and (hasOperatingProject some
(Projects
and (hasProjectBudgetRange some High_Budget)))
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectExtension some
(Non-Textured
or Textured)))
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectVolume some
(3DVolume_Big
or 3DVolume_Medium)))

Suitability: Large Objects

  - Camera

SubClass Of
ImagingDevice
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectVolume some
(3DVolume_Big
or 3DVolume_Medium
or 3DVolume_Small)))

Suitability: all sized Objects

Technologies: Instruments

- **Main Hardware**
  - **Structured Light Scanner**

Description: Structured_Light_3D_Scanner

(hasEssentials min 1 Camera)
and (hasEssentials exactly 1 Projector)
hasMeasurementPrinciples only TriangulationPrinciples

SubClass Of

(hasCost some High_Cost)
and (hasOperatingProject some
(Projects
and (hasProjectBudgetRange some High_Budget)))
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(PhysicalThing
and ((hasObjectSize some 2DSize_Small)
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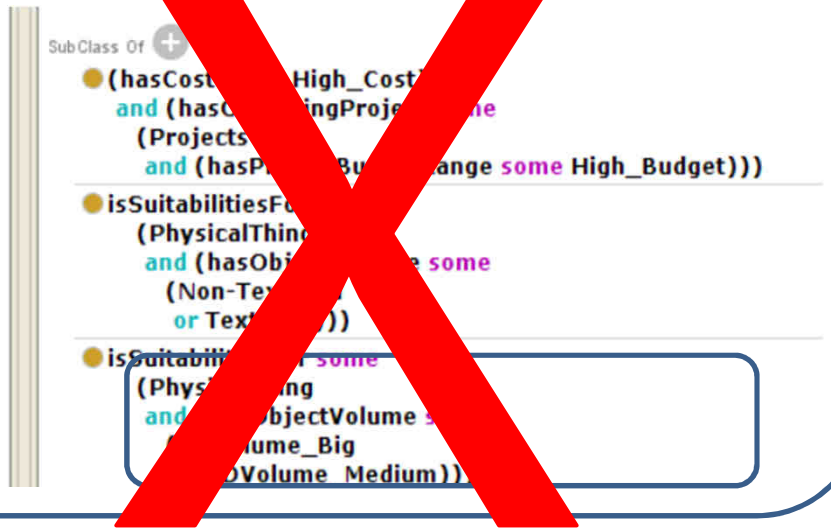
  - **Laser Scanner**



  - **Camera**

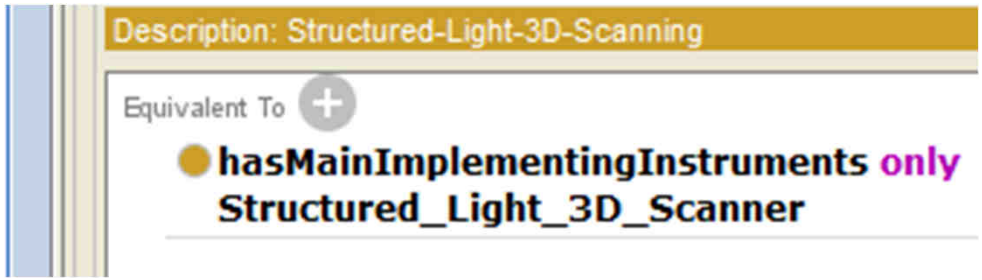
SubClass Of

ImagingDevice
isSuitabilitiesFor some
(PhysicalThing
and (hasObjectVolume some
(3DVolume_Big
or 3DVolume_Medium
or 3DVolume_Small)))

Technologies: Technical Process

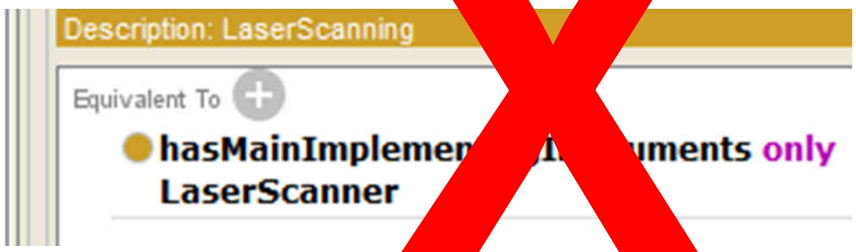
- **Structured Light Scanning**

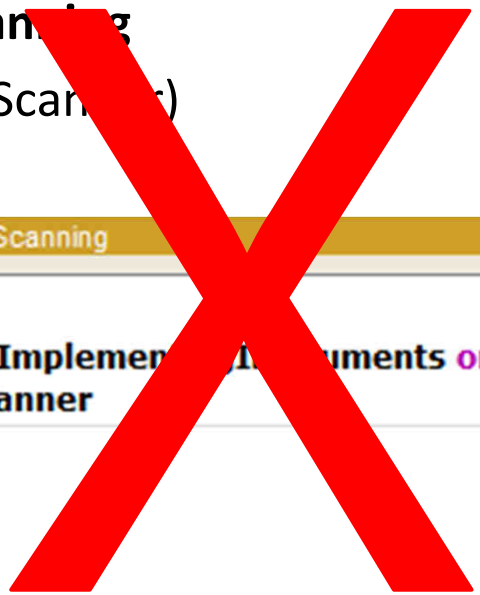
  (Structured Light Scanner)



- **Laser Scanning**

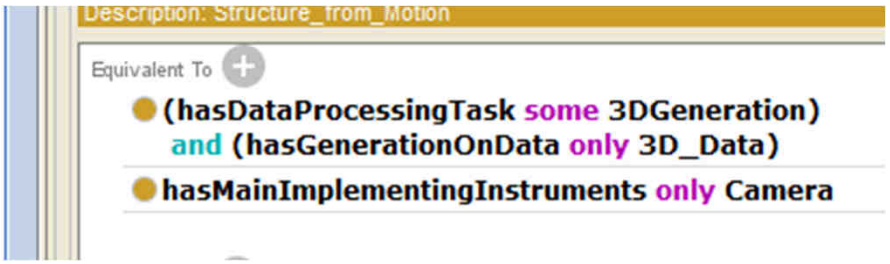
  (Laser Scanner)





– **Structure from Motion**

  (Camera)



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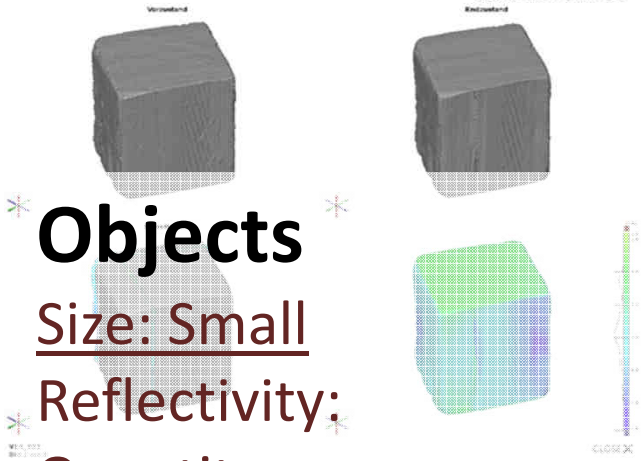
COSCH
COLOR & SPACE IN CULTURAL HERITAGE

CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity:

Quantity:

Texture:

Condition:

Data (High Quality 3D Data)

Technology

(Structured Light Scanning, ~~Laser Scanning~~, SfM)

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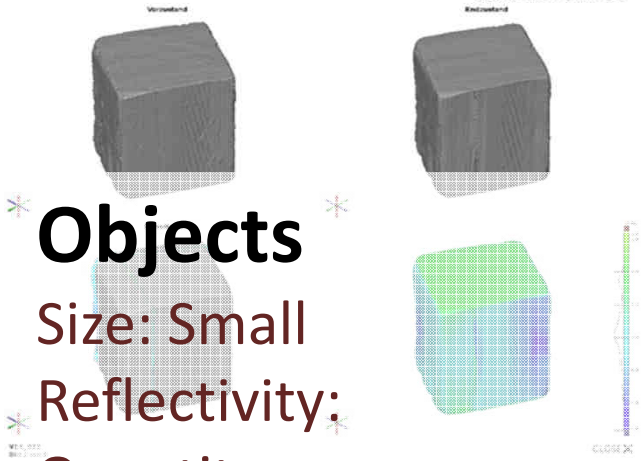


Objects

Size: Small

Reflectivity:

Quantity:

Texture: Non-Textured

Condition:

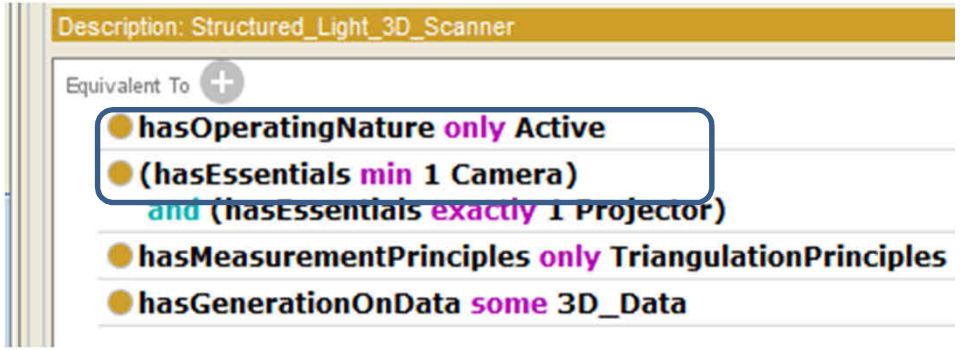
Data (High Accuracy 3D Data)

Technology

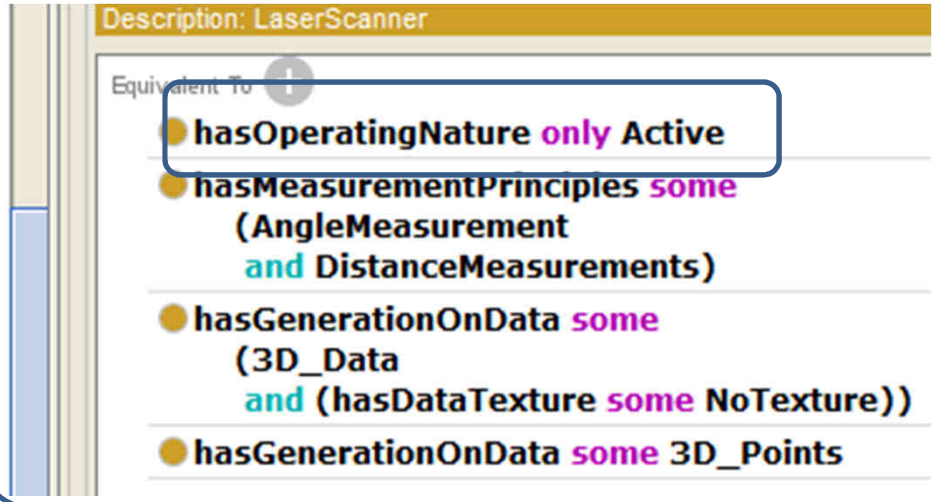
(Structured Light Scanning, ~~Laser Scanning~~, SfM)

Technologies: Instruments

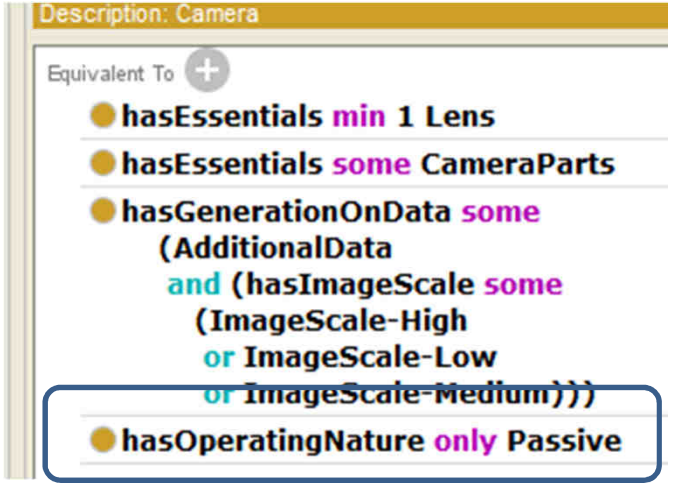
- **Main Hardware**
  - **Structured Light Scanner**



  - **Laser Scanner**

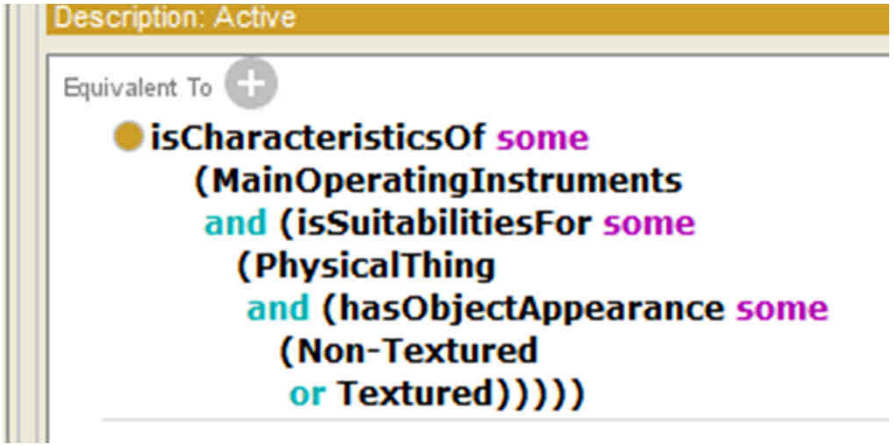


  - **Camera**

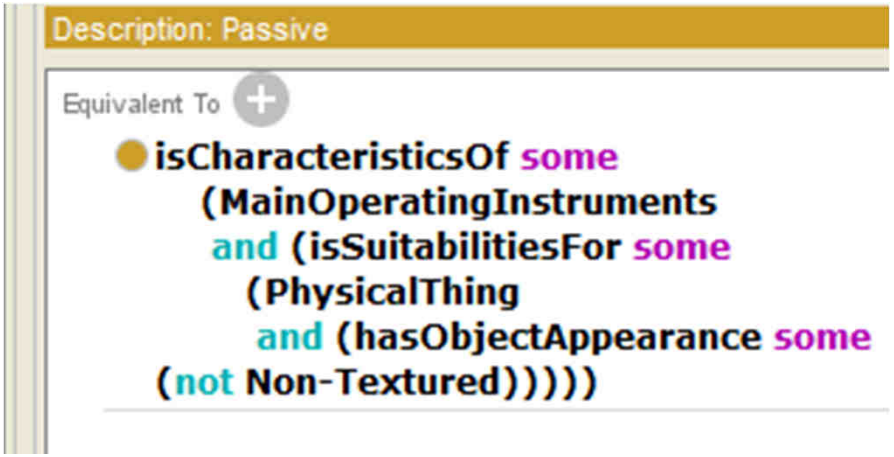


Instruments: Operating Nature

- Active

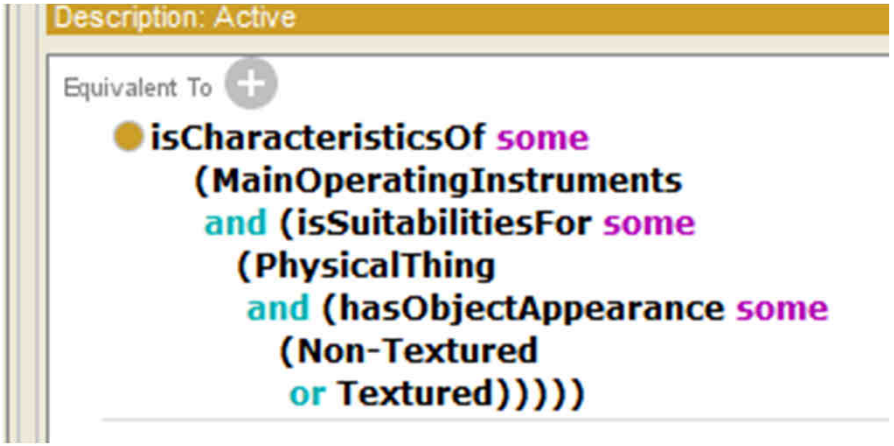


- Passive

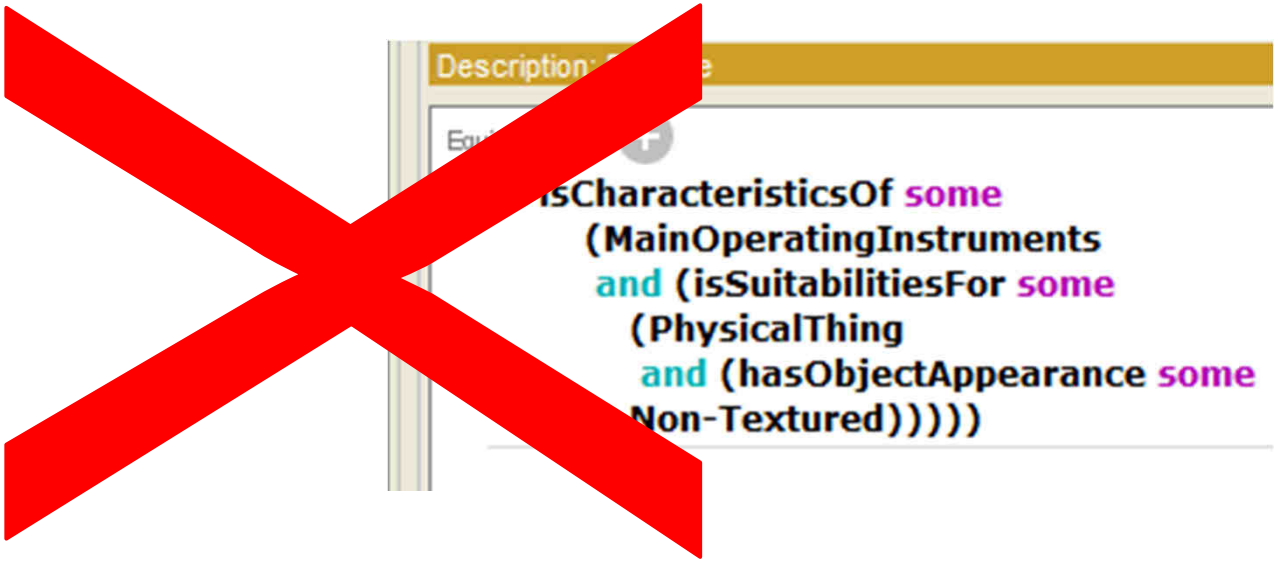


Instruments: Operating Nature

- Active

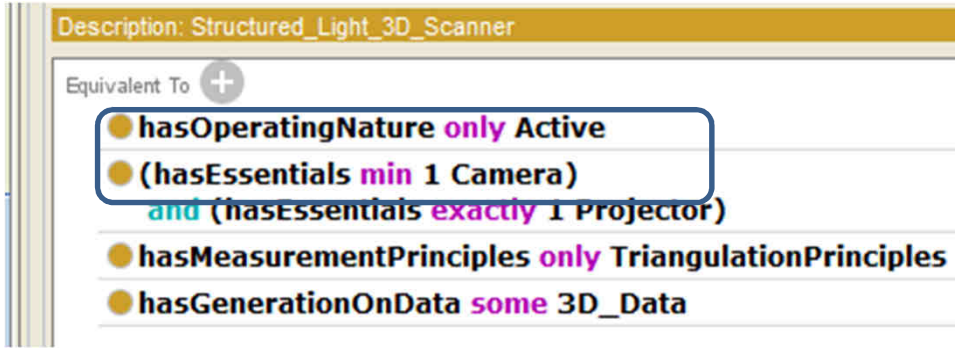


- Passive

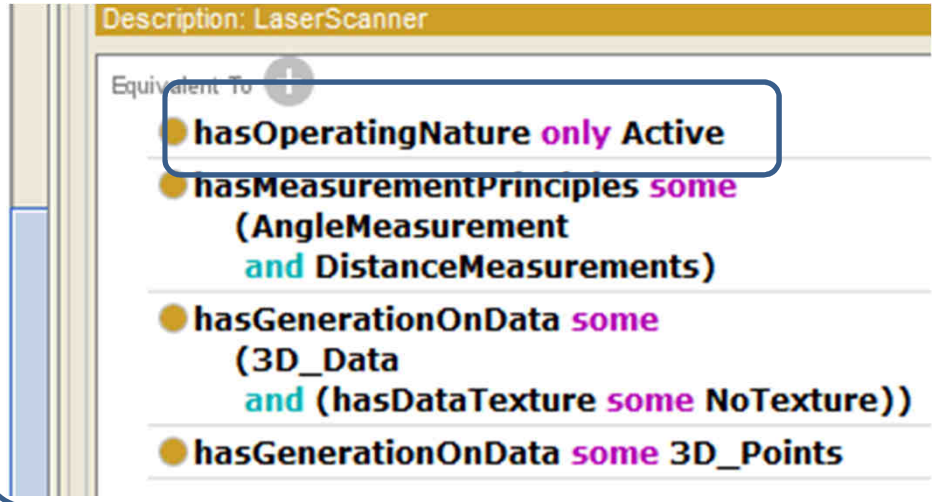


Technologies: Instruments

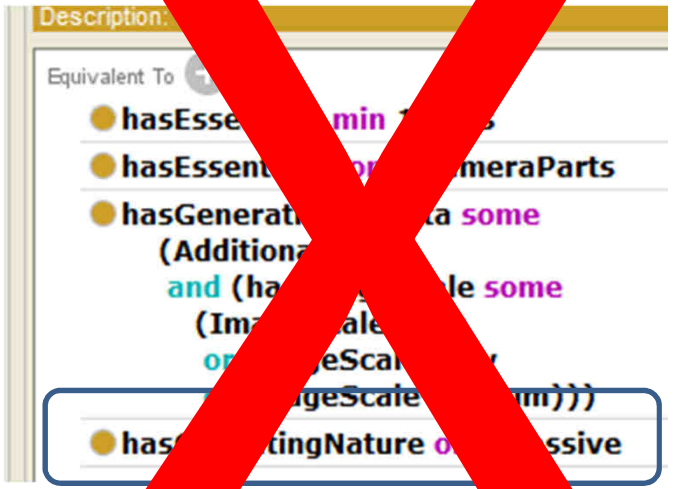
- **Main Hardware**
  - **Structured Light Scanner**



  - **Laser Scanner**



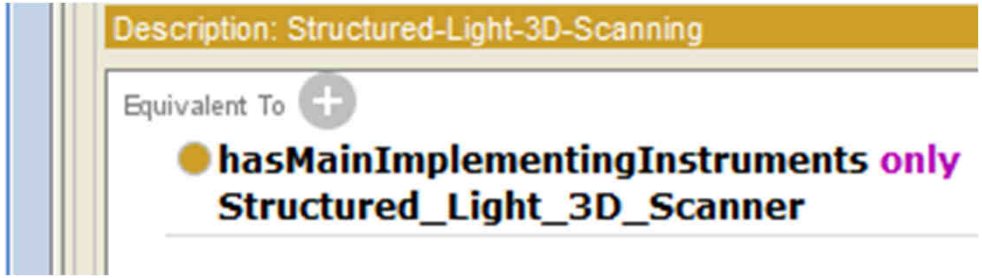
  - **Camera**



Technologies: Technical Process

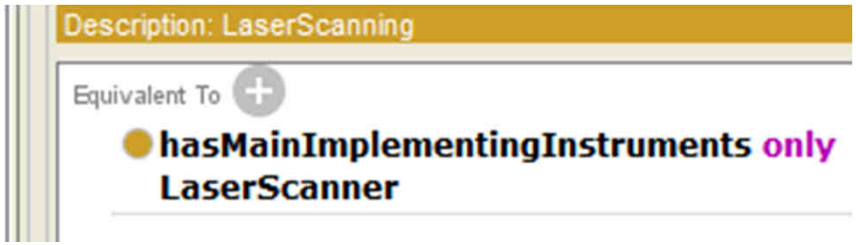
- **Structured Light Scanning**

  (Structured Light Scanner)



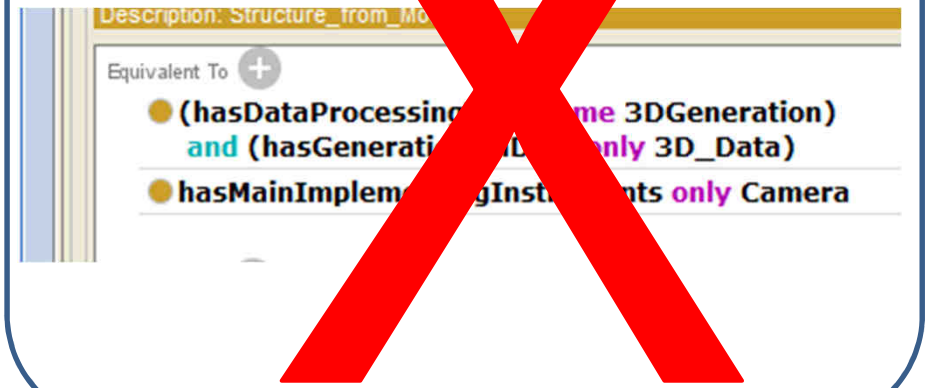
- **Laser Scanning**

  (Laser Scanner)



- ~~**Structure from Motion**~~

  ~~(Camera)~~



Technologies: Technical Process

- **Structured Light Scanning**

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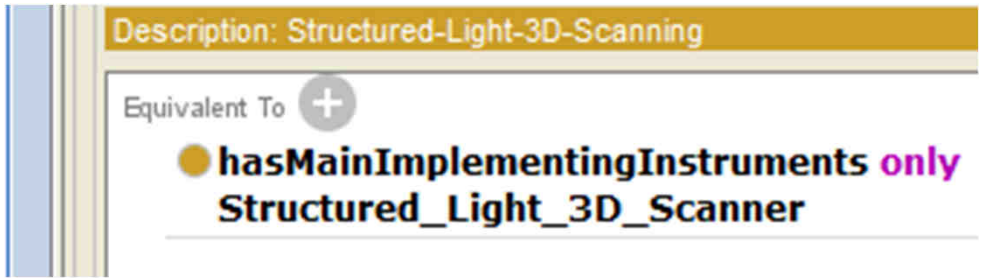
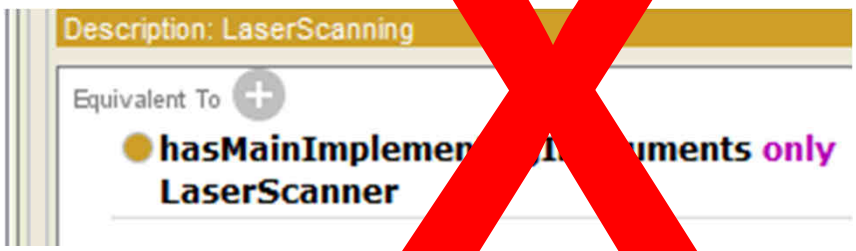


- **Laser Scan**

  (Laser Scan)



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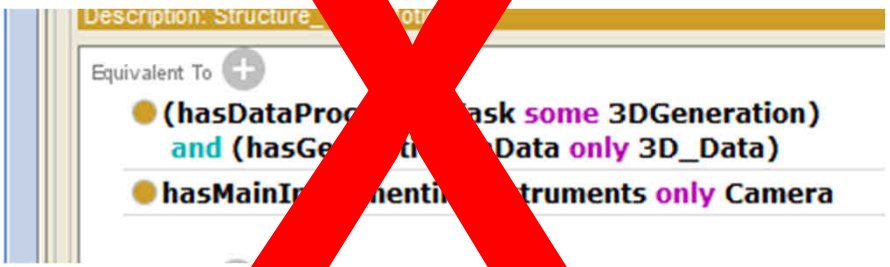

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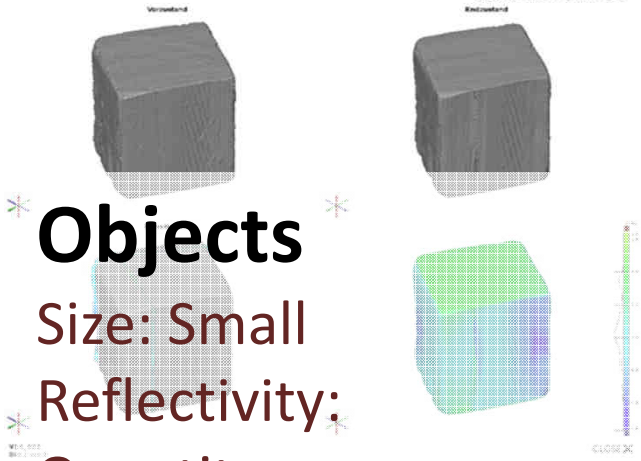


Objects

Size: Small

Reflectivity:

Quantity:

Texture: Non-Textured

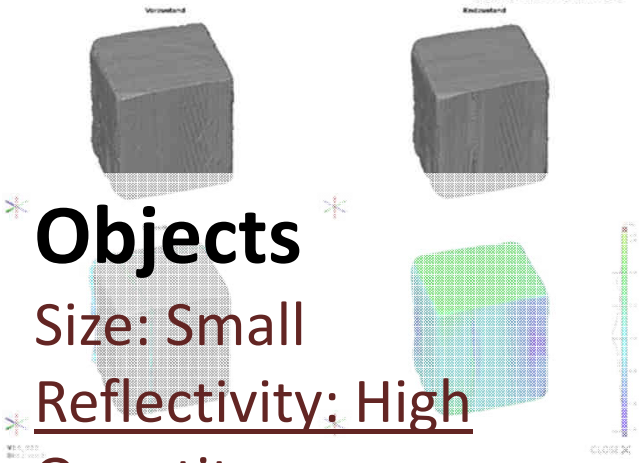
Condition:

Data (High Quality 3D Data)

Technology

(Structured Light Scanning, ~~Laser Scanning~~, ~~SfM~~)

CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: High

Quantity:

Texture: Non-Textured

Condition:

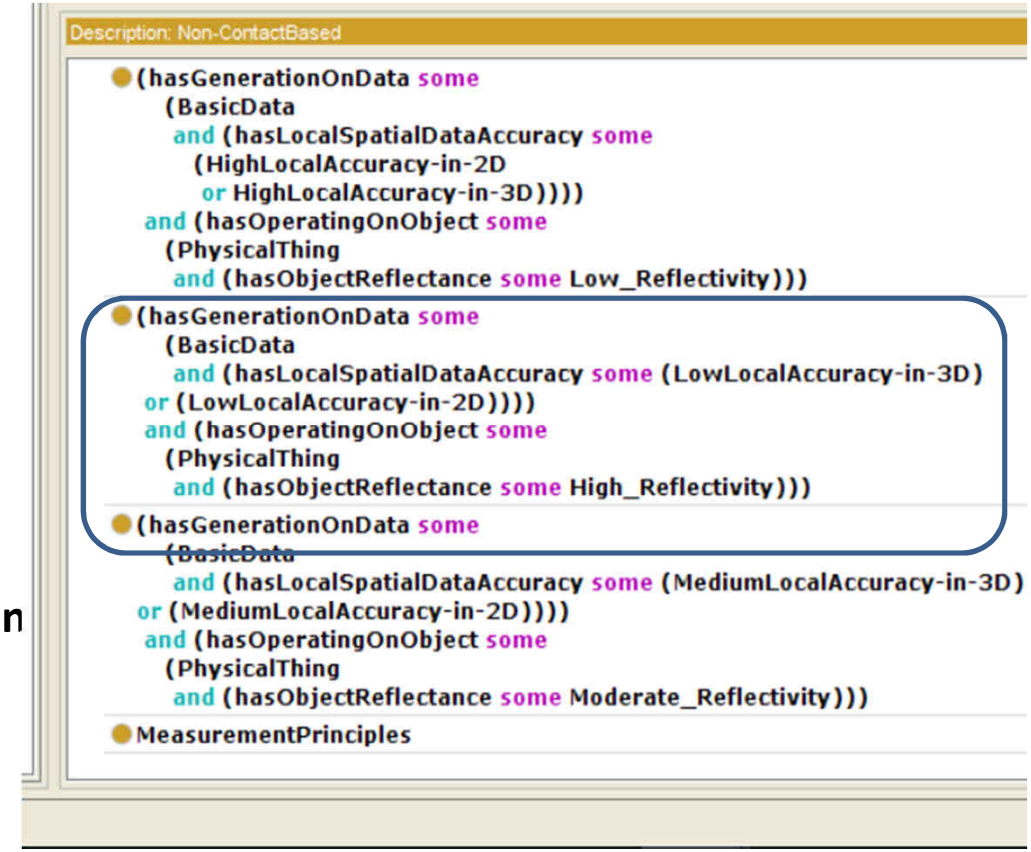
Data (High Quality 3D Data)

Technology

(Structured Light Scanning, ~~Laser Scanning~~, ~~SfM~~)

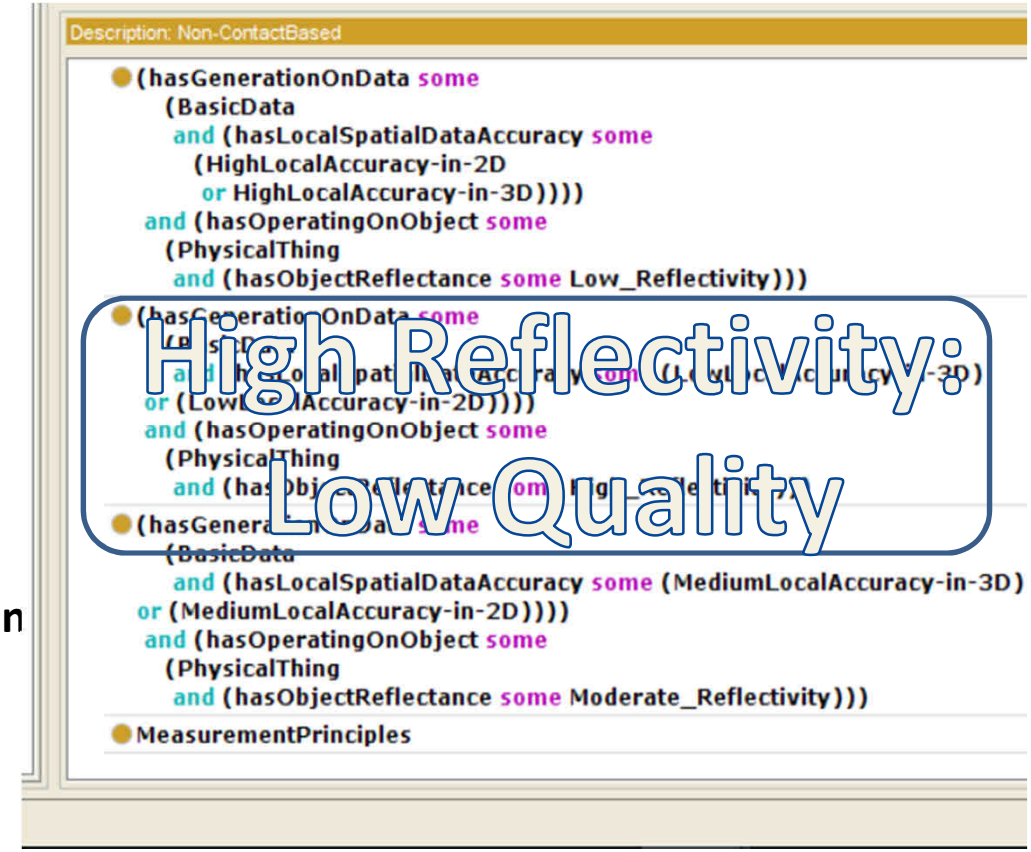
Technologies: Principles

- **Triangulations**
  - **Structured Light Scanner – Structured Light Scanning**
- **Angle/Distance Measurements**
  - **Laser Scanner – Laser Scanning**
- **Central Projection**
  - **Camera – Structure from Motion**

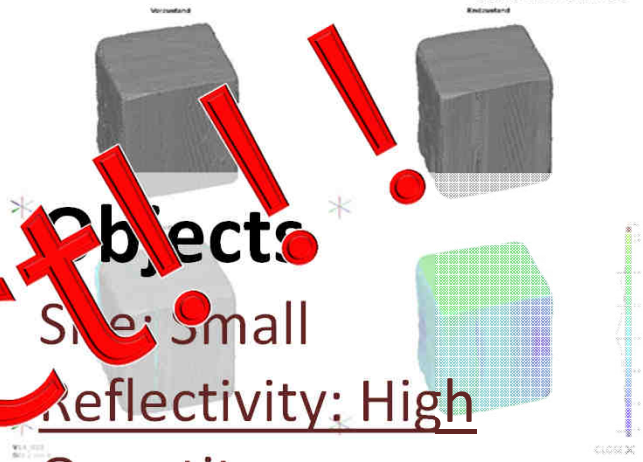


Technologies: Principles

- Tri[illegible]lations
  - St[illegible]ured Ligh[illegible]anner – Struc[illegible]d L[illegible] Scanning
- Angle/Dist[illegible] Measurements
  - Lase[illegible]anne[illegible]Laser Scanning
- Cent[illegible]Projection
  - [illegible]amera – Structur[illegible]m Motion



CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: High

Quantity:

Texture: Non-Textured

Condition: Fragile

!!! Conflict !!!

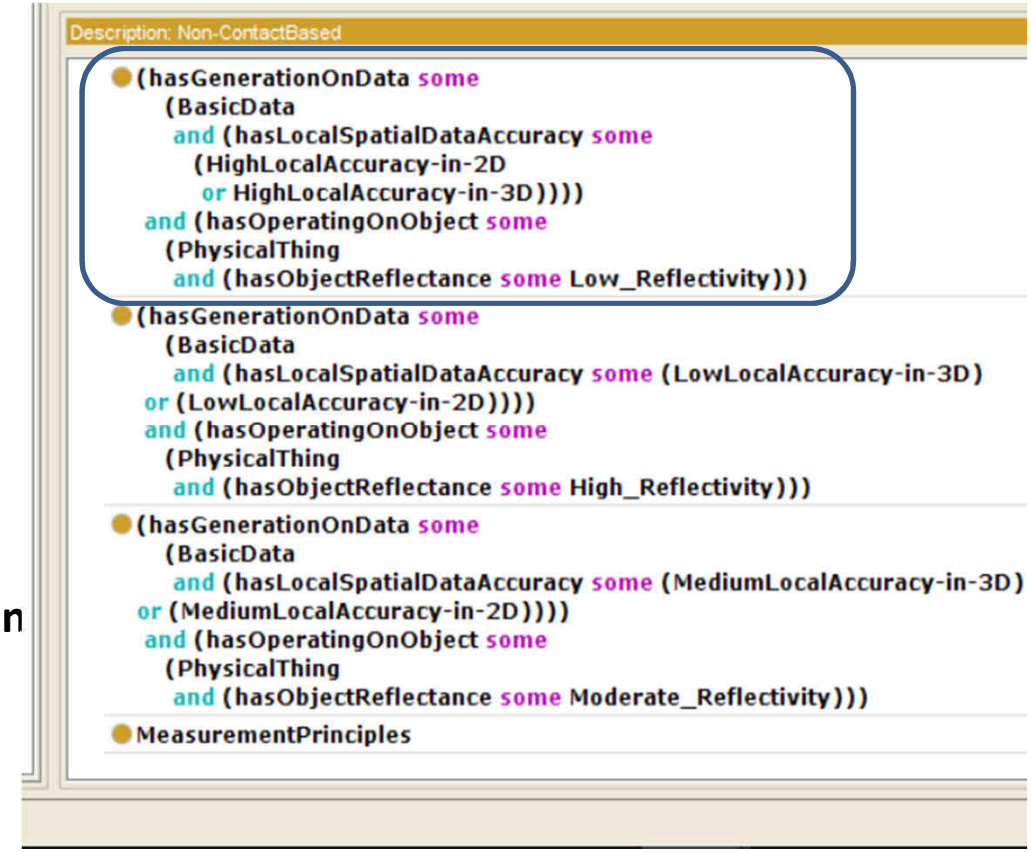
Data (High Accuracy 3D Data)

Technology

(~~Structured Light Scanning~~, ~~Laser Scanning~~, ~~SfM~~)

Technologies: Principles

- **Triangulations**
  - **Structured Light Scanner – Structured Light Scanning**
- **Angle/Distance Measurements**
  - **Laser Scanner – Laser Scanning**
- **Central Projection**
  - **Camera – Structure from Motion**



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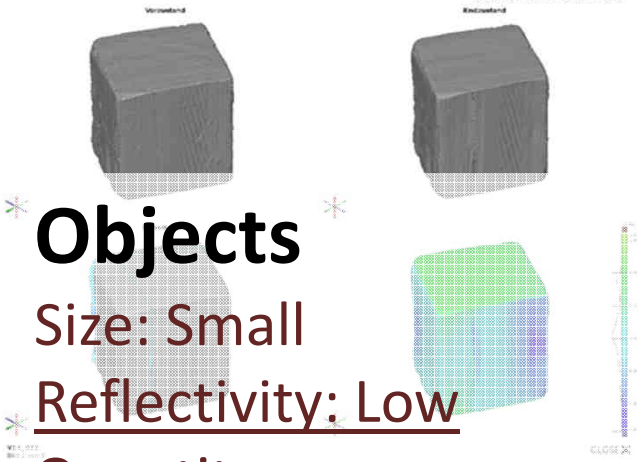
Institute for Spatial Information and Surveying Technology
Mainz University of Applied Sciences

COSCH
COLOR & SPACE IN CULTURAL HERITAGE

CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: Low

Quantity:

Texture: Non-Textured

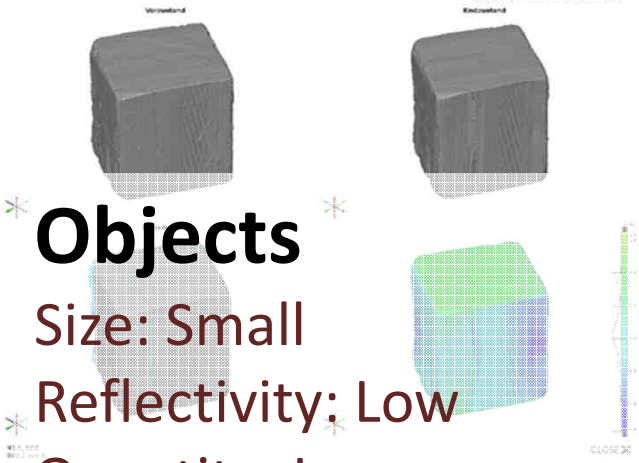
Condition:

Data (High Quality 3D Data)

Technology

(Structured Light Scanning, ~~Laser Scanning~~, ~~SfM~~)

CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: Low

Quantity: Large

Texture: Non-Textured

Condition:

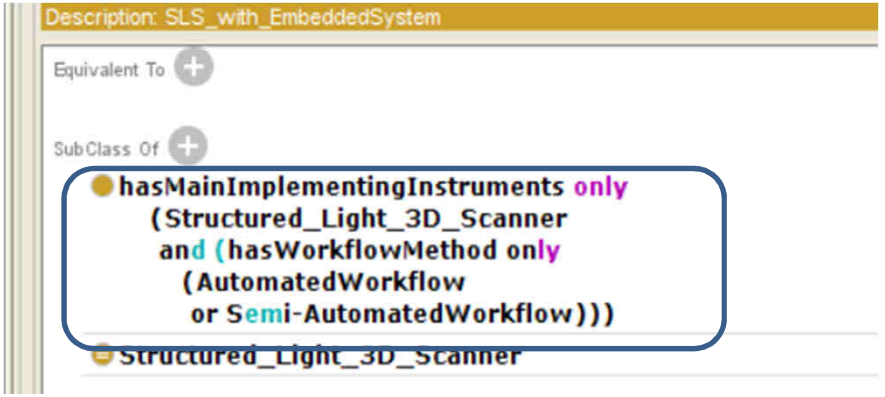
Data (High Quality 3D Data)

Technology

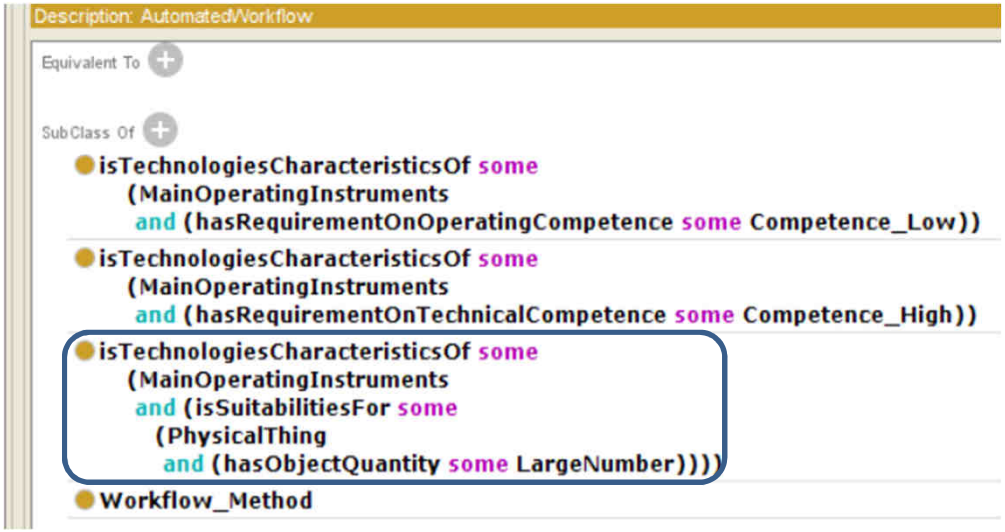
(Structured Light Scanning, ~~Laser Scanning~~, ~~SfM~~)

Technologies: Instruments

- **Structured Light Scanners**
  - **Automated / Semi-Automated Workflow**

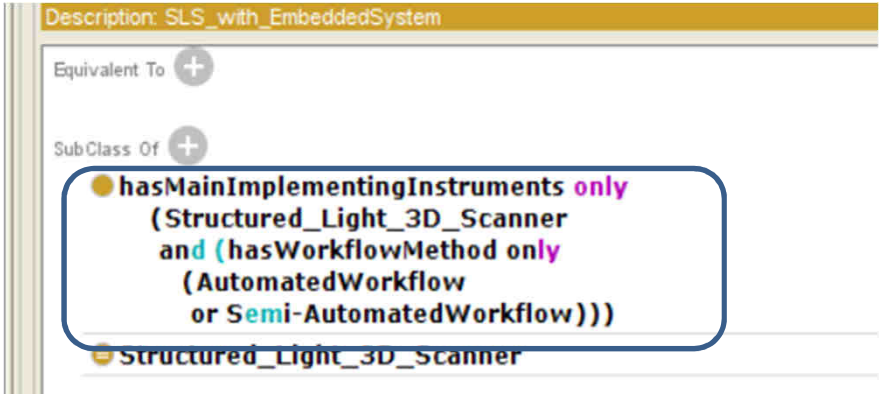


- **Automated / Semi-Automated Workflow**
  - **Suitable for large numbers of object**

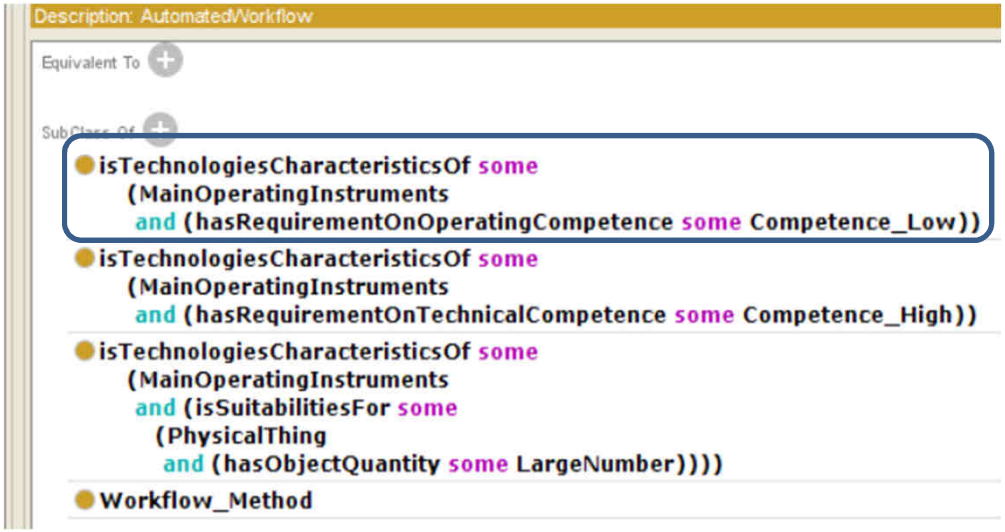


Technologies: Instruments

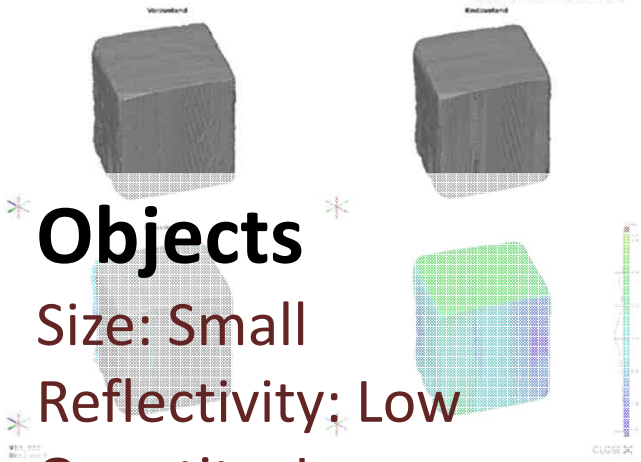
- **Structured Light Scanners**
  - **Automated / Semi-Automated Workflow**



- **Automated / Semi-Automated Workflow**
  - **Suitable for operating staff competency: Low**



CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: Low

Quantity: Large

Texture: Non-Textured

Condition: Fragile

Data (High Accuracy 3D Data)

External Influences

Project

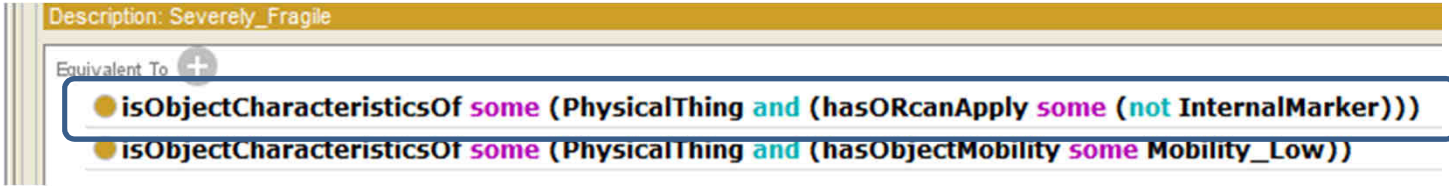
Staff Competence: Low

Technology

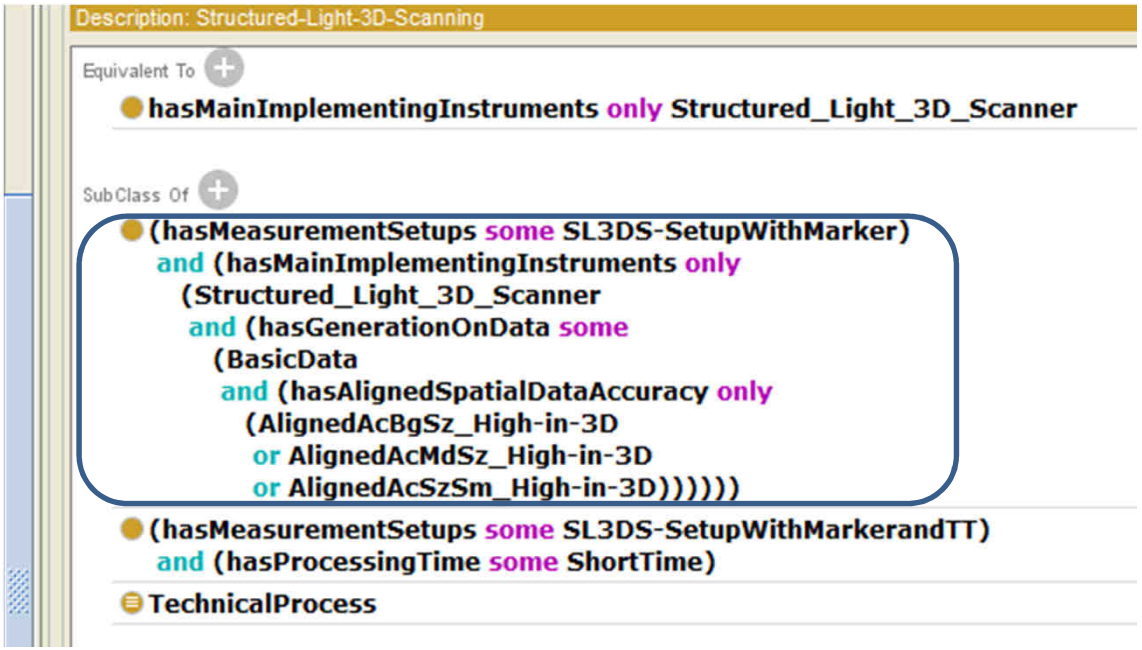
(Structured Light Scanning, ~~Laser Scanning~~, ~~SfM~~)

Technologies: Technical Process

- **Fragile**
  - **No internal markers**

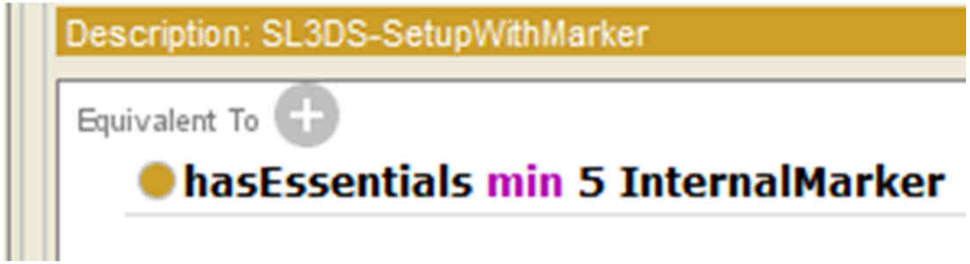


- **Structured Light Scanning**
  - **Setup with Markers**
    - **Generates highly accurate data**

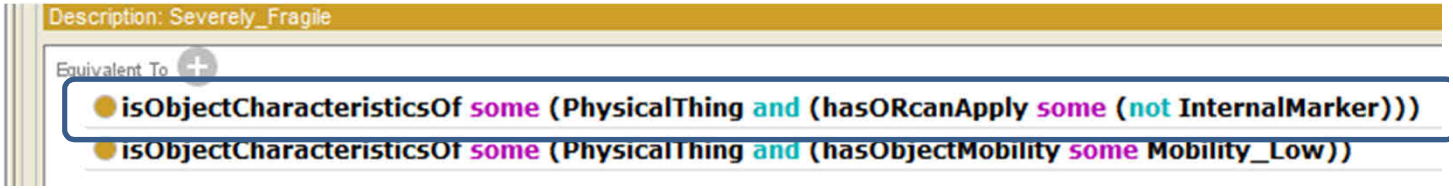


Technologies: Technical Process

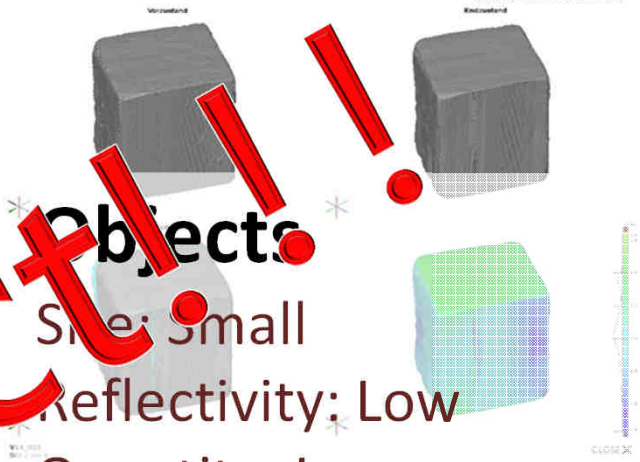
- **Setup with Markers**
  - **Needs at least 5 internal markers**



- **Object – Fragile**
  - **No internal Marker Possible**



CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: Low

Quantity: Large

Texture: Non-Textured

Condition: Fragile

Data (High Accuracy 3D Data)

External Influences

Project

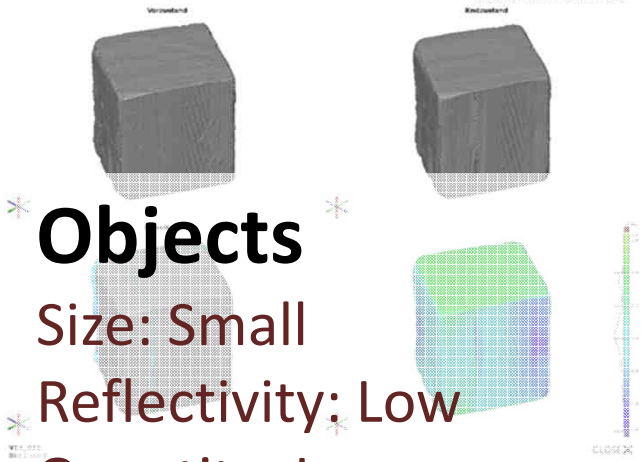
Staff Competence: Low

!!! Conflict !!!

Technology

(Structured Light Scanning, Laser Scanning, SfM)

CH Application (Deformation Analysis)



Objects

Size: Small

Reflectivity: Low

Quantity: Large

Texture: Non-Textured

Condition: Fragile

but internal markers possible

Data (High Quality 3D Data)

External Influences

Project

Staff Competence: Low

Technology

(Structured Light Scanning, ~~Laser Scanning~~, ~~SfM~~)