Working with Big *3D* data

Context-adaptive similarity reasoning for large collections of 3D models

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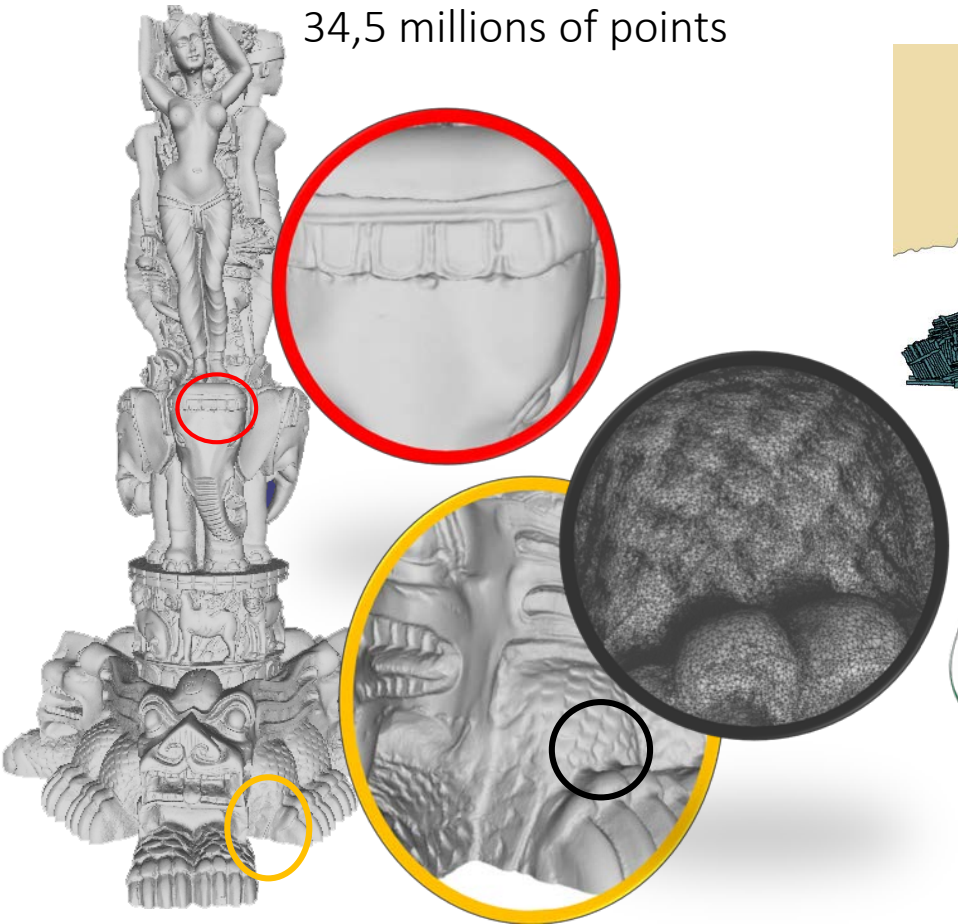
GRAVITATE: Geometric Reconstruction And noVel semantIc reunificaTion of culturAl heriTage objEcts

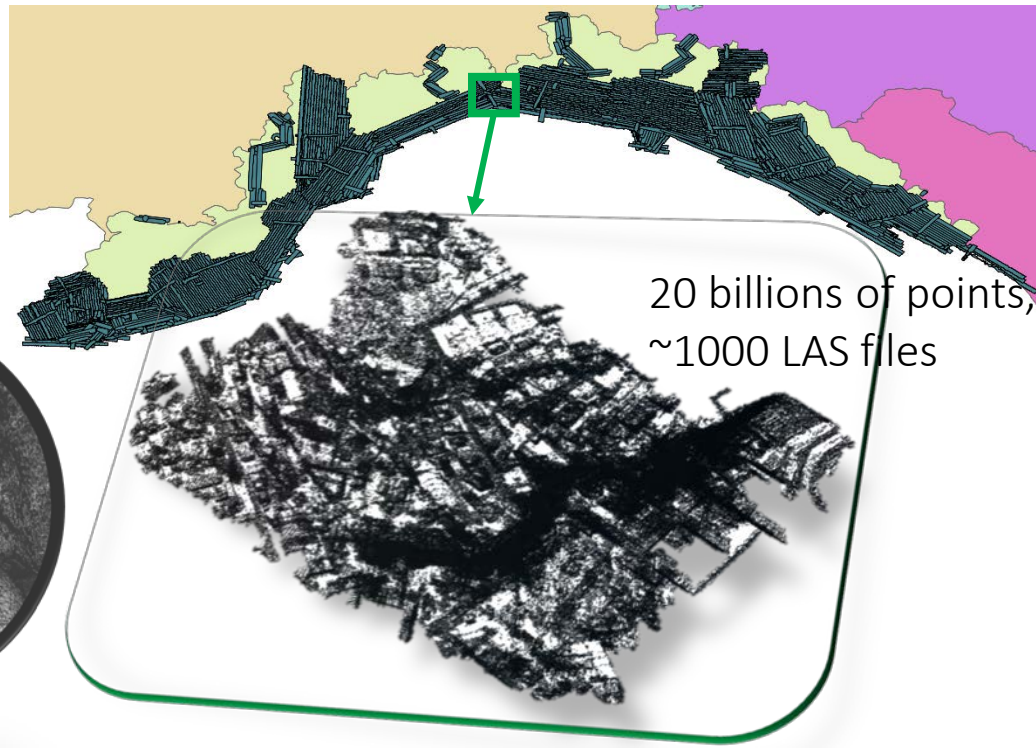
H2020 REFLECTIVE-7 - 2015-2018

Consortium: IT Innovation (UK), British Museum (UK), STARC - The Cyprus Institute (CY), IT Innovation Centre – Univ. of Southampton (UK), Informatics Institute, Universiteit van Amsterdam (NL), Technion Israel Institute of Technology (IL)

3D models & big data

- 3D models are intrinsically complex
  - high resolution scans are now available and contains millions or billions of points (and faces)





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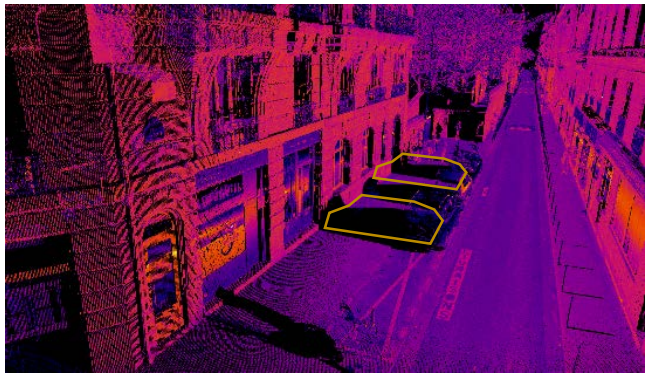

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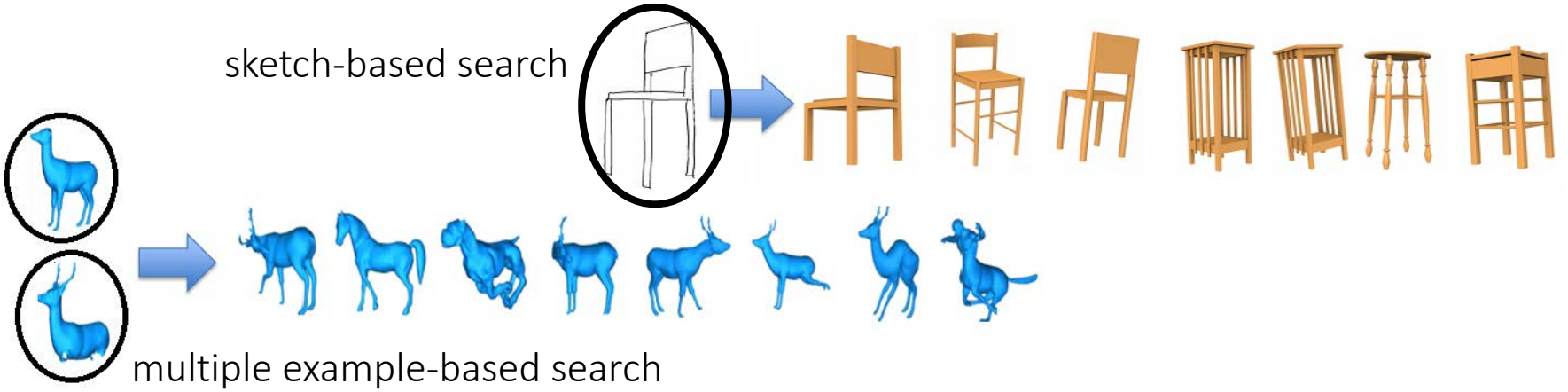

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- we are addressing similarity reasoning in collections of 3D models with heterogeneous properties and shape
  - geometric shape…
  - … but also material, color, decorations, common parts

GRAVITATE challenges

- to create software tools to allow archaeologists & curators to reconstruct **shattered** or **broken** CH objects
- to **recognise associations** between artefacts to allow new knowledge and understanding of past societies
- to **identify** and **re-unify** parts of a cultural object that has been **separated across collections**

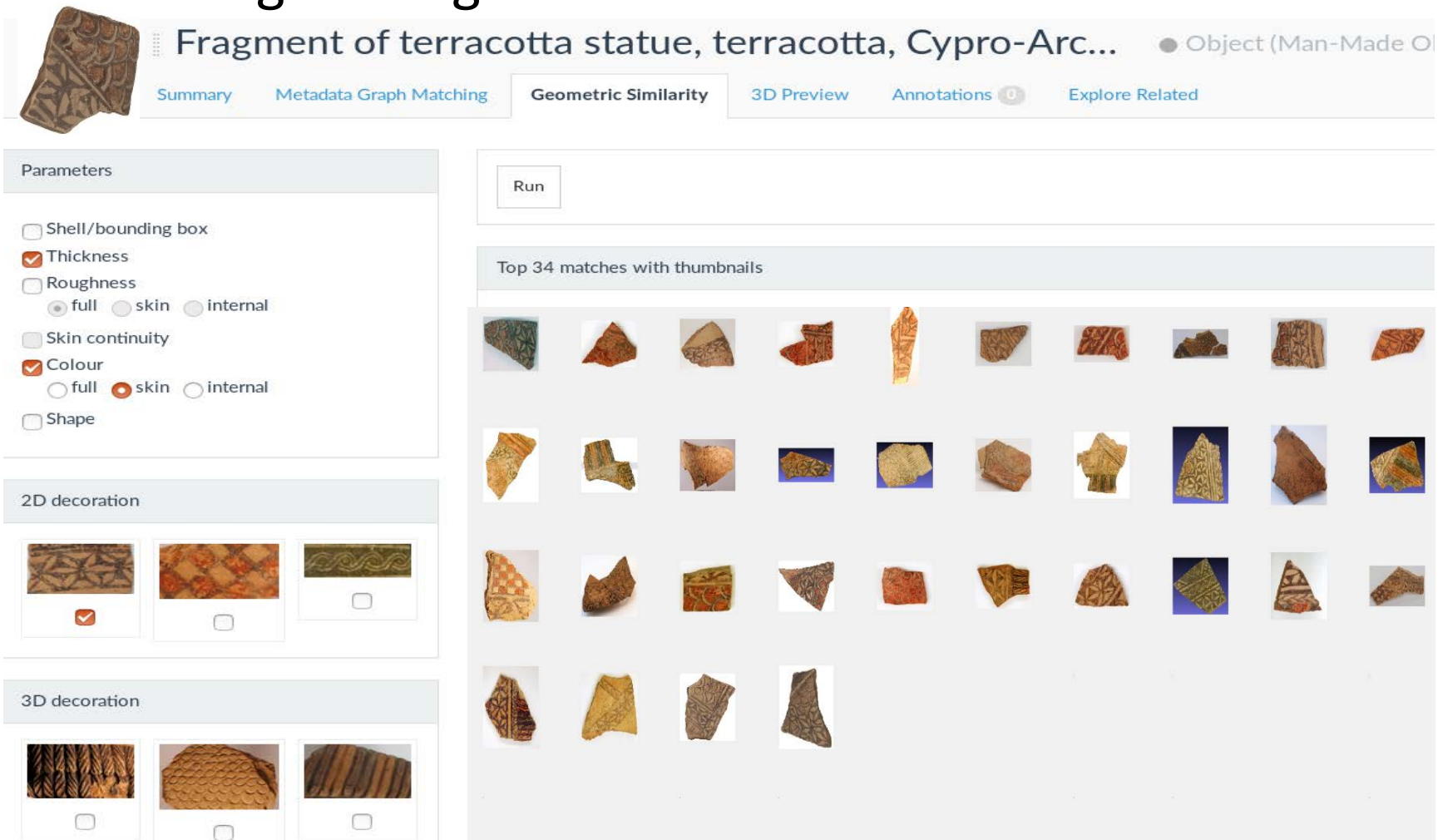
Re-Unification

Re-Association

Re-Assembly

content-aware similarity reasoning

- thickness, curvature, shape and decorations are the features that drive the GRAVITATE "*similarity engine*" for archaeological fragments



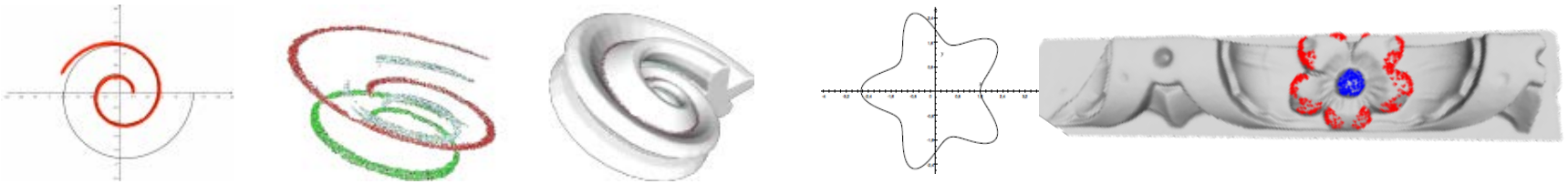
current research

- multi-criteria search, extension to generic repositories

- management of cross- and multi- modality searches and datasets (sketches, images, 3D models, time-varying objects, object sub-parts, features, etc..)

current research

- pattern recognition for surfaces
  - recognition of complex features: semantic elements, decorations, patterns, style,...



Torrente et al, (2018) *Recognition of feature curves on 3D shapes using an algebraic approach to Hough transforms*. Pattern recognition

Moscoso Thompson & Biasotti (2018) *Description and Retrieval of Geometric Patterns on Surface Meshes using an edge-based LBP approach*. Pattern recognition

Moscoso Thompson & Biasotti, (2019), Color patterns retrieval on surface meshes using the edgeLBP description, Computers&Graphics

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at the end…
… thank you for your attention!