

A research conducted by *Nature* in 2016 shows that 70% of 1,576 researchers who took part in the study, failed to reproduce another scientist's research protocol, and more than half have failed to reproduce their own research protocols.

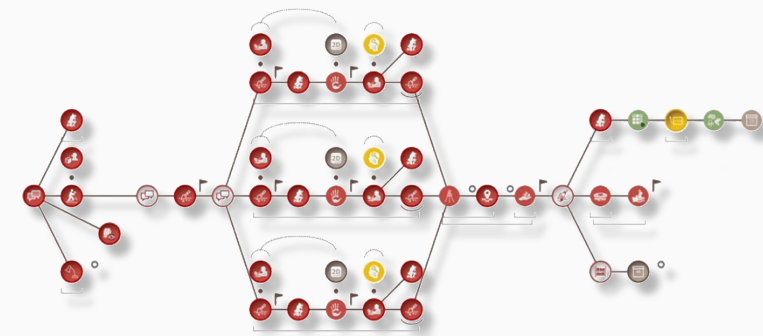
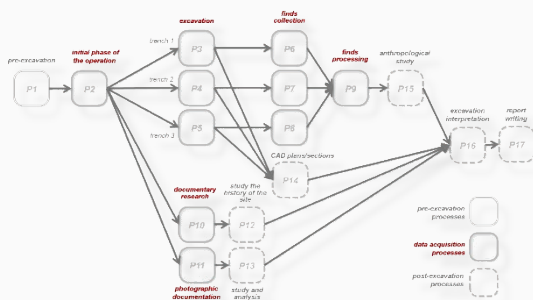
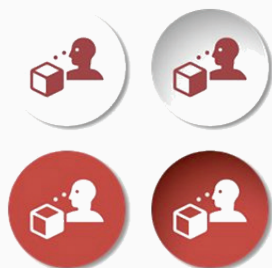
*Baker, M. 1,500 scientists lift the lid on reproducibility. Nature 533, 452–454 (2016).
<<https://doi.org/10.1038/533452a>>*



CAA2023



UMR 3495 CNRS/MC MAP - Modèles et simulations pour l'Architecture et le Patrimoine

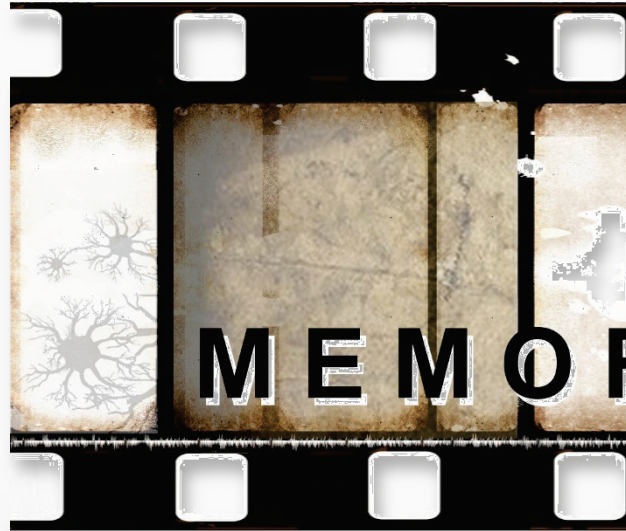


Iwona DUDEK, Jean-Yves BLAISE

Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - the MEMORIA IS



- brief outline of the Memoria IS objectives,
- clarification of the underlying concepts,
(output, process, workflow, metadata, paradata)
- illustration of these concepts by means of examples,
- discussion about advantages and limits of the system,
- short draft of the future works.



traceability

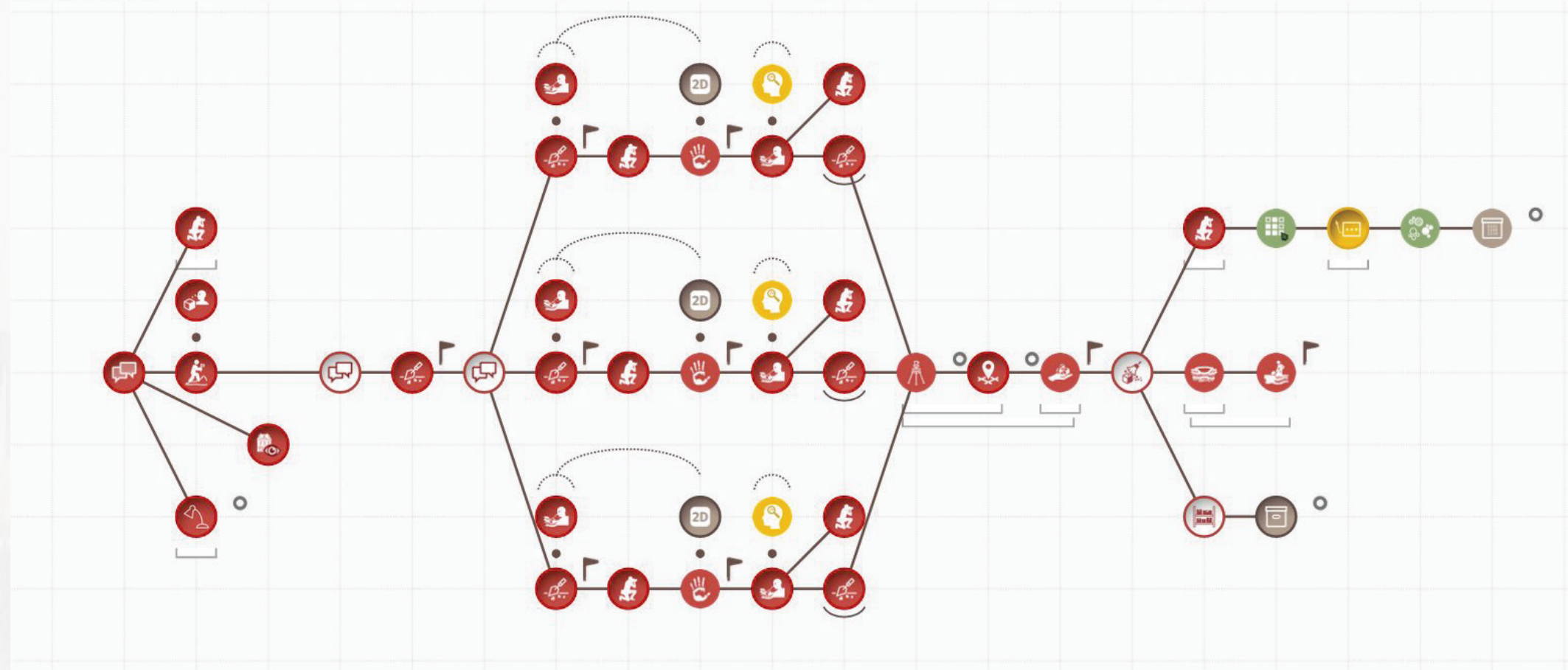
verifiability

Mémorisation de ressources numériques et d'activités
Record-keeping of digital resources and activities



MEMORIA IS

practical solution for formalising, describing and visualising research workflows



an attempt to describe a process of archaeological survey on the basis of an archaeological report



architectural and acoustic data acquisition
projet SESAMES (ANR-18-CE38-0009-01)
chapelle Saint-Roch, Les Mées
23/01/2020



objectives

MEMORIA
MEMORisation de Ressources numériques et d'Activités

Hide > + 🔍 ✎ 🔗

search

- author of sources
- composition
- expertise
- infrastructure
- object of study
- organisation
- output
- process
- project
- publication
- source
- toponym

fs

Connection 🏠

MEMORIA Information System > search mode

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- describe/document results obtained through scientific studies
what, who, when, for what purpose, where to find it, ...
- describe/document formally the processes that led to this or that result
(both in their methodological and technological aspects)
- enable comparative analysis of the data/information collected
evolution of our working methods (tools, techniques, approaches, objects of studies, ...)
critical study of methods, their validity and scope



basic concepts

MEMORIA
MEMORisation de Ressources numériques et d'Activités

Hide > + 🔍 ✎ 🔗

Connection 🏠

search

- author of sources
- composition
- expertise
- infrastructure
- object of study
- organisation
- output**
- process
- project
- publication
- source
- toponym

output

composition

publication

process

memoria-dev.gamsau.archi.fr/enter.php?show=output

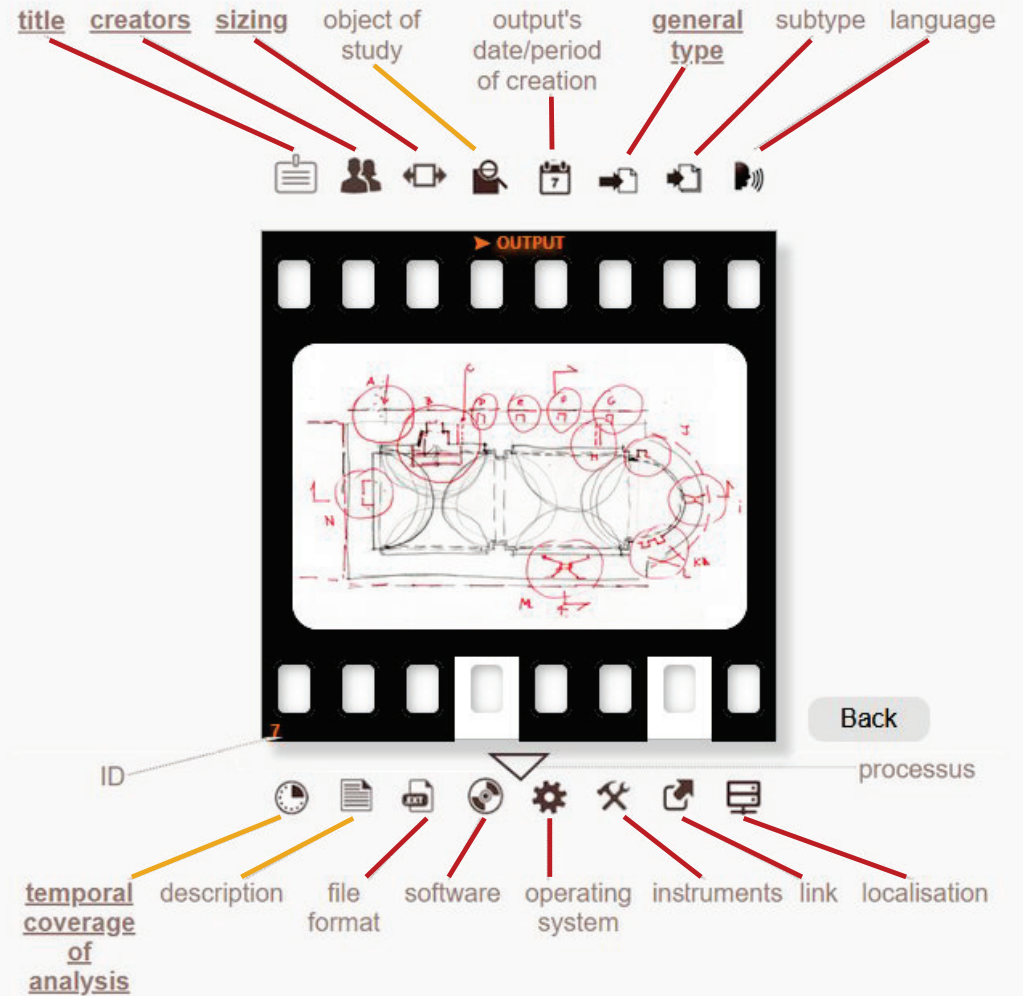
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- output

... a set of new data or information, or a raw result stemming from a processing and/or interpretation of data and information driven by a scientific objective ...

(digital or not) - a simple document (a 3D model, a plan, a point cloud) or a set of documents (a collection of models, charts).



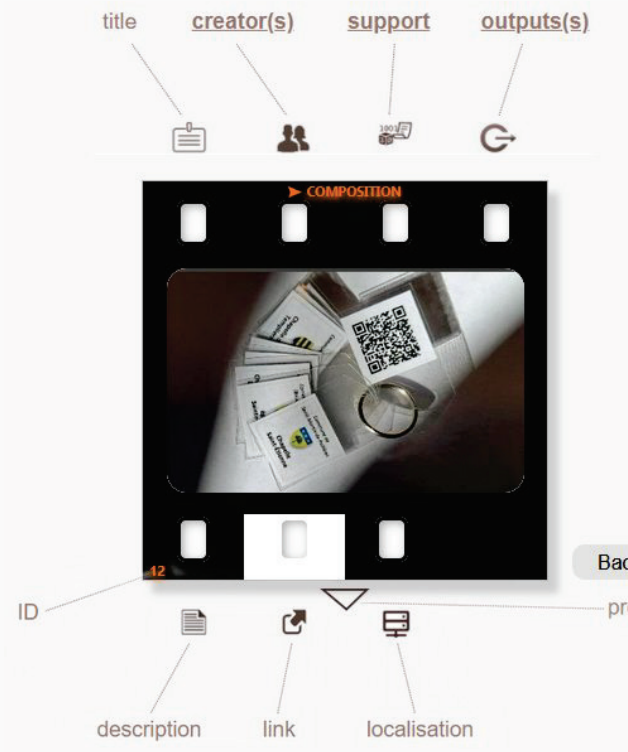


underlying concepts

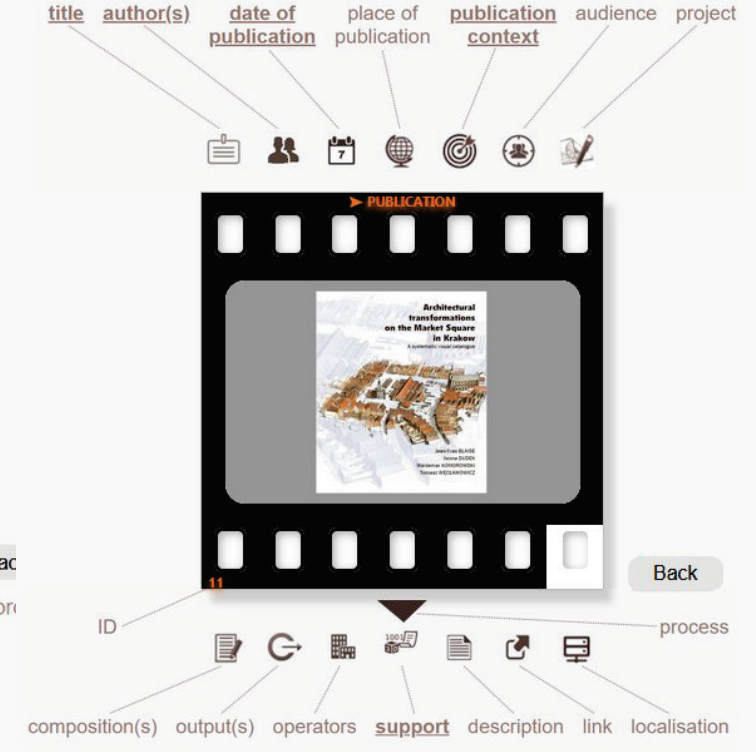
- publication
- composition

... combine and reorganise information brought to existence in outputs

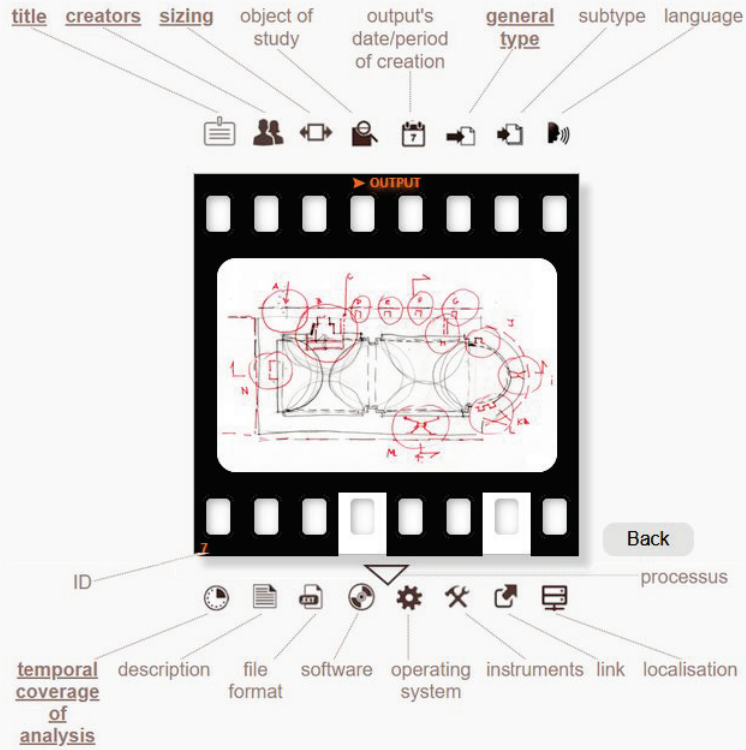
dissemination results



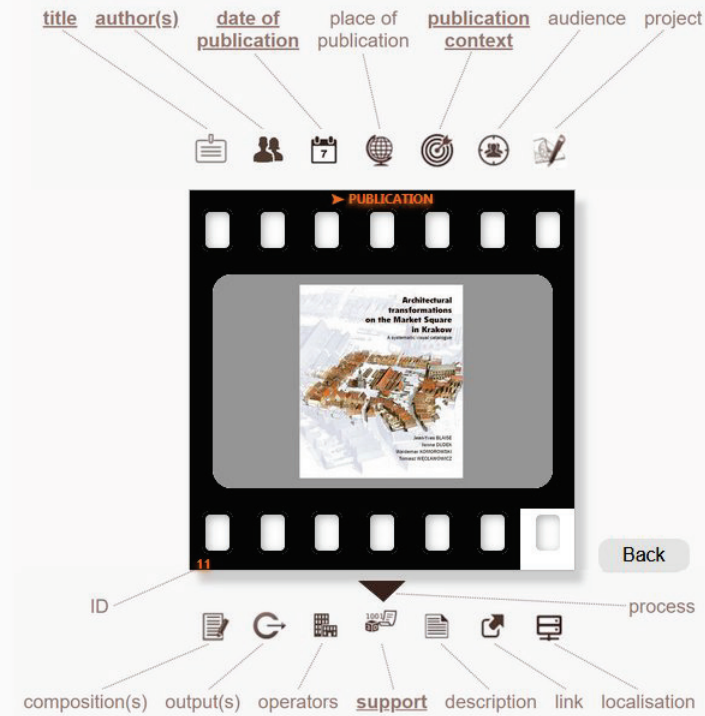
e.g.? presentations supporting informal working group discussions, reused valorisation material



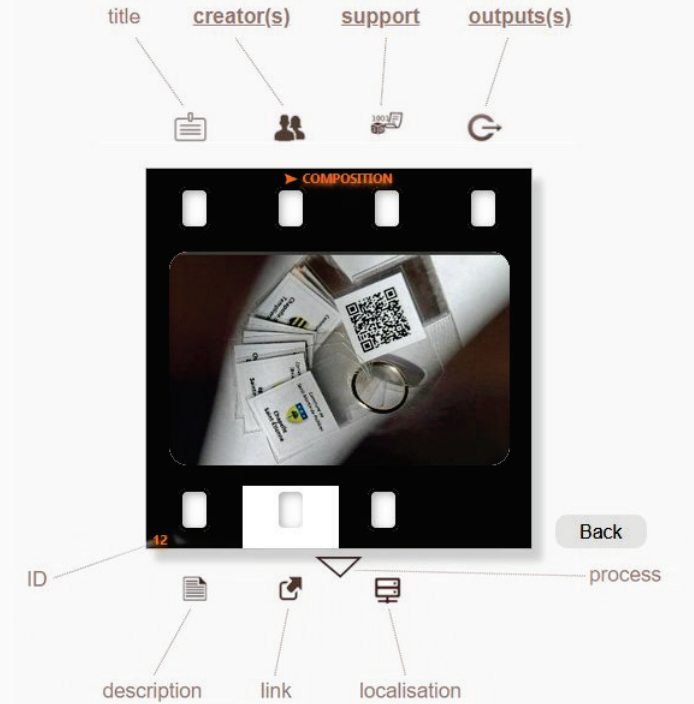
e.g., a journal article, a book, an online website



output



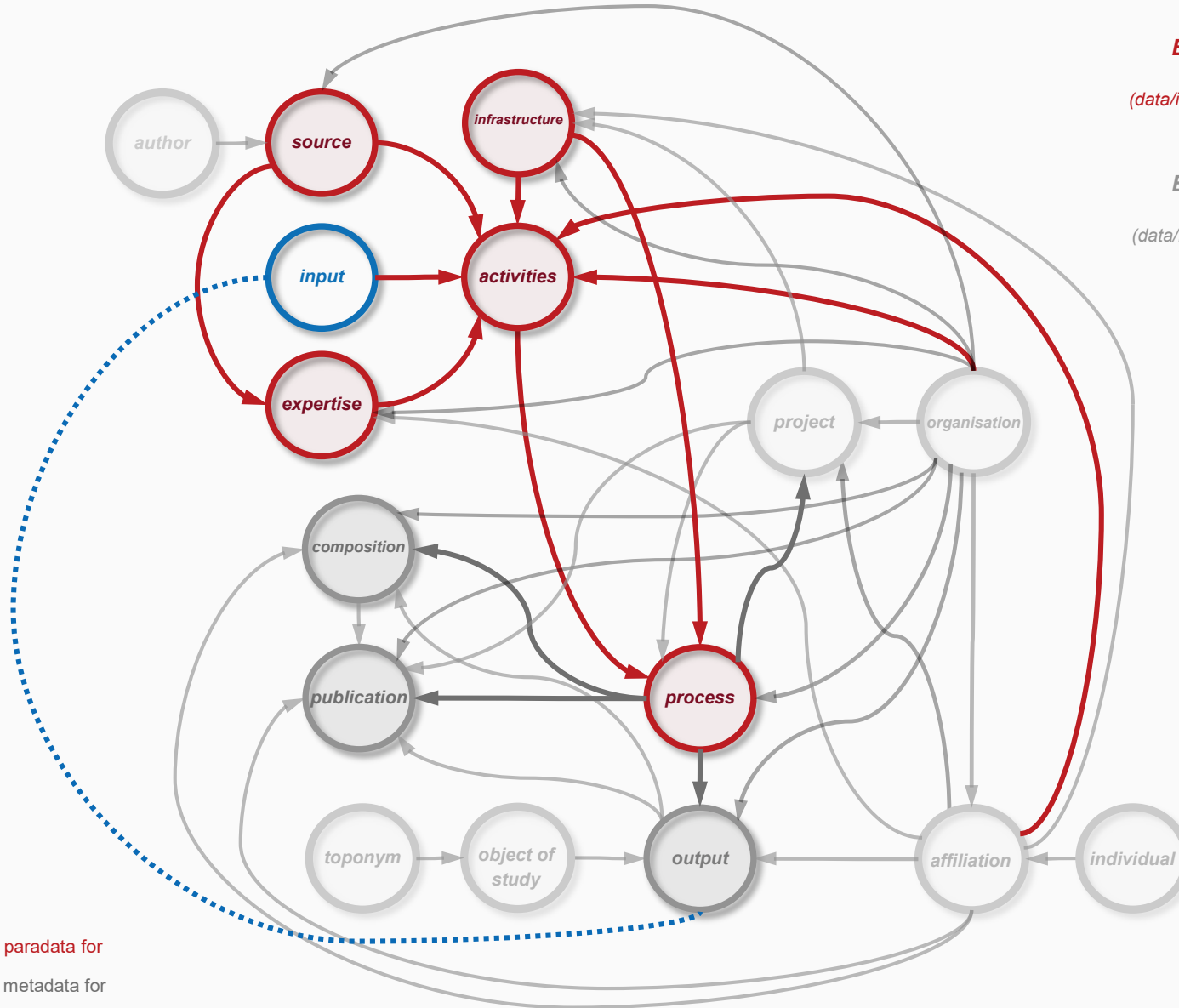
publication



composition



underlying concepts



Elements containing/providing paradata
(data/information about a process by which an outcome was achieved)

Elements containing/providing metadata
(data/information about an object or resource)

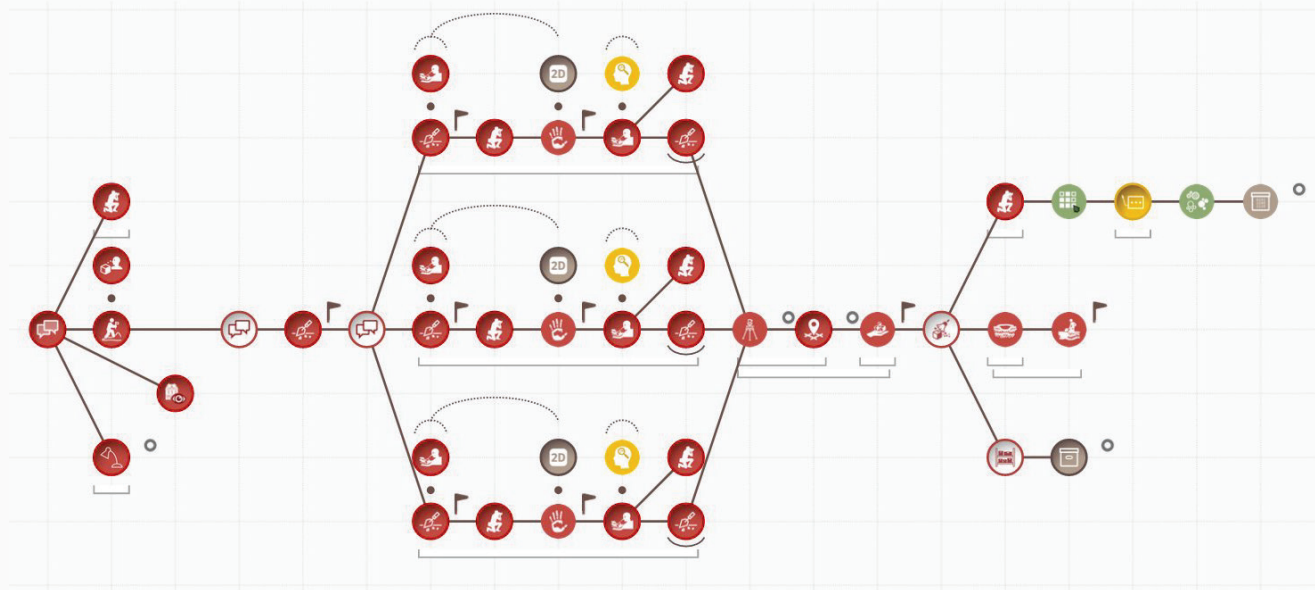
Red arrow: provides paradata for
Grey arrow: provides metadata for



underlying concepts

research process

a series of actions or steps taken in order to achieve a particular end/specific goal

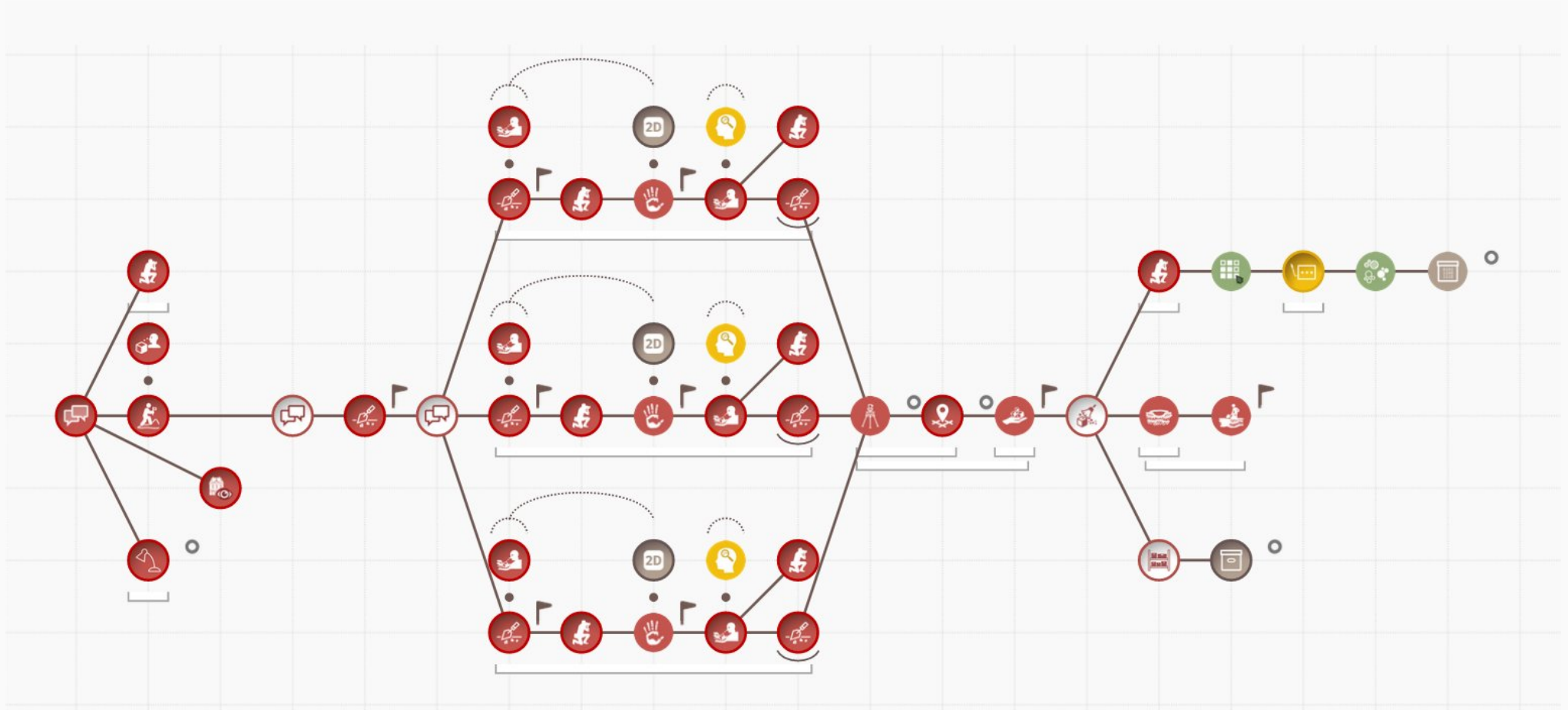


memoria workflow diagram

diagrammatic representation combining paradata



Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - MEMORIA IS

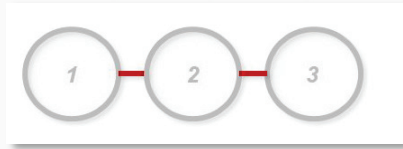
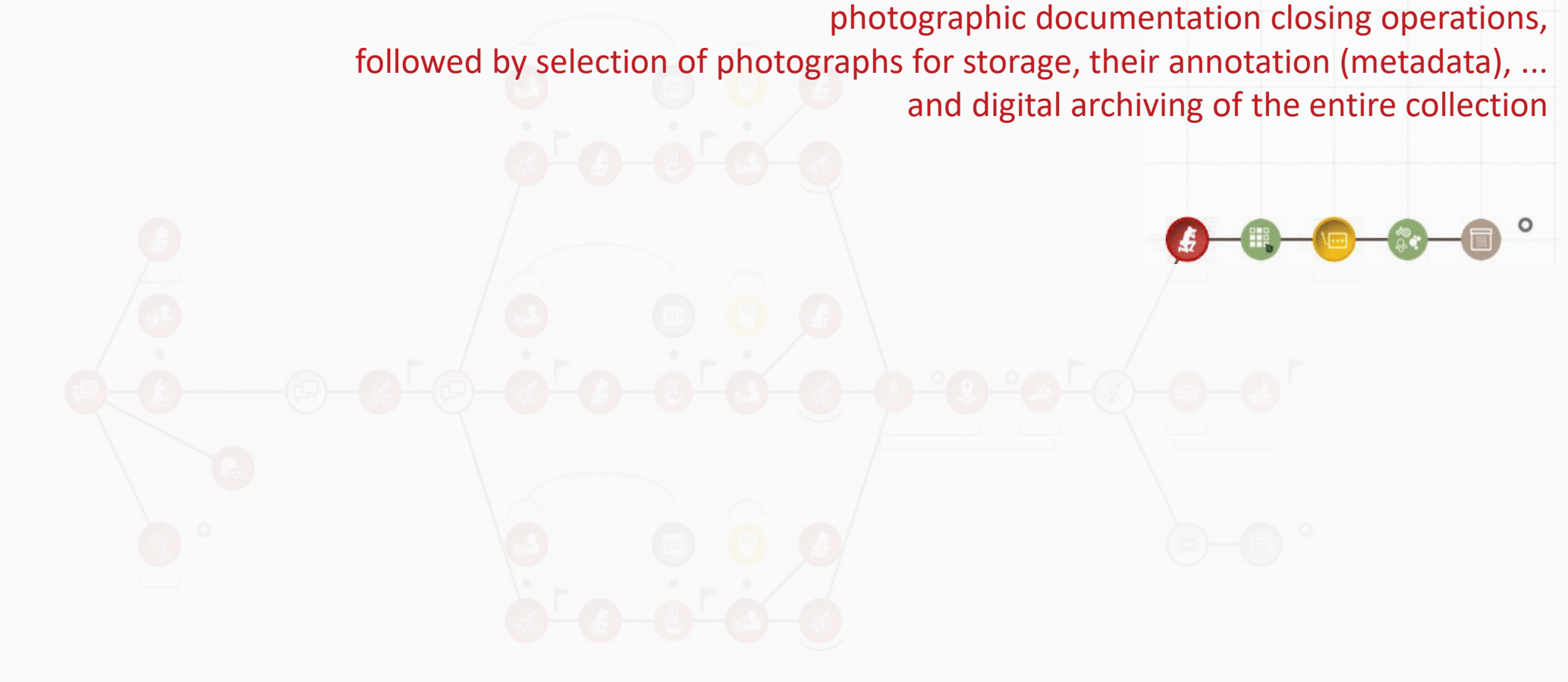


Memoria workflow diagram - the result of an attempt to describe a process of archaeological survey on the basis of an archaeological report <https://sandbox.memoria.map.cnrs.fr/is/enter.php?show=process&_op=set&id=118>.





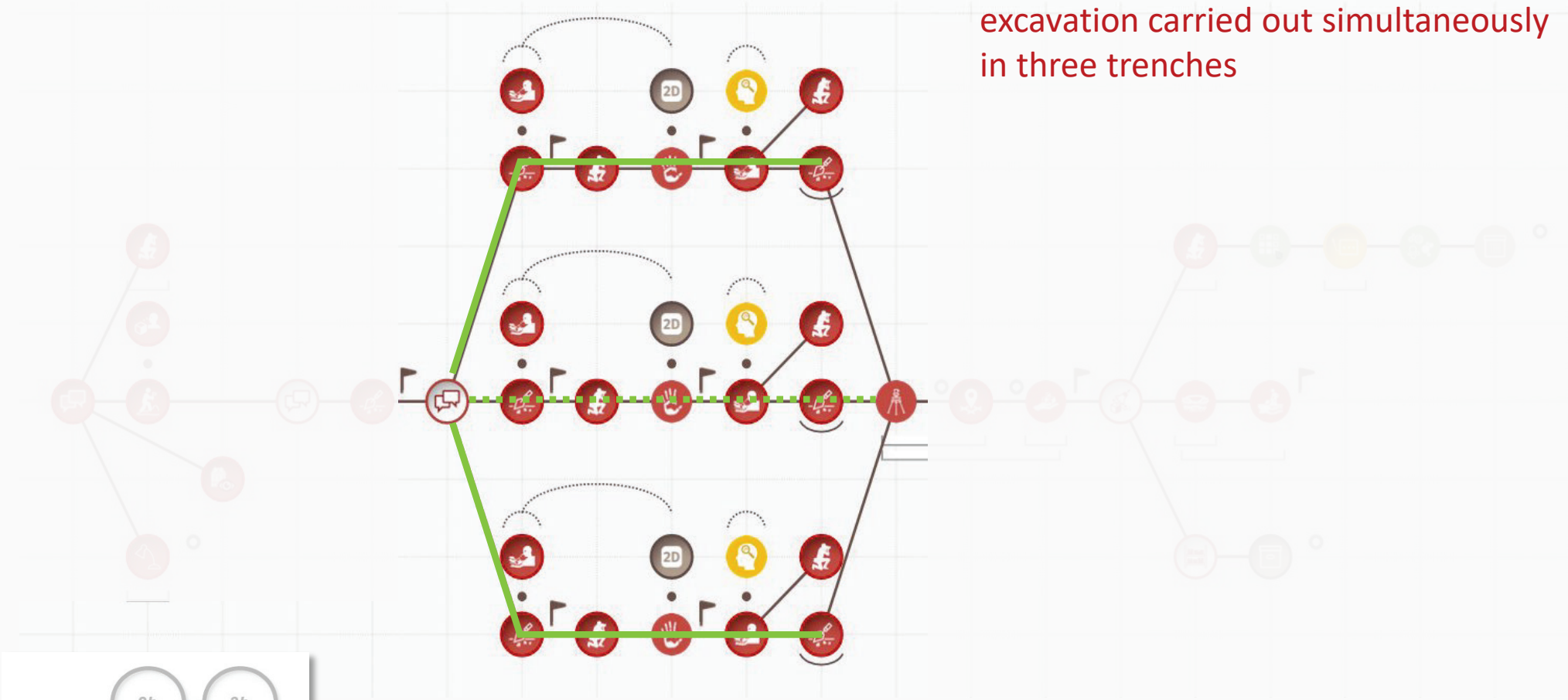
underlying concepts



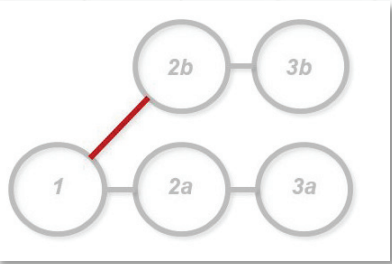
chain - a succession of activities over time (displaying their order)



underlying concepts



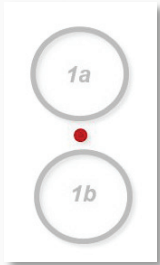
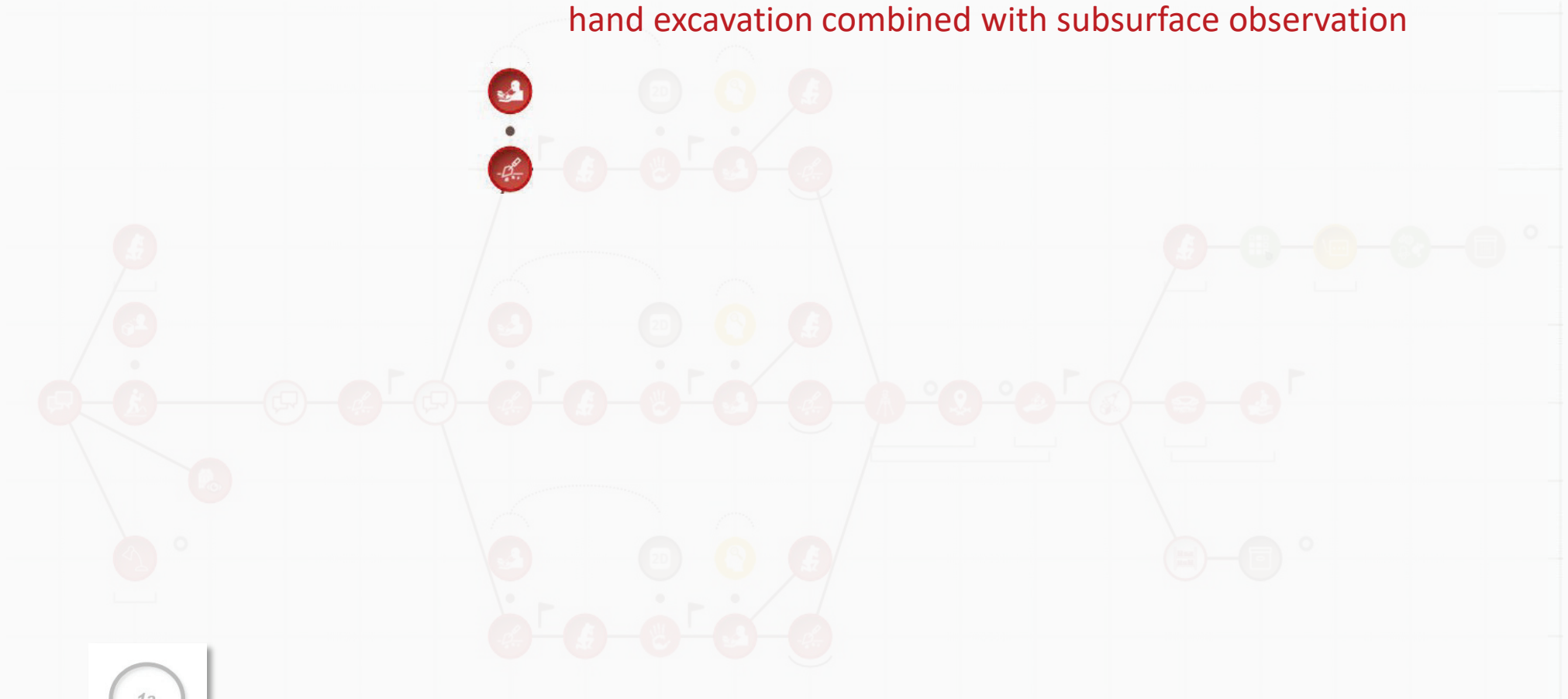
excavation carried out simultaneously in three trenches



parallel (sequences of) activities - activities that run concurrently in time



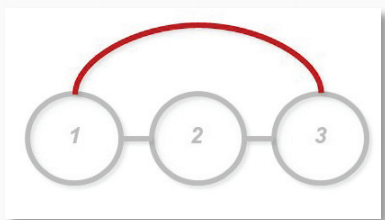
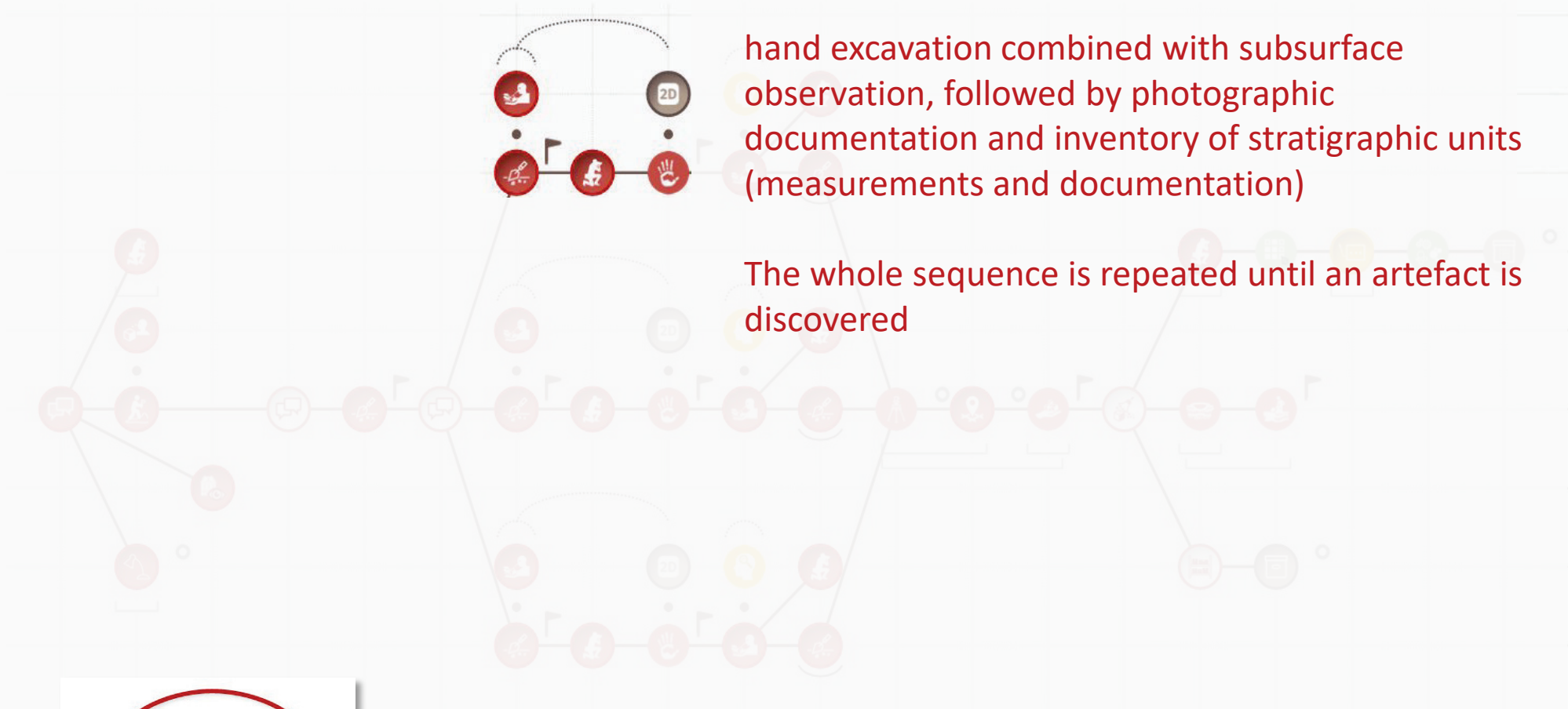
underlying concepts



knot of activities - activities that take place simultaneously at the same time or be combined without any apparent order



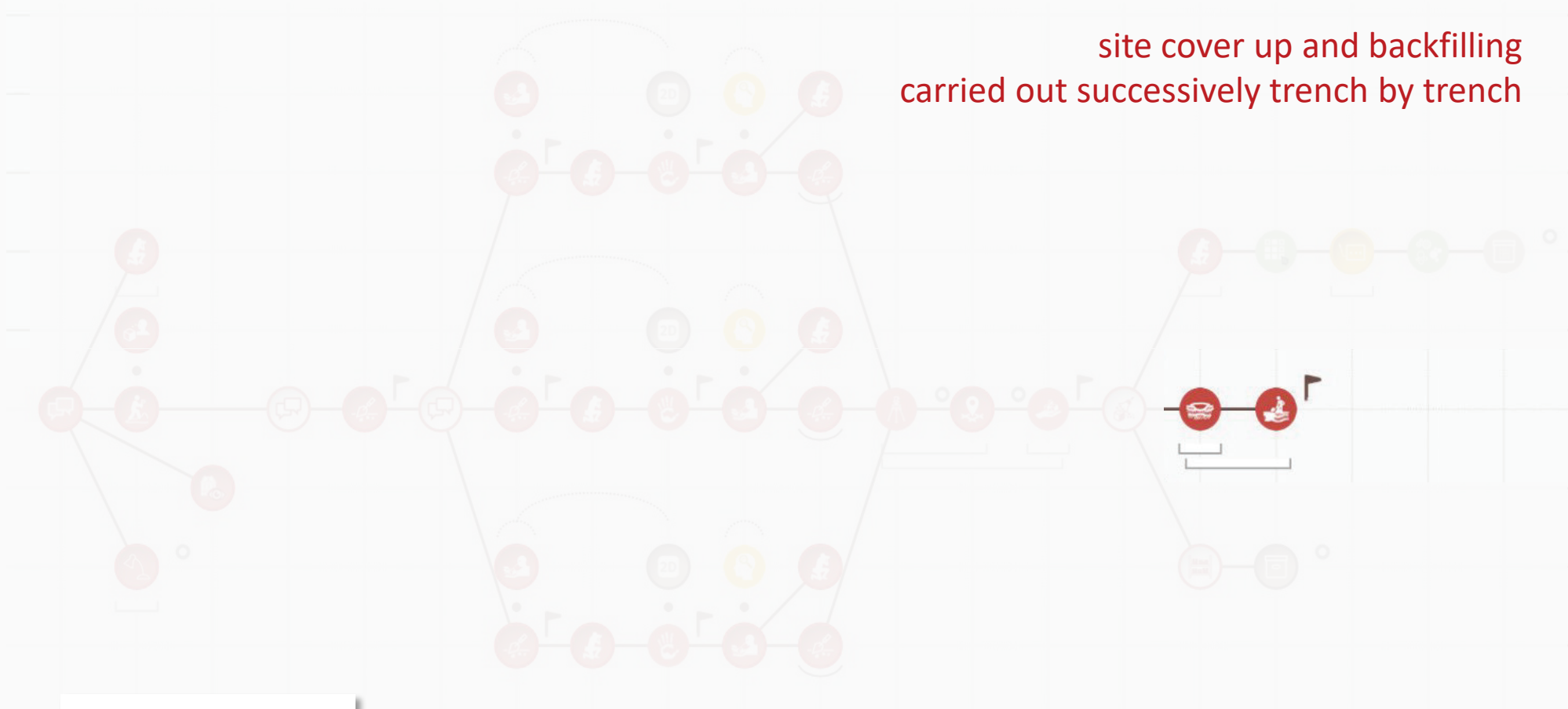
underlying concepts



iterative activities - sequence of operations is repeated on the same object until the desired result is obtained



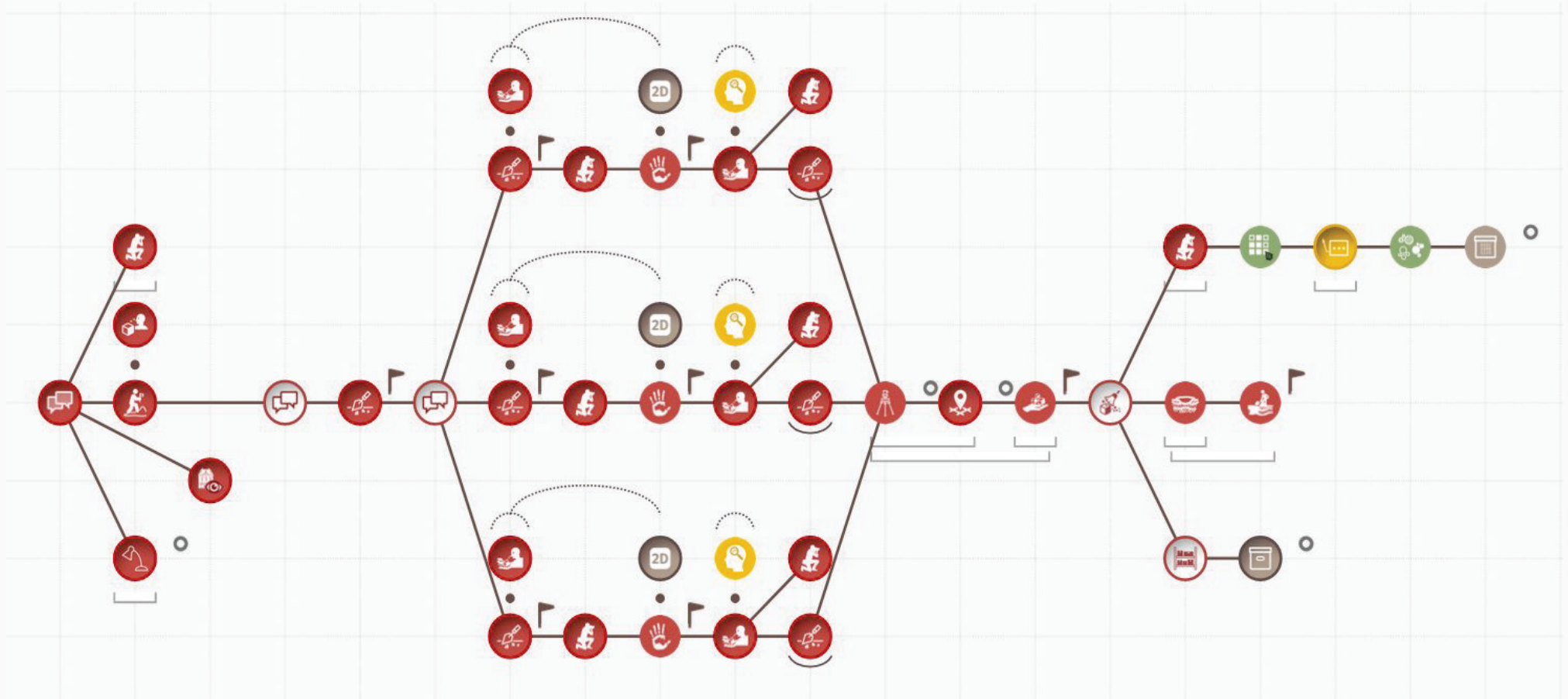
underlying concepts



repetitive activities - repetition of the same operations on multiple objects (done once for each item)



underlying concepts



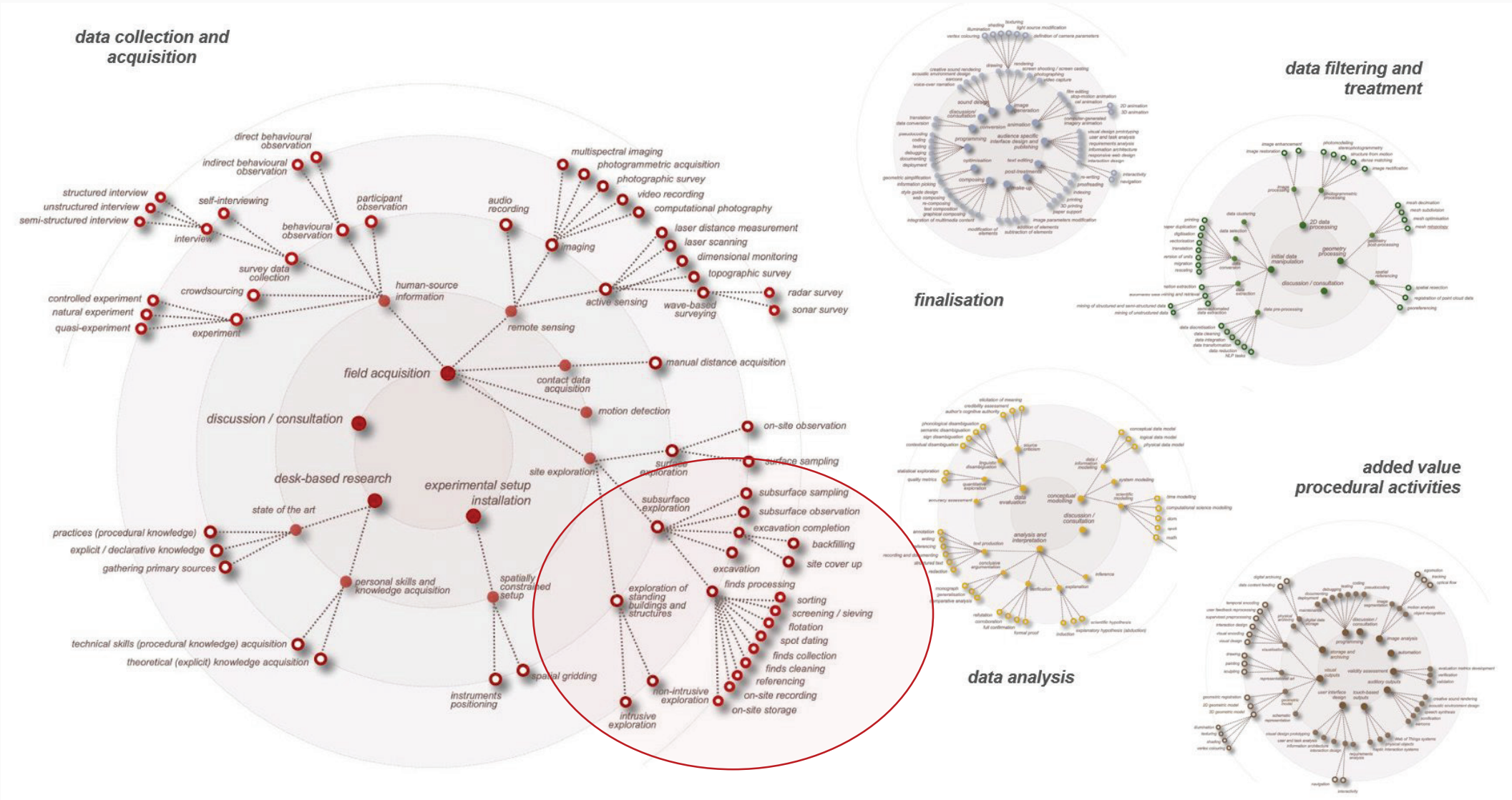
- data collection and acquisition
- data analysis
- data filtering and treatment
- added value procedural activities
- finalisation





Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - MEMORIA IS

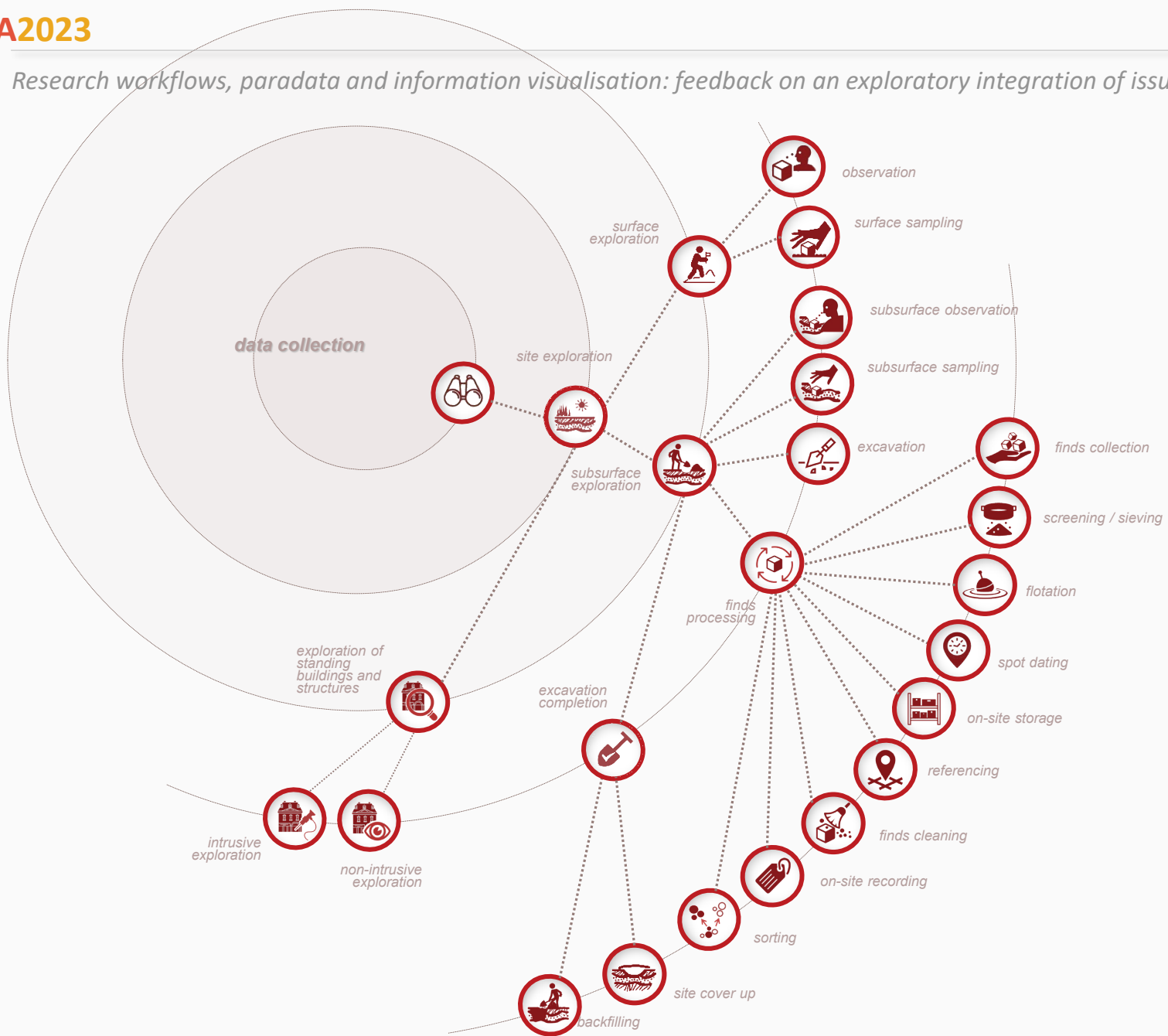
underlying concepts





Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - MEMORIA IS

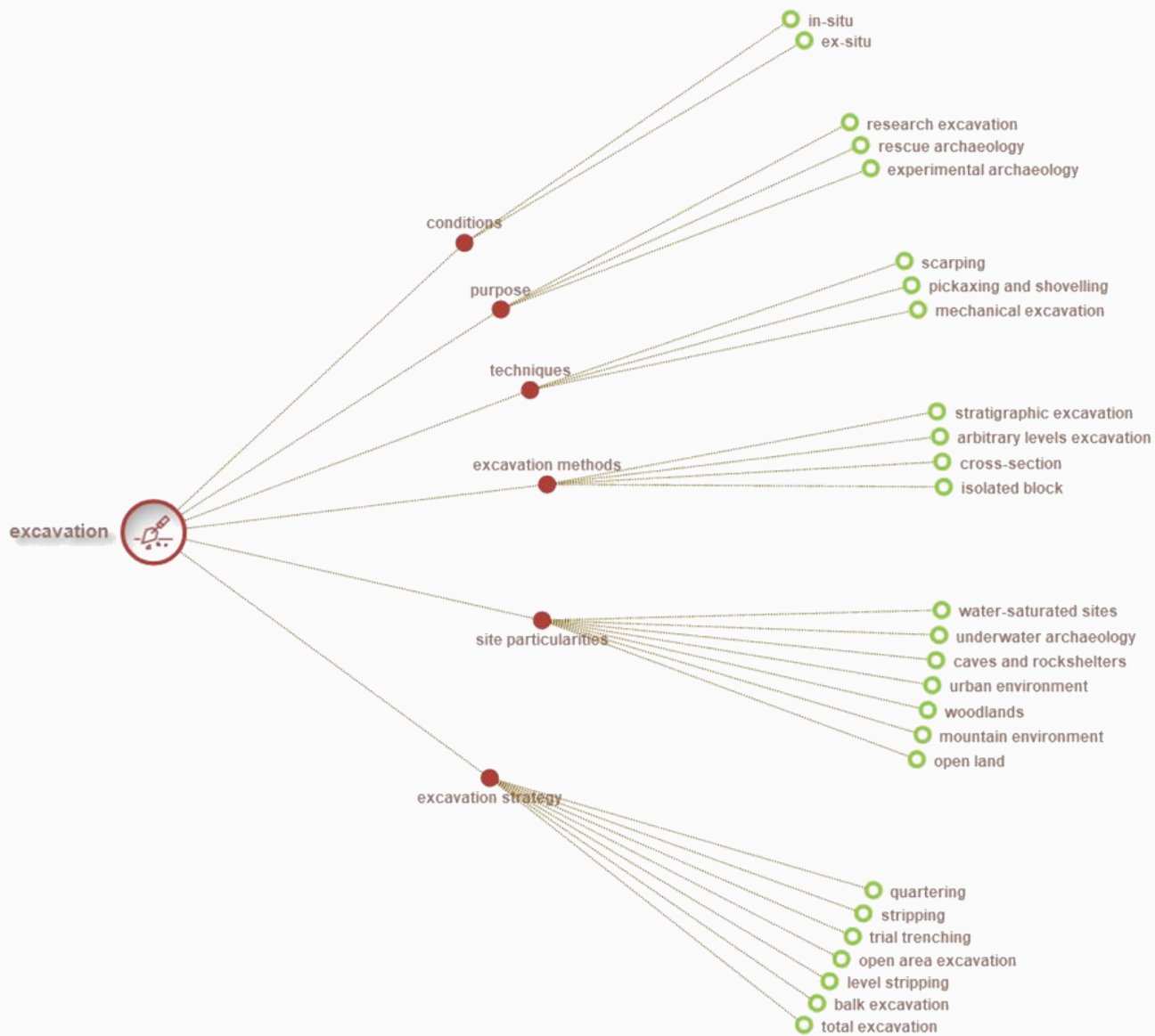
underlying concepts





underlying concepts

choice of paradata depicting each activity





Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - MEMORIA IS

MEMORIA
MEMORisation de Ressources numériques et d'Activités

Show > [Icons: +, magnifying glass, pencil, person, speech bubble, network]

[Icons: zoom, print, refresh, undo, redo, list, info, chat, user 'idu', home]

Select one or several activities from the wheel of activities.

Cancel

MEMORIA Information System > add mode > process

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selection of activities

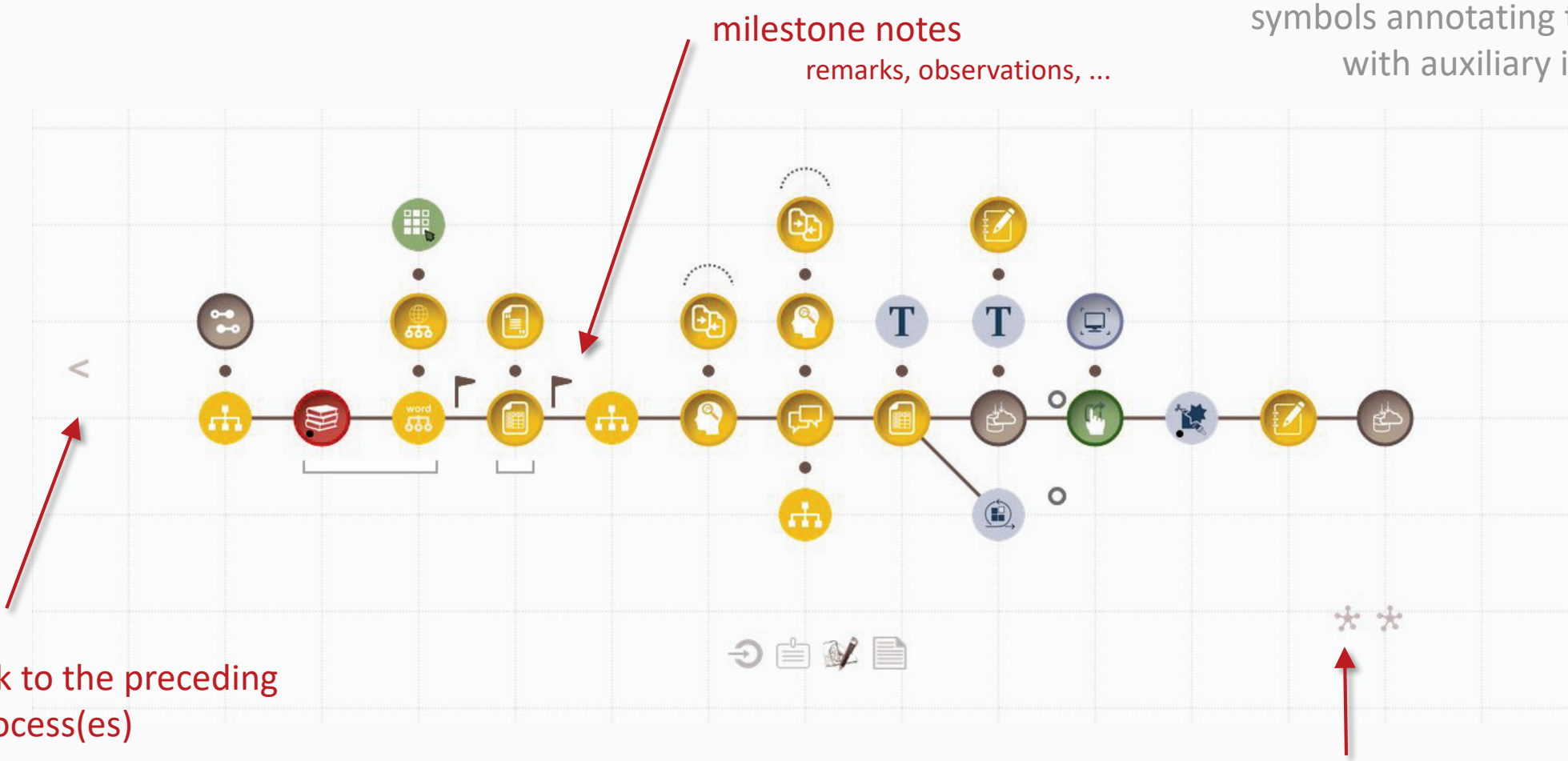


Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - MEMORIA IS

The screenshot displays the MEMORIA Information System interface. At the top, the title "MEMORIA" is shown with the subtitle "MEMOrisation de Ressources numériques et d'Activités". Below the title is a toolbar with various icons for editing and navigation. The main workspace is a large grid where a workflow diagram is being constructed. The diagram consists of several circular nodes connected by lines. A red node on the left is highlighted with a mouse cursor. The workflow includes nodes for editing (pencil), document management (document with checkmark), communication (speech bubble), and data processing (document with checkmark). At the bottom of the interface, there is a status bar with the text "MEMORIA Information System > add mode > process" and a set of navigation controls including "Cancel" and "Accept" buttons. The footer contains the text "UMR 3495 CNRS/MCC MAP | Modified on : 31/03/23 | Legal notice".



underlying concepts



milestone notes
remarks, observations, ...

symbols annotating the process
with auxiliary information

link to the preceding
process(es)

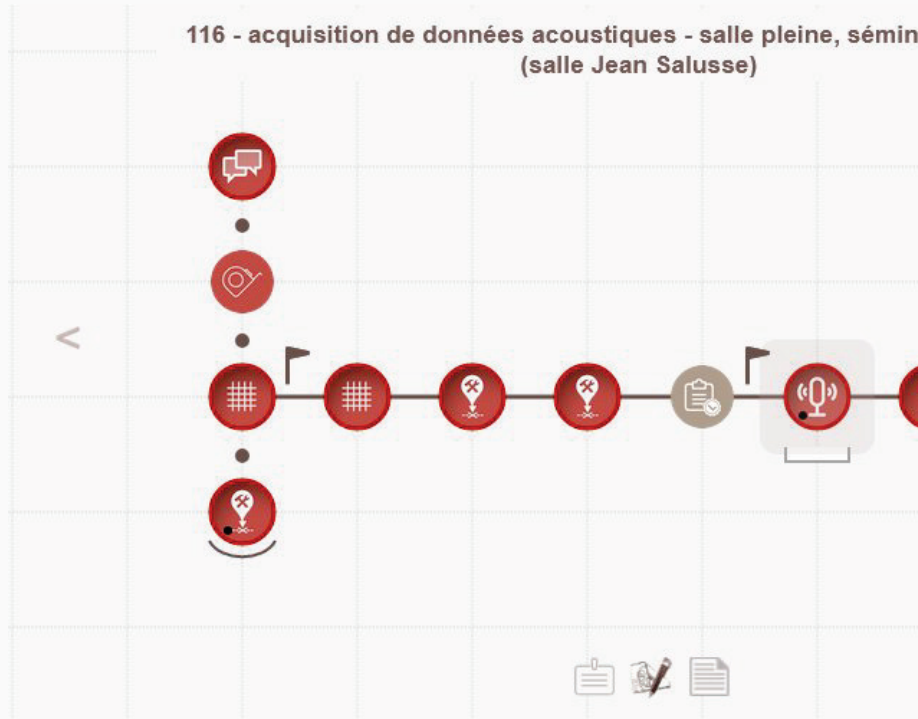
infrastructure(s)
used as a support during the process



examples

paradata depicting each activity is:

positioned in the workflow structure
freely accessible
searchable
editable

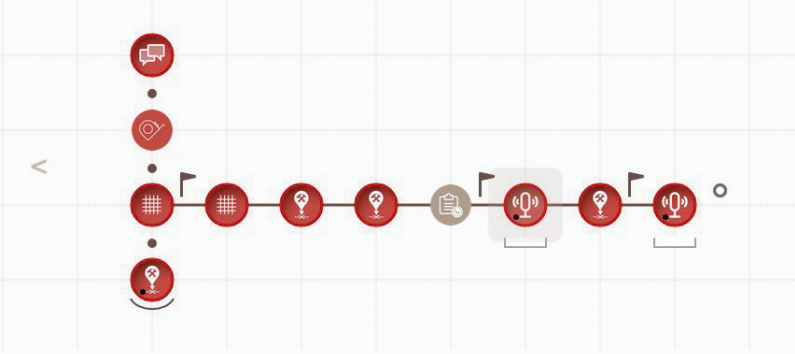


activity instance >

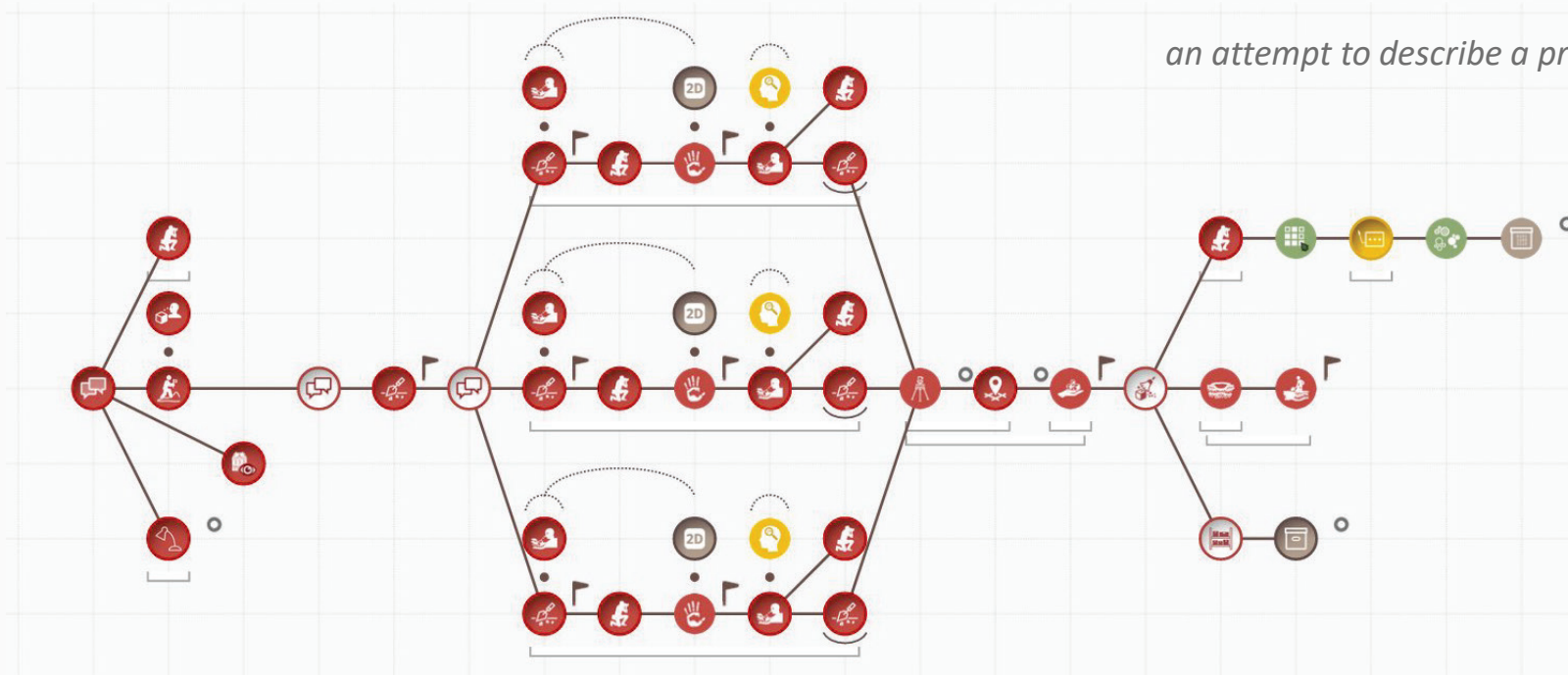
- activity group > data collection and acquisition
- activity type > audio recording
- acoustic source > preregistered sound
- place of registration > other indoor spaces
- individuals > Fargeot Simon > AMU
Vidal Adrien > PRISM
- collective bodies >
- sources >
- inputs > sweep acquisition Sesames
- compositions >
- publications >
- expertise >
- outputs >
- instrument(s) > em32 Eigenmike (microphone)
Genelec 8020C (speaker)
MacBook Pro (mi-2014)- PRISM
- software > REAPER
- operating system > Mac OS X 10.14 (Mojave)
- start date > 23/06/2022
- end date > 23/06/2022
- duration unit > minute
- remarks > mesures acoustiques enregistrement du sweep 3x, 25 personnes dans la salle



examples



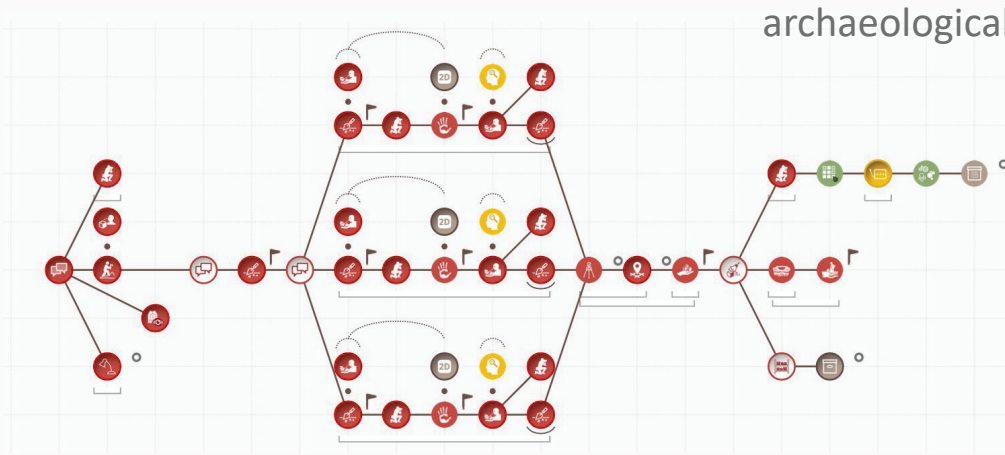
acoustic data acquisition



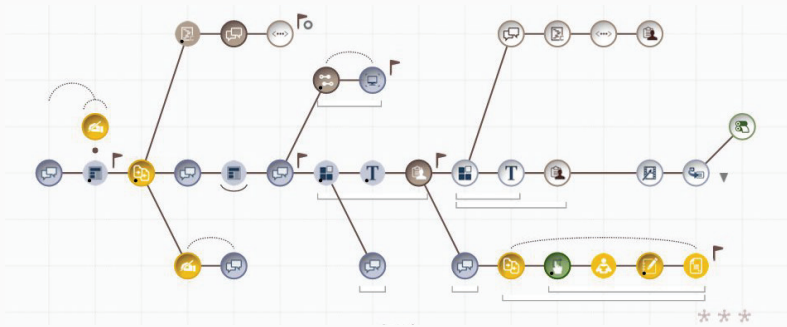
archaeological fieldworks
an attempt to describe a process on the basis of an archaeological report



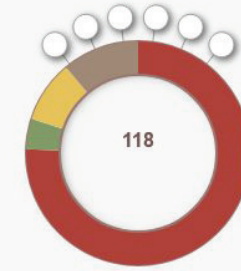
examples



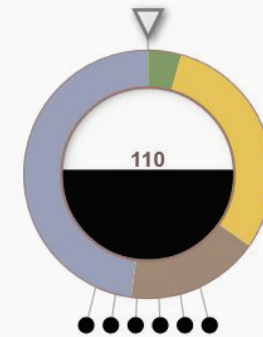
archaeological fieldworks



publication



an attempt to describe a process of archaeological survey on the basis of a report (Chapelle Notre-Dame de Bethléem, Commune de Bras, Var, 2017) ? (discussion/consultation) - ? (digital archiving)



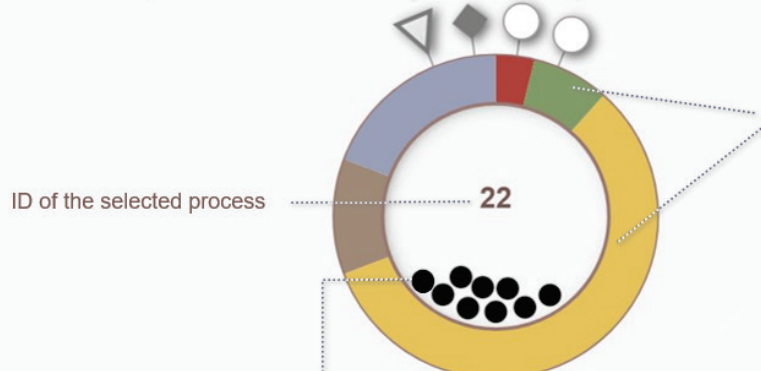
préparation de la publication: Nomenclature des activités MEMORIA (Jan-2022)



examples

results of the process:

- output
- composition
- publication



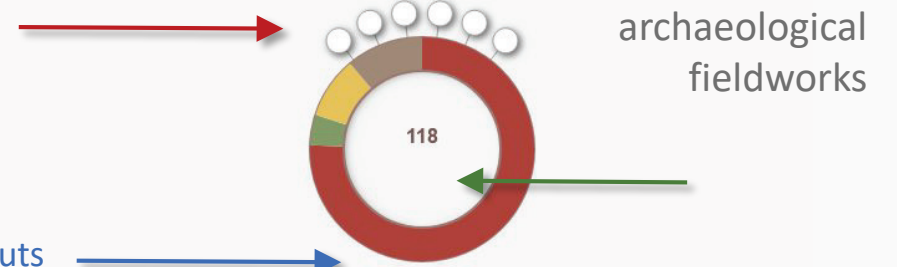
ID of the selected process

elements the process is based on:

- external source(s)
- input(s)
- expertise

A process as activities' proportion ring

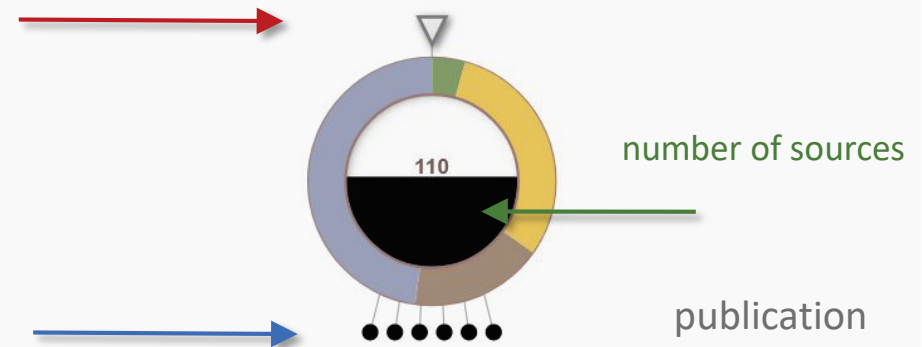
number and type of results



number of inputs



an attempt to describe a process of archaeological survey on the basis of a report (Chapelle Notre-Dame de Bethléem, Commune de Bras, Var, 2017) ? (discussion/consultation) - ? (digital archiving)

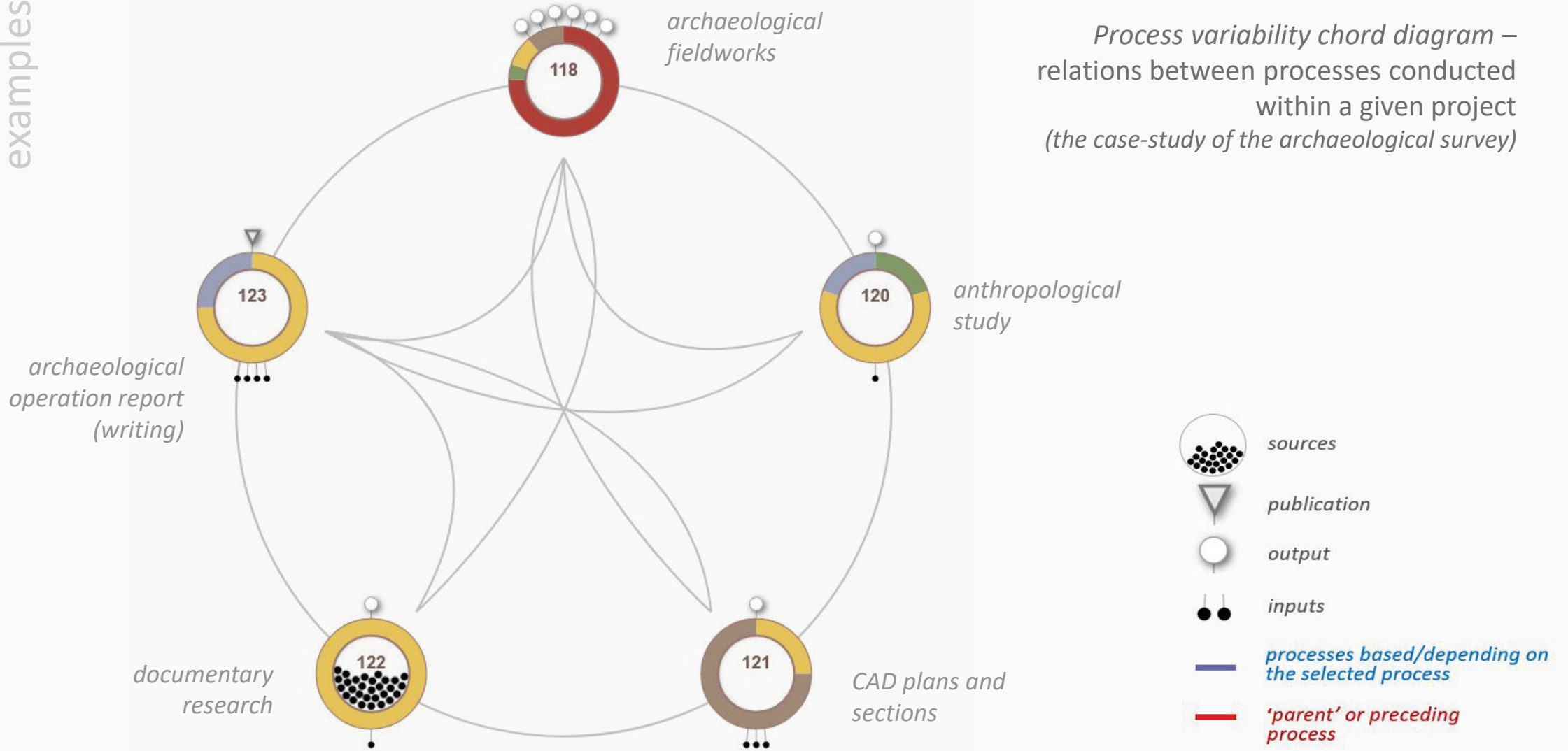


préparation de la publication: Nomenclature des activités MEMORIA (Jan-2022)



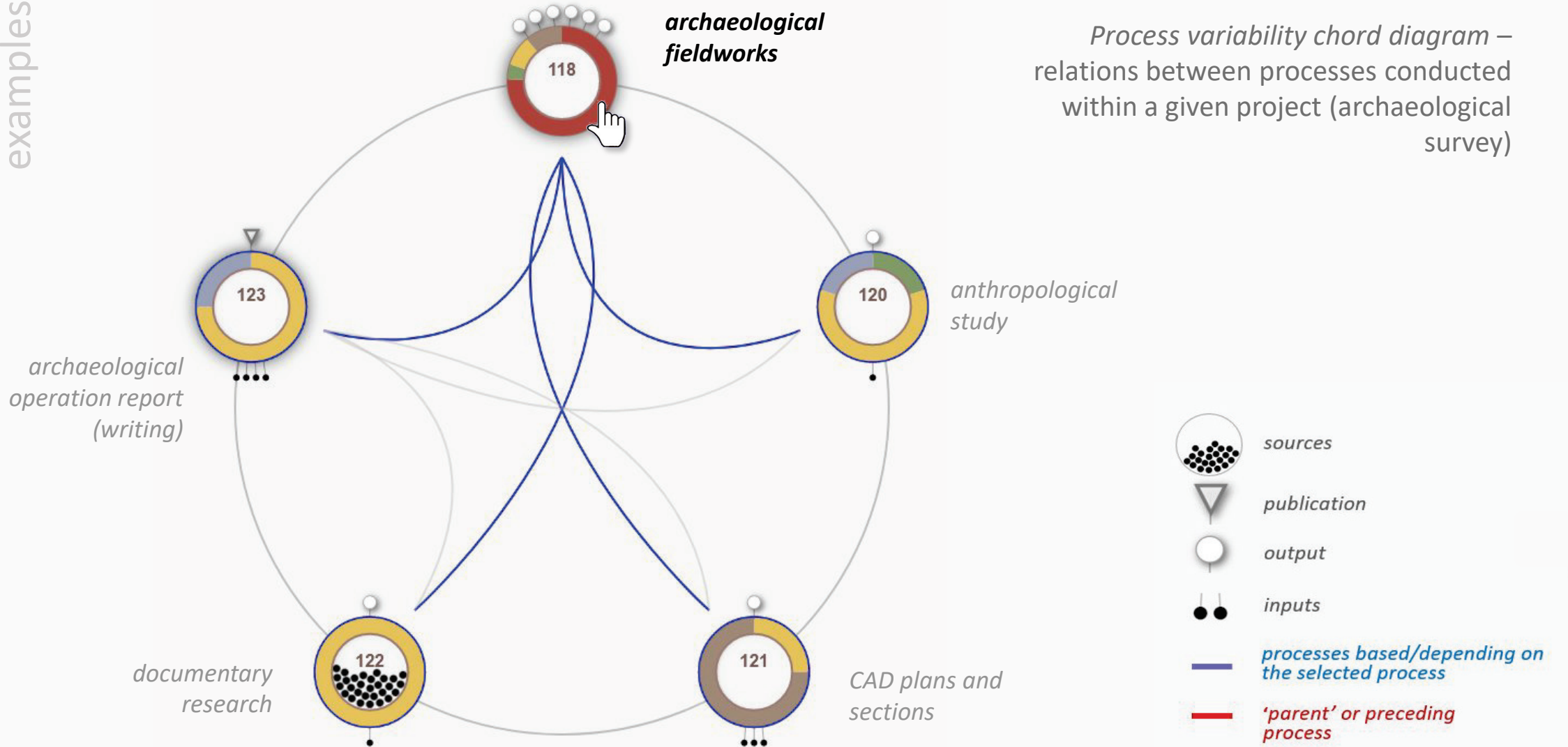
examples

Process variability chord diagram – relations between processes conducted within a given project (the case-study of the archaeological survey)





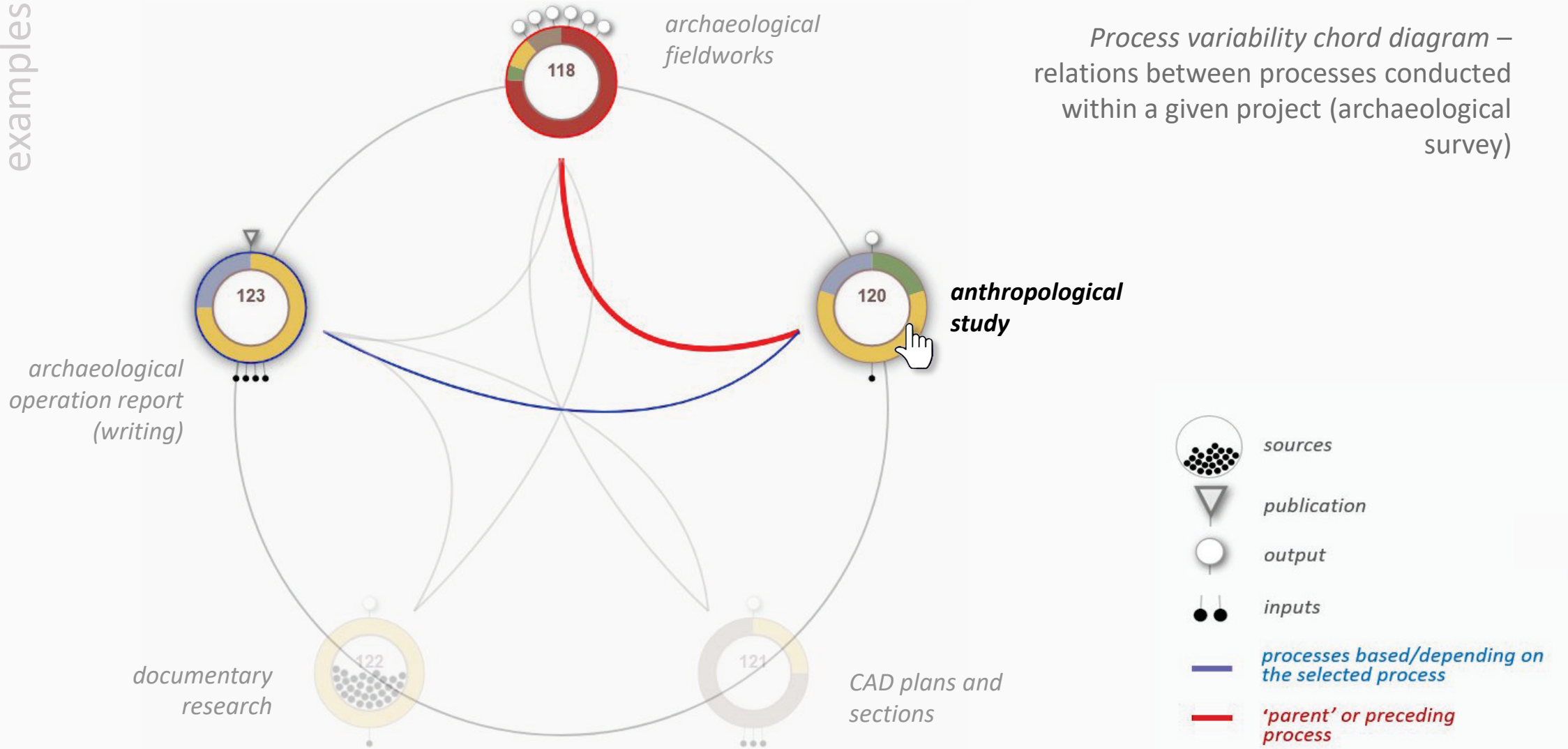
examples



Process variability chord diagram – relations between processes conducted within a given project (archaeological survey)



examples

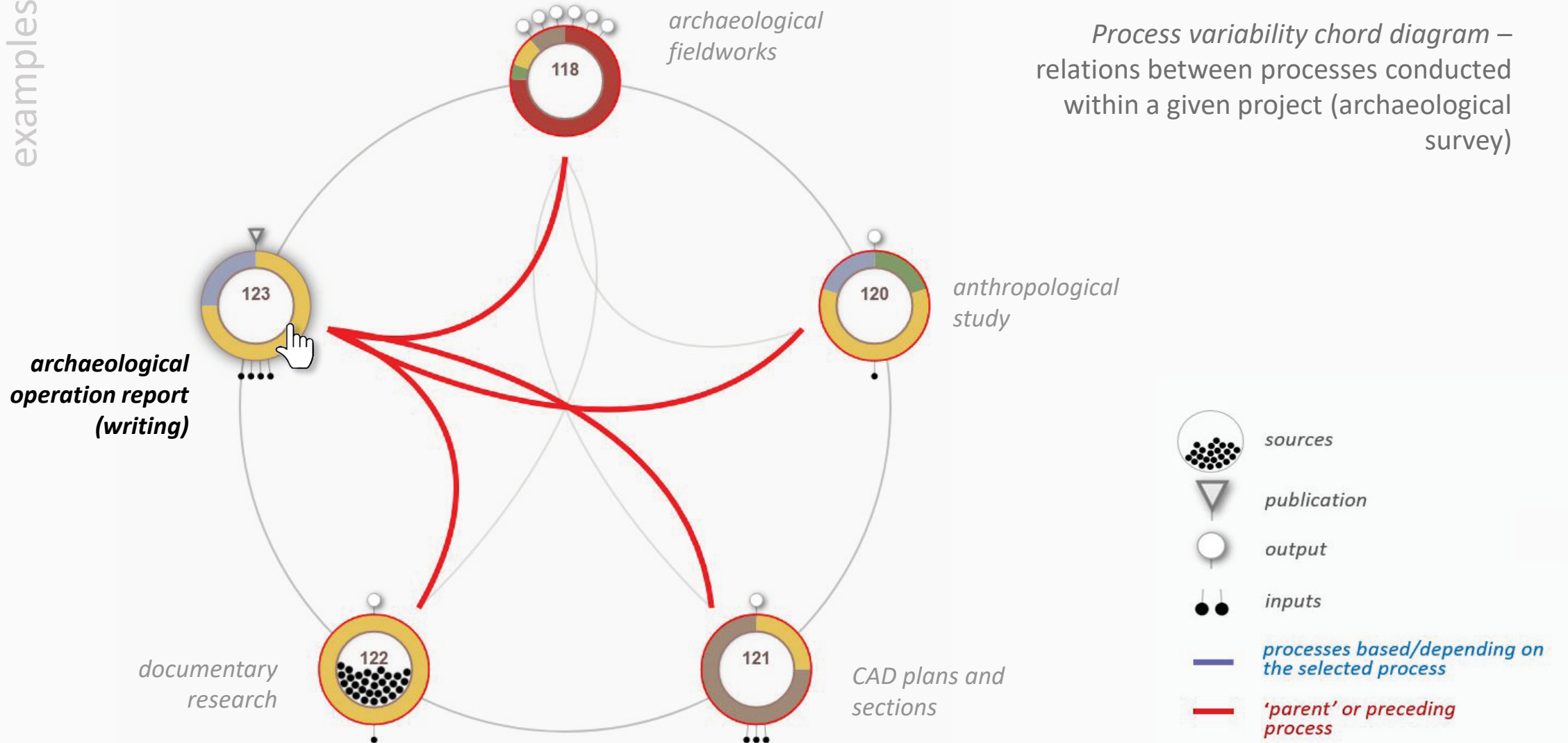


Process variability chord diagram – relations between processes conducted within a given project (archaeological survey)



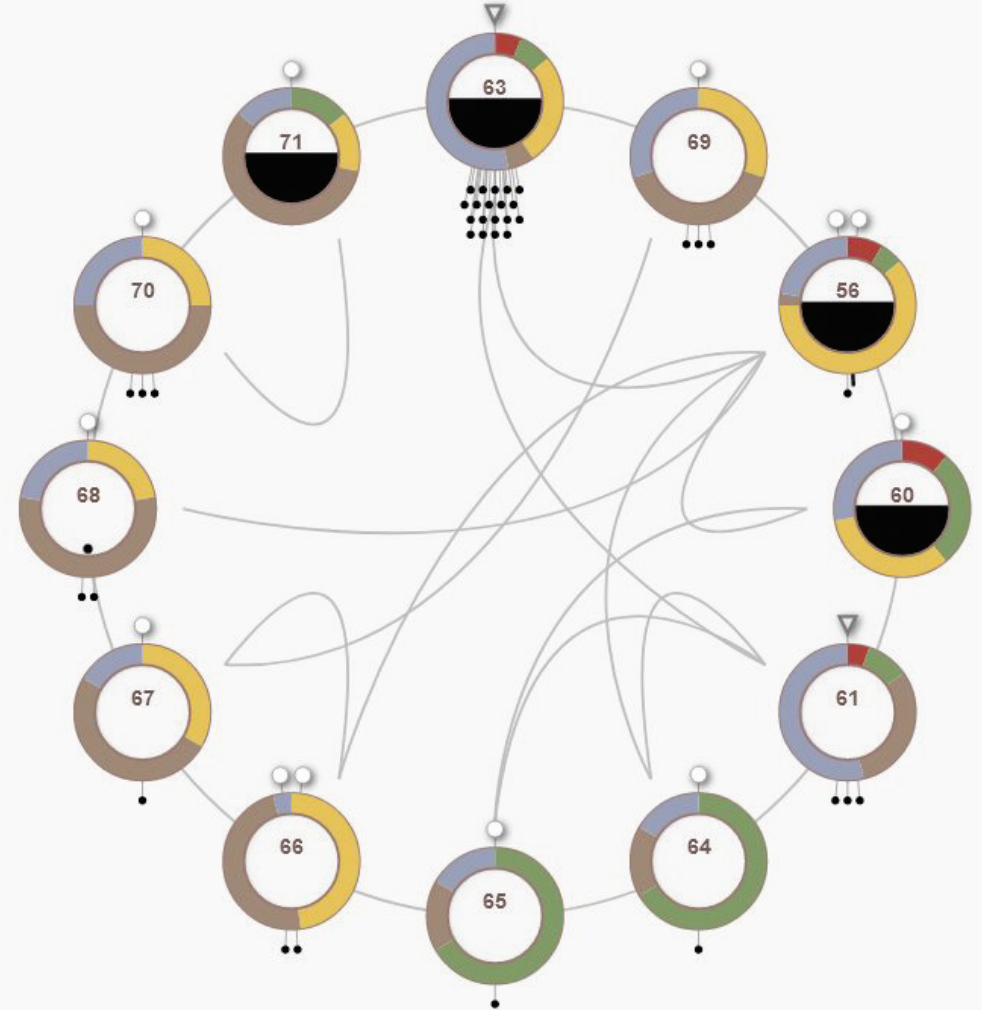
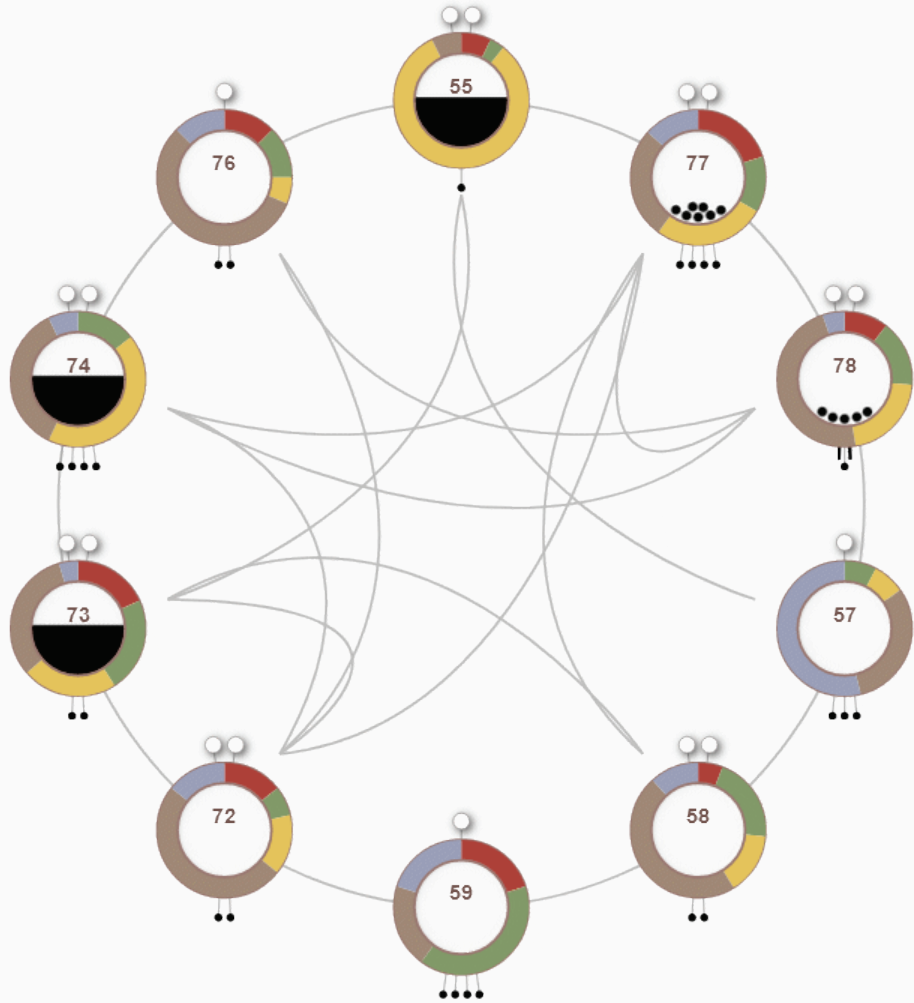
examples

Process variability chord diagram – relations between processes conducted within a given project (archaeological survey)





examples





metadata

- storage of information
- findability and filtering of results,
authors objects of study, projects, storage place, ...
- comparability of results

paradata

- storage of information
preventing our memory from blurring
- ensuring results' verifiability
- enlarging epistemological awareness
of our methods and approaches
- meet challenges of open science
*The system is open in consultation and analysis
mode for everybody.
Each process and result has an unique URL.
Export of metadata in human readable PDF
format.*



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Research workflows, paradata and information visualisation: feedback on an exploratory integration of issues and practices - MEMORIA IS

MEMORIA is an exploratory web-based prototype, an attempt to provide a methodological framework to meet the requirements of scientific integrity.

potential of the system :

- theoretical/tacit knowledge-sharing environment
- innovative/creative visual analytical framework
- support for the planning of scientific protocols based on past experiences
- new documentation framework
by requiring more reflection, it can help us to work more effectively, more consciously and less routinely (*human inertia*)



main constraints and limits of the system:

- sustainability of web-based information systems
the constant evolution of the technology requires continuous mobilisation to ensure functionality of such systems - maintenance, development, user support and funding
- digital nature entailing a certain fragility of the stored data
- quality and reliability of the visualisations depend strongly on the data entered
falsehood can be inferred from incomplete or partly unreliable data
- time-consuming documentation process, steep learning curve for some people
differences in individual capacities, difficulty in determining what is important to document, lack of skills in graphic interpretation, ...
- unreadiness to openly share information about our mistakes, errors, shortcomings
- so that they cannot be turned against us



future works :

- continue the implementation
implementation of the 'theoretical' and 'project' process, new visualisations, finding partners and funds
- tests within *n-Dame_Heritage* project
chantier "données numériques" de Notre-Dame de Paris
- export *memoria workflow diagrams* into other formats
stable human-readable format (PDF) , machine-specific formats, text-to-speech reader
- participate in building awareness of the importance of paradata in science
a clever combination of "sticks and carrots" that may contribute to changing our habits, regulations or evaluation criteria in the humanities and social sciences
- continue to document our work (results and processes) and make it accessible to all



Memoria Information System

for UMR 3495 CNRS/MC MAP
(open consultation)



Memoria sandbox

The platform for a familiarization with the principles and the interface of the MEMORIA IS
(user account available without restrictions)



MEMORIA - classification of activities

online PDF , 334 pages
(in English)

