



#### 4Science role in the Open Science and DSpace community

At 4Science We are driven by serving the open knowledge ecosystem.

Certified Platinum provider and main contributors of DSpace

Our goal is to anticipate the future making it more accessible

4Science created and maintains DSpace-CRIS

Experts in the field and enablers that can help with any situation

#### Open knowledge

empowering open access, supporting open science, advancing open scholarly communication.

#### **FAIR data**

Our solutions enable your data to be Findable,
Accessible, Interoperable and Reusable

#### Interoperable solutions

ORCID best Certified Service Provider, Datacite Registered Service Provider, CERIF enablers, IIIF open standards

#### **Compliance & Quality**

OpenAIRE guidelines, Certified Platinum Providers of DSpace, ISO 27001:2022, ISO 9001:2015

#### Security

Battle-tested solutions, secure by design; Trusted Providers of the Cloud Security Alliance



#### **Certifications**

4Science brings a high level of assurance to the services it provides for its clients. 4Science is the DSpace Certified Platinum Provider with the highest number of certifications



















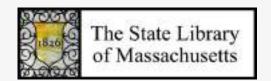


#### Clients that trust us





















INSTITUTE FOR FOR Fraunhofer

IIS

UNIVERSITÀ **DEGLI STUDI** DI MILANO







Università Ca'Foscari Venezia



## GLAM

We designed a state-of-art solution that fits with your needs and standards



## ...with flexibility: we adhere to the standards YOU choose

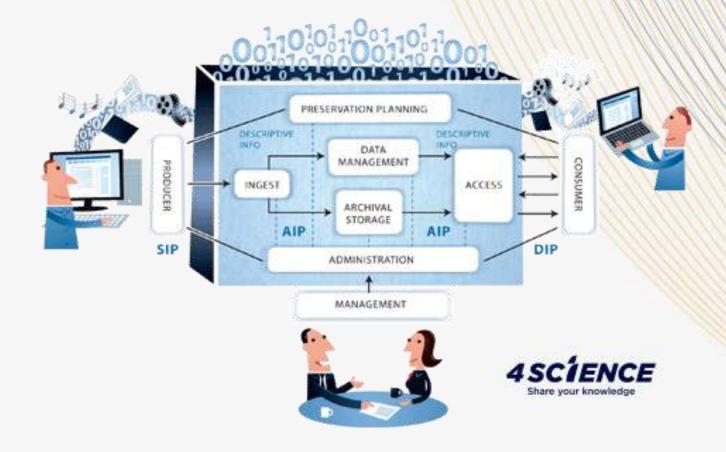


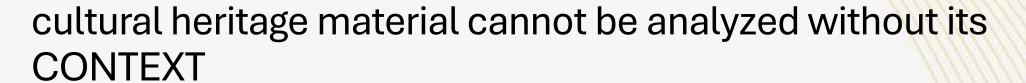














- •Cultural data can be fragmentary, partial, biased.
- •Scholars and cultural heritage professionals have to be able to correlate different data sources, to better investigate the articulation of historical phenomena and of the transformation processes that affected human history and culture.
- •Digital Cultural Resources have to be analyzed together with all contextual information needed to answer research questions, such as:
- (cultural, social, economic, technological...) production context of a document/object
- contextual associations at different levels and scales (spatial, temporal, functional, etc.)





### ...context that can be efficiently explored with a digital library solution!

To move such an approach from theory to practice we need infrastructures and tools for integration, analysis and storage of digital data and resources.

Today most of the digital cultural resources and data are in the Digital Libraries.

Digital Libraries should provide tools for:

- modeling, visualising and analysing information, both in a qualitative and quantitative way, as well as collaboratively working on it
- highlighting the relationships between data at different scales and the network of contextual relations in which historical sources are involved to enter the daily workflow of historians, archaeologists and humanities scholars.





## DIGITAL COLLECTIONS: ENABLING NEW IMMERSIVE EXPERIENCES

An extensible model to define a network of relationships to be discovered, browsed and studied.



Links are made between digital objects and an overview of artistic productions, thematic routes, historical paths...



...and all this allows to explore for real the contexts (historical, geographical, cultural) of the browsed digital objects.

## From Digital Records to Digital Cultural Landscapes

Beyond Digital Library Boundaries with DSpace





# Theoretical approach

- Need to reconstruct an information context around our data based on relationships at different levels
- Our approach has been improved and refined due to user input and feedback



#### Digital and the fragmentation risk

- "Where is the wisdom we have lost in knowledge?
- Where is the knowledge we have lost in information?"

Where is the information we have lost in data?

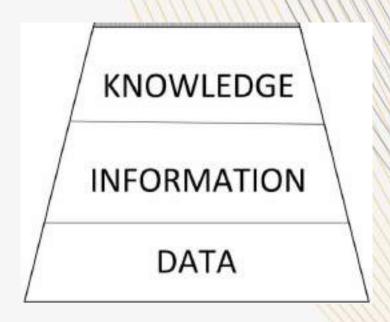


Information decomposition is (and must be) only a first step, with a view to its re-composition and enrichment to arrive at the production of new knowledge





Digital Libraries are the main tools, in the Humanities, for arriving at re-composing knowledge and at extending it







#### The Cultural Heritage Ecosystem

 We need to seize "the opportunity provided by digital to create an ecosystem for cultural heritage"

 The cultural heritage ecosystem should be able to manage digital relationships among different objects: to model them, to describe them, to interpret them, to communicate them.









 Extending DSpace for Digital Cultural Heritage Management



- To achieve the outlined goals and build a state-of-art Digital Library Management System, open source software is preferable.
- Development of open source software gives an effective way to create Digital Library Management Systems with a small financial investment.

 Looking exactly at sustainability, among the most used open source Digital Library Management Systems, we chose DSpace.



- DSpace is an Open Source Digital Asset Management System, allowing out-of-box to:
  - capture and describe digital objects using a submission workflow module, or a variety of batch ingest options
  - distribute digital assets over the web through a search and retrieval system
  - preserve Digital Assets over the long term



The system is based on the specifications of the OAIS (Open Archival Information System) for Long Term Preservation and is able to manage the whole "life cycle" of a digital object in terms of "Digital Curation", by means of:

- Metadata creation according to different standards
- SIP (Submission Information Package) import and validation
- AIP (Archival Information Package) creation
- AIP export
- Digital resources dissemination (also by means of the OAI
- PMH)
- Digital object history management and integrity check



 It is also used as a digital library to store, preserve and disseminate digital cultural heritage.

- A fairly large part of the world cultural and scientific heritage is already managed, accessed and preserved using DSpace
- It makes sense to enhance a system already widely used rather than propose to migrate data to new platforms



- DSpace has been extended for managing Digital Cultural Heritage
- IIIF based add-ons have been developed for curating and exploring digital objects
- An extended and extensible data model has been modeled to display contextual relationships at different levels and to manage different metadata schemas and conceptual models



# Managing Galleries, Libraries, Archives, Museums

Ancient and modern books, archival fonds, journal fonds, museums objects, documents, audio, video, maps ...

Cultural Heritage materials can be explored in an integrated way, without loosing domain metadata standards granularity

The applications can be extended to map further domains (tourism, botany.....)



tifier to cite or link to this item: http://hdl.handle.net/20.500.12460/123494



ILINE (MIRADOR)

| Title:                  | Nell'officina dei poeti : carte dal Fondo Manoscritti dell'Università di Pavia / ca   |
|-------------------------|---|
| Other authors:          | Trotta, Nicoletta 🚢   |
| Keywords:               | Pavia - Università - Fondo manoscritti - Esposizioni - 2014;Manoscritti - Sec. 2  |
| Issue Date:             | 2014  |
| Publisher:              | TCP   |
| Inventory Number:       | ISI9232   |
| Fond:                   | Pubblicazioni del Centro Manoscritti  |
| Туре:                   | Volume a stampa   |
| Description:            | Mostra tenuta a Pavia, Biblioteca Universitaria, 13-29 marzo 2014<br>In testa al frontespizio: Università degli studi di Pavia, Centro di ricerca interdi<br>contemporanei. |
| URI:                    | http://hdl.handle.net/20.500.12460/123494   |
| Link OPAC:              | https://openweb.unipv.it/openweb/#!rec?id=PAV0078003  |
| License:                | All rights reserved   |
| Appears in Collections: | Beni librari - Centro Manoscritti   |

# Bibliographic standards



ital Library Pavia / Università degli Studi di Pavia / Beni culturali dell'Università / Musei dell'Università / Museo di Archeologia

ease use this identifier to cite or link to this item: http://hdl.handle.net/20.500.12460/107040



| Title:                         | 00443 Denario                       |
|--------------------------------|-------------------------------------|
| Type:                          | moneta                              |
| Chronological range (century): | sec. I a.C.                         |
| Date start:                    | 55 a.C.                             |
| Date end:                      | 55 a.C.                             |
| Fond:                          | Monete romane repubblicane          |
| Material & technique:          | argento / coniazione                |
| Diameter:                      | 18                                  |
| Weight                         | 3.99                                |
| Axis:                          | 2                                   |
| Description of front:          | D/ Testa di Cibele a d dav. A.PLAV  |
| Description of back:           | R/ Cammello a d. e figura inginocch |
| Link to SIRBEC:                | http://www.lombardiabeniculturali.i |
| License:                       | All rights reserved                 |
| Appears in Collections:        | Beni numismatici - Museo di Arche   |

# Archaeological standards



#### Università degli Studi di Pavia / Beni culturali dell'Università / Musei dell'Università / Museo Camillo Golgi / Pa

fier to cite or link to this item: http://hdl.handle.net/20.500.12460/111039



NLINE (MIRADOR)

| Object title:           | Apparato di rischiaramento   |
|-------------------------|--|
| Subject:                | scienze della vita   |
| Date:                   | XIX secolo (Seconda metà del secolo)   |
| Fond:                   | Fondo di microscopia del Museo Camillo Golgi 🖬   |
| Description:            | Lo strumento è costituito da una base in legno con due corpi p<br>ottone, è fissata una piastra quadrata che ospita una lastra di<br>regolabile. |
| Function:               | E' un accessorio per la dissezione di oggetti molto piccoli.   |
| Usage:                  | Lo strumento viene abbinato a lenti o a microscopi da dissezio   |
| URI:                    | http://hdl.handle.net/20.500.12460/111039  |
| License:                | All rights reserved  |
| Appears in Collections: | Patrimonio scientifico e tecnologico - Museo Camillo Golgi   |

#### Scientific Museums Standards



#### ARCHIVIO STORICO DELL'UNIVERSITÀ DI PAVIA - CONSIGLIO ACCADEMICO



#### **Archival Standards**



www.4science.com

Please use this identifier to cite or link to this item: http://hdl.handlc.nst/28.588,12468/134875



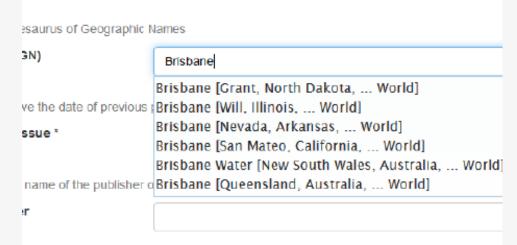
| Scientific name: | Trisetum pratense Pers.            |
|------------------|------------------------------------|
| SUB:             | Trisetum flavescens (L.) PBeauv.   |
| Family:          | GRAMINEAE                          |
| Genus            | Trisetum                           |
| Species:         | pratense Pers. (flavescens Beauv.) |
| Picked up by:    | Farneti, Rodolfo 🛔                 |
| Determined by:   | Farneti, Rodolfo 🎄                 |
| Date:            | 2-Jun-1888                         |
| Pick up place:   | M.te Penice                        |
| Place:           | Pavia - Italia i                   |
|                  |                                    |

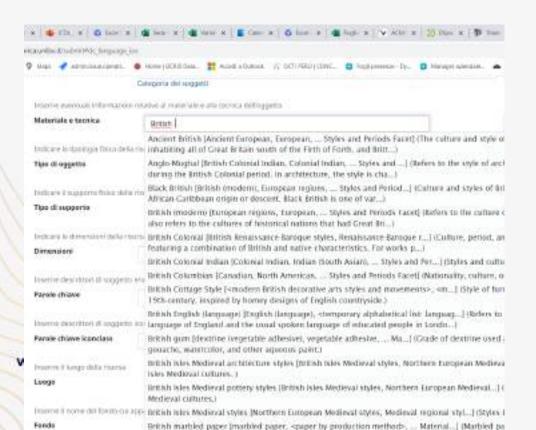


| Order:                        | Poales  |
|-------------------------------|---|
| APV family:                   | POACEAE   |
| Portal of the Flora of Italy: | https://dryades.units.it/floritaly/index.php?procedure=taxon_page&tipo=al |
| Fond:                         | Poaceae 🖬   |
| URI:                          | http://hdl.handle.net/20.500.12460/134875                                 |
| License:                      | All rights reserved   |
| Appears in Collections:       | Beni Botanici - Dipartimento di Scienze della Terra e dell'Ambiente       |

#### Botany metadata







# Integrated with the Getty Vocabularies



#### Image International Interoperability Framework

 In the last years IIIF became the "de facto" standard for presenting, navigating and delivering digital images on the web all over the world.

 It defines several APIs for providing a standard method for describing, analysing and sharing images over the web, as well as "presentation-based metadata" about structured sequences of images.



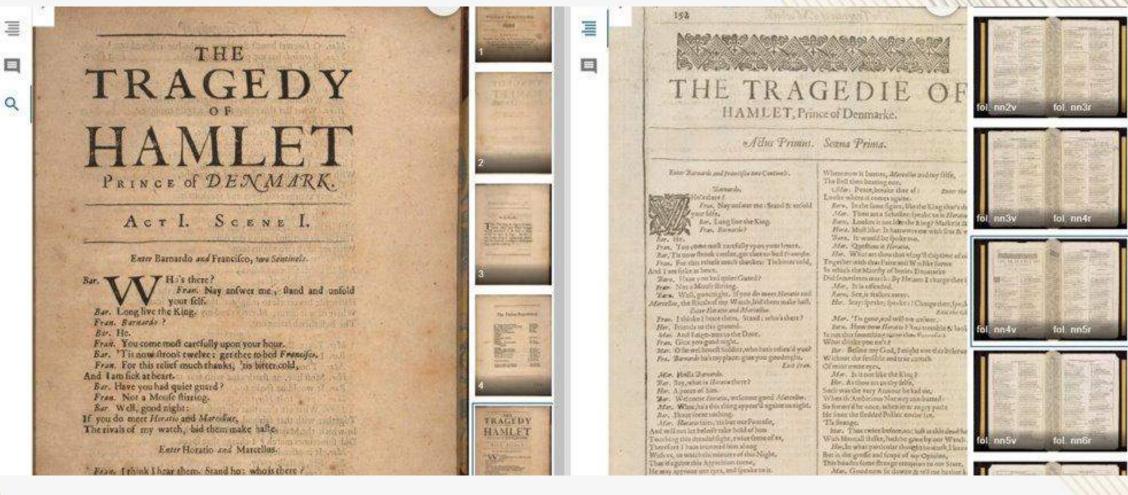
# An ecosystem built on IIIF

We developed 3 add-ons to "enrich" the IIIF experience.

- Image Viewer
- Document Viewer
- OCR & Transcription

The 3 add-ons implement several curation task for an easier digital resources management





## Comparing different contents on the Virtual Desktop

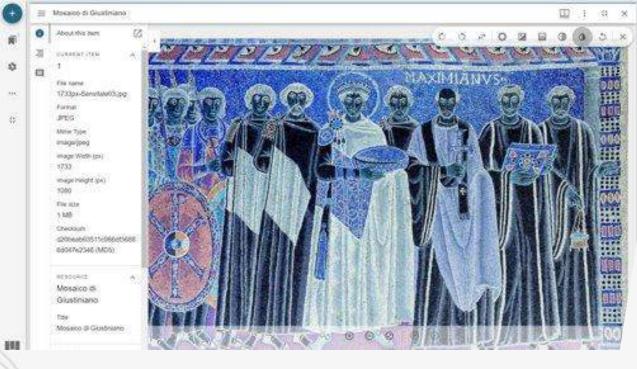
Experience an immersive journey outside repositories boundaries.

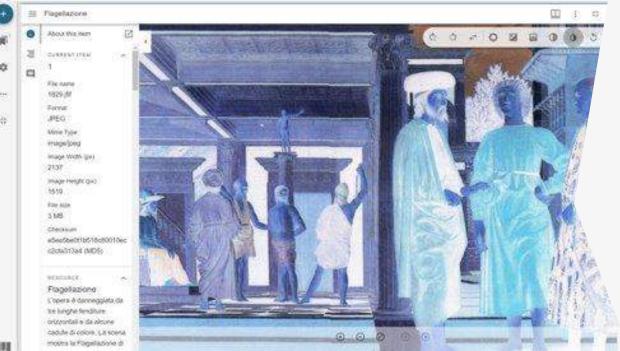






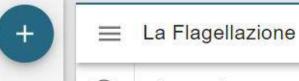
...





# Image Processing: analyzing images





















0 Annotations







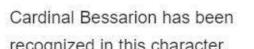
ITEM: [1]

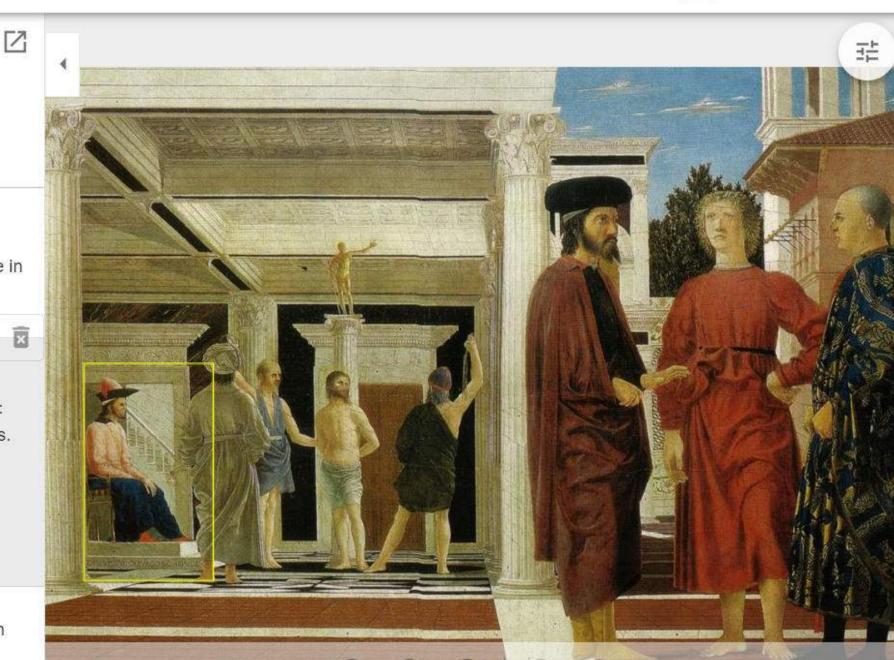
The column refers to the one in Constantinople's Forum





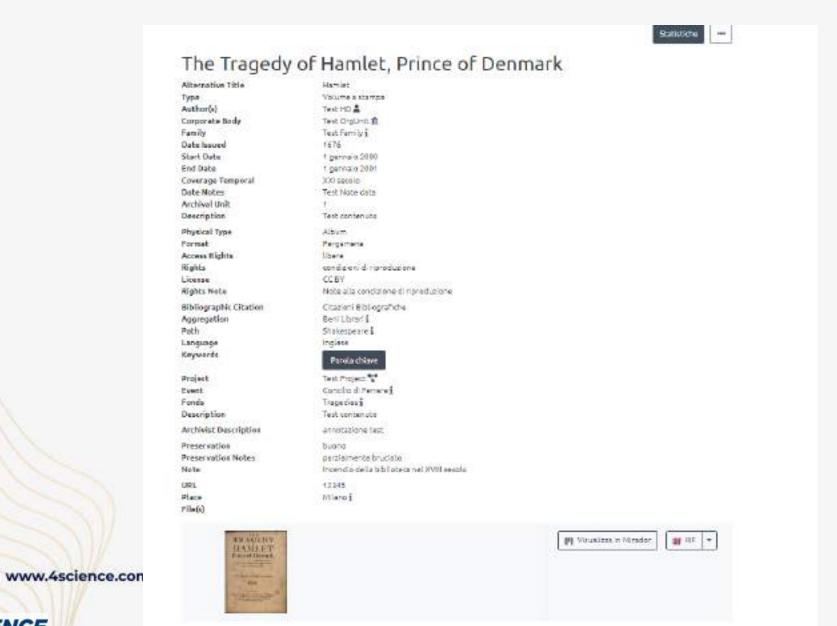
Pontius Pilate presents the marks of Byzantine kingship: pointed hat and purple shoes. He represents John VIII Paleologus observing the martyrdom of Byzantium without intervening







#### Forbid Bitstream Download







# Modeling Structural Metadata

- Structural Metadata can be uploaded in batch:
  - using the Simple Archive Format
  - using an Excel file

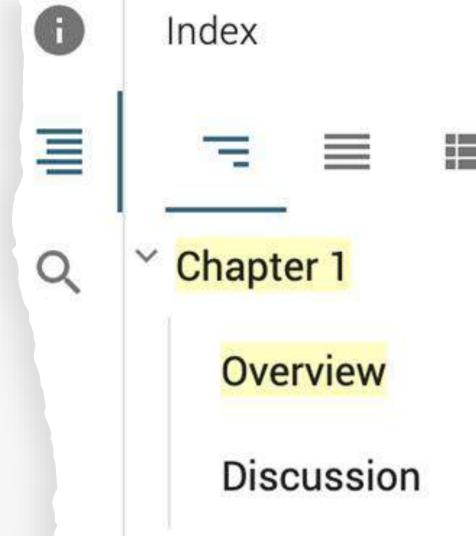






## TOC Management in Mirador

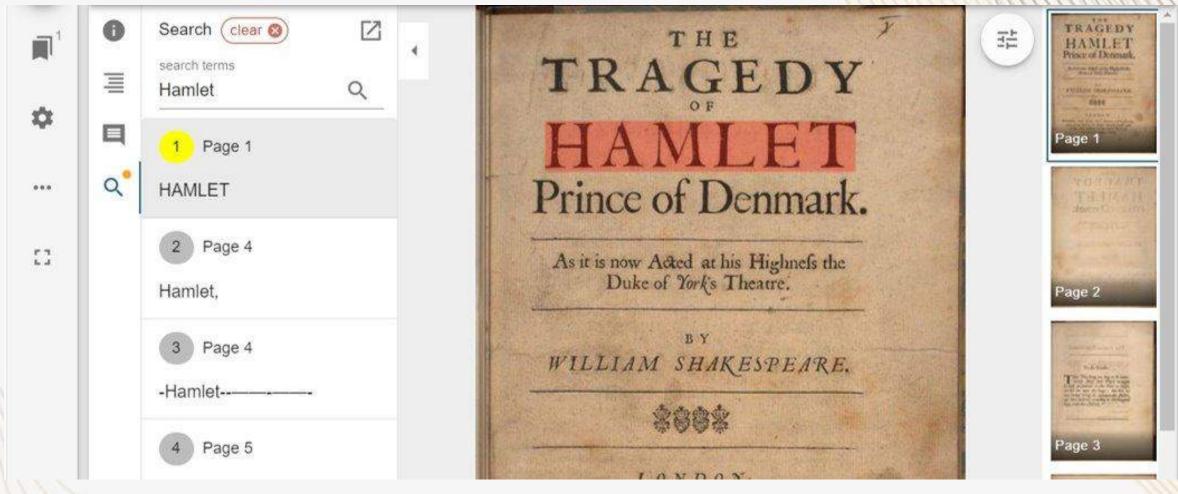
You can explore the Table of Contents by means of Structural Metadata using the IIIF manifest: a JSON file describing the structure of IIIF object



Chapter 2

Discussion





## The OCR & Transcription Module

Allows to extract text from images and index it



### Complete OCR management

- By means of its curation tasks, the module is able:
  - to extract OCR from images
  - to index the extracted text



## OCR & Transcription module's curation tasks

#### Extract

Extract text (hOCR) from images

#### Send

Send OCR to the annotation server

#### Consolidate

Consolidate hOCR for the fulltext indexing







# Integrating metadata and extracted text: the OCR text is indexed









# Video/Audio streaming

 Allows streaming of video and audio content uploaded to the repository with the use of a solution based entirely on open source components.



#### The data model

- Links the digital object with People, Places, Events, Fonds, ecc.
- Having an overview of artistic productions, thematic and historical paths,
- Define a relationships network to be explored, navigated and studied



...

### The Tragedy of Hamlet, Prince of Denmark

Hamlet

Alternative Title

Type Unità documentaria

Author(s) Shakespeare, William 🚨

Date Issued 1676

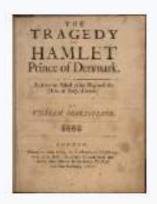
Archival Unit

Physical Type Volume

License CC0

Fonds Tragedies i

File(s)





#### Shakespeare, William



Biografia ingless

Path

Gender Bole

Poets Poet Accor Accore Oramatist Dremmeturge

m

Nationality inglese English

Birth Place Stratford-upon-Avon I Death Place Stratford-upon-Avon I

William Shakespeare was an English playwright, poet and actor. He is regarded as the greatest writer in the Enrigish language and the world's pre-eminent dramatist. [33] [4][5] He is often called England's national poet and the "Bard of Avon" (or simply "the Bard"). His extant works, including collaborations, consist of some 39 plays, 154 sonnets, three long nametive poems, and a few other verses, some of uncertain authorship. His plays have been translated into every major living language and are performed more often than those of any other playwright. He remains arguably the most influential writer in the English language, and his works continue to be studied and reinterpreted.

Shakespeare was born and raised in Stratford-upon-Ayon, Warwickshire. At the age of 18, he married Anne Hathaway, with whom he had three children: Susanna, and twins Hamnet and Judith. Sometime between 1983 and 1992, he began a successful cereor or London as an ector, writer, and performer of eplaying company called the Lund Chamberlain's Men, later known as the King's Men. At age 49 (around 1613), he appears to have retired to Stratford, where he died three years later. Few records of Shakespeare's private life survive; this has stimulated considerable speculation about such matters as his physical appearance, his ascussity, his religious beliefs and whether the works attributed to him were written by others.

Shakespeare produced most of his known storks between 1589 and 1613.[12][13] His early plays were primarily compiles and histories and are regarded as some of the best works produced in these gennes. He then wrote mainly tragedies until 1608, among them Hamlet, Remeo and Juliet, Othelio, King Lear, and Macbeth, all considered to be among the Finest works in the English language. [1][4][5] In the last phase of his life, he wrote tragecomedies [also known as remenced and collaborated with other playwrights.

Many of Shekespeare's plays were published in editions of varying quality and accuracy in his lifetime. However, in 1623, John Heminges and Henry Condell, two fellow actors and friends of Shekespeare's, published a more definitive text known as the First Folio, a posthumous collected edition of Shakespeare's dramatic works that included 36 of his plays. Its Preface was a prescient poemby Ben Jardon, a former rival of Shakespeare, that halled Shakespeare with the naw femous epithet: "not of an ege, but for all time".

\*Rdut

Shakengeere Peth \$



SCIENCI

www.4science.com

## Relationship between **Events** and Digital **Objects**

#### Flagellation of Christ

Date Issued

Abstract

Author(s)

Piero della Francesca 2 Pittore

The Flagellation of Christ (probably 1468-1470) is a painting by Piero della Francesca in the Galleria Nazionale

delle Marche in Urbino, Italy. Called by one writer an "enigmatic little painting,"[1] the composition is complex and unusual, and its iconography has been the subject of widely differing theories. Kenneth Clark called The

Flagellation "the greatest small painting in the world".

▲ Collapse

Physical Description

The theme of the picture is the Flagellation of Christ by the Romans during his Passion. The biblical event takes place in an open gallery in the middle distance, while three figures in the foreground on the right-hand side apparently pay no attention to the event unfolding behind them. The panel is much admired for its use of linear perspective and the air of stillness that pervades the work, and it has been given the epithet "the Greatest Small Painting in the World" by the art historian Kenneth Clark.

The painting is signed under the seated emperor OPVS PETRI DE BVRGO S[AN]C[T]I SEPVLCRI - "the work of Piero of Borgo Santo Sepolcro" (his town).

The Flagellation is particularly admired for the realistic rendering of the hall in which the flagellation scene is situated in relation to the size of the figures and for the geometrical order of the composition. The portrait of the bearded man at the front is considered unusually intense for Piero's time.

◆ Collapse

File(s)



Name 1829.jFiF

Size

3.76 MB

Format JPEG

Checksum

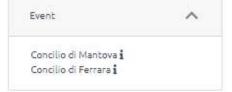
e5ee5be0f1b518c80010ecc2cfa313a4





Relations

Path Flagellazione i





Statistics

Subscribe

#### Concilio di Mantova



Start Date 1459 **End Date** 1460 Location Mantovai Country Italia

Abstract The Council of Mantua of 1459, or Congress of Mantua, was a religious meeting convoked by Pope Pius II, who had

> been elected to the Papacy in the previous year and was engaged in planning war against the Ottoman Turks, who had taken Constantinople in 1453. His call went out to the rulers of Europe, in an agonized plea to turn from in-

ternecine warfare to face Christendom's common enemy.

▲ Collapse

Path Flagellazione i

Documents People External Links



Export \*

#### Filters







#### Publication Flagellation of Christ

(1458) Piero della Francesca 2: Pittore

The Flagellation of Christ (probably 1468-1470) is a painting by Piero della Francesca in the Galleria Nazionale delle Marche in Urbino, Italy. Called by one writer an "enigmatic little painting,"[1] the composition is complex and unusual, and its iconography has been the subject of widely differing theories. Kenneth Clark called The Flagellation "the greatest small painting in the world".

▲ Collapse

#### Settings

Sort By Owner Relevance Des V Results per page

10



www.4science.com

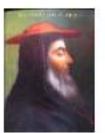
between

**Events** 

People and

Relationship

#### Bessarione



Alternative Names

Bessarion

Basillo

Gender m

Role Cardinale
Nationality Bizantina
Birth Date January 2, 1403
Death Date November 18, 1472

Birth Year 1403 Death Year 1472

Birth Place Trobisonda i
Death Place Ravenna i

Partecipated in Concilio di Mantova i

Concilio di Ferrara i

English Biography Bessarion (Greek: Βησσορίων; 2 January 1403 – 18 November 1472) was a Byzantine Greek Renaissance humanist,

theologian, Catholic cardinal and one of the famed Greek scholars who contributed to the so-called great revival

of letters in the 15th century.

He was educated by Cemistus Pletho in Neoplatonic philosophy and later served as the titular Latin Patriarch of

Constantinople. He eventually was named a cardinal and was twice considered for the papacy.

His baptismal name was Basil (Greek: Βασίλειος, Basileios or Basilios). The name Bessarion he took when entering the monastery. He has been mistakenly known also as Johannes Bessarion (Italian: Giovanni Bessarione) due to an

erroneous interpretation of Gregory III Mammas.

→ Collapse

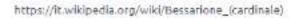
Path The Flageliation i

www.4science.cor

External Links



Wikipedia Link







**E**+Export ▼

#### Concilio di Mantova



Start Date 1459 End Date 1460 Mantovai Location Country Italia Abstract

The Council of Mantua of 1459, or Congress of Mantua, was a religious meeting convoked by Pope Pius II, who had been elected to the Papacy in the previous year and was engaged in planning war against the Ottoman Turks, who had taken Constantinople in 1453. His call went out to the rulers of Europe, in an agonized plea to turn from in-

ternecine warfare to face Christendom's common enemy.

▲ Collapse

The Flagellation i Path

Documents People External Links





Now showing 1 - 1 of 1

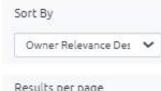


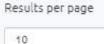




Person Bessarione

#### Settings







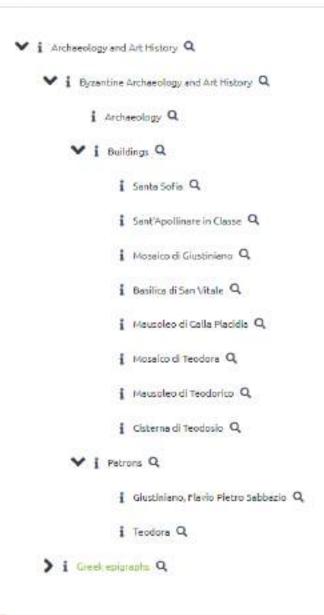
www.4science.com

# Opening new perspectives for Digital Collections

 The application is conceived to open original perspectives for digital collections and libraries not only by means of object relationships, but also using "views" and logical aggregates allowing us to inform new audiences about our cultural heritages.



#### Aggregation Tree

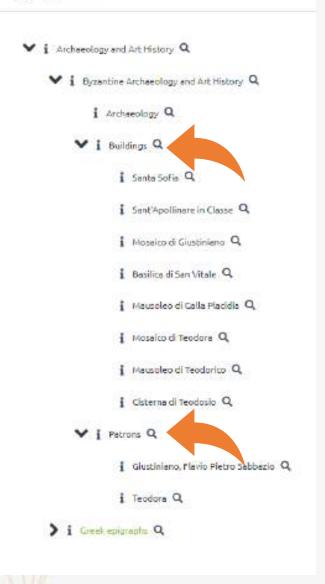


## The Aggregation

- Possibility of aggregating different contents present within the Digital Library, even organizing them in a hierarchical mode
- Enhancing relationships according to an even different declination, with the possibility of "disassembling" and "reassembling" them based on the changing needs of institutions.



#### Aggregation Tree



## The Aggregation

Using Aggregations, any type of entity can be correlated

 all buildings and all buildings patrons within the Digital Library



## The **Aggregation**

- Each "object" in DSpace can belong to multiple Aggregations.
- Each "object" can be presented differently depending on the Aggregation with which it is connected.
- The logical views that can be created are virtually "infinite."



### **Paths**

Paths mainly tell "stories."

Paths can also include objects of different types (Documents, Photographs, People, Events, Places, etc.).

The same object can be included in different Paths



# Paths creation and storytelling

 With DSpace-GLAM, it is easy to create paths by relating different entities, highlighting contexts, structuring exhibitions and enhancing itineraries

 Greater interaction between text and digital resources makes it possible to build real narratives around cultural heritage





# Structuring Digital Cultural Landscapes

- Through DSpace extension for Cultural Heritage, today many institutions are enhancing the relationships among their content, shaping "their" digital cultural landscapes according to the dimensions of variability needed
- Digital cultural landscapes are "virtual ecosystems" in which digital cultural heritage subsets are related with entities such as people, places, events, fonds, etc., according to different visions and interpretations, in order to generate new knowledge and to open up new perspectives.
- Such "digital landscapes" can be visualized either as Semantic Network,
   Paths or Aggregations.



# The Network Lab: explore the relationships graph

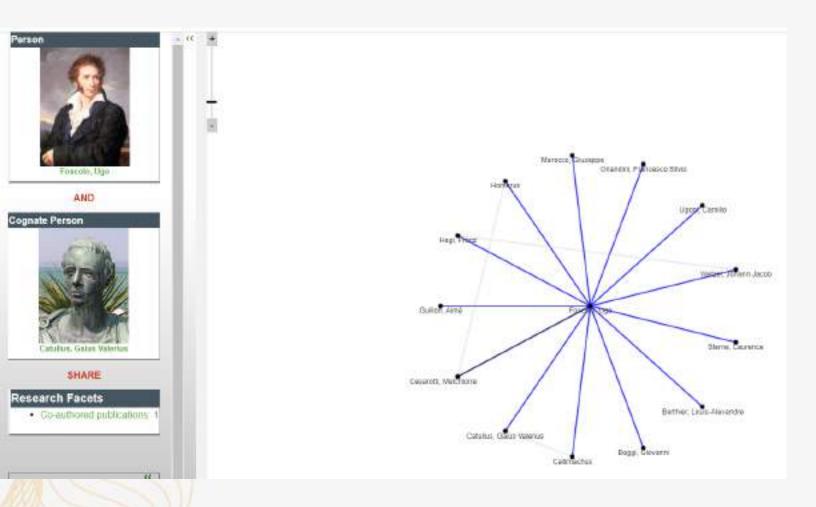
 Based on the relationships defined at the data model level, DSpace-GLAM is able to construct graphs, thanks to the Network Lab Byzantine master massicists of SarMicSalia VIII Paleolog



# The Network Lab: explore the relationships graph

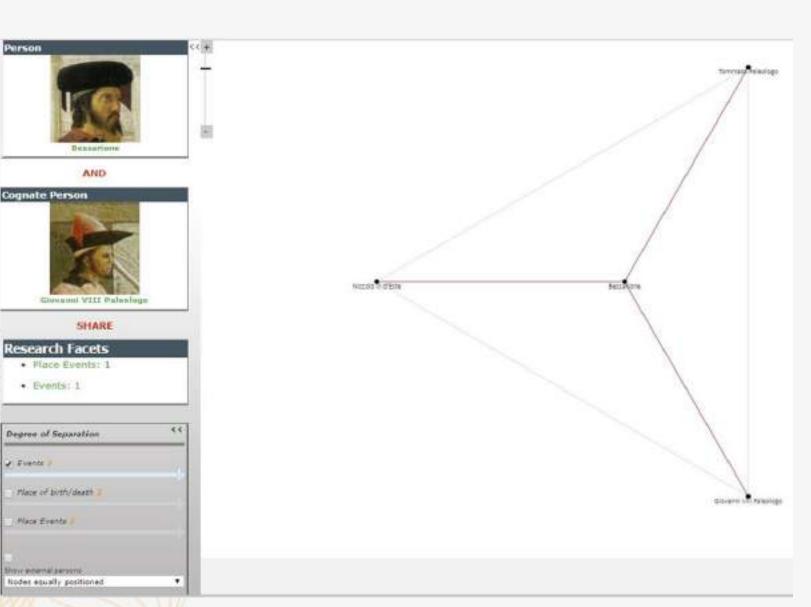
- For example you can navigate through the different Byzantine emperors who commissioned interventions on a building and explore their relationships with architects and workers who actually did the work
- In this way it is possible to uncover "hidden relationships" producing new knowledge

Byzantine master mosaicists of SarMicSolia VIII Paleologu Anthemiss of Traile



Exploring literary interests and collaborations (a cultural context)





# Explore historical events



www.4science.com

 Each digital object and each concept (Person, Event, Place, Path, Aggregation, etc.) is a node in a single semantic network



# DSpace and Digital Cultural Landscapes

The aim is to provide an environment where the traditional interpretive and hermeneutic work typical of the humanities can complement and benefit from the tools of data analysis and visualization

In this way, we hope that through the creation and exploration of more and more "digital landscapes" there can be a fundamental change in the ways in which digital cultural heritage is managed, analyzed, and enjoyed



# Ux Design

 Nowadays a Digital Library should be able to tell its content in different ways to different audiences



# Where are we going?

Towards a Digital Library

- Different navigation modes
- Different tone of voices
- Different ships

Everyone should reach the treasure



## A Digital Library many audiences

- The new DSpace-GLAM expands its ability to enhance content and make it usable through diversified consultation channels, also based on the needs of different types of audiences:
  - specialist, related to research and university studies
  - belonging to the sphere of school learning
  - tourists, interested in discovering or acquiring new knowledge about the territories being visited
  - citizens, who wish to acquire information on facts, places, objects





#### Contacts

Central contact point: info@4science.com

Phone numbers: +1 (816)905-8227, +39 348 0745050



Susanna Mornati, co-Chief Operating Officer: susanna.mornati@4science.com



Andrea Bollini, co-Chief Operating Officer & CTIO: andrea.bollini@4science.com



Irene Buso, Deputy Chief Sales&Marketing Officer: irene.buso@4science.com



Nicole Mariani, Sales executive: nicole.mariani@4science.com



Federico Verlicchi, Business&Marketing Developer USA: federico.verlicchi@4science.com