

DEPARTMENT OF
INFORMATION
ENGINEERING
UNIVERSITY OF PADOVA



30 Years of DL Research @ UNIPD

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14TH ITALIAN RESEARCH CONFERENCE ON DIGITAL LIBRARIES

University of Udine

26 gennaio 2018



Outline

- DUO and the birth of the DL area
- Annotations
- CULTURA and Digital Archives
- Log Analysis
- Personalisation
- User-System Interaction
- Data Driven Digital Libraries



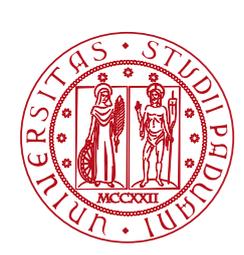
DUO: An Innovative OPAC



The Italian Library Automation Project and the OPAC



- The Italian national project of library automation, called SBN - Servizio Bibliotecario Nazionale, is an advanced library automation project started in 1970s
- Different library automation systems at national/regional/local level cooperating in a networked/hierarchical organisation
- Until late in the 1980s
 - The public online access to bibliographic data was not available, only traditional card catalogues were in use



OPAC Access at the University of Padua



- The University of Padua became a node of the SBN project in the late 1980s
- At that time, there was much interest in OPAC
 - A first indication that information retrieval might start to interest the general public of libraries
- We launched a project for a third generation OPAC with advanced library catalogue and IR functions



The OPAC DUO Interface (in Italian)



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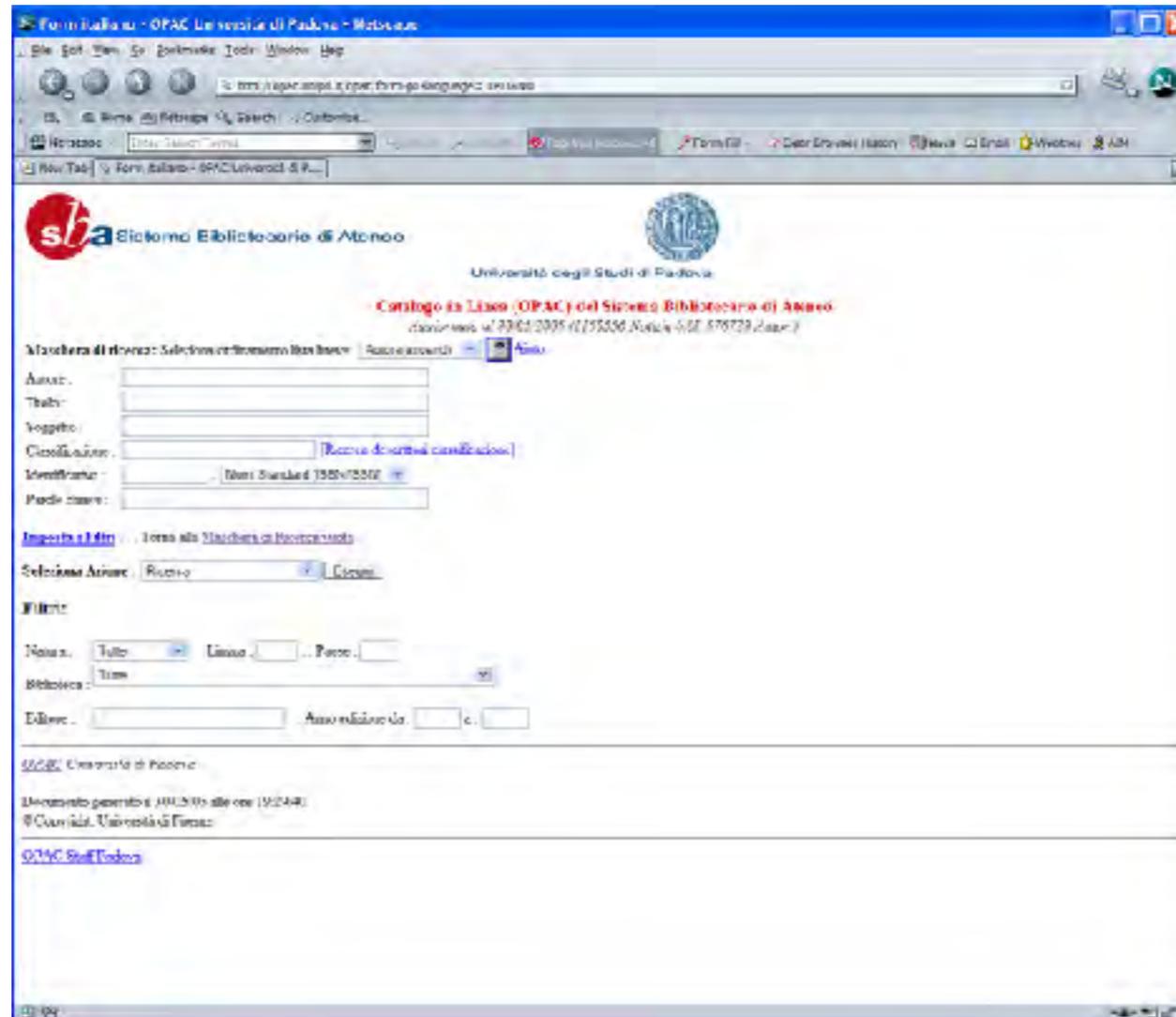
WVTECDO
-----
Universita' di Padova
DUO * Interrogazione base dati SBN * DUO
DUO * Dialog between University User and Online SBN database * DUO

-----
!                               Benvenuti nel sistema DUO.                               !
!                                                                           !
! >> 1 - Ricerca facilitata                                           !
! >> 2 - Ricerca per esperti                                           !
! >> 3 - Indice generale di Duo                                           !
!                                                                           !
! >> S - Stampa dei risultati (E-mail)                                   !
! >> H - Help (raccomandato ai nuovi utenti)                             !
! >> M - Terminali e Mouse                                           !
!                                                                           !
! >> Q - Fine sessione                                               !
!                                                                           !
! >> B - Funzioni riservate ai bibliotecari                             !
!                                                                           !
! Scelta: =                                                                !
!                                                                           !
! Le righe sottolineate ( > ) possono essere cliccate (oppure cursore + Invio) !
!                                                                           !
-----
!                               Ultimo aggiornamento                               !
!                               28/05/05 alle 16:03                               !
!                                                                           !
!                               Monografie 991169                               !
! > Periodici 42242                                                   !
!                               Collane 98913                               !
!                                                                           !
-----
!                               Mouse e Colori                               !
!                               <clicare>                                       !
! > clicare                                                           !
!                               leggere                                       !
!                               scrivere                                       !
!                                                                           !
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Maristella Agosti – University of Padova, Italy



- The time was not ripe for Web applications: the IR functions were lost



The Birth of the Digital Library Area

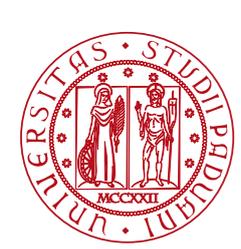


- The Library Automation community realises the lack of computer science and engineering knowledge
- The area of Digital Library starts in those years as a new scientific area
 - In USA - Digital Libraries Initiatives (DLI-1 and DLI-2) of the National Science Foundation (from late 1993)
 - In Europe - A group of projects supported by the European Commission under the 4th, 5th and 6th Framework Programme named DELOS Working Group 1996-99, first DELOS Network of Excellence 2000-2003, and DELOS Network of Excellence for Digital Libraries 2004-2007
- It is an area of confluence: library automation, database management, information retrieval, the Web, ...

DL a meeting point of disciplines and research fields:

- DB management
- Information retrieval
- Library and information systems
- Document and information systems
- The Web
- Information visualization
- Artificial intelligence
- Human-computer interaction



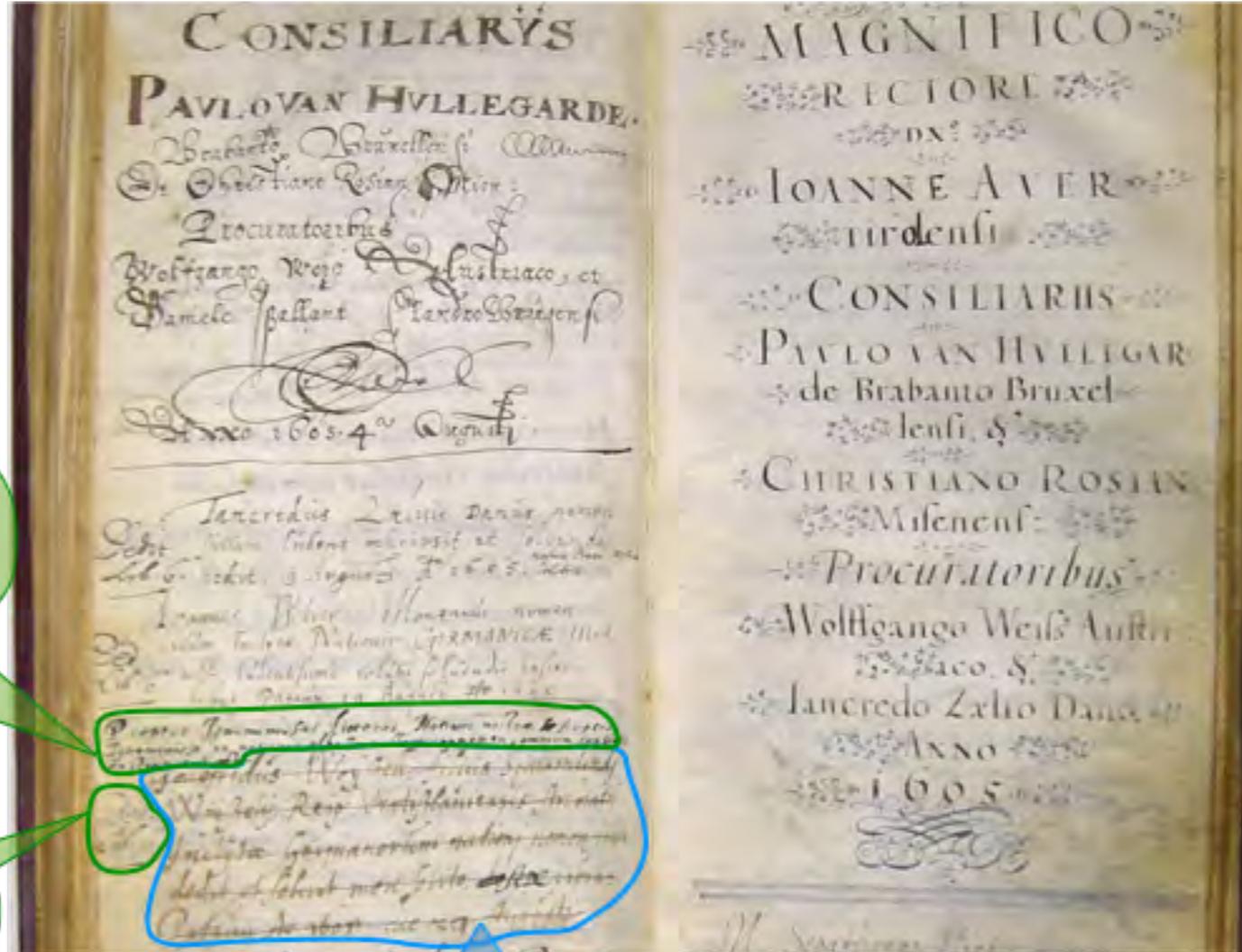


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Annotations



a₃

Propter ignominiosas litteras Nationi nostrae scriptas ignominiose ex Nationis albo in publico conventu, omnium consensu, extirpatus est

[He was ignominiously expelled by the Council of Association, because he wrote ignominious letter to the Association]

Dedit libras 6
[He payed 6 liras]



a₂

Godfridus Woyszel, filius Sigismundi Woysseii reipublicae Vratislaviensis archiatri, inclitae Germanorum nationi nomen suum dedit et solvit more solito sex libras. Patavii anno 1605 die 29 augusti

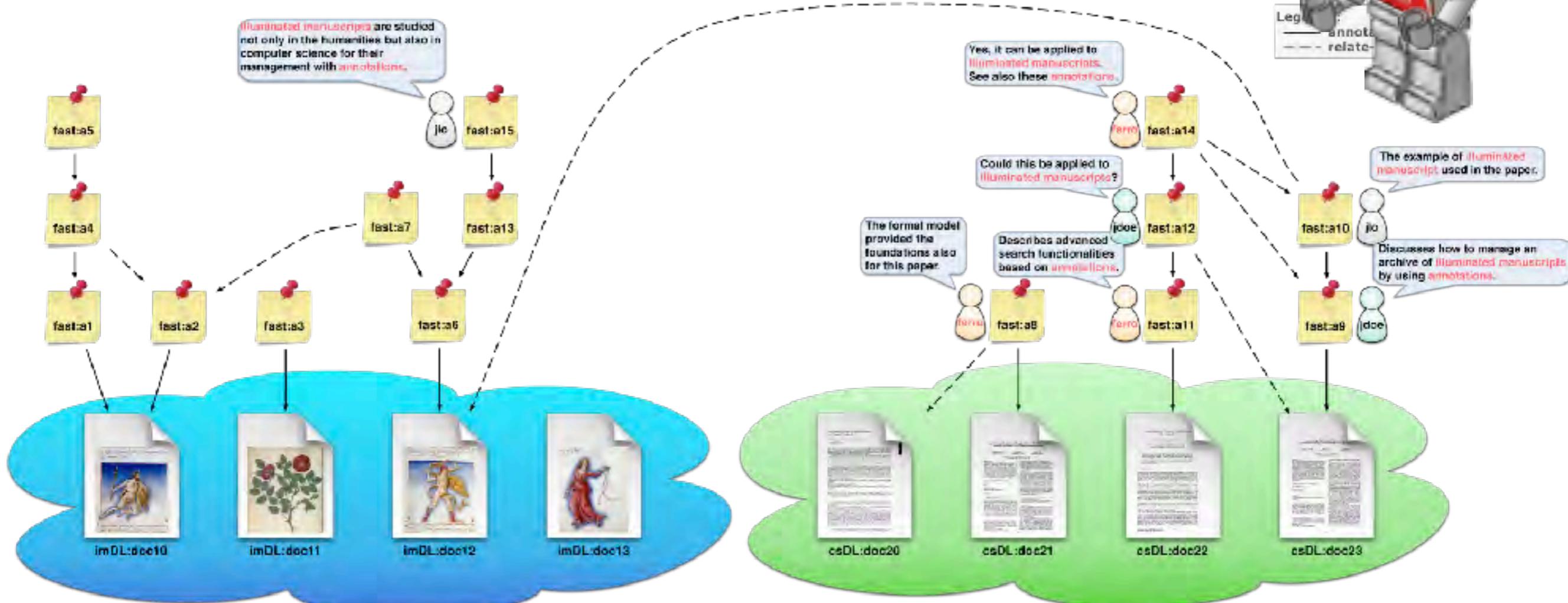
[Godfrey Woyszel, Sigmund's son, from Bratislav, enrolled and payed 6 liras]



a₁

- Italia, Padova, Archivio dell'Università di Padova, Archivio antico, Matricula Nationis Germanicae artistarum, reg. 465, c. 69v

I would like to find information about **illuminated manuscripts** and their usage with **annotations** as discussed by **ferro**



imDL: Illuminated Manuscripts Digital Library

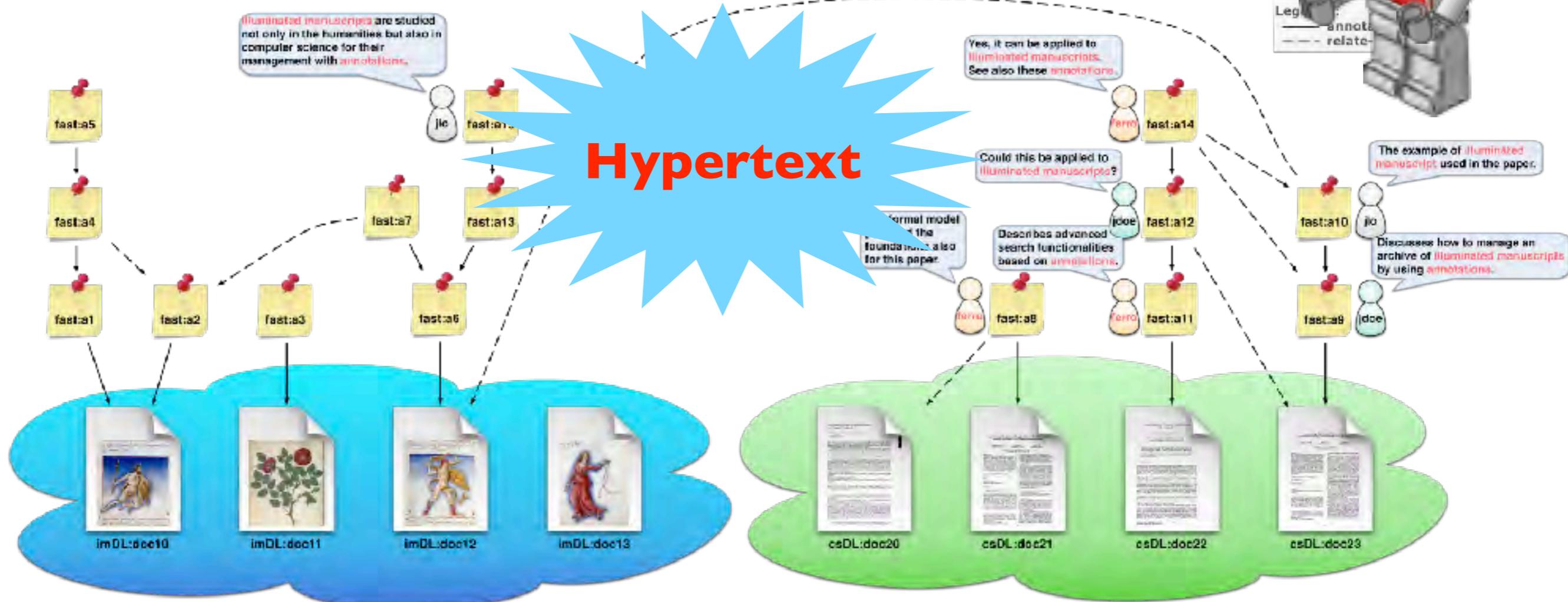
csDL: Computer Science Digital Library

Search by Using Annotations

I would like to find information about **illuminated manuscripts** and their usage with **annotations** as discussed by **ferro**

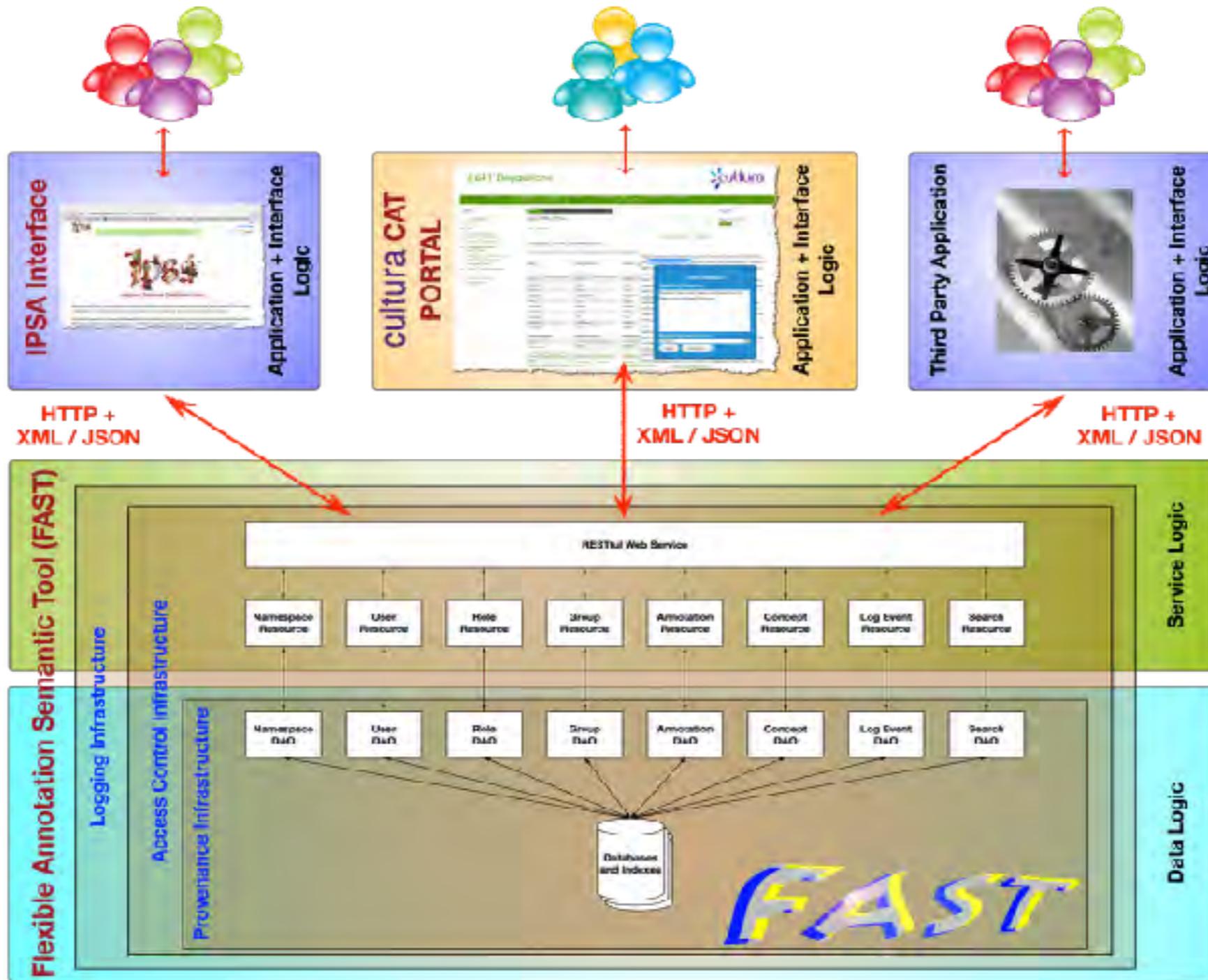
Best Match

Exact Match

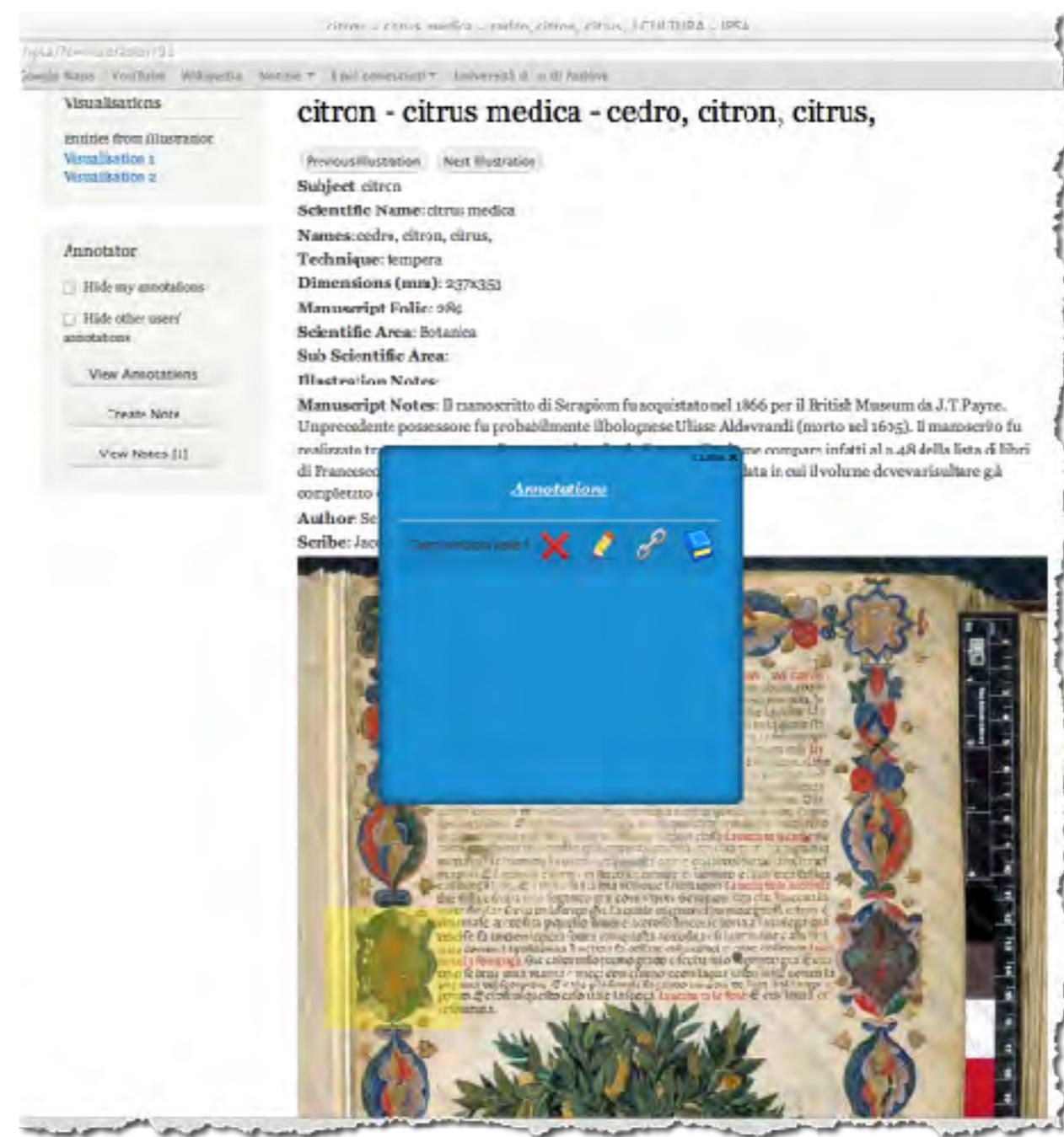


imDL: Illuminated Manuscripts Digital Library

csDL: Computer Science Digital Library



- The CULTURA project
 - innovative environment for users with a range of different expertise
 - users can collaboratively explore, interrogate and interpret complex and diverse digital cultural heritage collections
- Use cases
 - IPSA: a digital archive of illuminated manuscripts produced in northern Italy during the 14th and 15th centuries
 - The 1641 Depositions: the documents contain witness testimonies from men and women from all over Ireland and report on the rebellion of October 1641





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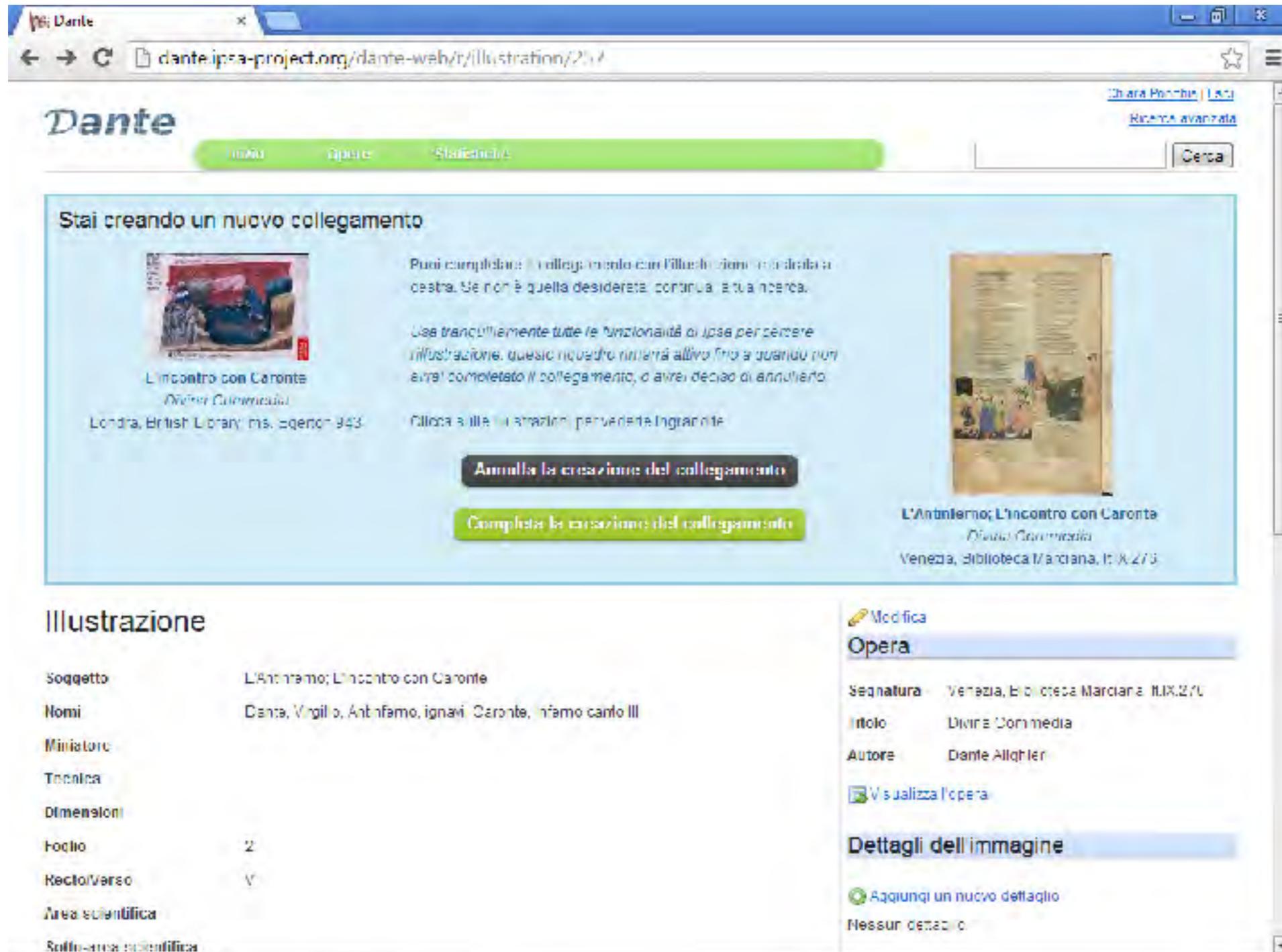
Digital Archives, IPSA and Dante

- Digital archive of illuminated manuscripts
- Result of a joint research project
 - Ex-Department of History of Visual Arts and Music
 - Department of Information Engineering
- Initially designed for a specialist public of scholars and researchers
- 56 manuscripts and more than 3000 images



DANTE.

A web-application for the History of Art



The screenshot shows a web browser window with the URL `dante.ipsa-project.org/dante-web/r/illustration/2517`. The page title is "Dante" and it features a navigation bar with "Home", "Opere", and "Statistiche". A search bar is located in the top right corner.

The main content area is titled "Stai creando un nuovo collegamento" (You are creating a new connection). It displays two illustrations side-by-side:

- Left illustration:** "L'incontro con Caronte" (The encounter with Charon), from the *Divina Commedia*, London, British Library, ms. Egerton 943.
- Right illustration:** "L'Antinferno; L'incontro con Caronte" (The Ante-Inferno; The encounter with Charon), from the *Divina Commedia*, Venezia, Biblioteca Marciana, It. IX.275.

Text in the center explains the connection process: "Puoi completare il collegamento con l'illustrazione indicata a destra. Se non è quella desiderata, continua la tua ricerca. Usa tranquillamente tutte le funzionalità di Ipa per cercare l'illustrazione: questo riquadro rimarrà attivo fino a quando non avrai completato il collegamento, o avrai deciso di annullarlo. Clicca sulle immagini per vederle ingrandite." Below this text are two buttons: "Annulla la creazione del collegamento" (Cancel connection creation) and "Completa la creazione del collegamento" (Complete connection creation).

Below the illustrations, there is a metadata section titled "Illustrazione" (Illustration) with the following details:

- Soggetto:** L'Antinferno; L'incontro con Caronte
- Nomi:** Dante, Virgilio, Antinferno, ignavi, Caronte, inferno canto III
- Miniatura:**
- Tecnica:**
- Dimensioni:**
- Foglio:** 2
- Recto/Verso:** V
- Area scientifica:**
- Sotto-area scientifica:**

On the right side, there is a "Modifica" (Edit) button and a section titled "Opera" (Work) with the following details:

- Segnatura:** Venezia, Biblioteca Marciana, It. IX.275
- Titolo:** Divina Commedia
- Autore:** Dante Alighieri

Below the "Opera" section, there is a "Visualizza l'opera" (View work) button and a section titled "Dettagli dell'immagine" (Image details) with an "Aggiungi un nuovo dettaglio" (Add new detail) button and the text "Nessun dettaglio" (No detail).



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CULTURA



- STREP project active from February 2011 to January 2014
- Engaging new user categories with digital cultural heritage collections
 - User centered-approach
- Exploring new ways to experience digital cultural heritage
 - Adaptivity
 - Interactive environment



Collections



- IPSA: a digital archive of illuminated manuscripts produced in northern Italy during the 14th and 15th centuries
- The 1641 Depositions: the documents contain witness testimonies from men and women from all over Ireland and report on the rebellion of October 1641



- Involving different user categories from the very beginning of the project
- Continuous Evaluation:
 - November and December 2011: baseline evaluations with professional researchers and students
 - April 2012: IPSA trials with postgraduate students
 - May 2012: interaction with professional researchers
 - September 2012: IPSA@CULTURA
 - December 2012 and January 2013: evaluation of IPSA@CULTURA with a new cohort of students and a new user category (Salvalarte Group)
 - October 2013 DILL Master evaluation
 - October 2013 High school students evaluation



References

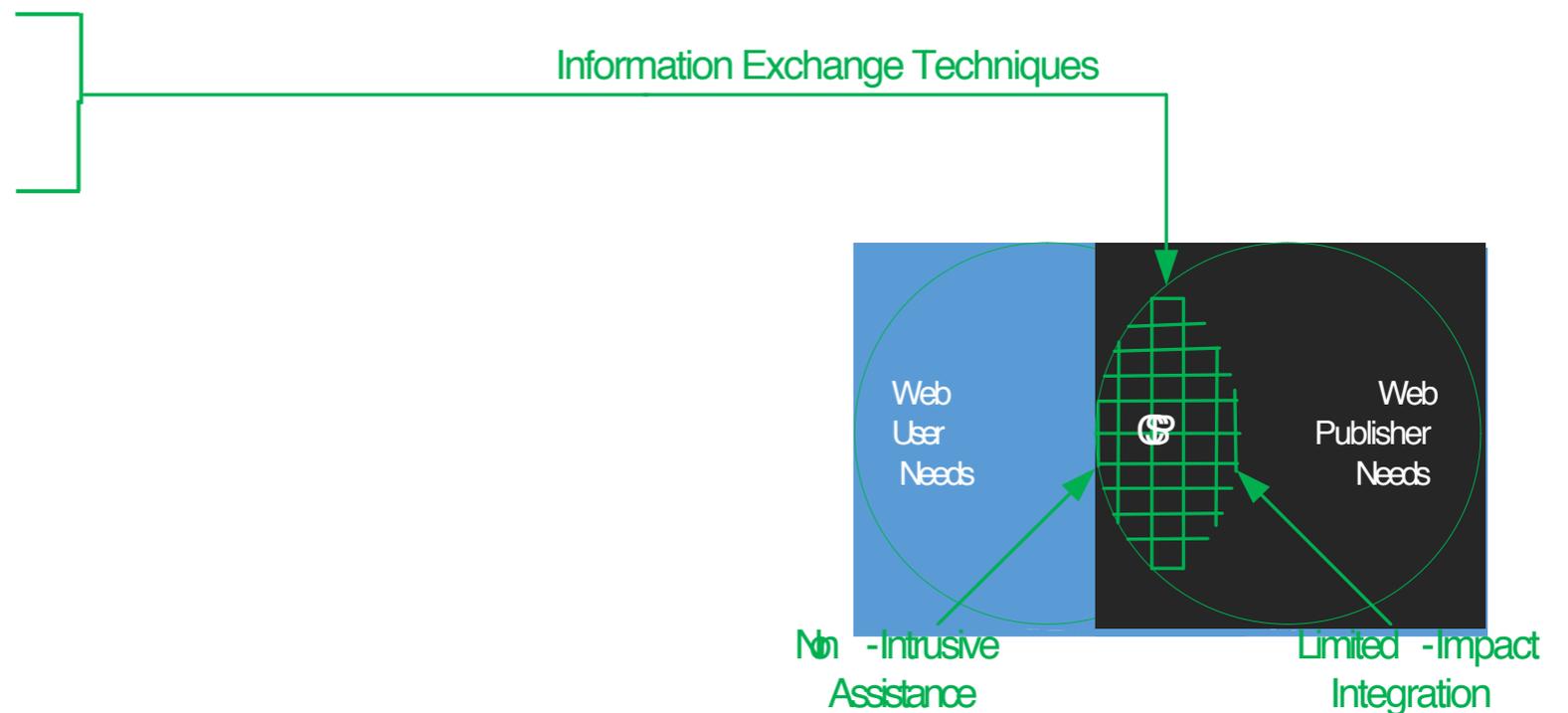
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Personalisation

Motivation

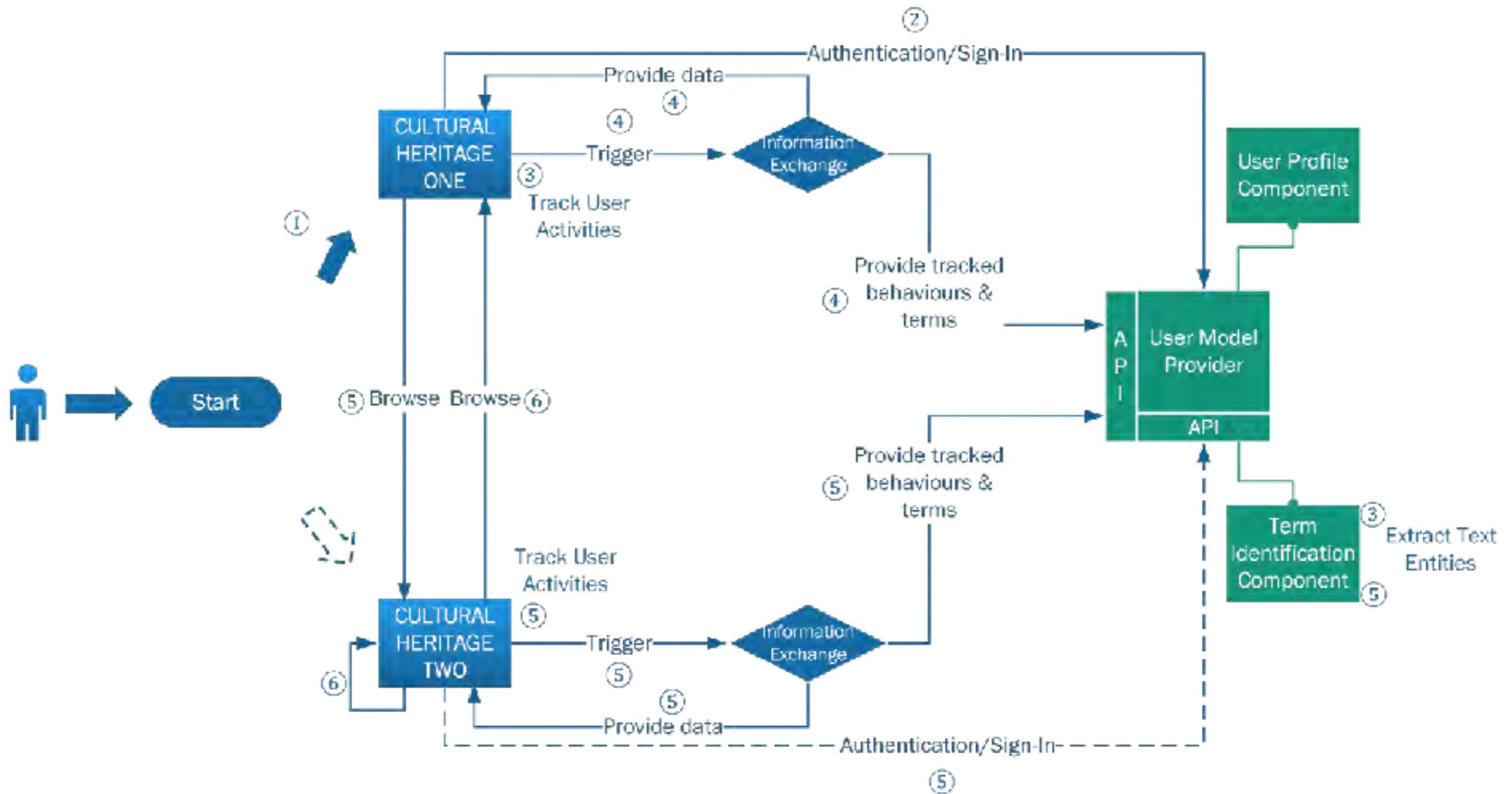
- Lack of a seamless browsing experience for users across (cultural) websites
- Most of personalisation approaches unable to assist users in information needs that span different (cultural) websites
- Need for a consistent Cross-Site Personalisation (CSP) support mechanism that provides:
 - Valuable exchange of information between a target website and the user modelling service
 - Users' privacy needs
- Use case:
 - The CULTURA project



Cross-Site Approach

- Complementary approach to the CULTURA Virtual Research Environment's demonstrator

- Designed as an open domain approach



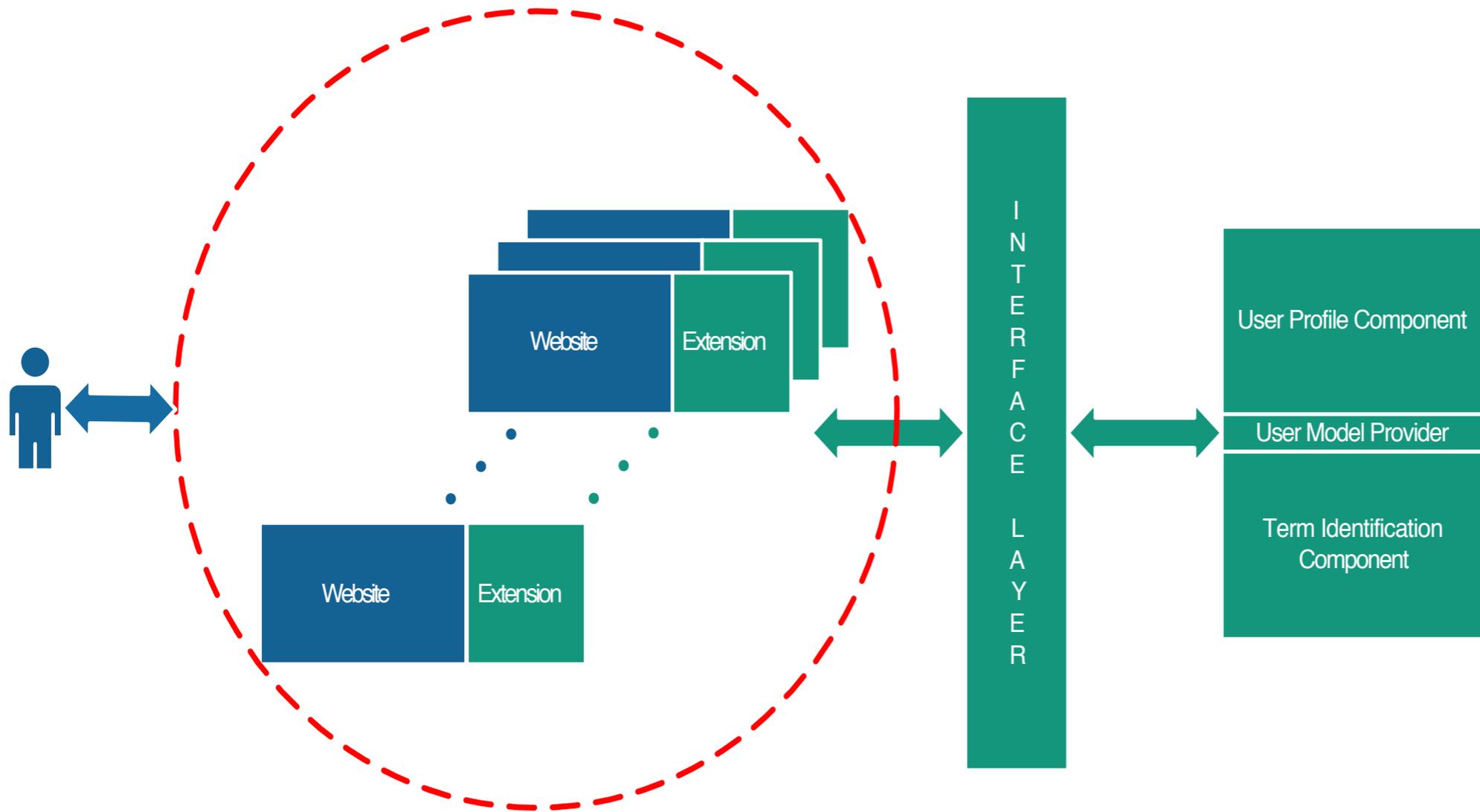


Architectural Design

Cross-Site Browsing Space
Web space introduced by websites that integrate the cross-site service through module extensions

Interface Layer
Facilitate communication between websites and the service

Cross Site Browsing Space



User Profile
Store and aggregate users activities and content related text entities

Term Identification
Extract relevant text entities from browsed content within websites



References

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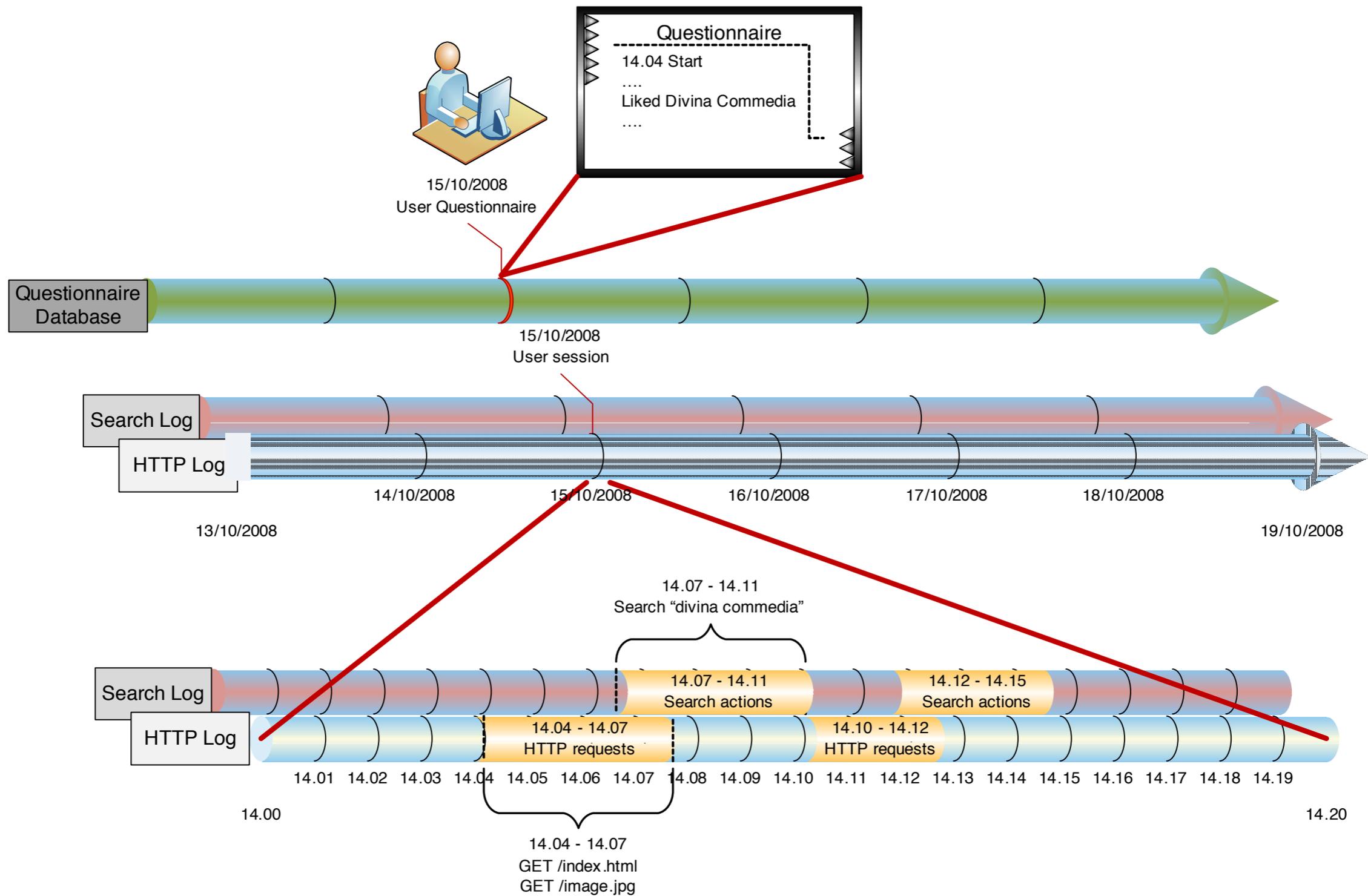
Log Analysis

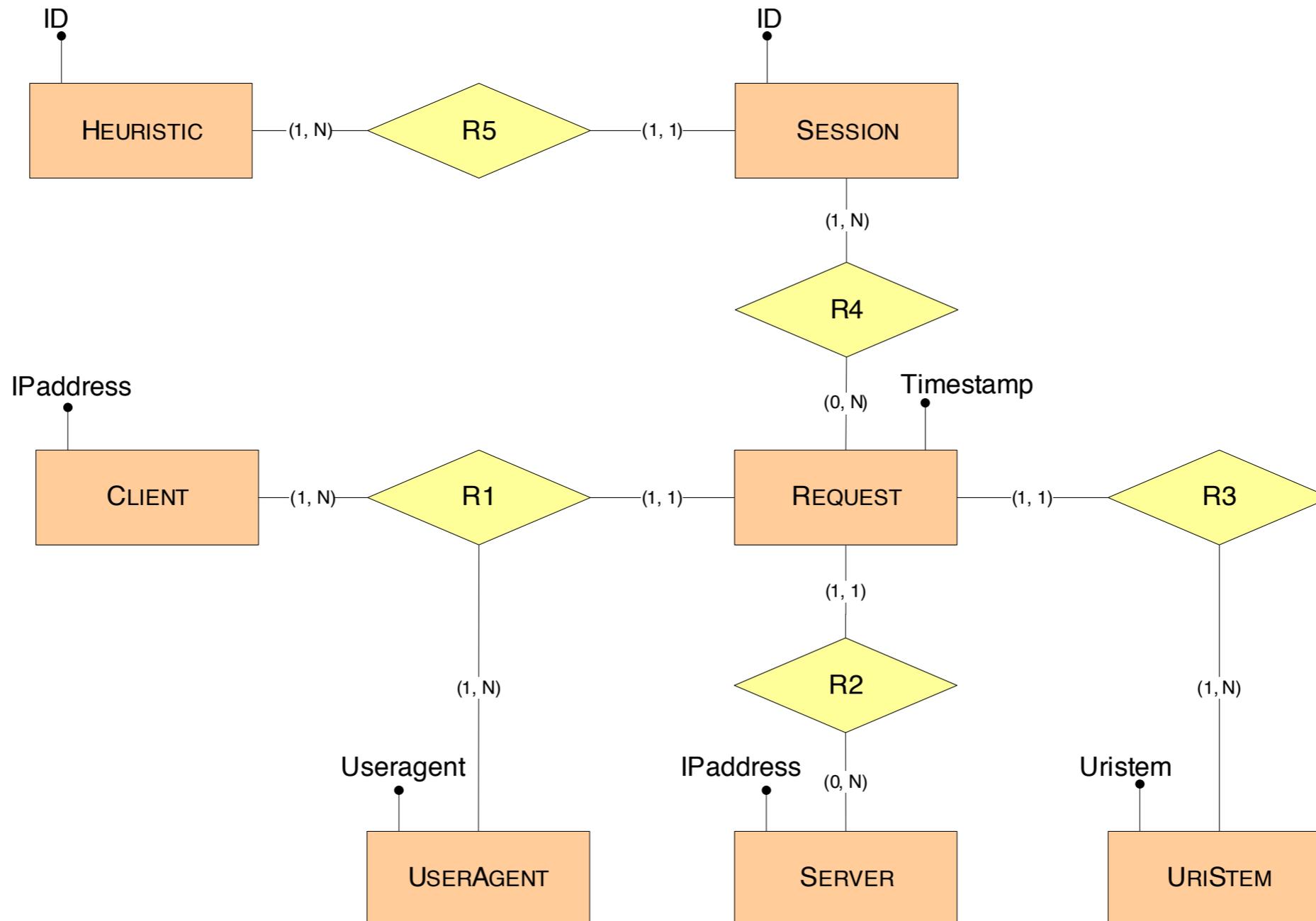


The European Library



- Case study: A portal born to offer access to the resources of 45 European National libraries.
- Analyse the data contained in the logs of their Web servers.
- Find a general methodology of HTTP Web Log analysis in order to
 - give advice about the security of the portal,
 - discover and study personalization issues.







Multilingual LogCLEF

- Verifiability and repeatability of experiments
 - using the same period of time across different studies.
- From 2009 to 2011 LogCLEF Task
 - Language identification task
 - Query classification
 - Success of a query
 - Query refinement



References

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User-System Interaction



Click Log Data



Query logs have proven to be a valuable and informative source of implicit user feedback:

- they can be easily collected by IR systems;
- they are available in real time;
- they represent personalized user preferences.

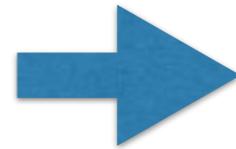
Query logs have proven to be a very alternative source of implicit user feedback.

- they can be used to identify user preferences.
- they are available in a structured way.
- they represent personalized user preferences.

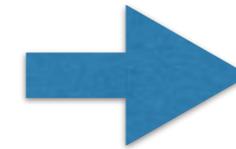
NOISE

User Models

Different Types
of Users



Different
Search



Different
Evaluation





Markovian User Model

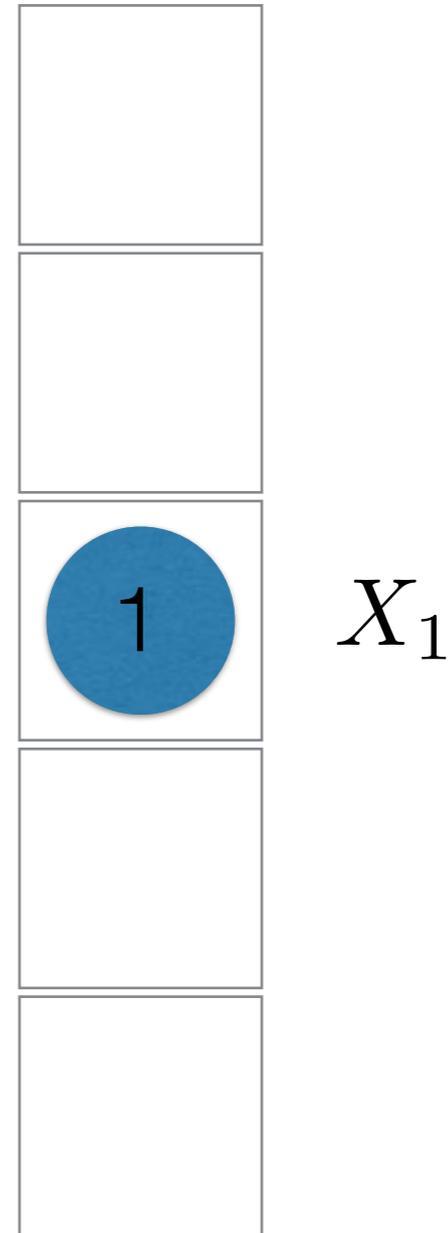
We assume that each user decides, independently from the random time spent in the first document, to move forward or backward to another document in the list.





Markovian User Model

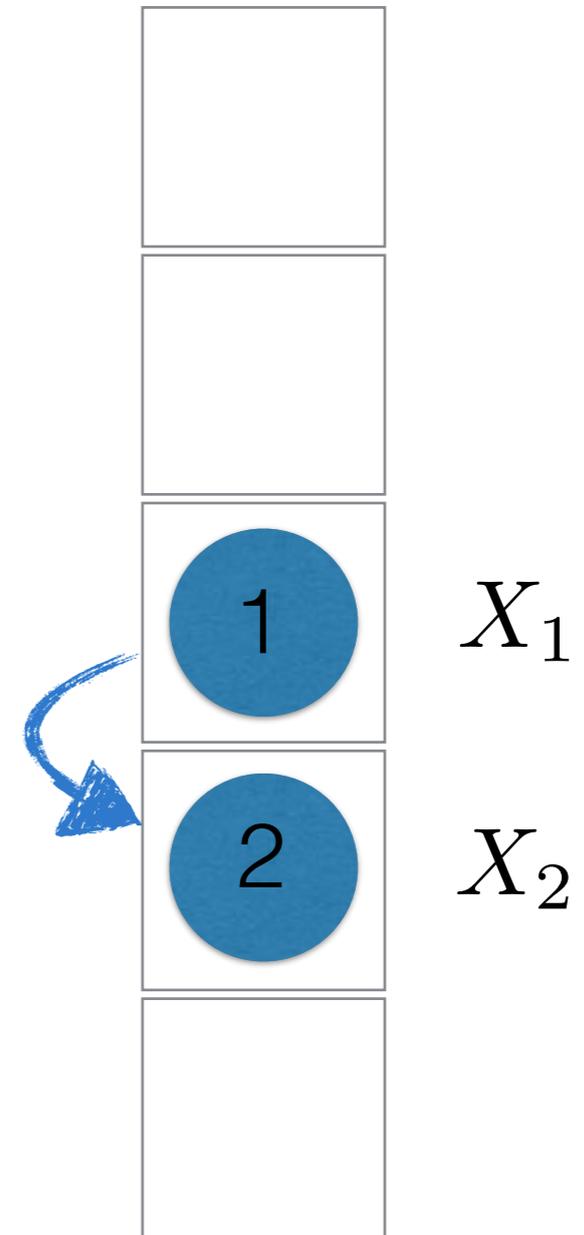
We assume that each user decides, independently from the random time spent in the first document, to move forward or backward to another document in the list.





Markovian User Model

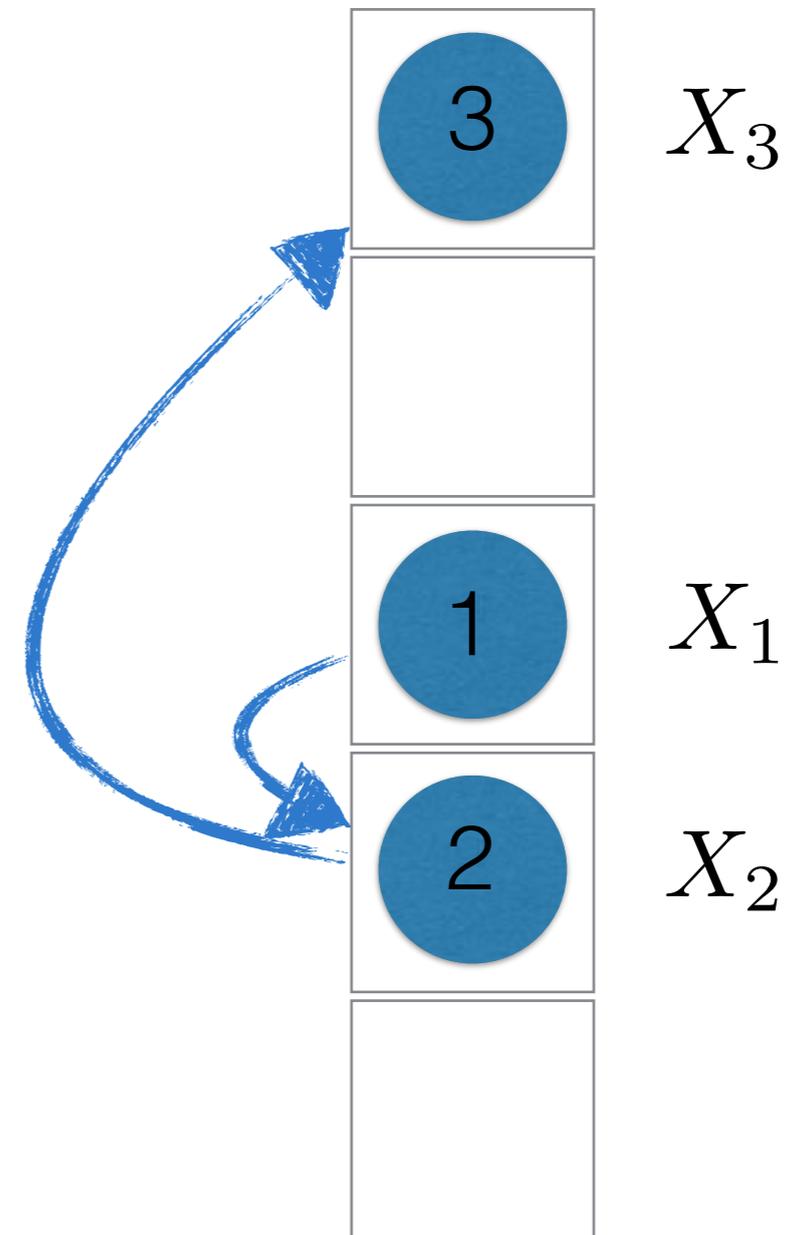
We assume that each user decides, independently from the random time spent in the first document, to move forward or backward to another document in the list.



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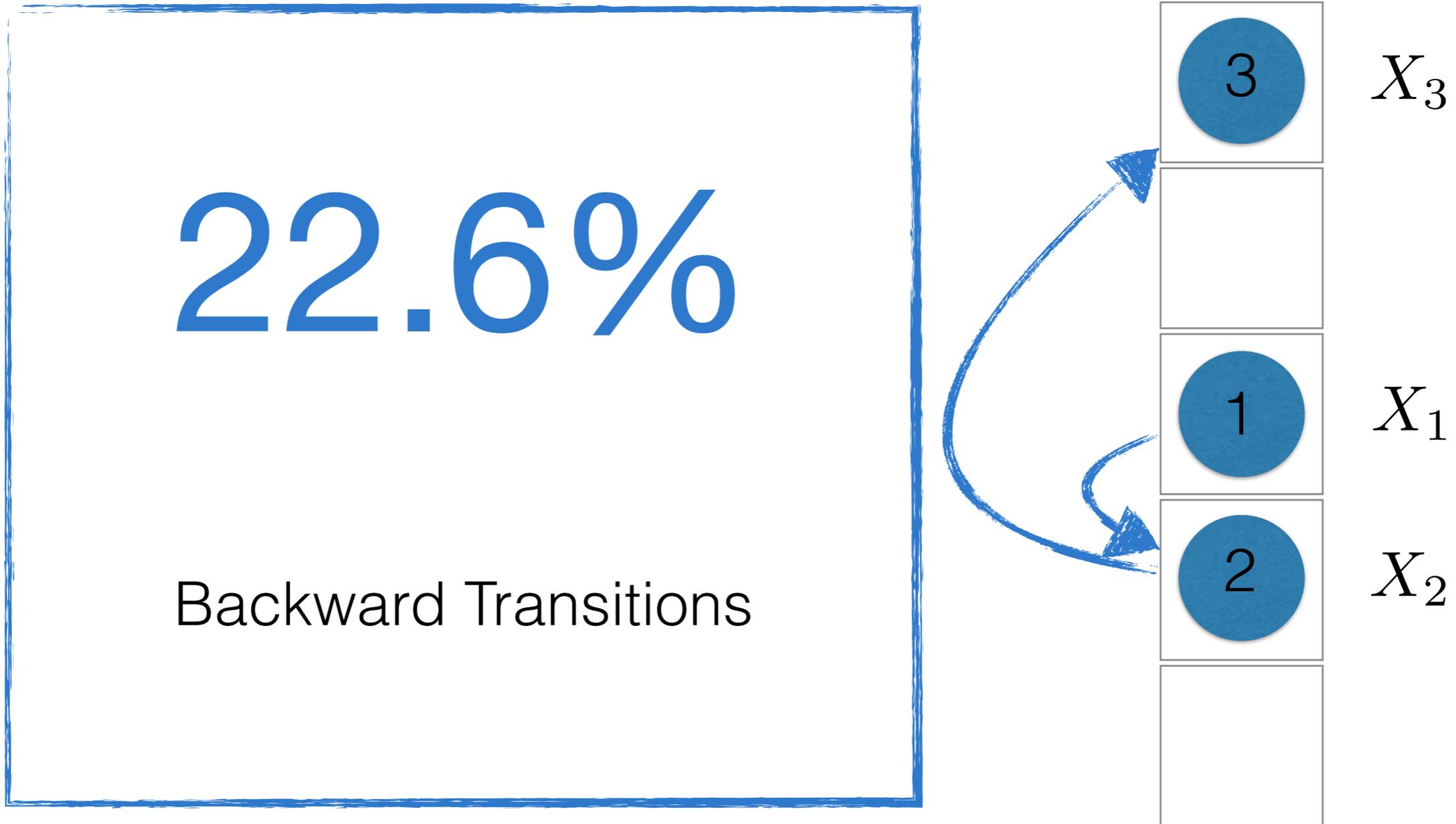
$$X_1, X_2, X_3, \dots \in \mathcal{R} = \{1, 2, \dots, R\}$$

random sequence of document ranks visited by





Markovian User Model

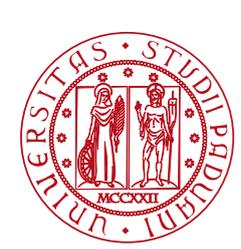




Application of the Markovian User Model



- New family of evaluation measures, called Markov Precision, which injects user models into precision
- Describe the user dynamic, which can be integrated in the Learning to Rank algorithm LambdaMart.



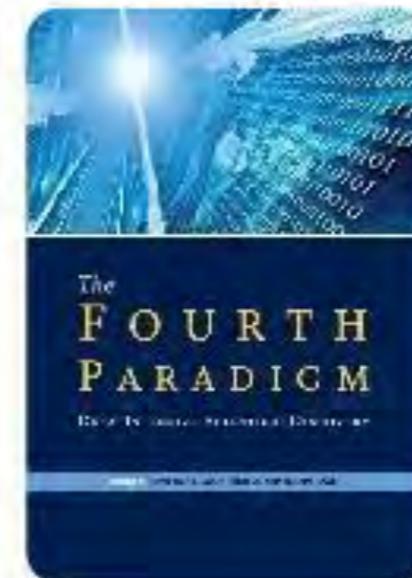
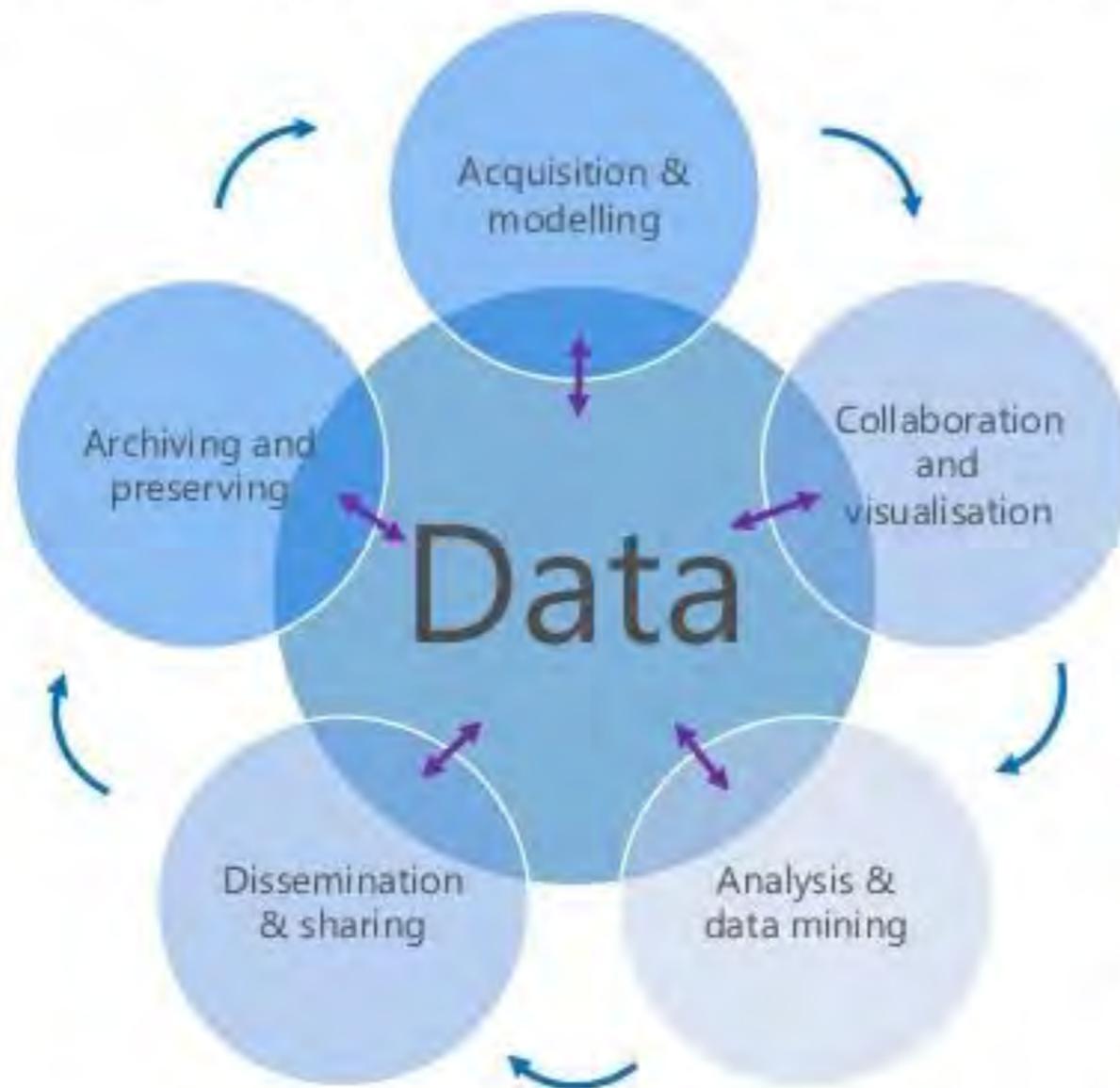
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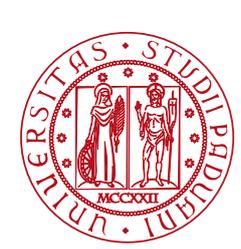
Data Driven DL

Data-intensive Research



fourthparadigm.org





Reproducibility



No research paper can ever be considered to be the final word, and the *replication* and corroboration of research results is key to the scientific process

[Nature, <http://www.nature.com/nature/focus/reproducibility/>]

An experimental result is not fully established unless it can be independently reproduced. Additional benefits ensue if the research artifacts are themselves made publically available so that any interested party may audit them. This also enables replication experiments to be performed.

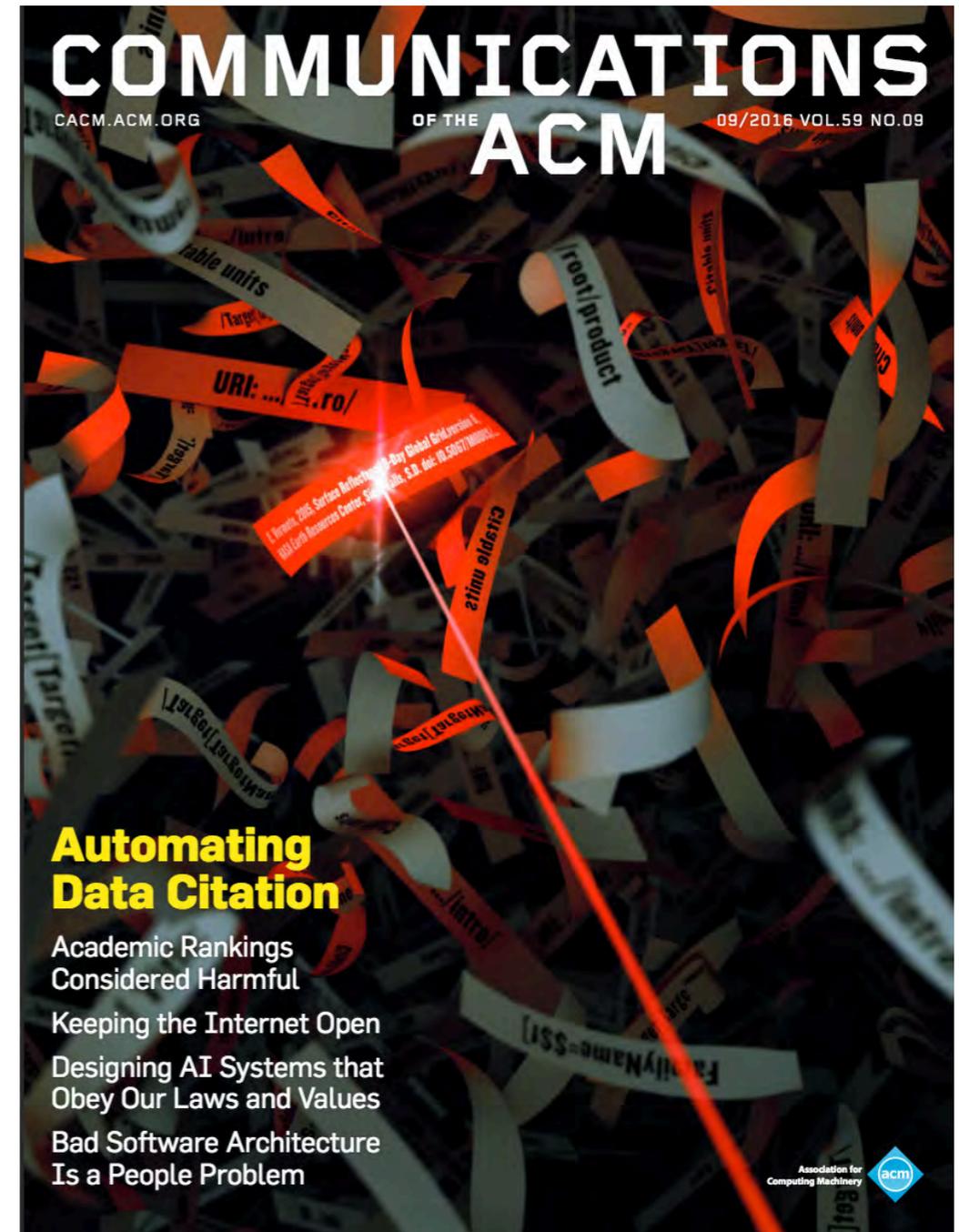
[ACM Press, <https://www.acm.org/publications/policies/artifact-review-badging>]



Reproducibility is connected to data citation



- Principles and standards for data citation are unlikely to be used unless the process of extracting information is coupled with that of providing a citation for it.
- We need to automatically generate citations as the data is extracted.
- Data citation is a computational problem.



Buneman, Davidson, Frew:
Why data citation is a computational problem.
[Commun. ACM 59\(9\): 50-57 \(2016\)](#)



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