Open Archives Initiative
Object Reuse & Exchange

Context and Motivation

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Acknowledgments: Michael Kurtz, Astrophysics Data Service

OAI Object Reuse and Exchange: Support

- The Andrew W. Mellon Foundation
- The Coalition for Networked Information
- Joint Information Systems Committee
- Microsoft Corporation
- The National Science Foundation

- University of Southampton

OAI Object Reuse and Exchange: Technical Experts

ORE Technical Committee

Chris Bizer	Freie Universität Berlin
Les Carr	University of Southampton
Tim DiLauro	Johns Hopkins University
Leigh Dodds	Ingenta
David Fulker	UCAR
Tony Hammond	Nature Publishing Group
Pete Johnston	Eduserv Foundation
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Ray Plante	NCSA and National Virtual Observatory
Rob Sanderson	University of Liverpool
Herbert Van de Sompel	Los Alamos National Laboratory
Simeon Warner	Cornell University
Jeff Young	OCLC

ORE Liaison Group

Leonardo Candela	Consiglio Nazionale delle Ricerche - DRIVER
Tim Cole	University of Illinois Urbana-Champaign - Aquifer
Julie Allinson	JISC
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Sandy Payette	Fedora Commons
Thomas Place	University of Tilburg - DARE
Andy Powell	Eduserv Foundation - DCMI
Robert Tansley	Google, Inc. - DSpace

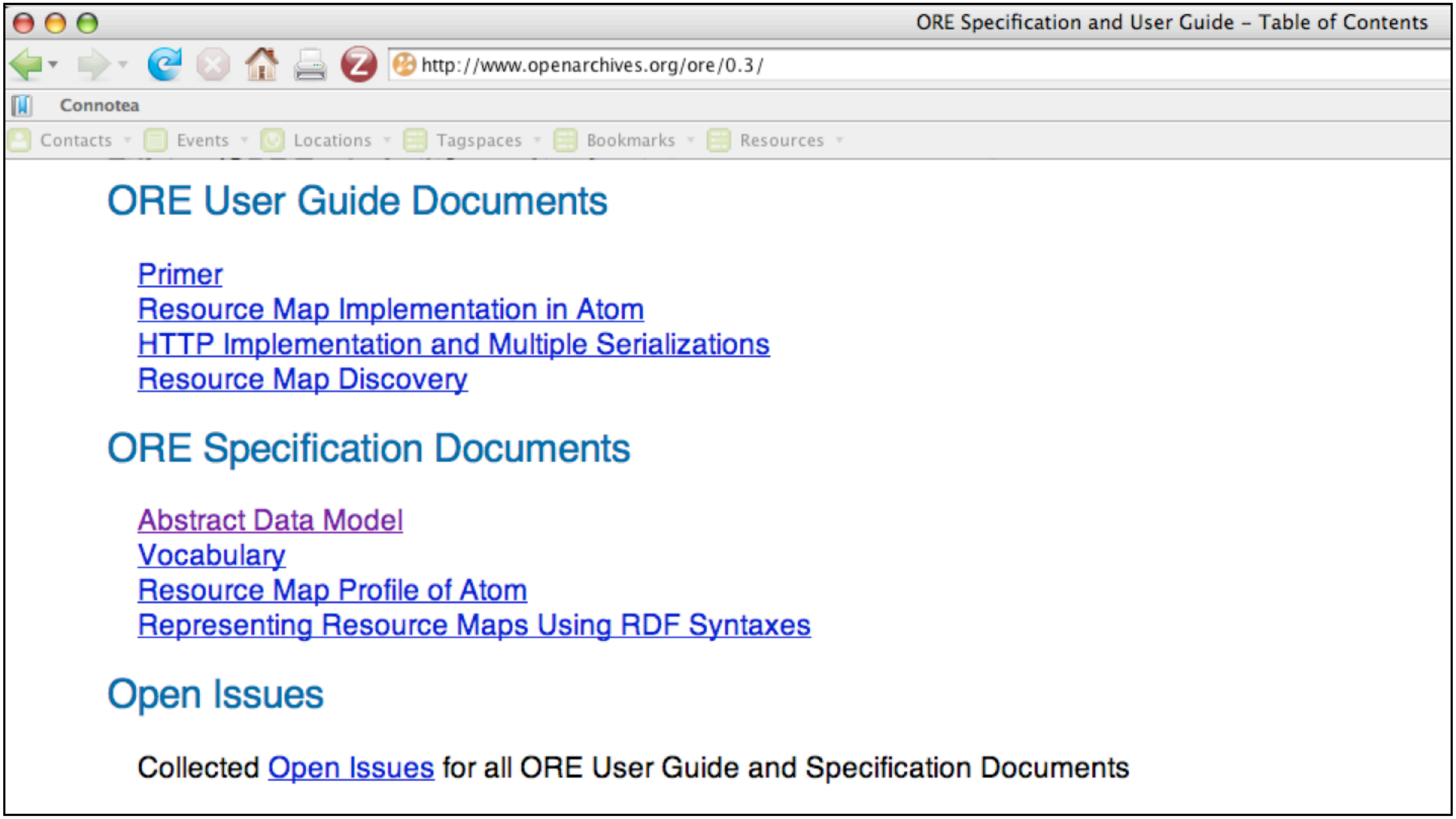
Object Reuse and Exchange: Timeline

- Deliverables: http://www.openarchives.org/ore/toc
  - ORE Specifications alpha 0.1 (12/2007)
  - ORE Specifications alpha 0.2 (03/2008)
  - ORE Specifications alpha 0.3 (04/2008; today)
  - ORE Specifications beta (end 04/2008)
  - ORE Specification 1.0 (09/2008)

- Experiments to obtain feedback for specifications
  - 02/2008-08/2008

- Meetings:
  - March 3rd 2008, John Hopkins University: USA ORE Open Meeting
  - April 4th 2008, University of Southampton: European ORE Open Meeting

Object Reuse and Exchange: Documents


ORE Specification and User Guide – Table of Contents

http://www.openarchives.org/ore/0.3/

Connotea

Contacts Events Locations Tagspaces Bookmarks Resources

ORE User Guide Documents

- Primer
- Resource Map Implementation in Atom
- HTTP Implementation and Multiple Serializations
- Resource Map Discovery

ORE Specification Documents

- Abstract Data Model
- Vocabulary
- Resource Map Profile of Atom
- Representing Resource Maps Using RDF Syntaxes

Open Issues

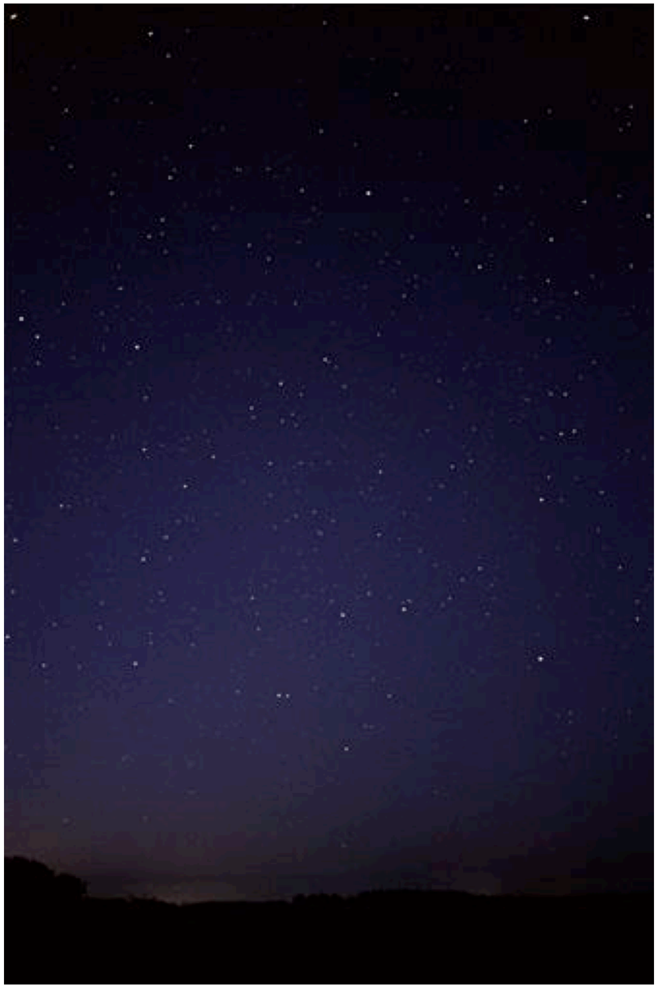
Collected Open Issues for all ORE User Guide and Specification Documents

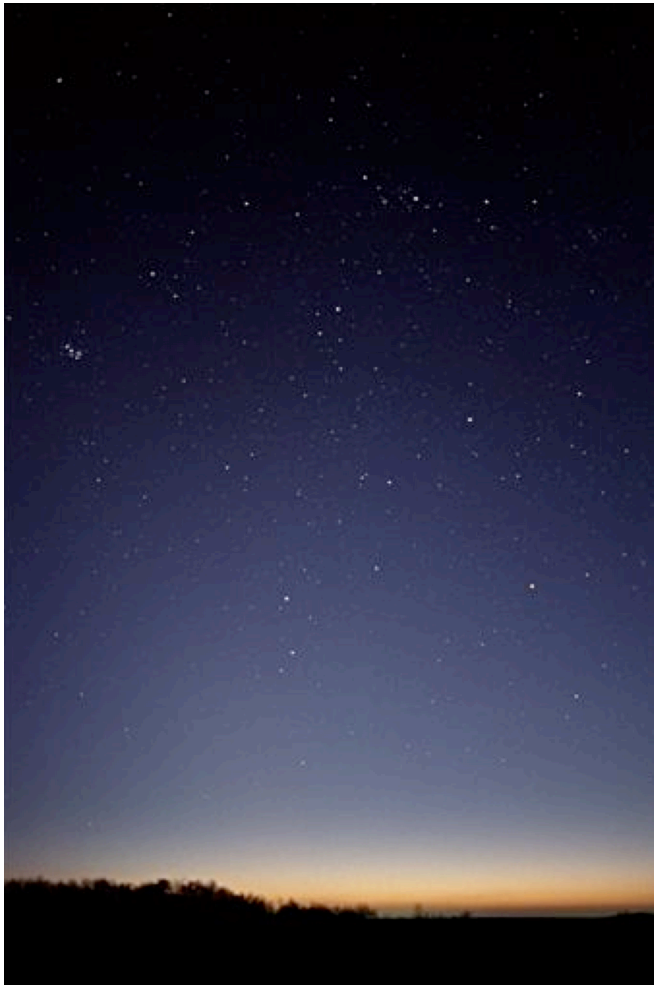
http://www.openarchives.org/ore/toc

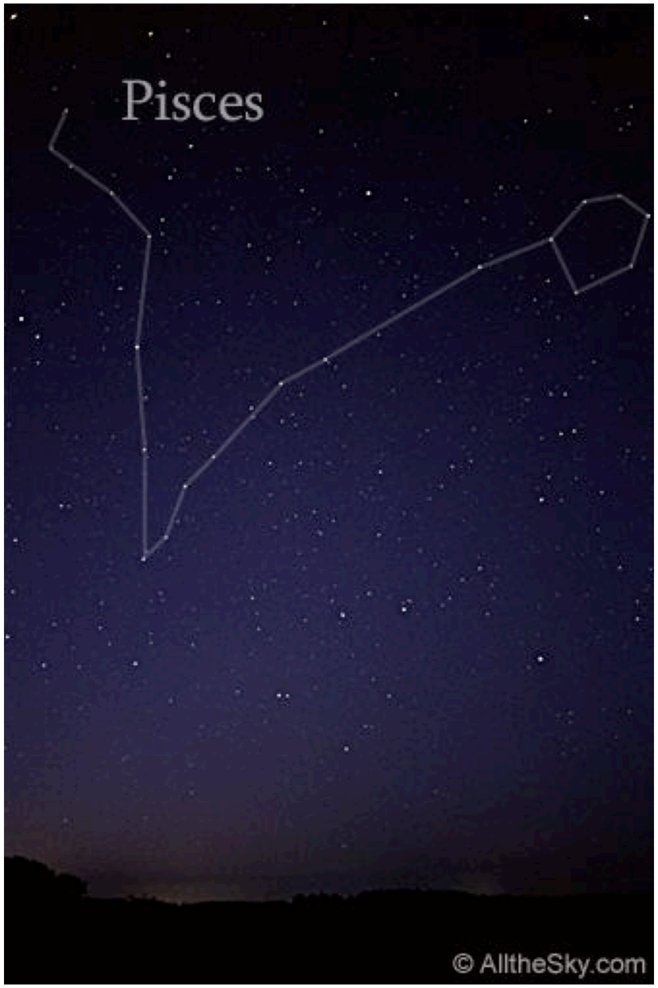
OAI Object Reuse and Exchange

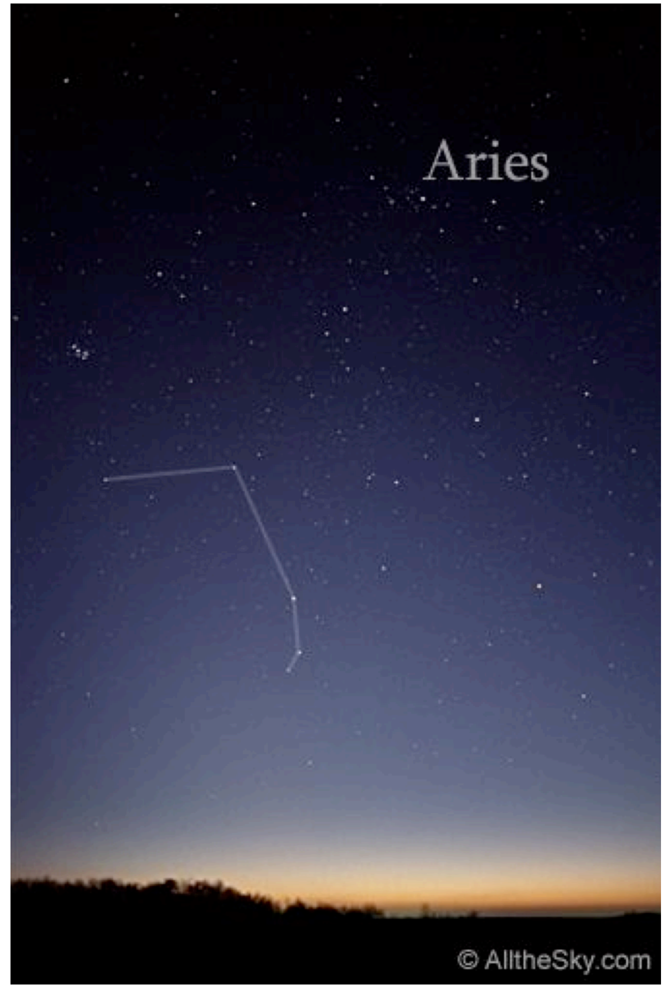
Subject: **Aggregations** of Web resources

Approach: Publish **Resource Maps** to the Web that Instantiate, Describe, and Identify Aggregations









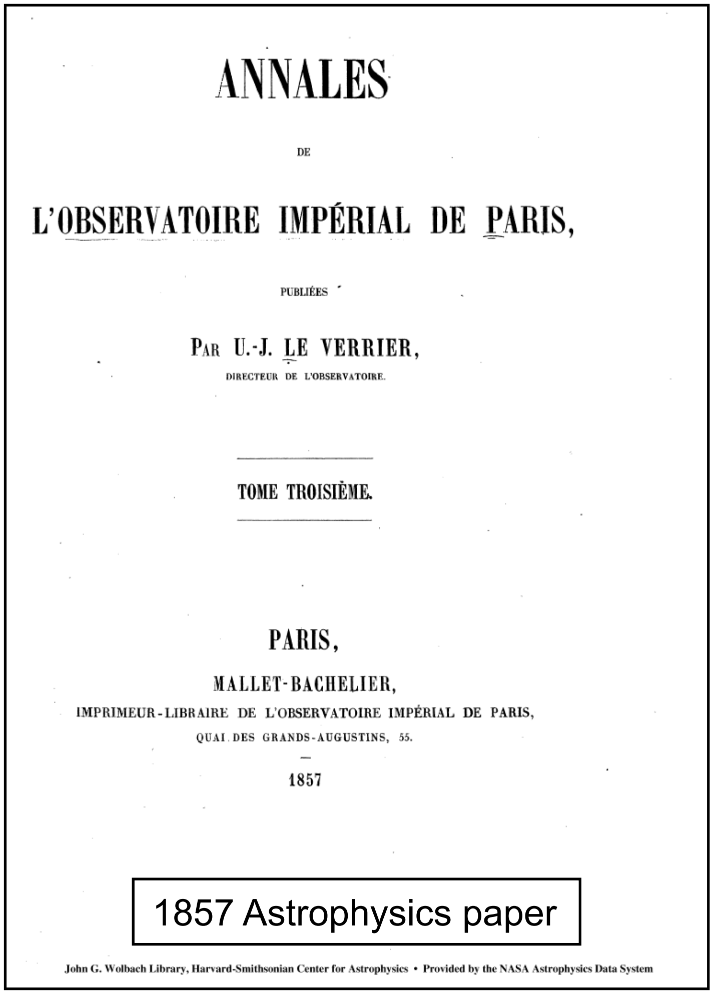
Instantiate, Describe, and Identify Aggregations

Aggregations

It used to be that all information that was to be conveyed could be provided in a single container.

Babylonian Astronomical Catalogue

Aggregations


ANNALES

DE

L'OBSERVATOIRE IMPÉRIAL DE PARIS,

PUBLIÉES

PAR U.-J. LE VERRIER,

DIRECTEUR DE L'OBSERVATOIRE.

TOME TROISIÈME.

PARIS,

MALLET-BACHELIER,

IMPRIMEUR-LIBRAIRE DE L'OBSERVATOIRE IMPÉRIAL DE PARIS,

QUAI DES GRANDS-AUGUSTINS, 55.

1857

1857 Astrophysics paper

It used to be that all information that was to be conveyed could be provided in a single container.

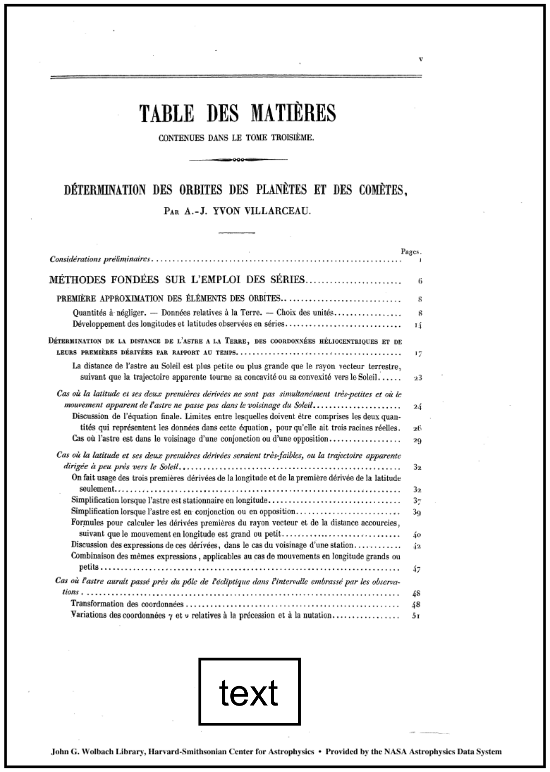


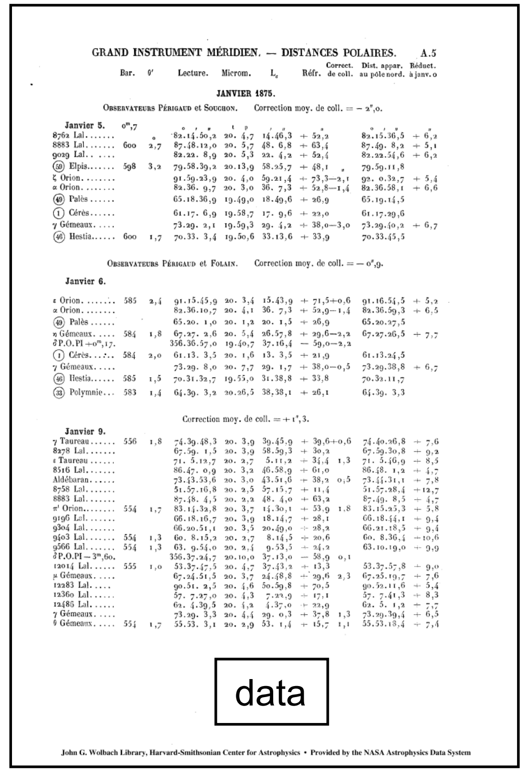
TABLE DES MATIÈRES

CONTENUES DANS LE TOME TROISIÈME.

DÉTERMINATION DES ORBITES DES PLANÈTES ET DES COMÈTES,

PAR A.-J. YVON VILLARCEAU.

text


GRAND INSTRUMENT MÉRIDIEN. — DISTANCES POLAIRES. A.5

JANVIER 1875.

OBSERVATEURS PÉRIGAUD et SOUCHON. Correction moy. de coll. = − 2″,0.

Janvier 5.

OBSERVATEURS PÉRIGAUD et FOLAIN. Correction moy. de coll. = − 0″,9.

Janvier 6.

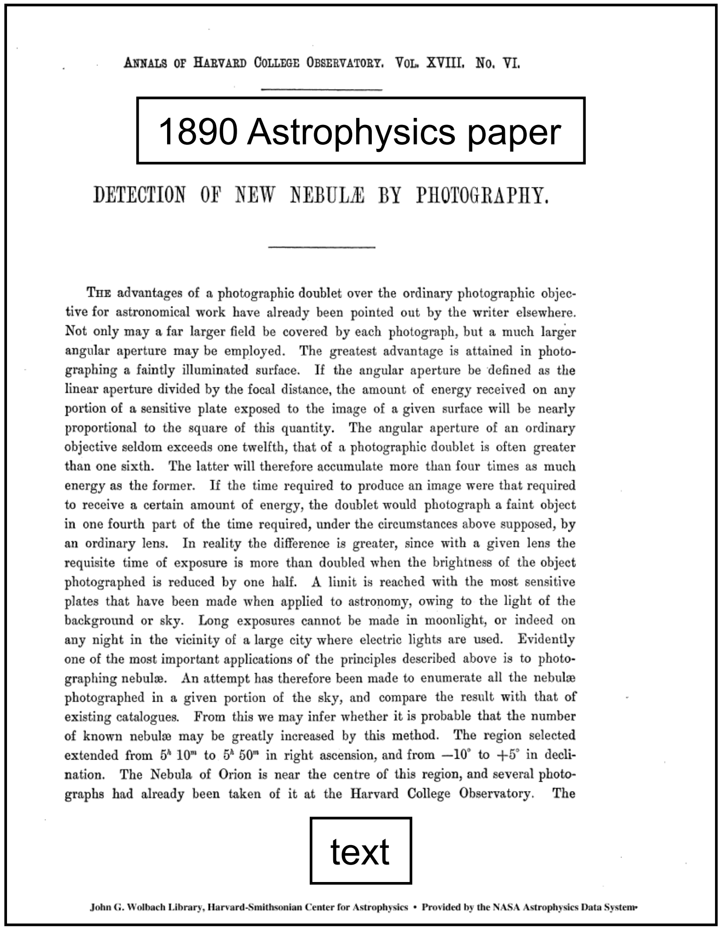
Correction moy. de coll. = + 1″,3.

Janvier 9.

data

Aggregations

In scholarly communication that didn't last very long.



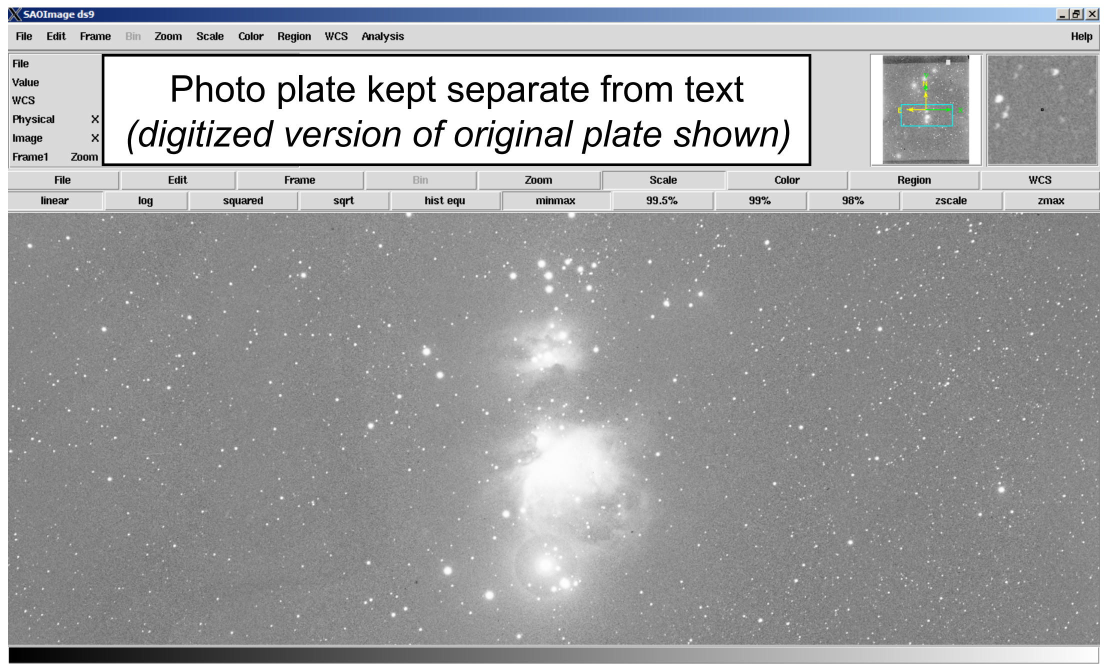
1890 Astrophysics paper

ANNALS OF HARVARD COLLEGE OBSERVATORY. VOL. XVIII. NO. VI.

DETECTION OF NEW NEBULÆ BY PHOTOGRAPHY.

THE advantages of a photographic doublet over the ordinary photographic objective for astronomical work have already been pointed out by the writer elsewhere. Not only may a far larger field be covered by each photograph, but a much larger angular aperture may be employed. The greatest advantage is attained in photographing a faintly illuminated surface. If the angular aperture be defined as the linear aperture divided by the focal distance, the amount of energy received on any portion of a sensitive plate exposed to the image of a given surface will be nearly proportional to the square of this quantity. The angular aperture of an ordinary objective seldom exceeds one twelfth, that of a photographic doublet is often greater than one sixth. The latter will therefore accumulate more than four times as much energy as the former. If the time required to produce an image were that required to receive a certain amount of energy, the doublet would photograph a faint object in one fourth part of the time required, under the circumstances above supposed, by an ordinary lens. In reality the difference is greater, since with a given lens the requisite time of exposure is more than doubled when the brightness of the object photographed is reduced by one half. A limit is reached with the most sensitive plates that have been made when applied to astronomy, owing to the light of the background or sky. Long exposures cannot be made in moonlight, or indeed on any night in the vicinity of a large city where electric lights are used. Evidently one of the most important applications of the principles described above is to photographing nebulæ. An attempt has therefore been made to enumerate all the nebulæ photographed in a given portion of the sky, and compare the result with that of existing catalogues. From this we may infer whether it is probable that the number of known nebulæ may be greatly increased by this method. The region selected extended from $5^h 10^m$ to $5^h 50^m$ in right ascension, and from $-10°$ to $+5°$ in declination. The Nebula of Orion is near the centre of this region, and several photographs had already been taken of it at the Harvard College Observatory. The

text



Aggregations

And in digital scholarly communication, the single container concept is obsolete.


THE ASTROPHYS[...]
© 2006. The Am[...]

ENTROPY PROFILES IN THE CORES OF COOLING FLOW CLUSTERS OF GALAXIES

MEGAN DONAHUE,[1] DONALD J. HORNER,[2] KENNETH W. CAVAGNOLO,[1] AND G. MARK VOIT[1]

Received 2005 July 13; accepted 2006 February 6

ABSTRACT

The X-ray properties of a relaxed cluster of galaxies are determined primarily by its gravitational potential well and the entropy distribution of its intracluster gas. That entropy distribution reflects both the accretion history of the cluster and the feedback processes that limit the condensation of intracluster gas. Here we present *Chandra* observations of the core entropy profiles of nine classic "cooling flow" clusters that appear relatively relaxed (at least outside the central 10–20 kpc) and contain intracluster gas with a cooling time less than a Hubble time. We show that those entropy profiles are remarkably similar, despite the fact that the clusters range over a factor of 3 in temperature. They typically have an entropy level of $\approx$130 keV cm^2 at 100 kpc that declines to a plateau $\sim$10 keV cm^2 at $\lesssim$10 kpc. Between these radii, the entropy profiles are $\propto r^{\alpha}$ with $\alpha \approx 1.0$–1.3. The nonzero central entropy levels in these clusters correspond to a cooling time $\sim 10^8$ yr, suggesting that episodic heating on this timescale maintains the central entropy profile in a quasi–steady state. We show in an appendix that although disturbances and bubbles are visible in the central regions of these clusters, these phenomena do not strongly bias our entropy estimates.

Subject headings: catalogs — cosmology: observations — galaxies: clusters: general — methods: data analysis — X-rays: galaxies: clusters

Online material: color figures

1. INTRODUCTION

The global properties of a cluster of galaxies, such as its bolometric X-ray luminosity L_X and its mean temperature T_X, are determined primarily by the mass M_{vir} within a suitably chosen virial radius. A cluster's temperature depends on mass because mass determines the depth of the cluster's potential well. Its X-ray luminosity depends on mass because mass determines both the total number of baryons in the cluster and the potential well confining those baryons. However, several secondary factors combine to produce a dispersion in both L_X and T_X at a fixed M_{vir}, and understanding the nature of that dispersion is crucial to doing precision cosmology with clusters. One of those factors is merger shocks, which can temporarily raise both the luminosity and best-fitting temperature of a cluster (e.g., Randall et al. 2002). A second is the shape of the potential well, because clusters whose potentials are more centrally concentrated tend to have higher central temperatures (e.g., Voit et al. 2002). A third factor is the amount of intracluster gas with a cooling time less than the age of the universe. The presence of such gas leads to both a large peak in the central surface brightness of a cluster and a central temperature gradient that rises with radius. Consequently, clusters having larger amounts of gas with a short cooling time tend to have higher L_X and lower T_X at a given value of M_{vir} (Allen & Fabian 1998; Fabian et al. 1994; Markevitch 1998).

Such clusters have often been called "cooling flow clusters" because the central gas was thought to condense and flow toward the center of the cluster as it radiated away its thermal energy (for a recent review see Donahue & Voit 2004). Observations from *Chandra* and *XMM-Newton* now show that the central gas is not simply cooling to low temperatures and condens[...] manner originally envisioned (e.g., Peterson et al. 2001, 2003). Some form of feedback apparently prevents the central gas from condensing and forming stars, thereby truncating the high end of the galaxy luminosity function. The nature of that feedback is currently an active topic of both observational and theoretical research, focusing largely on the role of outflows from active galactic nuclei (AGNs) in cluster cores.

This paper analyzes archival *Chandra* data on nine cooling flow clusters seeking clues to what keeps that gas from condensing and why clusters of a given mass have different amounts of gas with a short central cooling time. The tactic we take in our analysis is to focus on the entropy profiles of these clusters. We concentrate on entropy because it is a more fundamental property of the intracluster medium (ICM) itself than either temperature or density alone. For example, the temperature of a cluster's gas primarily reflects the cluster's potential well depth; heating or cooling of the gas merely causes it to expand or contract in the potential well with only a modest change in temperature. The density of that gas depends on how much gravity can compress it in the cluster's potential well, and it is the specific entropy of the gas that determines its density at a given pressure. Thus, the observable X-ray properties of a relaxed cluster of galaxies depend almost entirely on two physical attributes: (1) the shape and depth of the cluster's dark matter halo and (2) the entropy distribution of the intracluster gas (e.g., Voit et al. 2002).

Intracluster entropy is also intimately related to the cooling and feedback processes that govern galaxy evolution and that may also play a role in limiting condensation in cluster cores. Theories and simulations of cluster formation that ignore these processes fail to reproduce the observable properties of present-day clusters. [...]ity alone were responsible for shaping the appearances of [...]s and groups, then we would expect their properties to be [...] self-similar, with a luminosity-temperature relation like [...]. Furthermore, we would expect groups and clusters [...] similar surface brightness profiles, when scaled to the virial radius of the system. However, observations indicate that

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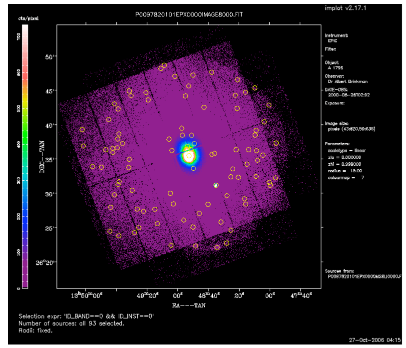
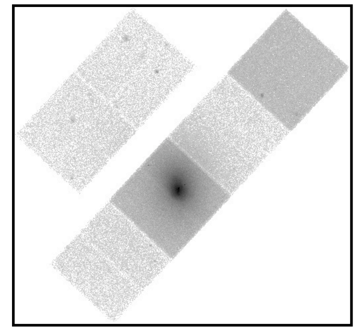
730

2006 Astrophysics paper

text



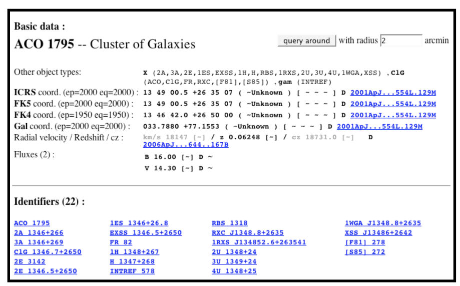
X-MM-Newton X-ray observation
Vilspa, Spain



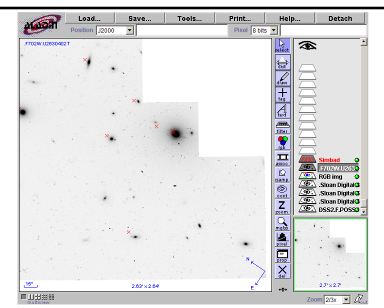
Chandra X-ray observation
Cambridge, MA

A1795

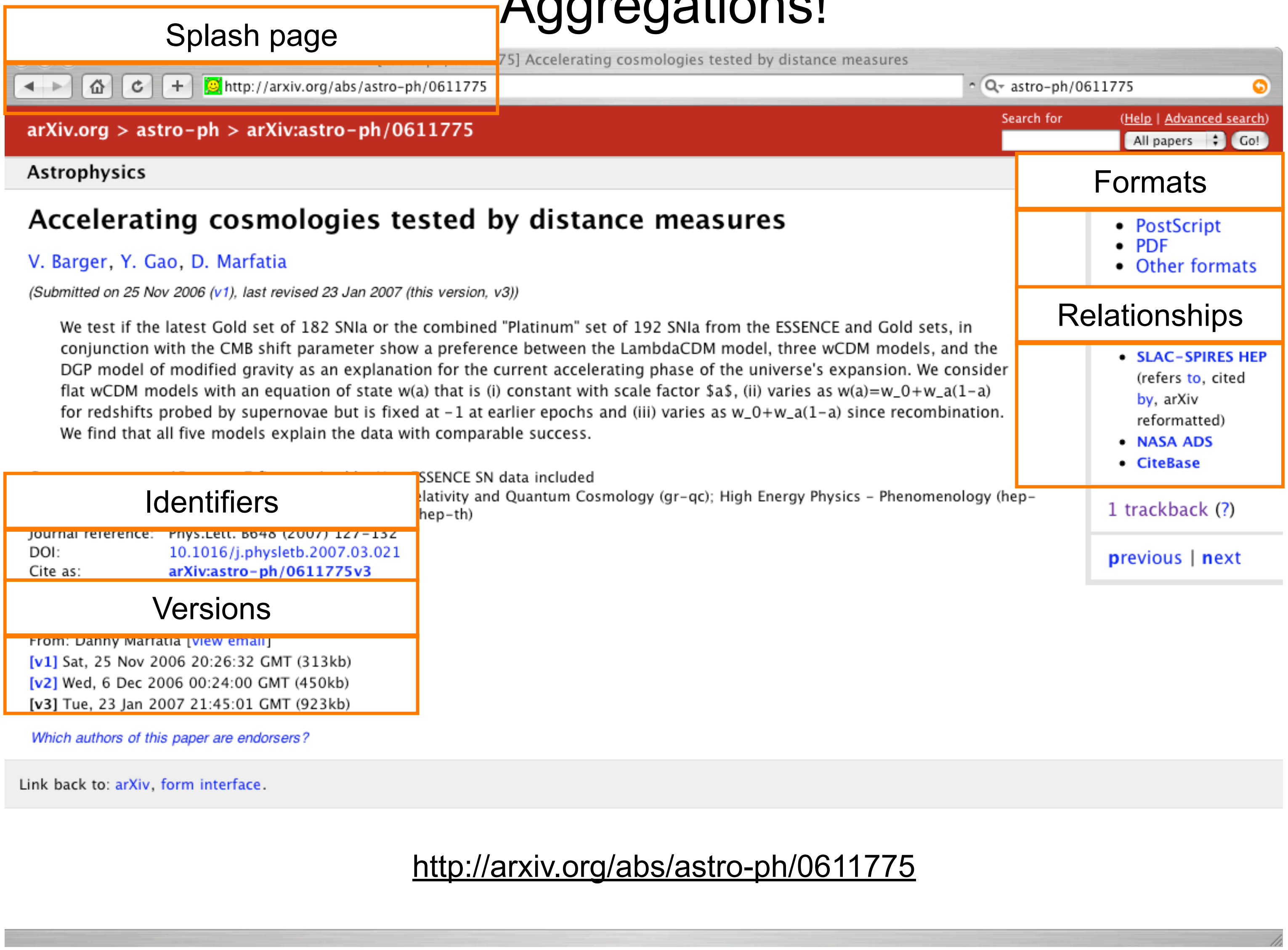
Basic object information
Strasbourg, France



Hubble optical observation
Baltimore, MD



Aggregations!



http://arxiv.org/abs/astro-ph/0611775

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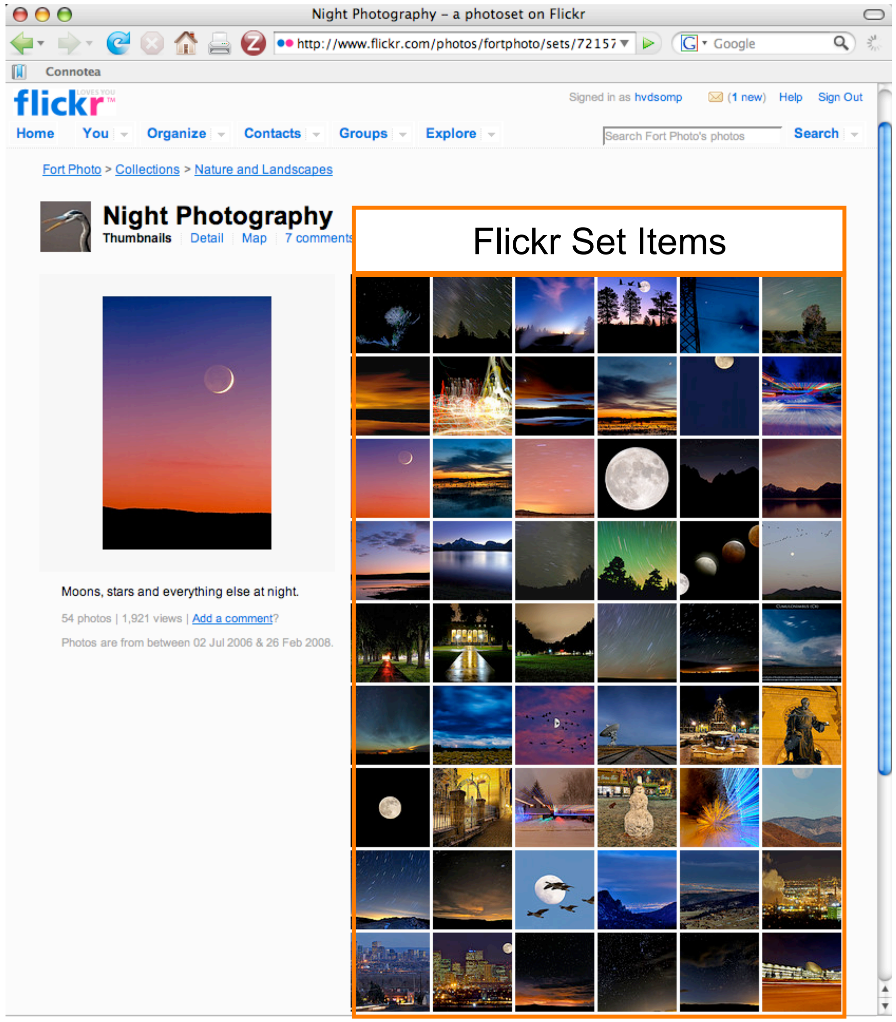

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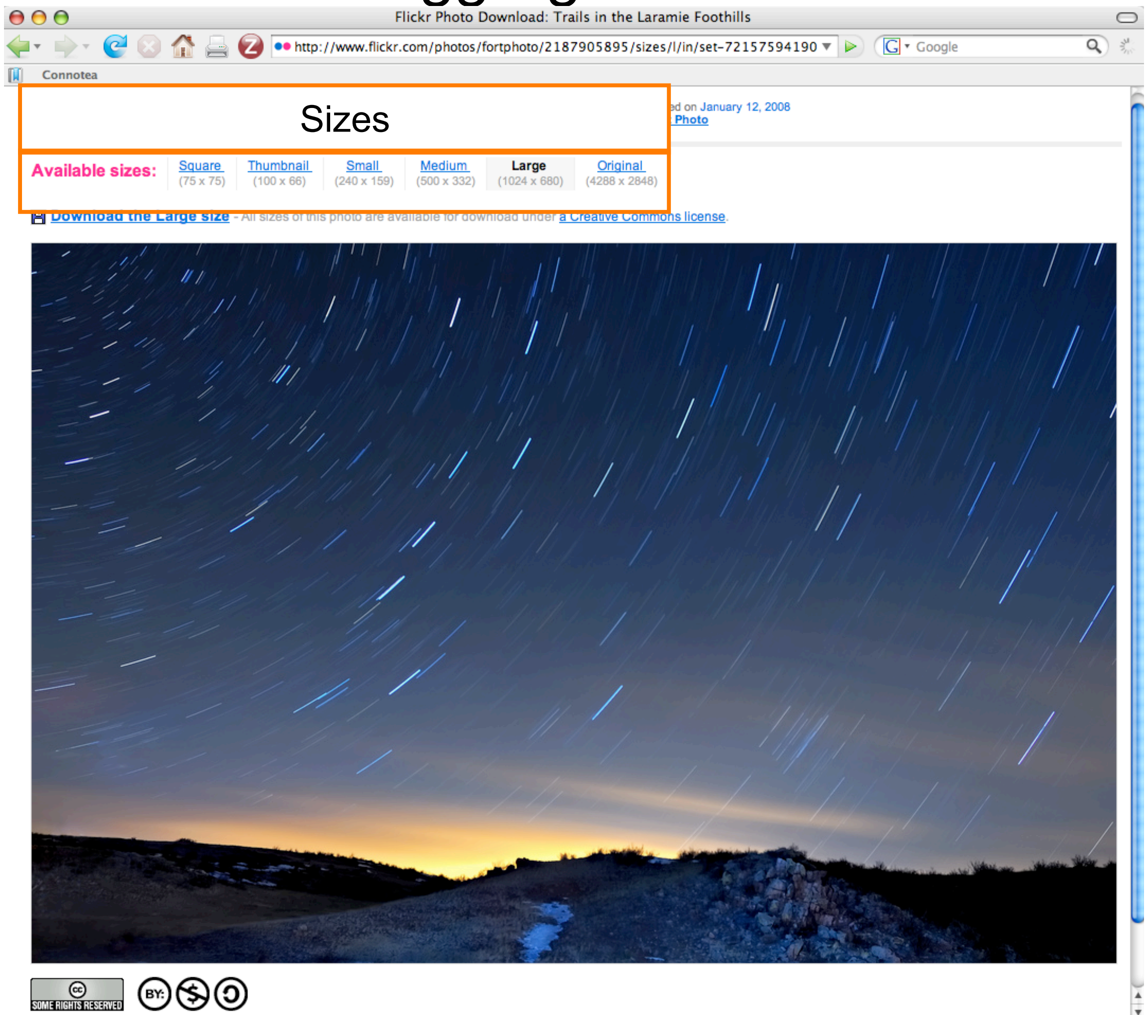
Aggregations!!!



http://www.flickr.com/photos/fortphoto/sets/72157594190371016/

OAI Object Reuse and Exchange: Original Vision

- Scholarly communication as a global, cross-repository workflow.
  - Leverage the intrinsic value of the materials that become available in distributed repositories.
  - Value chains across repositories and applications with repository materials as their subject.
  - Make repositories **active nodes in a global environment**, not passive local nodes.
  - Life for those materials **starts** in repositories; it does not end there.
  - Materials from repositories must be **reusable in different contexts**.

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Rethinking Scholarly Communication

Building the System that Scholars Deserve

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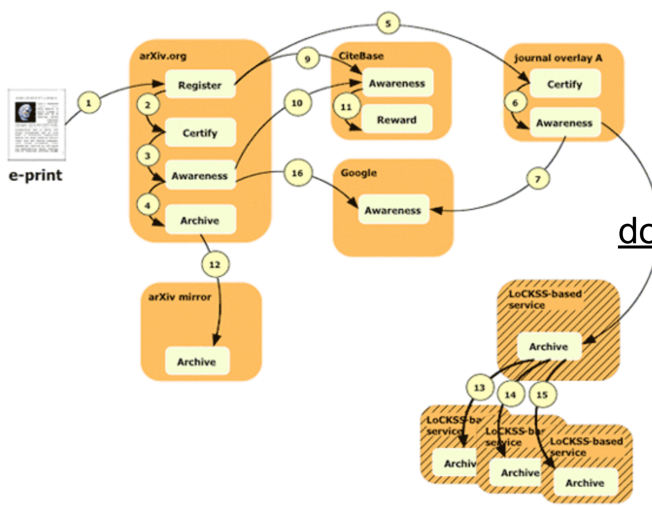


doi:10.1045/september2004-vandesompel

OAI Object Reuse and Exchange: The Reality

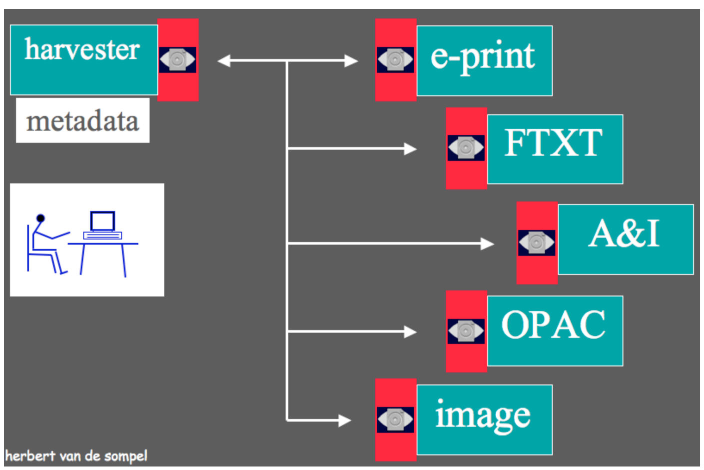
Subject: **Aggregations** of Web resources

Approach: Publish **Resource Maps** to the Web that Instantiate, Describe, and Identify Aggregations

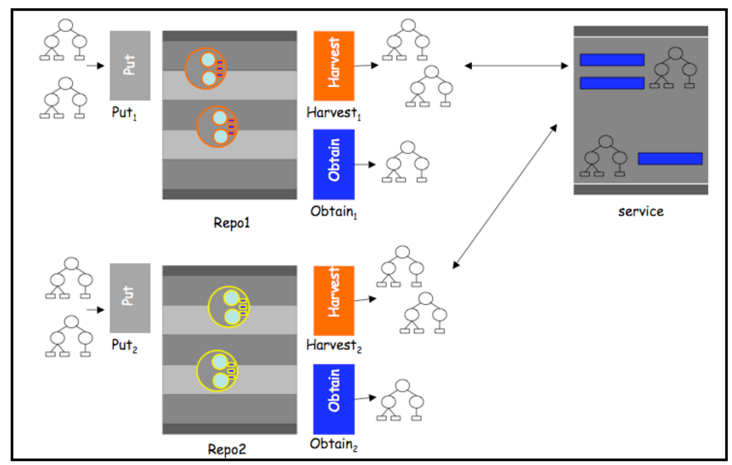
Reuse: URI of Aggregation as handle; Resource Map as the ore for value chains

OAI Object Reuse and Exchange: A Resource-Centric Approach

- Prior efforts had the repository as the center of the interoperability thinking:
  - Including OAI-PMH
  - Including initial OAI-ORE thinking cf. "Augmenting Interoperability across Scholarly Repositories"
- This approach does not vibe well with the Web:
  - The Web Architecture knows resources and URIs, not repositories
  - Requires special treatment by applications that dominate the Web.

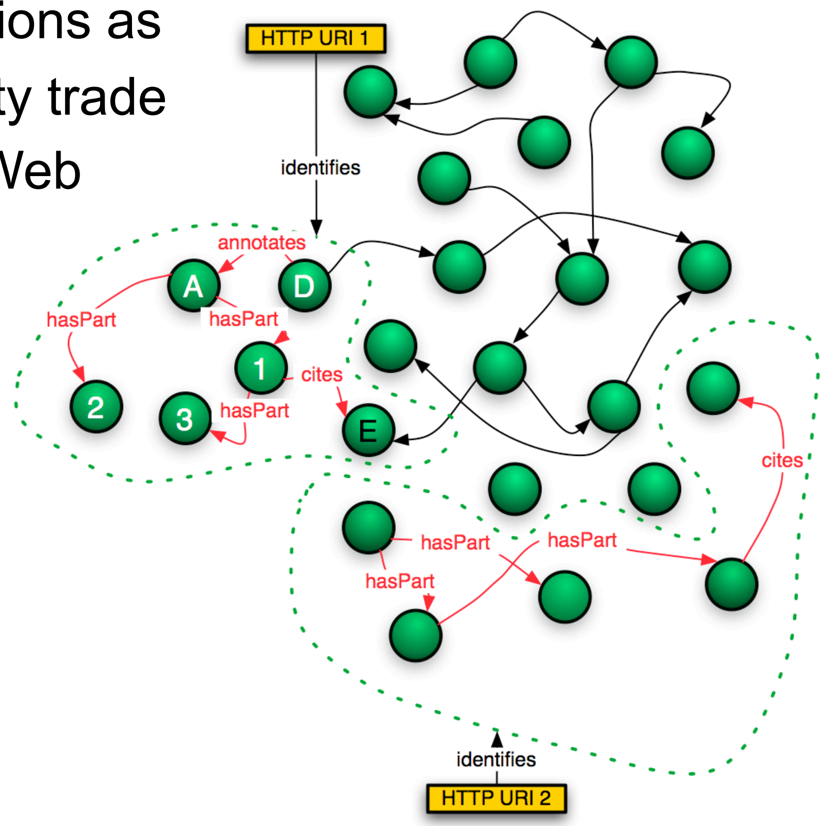


Keep dreaming!

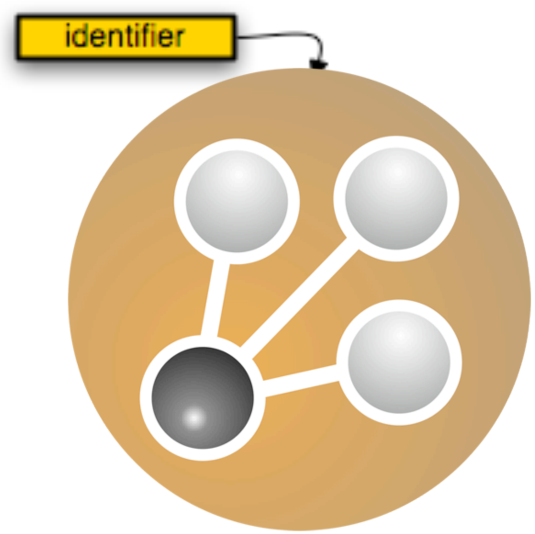


OAI Object Reuse and Exchange: A Resource-Centric Approach

- Fundamental shift in the chosen approach towards interoperability
- The Web Architecture as the platform for interoperability
- Resources, URIs, and representations as the tools of the ORE interoperability trade
- De-facto integration with existing Web applications
- Potential of adoption by other communities
- Potential of tools created by other communities
- ….



From Compound Information Objects to Aggregations

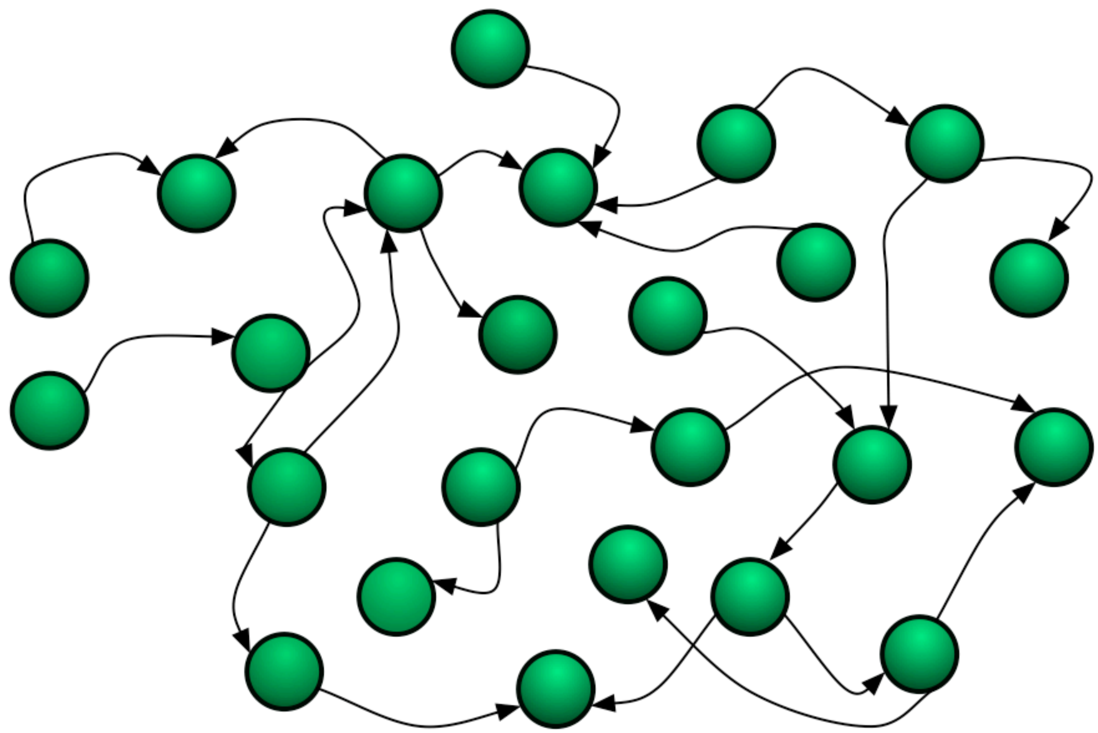


Identified, bounded aggregations of related information units that form a logical whole.

Components of a compound object may vary according to:

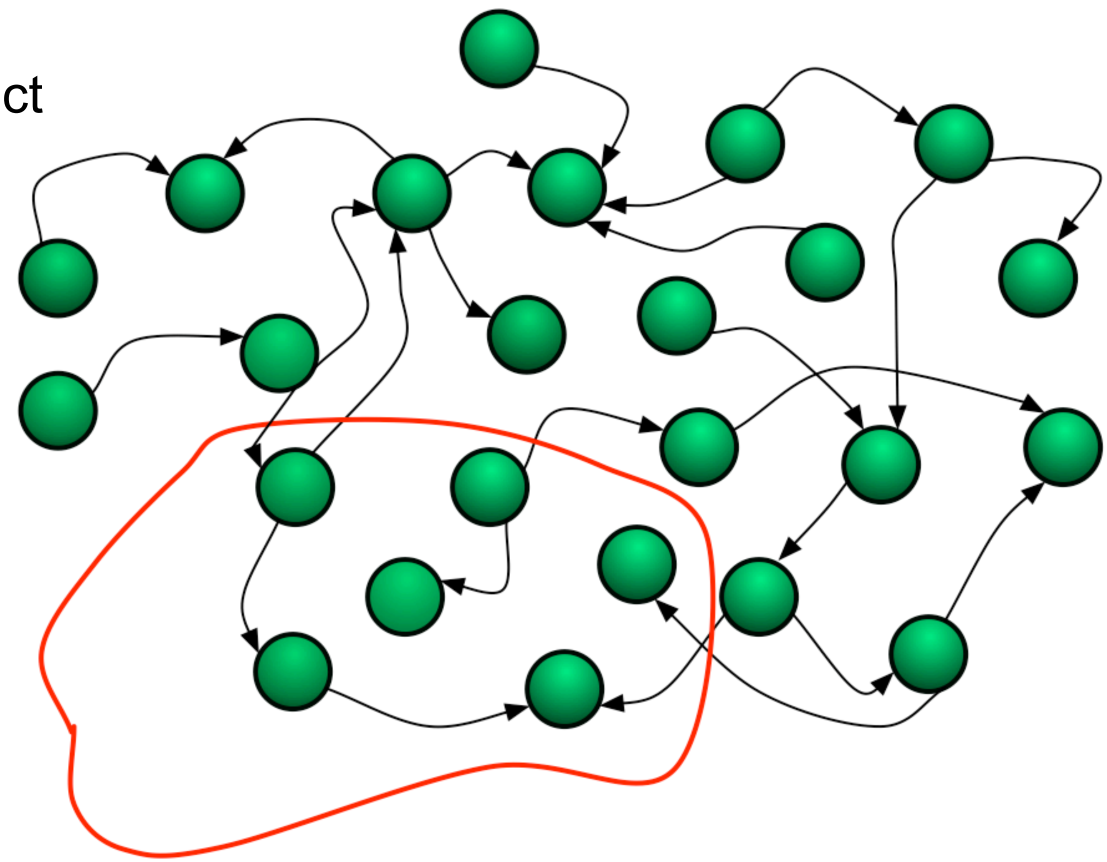
- Semantic type: book, article, software, dataset, simulation, …
- Media type: text, image, audio, video, mixed
- Media format: PDF, HTML, JPEG, MP3, …
- Network location
- Relationships: internal, external

The Web



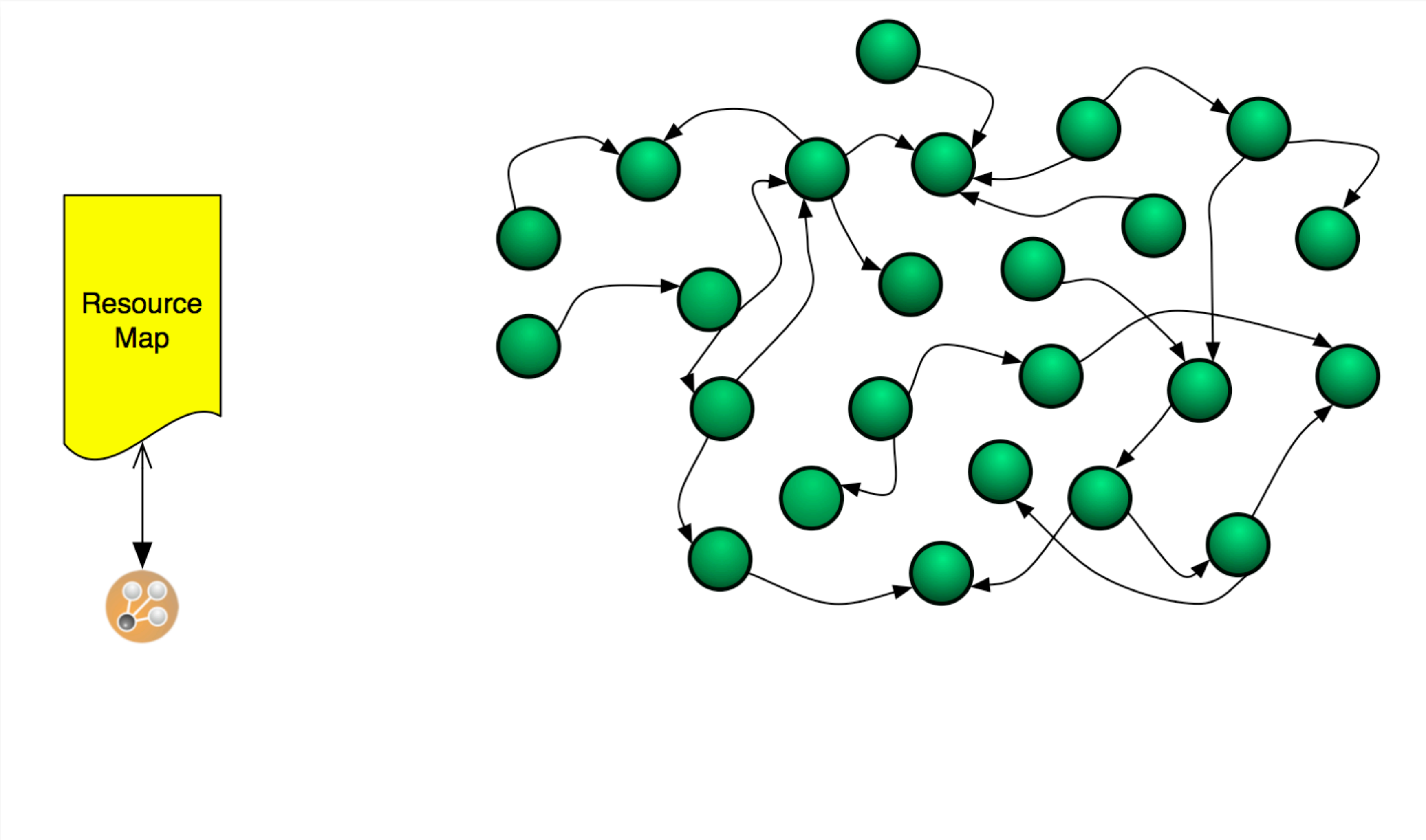
An Aggregation and the Web

- Resources of an Aggregation are distinct URI-identified Web resources

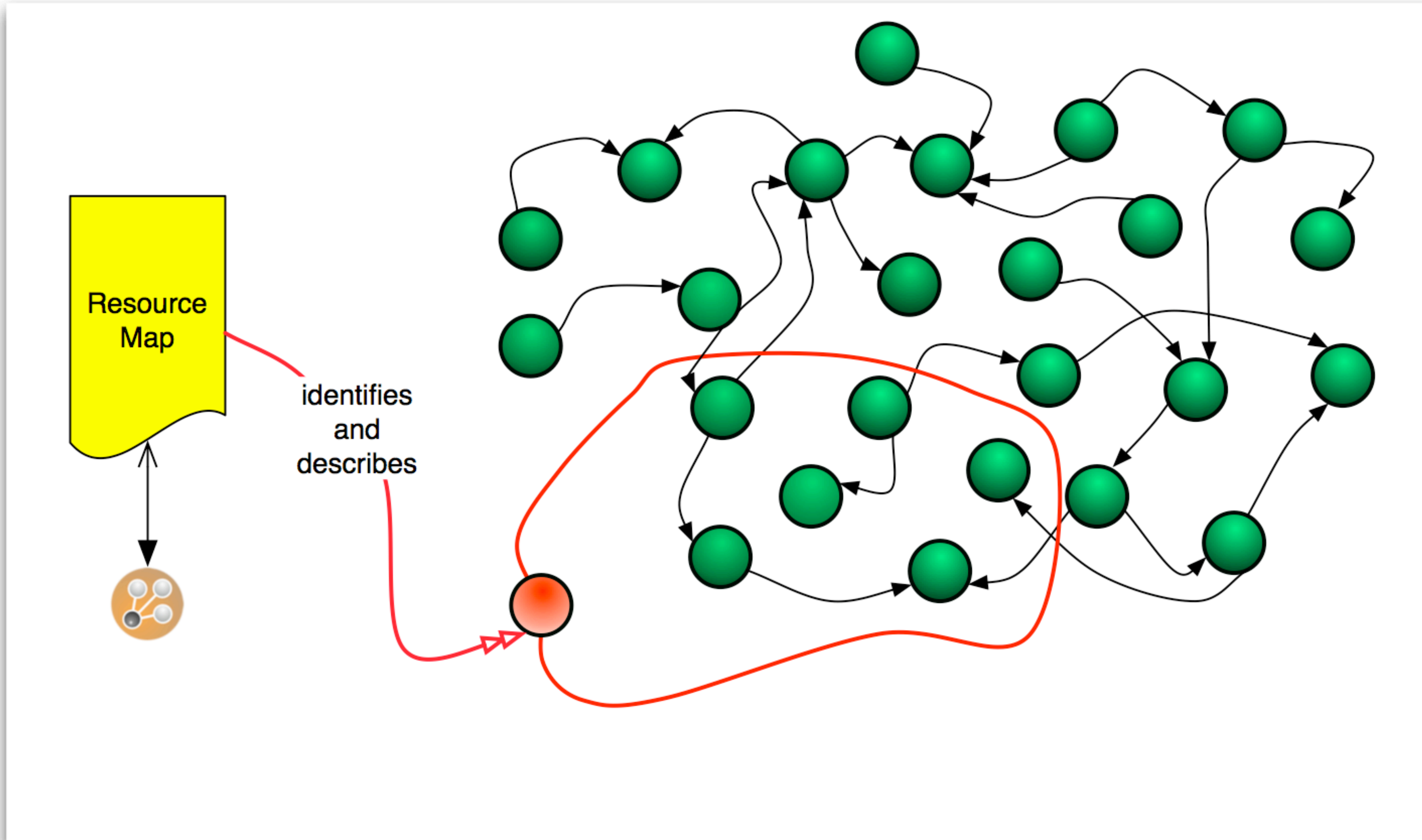


- Missing are:
  - The boundary that delineates the Aggregation in the Web
  - An identity (URI) for the Aggregation

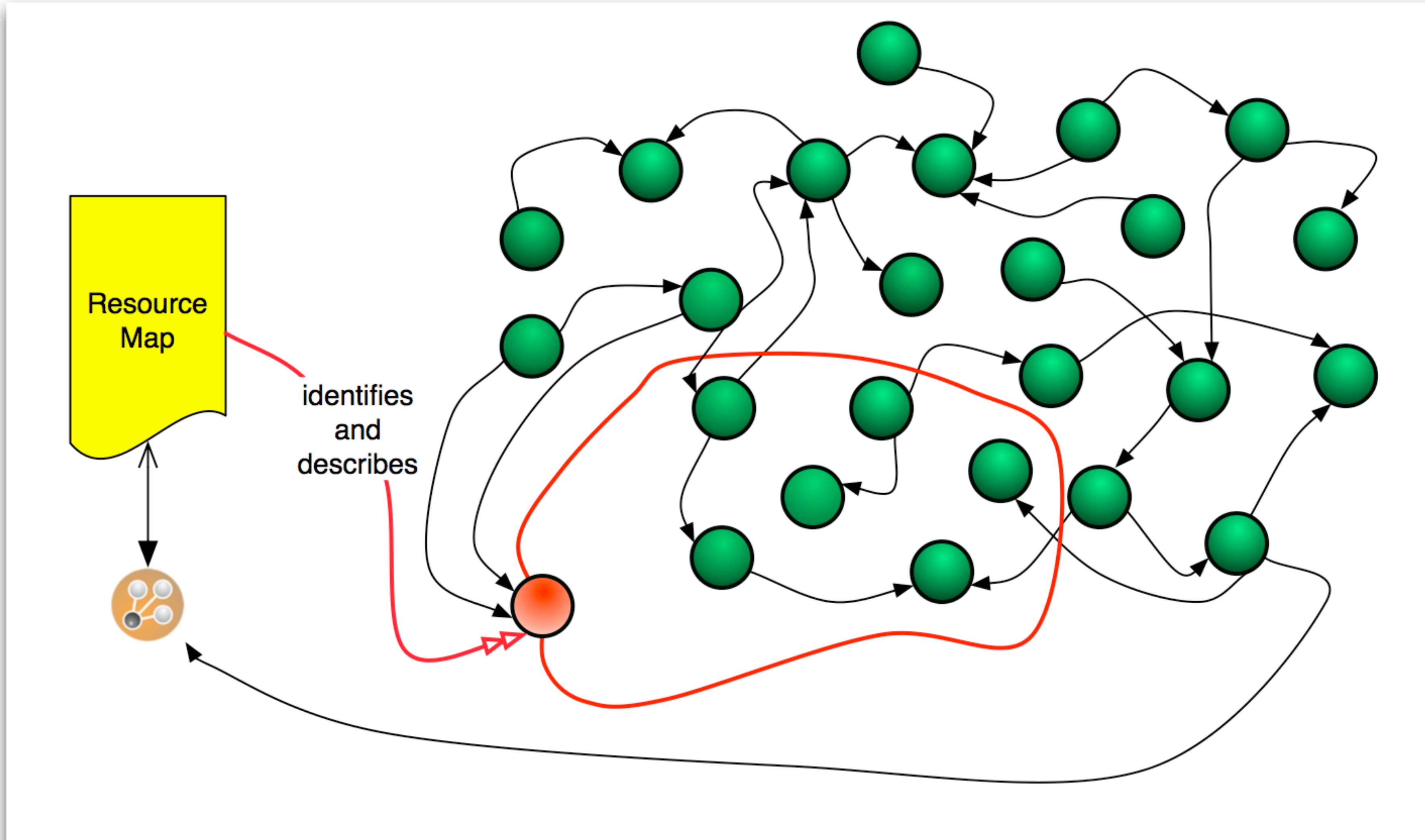
Publish a Resource Map to the Web



The Resource Map Identifies and Describes the Aggregation



The Resource Map and the Aggregation integrate into the Web



OAI Object Reuse and Exchange: Today's Agenda

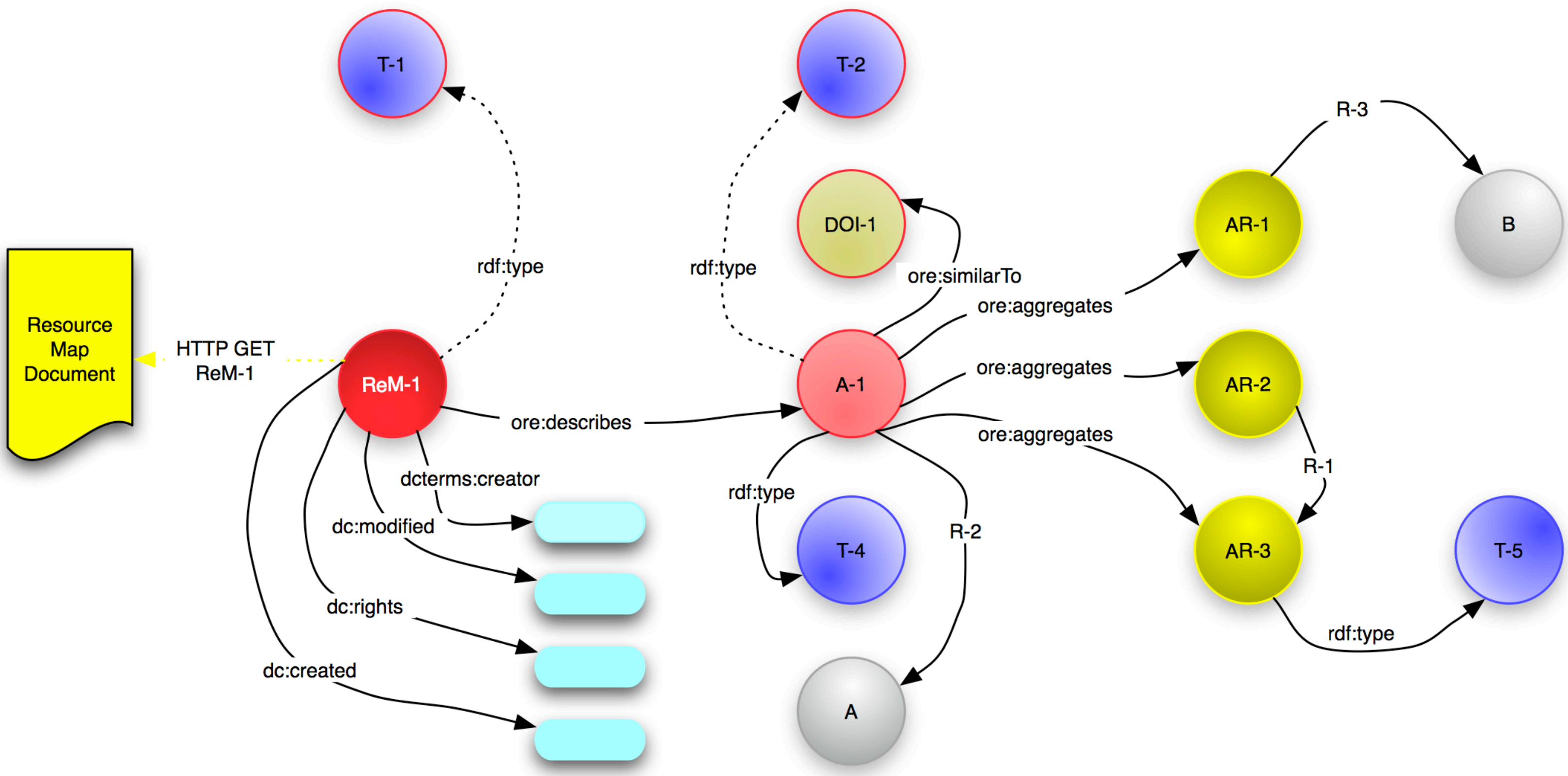
Subject: **Aggregations** of Web resources

Approach: Publish **Resource Maps** to the Web that Instantiate, Describe, and Identify Aggregations

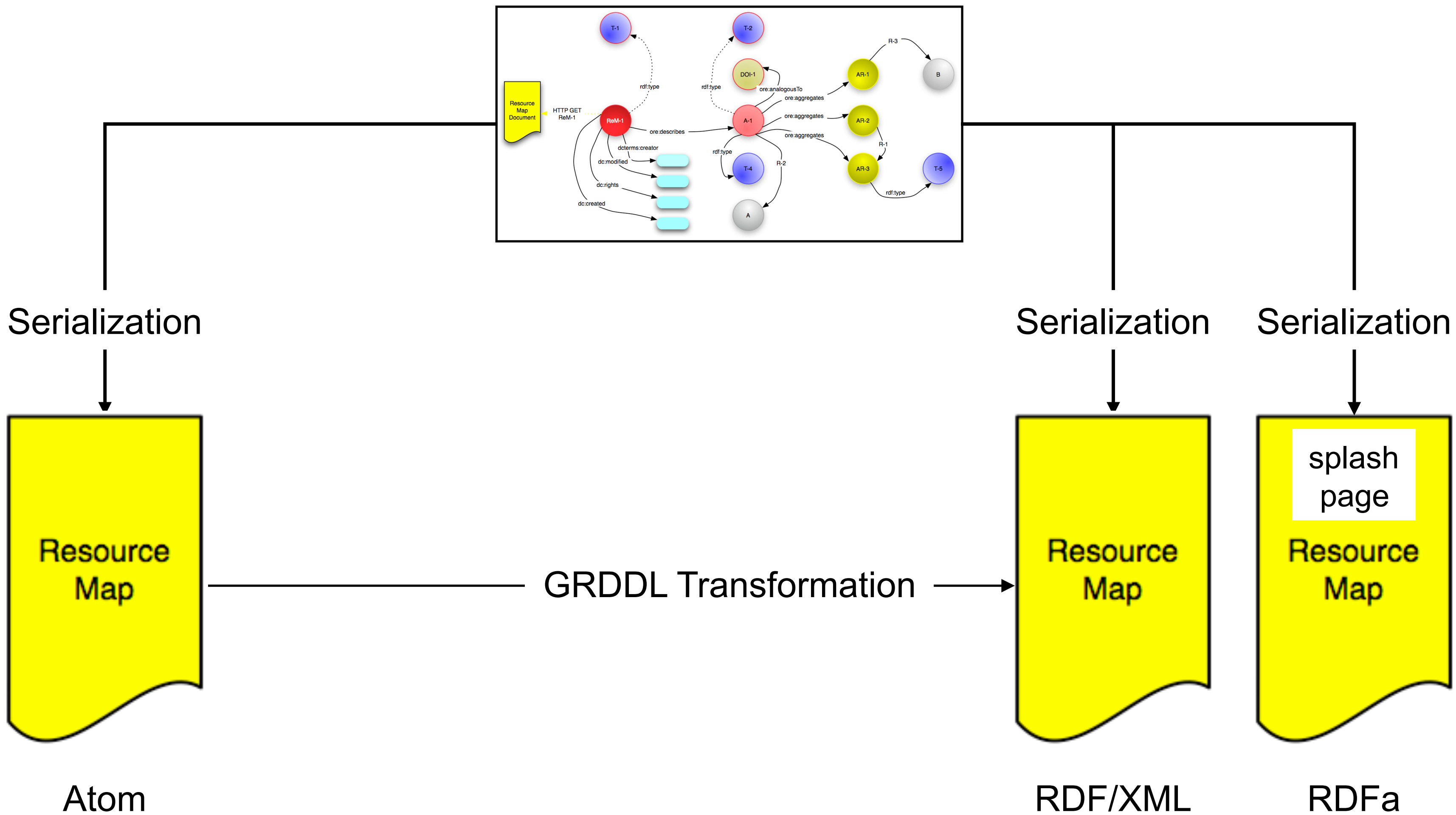
Reuse: URI of Aggregation as handle; Resource Map as the ore for value chains

How exactly: Learn today.

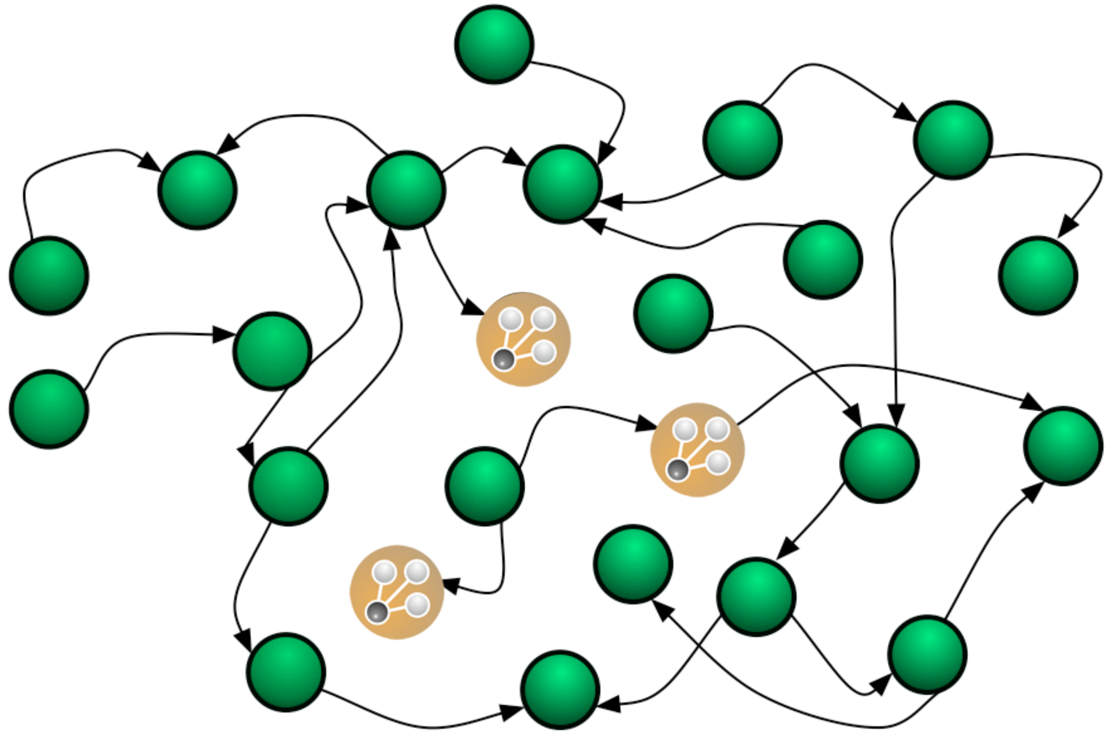
Agenda: Data Model (Carl Lagoze, Simeon Warner)



Agenda: Serializations (Carl Lagoze, Simeon Warner)



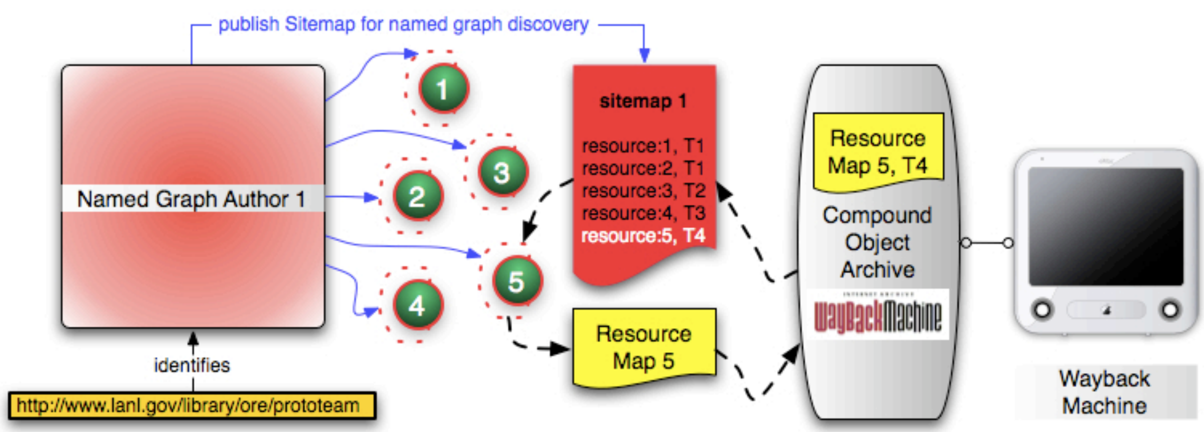
Agenda: Resource Map Discovery (Michael Nelson)



Agenda: Experiments

- Tim Cole, Tim DiLauro, Jim Downing, Michael Nelson, Thomas Place, Robert Sanderson, Herbert Van de Sompel,

http://www.ctwatch.org/quarterly/articles/2007/08/interoperability-for-the-discovery-use-and-re-use-of-units-of-scholarly-communication/



Agenda: Q&A

- You and Pete Johnston, Carl Lagoze, Michael Nelson, Robert Sanderson, Herbert Van de Sompel, Simeon Warner

Agenda: Reception

But First: Carl Lagoze