

meta-metadata: an extensible semantic architecture for multimedia metadata definition, extraction, and presentation

```
<meta_metadata name="acm_portal"
  url_base="http://portal.acm.org/citation.cfm">
  <meta_metadata_field name="title" scalar_type="String"
    xpath="//td[@class='medium-text']/strong/child::text()"/>
  <meta_metadata_field name="full_text"
    scalar_type="ParsedURL" xpath="//td[...]"/>
  <meta_metadata_field name="author">
    <meta_metadata_field name="name"
      scalar_type="String" xpath="//td[...]"/>
    <meta_metadata_field name="affiliation"
      scalar_type="String" xpath="//td[...]"/>
    <meta_metadata_field name="result_page"
      scalar_type="Pars.." xpath="//td[...]"/>
  </meta_metadata_field>
  ...
</meta_metadata>
```

```
public class AcmPortal
{
  @xml_nested String title;
  @xml_nested ParsedURL fullText;
  @xml_map HashMapArrayList
    <String, Author> authors;
}
```

```
public class Author
{
  @xml_nested String name;
  @xml_nested String affiliation;
  @xml_nested ParsedURL resultsPage;
}
```

http://portal.acm.org/ft_gateway.cfm?id=1057063&type=pdf&col

Breakaway: An Ambient Display Designed to Change Human Behavior

heading	Conference on Human Factors in Computing Systems
pages	1945 - 1948
year_of_publication	2005
isbn	:1-59593-002-7

name	Nassim Jafarinaimi
affiliation	Carnegie-Mellon University, Pittsburgh, PA
results_page	http://portal.acm.org/author_page.cfm?id=1057063

We present Breakaway, an ambient display that encourages people to interact with their environment in a novel way.

bib_text	James Bo Begole , John C. Tang , Roscoe A. Stewart
bib_text	Christoph Obermair , Bernd Ploderer , W

andruud kerne, sasnikant
damaraju,
bharat kumar, and andrew webb



interface ecology lab

department of computer science & engineering
texas a&m university

information sources

The screenshot shows the ACM Digital Library Portal interface. At the top left is the 'acm PORTAL' logo. To its right are links for 'Subscribe (Full Service)', 'Register (Free, Limited Service)', and 'Login'. Below the logo is a search bar with a dropdown menu set to 'The ACM Digital Library' and a 'SEARCH' button. The main content area is divided into several sections: 'THE ACM DIGITAL LIBRARY' with a green header, 'Full text of every article ever published by ACM.' with links to 'Using the ACM Digital Library' and 'Frequently Asked Questions (FAQ's)'; 'Recently loaded issues and proceedings:' with a vertical scrollbar and links to various ACM Transactions volumes; 'Personalized Services: Login required' with links for 'My Binders' and 'TOC Service'; 'Author Profile' with a photo and a link to 'Author Profile Page'; and 'CrossRef Search' with a link to 'CrossRef Search' and a description of a pilot program. At the bottom left are buttons for 'Join ACM', 'Subscribe to Publications', 'Join SIGs', and 'Institutions & Libraries'. At the bottom right is a 'Send us your feedback' link.

large number of elements

human experience: difficult to explore

From context to content: leveraging context to infer media metadata

Full text  Pdf (373 KB)

Source [International Multimedia Conference](#) [archive](#)
Proceedings of the 12th annual ACM international conference on Multimedia
 New York, NY, USA
 SESSION: Brave new topics - session 2: from context to content: leveraging conte
 Pages: 188 - 195
 Year of Publication: 2004
 ISBN: 1-58113-893-8

Authors [Marc Davis](#) University of California at Berkeley, Berkeley, CA
[Simon King](#) University of California at Berkeley, Berkeley, CA
[Nathan Good](#) University of California at Berkeley, Berkeley, CA
[Risto Sarvas](#) Helsinki Institute for Information Technology (HIIT), HUT, Finland

Sponsors [SIGMULTIMEDIA](#): ACM Special Interest Group on Multimedia
[ACM](#): Association for Computing Machinery

Publisher [ACM](#) New York, NY, USA

Bibliometrics Downloads (6 Weeks): 21, Downloads (12 Months): 180, Citation Count: 23

Additional Information: [abstract](#) [references](#) [cited by](#) [index terms](#) [collaborative](#)

Tools and Actions: [Review this Article](#)
[Save this Article to a Binder](#) Display Formats: [BibTex](#)

DOI Bookmark: Use this link to bookmark this Article: <http://doi.acm.org/10.1145/101145/101145>
[What is a DOI?](#)

↑ **ABSTRACT**

The recent popularity of mobile camera phones allows for new opportunities to gather im
 for generating metadata for photos using spatial, temporal, and social context. We descr
 taken with camera phones and its performance evaluation. We propose that leveraging c
 semantic and sensory gaps. In particular, combining and sharing spatial, temporal, and s
 make inferences about media content.

metadata semantics

about elements within a
collection

used to search, browse, collect and
explore

find related information

unified framework

problem: heterogeneous sources

solution: language for authoring
extensible
metadata structure

meta-metadata

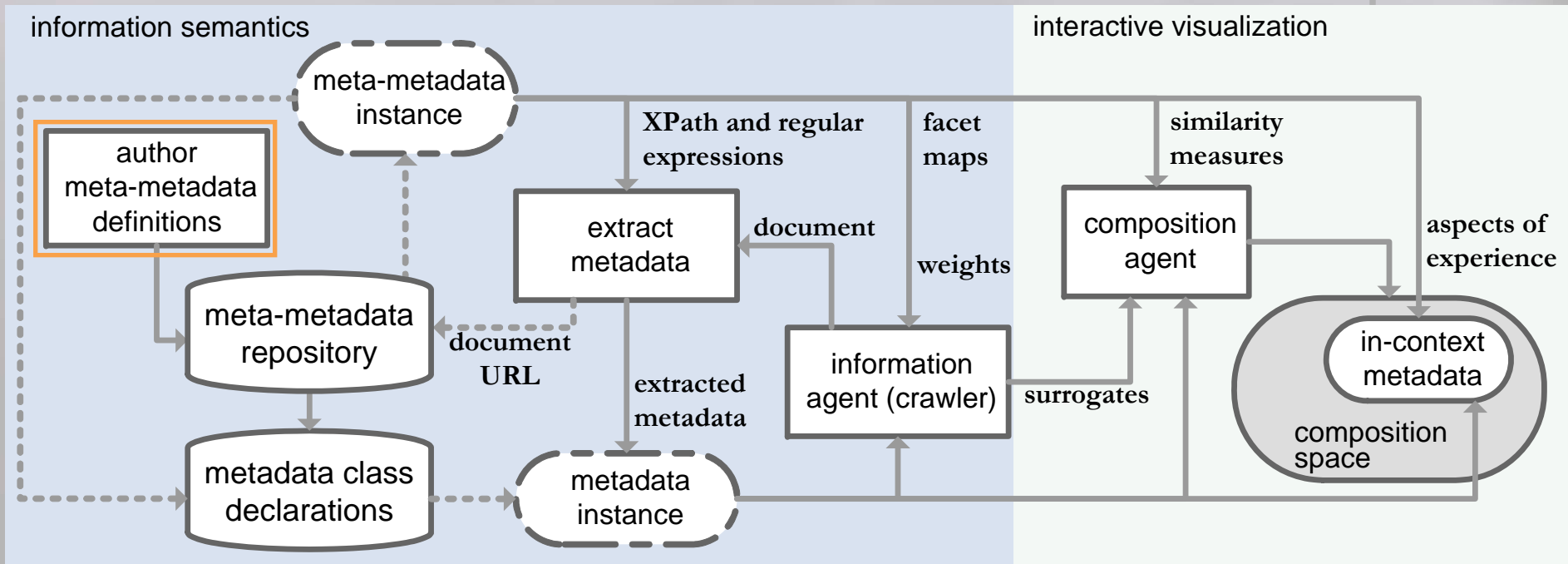
language
defines metadata
life cycle
representation
extraction
presentation

```
<meta_metadata name="acm_portal" url_base="http://portal.acm.org/citation.cfm?"  
  extends="pdf" package="ecologylab.semantics.library.scholarlyPublication">  
  <meta_metadata_field name="title" navigates_to="full_text" scalar_type="String"  
    xpath="//td[@class='medium-text']/strong/child::text()" />  
  <meta_metadata_field name="source" comment="Metadata related to where...">  
    <meta_metadata_field name="heading" navigates_to="archive" scalar_type="String"  
      xpath="//span[@class='mediumb-text']/child::text()" is_facet="true" />  
    <meta_metadata_field name="archive" hide="true" scalar_type="ParsedURL"  
      xpath="//span[@class='mediumb-text']/..a[child::text()='archive']/@href" />
```

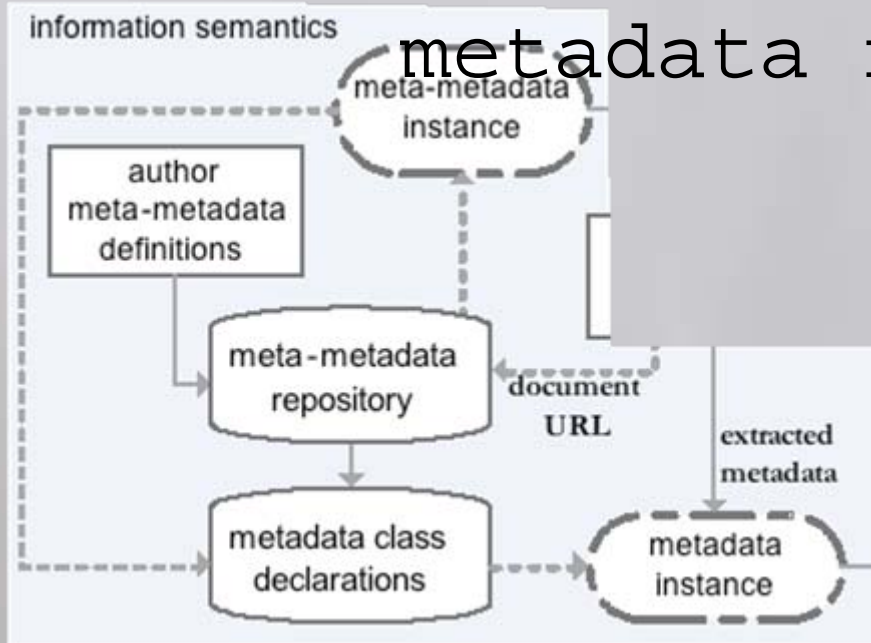
authored in XML

programming not required

architecture



metadata representation



```
public class AcmPortal
{
    @xml_nested String title;
    @xml_nested ParsedURL fullText;
    @xml_map HashMapArrayList
        <String, Author> authors;
    ...
}
```

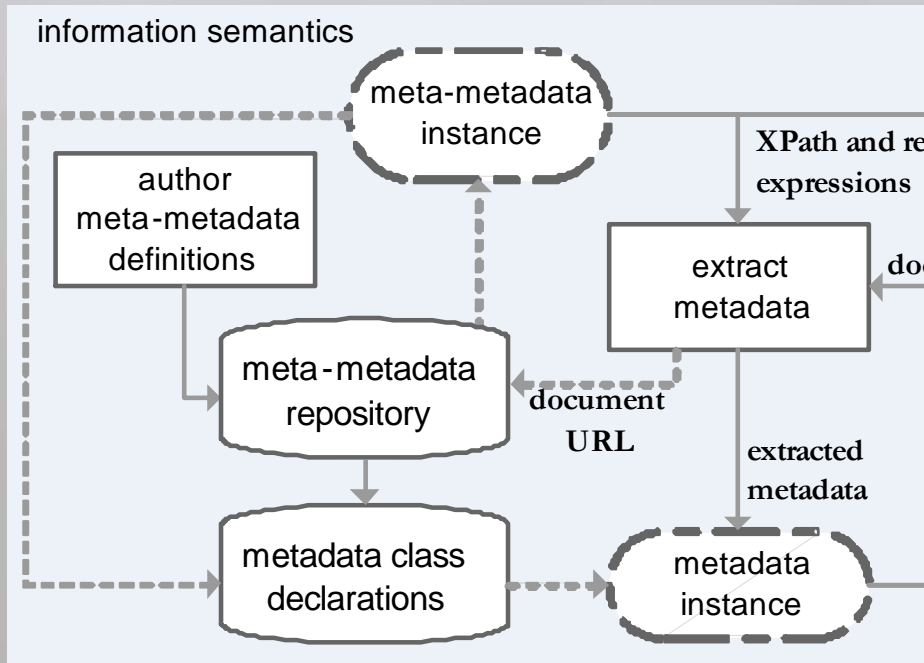
```
public class Author
{
    @xml_nested String name;
    @xml_nested String affiliation;
    @xml_nested ParsedURL resultsPage;
    ...
}
```

strongly typed metadata fields

nested structure

meta-metadata > metadata translation

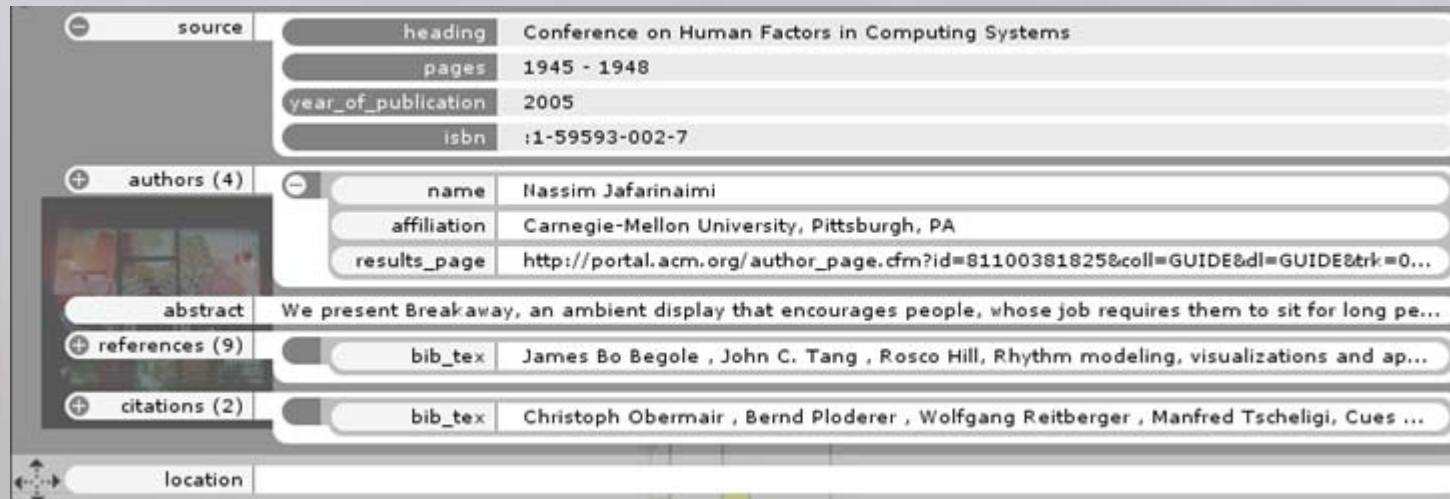
metadata extraction



unique by field per a source

XPath expressions

metadata visualization



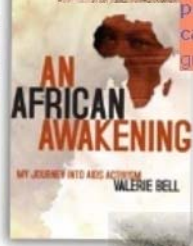
properties describing
display and interaction
field order
navigatesTo
hide
alwaysShow

combined-initiative creativity support tool

surrogates & information composition



BRIDGING THE GAP

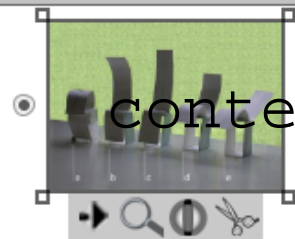


We can use our most advanced water purification technology to help in the fight against thirst and water-borne illnesses.

in-context metadata

The screenshot shows a web interface with a metadata table. The table has columns for 'location', 'title', 'source', 'authors (4)', 'abstract', 'references (9)', and 'citations (2)'. The 'source' section is expanded, showing 'heading', 'pages', 'year_of_publication', and 'isbn'. The 'authors' section is also expanded, showing 'name', 'affiliation', and 'results_page'. The 'abstract' section shows the beginning of the text: 'We present Breakaway, an ambient display that encourages people, whose job requires them to sit for long pe...'. The 'references' and 'citations' sections show 'bib_tex' entries.

location	http://portal.acm.org/ft_gateway.cfm?id=1057063&type=pdf&coll=GUIDE&dl=GUIDE&CFID=10553864&CFTOKE...								
title	Breakaway: An Ambient Display Designed to Change Human Behavior								
source	<table border="1"><tr><td>heading</td><td>Conference on Human Factors in Computing Systems</td></tr><tr><td>pages</td><td>1945 - 1948</td></tr><tr><td>year_of_publication</td><td>2005</td></tr><tr><td>isbn</td><td>:1-59593-002-7</td></tr></table>	heading	Conference on Human Factors in Computing Systems	pages	1945 - 1948	year_of_publication	2005	isbn	:1-59593-002-7
heading	Conference on Human Factors in Computing Systems								
pages	1945 - 1948								
year_of_publication	2005								
isbn	:1-59593-002-7								
authors (4)	<table border="1"><tr><td>name</td><td>Nassim Jafarainimi</td></tr><tr><td>affiliation</td><td>Carnegie-Mellon University, Pittsburgh, PA</td></tr><tr><td>results_page</td><td>http://portal.acm.org/author_page.cfm?id=81100381825&coll=GUIDE&dl=GUIDE&trk=0...</td></tr></table>	name	Nassim Jafarainimi	affiliation	Carnegie-Mellon University, Pittsburgh, PA	results_page	http://portal.acm.org/author_page.cfm?id=81100381825&coll=GUIDE&dl=GUIDE&trk=0...		
name	Nassim Jafarainimi								
affiliation	Carnegie-Mellon University, Pittsburgh, PA								
results_page	http://portal.acm.org/author_page.cfm?id=81100381825&coll=GUIDE&dl=GUIDE&trk=0...								
abstract	We present Breakaway, an ambient display that encourages people, whose job requires them to sit for long pe...								
references (9)	<table border="1"><tr><td>bib_tex</td><td>James Bo Begole , John C. Tang , Rosco Hill, Rhythm modeling, visualizations and ap...</td></tr></table>	bib_tex	James Bo Begole , John C. Tang , Rosco Hill, Rhythm modeling, visualizations and ap...						
bib_tex	James Bo Begole , John C. Tang , Rosco Hill, Rhythm modeling, visualizations and ap...								
citations (2)	<table border="1"><tr><td>bib_tex</td><td>Christoph Obermair , Bernd Ploderer , Wolfgang Reitberger , Manfred Tscheligi, Cues ...</td></tr></table>	bib_tex	Christoph Obermair , Bernd Ploderer , Wolfgang Reitberger , Manfred Tscheligi, Cues ...						
bib_tex	Christoph Obermair , Bernd Ploderer , Wolfgang Reitberger , Manfred Tscheligi, Cues ...								



contextual display and editing
support for meta-metadata and nested
structure

demo

conclusion

diverse metadata from heterogeneous
sources

meta-metadata defines life cycle of
metadata

author XML, no programming

in-context visualization

developed as reusable components

questions and thoughts

```
<meta_metadata name="acm_portal"
  url_base="http://portal.acm.org/citation.cfm">
  <meta_metadata_field name="title" scalar_type="String"
    xpath="//td[@class='medium-text']/strong/child::text()"/>
  <meta_metadata_field name="full_text"
    scalar_type="ParsedURL" xpath="//td[...]/>
  <meta_metadata_field name="author">
    <meta_metadata_field name="name"
      scalar_type="String" xpath="//td[...]/>
    <meta_metadata_field name="affiliation"
      scalar_type="String" xpath="//td[...]/>
    <meta_metadata_field name="result_page"
      scalar_type="Pars.." xpath="//td[...]/>
  </meta_metadata_field>
  ...
</meta_metadata>
```

```
public class AcmPortal
{
  @xml_nested String title;
  @xml_nested ParsedURL fullText;
  @xml_map HashMapArrayList
    <String, Author> authors;
  ...
}
```

```
public class Author
{
  @xml_nested String name;
  @xml_nested String affiliation;
  @xml_nested ParsedURL resultsPage;
  ...
}
```

source

pages 1945 - 1948

year_of_publication 2005

isbn :1-59593-002-7

authors (4)

name Nassim Jafarinaimi

affiliation Carnegie-Mellon University, Pittsburgh, PA

results_page http://portal.acm.org/author_page.cfm?id=81100381825&coll=GUIDE&di=GUIDE&rk=0...

abstract We present Breakaway, an ambient display that encourages people, whose job requires them to sit for long pe...

references (9)

bib_text James Bo Begole , John C. Tang , Rosco Hill, Rhythm modeling, visualizations and ap...

citations (2)

bib_text Christoph Obermair , Bernd Ploderer , Wolfgang Reitberger , Manfred Tscheligi, Cues ...

location

<http://ecologylab.net/beta/cf>