Flexible Interfaces for Semantically Annotated Multimedia

Lynda Hardman

CWI, Semantic Media Interfaces
TU/e, Multimedia and Internet Technology

Learning Objectives

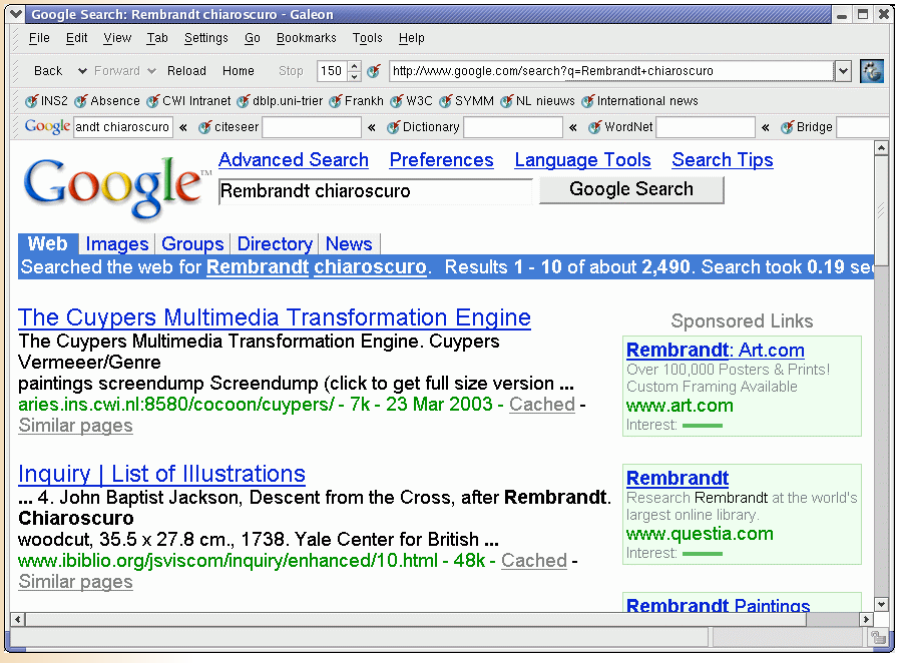
- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

2

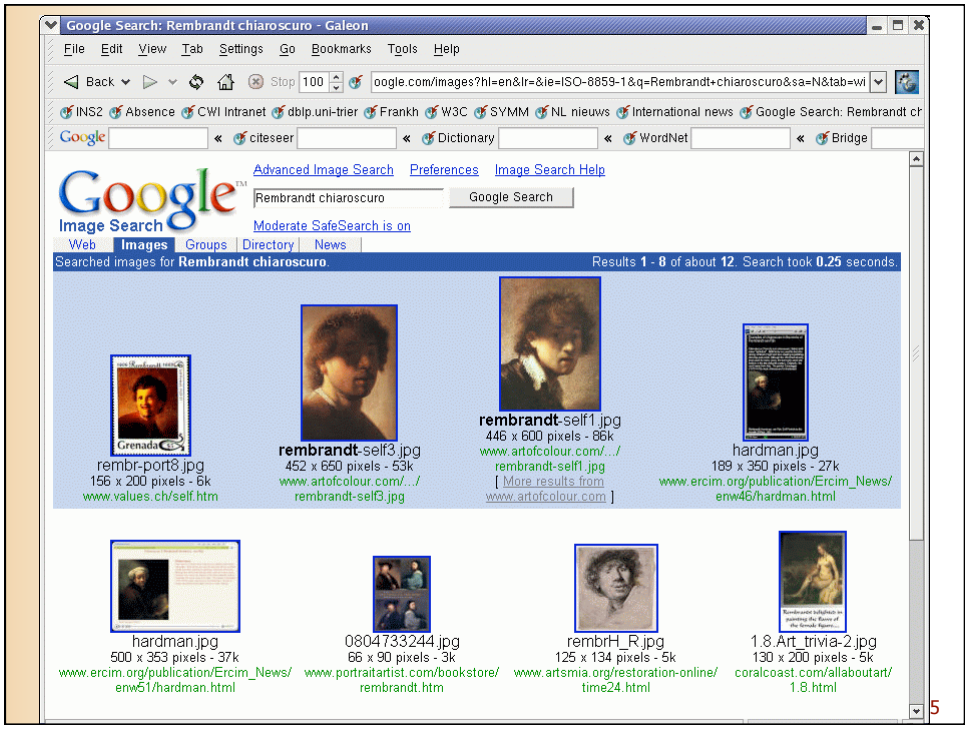
Learning Objectives

- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

3

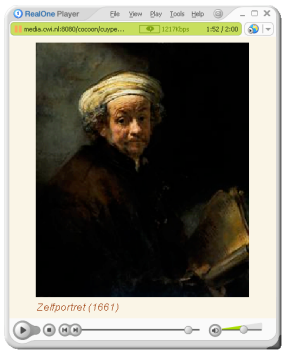


4


Google Search: Rembrandt chiaroscuro - Galeon
File Edit View Tab Settings Go Bookmarks Tools Help
Back Stop 100
oogle.com/images?hl=en&lr=&ie=ISO-8859-1&q=Rembrandt+chiaroscuro&sa=N&tab=wi
INS2 Absence CWI Intranet dblp.uni-trier Frankh W3C SYMM NL nieuws International news Google Search: Rembrandt ch
Google citeseer Dictionary WordNet Bridge
Google Image Search
Advanced Image Search Preferences Image Search Help
Rembrandt chiaroscuro
Google Search
Moderate SafeSearch is on
Web Images Groups Directory News
Searched images for Rembrandt chiaroscuro.
Results 1 - 8 of about 12. Search took 0.25 seconds.
rembr-port8.jpg
156 x 200 pixels - 6k
www.values.ch/self.htm
rembrandt-self3.jpg
452 x 650 pixels - 53k
www.artofcolour.com/.../rembrandt-self3.jpg
rembrandt-self1.jpg
446 x 600 pixels - 86k
www.artofcolour.com/.../rembrandt-self1.jpg
[More results from www.artofcolour.com]
hardman.jpg
189 x 350 pixels - 27k
www.ercim.org/publication/Ercim_News/enw46/hardman.html
hardman.jpg
500 x 353 pixels - 37k
www.ercim.org/publication/Ercim_News/enw51/hardman.html
0804733244.jpg
66 x 90 pixels - 3k
www.portraitartist.com/bookstore/rembrandt.htm
rembrH_R.jpg
125 x 134 pixels - 5k
www.artsmia.org/restoration-online/time24.html
1.8.Art_trivia-2.jpg
130 x 200 pixels - 5k
coralcoast.com/allaboutart/1.8.html
5


Chiaroscuro & Rembrandt Harmensz. van Rijn
Chiaroscuro
Clair-obscur (French) and chiaroscuro (Italian) both mean 'light-dark'. Both terms are used to describe strong contrast of light and dark shading in paintings, drawings and prints. Although the effect had already been used for many years, the term only came into fashion in the late sixteenth century. Originally, the word came from Italy. The painter Caravaggio (1573-1610) made chiaroscuro his trademark. He was a master at painting illuminated scenes in dark settings.
Self Portrait (1661)
6

One size *doesn't* fit all



7

The problem

- Too many users need their own information
  - for their level of expertise
  - using appropriate media
  - in an appropriate style
  - displayed on their own device
- Multimedia information design is expensive
- There has to be some automation in the process

8

RealOne Player File View Play Tools Help

gemini.ins.cwi.nl/cocoon/cuypers/aria/selectform-process 1393Kbps 1:29 / 1:35

Chiaroscuro & Rembrandt Harmensz. van Rijn

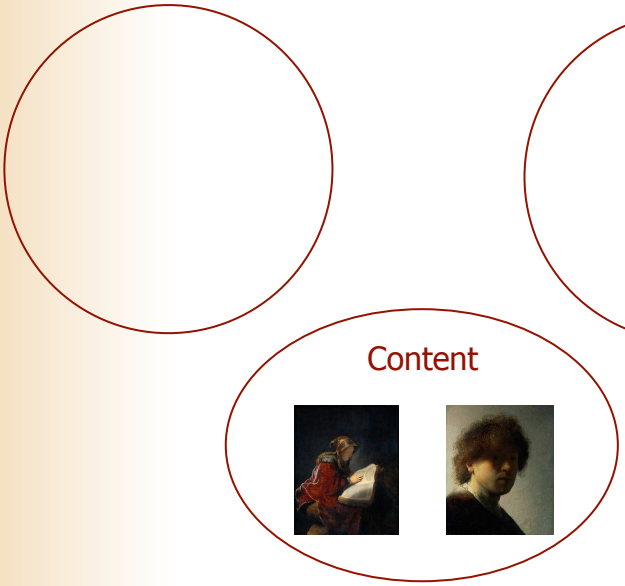
Self Portrait (1661)

Chiaroscuro

Clair-obscur (French) and chiaroscuro (Italian) both mean 'light-dark'. Both terms are used to describe strong contrast of light and dark shading in paintings, drawings and prints. Although the effect had already been used for many years, the term only came into fashion in the late sixteenth century. Originally, the word came from Italy. The painter Caravaggio (1573-1610) made chiaroscuro his trademark. He was a master at painting illuminated scenes in dark settings.

9

Three ingredients



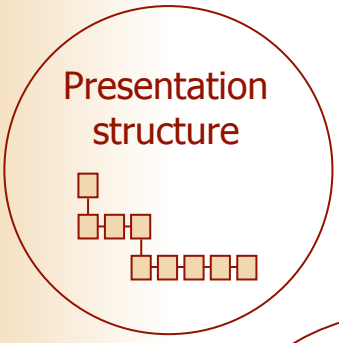
10

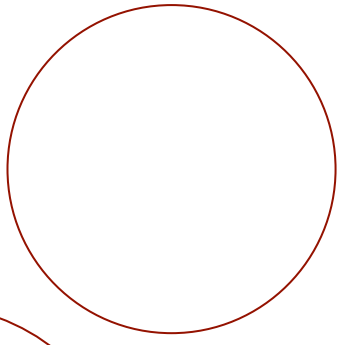
Content of example

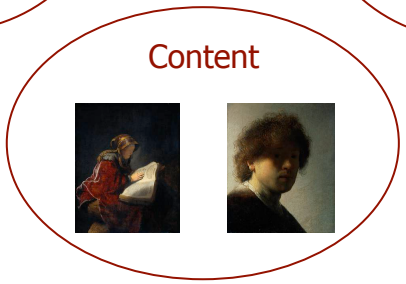
Clair-obscur (Frans) en chiaroscuro (Italiaans) betekenen 'licht-donker'. Beide termen worden gebruikt om sterke licht-donkercontrasten in schilderijen, tekeningen en prenten aan te duiden. Hoewel het effect al eerder werd toegepast, is de term pas sinds het einde van de 16de eeuw in zwang. De oorsprong van het woord ligt in Italië. De schilder Caravaggio (1573-1610) maakte het chiaroscuro-effect tot zijn handelsmerk. Hij was een meester in het schilderen van donkere taferelen met één felle lichtbundel.

11

Three ingredients

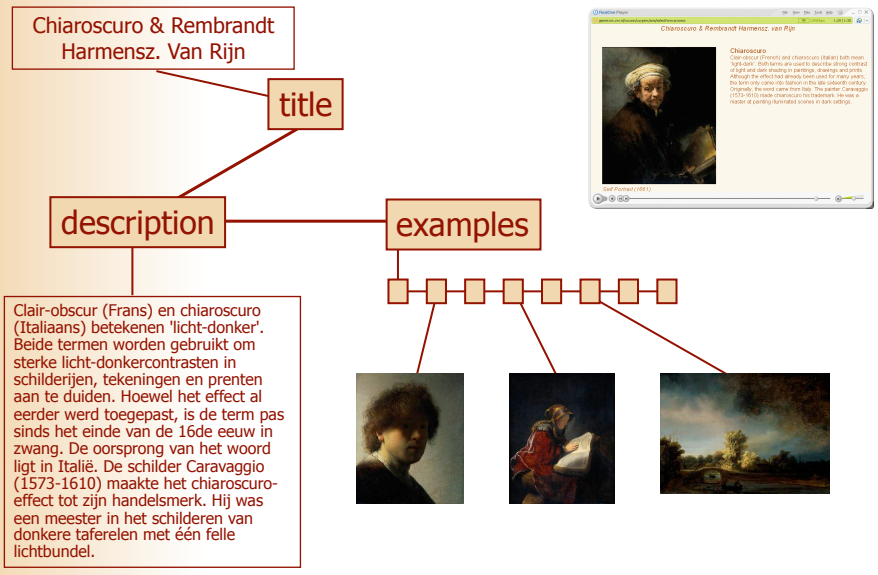






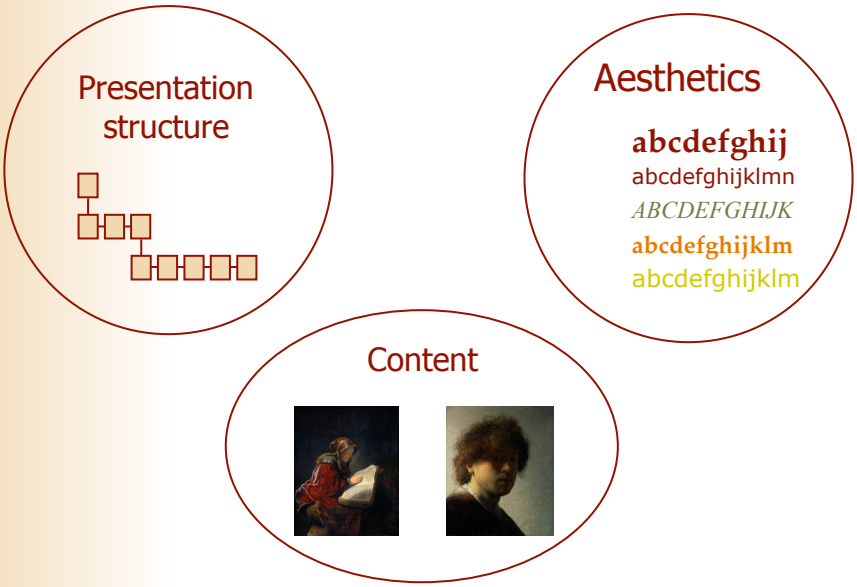
12

Presentation structure of example



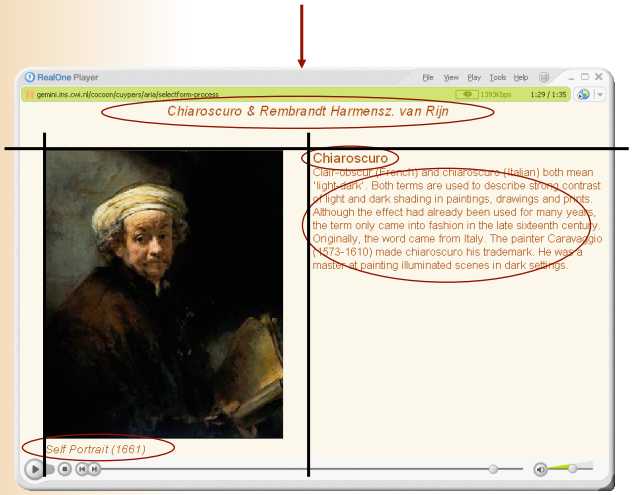
13

Three ingredients



14

Aesthetics of example



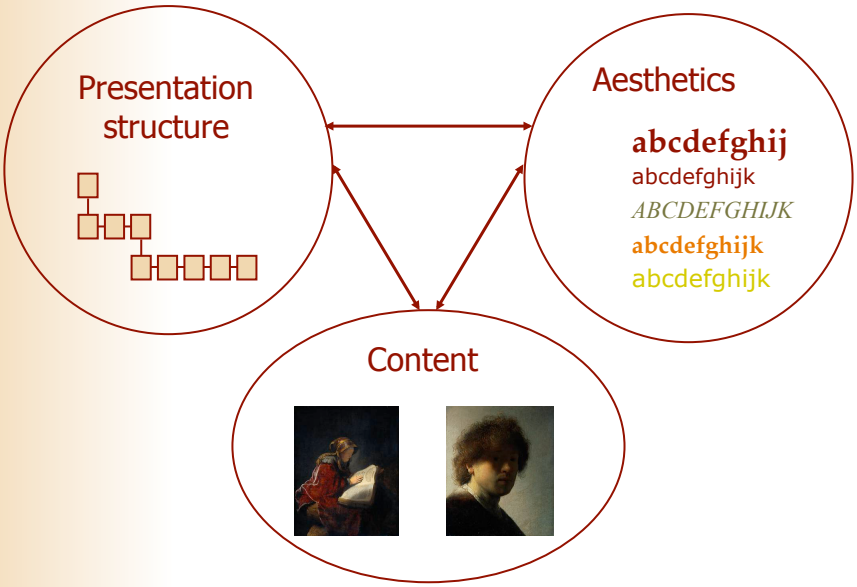
Fonts

Layout

Colours

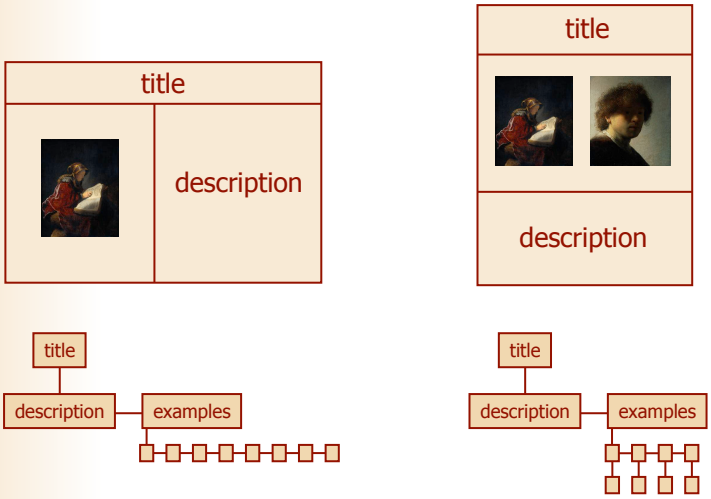
15

Design dependencies



16

Presentation Structure depends on Layout



17

Style Depends on Content

Chiaroscuro & Rembrandt

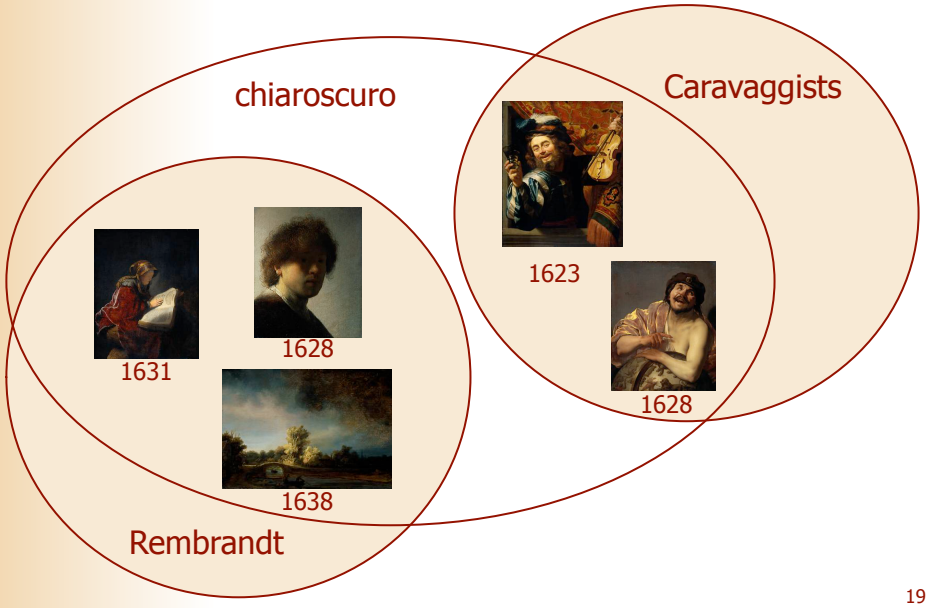
The Stone Bridge (1638)

Chiaroscuro & Rembrandt

The Stone Bridge (1638)

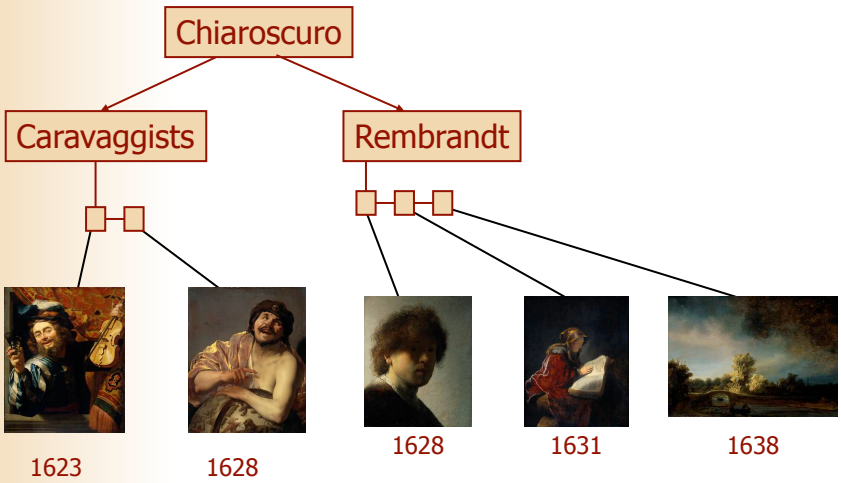
18

Presentation structure depends on content



19

Example Presentation Structure

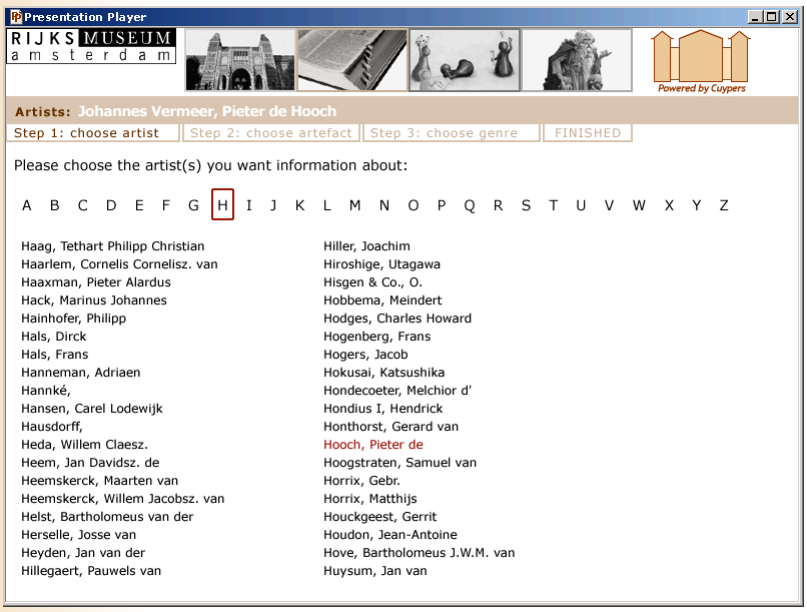


20

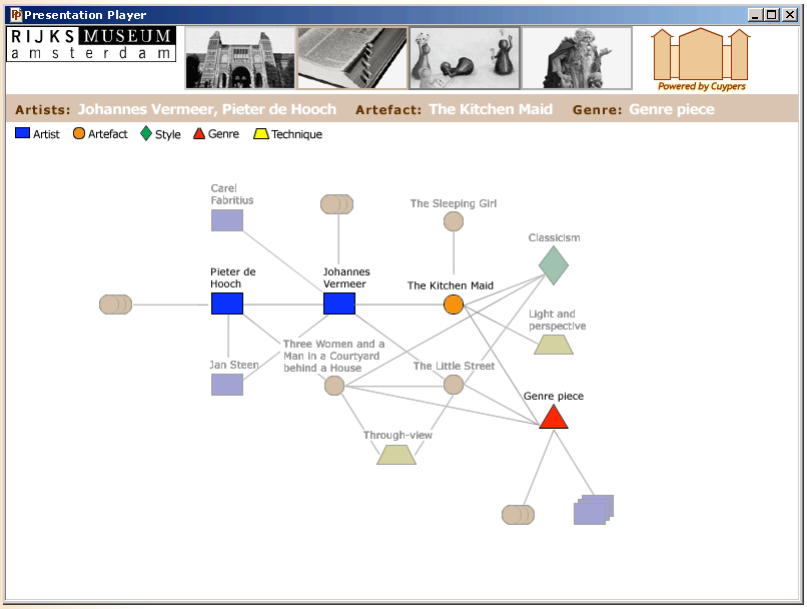
Different presentation styles

- Large amount of information
- High interaction

21



22


Presentation Player
RIJKS MUSEUM
a m s t e r d a m
Powered by Cuypers
Artists: Johannes Vermeer, Pieter de Hooch
Artefact: The Kitchen Maid
Genre: Genre piece
Artist
Artefact
Style
Genre
Technique
Carel Fabritius
The Sleeping Girl
Classicism
Pieter de Hooch
Johannes Vermeer
The Kitchen Maid
Light and perspective
Three Women and a Man in a Courtyard behind a House
Jan Steen
The Little Street
Genre piece
Through-view

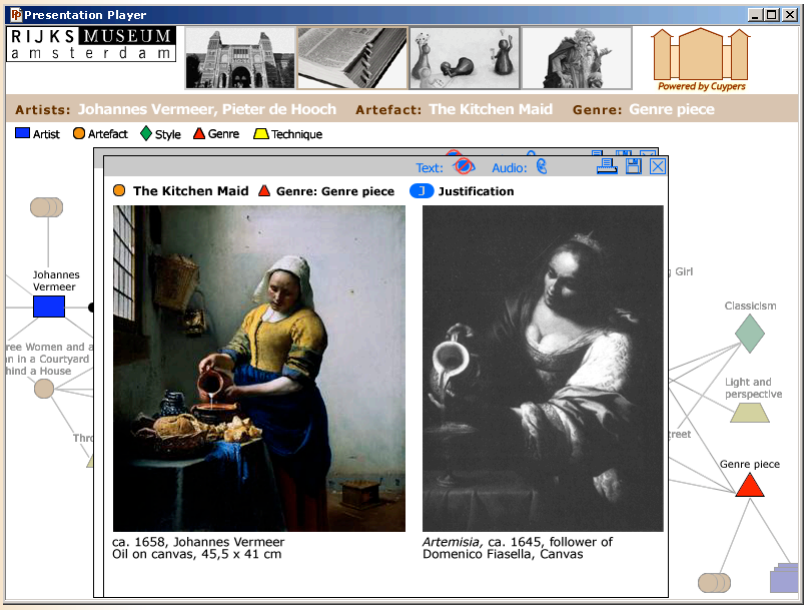
23


Presentation Player
RIJKS MUSEUM
a m s t e r d a m
Powered by Cuypers
Artists: Johannes Vermeer, Pieter de Hooch
Artefact: The Kitchen Maid
Genre: Genre piece
Artist
Artefact
Style
Genre
Technique
1 2 3
Text:
Audio:
The Kitchen Maid
With quiet concentration a woman pours milk into a bowl. With her left hand she supports the can she is pouring from. Around her are various objects: a loaf of bread, a stoneware jug, a basket and a brass bucket. The woman is standing near the window so she can see what she is doing. The light falls on her hands; her silhouette is dark against the white wall. There is a fascinating play of light and shadow in this painting.
Genre
This is one of Johannes Vermeer's genre pieces in which he establishes an intensely intimate atmosphere. Although the artist observes his model from nearby, she continues with her work, totally unperturbed.
E
Ex
J
All
Technique
Vermeer made use of light and perspective to create the intimate atmosphere. All lines of perspective lead to the right hand of the girl, which subtly accentuates the task of pouring milk in which she is completely engrossed. The horizon lies beneath her head, so that the viewer seems to look up
ca. 1658, Johannes Vermeer
Oil on canvas, 45,5 x 41 cm
Johannes Vermeer
Classicism
Light and perspective
Genre piece

24


Presentation Player
RIJKS MUSEUM
a m s t e r d a m
Powered by Cuypers
Artists: Johannes Vermeer, Pieter de Hooch
Artefact: The Kitchen Maid
Genre: Genre piece
Artist
Artefact
Style
Genre
Technique
Text:
Audio:
The Kitchen Maid
ca. 1658, Johannes Vermeer
Oil on canvas, 45,5 x 41 cm
Genre
Technique
Style
Johannes Vermeer
The Sleeping Girl
E
Ex
J
All
Johannes Vermeer
Classicism
Light and perspective
Genre piece

25


Presentation Player
RIJKS MUSEUM
a m s t e r d a m
Powered by Cuypers
Artists: Johannes Vermeer, Pieter de Hooch
Artefact: The Kitchen Maid
Genre: Genre piece
Artist
Artefact
Style
Genre
Technique
Text:
Audio:
The Kitchen Maid
Genre: Genre piece
Justification
Johannes Vermeer
Classicism
Light and perspective
Genre piece
ca. 1658, Johannes Vermeer
Oil on canvas, 45,5 x 41 cm
Artemisia, ca. 1645, follower of
Domenico Fiasella, Canvas

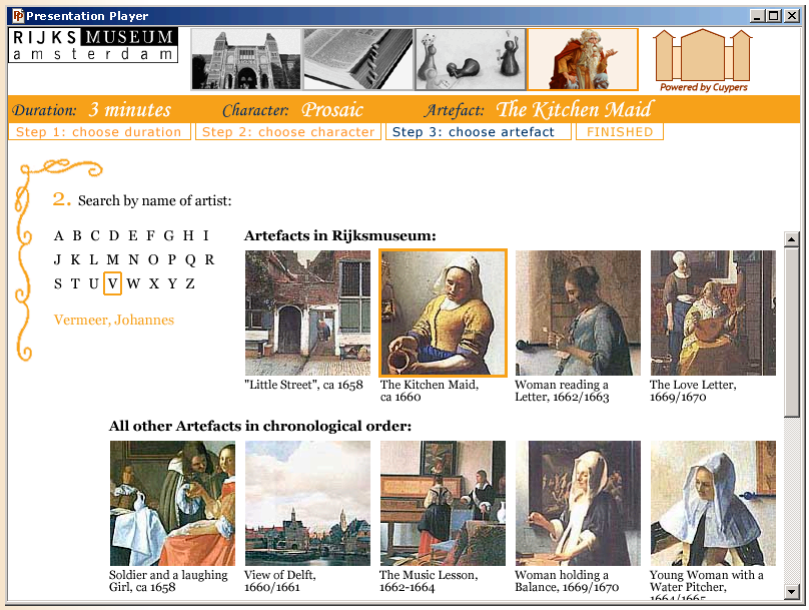
26

Different presentation styles

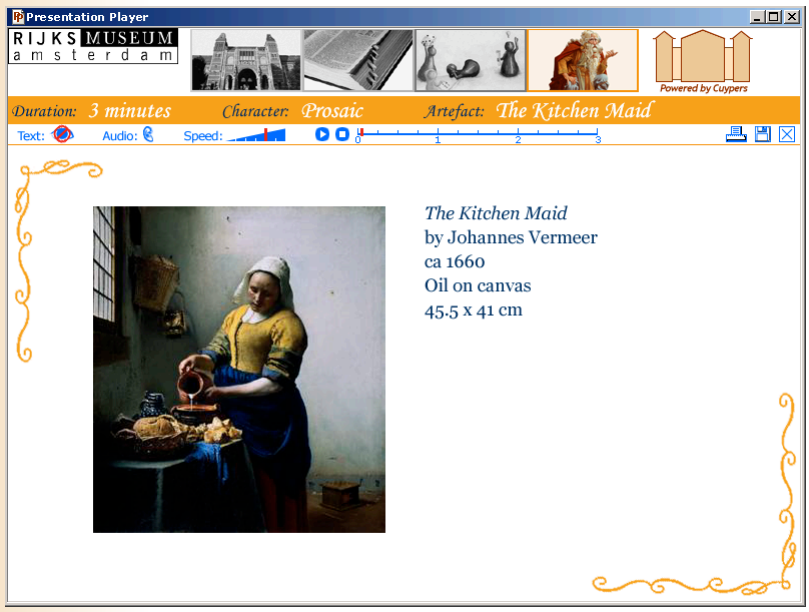
- Entertainment rather than information
- Low interaction

27

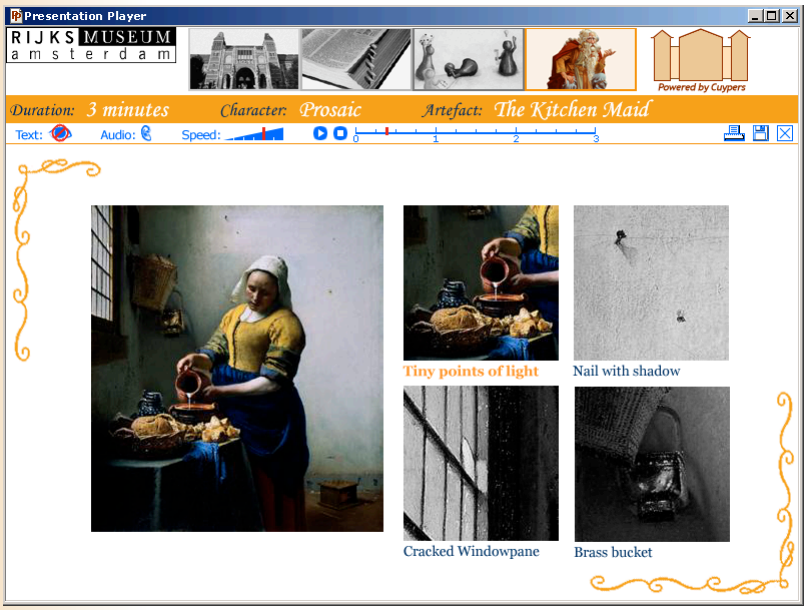
28


Presentation Player
RIJKS MUSEUM amsterdam
Powered by Cuypers
Duration: 3 minutes Character: Prosaic Artefact: The Kitchen Maid
Step 1: choose duration
Step 2: choose character
Step 3: choose artefact
FINISHED
2. Search by name of artist:
A B C D E F G H I
J K L M N O P Q R
S T U V W X Y Z
Vermeer, Johannes
Artefacts in Rijksmuseum:
"Little Street", ca 1658
The Kitchen Maid, ca 1660
Woman reading a Letter, 1662/1663
The Love Letter, 1669/1670
All other Artefacts in chronological order:
Soldier and a laughing Girl, ca 1658
View of Delft, 1660/1661
The Music Lesson, 1662-1664
Woman holding a Balance, 1669/1670
Young Woman with a Water Pitcher,

29


Presentation Player
RIJKS MUSEUM amsterdam
Powered by Cuypers
Duration: 3 minutes Character: Prosaic Artefact: The Kitchen Maid
Text:
Audio:
Speed:
The Kitchen Maid
by Johannes Vermeer
ca 1660
Oil on canvas
45.5 x 41 cm

30



31

Flexible interfaces to MM

- Creating multimedia presentations requires
  - understanding message of presentation
  - knowing specifications of use context
  - making design dependencies explicit
  - taking these dependencies into account

32

Literature tips

- *Kateryna Falkovych and Stefano Bocconi*
  Creating a semantic-based discourse model for hypermedia presentations: (un)discovered problems, HT 2005 Workshop on Narrative, Musical, Cinematic and Gaming Hyperstructure, September 2005, Salzburg, Austria
  http://www.cwi.nl/~media/publications/HTW05Falkovych.pdf
- *Lynda Hardman and Jacco van Ossenbruggen*
  Creating meaningful multimedia presentations, Proceedings IEEE International Symposium on Circuits and Systems ISCAS 2006.
  http://ieeexplore.ieee.org/xpl/freeabs_all.jsp?arnumber=1693031
  http://www.cwi.nl/~media/publications/iscas06.pdf
- *John Bateman, Jörg Kleinz, Thomas Kamps, and Klaus Reichenberger*
  Towards Constructive Text, Diagram, and Layout Generation for Information Presentation Computational Linguistics 27(3), pp. 409-449, September 2001
  http://acl.ldc.upenn.edu/J/J01/J01-3004.pdf

33

Learning Objectives

- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia data+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

34

Learning Objectives

- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia data+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

35

Understanding Data+metadata Workflow in Multimedia Applications

- Identify and define a number of canonical processes of media production
- Community effort
  - 2005: Dagstuhl seminar
  - 2005: ACM MM Workshop on *Multimedia for Human Communication*
  - 2008: Multimedia Systems Journal Special Issue (model and companion system papers)
    editors: Frank Nack, Zeljko Obrenovic and Lynda Hardman

`http://www.springerlink.com/content/100377/?Content+Status=Accepted`

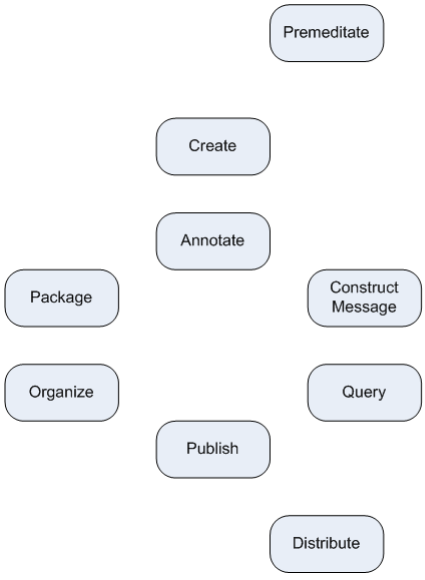
36

Why Canonical Processes?

- Canonical: *reduced to the simplest and most significant form possible without loss of generality*
- Identify stages of multimedia creation and provide a common vocabulary
- Allow system developers to output combinations of data and metadata that can be used by other developers

37

Overview of Canonical Processes



38

Example 1: CeWe Color PhotoBook

- Application for authoring digital photo books
- Automatic selection, sorting and ordering of photos
  - Context analysis methods: timestamp, annotation, etc.
  - Content analysis methods: color histograms, edge detection, etc.
- Customized layout and background
- Print by the European leader photo finisher company

http://www.cewe-photobook.com

39

CeWe Color PhotoBook Processes

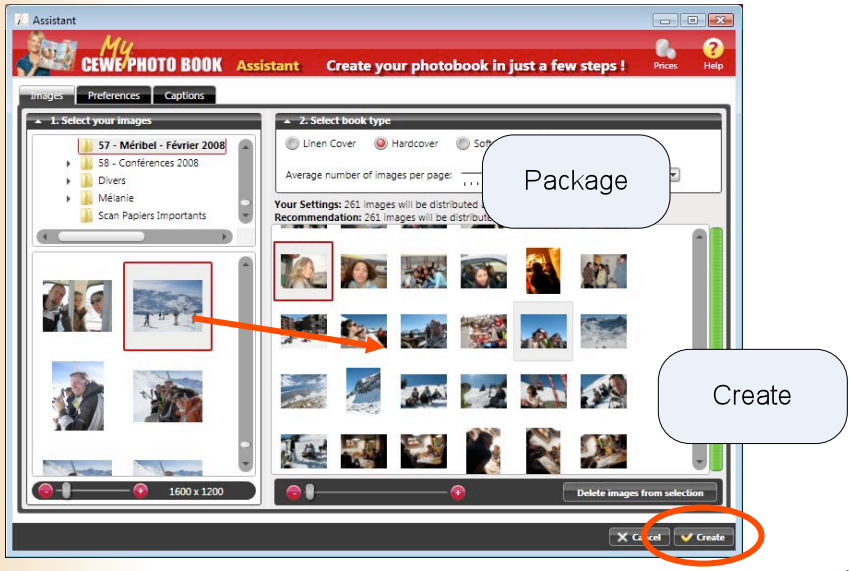
- My winter ski holidays with my frie
-

Premeditate

Construct Message

40

CeWe Color PhotoBook Processes

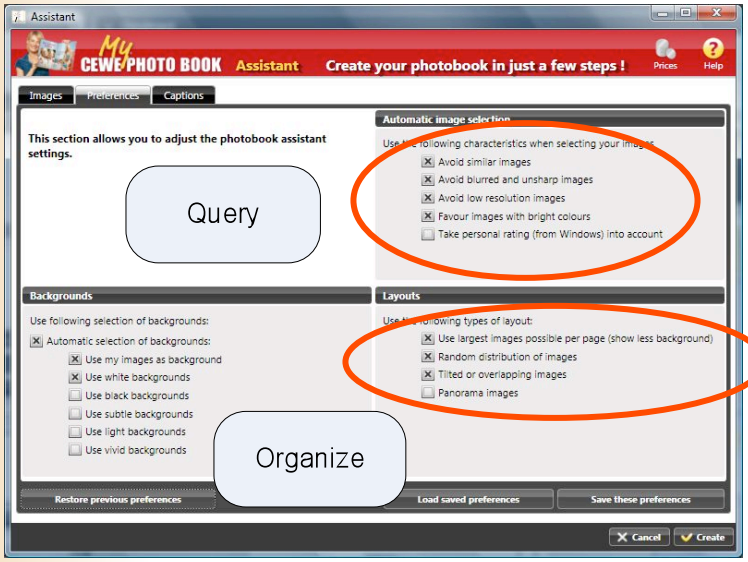


41

CeWe Color PhotoBook Processes

42

CeWe Color PhotoBook Processes

- 

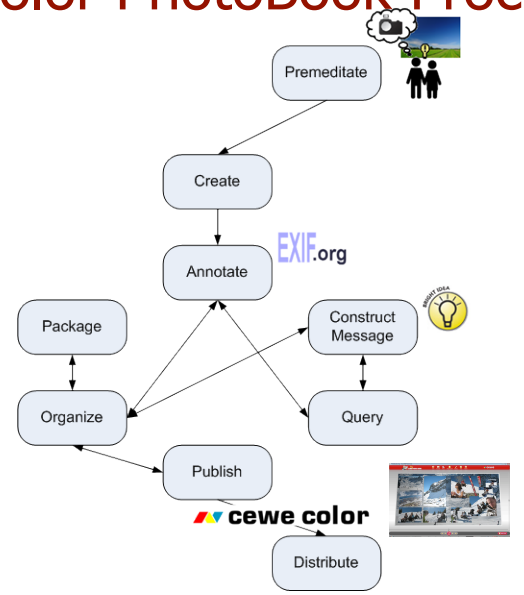
43

CeWe Color PhotoBook Processes

- 

44

CeWe Color PhotoBook Processes



45

Example 2: Vox Populi Video Sequences Generation

Stefano Bocconi, Frank Nack

- **Interview with America**
  video footage with interviews and background material about the opinion of American people after 9-11
  http://www.interviewwithamerica.com
- Example question:
  What do you think of the war in Afghanistan?

"I am never a fan of military action, in the big picture I don't think it is ever a good thing, but I think there are circumstances in which I certainly can't think of a more effective way to counter this sort of thing…"

47

Video Documentaries on the Web

- Traditional video authoring
  - only one final version
  - what is shown is the choice of the author/editor
- Proposed video authoring
  - Annotate the video material semantics
  - Show what the user asks to see, using presentation forms a film editor would use

Vox Populi Premeditate Process

- Analogous to the pre-production process in the film industry
  - *Static* versus *dynamic* video artifact
- Output
  - Script, planning of the videos to be captured
  - Questions to the interviewee prepared
  - Profiles of the people interviewed: education, age, gender, race
  - Locations where the interviews take place

Premeditate

49

Vox Populi Annotations

- Contextual
  - Interviewee (social), locations
- Descriptive
  - Question asked and transcription of the answers
  - Filmic continuity, examples:
    - gaze direction of speaker (left, centre, right)
    - framing (close-up, medium shot, long shot)
- Rhetorical
  - Rhetorical Statement
  - Argumentation model: Toulmin model

Annotate

50

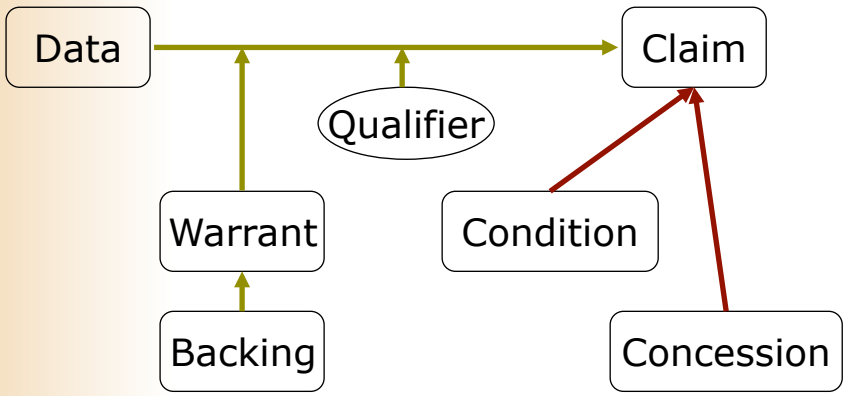
Vox Populi Statement Annotations

- Statement formally annotated:
  - <subject> <modifier> <predicate>
  - E.g. "**war best solution**"
- A thesaurus containing:
  - Terms on the topics discussed (155)
  - Relations between terms: *similar* (72), *opposite* (108), *generalization* (10), *specialization* (10)
  - E.g. **war** *opposite* **diplomacy**

Annotate

51

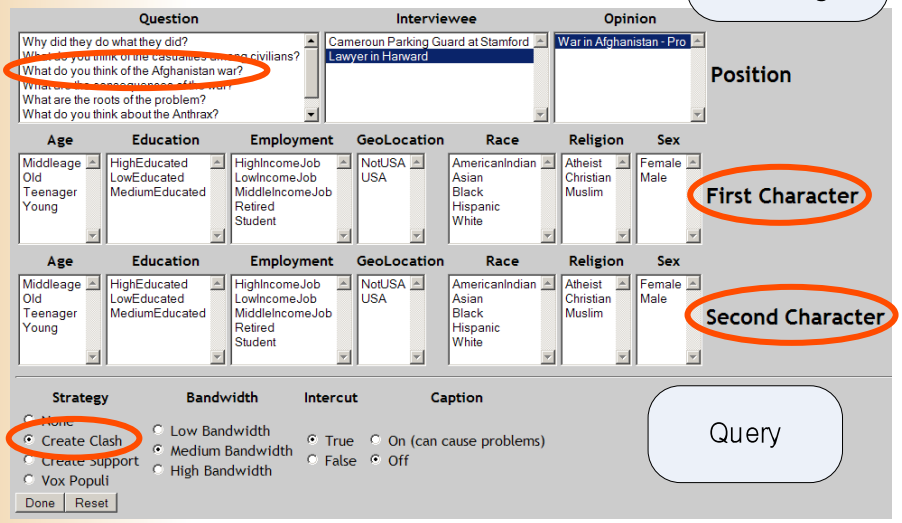
Toulmin Model



57 Claims, 16 Data, 4 Concessions, 3 Warrants, 1 Condition

52

Vox Populi Query Interfac

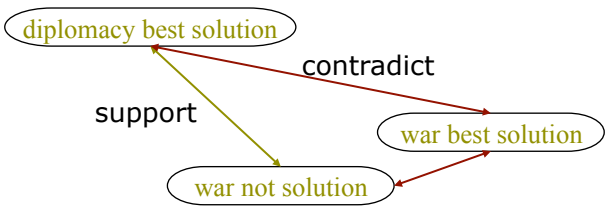


53

Vox Populi Organize Process

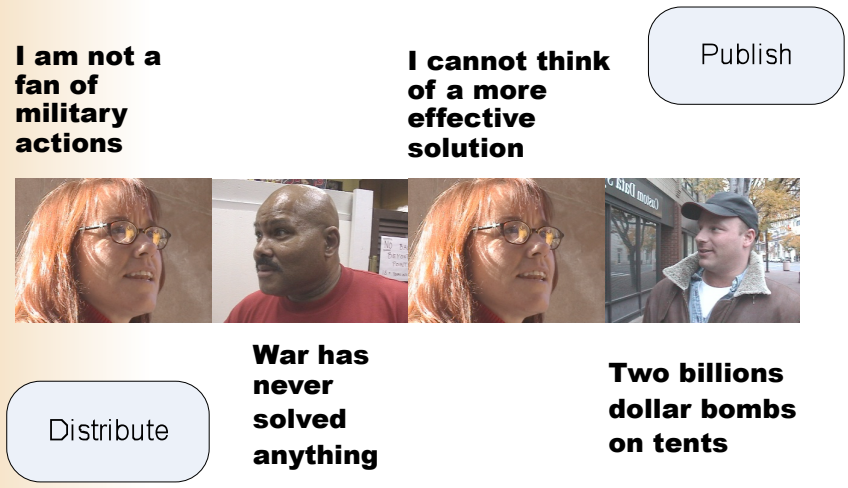
- Using the thesaurus, create a graph of related statements
  - nodes are the statements (corresponding to video segments)
    "*war best solution*",
    "*diplomacy best solution*",
    "*war not solution*"
  - edges are either *support* or *contradict*

Organize



54

Result of Vox Populi Query

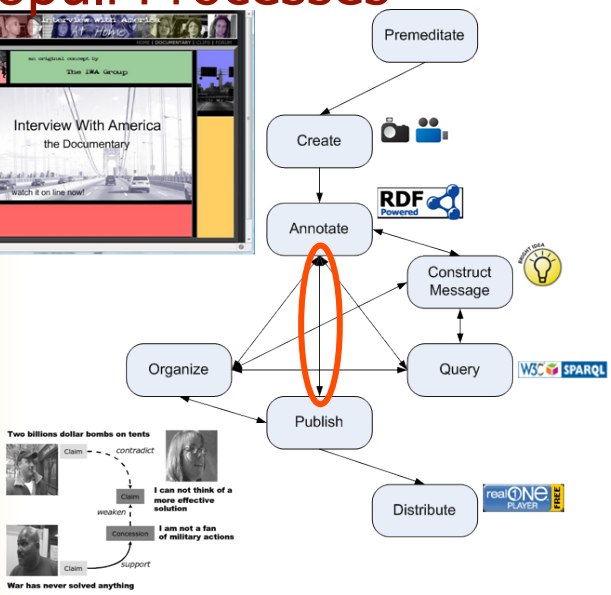


55

Pointers & Acknowledgments

- Presentation and Demo available at: http://www.cwi.nl/~media/demo/IWA/
- This research was funded by the Dutch national ToKeN I²RP and CHIME projects.
- Stefano Bocconi <S.Bocconi@few.vu.nl>

Vox Populi Processes



57

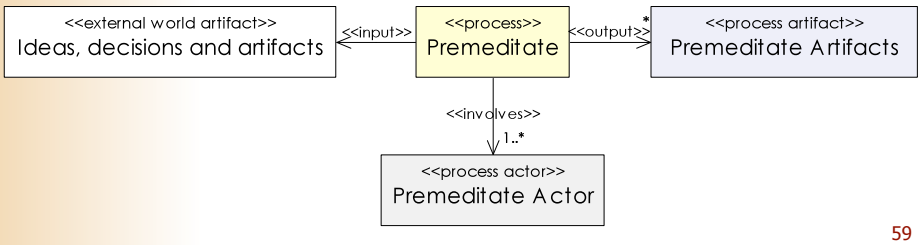
Canonical Processes 101

- Formalization of each process in UML diagrams
  - Process
  - Process artifacts
  - Process actors
  - External world artifacts

58

Premeditate

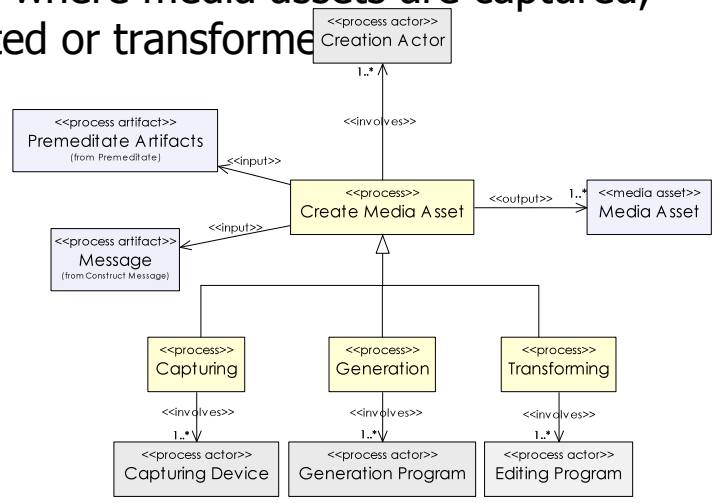
- Process where initial ideas about media production are established
  - *Design a photo book of my last holidays for my family*
  - *Create argument-based sequences of videos of interviews after September 11*



59

Create Media Asset

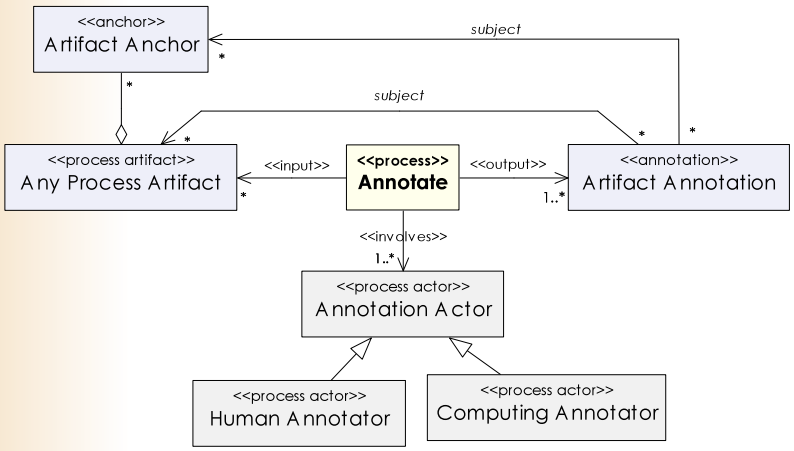
- Process where media assets are captured, generated or transforme



60

Annotate

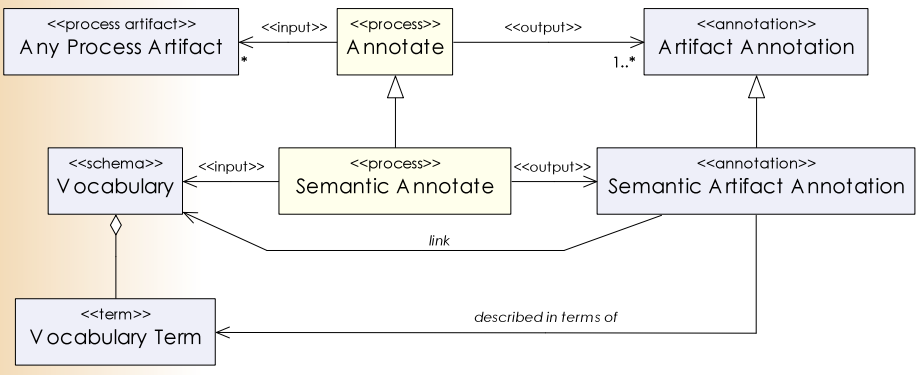
- Process where annotation is created



61

Semantic Annotate

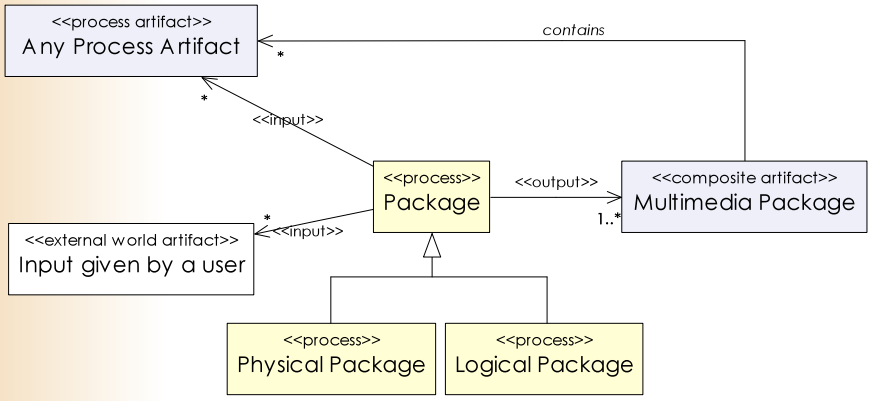
- The annotation uses some controlled vocabularies
  - *Subject matter annotations of your photos*
  - *Rhetorical annotations in Vox Populi*



62

Package

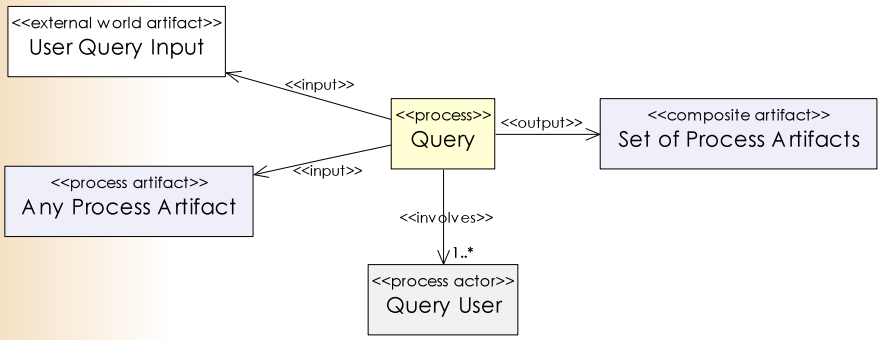
- Process where process artifacts are logically and physically packed



63

Query

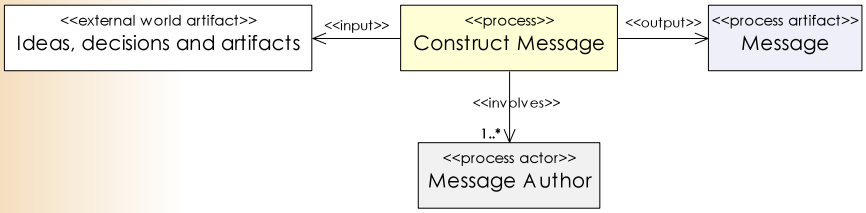
- Process where a user retrieves a set of process artifacts based on a given query



64

Construct Message

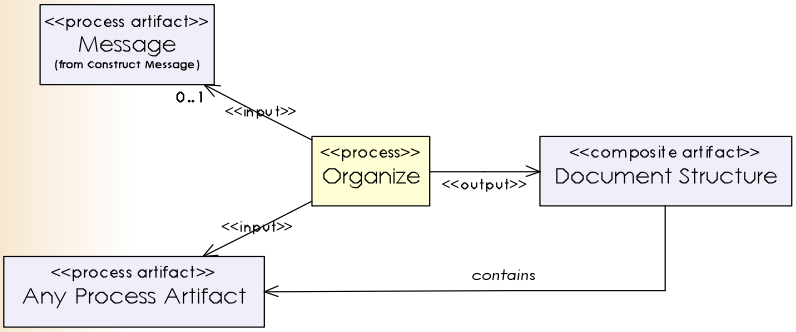
- Process where an author specifies the message they wish to convey
  - *Our holiday was sporty, great weather and fun*
  - *Create clash about whether war is a good thing*



65

Organize

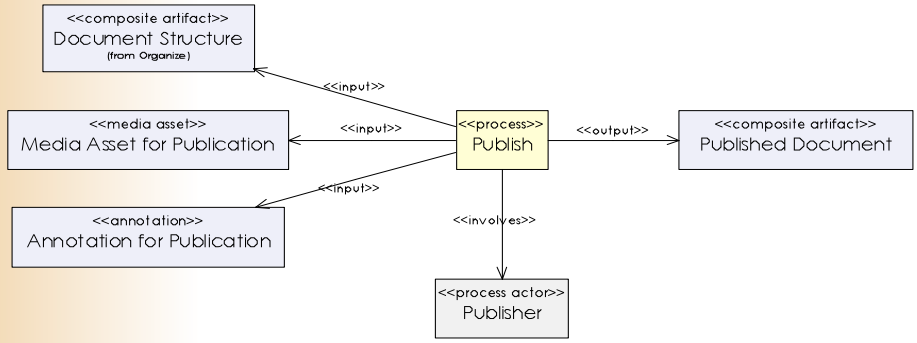
- Process where process artifacts are organized according to the message
  - *Organize a number of 2-page layouts in photobook*
  - *Use semantic graph to select related video clips to form linear presentation of parts of argument structure*



66

Publish

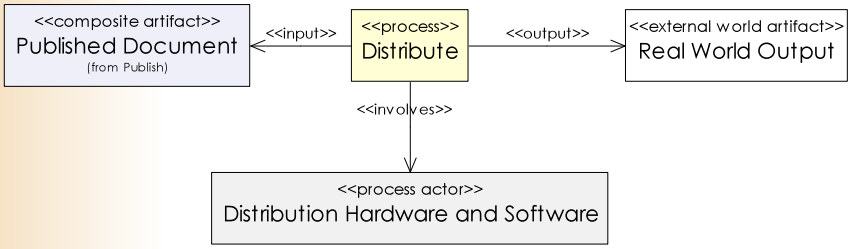
- Process where final content and user interface is created



67

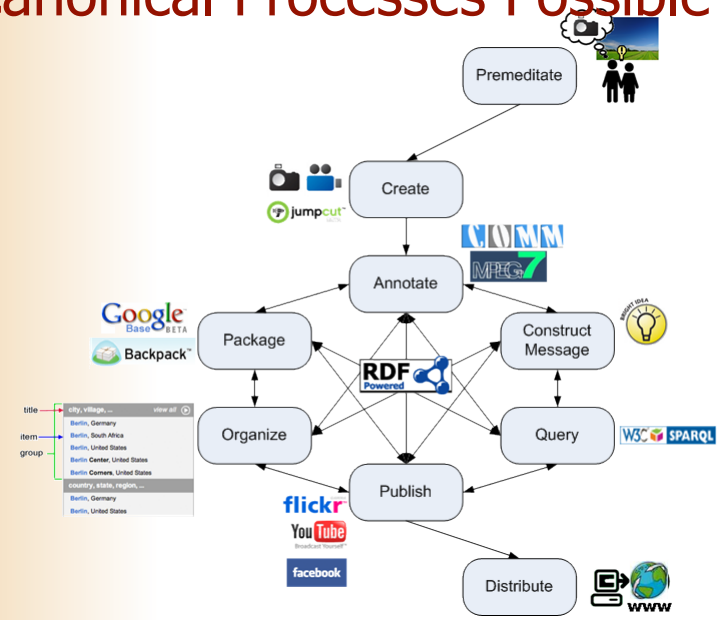
Distribute

- Process where final interaction between end-users and produced media occurs



68

Canonical Processes Possible Flow



69

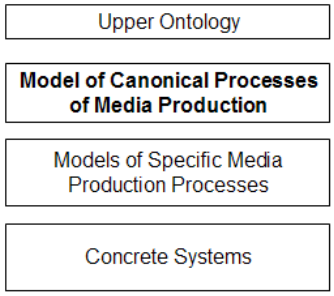
Summary

- Community agreement, not "yet another model"
- Large proportion of the functionality provided by multimedia applications can be described in terms of this model
- Initial step towards the definition of open web-based data structures for describing and sharing semantically annotated media assets

70

Discussion

- Frequently asked questions
  - Complex processes
  - Interaction
  - Complex artifacts and annotations can be annotated
- Towards a more rigorous formalization of model
  - Relationship to foundational ontologies
  - Semantics of Annotations



71

Literature

- Special Issue on Canonical Processes of Media Production http://www.ifi.uio.no/MMSJ/upcomming.html http://www.cwi.nl/~media/projects/canonical/
- Lynda Hardman, Željko Obrenović, Frank Nack, Brigitte Kerhervé and Kurt Piersol: *Canonical Processes of Semantically Annotated Media Production*. Multimedia Systems Journal, 2008 http://dx.doi.org/10.1007/s00530-008-0134-0
- Philipp Sandhaus, Sabine Thieme and Susanne Boll: *Canonical Processes in Photo Book Production*. Multimedia Systems Journal, 2008(http://dx.doi.org/*10.1007/s00530-008-0136-y*
- Stefano Bocconi, Frank Nack and Lynda Hardman: *Automatic generation of video documentaries*. Journal of Web Semantics, 6(1) 139-150, 2008.

72

Learning Objectives

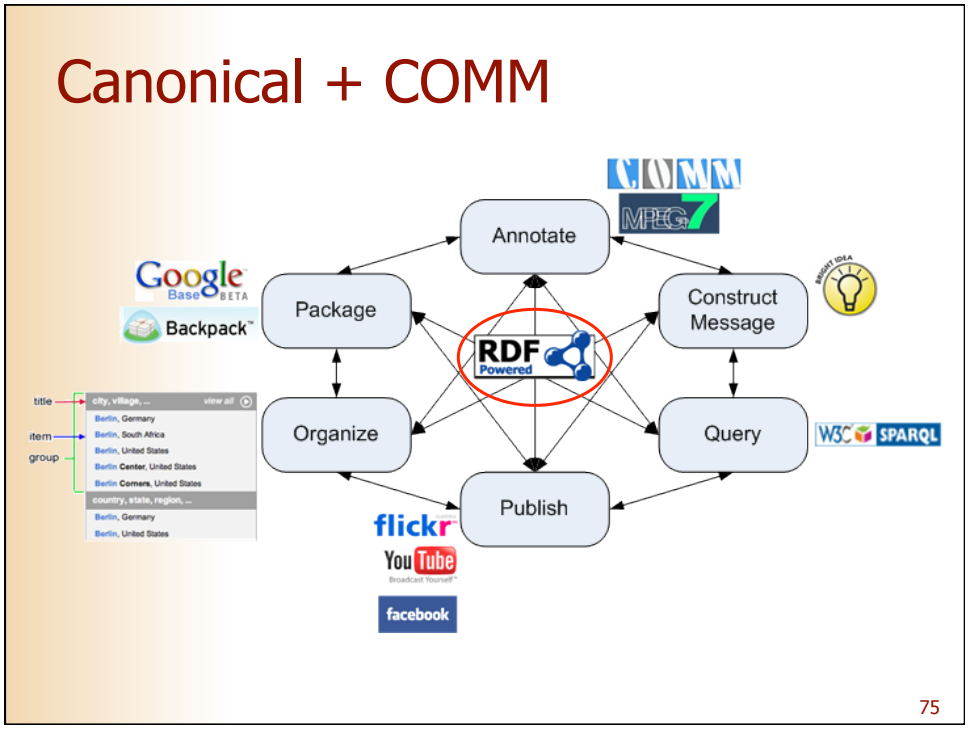
- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

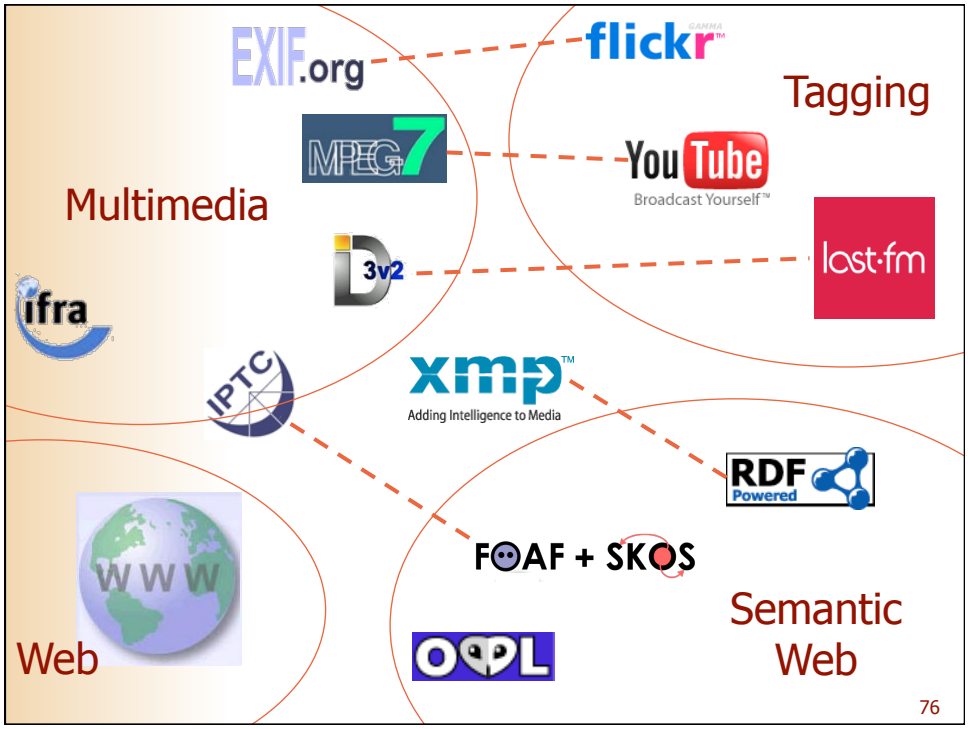
73

Learning Objectives

- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

74


Canonical + COMM
Annotate
Package
Construct Message
Organize
Query
Publish
RDF Powered
Google Base BETA
Backpack
SPARQL
flickr
YouTube
facebook
title
item
group
75


EXIF.org
flickr
Tagging
MPEG7
YouTube
Broadcast Yourself
Multimedia
3v2
last.fm
ifra
IPTC
xmp
Adding Intelligence to Media
RDF Powered
FOAF + SKOS
WWW
Web
Semantic Web
OOPL
76

Common Scenario

The "Big Three" at the Yalta Conference (Wikipedia)

77

Common Scenario: Tagging Approach

Regi

The "Big Three" at the Yalta Conference (Wikipedia)

- Localize a region
  - Draw a bounding box, a circle around a shape
- Annotate the content
  - Interpret the content
  - Tag: Winston Churchill, UK Prime Minister, Allied Forces, WWII

78

Common Scenario: SW Approach

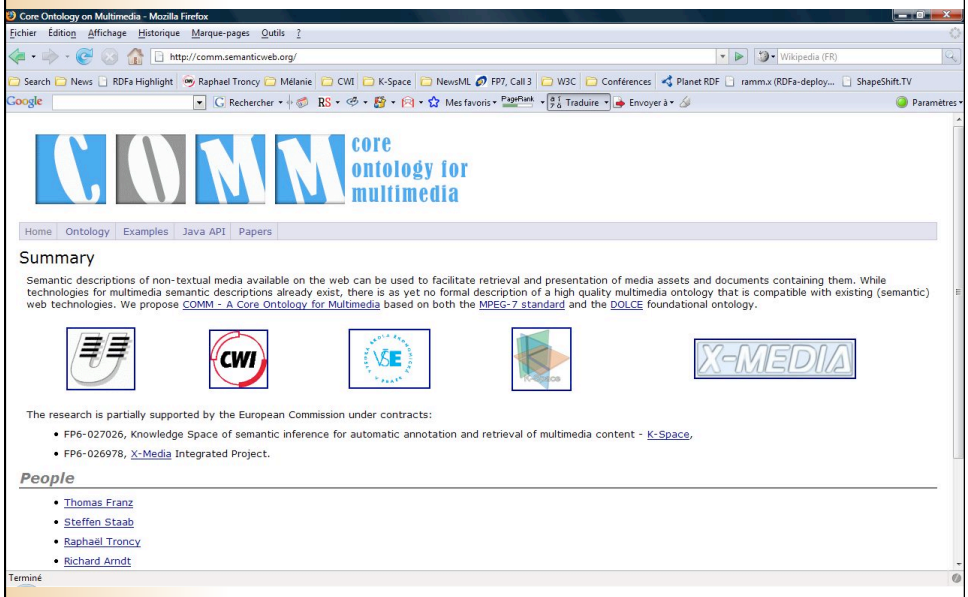
Reg1

The "Big Three" at the Yalta Conference (Wikipedia)

- Localize a region
  - Draw a bounding box, a circle around a shape
- Annotate the content
  - Interpret the content
  - Link to knowledge on the Web

```
:Reg1 foaf:depicts dbpedia:WinstonChurchill
dbpedia:Churchill rdfs:label "Winston Churchill"
dbpedia:Churchill rdf:type foaf:Person
```

79



80

Scenario: Image

Reg1

The "Big Three" at the Yalta Conference (Wikipedia)

- Localize a region (bounding box)
- Annotate the content (interpretation)
  - Tag: Winston Churchill, UK Prime Minister, Allied Forces, WWII
  - Link to knowledge on the Web

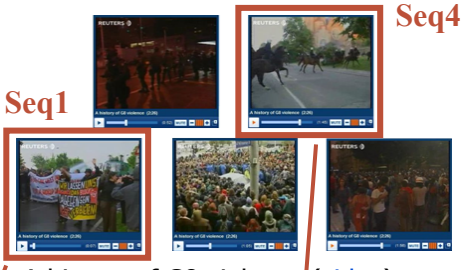
```
:Reg1 foaf:depicts dbpedia:WinstonChurchill
dbpedia:Churchill rdfs:label "Winston Churchill"
dbpedia:Churchill rdf:type foaf:Person
```

81

Scenario: Video

Seq4

Seq1



A history of G8 violence (video) (© Reuters)

- Localize a region
- Annotate the content
  - Tag: G8 Summit, Heiligendamn, 2007
  - Link to knowledge on the Web

EU Summit, Gothenburg, 2001

```
:Seq1 foaf:depicts dbpedia:34th_G8_Summit
:Seq4 foaf:depicts dbpedia:EU_Summit
geo:Heilegendamn skos:broader geo:Germany
```

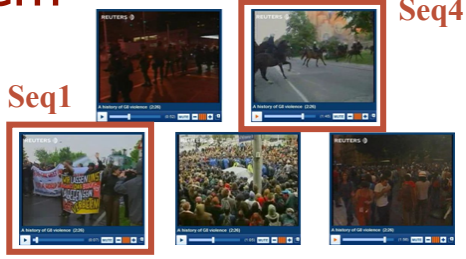
82

Research Problem

Reg1

The "Big Three" at the Yalta Conference (Wikipedia)

Seq1



Seq4

A history of G8 violence (video) (© Reuters)

- Multimedia objects are complex
  - Compound information objects, fragment identification
- Semantic annotation
  - Subjective interpretation, context dependent
- Linked data principle
  - Open to reuse existing knowledge

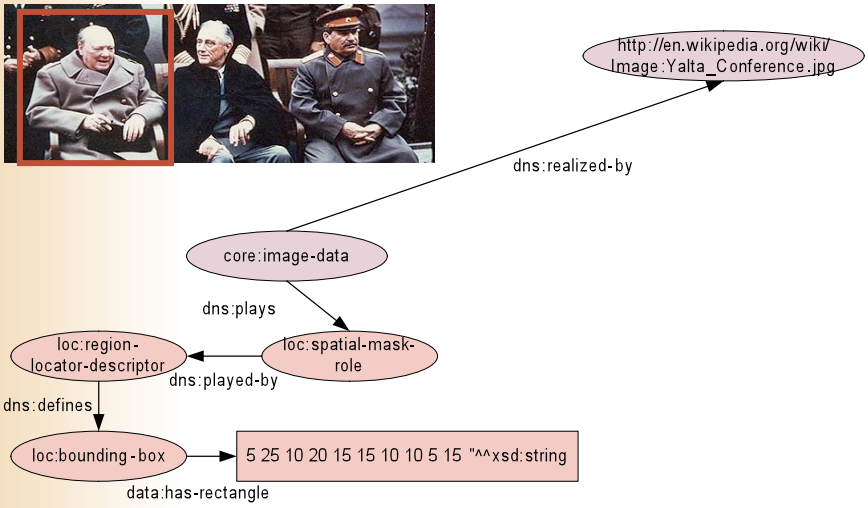
⇨ MPEG-7

⇨ D&S | OIO

⇨ RDF

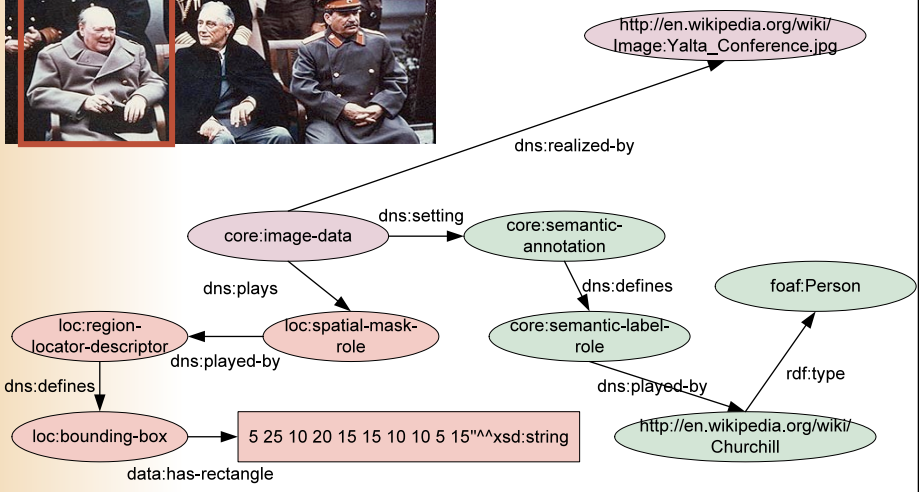
83

Example 1: Fragment Identification



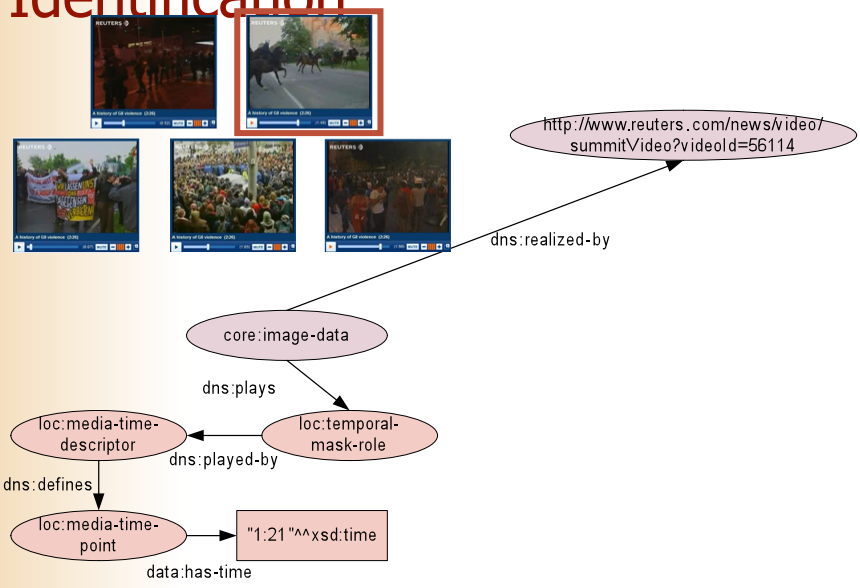
84

Example 1: Region Annotation



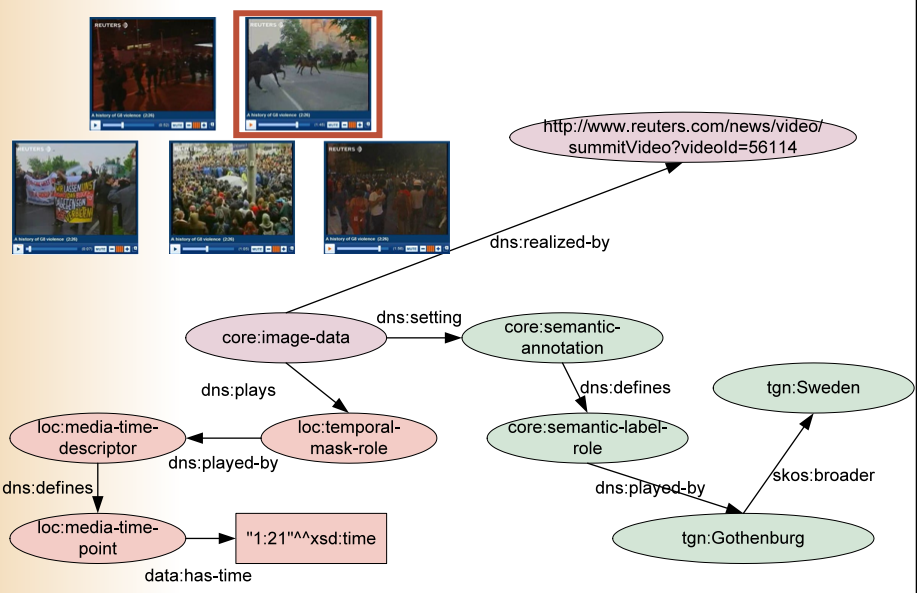
85

Example 2: Fragment Identification



86

Example 2: Sequence Annotation



87

Implementation

- COMM fully formalized in OWL DL
  - Rich axiomatization, consistency check (Fact+ +v1.1.5)
  - OWL 2.0: qualified cardinality restrictions for number restrictions of MPEG-7 low-level descriptors
- JAVA API available
  - MPEG-7 class interface for the construction of meta-data at runtime
- http://comm.semanticweb.org/

88

Literature

- Jan Wielemaker, Michiel Hildebrand , Jacco van Ossenbruggen and Guus Schreiber *Infrastructure for thesaurus-based search and annotation: evaluating the standards*, ISWC 2008
- Michael Hausenblas *et al.*: *Multimedia Vocabularies on the Semantic Web*. W3C Multimedia Semantics Incubator Group Report (XGR), 24 July 2007.
- Raphaël Troncy, Jacco van Ossenbruggen, Jeff Z. Pan and Giorgos Stamou. *Image Annotation on the Semantic Web*. W3C Multimedia Semantics Incubator Group Report (XGR), 14 August 2007.
- Vassilis Tzouvaras, Raphaël Troncy and Jeff Z. Pan. *Multimedia Annotation Interoperability Framework*. W3C Multimedia Semantics Incubator Group Report Editor's Draft, 14 August 2007.
- Richard Arndt, Raphaël Troncy, Steffen Staab, Lynda Hardman and Miroslav Vacura: *COMM: Designing a Well-Founded Multimedia Ontology for the Web*. In 6th International Semantic Web Conference (ISWC'2007), Busan, Korea, November 11-15, 2007.
- Raphaël Troncy, Oscar Celma, Suzanne Little, Roberto Garcia, Chrisa Tsinaraki: *MPEG-7 based Multimedia Ontologies: Interoperability Support or Interoperability Issue?* In 1st Workshop on Multimedia Annotation and Retrieval enabled by Shared Ontologies (MAReSO'2007), Genoa, Italy, December 2007.

89

A Giant Graph Open to the World

```
<rdf:Description
 rdf:about="Ganesh.jpg">
   <dc:title>An image of the
 Elephant Ganesh</dc:title>
   <dc:creator>
 Raphaël Troncy</dc:creator>
</rdf:Description>
```

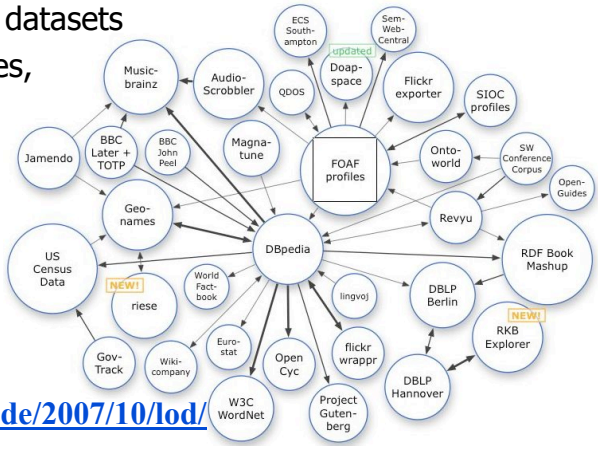
- Annotate the content (interpretation)
  Elephant, Ganesh, Thailand, Holidays, Chiang Mai
- Link to knowledge on the Web

```
:img foaf:depicts dbpedia:Ganesh
dbpedia:Ganesh rdfs:label "Vinayaka"
dbpedia:Ganesh skos:altlabel "Ganapati"
dbpedia:Ganesh rdf:type wn:synset-Deities-noun-1
dbpedia:Ganesh owl:sameas wn:synset-Ganesh-noun-1
```

90

Linking Open Data Project

- Expose open datasets in RDF
- Set RDF links among the data items for different datasets
- Over 2 billion triples, 3 millions links (March 2008)



http://richard.cyganiak.de/2007/10/lod/

91

DBpedia

- DBpedia is a community effort to:
  - extract structured "infobox" information from Wikipedia
  - interlink DBpedia with other datasets on the Web

UNIVERSITÄT LEIPZIG Freie Universität Berlin OPENLINK SOFTWARE

92

DBpedia

Extracting Infobox Data

```
http://en.wikipedia.org/wiki/Calgary
```

```
<http://dbpedia.org/resource/Calgary>
  dbpedia:native_name "Calgary" ;
  dbpedia:altitude "1048" ;
  dbpedia:population_city  "988193" ;
  dbpedia:population_metro "1079310" ;
  mayor_name
        dbpedia:Dave_Bronconnier ;
  governing_body
        dbpedia:Calgary_City_Council ;
 ...
```

- Altogether 9,100,000 RDF triples extracted from 754,000 infoboxes

Christian Bizer et al: DBpedia – Querying Wikipedia Like a Database (May 11, 2007)

93

Automatic Links Among Open Datasets

```
<http://dbpedia.org/resource/Calgary>
  owl.sameAs <http://sws.geonames.org/5913490>;
 ...
```

DBpedia

Geonames

```
<http://sws.geonames.org/5913490>
  owl:sameAs <http://DBpedia.org/resource/Calgary>
  wgs84_pos:lat "51.050112282";
  wgs84_pos:long "-114.085285152";
  sws:population "968460"
 ...
```

Processors can switch automatically from one to the other …

94

Take Home Message

- Reuse what is there
  - Of course, one could create RDF data manually …
    … but that is unrealistic on a large scale
  - Goal is to generate RDF data automatically when possible and "fill in" by hand only when necessary
    - service to get RDF from flickr images
      http://www.kanzaki.com/works/2005/imgdsc/flickr2rdf
    - service to get RDF from XMP
      http://www.ivan-herman.net/cgi-bin/blosxom.cgi/WorkRelated/SemanticWeb/xmpextract.html
- Expose what you make

95

Learning Objectives

- Understand underlying principles of communication via multimedia presentations
  - Relationships between content, structure and aesthetics
  - Roles of domain and discourse "semantics"
- Understand multimedia+metadata workflow
  - Canonical processes of media production model
- Experience exploratory interfaces based on rich multimedia metadata semantics
  - Know how to link and expose your data on the web
  - See various multimedia presentation interfaces

96

The MultimediaN E-culture
Search

CWI

Semantic Search

Michiel Hildebrand
Jacco van Ossenbruggen, Alia Amin, Lynda Hardman

CWI, Semantic Media Interfaces

K-Space

Semantic Search

- Text-based search queries
- Explicit semantics improve search results

- Many implementations
  - different types of functionality and interfaces
  - What is useful for end-users?

98

Semantic search survey

- 35 systems
  - Search engine, faceted browser, wiki, question answering, portal
- Analysis of search functionality and interface for
  - Query construction
  - Search algorithm
  - Presentation of search results

http://swuiwiki.webscience.org/index.php/Semantic_Search_Survey
http://en.wikipedia.org/wiki/Semantic_search

99

Query Construction

Feature	Functionality	Interface components
Free text input	Keyword, natural language	Single text-entry, Property specific field
Operators	Syntactic disambiguation, Semantic constraints	
Controlled terms	Disambiguate input, Restrict output, Predefined queries	Value lists, Faceted browser, Graph
User feedback	Pre-query disambiguation	Autocompletion

100

Search algorithm

- Syntactic matching
  - Exact, prefix or substring match
  - Minimal edit distance
  - Stemming
- Semantic matching
  - Graph traversal
  - Query expansion
  - RDFS/OWL reasoning

101

Result Presentation

Feature	Functionality	Interface components
Data selection	Selected values, Template, Display vocabularies	Visualized by text, graph, tagcloud, map, timeline, calendar
Ordering	Content / link structure based ranking	Ordered list
Organization	Clustering by property, by result path or dynamic	Tree, nested box structure, clustermap
User feedback	Post-query disambiguation, Recommendation	Facets, tagcloud, value list

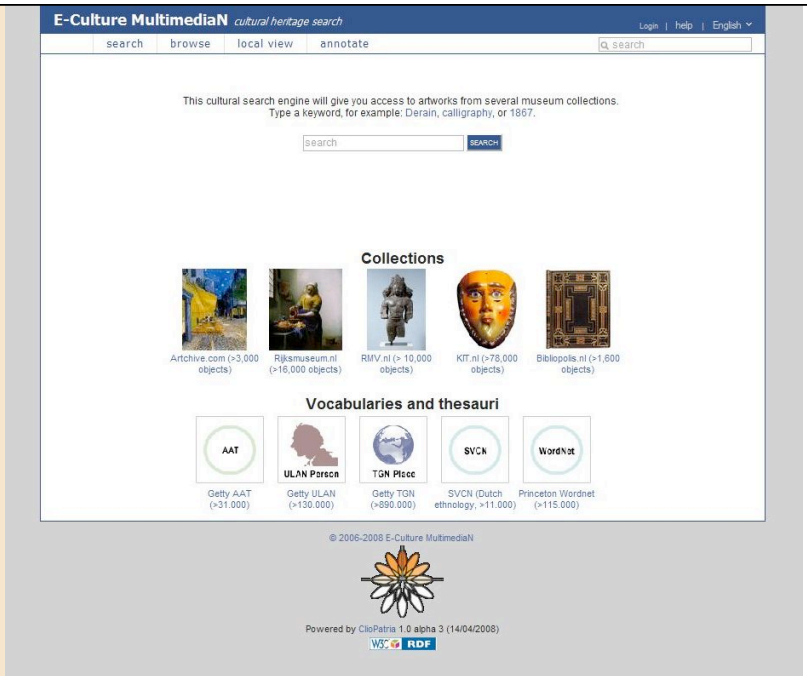
102

Semantic Search

- Point in graph
- Whole graph
- Subset of graph useful for human

- Search in eCulture
  - http://e-culture.multimedian.nl
    http://e-culture.multimedian.nl/tutorials/

103



http://e-culture.multimedian.nl/demo/search

104

Principles of Facet Browsing

- Groups objects from different perspective
- Build constraints as you go

With thanks to Alia Amin for the slides explaining facet browsing

105

Group objects from different perspectives

Example: A set of paintings with these properties. How to group them?

- Art Style: Art Nouveau
- Location: Paris
- Artist: Gustav Klimt

- Art Style: Art Nouveau
- Location : Paris
- Artist: Monet

- Art Style: Expressionist
- Location : Vienna
- Artist: Monet

- Art Style: Impressionist
- Location : Paris
- Artist: Picasso

106

Groups of objects from different perspectives (location)

Group objects based on location:

- Group 1: Paris
- Group 2: Vienna



Paris

Vienna

107

Group objects from different perspectives

Example: A set of paintings with these properties. How to group them?

- Art Style: Art Nouveau
- Location: Paris
- Artist: Gustav Klimt

- Art Style: Art Nouveau
- Location : Paris
- Artist: Monet

- Art Style: Expressionist
- Location : Vienna
- Artist: Monet

- Art Style: Impressionist
- Location : Paris
- Artist: Picasso

108

Groups of objects from different perspectives (art style)

Group objects based on art style:

- Group 1: Art nouveau
- Group 2: Expressionist
- Group 3: Impressionist



Art nouveau


Expressionist


Impressionist

109

Group objects from different perspectives

Example: A set of paintings with these properties. How to group them?

- Art Style: Art Nouveau
- Location: Paris
- Artist: Gustav Klimt

- Art Style: Art Nouveau
- Location : Paris
- Artist: Monet

- Art Style: Expressionist
- Location : Vienna
- Artist: Monet

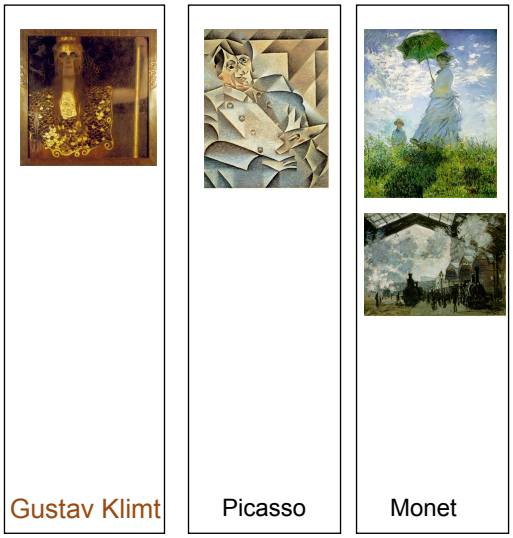
- Art Style: Impressionist
- Location : Paris
- Artist: Picasso

110

Groups of objects from different perspectives (artist)

Group objects based on artist:

- Group 1: Gustav Klimt
- Group 2: Picasso
- Group 3: Monet

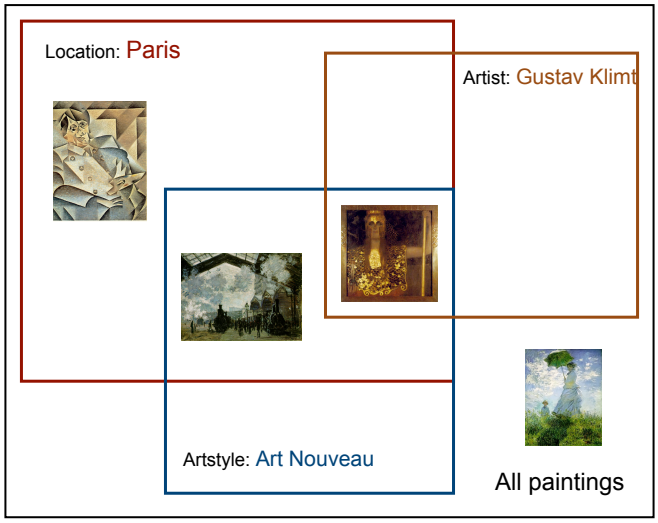


111

Build constraints as you go

All paintings which are

- Location: Paris
- Artstyle: Art Nouveau
- Artist: Gustav Klimt



112

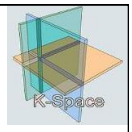
Examples

- Commercial: Ebay Express
- Noncommercial: /facet, Flamenco

- Main advantage: support exploratory search
- Facet browser tutorial at CHI06 and CHI07

113

Semantic Browsing of Multimedia News

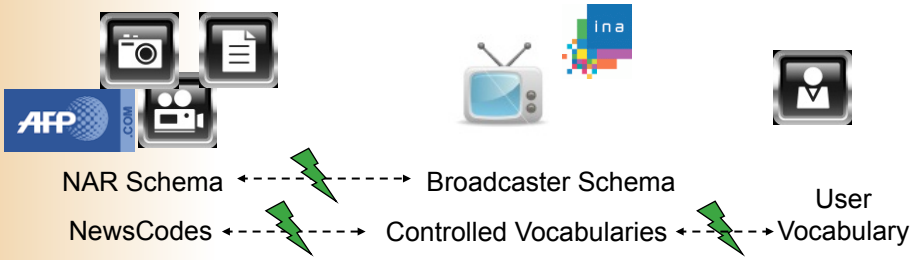


- Goal:
  - Provide en environment for ***searching*** and ***browsing contextualized multimedia news*** information
- Method:
  - Semantic processing of multimedia news items
  - Link news items with knowledge on the web
- Datasets:
  - News stories: Jun/Jul 2006 (en/fr) newsfeed, AFP ± 90,000 items
  - Photos: 2006 football world cup, AFP ± 2,500 items
  - Video: Jun/Jul 2006 TV News (fr), INA ± 30 items

114

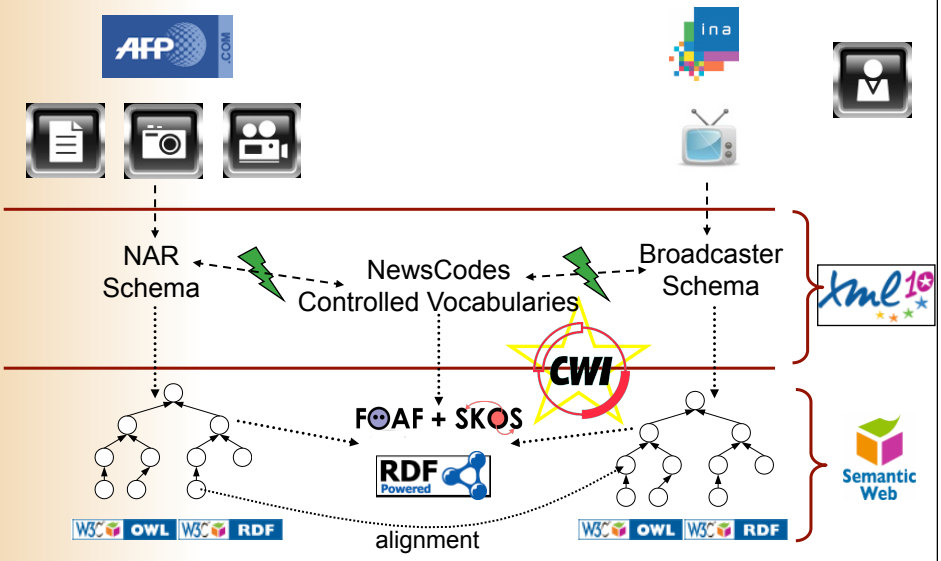
Problems

- No integration of media (stories, photo, video)
- Little (or no) context in the news presentation
- Lack of interoperability in the current workflow



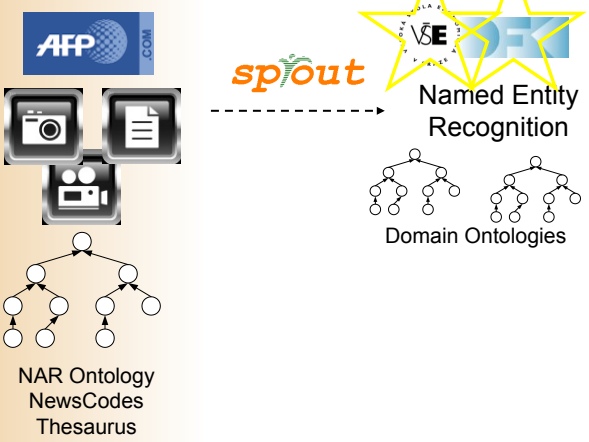
115

Metadata Conversion



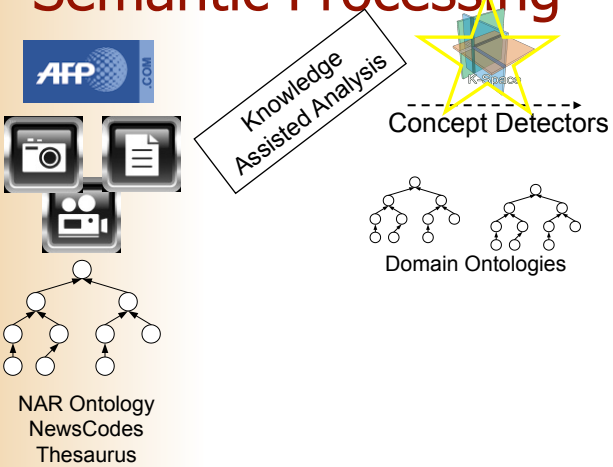
116

Semantic Processing

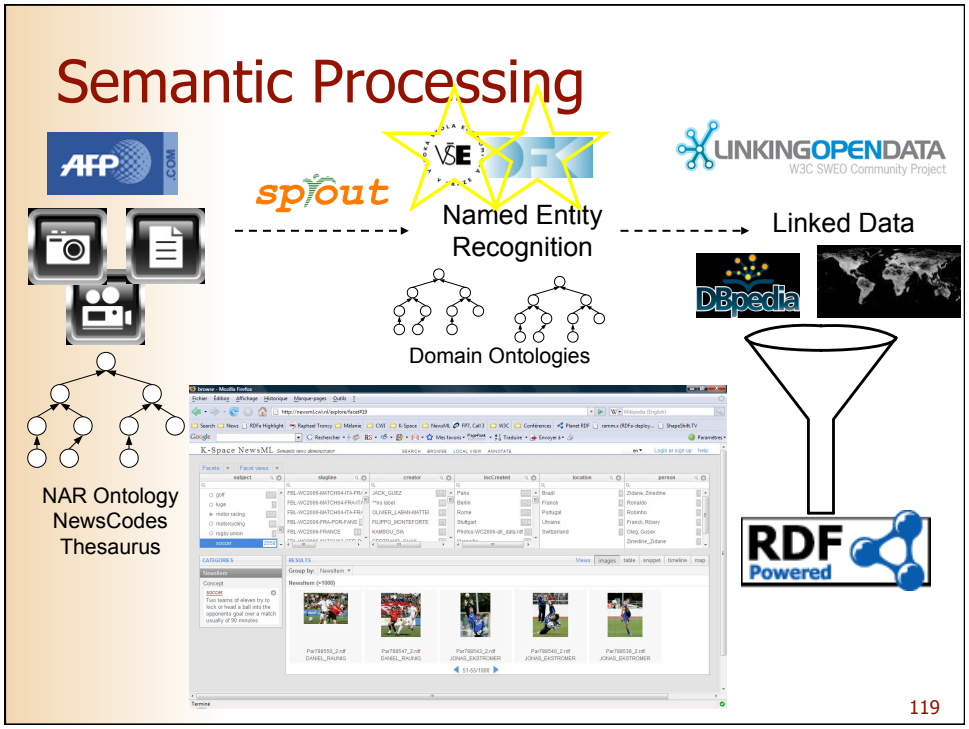


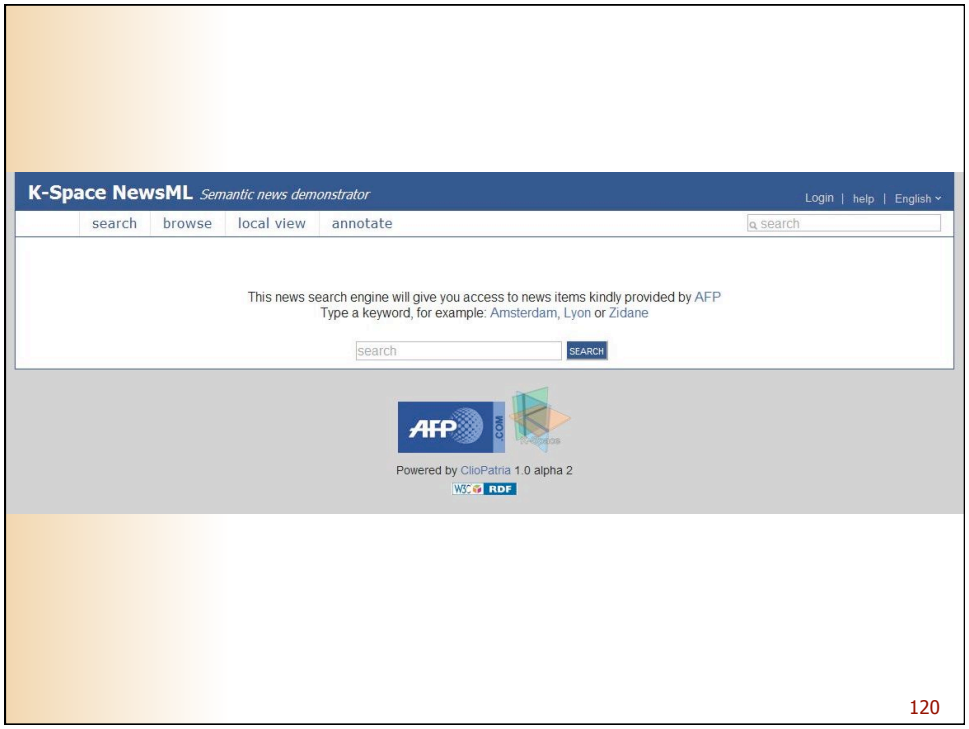
117

Semantic Processing



118


Semantic Processing
AFP
sprout
Named Entity Recognition
LINKINGOPENDATA
W3C SWEO Community Project
Linked Data
DBpedia
Domain Ontologies
NAR Ontology
NewsCodes
Thesaurus
RDF Powered
119


K-Space NewsML Semantic news demonstrator
Login | help | English
search
browse
local view
annotate
search
This news search engine will give you access to news items kindly provided by AFP
Type a keyword, for example: Amsterdam, Lyon or Zidane
search
SEARCH
Powered by ClioPatria 1.0 alpha 2
120

Interfaces on linked data

- Where are we now?
  - http://en.wikipedia.org/wiki/Freebase_(database)
    http://www.freebase.com/
  - http://mqlx.com/~david/parallax/
- Where could we be going?
  - http://adaptivepath.com/aurora/

121

Literature

- *Guus Schreiber, Alia Amin, Mark van Assem, Victor de Boer, Lynda Hardman, Michiel Hildebrand, Laura Hollink, Zhisheng Huang, Janneke van Kersen, Marco de Niet, Borys Omelayenko, Jacco van Ossenbruggen, Ronny Siebes, Jos Taekema, Jan Wielemaker and Bob Wielinga*
  MultimediaN E-Culture Demonstrator, ISWC 2006
  http://dx.doi.org/10.1007/11926078_70
- Michiel Hildebrand, Jacco van Ossenbruggen and Lynda Hardman: */facet: A Browser for Heterogeneous Semantic Web Repositories*. In 5th International Semantic Web Conference (ISWC'2006), pages 272-285, Athens (GA), USA, November 5-9, 2006.
- Raphaël Troncy, Lynda Hardman, Jacco van Ossenbruggen and Michael Hausenblas:
  Identifying Spatial and Temporal Media Fragments on the Web. In W3C Video on the Web Workshop, San Jose (CA) & Brussels (BE), Dec 2007.
- W3C Video on the Web Activity, April 2008
  http://www.w3.org/2008/01/video-activity.

122

What are my messages?

- Features can be extracted and used to describe multimedia content (metadata)
- Multimedia presentations embody messages
- Media, structure and aesthetics all contribute to conveying the message
- The message can be made explicit (more metadata)
- Media content and metadata can be passed around and among systems
- We need to agree on how to do this (e.g. canonical processes; COMM; W3C working groups; IPTC)
- Users can be given much richer and more flexible access to (semantically annotated) content, but…
- we are still figuring out how to do this.

123

Thanks for your attention

http://www.cwi.nl/~lynda

http://www.cwi.nl/~troncy

124