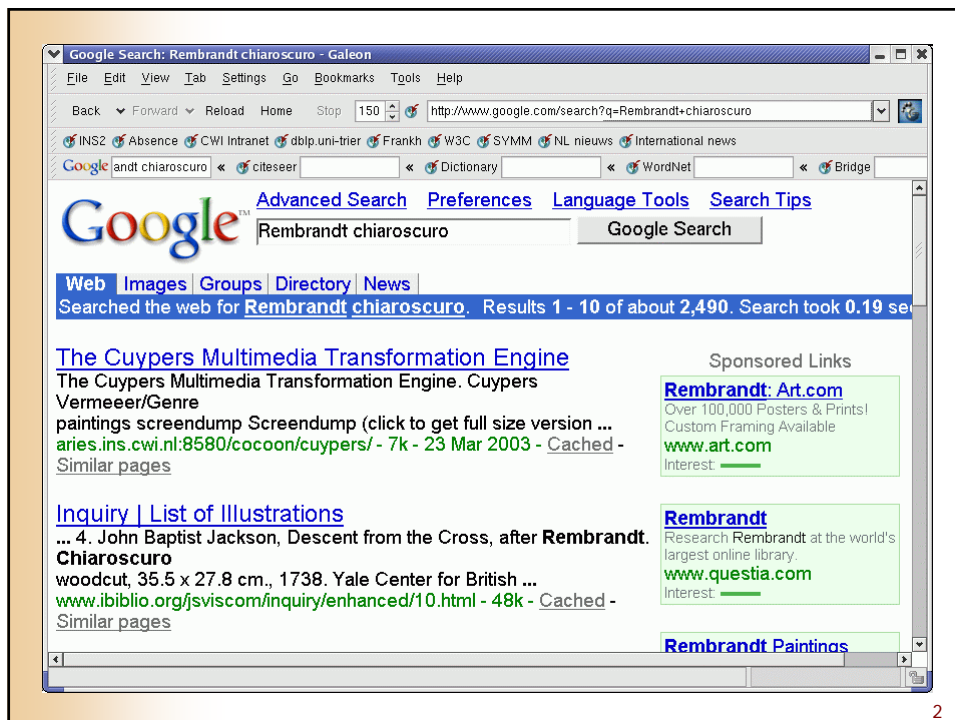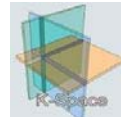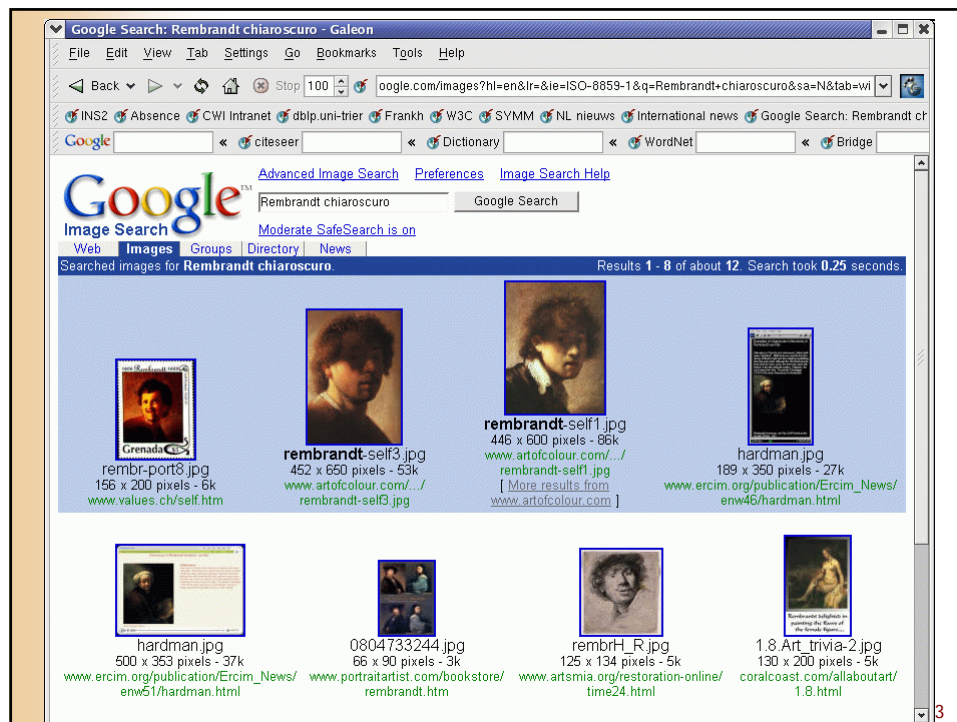**TU/e** technische
universiteit
eindhoven

CWI

Providing Flexible Interfaces to Annotated Multimedia Repositories

Lynda Hardman

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

Flexible interfaces to MM

- Creating multimedia presentations requires
  - understanding message of presentation
  - knowing specifications of user context
    - device
    - user
  - expressing the message
    - using the available media
    - within the constraints of the user context

4

Overview of topics

- Incorporating discourse in MM interfaces
- Vox Populi: creating argumentation structure using video fragments
- Canonical processes of media production
- Semantics for improving interaction
- Example applications: E-Culture and News

TU/e technische universiteit eindhoven

Creating Meaningful Presentations

Lynda Hardman
Jacco van Ossenbruggen

Semantic Media Interfaces
CWI, Amsterdam
http://www.cwi.nl/ins2/
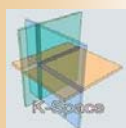
Introduction

- Creating meaningful presentations from query results
- The role that **explicit discourse** information plays in the *personalized generation process*
- The difference between:
  - a *list* of retrieval results ordered *most relevant first* and
  - a *presentation* that has *structure* interpretable by the end user, giving the collection *sense of belonging to same presentation*

7

Existing approaches in presenting query results

- No explicit discourse (only domain semantics):
  - Noadster - clusters from domain semanitcs
  - Topia - preselecting concepts in domain semantics
  - Museo Suomi - selection based on domain semantics

- Deriving some aspects of discourse:
  - Giving meaning to clustering process
  - Assigning different weights to clusters => ordering
    - Influence the way people perceive information

8

Semantic Web browsing

- Noadster

- Generalised semantic web browsing

- Integrating global and local browsing

- Lloyd Rutledge,
  WWW 2005

Inferring document structure

- Topia
- Rijksmuseum ARIA database -> RDF
- Clustering on results of query
- Presentation showing "table of contents" and current focus

- Lloyd Rutledge
  ACM Hypertext 2003

Inferring document structure

Rijksmuseum Artifacts Matching the Query " beach "

Pinks in the Breakers

by Hendrik Willem Mesdag
c. 1875-1885

Fishing boats are lying at anchor in the surf before Scheveningen. They are 'pinks', flat-bottomed boats with no keel and a broad curved prow. They were used in the herring fishery. The boats would be dragged along the beach by horses. Scheveningen did not yet have a harbour in the nineteenth century. To the left is a pink on dry land, surrounded by fisherfolk, mainly women with baskets of fish. A strong breeze is blowing and the breakers are capped with white foam. Mesdag was skilled at catching the feeling of a rough day at

Explicit Discourse

- **Fixed discourse**:
  - DISC – uses annotated multimedia repository + domain ontology and discourse knowledge
  - discourse knowledge = set of rules (genre, narrative units...)

- **Dynamic discourse**:
  - VoxPopuli:
    argument generation in video

- **Role of structured progression**

Fixed Discourse

- DISC
- Rijksmuseum repository of media items
- Semantic graph is not enough
  Rembrandt married-to Saskia
  also need discourse structures
  for deriving grouping, ordering and priorities
- Biography template created
  painter is-a profession

- Stefano Bocconi, Joost Geurts
  ISWC 2003

DISC Rembrandt example

RealOne Player

media.cwi.nl/cocoon/cuypers/aria/selectform-process   wav 1506Kbps   0:24 / 1:30

Rembrandt Harmensz. van Rijn

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 (1628)

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Dynamic Discourse

- Vox Populi: Argument generation in video
- Database of video clips
- Annotated with topic and agree/disagree
  – Argumentation model (Toulmin)
- User specifies query and video sequence

Two billions dollar bombs on tents

Claim --- contradict

Claim

weaken

I can not think of a more effective solution

Concession

I am not a fan of military actions

Claim   support

War has never solved anything

- Stefano Bocconi, ICME 2005

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8
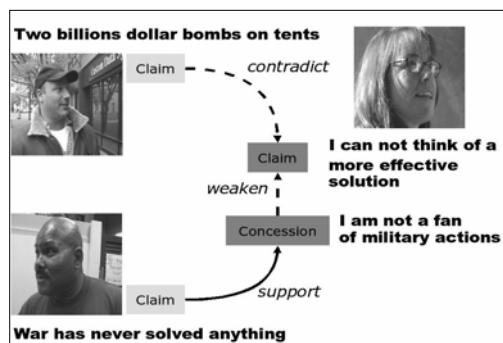
Vox Populi example

| Question	Interviewee	Opinion	
Why did they do what they did? What do you think of the casualties among civilians? What do you think of the Afghanistan war? What are the consequences of the war? What are the roots of the problem? What do you think about the Anthrax?	Cameroun Parking Guard at Stamford Lawyer in Harward	War in Afghanistan - Pro	**Position**

Age	Education	Employment	GeoLocation	Race	Religion	Sex	
Middleage Old Teenager Young	HighEducated LowEducated MediumEducated	HighIncomeJob LowIncomeJob MiddleIncomeJob Retired Student	NotUSA USA	AmericanIndian Asian Black Hispanic White	Atheist Christian Muslim	Female Male	**First Character**

Age	Education	Employment	GeoLocation	Race	Religion	Sex	
Middleage Old Teenager Young	HighEducated LowEducated MediumEducated	HighIncomeJob LowIncomeJob MiddleIncomeJob Retired Student	NotUSA USA	AmericanIndian Asian Black Hispanic White	Atheist Christian Muslim	Female Male	**Second Character**

Strategy
- ○ None
- ● Create Clash
- ○ Create Support
- ○ Vox Populi

Bandwidth
- ○ Low Bandwidth
- ● Medium Bandwidth
- ○ High Bandwidth

Intercut
- ● True   ○ On (can cause problems)
- ○ False ● Off

Caption

[Done] [Reset]

Role of structured progression

- Mono-media cases (text or video sequences):
  - ordering for the fragments and present them
- Presentations that use combinations of media,
  - Semantics of domain and discourse need translation to *hierarchical structures* that can be expressed through *layout*, *navigational links* or *temporal info*.
- Intermediate format is required:

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9
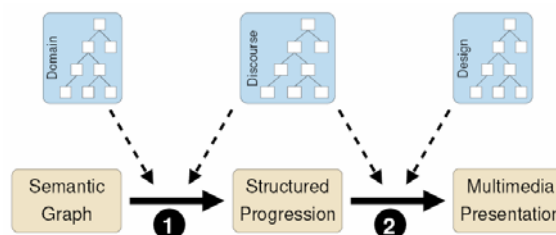
Conclusions

- From projects described we have learned:
  - distinguish stages in process
  - separate discourse knowledge
    - Fixed and Dynamic discourse
  - mappings between domain & discourse knowledge

- Scientific challenges remain:
  - Making (MM) discourse and design knowledge explicit
  - Expressing re-usable semantics of media assets
  - Architectures for multimedia presentation generation

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Acknowledgments

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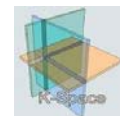
10

Generating video documentaries from annotated media repositories

Stefano Bocconi, Frank Nack

CWI Amsterdam

The Netherlands

Contact: Stefano.Bocconi@cs.vu.nl

CWI

Example: Vox Populi
Video Sequence 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..."

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Vox Populi Premeditate Process

- Analogous to the pre-production process in the film industry
  - *Static* versus *dynamic* video artifact

  Premeditate

- 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

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Vox Populi Annotations

- Contextual
  - Interviewee (social), locations

  Annotate

- 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

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Vox Populi Statement Annotations

Annotate

- 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**

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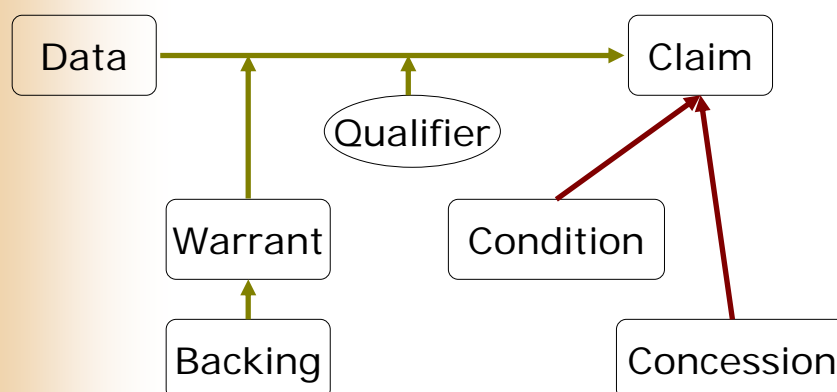
57 Claims, 16 Data, 4 Concessions, 3 Warrants, 1 Condition

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Vox Populi Query Interface

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

14
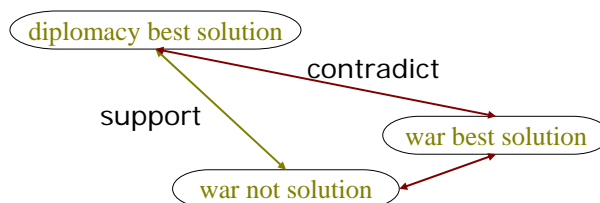
Result of Vox Populi Query

I am not a fan of military actions

I cannot think of a more effective solution

War has never solved anything

Two billions dollar bombs on tents

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Pointers & Acknowledgments

- This presentation and a Demo available at:
  http://www.cwi.nl/~media/demo/IWA/

- This research was funded by the Dutch national ToKeN I^{2}RP and CHIME projects.

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Canonical Processes of Annotated Media Production

Lynda Hardman
Frank Nack
Željko Obrenović

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

Introduction

- Canonical: reduced to the simplest and most significant form possible without loss of generality
- Motivation
  - agreement on a small number of very basic processes
  - allow designers to decide which processes they will support (or not)
  - encourage system designers to provide the outputs when the processes are supported
- Application areas
  - feature extraction
  - professional news production
  - new media art
  - photo book generation
  - ambient multimedia systems with complex sensory networks

http://www.cwi.nl/~media/projects/canonical/

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Overview of Canonical Processes

The world as we know it

Premeditate

Create

Annotate

The world as we know it

Construct Message

Package

Query

Organize

Publish

Distribute

The world as we know it
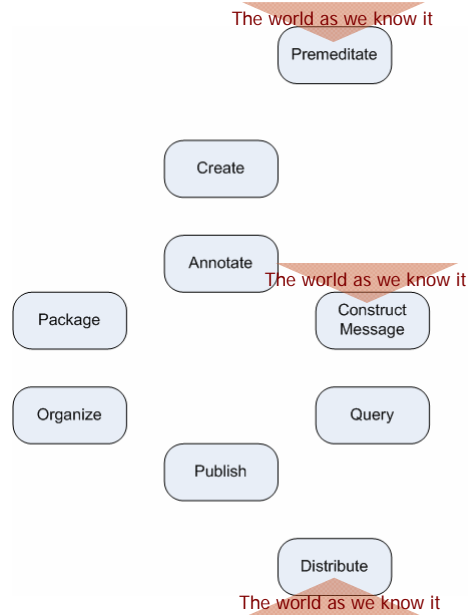
33

Premeditate

- Process where initial ideas about media production are established
  - *Create argument-based sequences of videos of interviews after September 11*

| <<external world artifact>> Ideas, decisions and artifacts | <<input>> | <<process>> Premeditate | <<output>> * | <<process artifact>> Premeditate Artifacts |

<<involves>>
1..*

<<process actor>>
Premeditate Actor

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17
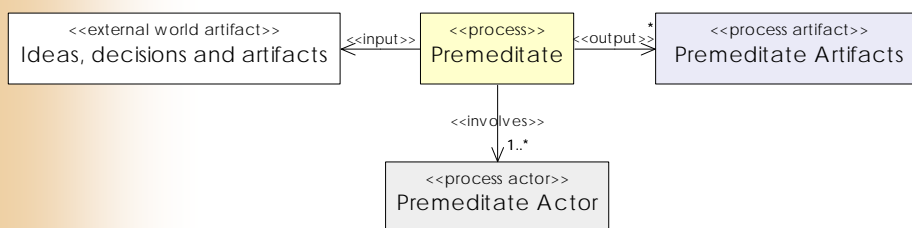
Create Media Asset

- Process where media assets are captured, generated or transformed
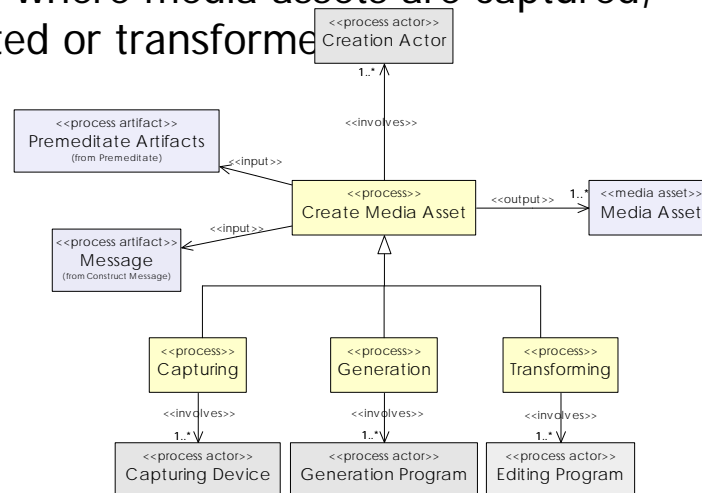
Annotate

- Process where annotation is created

Semantic Annotate

- The annotation uses some controlled vocabularies
    - *Rhetorical annotations in Vox Populi*

<<process artifact>> Any Process Artifact	<<input>>	<<process>> Annotate	<<output>>	<<annotation>> Artifact Annotation

| <<schema>> Vocabulary | <<input>> | <<process>> Semantic Annotate | <<output>> | <<annotation>> Semantic Artifact Annotation |

link

| <<term>> Vocabulary Term |

described in terms of
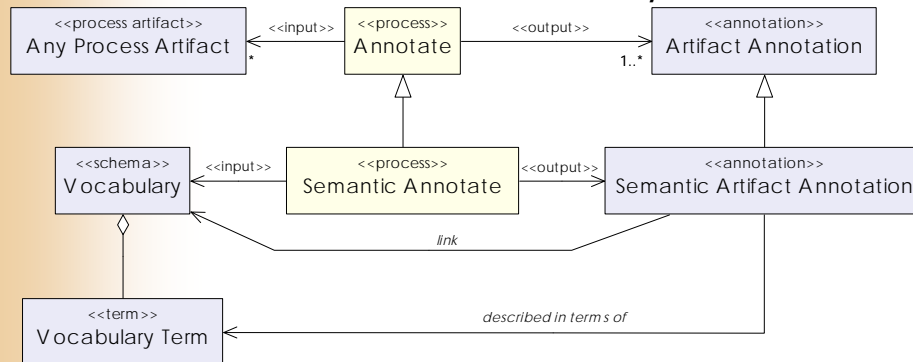
37

Package

- Process where process artifacts are logically and physically packed
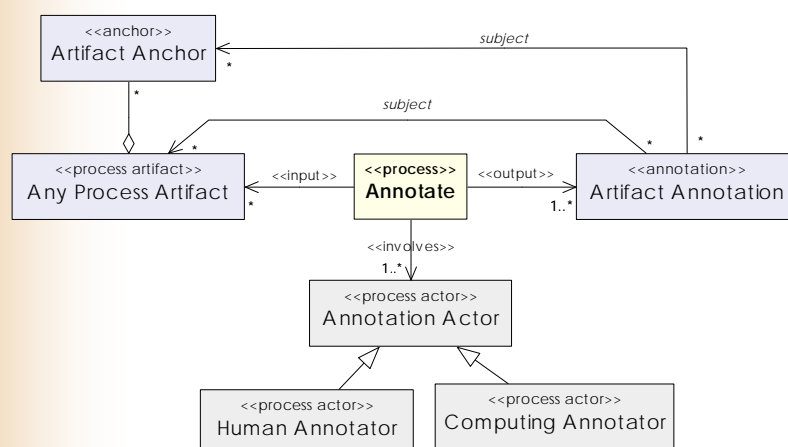
| <<process artifact>> Any Process Artifact |

contains

| <<process>> Package | <<output>> | <<composite artifact>> Multimedia Package |

<<input>>

| <<external world artifact>> Input given by a user |

<<input>>

| <<process>> Physical Package | <<process>> Logical Package |

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19
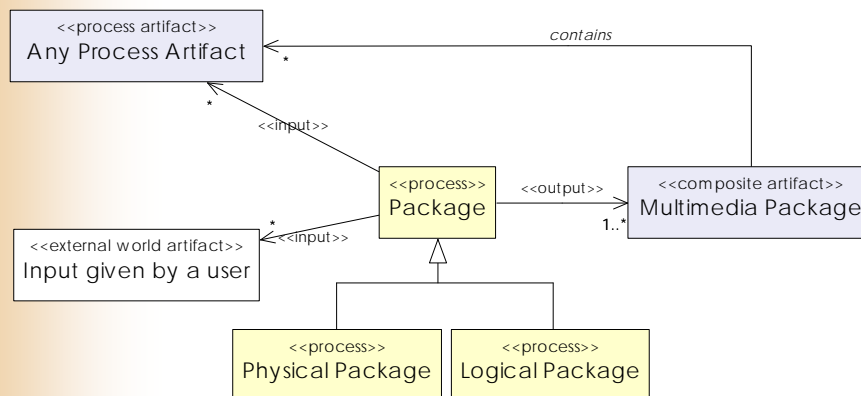
Query

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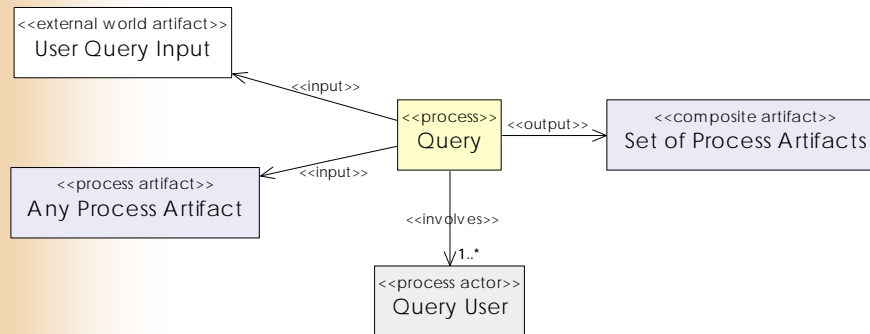
Construct Message

- Process where an author specifies the message they wish to convey
  - *Create clash about whether war is a good thing*
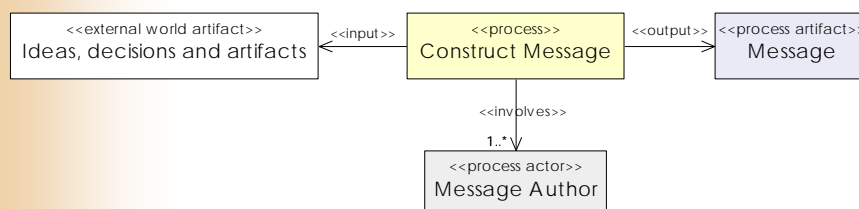
Organize

- Process where process artifacts are organized according to the message
  - *Use semantic graph to select related video clips to form linear presentation of parts of argument structure*
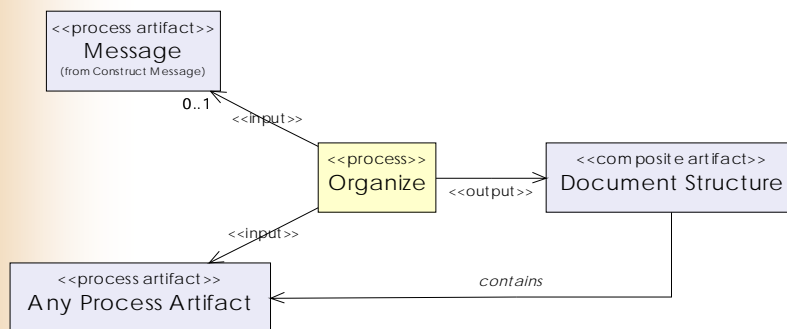
41

Publish

- Process where final content and user interface is created

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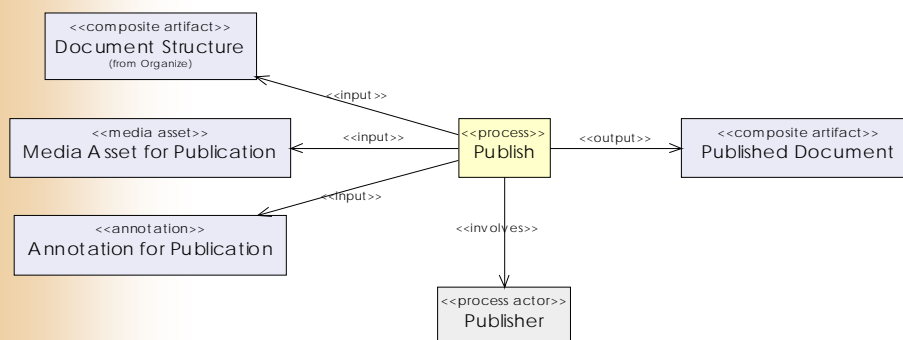
Distribute

- Process where final interaction between end-users and produced media occurs
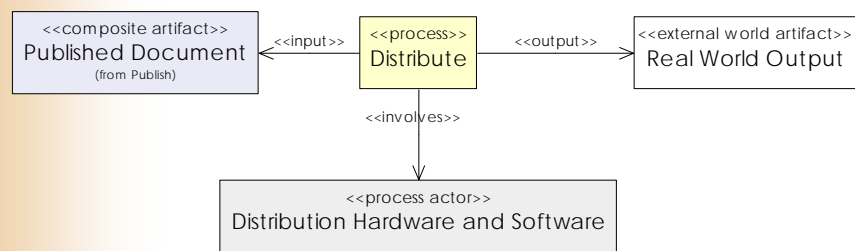
Vox Populi Processes
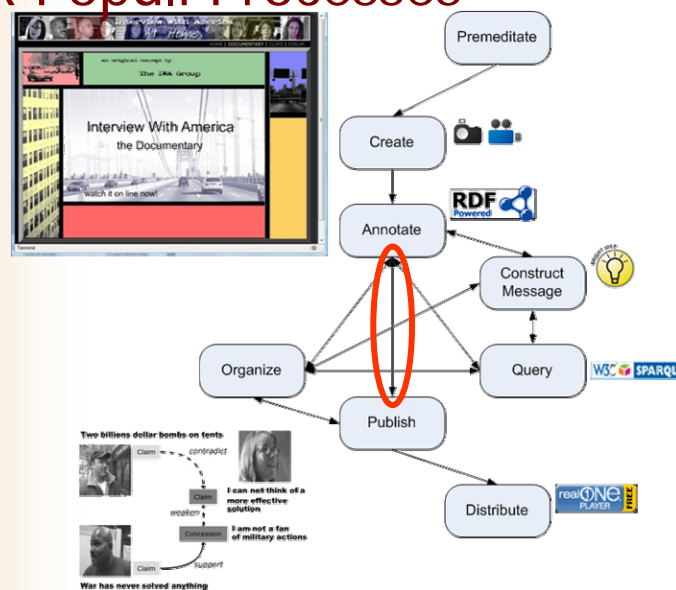
Canonical Processes Possible Paths
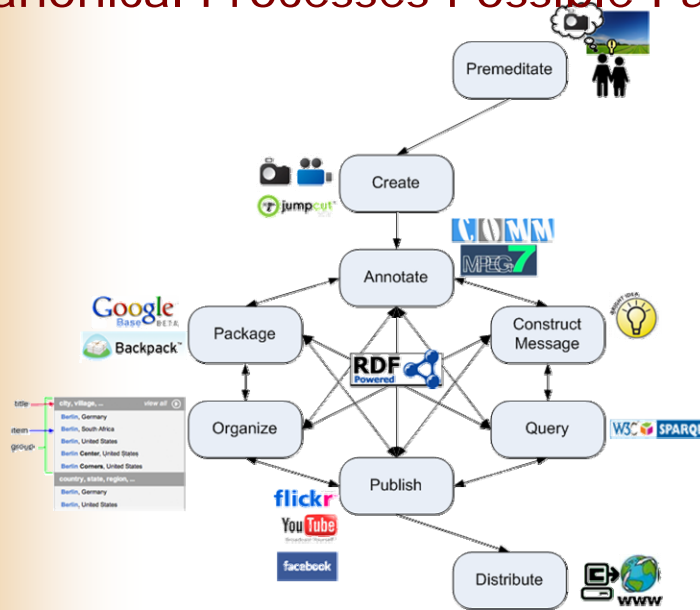
Sum Up

- 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

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Discussion

- Frequently asked questions
  - Complex processes
  - Interaction
  - Complex artifacts and annotations can be annotated

Upper Ontology
Model of Canonical Processes of Media Production
Models of Specific Media Production Processes
Concrete Systems

- Towards a more rigorous formalization of model
  - Relationship to foundational ontologies
  - Semantics of Annotations

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Literature

- Lynda Hardman: *Canonical Processes of Media Production*. In Proceedings of the ACM Workshop on Multimedia for Human Communication - From Capture to Convey (MHC 05), November 2005.
- 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, Zeljko Obrenovic, Frank Nack, Brigitte Kerhervé and Kurt Piersol: *Canonical Processes of Semantically Annotated Media Production*. In Multimedia Systems Journal, 2008 (*to appear*)
- Stefano Bocconi, Frank Nack and Lynda Hardman: *Automatic generation of video documentaries*. In Journal of Web Semantics, 2008 (*to appear*).
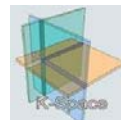
48

Semantic Search

Michiel Hildebrand

Jacco van Ossenbruggen, Alia Amin, Lynda Hardman

CWI, Semantic Media Interfaces

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?

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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://www.webscience.org/swuiwiki/index.php?title=Semantic_Search_Survey

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Query Construction

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

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Search algorithm

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

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Result Presentation

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

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The MultimediaN E-Culture project

- Basic search in E-Culture
  - http://e-culture.multimedian.nl
  - http://e-culture.multimedian.nl/demo/search
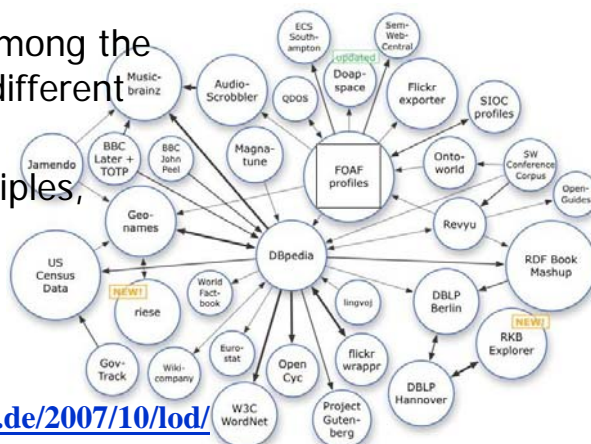
55

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

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So where *is* the Semantic Web?

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/

DBpedia

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

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**

Calgary

Downtown Calgary.

Government	
- Mayor	Dave Bronconnier
	(Past mayors)
-	Calgary City Council
Governing body	
- Manager	Owen A. Tobert

Area [1]	
- City	726.50 km² (280.5 sq mi)
- Metro	5,107.43 km² (1,972 sq mi)
Elevation	1,048 m (3,438.3 ft)

Population (2006)[1]	
- City	988,193
- Density	1,360.2/km² (3,522.9/sq mi)
- Metro	1,079,310
- Population rank	3rd
- Metro rank	5th

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

Automatic Links Among Open Datasets

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

DBpedia

```
<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"
...
```

Geonames

Processors can switch automatically from one to the other …

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Don't invent it yourself

- Reuse what is there
  - Generate RDF data automatically where possible, "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

open your data
to anyone who might use it

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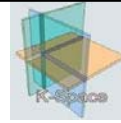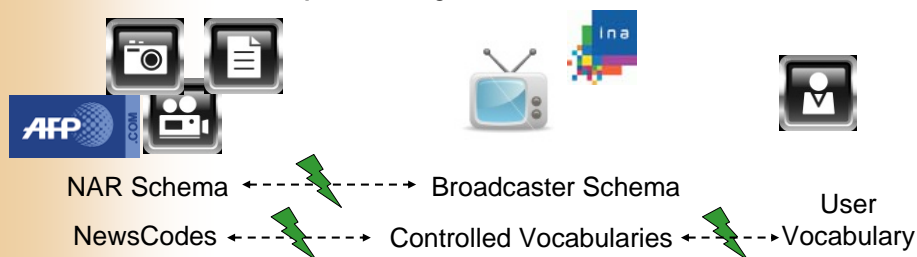
- Goal: Raphaël Troncy
  - Provide en environment for **searching** and **browsing contextualized multimedia news** information
- Method:
  - Semantic processing of multimedia news items
  - Link news items with knowledge on the web
- Datasets:
  - News stories: Jun/Jul 2006 (en/fr) newsfeed, AFP ± 90,000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

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Problems

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

NAR Schema ←------↯------→ Broadcaster Schema

NewsCodes ←----↯----→ Controlled Vocabularies ←--↯--→ User Vocabulary

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Metadata Conversion

NAR
Schema

NewsCodes
Controlled Vocabularies

Broadcaster
Schema

FOAF + SKOS

RDF
Powered

W3C OWL W3C RDF

alignment

W3C OWL W3C RDF

Semantic
Web

Semantic Processing

sprout

Named Entity
Recognition

Domain Ontologies

NAR Ontology
NewsCodes
Thesaurus

Semantic Processing

Knowledge Assisted Analysis

Concept Detectors

Domain Ontologies

NAR Ontology
NewsCodes
Thesaurus

Semantic Processing

LINKING**OPEN**DATA
W3C SWEO Community Project

sprout

Named Entity Recognition

Linked Data

DBpedia

Domain Ontologies

RDF Powered

NAR Ontology
NewsCodes
Thesaurus

http://newsml.cwi.nl/explore/search

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Literature
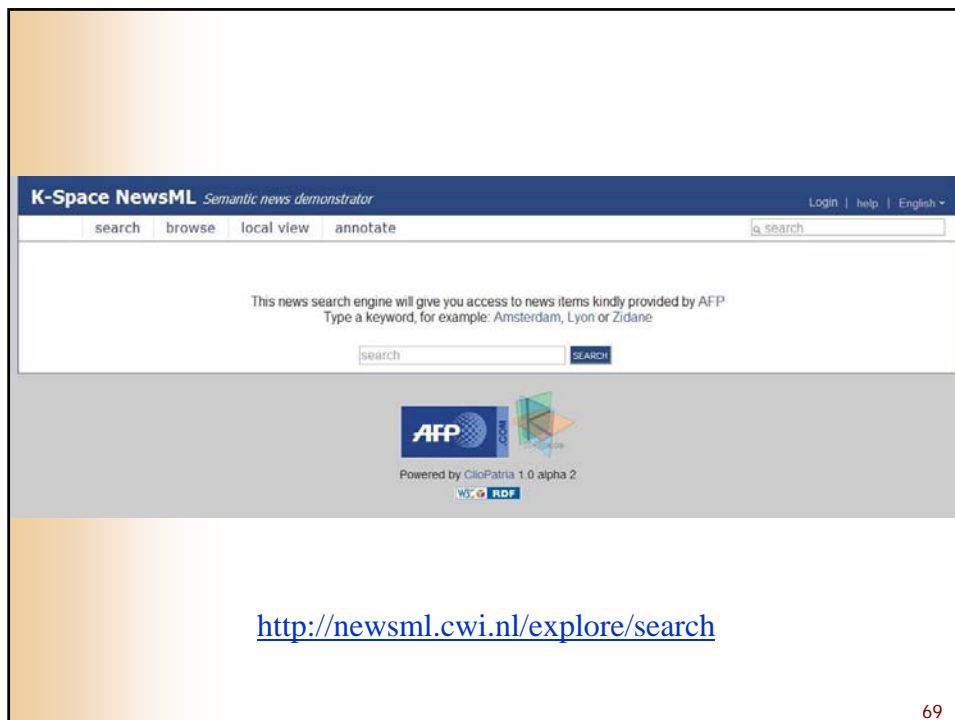
- Michiel Hildebrand, Jacco van Ossenbruggen and Lynda Hardman: */facet: A Browser for Heterogeneous Semantic Web Repositories.* In 5th International Semantic Web Conference (ISWC'2006), pages 272-285, Athens (GA), USA, November 5-9, 2006.

- 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 (California) and Brussels (Belgium), December 2007.

- W3C Video on the Web Activity, April 2008 http://www.w3.org/2008/01/video-activity.

71

Literature tips 1

- *Roger T. Pédauque*
  Document: Form, Sign and Medium, As Reformulated for Electronic Documents
  http://archivesic.ccsd.cnrs.fr/documents/archives0/00/00/05/94/index_fr.html
- *Jacco van Ossenbruggen*
  Web Document Engineering, Part I of PhD thesis (2001):
  http://www.cwi.nl/~jrvosse/thesis/thesis-linked.pdf
- *Lloyd Rutledge, Jacco van Ossenbruggen, Lynda Hardman, and Dick C.A. Bulterman*
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