

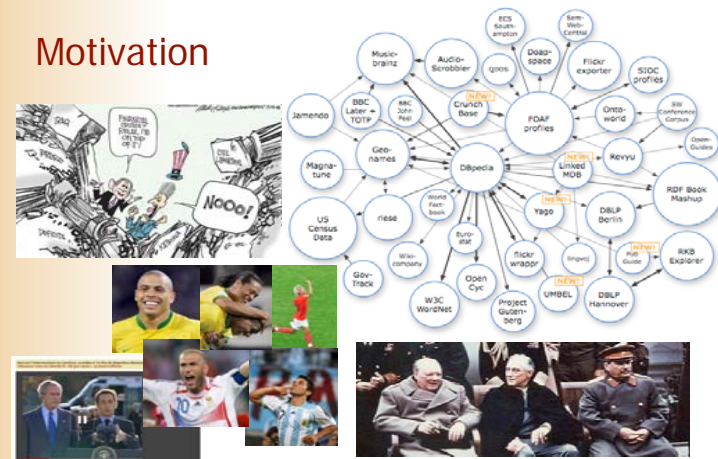
Multimedia lifecycle

Lynda Hardman

CWI, Interactive Information Access
UvA, Multimedia Interaction



Motivation



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Creating a semantic media web

- Allocate URI to media asset
 - Attach metadata using RDF
- But...
- want to attach metadata to parts of a media asset
 - want to combine multiple (parts) of assets into new assets/presentations
 - each media type/format needs a different player (whereas everyone can display text)

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We don't even care about media!

- We want to enable
 - the processing of information-bearing content
 - of one or more media types
 - that can be interpreted by end users
- End-users are primarily interested in
 - the meaning conveyed by a combination of media assets
 - interacting further with the media
 - as part of complex search task
 - passing it on to someone else in media “chain”

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We can use the (semantic) web

- *Web* enables the identification and delivery of units of information of different data types
- *Semantic web* enables the association of metadata with each identified unit/fragment
- To find and use them, we need mechanisms:
 - for identifying (part of) an individual media asset
 - for associating metadata with an identified fragment
 - that enable larger meaningful structures to be composed, identified and annotated

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Really need...

- to be aware of the human aspects of multimedia
- multimedia assets are not created "*in vacuo*", but by someone for a specific purpose
- more than the information "expressed" by the media asset itself, e.g.
 - the creator and the intended purpose
 - provenance also important on the semantic web, where a multimedia presentation may be composed of assets published by many different sources
 - the context in which the media asset was created (e.g. before or after Obama was elected)

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Why are you here?

- To do just this...
- To understand the context in which information is used
- Learn about different techniques that already exist
- Understand how far media is part of the semantic web
- And most importantly, what still needs to be done to get it to work!

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This talk

Understand Multimedia Applications Workflow

CeWe Color Photo Book creation application

Vox Populi argumentation-based video sequences generation

Canonical Processes of Media Production

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Understanding Multimedia Applications Workflow

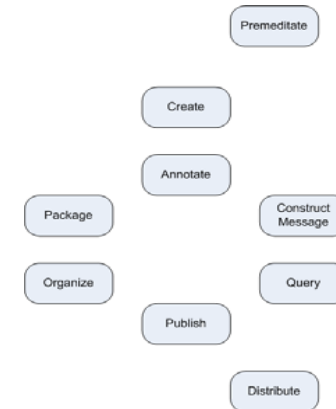
- Identify and define a number of canonical processes of media production
- Community effort
 - 2005: [Dagstuhl seminar](#)
 - 2005: ACM MM Workshop on [Multimedia for Human Communication](#)
 - 2008: Multimedia Systems Journal Special Issue (core model and companion system papers)
editors: Frank Nack,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



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Overview of Canonical Processes



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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>

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CeWe Color PhotoBook Processes

- My winter ski holidays with my friends



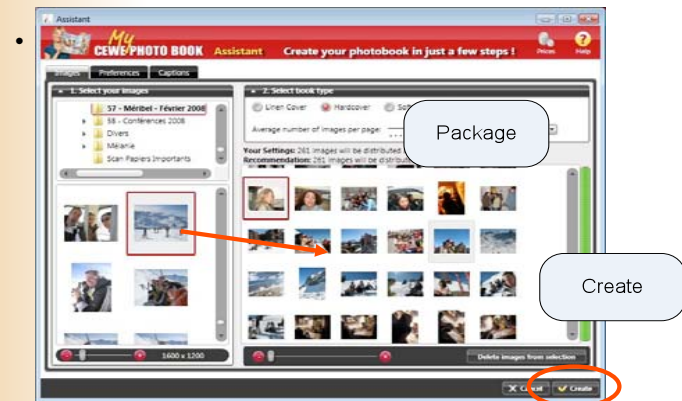
Premeditate

Construct Message

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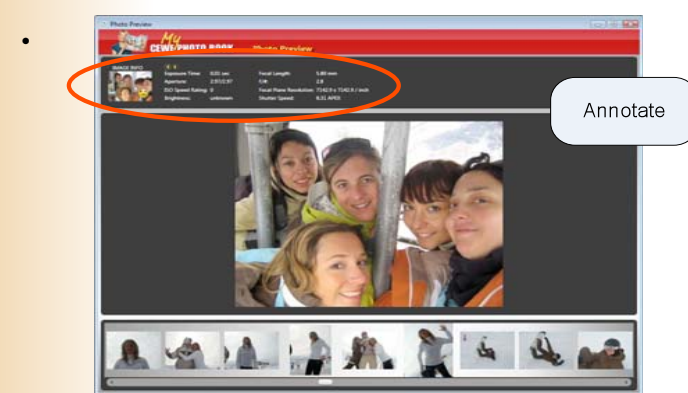
CeWe Color PhotoBook Processes



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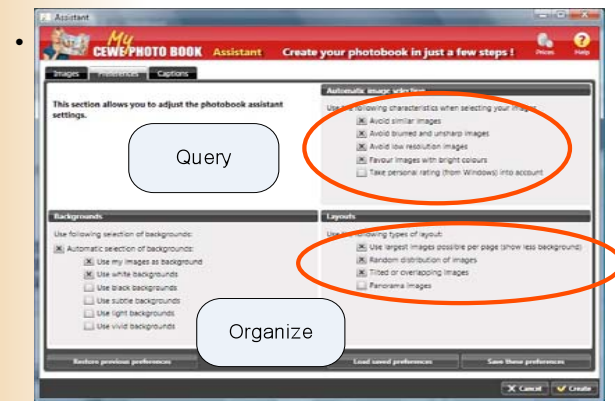
CeWe Color PhotoBook Processes



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CeWe Color PhotoBook Processes



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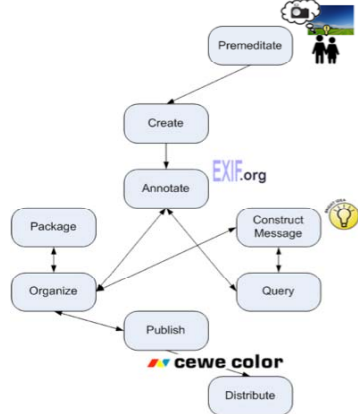
CeWe Color PhotoBook Processes



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CeWe Color PhotoBook Processes



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Generating video documentaries from annotated media repositories

Stefano Bocconi, Frank Nack
 CWI Amsterdam
 The Netherlands
 Contact: stefano.bocconi@gmail.com



Talk Outline

- ☐ Motivation
- ☐ Example
- ☐ Scenarios
- ☐ Technical details
 - ☒ Annotations
 - ☒ Editing Process
- ☐ Conclusions

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Video Documentaries on the Web

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

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Video material

- Focus on video interviews about controversial issues
- **Interview with America** video footage with interviews and background material about the opinion of American people after 9-11

www.interviewwithamerica.com

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Example: *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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What do you think of the war in Afghanistan?

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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The annotations

- Rhetorical
 - Rhetorical Statement (mostly verbal, but visual also possible)
 - Argumentation model: Toulmin model
- Descriptive
 - Question asked
 - Interviewee (social)
 - Filmic *next slide*

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Filmic annotations

Continuity, e.g.

- lighting conditions
- background sound
- gaze direction of speaker
left, centre, right
- framing continuity
close-up, medium shot, long shot
- camera movement
none, pan left/right, shaking, tilt up/down, zoom in/out

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Statement encoding

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

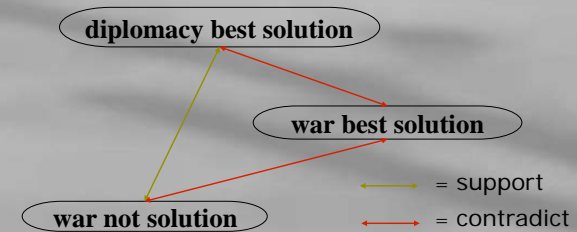
26

Connect statements

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

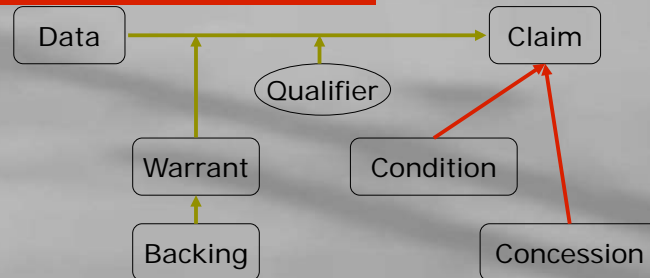
27

Semantic Graph



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Toulmin model



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

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Analysis of the Example

Two billions dollar bombs on tents



Claim

contradict



Claim

I cannot think of a more effective solution

weaken

Concession

I am not a fan of military actions



Claim

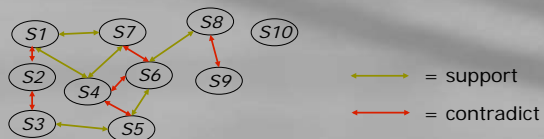
support

War has never solved anything

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Facts and features

- Annotations: 1 hour annotated, 15 interviews, 60 interview segments, 120 statements
- Partially **tunable**: examining the Segment graph gives feedback on the quality of the annotations and the thesaurus



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Controlling the Bias

- Video documentaries are not neutral account of reality: the selection and editing of the footage expresses a point of view
- Editing strategy:
 - Balanced
 - Pro opinion X
 - Against opinion X
- We use:
 - Logos (the statements)
 - Ethos (based on user profile)
 - Film editing (e.g. framing, gaze)

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Vox Populi interface

The interface is divided into several sections:

- Question:** A list of questions to choose from, such as "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?", and "What do you think about the Anthrax?".
- Interviewee:** A dropdown menu with options like "Cameroun Packing Guard at Stamford" and "Lawyer in Harvard".
- Opinion:** A dropdown menu with options like "War in Afghanistan - Pro" and "War in Afghanistan - Con".
- Position:** A label for the interviewee's role.
- First Character:** A set of dropdown menus for selecting character attributes: Age (Middleage, Old, Teenager, Young), Education (HighEducated, LowEducated, MediumEducated), Employment (HighIncomeJob, LowIncomeJob, MiddleIncomeJob, Retired, Student), GeoLocation (NotUSA, USA), Race (AmericanIndian, Asian, Black, Hispanic, White), Religion (Atheist, Christian, Muslim), and Sex (Female, Male).
- Second Character:** A similar set of dropdown menus for selecting character attributes.
- Strategy:** Radio buttons for "None", "Create Clash", "Create Support", and "Vox Populi".
- Bandwidth:** Radio buttons for "Low Bandwidth", "Medium Bandwidth", and "High Bandwidth".
- Intercut:** Radio buttons for "True" and "False".
- Caption:** Radio buttons for "On (can cause problems)" and "Off".
- Buttons:** "Done" and "Reset" buttons at the bottom.

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Conclusions

- ❑ Automatic generation of video interviews augmented with supporting and/or contradicting material
- ❑ The user can determine the subject and the bias of the presentation
- ❑ The documentarist can add material and let the system generate new documentaries

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 I²RP and CHIME projects.

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Literature

- *Stefano Bocconi*
Vox Populi: generating video documentaries from semantically annotated media repositories
PhD thesis, Technical University of Eindhoven, 2006
<http://www.cwi.nl/~media/Theses/Bocconi/VoxPopuli.pdf>

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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..."

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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

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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

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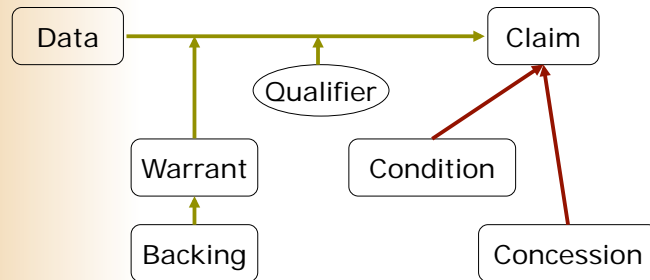
Vox Populi Statement Annotations

- 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**

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Toulmin Model



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

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Vox Populi Query Interface

The interface includes sections for Question, Interviewee, Opinion, Position, and various demographic filters (Age, Education, Employment, GeoLocation, Race, Religion, Sex). It also has a Strategy section with options like 'Create Clash', 'Create support', and 'Vox Populi'. A 'Query' button is at the bottom right.

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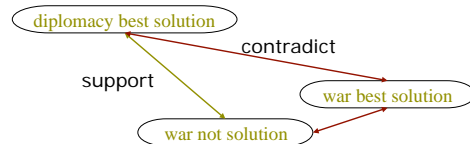
42

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*



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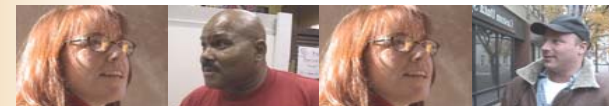
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Result of Vox Populi Query

I am not a fan of military actions

I cannot think of a more effective solution

Publish



War has never solved anything

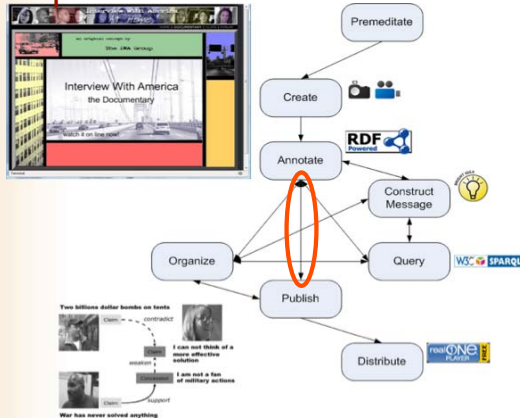
Two billions dollar bombs on tents

Distribute

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Vox Populi Processes



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Canonical Processes 101

- Canonical: reduced to the simplest and most significant form possible without loss of generality
- Each process
 - short description
 - illustrated with use cases
 - input(s), actor(s) & output(s)
- Formalization of processes in UML diagrams in paper (see literature list)

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Premeditate

- Establish initial ideas about media production
 - *Design a photo book of my last holidays for my family*
 - *Create argument-based sequences of videos of interviews after September 11*
- Inputs: ideas, inspirations from human experience
- Actors:
 - camera owner
 - group of friends
- Outputs:
 - decision to take camera onto ski-slope
 - structured set of questions and locations for interviews

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Create Media Asset

- Media assets are captured, generated or transformed
 - Photos taken at unspecified moments at holiday locations
 - Synchronized audio video of interviewees responding to fixed questions at many locations
- Inputs:
 - decision to take camera onto ski-slope;
 - structured set of questions and locations for interviews
- Actors:
 - (video) camera, editing suite
- Outputs:
 - images, videos



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Annotate

- Annotation is associated with asset
- Inputs:
 - photo, video, existing annotation
 - optional thesaurus of terms
- Actors:
 - human, feature analysis program
- Outputs:
 - Complex structure associating annotations with images, videos



Q: "What do you think of the Afghanistan war?"

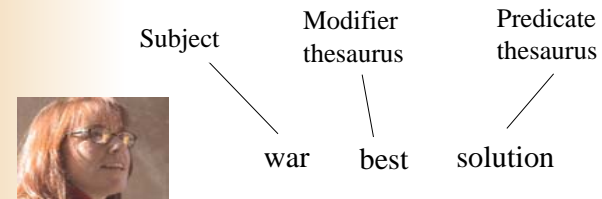
Speaker: Female, Caucasian...

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Semantic Annotate

- Annotation uses existing controlled vocabularies
 - Subject matter annotations of your photos (COMM, XMP)
 - Rhetorical annotations in Vox Populi



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Package

- Process artifacts are packed logically or physically
- Useful for storing collections of media after capturing...
- ... before selecting subset for further stages



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Query

- User retrieves a set of process artifacts based on a user-specified query
- Inputs:
 - user query, in terms of annotations or by example
 - collection(s) of assets
- Actors:
 - human
- Output:
 - subset of assets plus annotations (in no order)



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Construct Message

- 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*
- Inputs: ideas, decisions, available assets
- Actors:
 - author
- Outputs:
 - the message that should be conveyed by the assets

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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*
- Inputs: set of assets and annotations (e.g. output from query process)
- Actors: human or machine
- Outputs: document structure with recommended groupings and orderings for assets



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Publish

- Presentation is created
 - associated annotations may be removed
 - *create proprietary format of photobook for upload*
 - *create SMIL file containing videos and timing information*
- Inputs: set of assets and annotations (e.g. output from organize process)
- Actors: human or machine
- Outputs:
 - final presentation in specific document format, such as html, smil or pdf

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Distribute

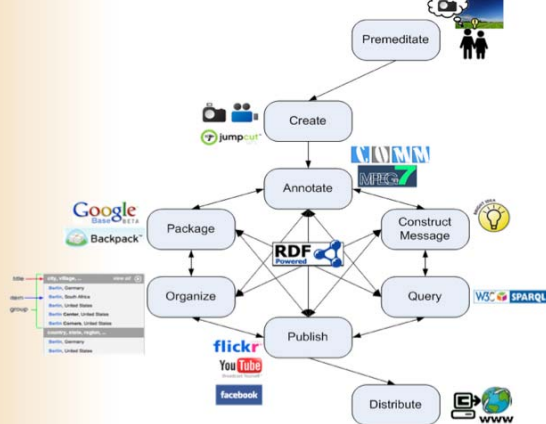
- Presentation is transported to end user, end-user can view and interact with it
 - *photobook uploaded to printer, printed then posted to user*
 - *SMIL file is downloaded to client and played*
- Inputs: published document (output from publish process)
- Actors: distribution hardware and software
- Outputs:
 - media assets presented on user's device



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Canonical Processes Possible Flow



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Sum Up

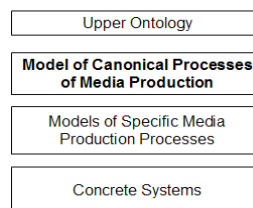
- Community agreement, not “yet another model”
- Large proportion of the functionality provided by multimedia applications can be described in terms of this model
- Initial step towards the definition of open web-based data structures for describing and sharing semantically annotated media assets

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Discussion

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



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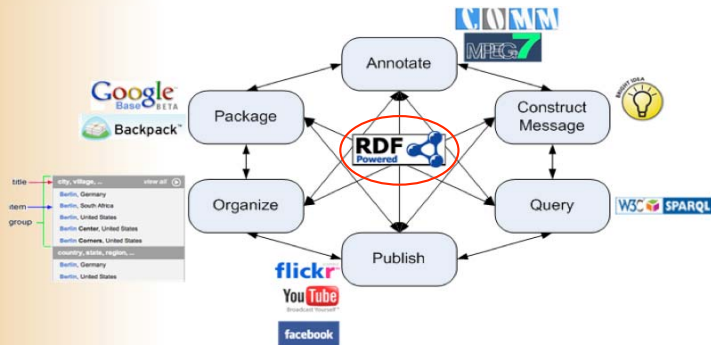
Literature

- Special Issue on Canonical Processes of Media Production
<http://www.springerlink.com/content/j0l4g337581652t1/>
<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
- Philipp Sandhaus, Sabine Thieme and Susanne Boll: *Canonical Processes in Photo Book Production*. In *Multimedia Systems Journal*, 2008
- Stefano Bocconi, Frank Nack and Lynda Hardman: *Automatic generation of matter-of-opinion video documentaries*. In *Journal of Web Semantics*, 6(2), p139-150, 2008.
- 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.

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Annotations: the link with COMM



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Annotating an 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:Winston_Churchill
dbpedia:Winston_Churchill skos:altLabel
"Sir Winston Leonard Spencer-Churchill"
dbpedia:Winston_Churchill rdf:type foaf:Person
```

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Annotating a Video



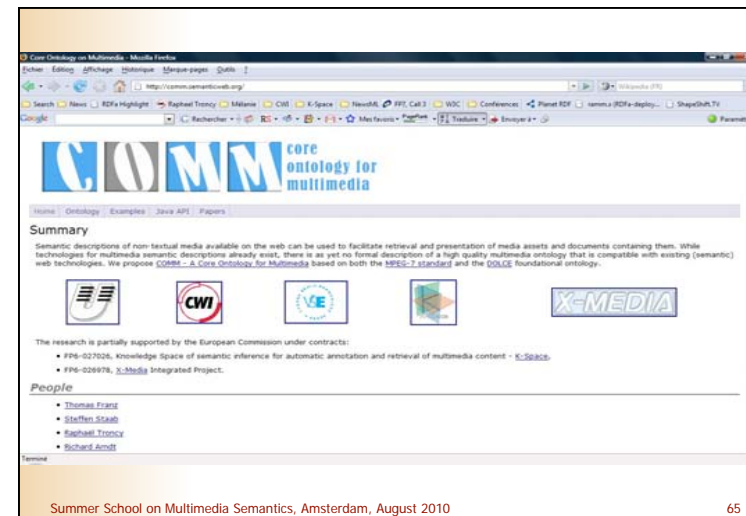
- Localize a region
- Annotate the content
 - Tag: G8 Summit, Heiligendamn, 2007
 - Link to knowledge on the Web

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

EU Summit, Gothenburg, 2001

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Acknowledgements



Raphaël Troncy, Eurecom

<http://www.cwi.nl/~media/samt08/>