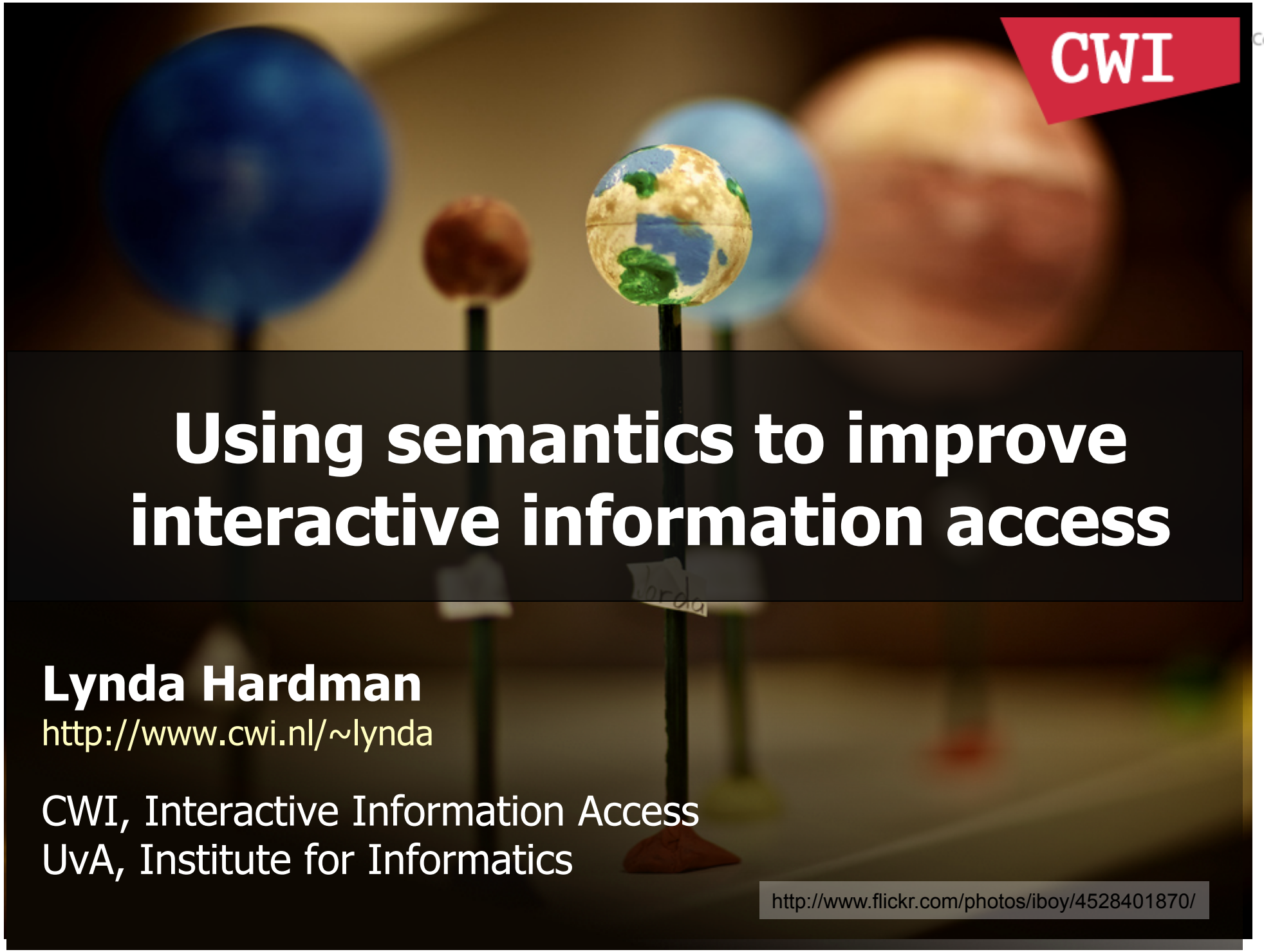
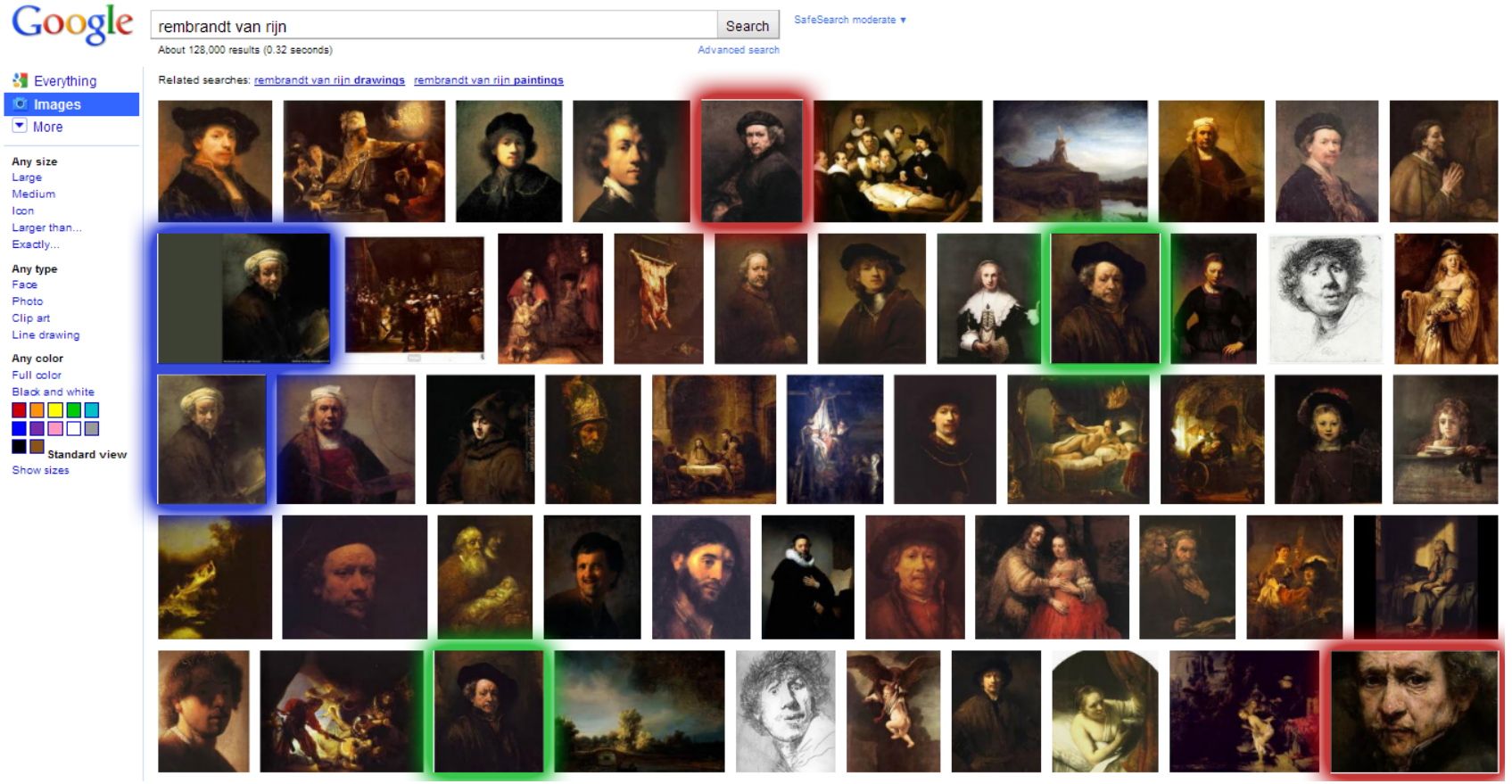


Using semantics to improve interactive information access

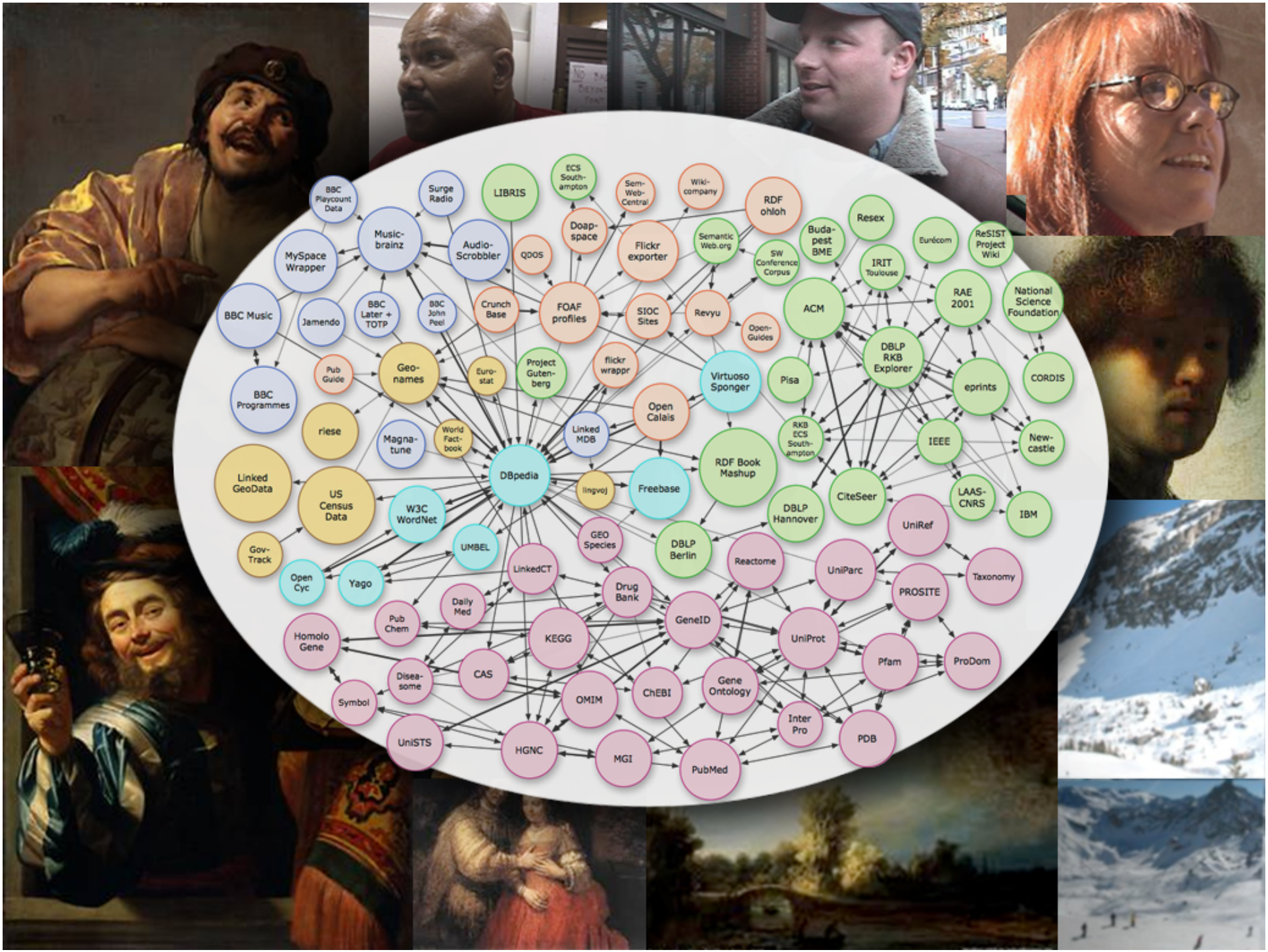
Lynda Hardman
http://www.cwi.nl/~lynda

CWI, Interactive Information Access
UvA, Institute for Informatics

http://www.flickr.com/photos/iboy/4528401870/



Google: Rembrandt van Rijn


BBC Playcount Data
Surge Radio
LIBRIS
ECS South-ampton
Sem-Web-Central
Wiki-company
RDF ohloh
Resex
Buda-pest BME
Eurécom
ReSIST Project Wiki
Music-brainz
Audio-Scrobbler
Doap-space
Flickr exporter
Semantic Web.org
SW Conference Corpus
IRIT Toulouse
MySpace Wrapper
QDOS
BBC Music
Jamendo
BBC Later + TOTP
BBC John Peel
Crunch Base
FOAF profiles
SIOC Sites
Revyu
Open-Guides
ACM
RAE 2001
National Science Foundation
Pub Guide
Geo-names
Euro-stat
Project Guten-berg
flickr wrappr
Virtuoso Sponger
DBLP RKB Explorer
Pisa
CORDIS
BBC Programmes
riese
Magna-tune
World Fact-book
Linked MDB
Open Calais
RKB ECS South-ampton
eprints
IEEE
New-castle
Linked GeoData
US Census Data
W3C WordNet
DBpedia
lingvoj
Freebase
RDF Book Mashup
CiteSeer
LAAS-CNRS
IBM
Gov-Track
UMBEL
GEO Species
DBLP Berlin
DBLP Hannover
UniRef
Open Cyc
Yago
LinkedCT
Drug Bank
Reactome
UniParc
Taxonomy
Daily Med
PROSITE
Pub Chem
GeneID
Homolo Gene
KEGG
UniProt
Pfam
ProDom
Disea-some
CAS
ChEBI
Gene Ontology
Symbol
OMIM
Inter Pro
UniSTS
HGNC
MGI
PubMed
PDB

Interactive Information Access

- Users need support for
  - the processing of information-bearing content
  - in one or more media types
  - for their specific task
- We need to be aware that there is more than the information “expressed'' by the media asset itself, e.g.
  - the intended purpose of the creator
  - the context in which the media asset was created

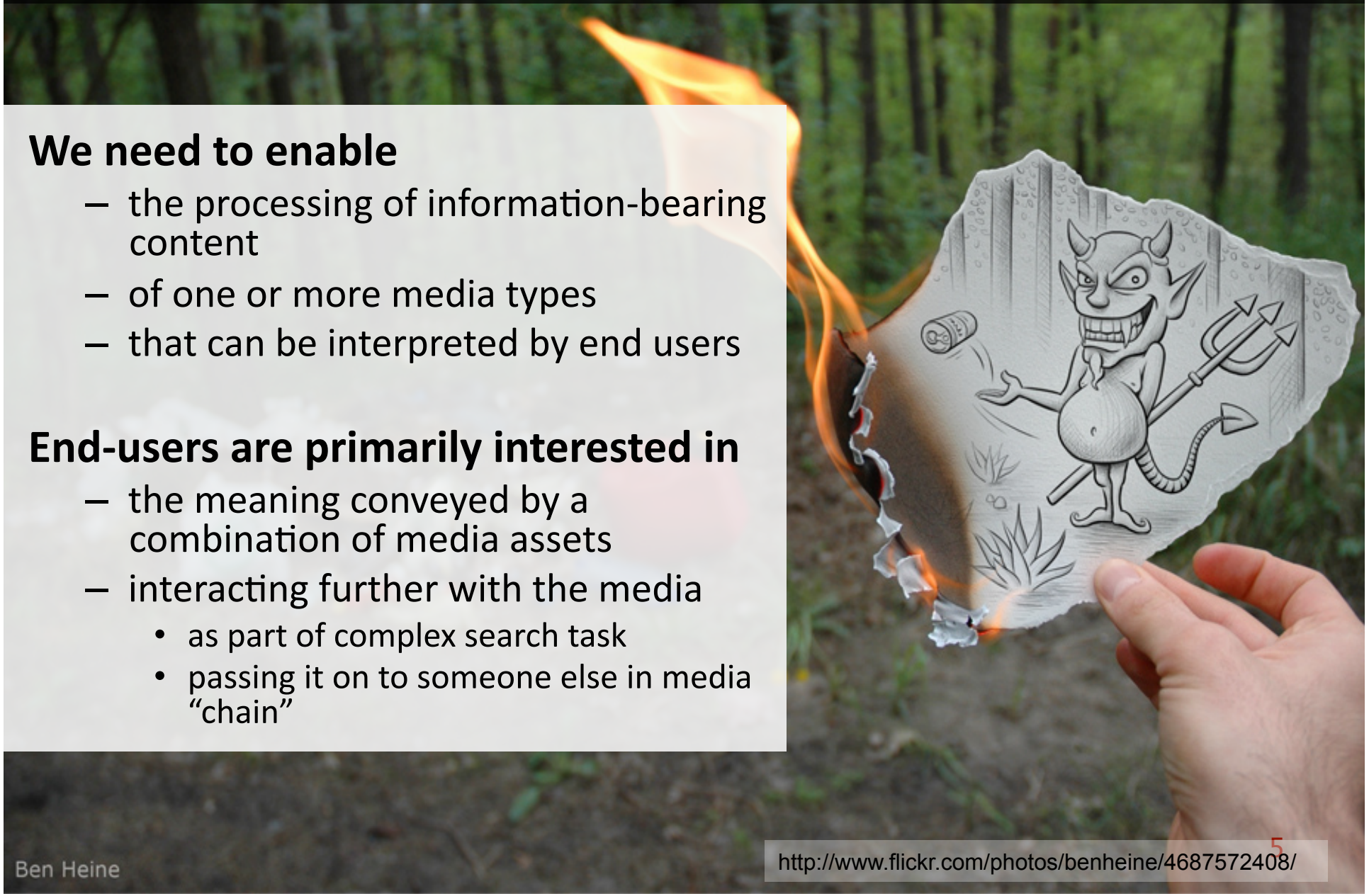
We don't care about the media!

We need 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"



Ben Heine

http://www.flickr.com/photos/benheine/4687572408/

How can we get this to work?

We need mechanisms

- for identifying (part of) an individual media asset
- for associating metadata with an identified fragment
- for agreeing on the meaning of metadata
- that enable larger meaningful structures to be *composed*, *identified* and *annotated*

http://www.flickr.com/photos/jannem/3312115991

Outline of talk

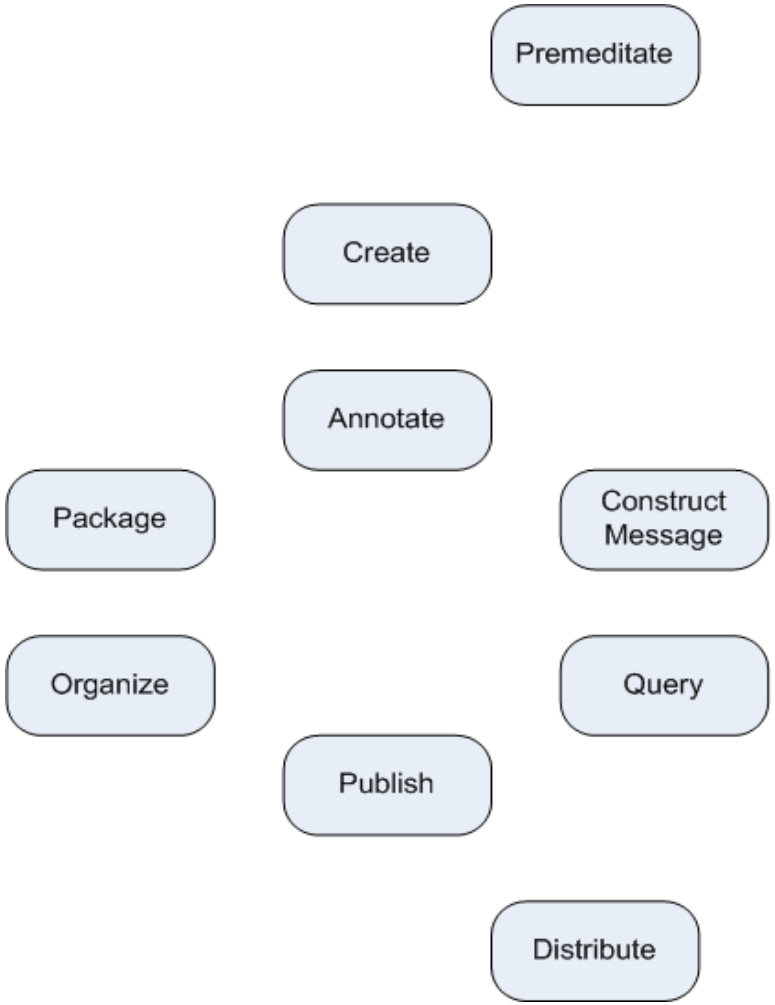
- Explain information processes in which media and metadata play a role
  - "canonical processes of media production"
- Example systems showing different types of user interaction enabled by media and metadata
  - MultimediaN E-Culture
  - Vox Populi
  - EventMedia

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

Canonical **Reduced to the simplest and most significant form possible, without loss of generality**

Overview of Canonical Processes



Example: CeWe Color PhotoBook

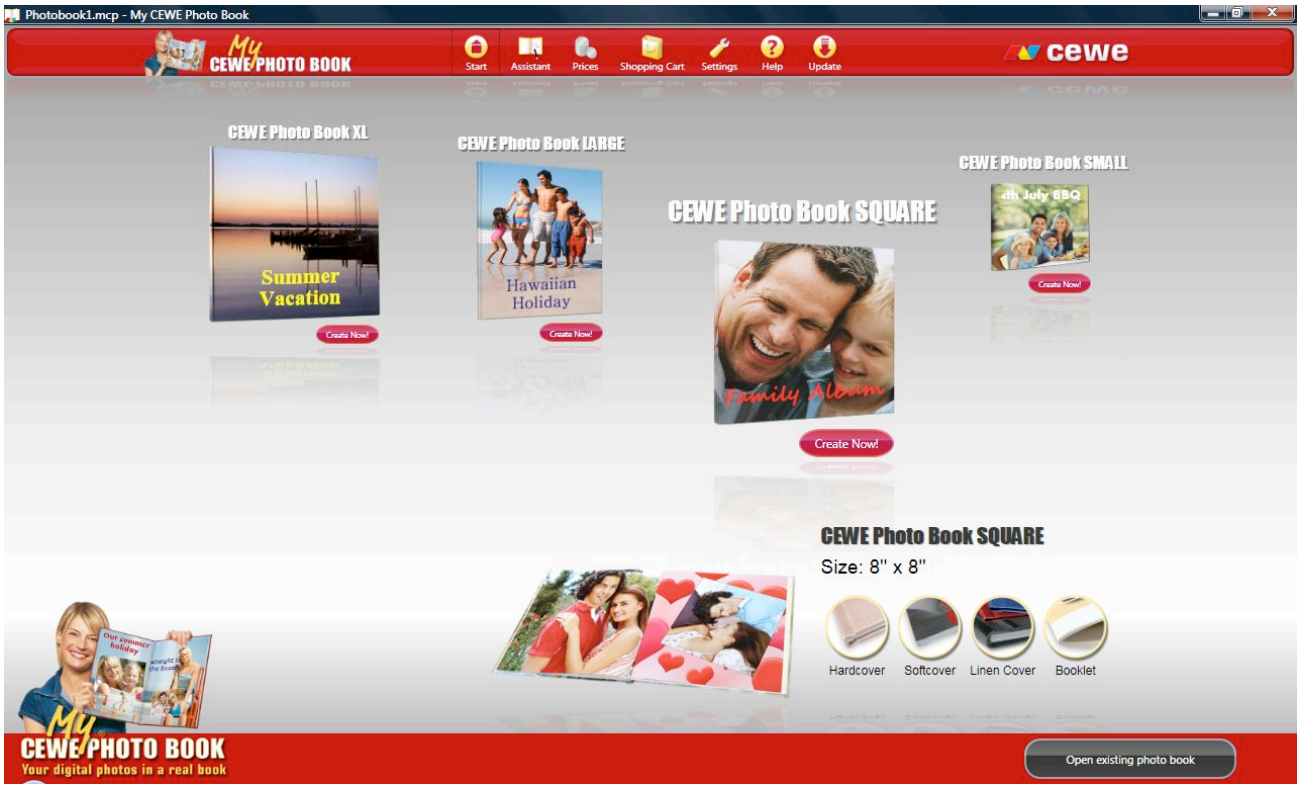
- Application for authoring digital photo books
- Automatic selection, sorting and ordering of photos
  - Context analysis methods:
    e.g., timestamp, annotation
  - Content analysis methods:
    e.g., color histograms, edge detection
- Customized layout and background

http://www.cewe-photobook.com

CeWe Color PhotoBook Processes

My winter ski holidays with my friends

Premeditate



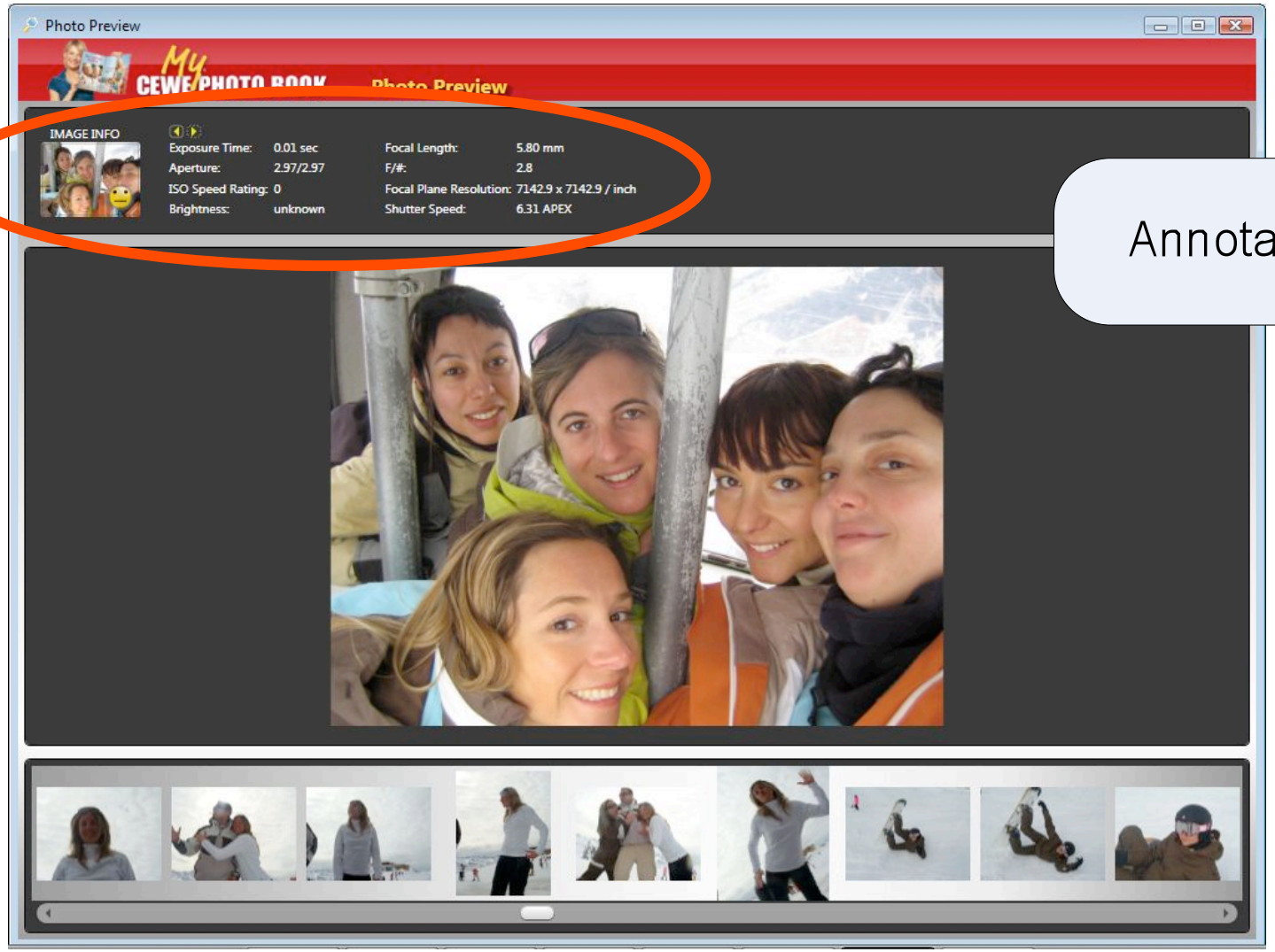
Construct Message

CeWe Color PhotoBook Processes

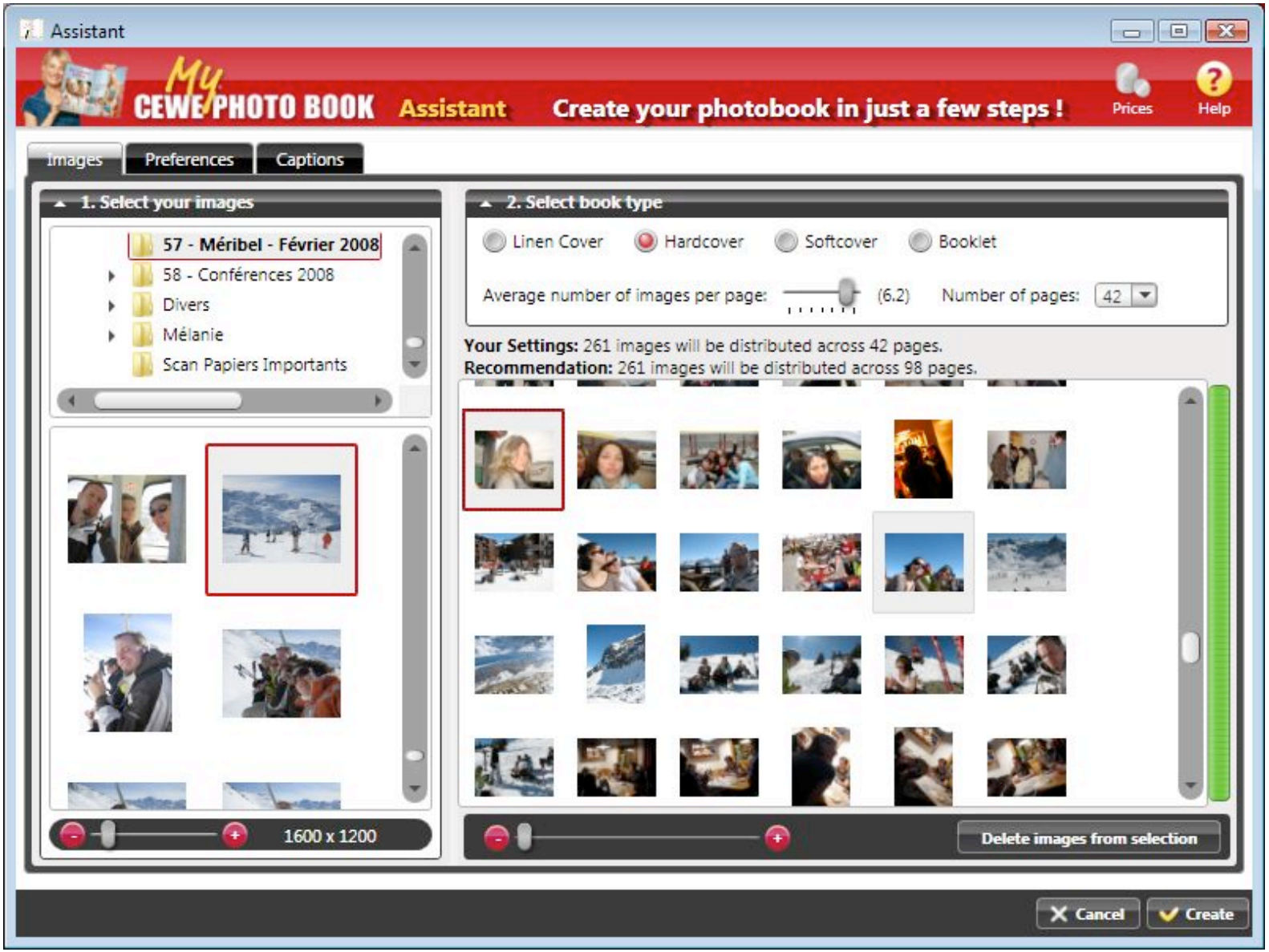
- Media assets are captured, generated or transformed

Create

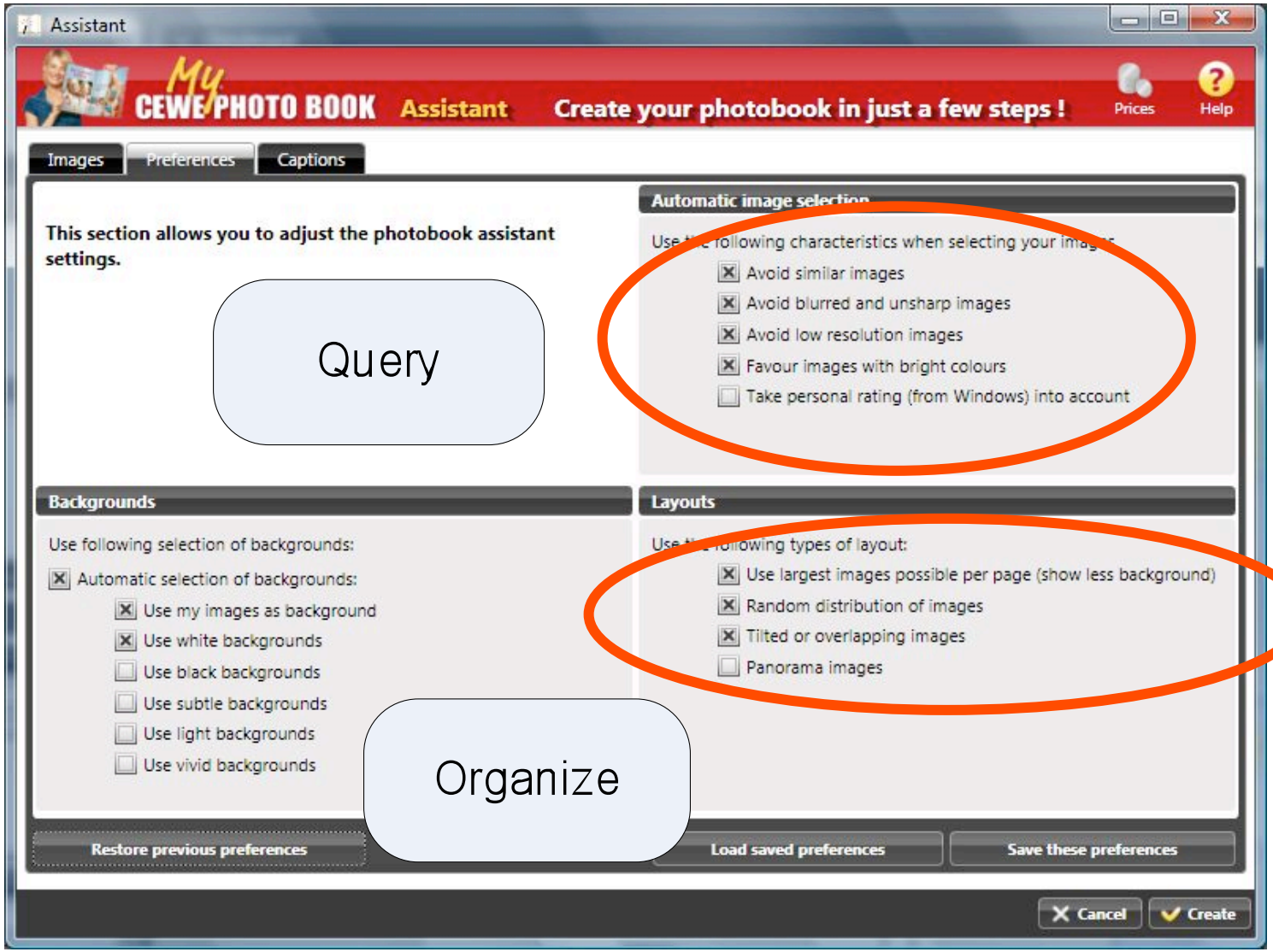
CeWe Color PhotoBook Processes



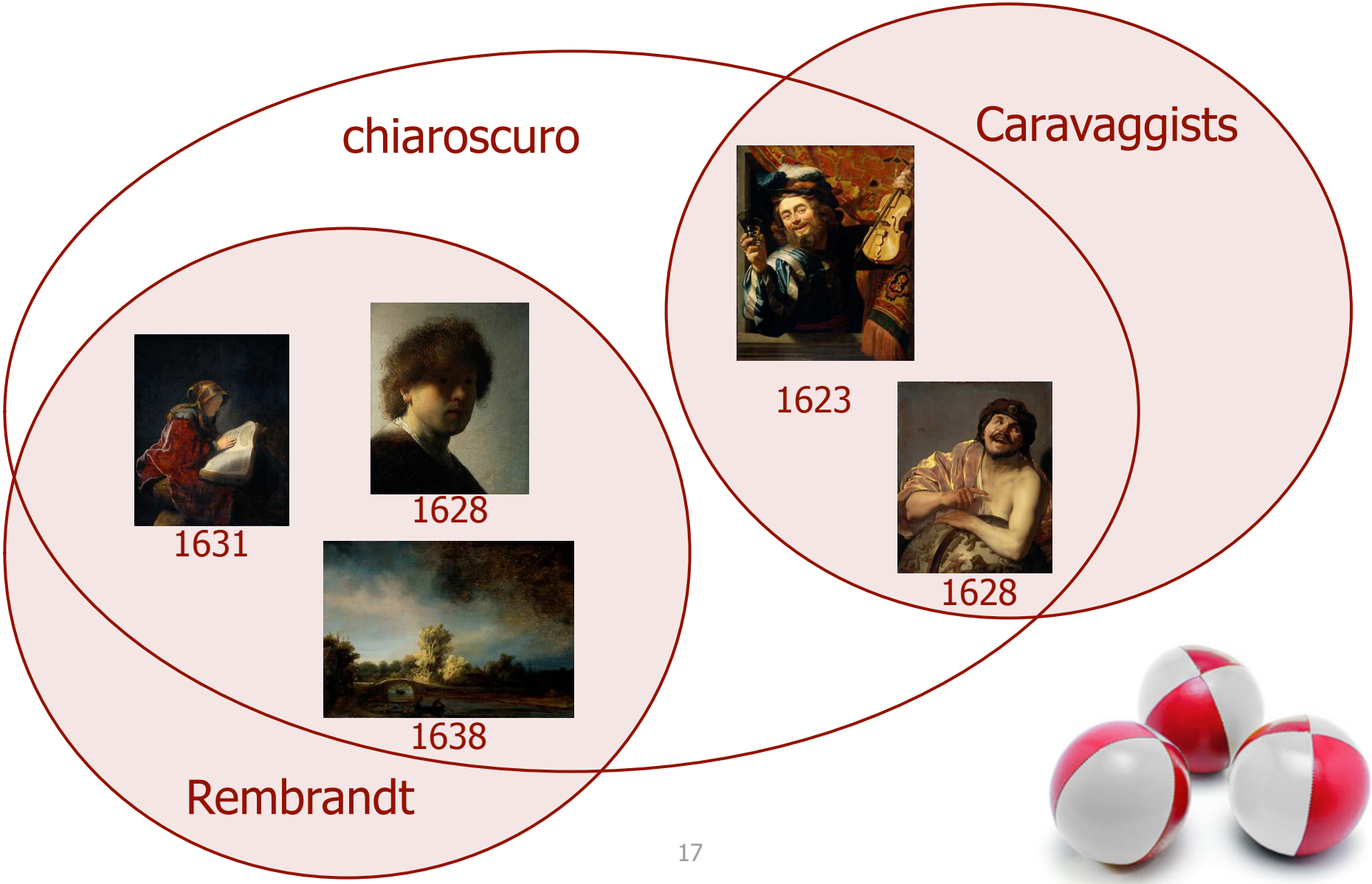
CeWe Color PhotoBook Processes



CeWe Color PhotoBook Processes



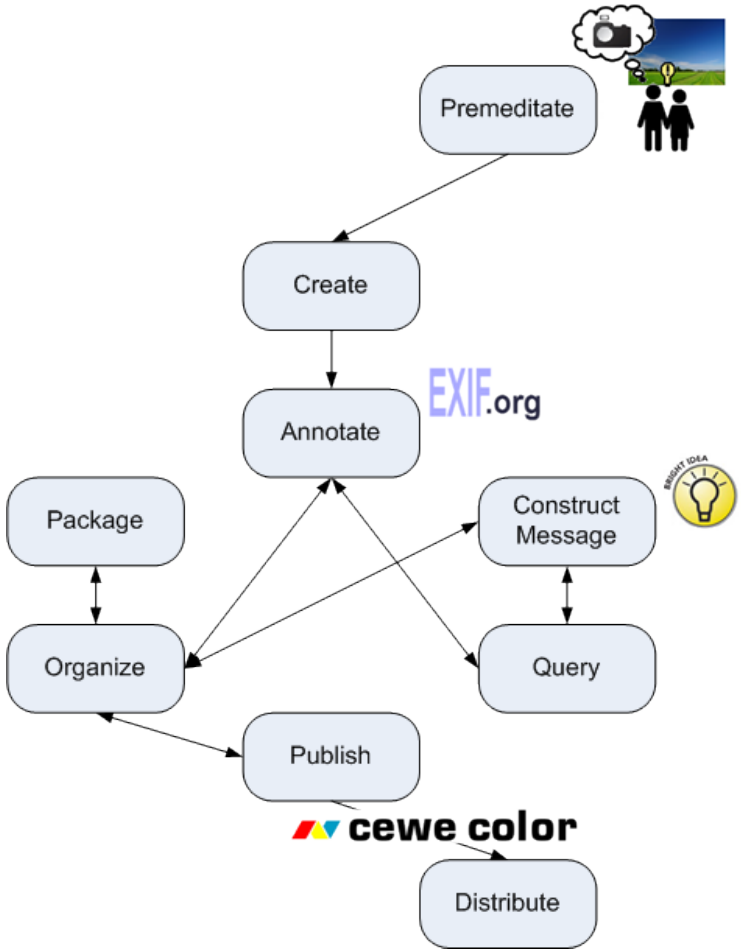
Organize using domain annotations



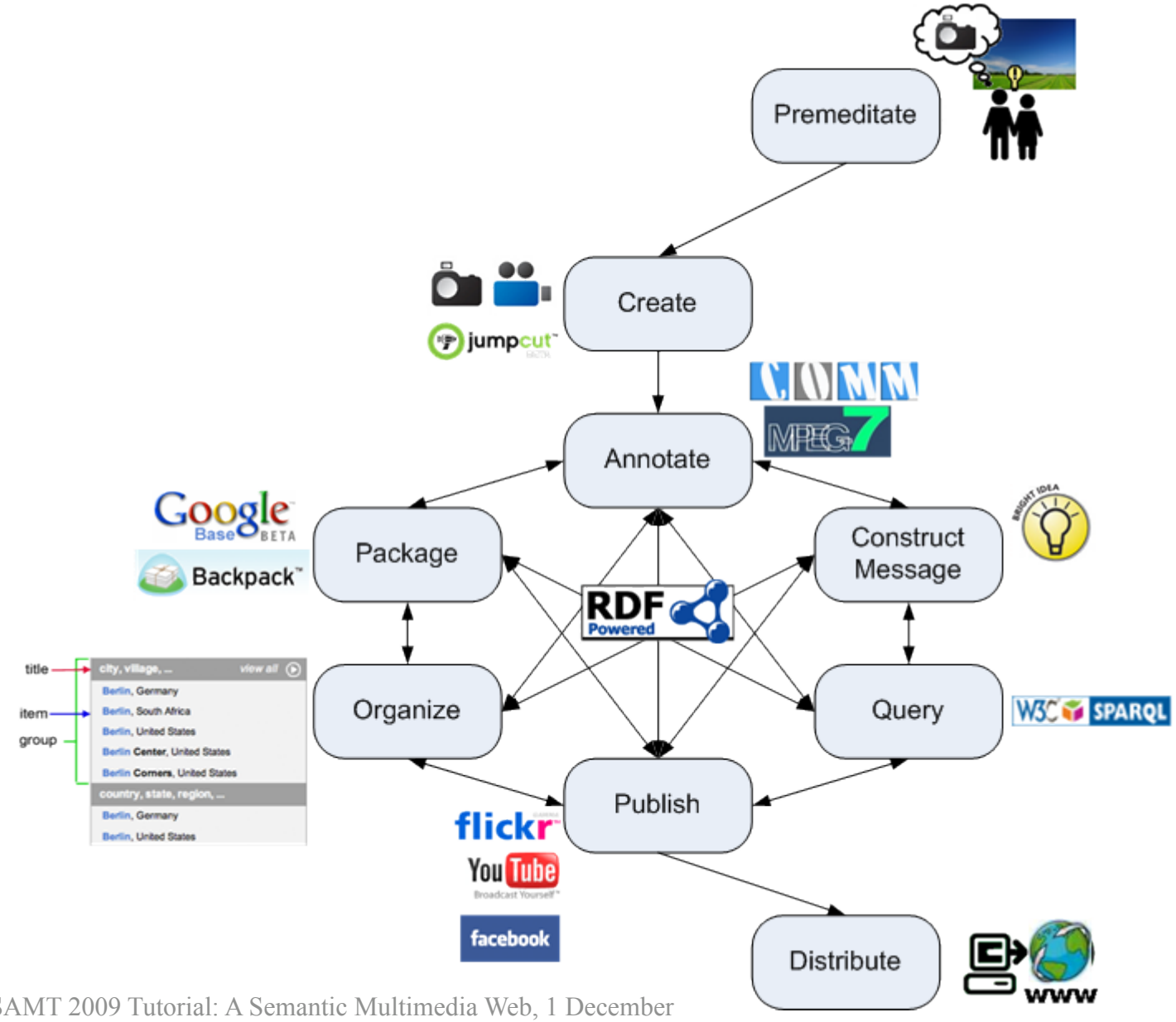
CeWe Color PhotoBook Processes

- 

CeWe Color PhotoBook Processes



Canonical Processes



How can we use Semantics to support Interactive Information Access?

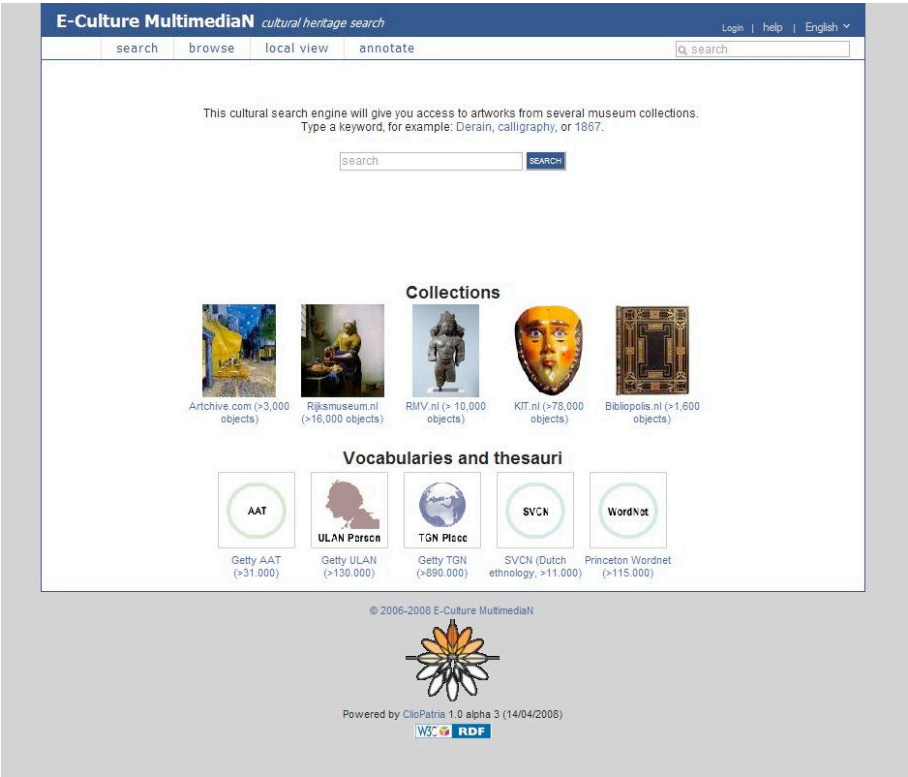
- Long term goal to find and present information to end-users
  - In a way that is useful to them
- We understand how to design information interfaces by hand.
  - How can metadata help us in giving more flexible access to media collections?
- We can link media assets to existing linked data, and use this to improve presentation, e.g. by
  - Selecting a sub-set
  - Grouping, ordering and linking media assets
  - Influencing the presentation

How can semantics help?

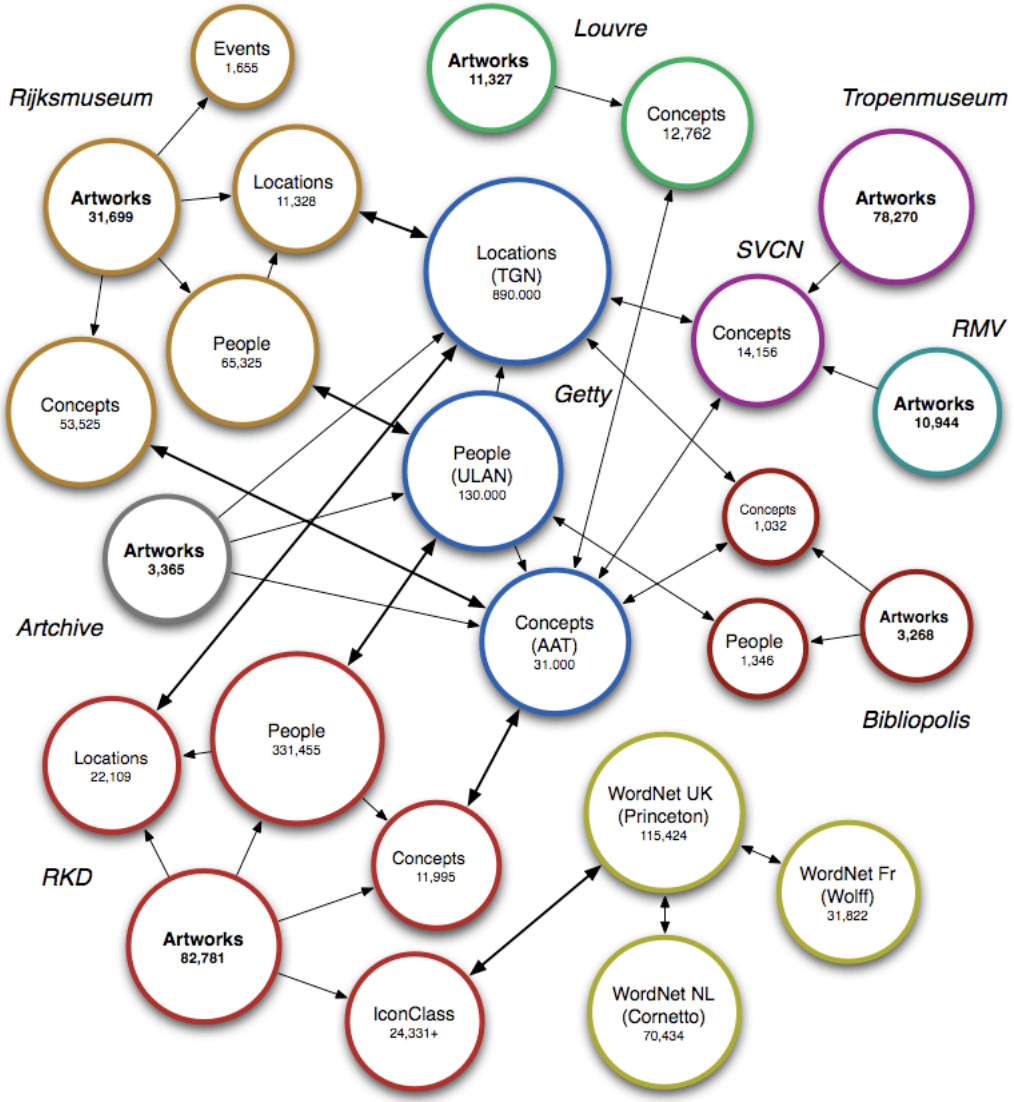
- What can be expressed explicitly?
  - the message to be conveyed
  - objects that are depicted in a media asset
  - domain information (e.g., art, painter)
  - human communication roles (discourse)
- What can they be used for?
  - disambiguating queries
  - grouping similar items for conveying topic breadth
  - visualizing items for presentation, e.g. timeline, map
  - finding similar items
  - …

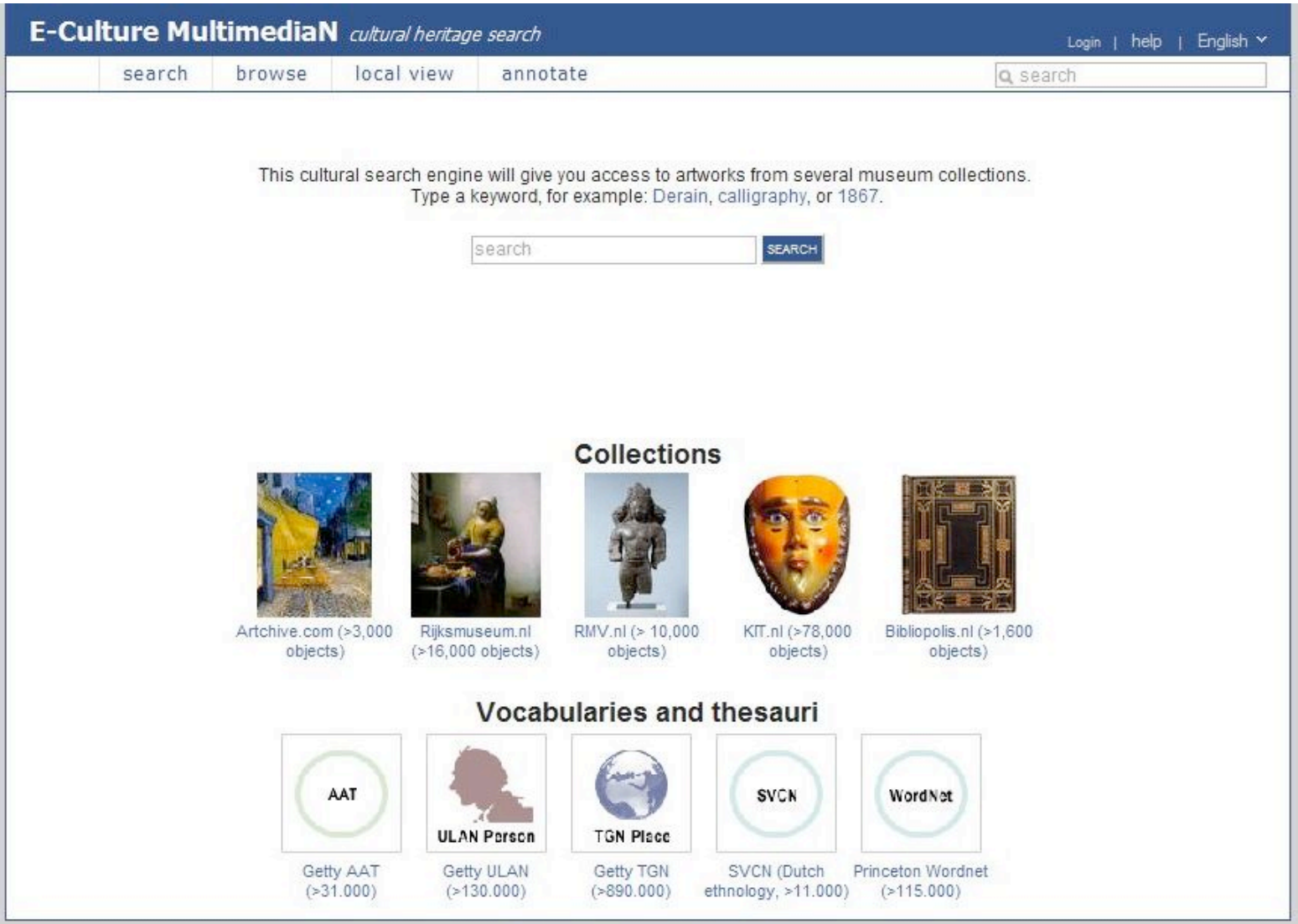
Browsing annotated collections of cultural heritage artefacts

- Users interested in cultural heritage, exploring artefacts available in repository
- Searching across multiple, linked collections
- Thesaurus structure used for identifying topics
- Artworks grouped into different topic structures to present results



E-Culture Linked Data Cloud





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

Use of linked data in E-Culture

- Query construction
  - auto-completion uses strings found in “data” and “concepts”
  - suggestions are grouped and ordered using links among items
- Result set
  - uses empirical balance between “closeness” to search string and non-intuitive path
- Result presentation
  - uses grouping of result set to show breadth of results
  - uses no particular ordering within each group

Generating video documentaries from annotated media repositories

Stefano Bocconi, Frank Nack (CWI, Amsterdam)

Outline

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

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

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

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…"

http://www.flickr.com/photos/soldiersmediacenter/1183836576

What do you think of the war in Afghanistan?

War has never solved anything

Two billions dollar bombs on tents

I am not a fan of military actions

I cannot think of a more effective solution

The annotations

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

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

We need your metadata!

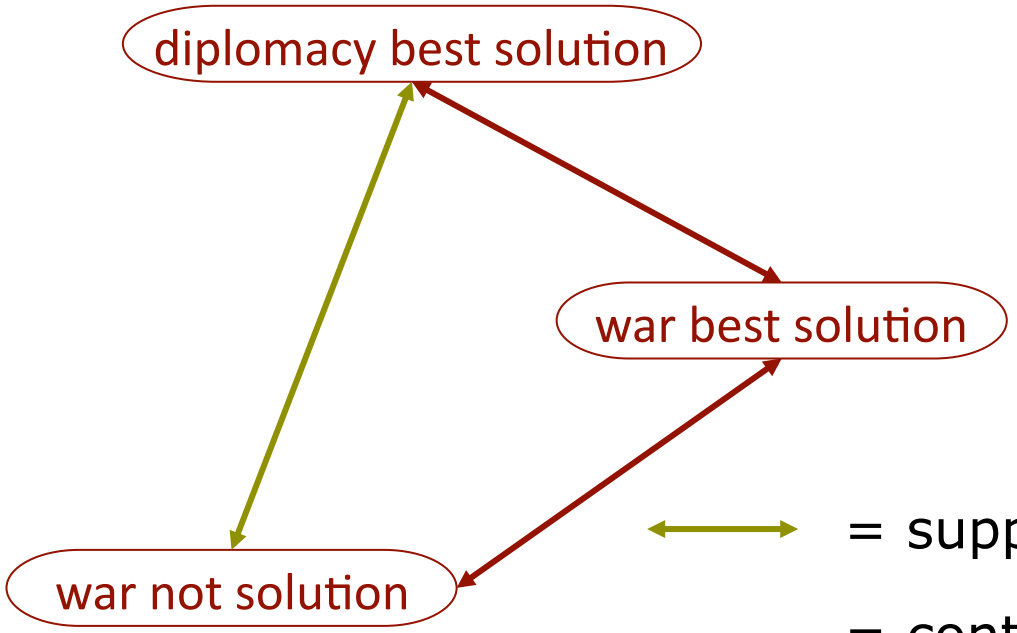
Statement encoding

- 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**

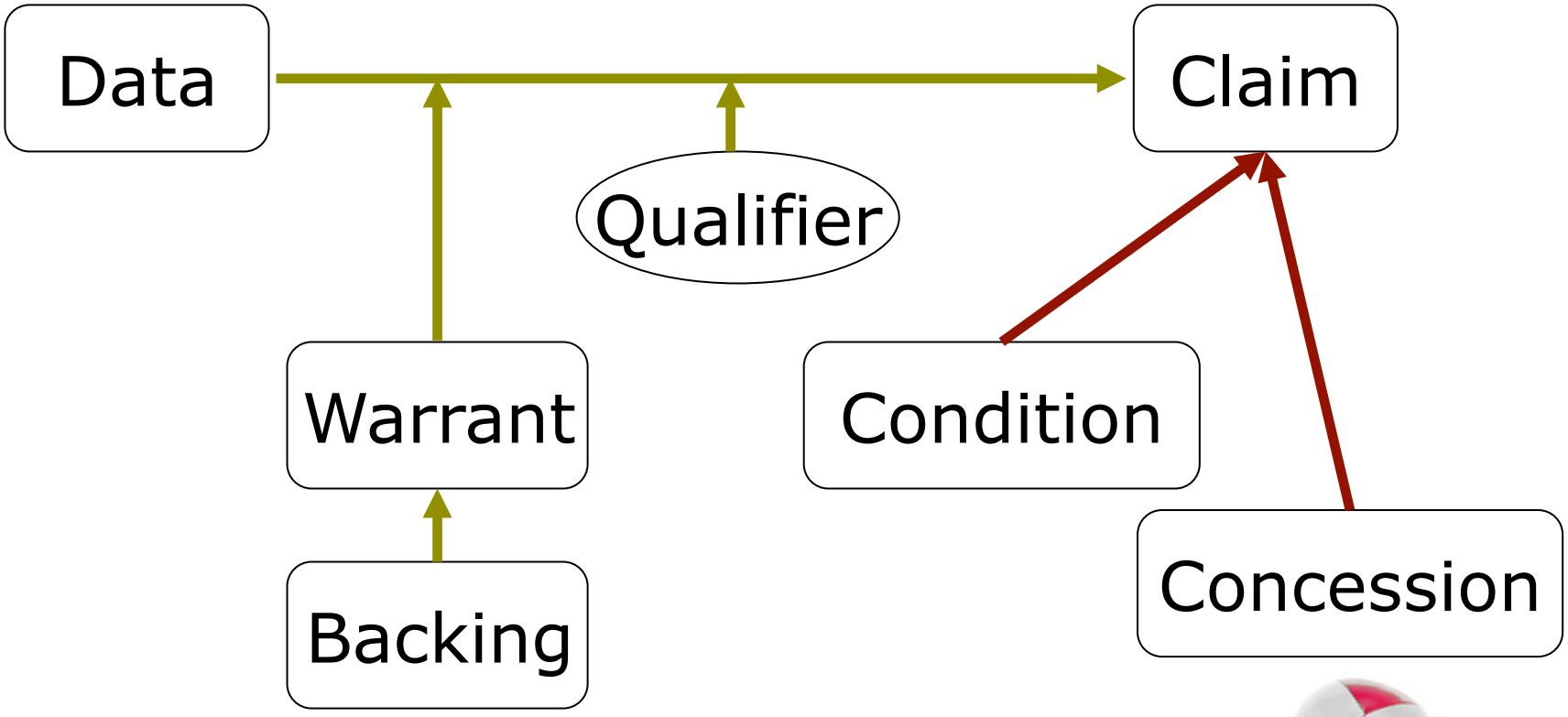
Connect statements

- 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*

Semantic Graph



Toulmin model



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

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

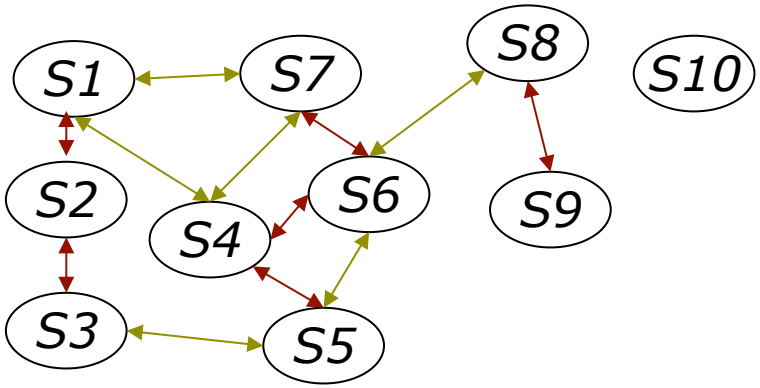
Claim

support

War has never solved anything

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



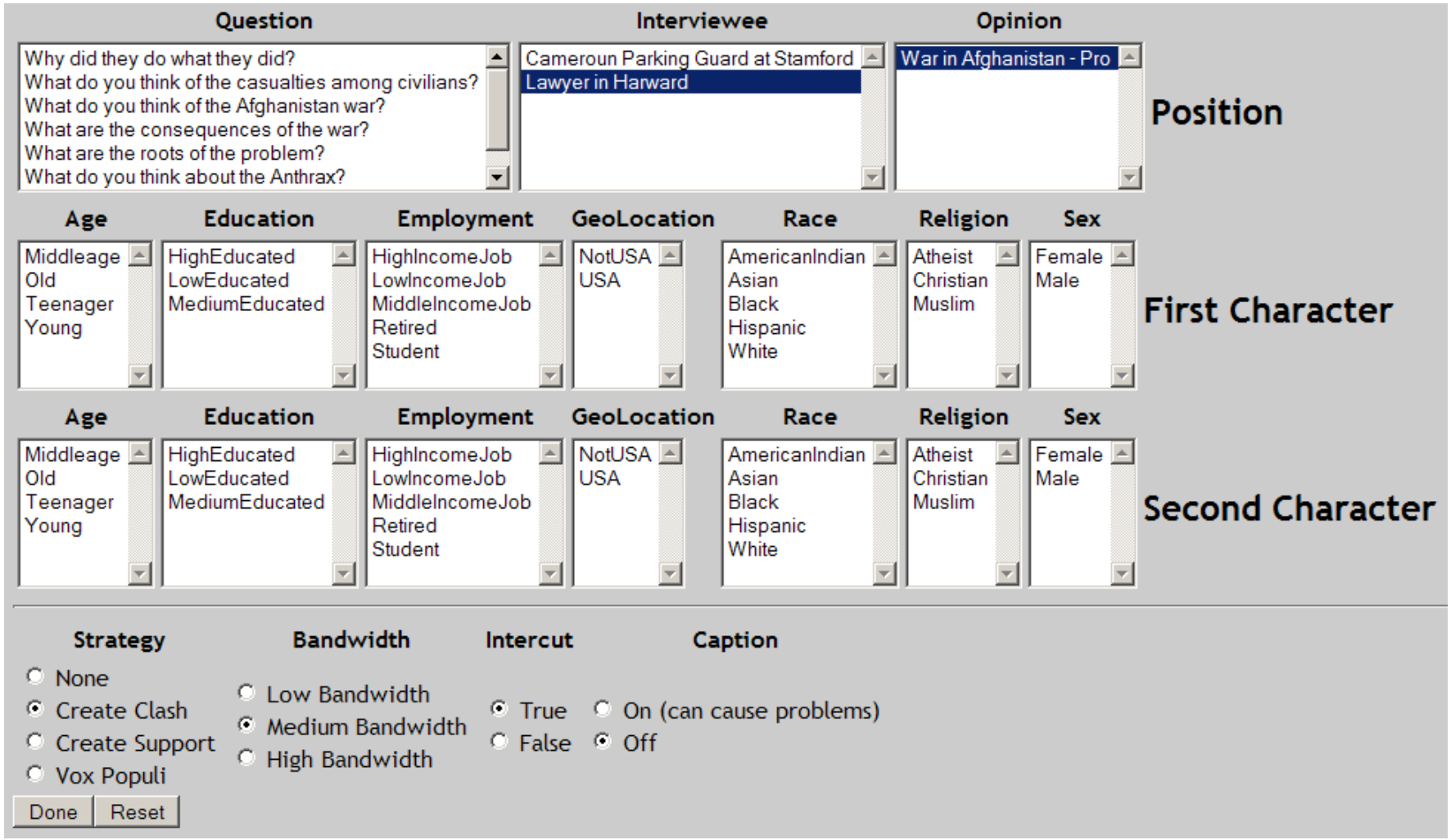
= support

= contradict

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)

Vox Populi interface



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

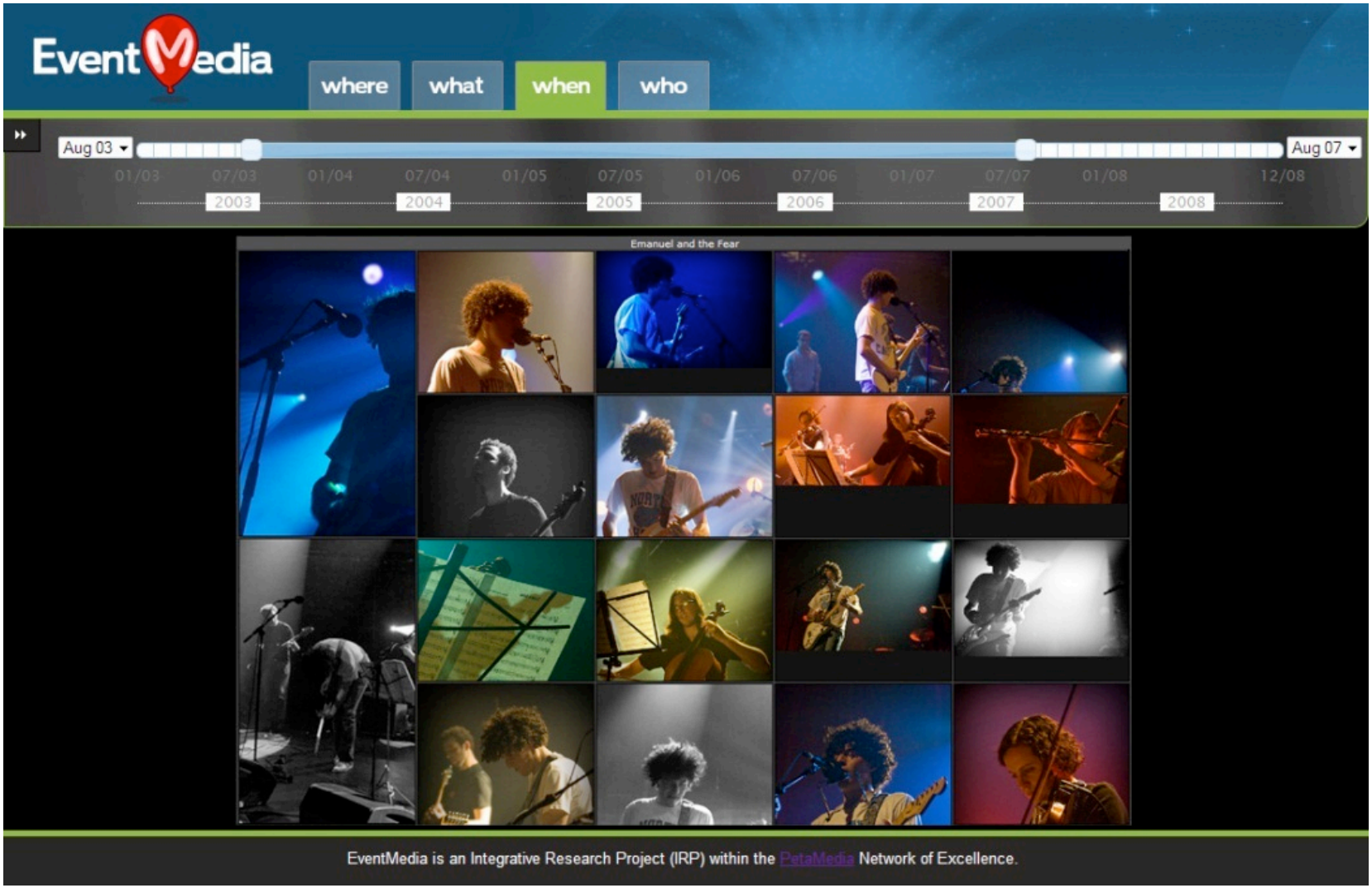
Pointers & Acknowledgments

- Demo available at:

  http://www.cwi.nl/~media/demo/VoxPopuli/

- VoxPopuli research was funded by the Dutch national ToKeN I²RP and CHIME projects

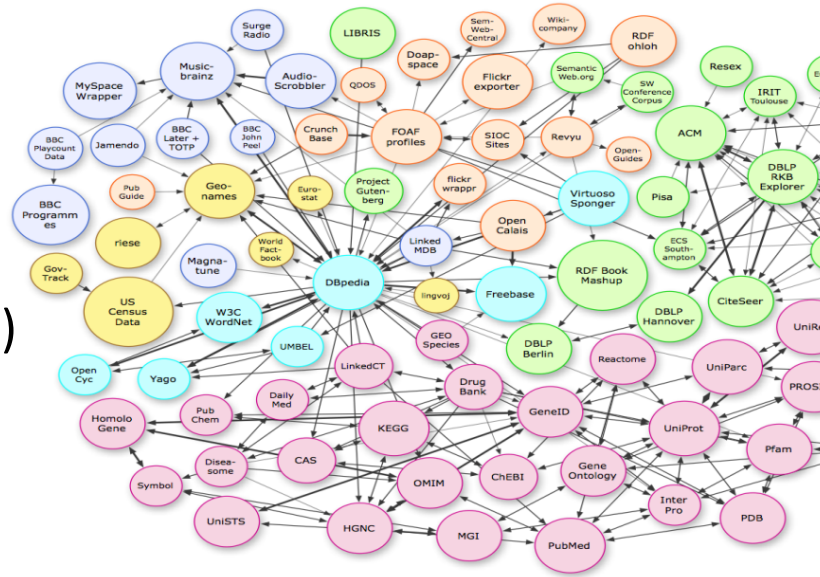
EventMedia



http://eventmedia.cwi.nl/

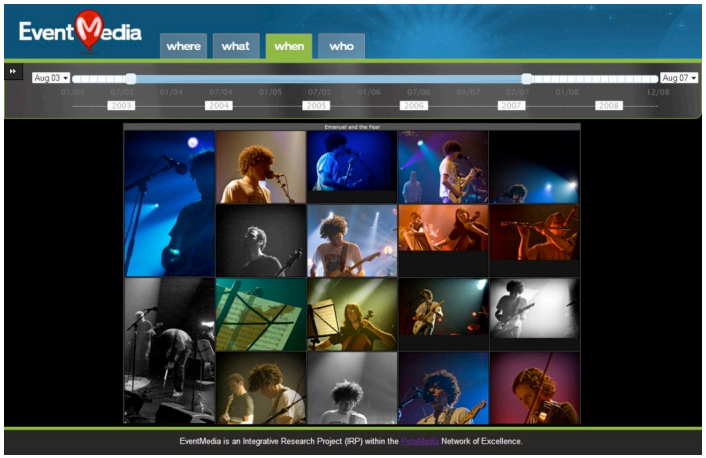
EventMedia Interlinking

- Linking Agents with
  - Freebase, Dbpedia, MusicBrainz
- Linking Venues with
  - Geonames, Dbpedia, Foursquare (via Uberblic)
- Linking Events with
  - Last.fm, Upcoming, Eventful
- Linking Categories with
  - Facebook, Eventful, Upcoming, Zevents, LinkedIn,Eventbrite, TicketMaster
- Linking Users with
  - Social Graph API



EventMedia 3

- size of different events to depend on no. of participants (popularity)
- image itself chosen most viewed image on flickr
- use image clustering to find largest numbers of similar images -> more important -> bigger;



- Looking at event (several hundreds)
- use (real-time) image clustering to show most different images.

- Metadata from tags to detect poster, ticket, stage, vocal

What are my messages?

- Metadata associated with media assets can be used for different stages of interactive access
- Metadata can be created and added by hand, linked automatically or automatically extracted
- The message itself can be made explicit (more metadata)
- Media content and metadata can be passed around and among systems
- We need community agreement on how to do this (e.g. canonical processes)
- Users can be given much richer and more flexible access to (semantically annotated) media content, but…
- we need to understand why we are generating metadata and store it in a reusable way

48

Acknowledgements

Jacco van Ossenbruggen

Frank Nack

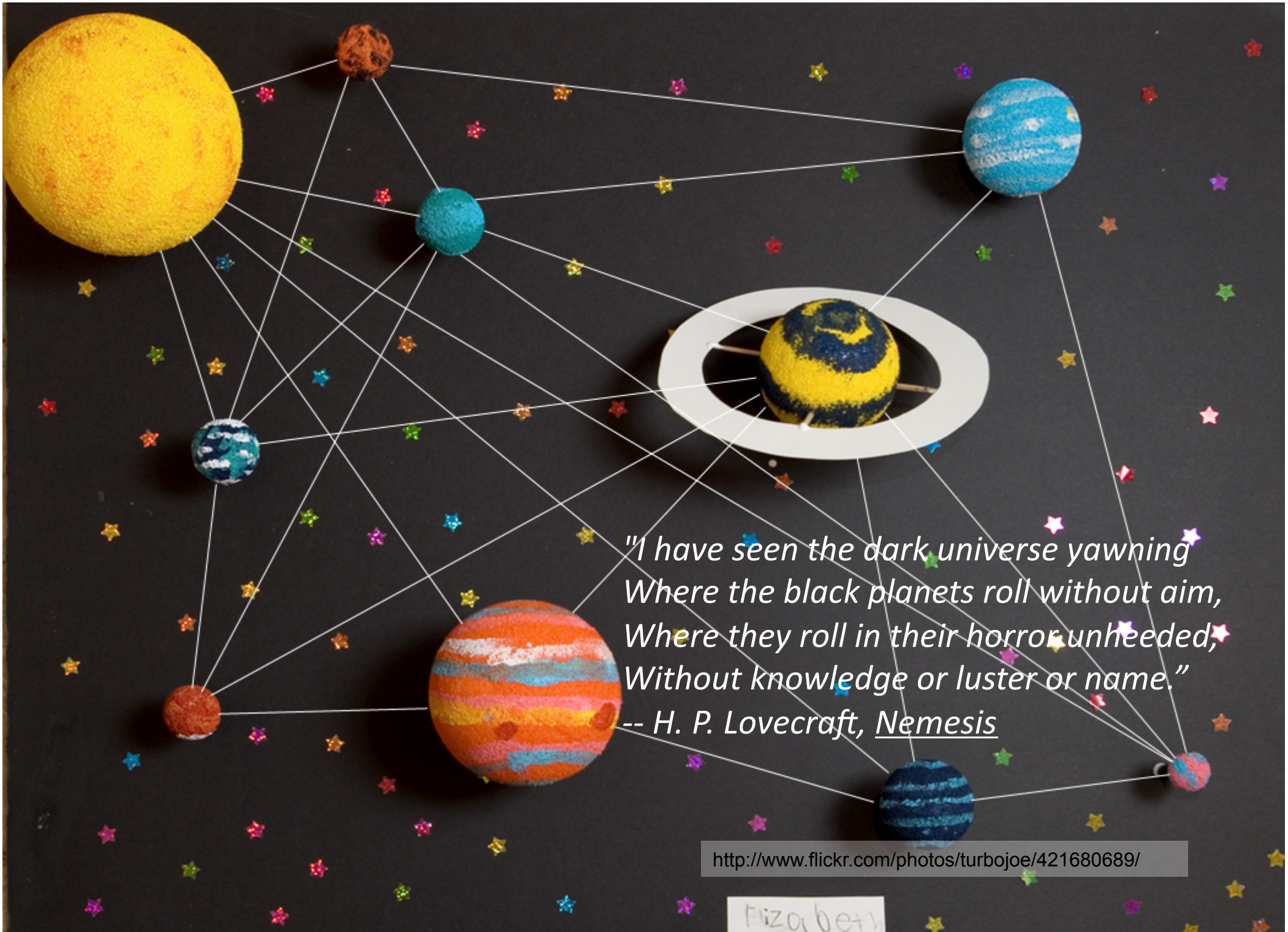
Raphaël Troncy

Stefano Bocconi

Alia Amin

Michiel Hildebrand

Andre Fialho


"I have seen the dark universe yawning
Where the black planets roll without aim,
Where they roll in their horror unheeded,
Without knowledge or luster or name."
-- H. P. Lovecraft, Nemesis
http://www.flickr.com/photos/turbojoe/421680689/