Content Management and Knowledge Management: Two Faces of Ontology-based Deep-Level Interpretation of Text

Dissertation presentation of

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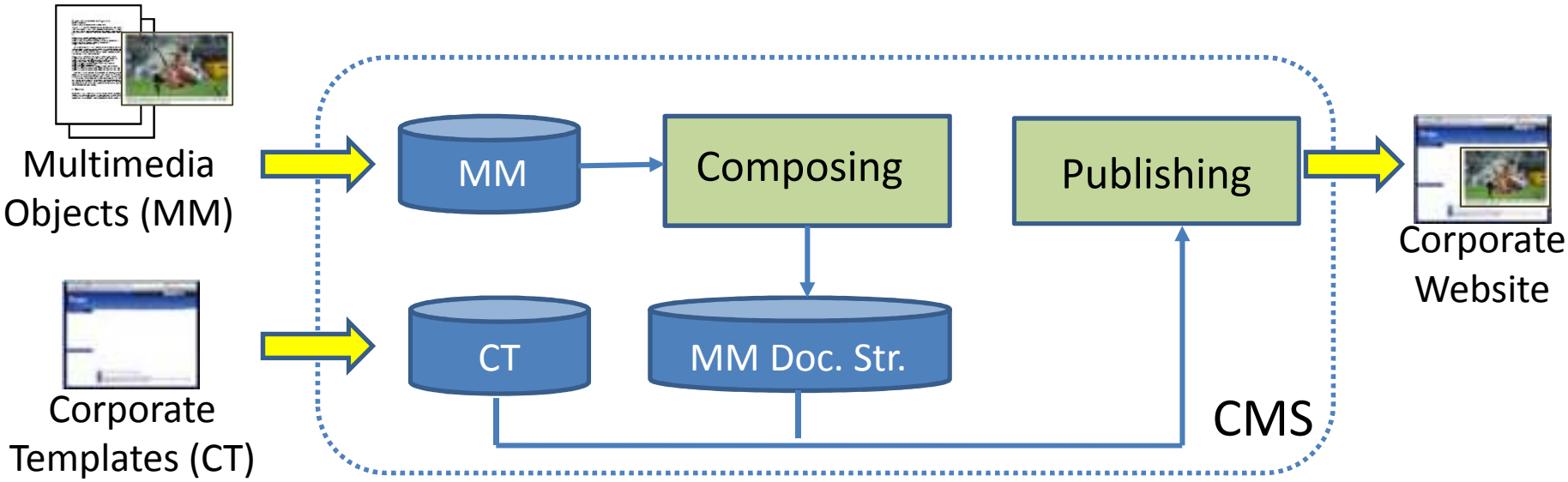
Reviewers: Prof. Möller, Prof. Menzel

Hamburg, 16th of September 2011

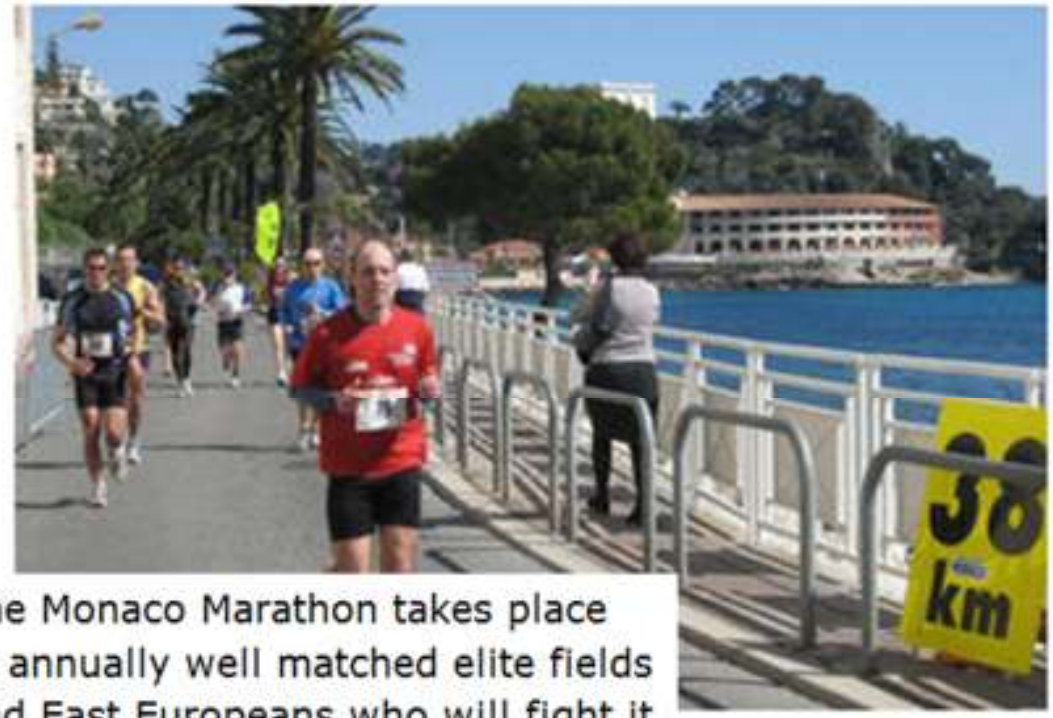
Background

- Science: Informatics
- Area: Content Management (CM)
- Standard scenario of a CM System (CMS):



Background

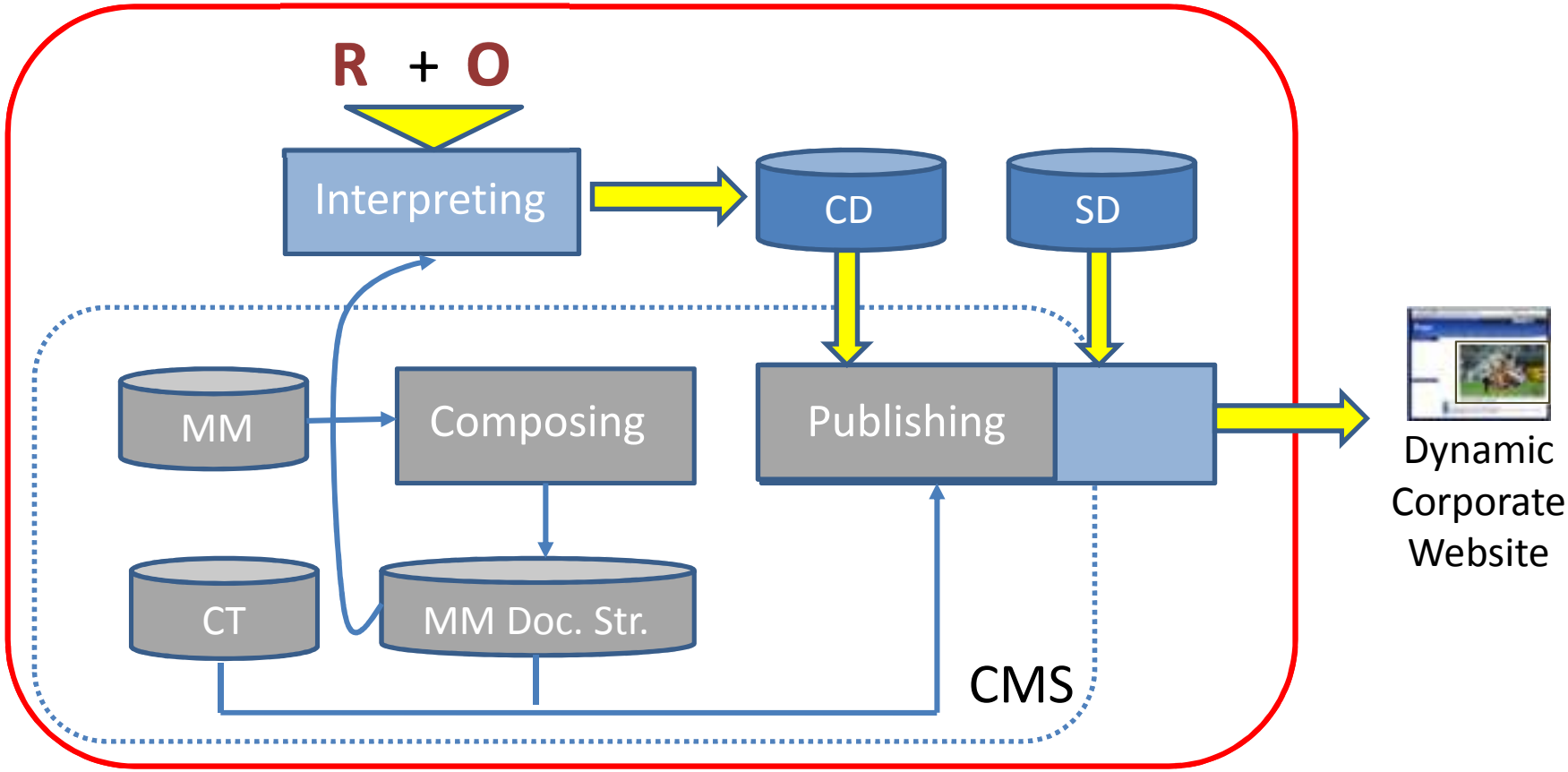
- Current CMS use:
  - Editorial information
  - Metadata
  - Structure
  - Format



Monte-Carlo - The tenth edition of the Monaco Marathon takes place Sunday 12 November, presenting its annually well matched elite fields composed mainly of East Africans and East Europeans who will fight it out on the notoriously tough Mediterranean course.

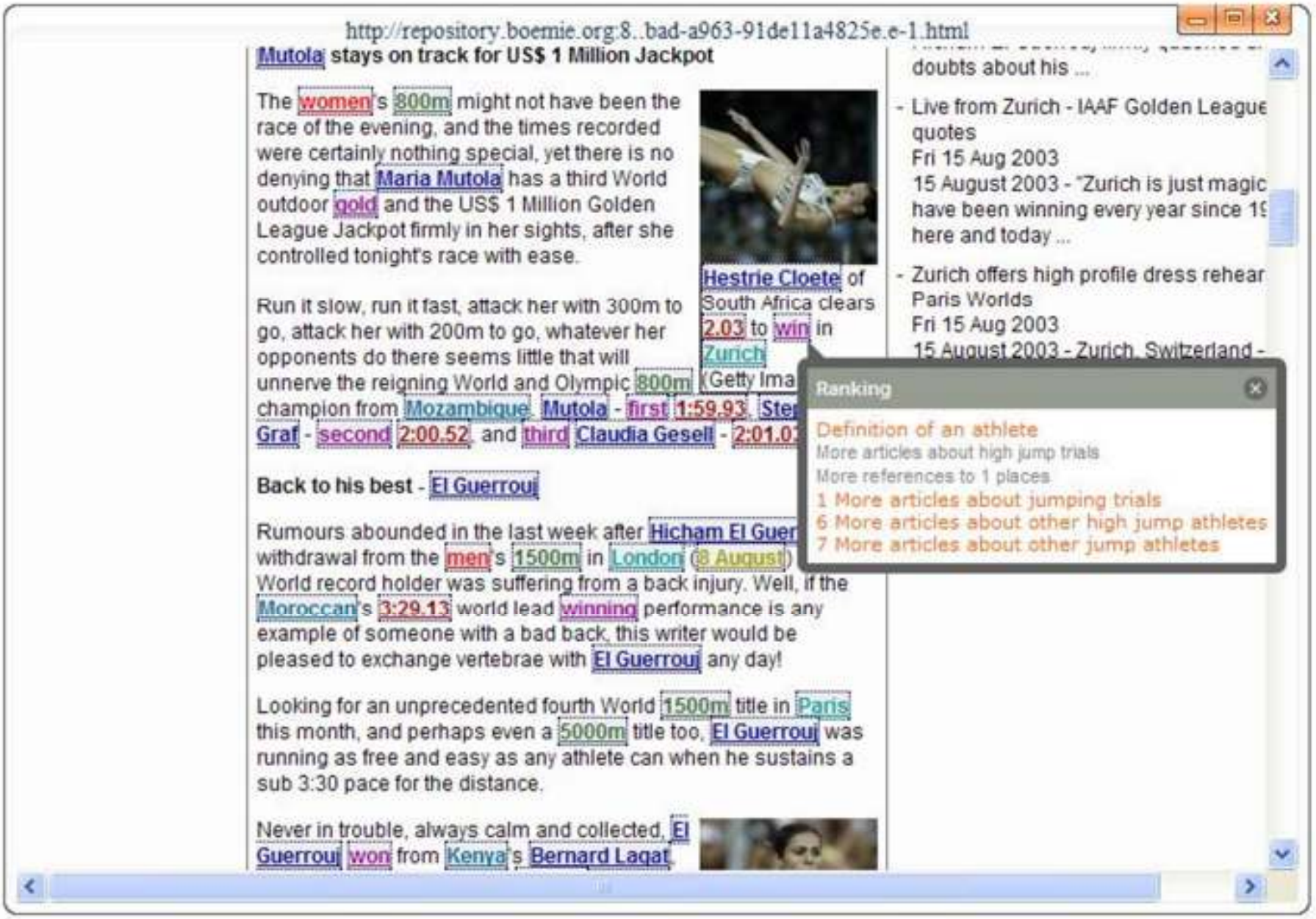
Images taken from: www.iaaf.org and www.jogging-international.net

Challenge



- Define a language for service definitions (SD) & content descriptions (CD)
- Preprocessing step for content publishing
- Automate creation of content descriptions (CD)
- Identify the knowledge that should be designed (Knowledge Management)

Challenge


http://repository.boemie.org:8..bad-a963-91de11a4825e.e-1.html
Mutola stays on track for US$ 1 Million Jackpot
The women's 800m might not have been the race of the evening, and the times recorded were certainly nothing special, yet there is no denying that Maria Mutola has a third World outdoor gold and the US$ 1 Million Golden League Jackpot firmly in her sights, after she controlled tonight's race with ease.
Run it slow, run it fast, attack her with 300m to go, attack her with 200m to go, whatever her opponents do there seems little that will unnerve the reigning World and Olympic 800m champion from Mozambique. Mutola - first 1:59.93, Ste
Graf - second 2:00.52, and third Claudia Gesell - 2:01.0
Hestrie Cloete of South Africa clears 2.03 to win in Zurich (Getty Ima
Back to his best - El Guerrouj
Rumours abounded in the last week after Hicham El Guer
withdrawal from the men's 1500m in London (8 August)
World record holder was suffering from a back injury. Well, if the Moroccan's 3:29.13 world lead winning performance is any example of someone with a bad back, this writer would be pleased to exchange vertebrae with El Guerrouj any day!
Looking for an unprecedented fourth World 1500m title in Paris this month, and perhaps even a 5000m title too, El Guerrouj was running as free and easy as any athlete can when he sustains a sub 3:30 pace for the distance.
Never in trouble, always calm and collected, El Guerrouj won from Kenya's Bernard Lagat
doubts about his ...
- Live from Zurich - IAAF Golden League quotes
Fri 15 Aug 2003
15 August 2003 - "Zurich is just magic have been winning every year since 19 here and today ...
- Zurich offers high profile dress rehear Paris Worlds
Fri 15 Aug 2003
15 August 2003 - Zurich, Switzerland -
Ranking
Definition of an athlete
More articles about high jump trials
More references to 1 places
1 More articles about jumping trials
6 More articles about other high jump athletes
7 More articles about other jump athletes

Challenge

- Current services in the market:
  - „in-depth browsing“ (ClearForest Gnosis)

Challenge

22307_W600XH400.jpg
PersonBody
PersonFace
HorizontalBar
Horizontal Bar
Buy Athletics Equipment at Sportswarehouse
More images of Hestrie Cloete being referenced as high jumper
More images of No.1 places in high jump trial
More images of Hestrie Cloete being referenced as jumper
More images of No.1 places in jumping trial
12 More Jumper Images
12 More Images of Jumping Trials
7 More Images of HighJump Trials
7 More High Jumper Images

BOEMIE
Semantic Associator

Map | Media Gallery | Image | Webpage | Video

Options | Help

Context: Crystal Palace FC | Status: media retrieved | POIs: 2 | Images: 15/15 | Webpages: 13/13 | Videos: 8/8

City:
London

Search

Crystal Palace FC

Media gallery available

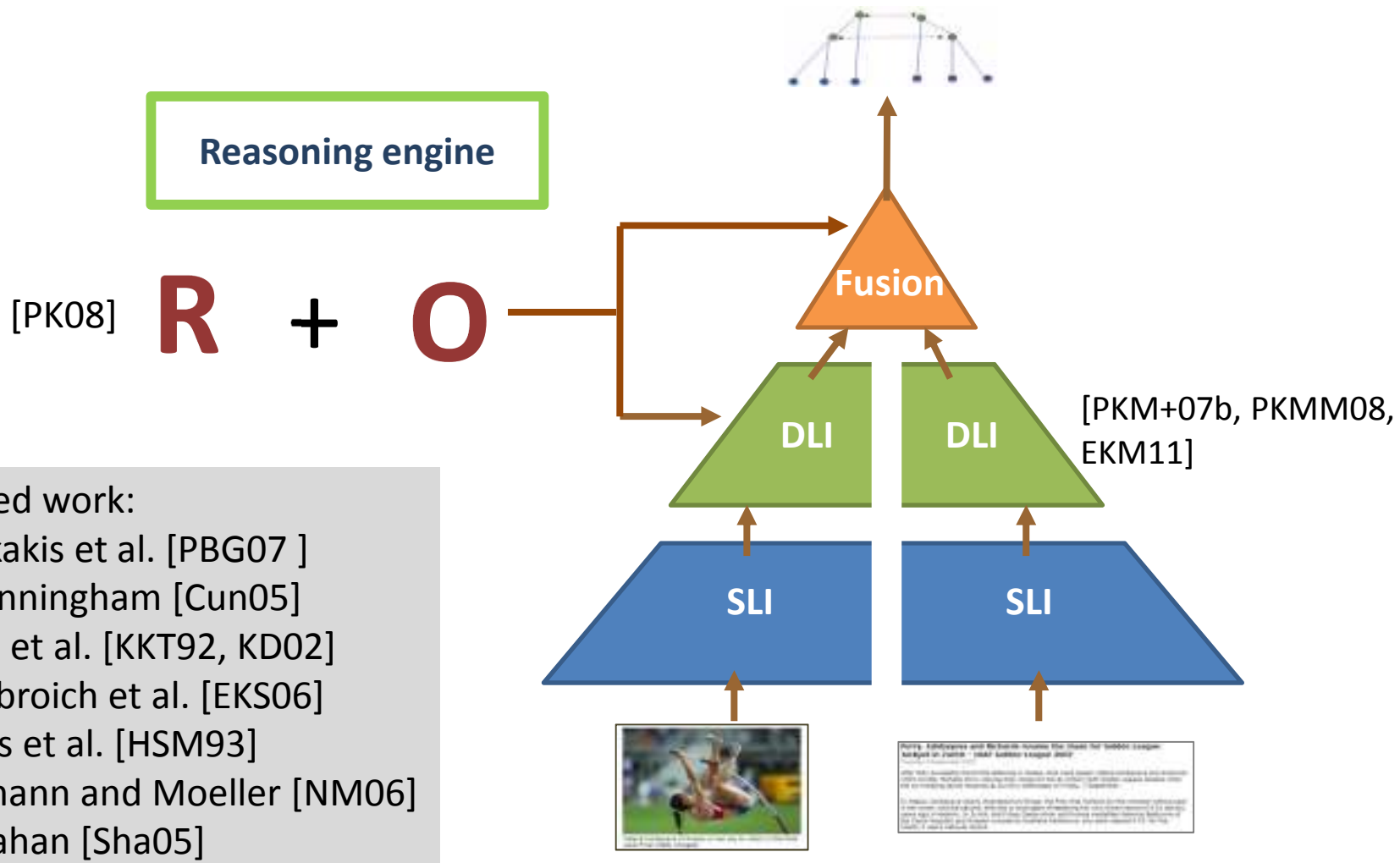
Crystal Palace FC

0.00579, 51.47685

Methodology

- Development of a prototypical application
  - Realistic content repositories
  - Use of SOA analysis and interpretation tools
  - Extension of the publishing process of CM
  - Useful domain ontology and rules
- System evaluation by EU project partners
  - End users

Interpretation

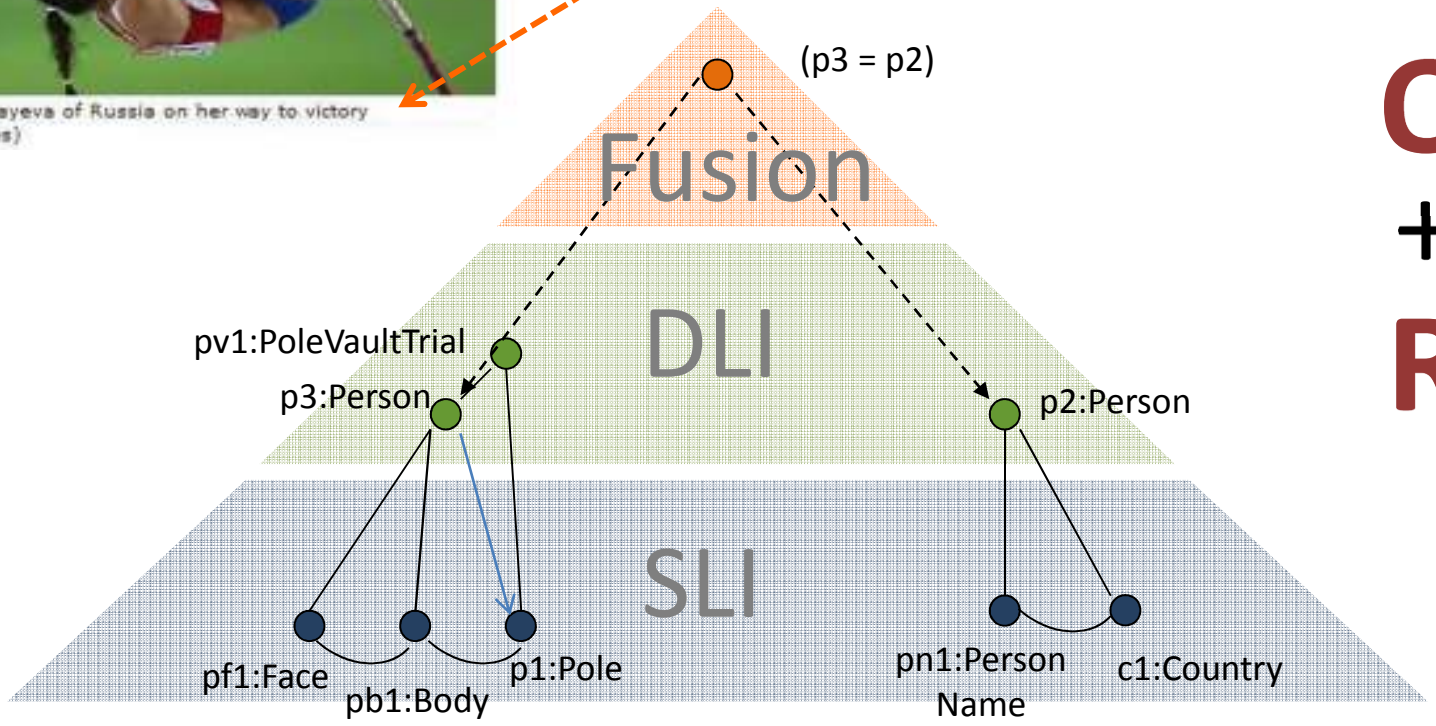


Related work:
Patrikakis et al. [PBG07]
H. Cunningham [Cun05]
Kakas et al. [KKT92, KD02]
Elsenbroich et al. [EKS06]
Hobbs et al. [HSM93]
Neumann and Moeller [NM06]
Shanahan [Sha05]

[PKM+07b] IEEE/WIC/ACM International Conference on Web Intelligence (WI`07)
[PKMM08] Conference on Intelligent Text Processing and Computational Linguistics (CICLing-2008)
[EKM11] Book chapter on Knowledge-Driven Multimedia Information Extraction and Ontology Evolution, number 6050 in LNAI
[PK08] Ontology and Rule Design Patterns for Multimedia Interpretation, http://www.boemie.org/boemie2008

Symbolic descriptions of content

Yelena Isinbayeva of Russia on her way to victory (Getty Images)



O ntology

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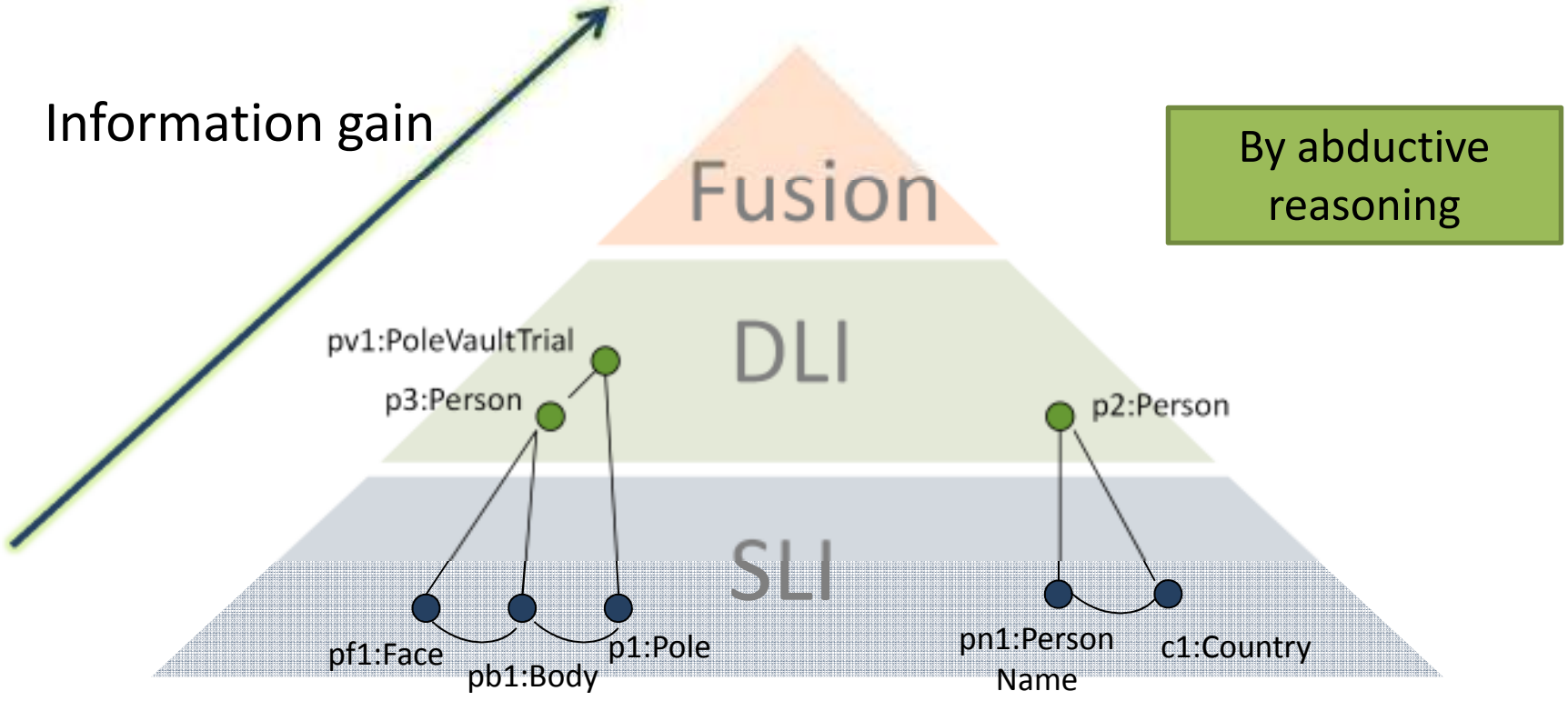
R ules

R

$$personNameToCountry(X,Y) \leftarrow Person(Z), hasName(Z,X), PersonName(X), hasNationality(Z,Y), Country(Y).$$

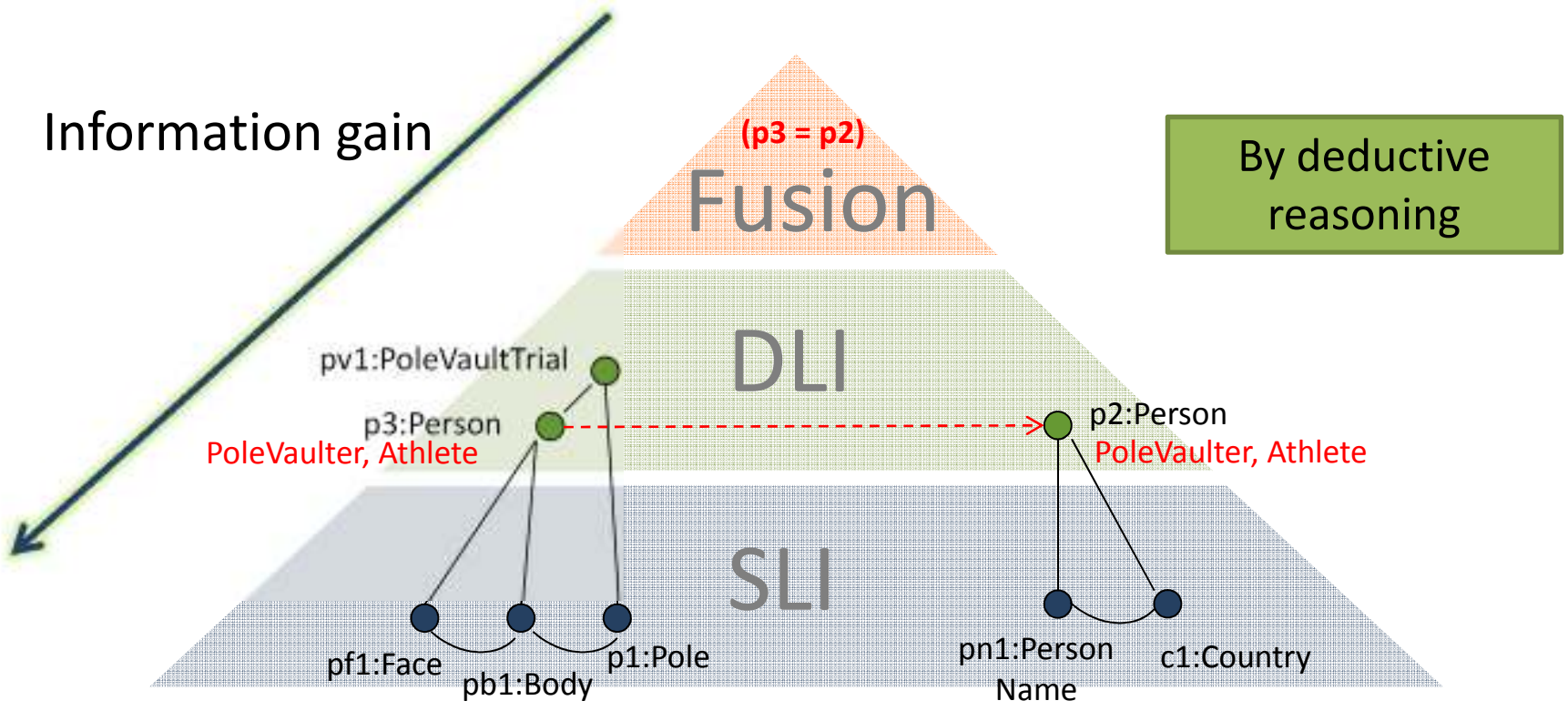
$$isAdjacent(X, Y) \leftarrow Person(Z), hasPart(Z, X), Body(X), hasPart(Z, Y), Face(Y).$$



By abductive reasoning

O

$$PoleVaultTrial \sqsubseteq \forall hasParticipant.PoleVaulter$$
$$PoleVaulter \sqsubseteq Athlete$$
$$Athlete \sqsubseteq Person$$



By deductive reasoning

Service definitions

$$HorizontalBar \sqsubseteq AthleticsEquipment$$

b1:HorizontalBar

+

reasoning

Service Id: 1

Legend: Buy Athletics Equipment at Sportswarehouse

SemanticFootprint: **{ (x) | AthleticsEquipment (x) }**

Type: WebNavigation

URL: http://www.sportswarehouse.co.uk/acatalog/Athletics

Determines applicability

Service definitions

“More images of Hastrie Cloete being referenced as high jumper”

Service Id: 306

Legend: More images of %Value1% being referenced as high jumper

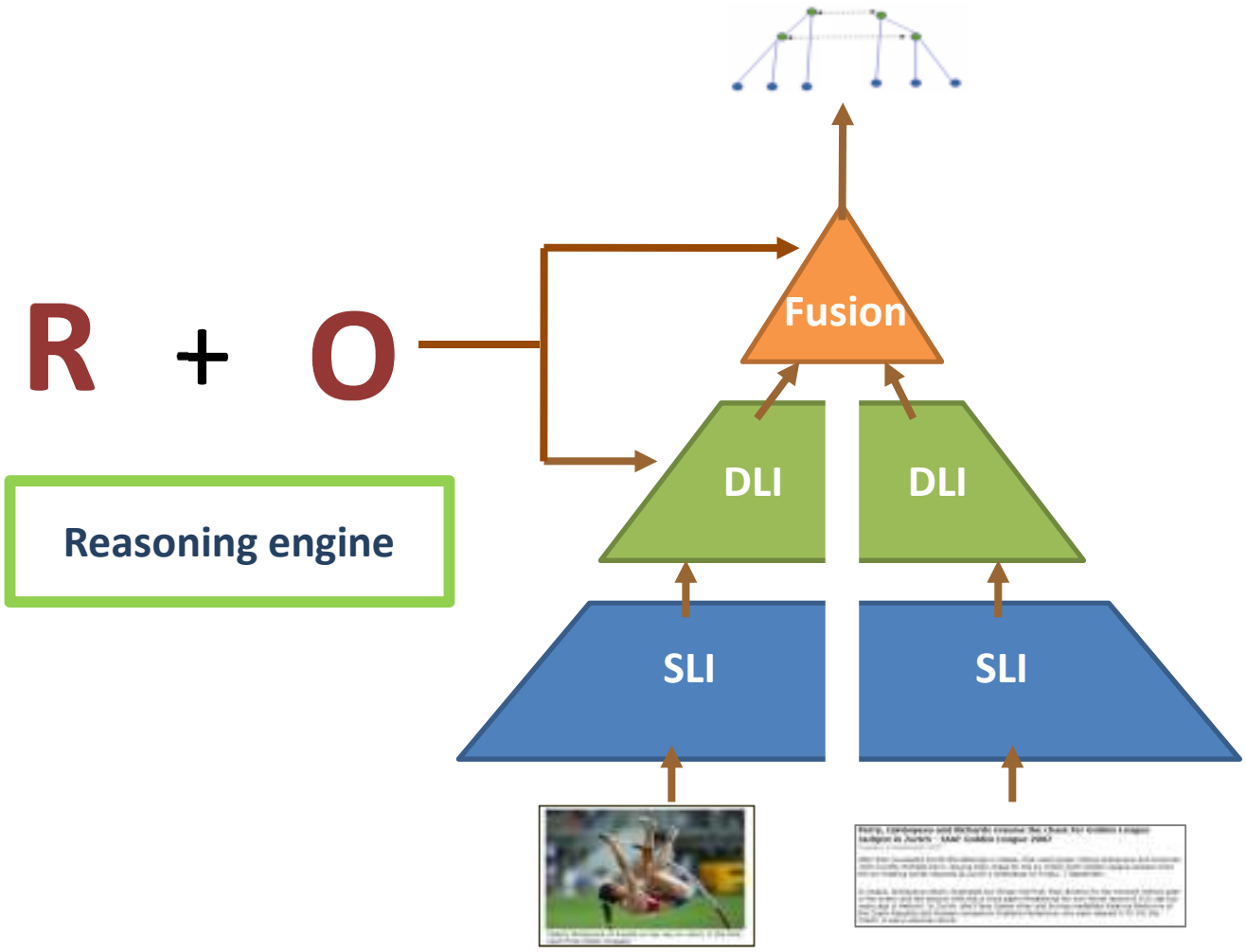
SemanticFootprint: **{ (Z) | HighJumper(Z), hasName(Z,Y), PersonName(Y) }**

Arguments: (PersonName (hasPersonsNameValue, %Value1%))

Type: SparqlQ

Code:

Knowledge Management



Knowledge Management

- Grounded Ontology Design:

  - Interpretation results used as feedback

- Semi-automatic tools for ontology evolution

  Castano et al. in [CEF+09, CEF+07]

- Ontology and rule design patterns

Achievements

- Formalized a process of DLI [PKM+07b, PKMM08, EKM11].
- Formalized abduction [PKM+07a, PKM09a].
- Designed patterns for ontology and rule engineering [PK08].
- Presented a new perspective of knowledge engineering called grounded ontology design [CEF+09].
- Showed with a prototype [PKM09b], practical advantages of CD & SD if offered by CMS

[PKM+07b] IEEE/WIC/ACM International Conference on Web Intelligence (WI`07)
[PKMM08] Conference on Intelligent Text Processing and Computational Linguistics (CICLing-2008)
[EKM11] Book chapter on Knowledge-Driven Multimedia Information Extraction and Ontology Evolution, number 6050 in LNAI
[PKM+07a] In Proc. of DL-2007
[PKM09a] Description Logics, CEUR Workshop Proceedings. CEUR-WS.org, 2009.
[PK08] Ontology and Rule Design Patterns for Multimedia Interpretation, http://www.boemie.org/boemie2008
[CEF+09] In Journal of Logic and Computation, Oxford University Press, 2009.
[PKM09b] In Proc. Of AST, LNI, 2009. Gesellschaft fur Informatik, Bonn, INFORMATIK 2009.