



## Testing Smart Information Retrieval Prototypes

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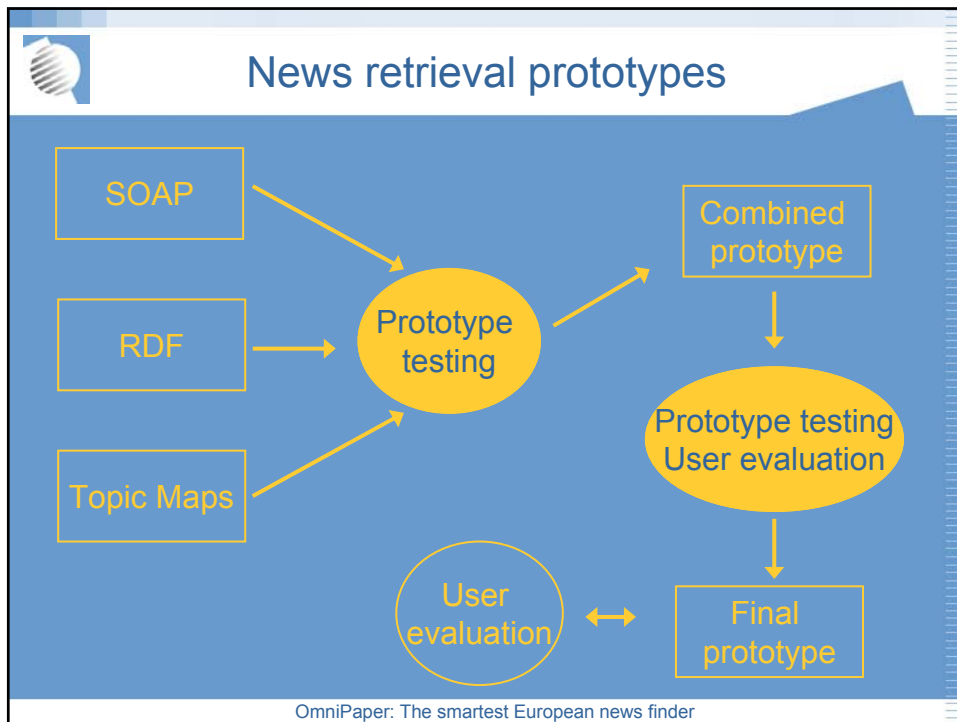
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## OmniPaper: short introduction

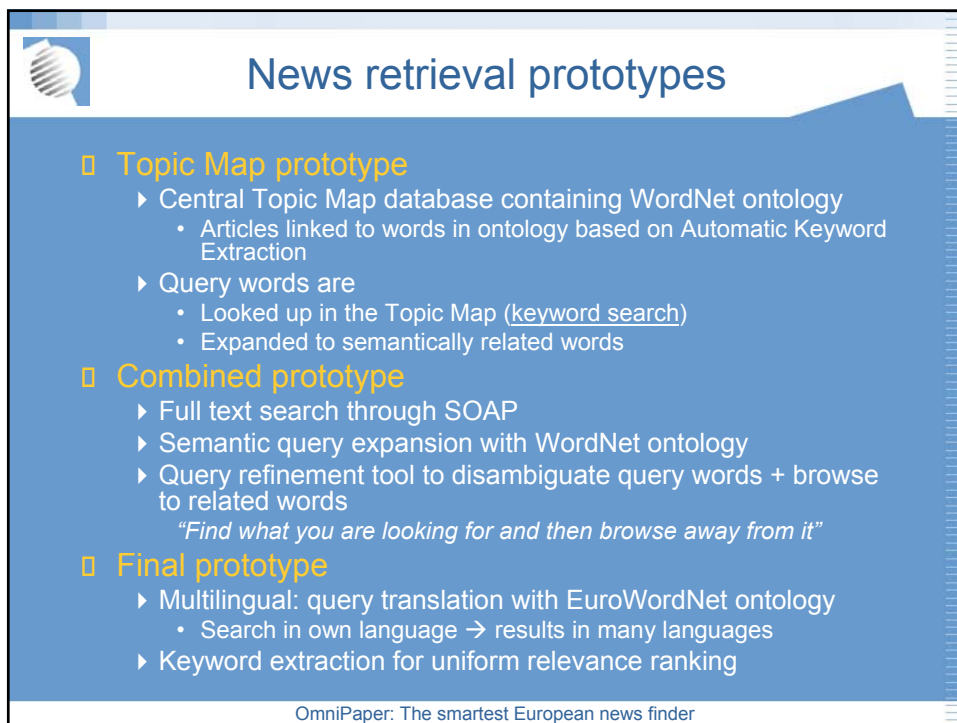
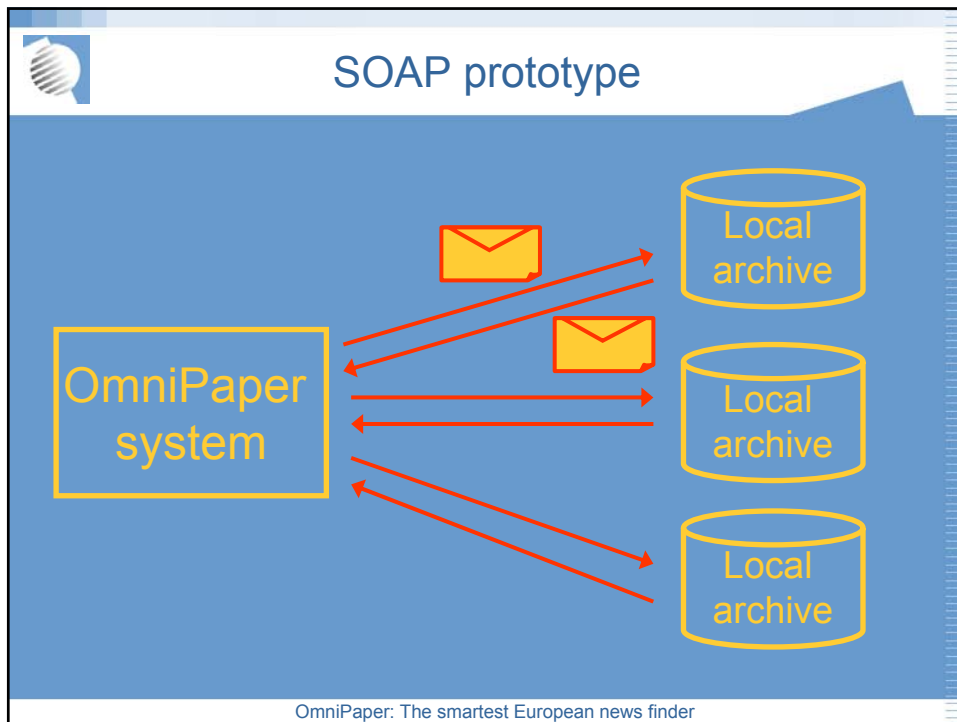
- **EU-funded project (FP5)**
  - ▶ 3-year project: Jan 2002 – Dec 2004
- **Main goals:**
  - ▶ Propose solutions for information overload problem
  - ▶ Combine shattered data sources into a “*virtual super-archive*”
- **Concrete work:**
  - ▶ Create a *multilingual navigation and linking layer* on top of distributed information resources
  - ▶ Prototypes in news area
    - One smart access point to distributed news databases
    - Different prototypes to cross-evaluate IR methods on one data set

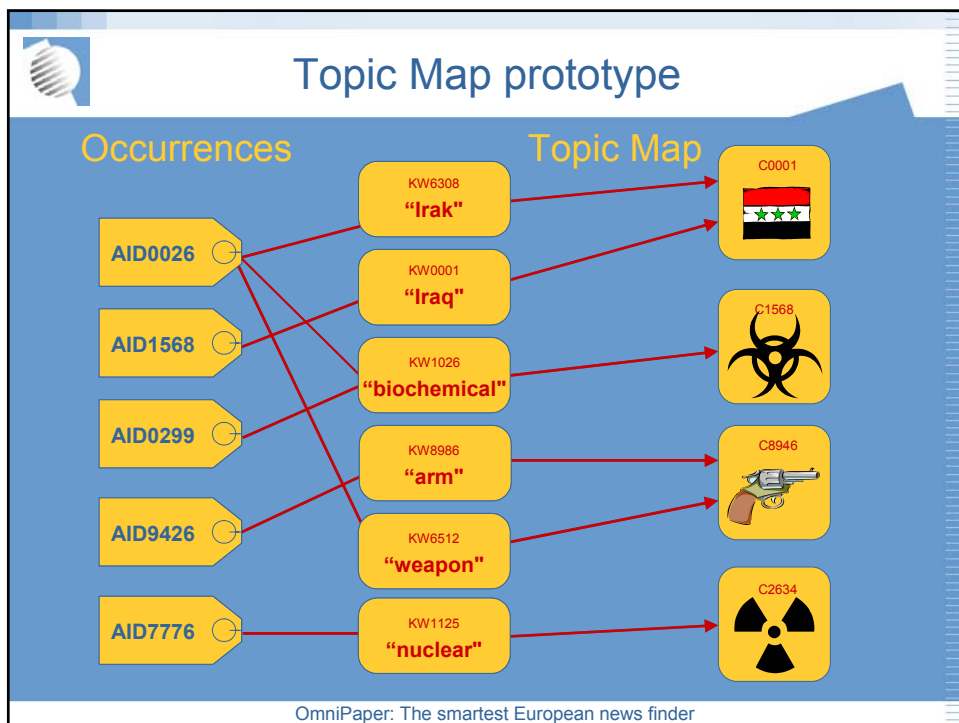
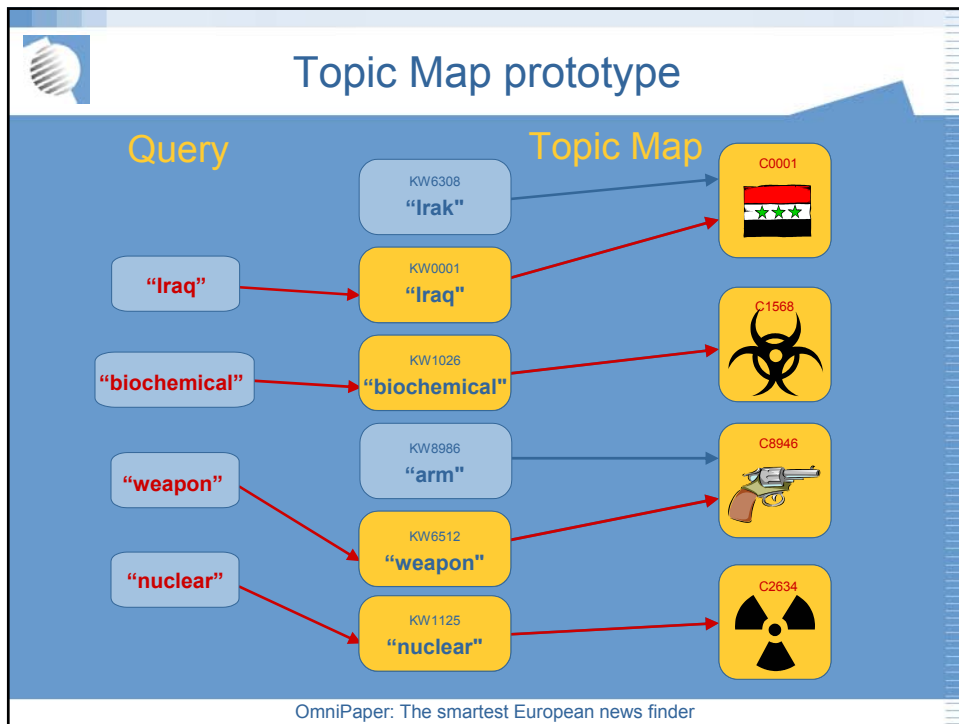


## News retrieval prototypes

- **Common features:**
  - Search for news articles
  - Data set of English articles from Sep 2002
- **SOAP prototype:**
  - Queries forwarded to distributed news databases
  - IR system relies on search systems of these databases
  - Full-text search
- **RDF prototype**
  - Central metadatabase storing all metadata of news articles in test set
    - Native RDF database (RDF Gateway)
  - Queries answered by this database
  - Metadata search (searching keywords extracted from articles)

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## Combined prototype

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Search for:   [Simple search](#) | [Advanced search](#)

**Web of concepts**

zoom out      zoom in

pan down      pan up

pan to right      pan to left

**Search results**

Your original query: penalty OR France OR England  
[Show expanded query](#)

100 Results      Results 1 to 10

<b>STATEOFPLAY Essential guide to Euro 2004</b>		
61,00%	2004-6-17	THE DAILY TELEGRAPH
<b>YOUR VIEW Reaction to France v England</b>		
45,00%	2004-6-17	THE DAILY TELEGRAPH
<b>Blisters on England soles not as serious as blisters on souls</b>		
45,00%	2004-6-16	THE DAILY TELEGRAPH
<b>Croatia grab point with showing of real serve EURO 2004 group b</b>		
43,00%	2004-6-18	THE DAILY TELEGRAPH
<b>EURO 2004 MAN MARKING How the England players fared</b>		
43,00%	2004-6-18	THE DAILY TELEGRAPH
<b>England expects more from these superstars</b>		
43,00%	2004-6-17	THE DAILY TELEGRAPH
<b>Time to compose sweet music</b>		
		THE DAILY TELEGRAPH

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## Cross-testing of prototypes

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- **Comparison criteria:**
  - Relevancy: recall, precision and F-value
  - Response time
  - Data size
- **Test set**
  - Manually created topics, queries and reference result sets
- **Test system: Automatic Testing Engine**
  - Submit test queries in XML file through a web interface
  - Test engine:
    - forwards queries to all prototypes
    - combines responses
    - Calculates results
    - displays results in HTML and SVG

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## Test results: relevancy

Relevancy summary table:

	SOAP	RDF	Topic Maps	Combined prototype
Recall	0.53	0.33	0.36	0.39
Precision	0.48	0.27	0.17	0.39
F-value	0.45	0.19	0.20	0.36

(values are averages over queries)

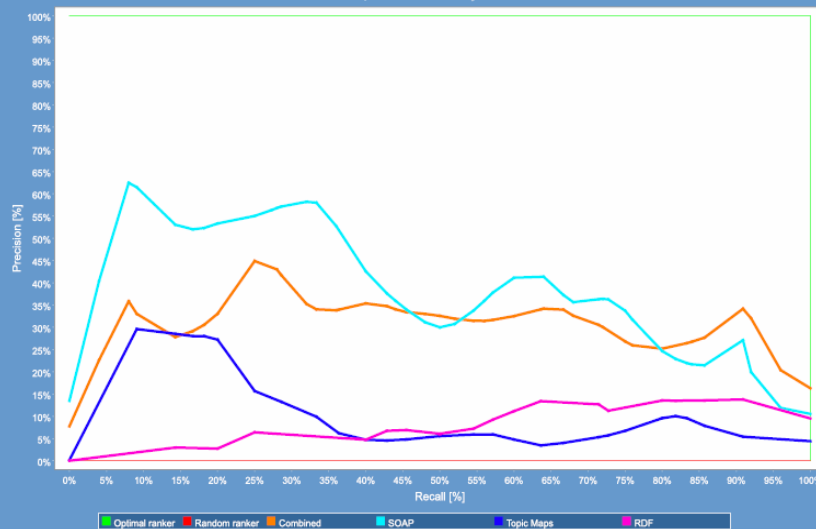
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## Test results: relevancy

Recall - precision graph

Topic: Overall summary



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## Relevancy conclusions

- ❑ **Keyword-based search (RDF and Topic Maps) has poor results in recall**
  - ▶ A lot of results are not found because only extracted keywords can be found
  - ▶ Dependence on keyword extraction performance
- ❑ **Full-text search (SOAP) is performing best, both in terms of recall and precision**
  - ▶ Decision to use SOAP + query expansion in combined prototype
- ❑ **Semantic query expansion does *not* make full-text search engines perform better in terms of recall and precision**
  - ▶ It *does* have interesting applications for users as query aid tool
- ❑ **Influence of stemming:**
  - ▶ Slight gain in recall
  - ▶ No gain in precision

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## Test results: response time

Response time summary table:

	SOAP	RDF	Topic Maps	Combined prototype
Database time	0	0.78	2.30	2.55
Network time	3.40	0	0	2.00
<b>Total time</b>	<b>4.55</b>	<b>0.79</b>	<b>2.36</b>	<b>4.90</b>

(values are averages over queries / scale = seconds)

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## Response time conclusions

- ❑ Use of SOAP increases response time due to network traffic and delay
- ❑ Still, SOAP is retained as search method for combined prototype
  - ▶ Better recall / precision
  - ▶ No content (nor metadata) needed in central system
    - Virtual archive philosophy
    - Avoid tremendous efforts in article gathering
    - Up-to-date information
- ❑ Use of Topic Map DB increases DB time
  - ▶ Because of heavy querying in ontology for query translation and/or expansion

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## User evaluation

- ❑ Survey conducted within group of end users
  - ▶ Professional news users
  - ▶ Average user:
    - is 26 to 35 years
    - Attended University or College
    - more than 5 years experience with using computers
    - uses the Internet several times per day via a broadband connection
- ❑ Method:
  - ▶ Questionnaire: system usage, system features and overall user experience
  - ▶ Tasks (queries) + user feedback on task success
- ❑ Evaluated prototype: combined prototype

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## User evaluation results

- ❑ Users are not confident enough in search results
- ❑ Users like the query refinement tool (web of concepts)
- ❑ Users are not using the hierarchical subject view for searching news articles

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## Conclusions

- ❑ Gap between user experience and statistical results
  - ▶ User experience is very subjective, hard to measure in terms of statistics
  - ▶ Traditional IR evaluation methods do not take into account user experience
- ❑ Combination of statistical (brute force, full-text) and semantic (ontology) search methods can greatly increase the user search experience
  - ▶ High interaction between querying and navigating

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## Learn more?

- OmniPaper web: [www.omnipaper.org](http://www.omnipaper.org)
- E-Mail: [info@omnipaper.org](mailto:info@omnipaper.org)
- Subscribe to our newsletter !
- Become a beta tester for the multilingual prototype (end October)
- Attend the OmniPaper seminar
  - ▶ Thu 2 December in Leuven (Belgium)

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