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Web Retrieval

Interactive Information Retrieval (IIR)

Frank Hopfgartner
Institute for Web Science and Technologies

Recapitulation

- PageRank
  - Web graph
  - Origins
  - Motivation
  - Idea of PageRank
  - Recursive formalization
  - Random surfer
  - Formal Model

And today…

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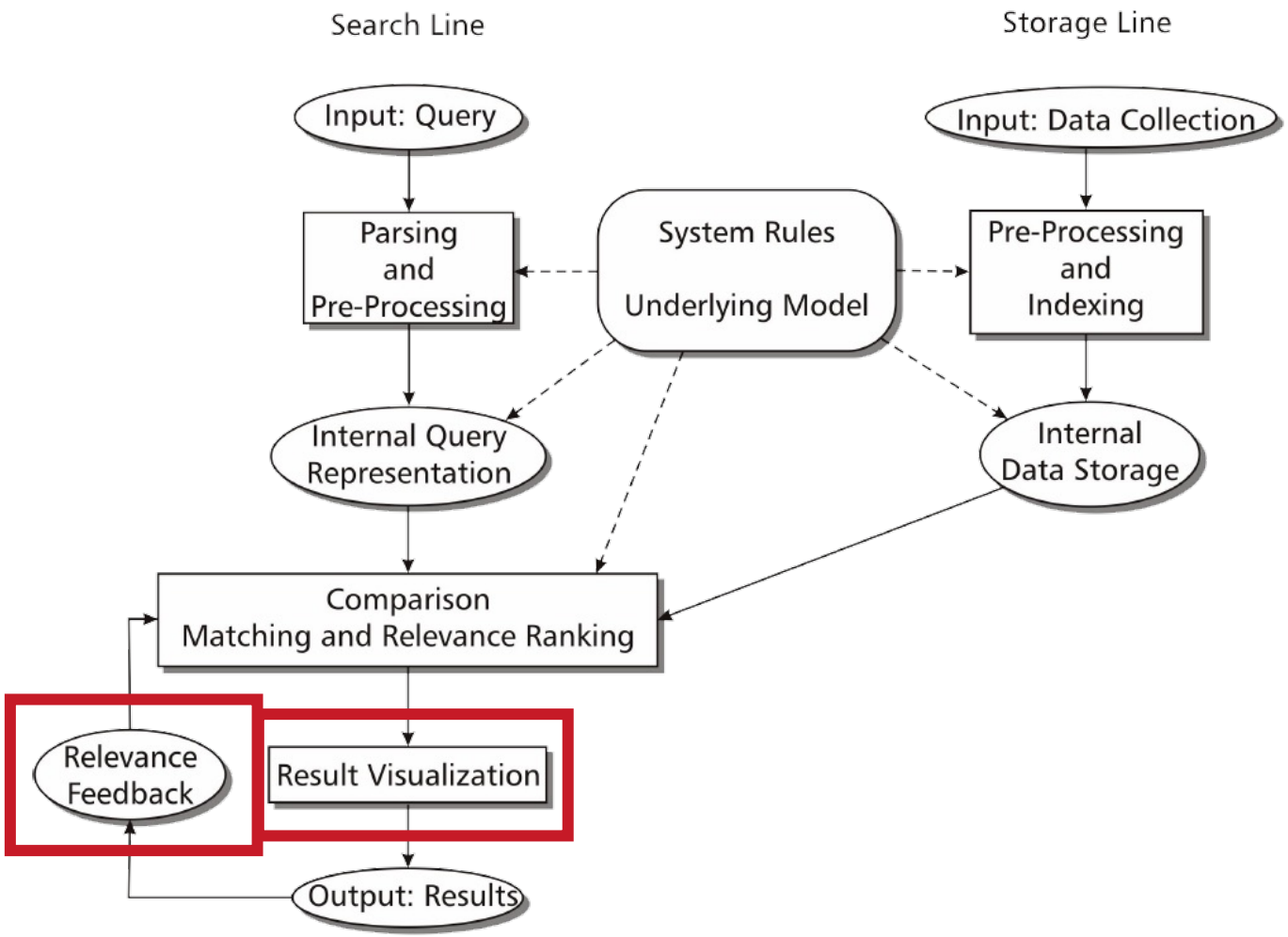
- Interactive Information Retrieval (IIR) – study of search interfaces, and user interaction with these interfaces.
  - IIR is often concerned with the development and evaluation of new search interfaces.

- From Wilson (2011):
  - “Information Seeking – the study of how humans achieve larger goals, which include (but are not limited to) IIR and other searching behaviours.
  - Information Behaviour – a term for overall behaviour with information, which includes seeking, but also creating, using, avoiding, and destroying information.”

IR System Architecture



Intended Learning Outcomes

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At the end of this lecture, you will be able to:

- clarify the role of context in search
- outline how to model search behaviour
- summarise key features of search interfaces
- describe various search modes

Outline

- Search in context
- Modelling search behaviour
- Search user interfaces
- Search modes
- Summary

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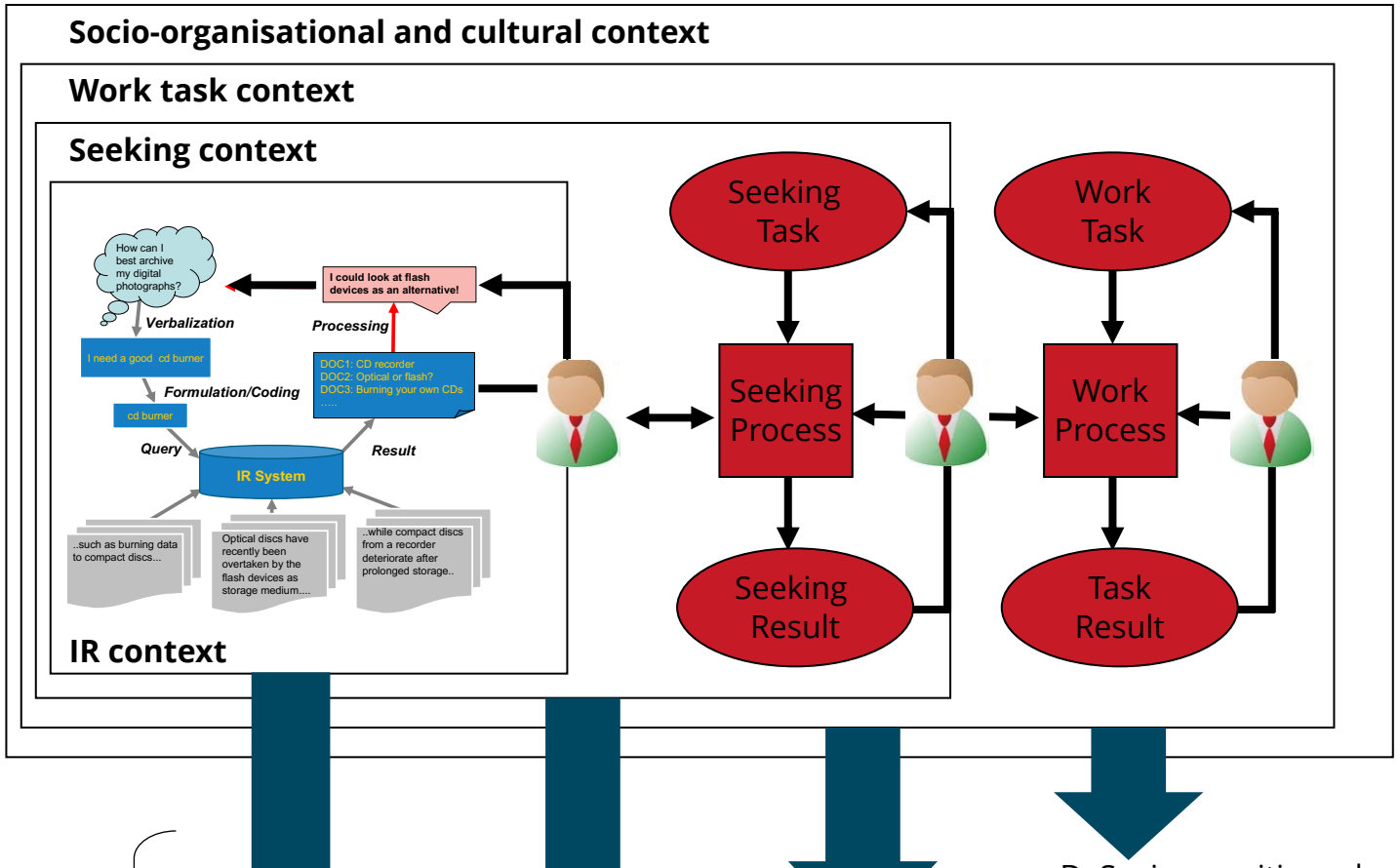
1. Search in Context

“Contexts” of IR Evaluation

Ingwersen: & Järvelin, K. (2005). *The turn: integration of information seeking and retrieval in context*, New York, NY: Springer-Verlag



Measurement

A: Recall, precision, efficiency, quality of information/process

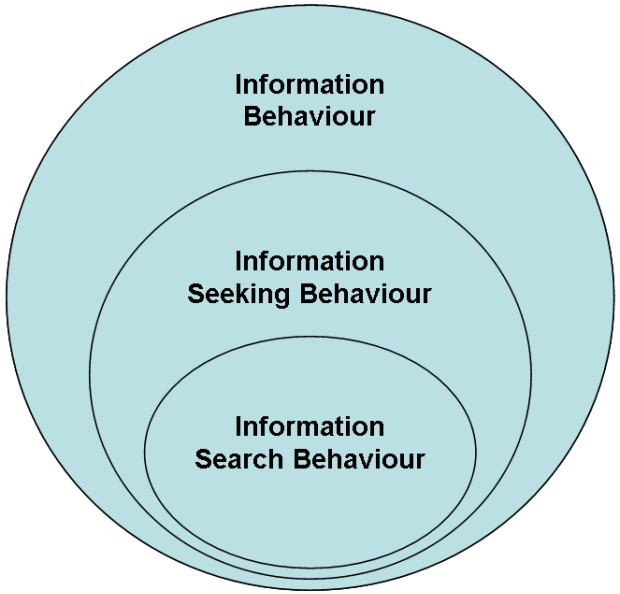
B: Usability, quality of information/process

C: Quality or work and task process/result

D: Socio-cognitive relevance, quality of work task result

Thinking about users

- Work tasks
- Information needs
- Information seeking tasks
- Information seeking behaviour
- Search tasks
- Information search behaviour
- Search modes



Information needs

- Anomalous State of Knowledge (ASK) (Belkin et al, 1982)
  - Puts information needs at the heart of IR
  - Users realise that there is an anomaly ("gap") in their knowledge with regard to the problem situation (context –> task, etc.) they face
  - This is realised as an information need
  - They undertake an information seeking process to fulfil the need
  - Once information is found, they re-assess if the gap has been closed
  - If not, they revise the need and seek more information…
  - Information retrieval (seeking) is therefore an iterative process, and IR systems should support this type of search activity

Information needs

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- **Identification of a visceral need** – a “vague sort of dissatisfaction” that is unexpressed
- **Formulation of a conscious need** - expressed as “an ambiguous and rambling statement” and which sometimes results in communicating the need to another person
- **Construction of a formalised need** - expressed as a “qualified and rational” statement of the need
- **Establishment of a compromised need** - a query that is expressed in terms that fit the organization of the information system (i.e., the library collection or database)

Taylor, Robert S. (1968). Question negotiation and information seeking in libraries. *Journal of College and Research Libraries* **29** (3), 178-94.

Converting information needs to search terms

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Challenges

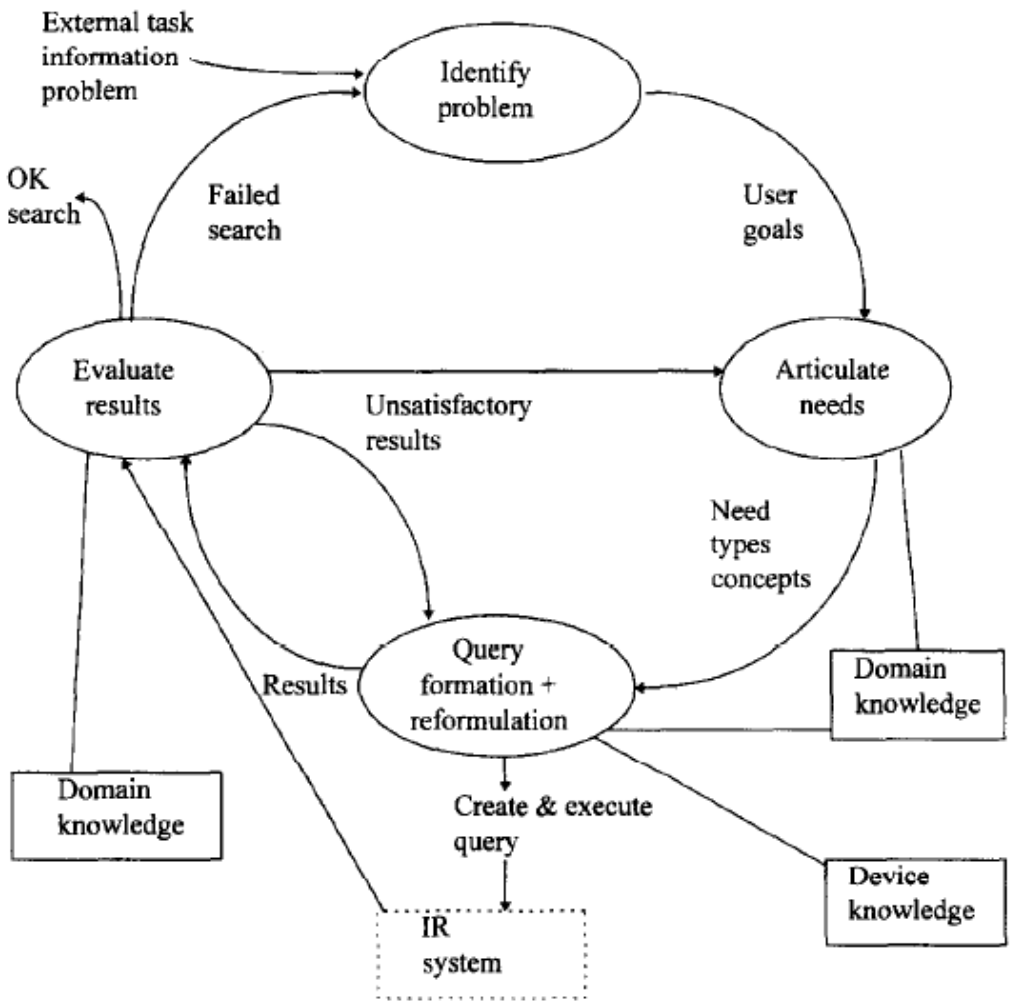
- Expressing the need as keywords
  - Subject knowledge & vocabulary
  - Knowing how the system works
- Users typically search with one or few keywords
  - Search engine needs to try to ‘understand’ the user needs and/or compensate for lack of keywords
- Language issues
  - E.g. different usage in UK/US English, technical terms, words in common usage
- Contextual issues
  - E.g. user role, expertise level, geographical and temporal factors

Web search types

- Broder's Taxonomy classified web queries into:
  - Navigational:
    - user's intent is to reach a particular web site
    - e.g. "Institute WeST homepage", "University of Koblenz", to find a particular organisation's web page
  - Informational:
    - intent is to gather information
    - e.g. background or specific information such as "the history of the data science", "recipe for carrot cake", "reviews of latest iPhone"
  - Transactional:
    - intent is to perform a web-mediated activity
    - e.g. finding a page to download software (such as "download OpenOffice"), finding a retailer of a specific product "cheap iPhone", compare prices "best broadband deals", etc.

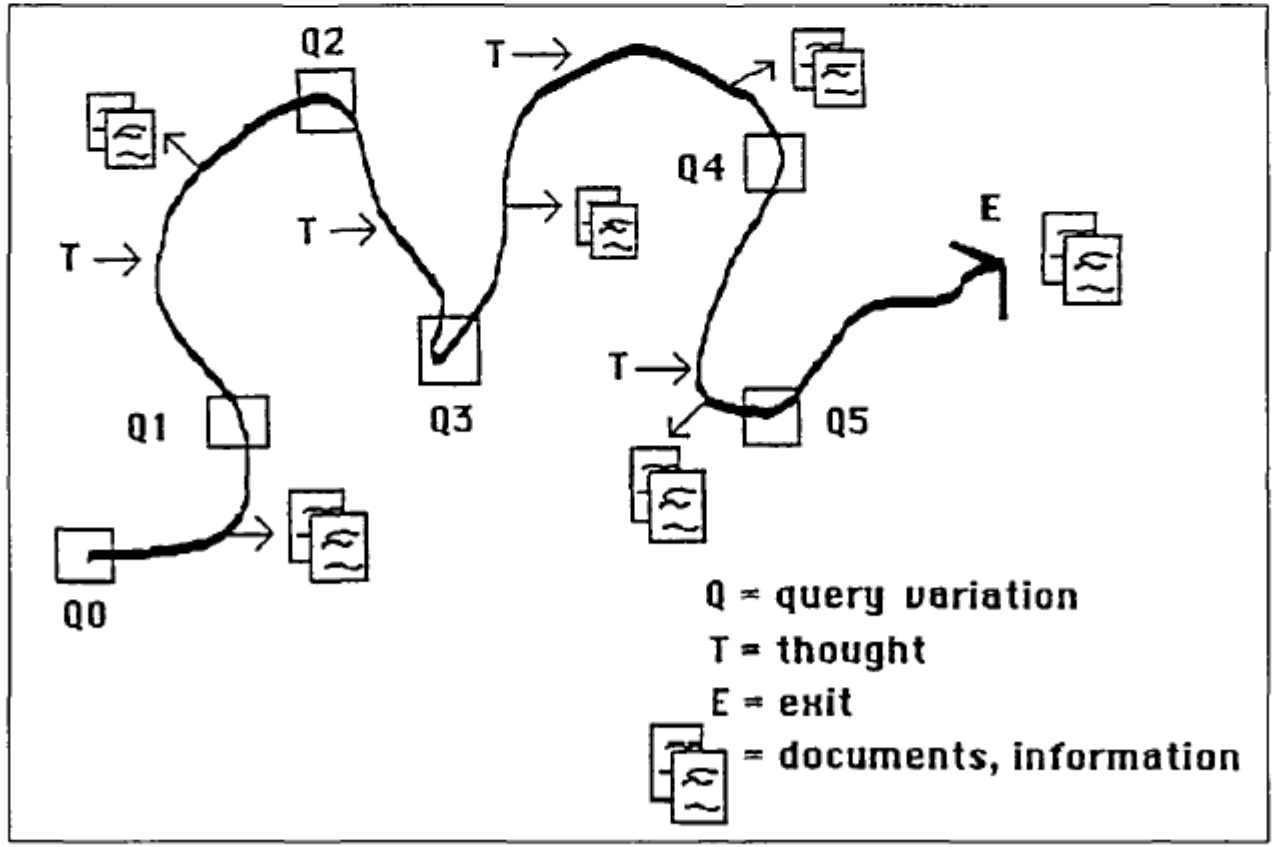
2. Modeling Search Behaviour

Sutcliffe and Ennis (1998)



Sutcliffe, A. & Ennis, M. (1998). Towards a cognitive theory of information retrieval, *Interacting with Computers*, 10(3), 321-351. http://dx.doi.org/10.1016/S0953-5438(98)00013-7

Berrypicking (Bates, 1989)



Marcia J. Bates, (1989). The design of browsing and berrypicking techniques for the online search interface. *Online Information Review*, 13(5), 407 – 424.

Information Search Process (ISP)

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Kuhlthau, 1991

Information Search Process (ISP)

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- **Initiation:** recognizing a need for information
- **Selection:** selecting the general topic/approach to the searching
- **Exploration:** investigating the general topic
- **Formulation:** a focused perspective on the topic arises
- **Collection:** gathering info on the focused topic
- **Action (presentation):** completing the search, prepare to use the material found

Information Search Process (ISP)

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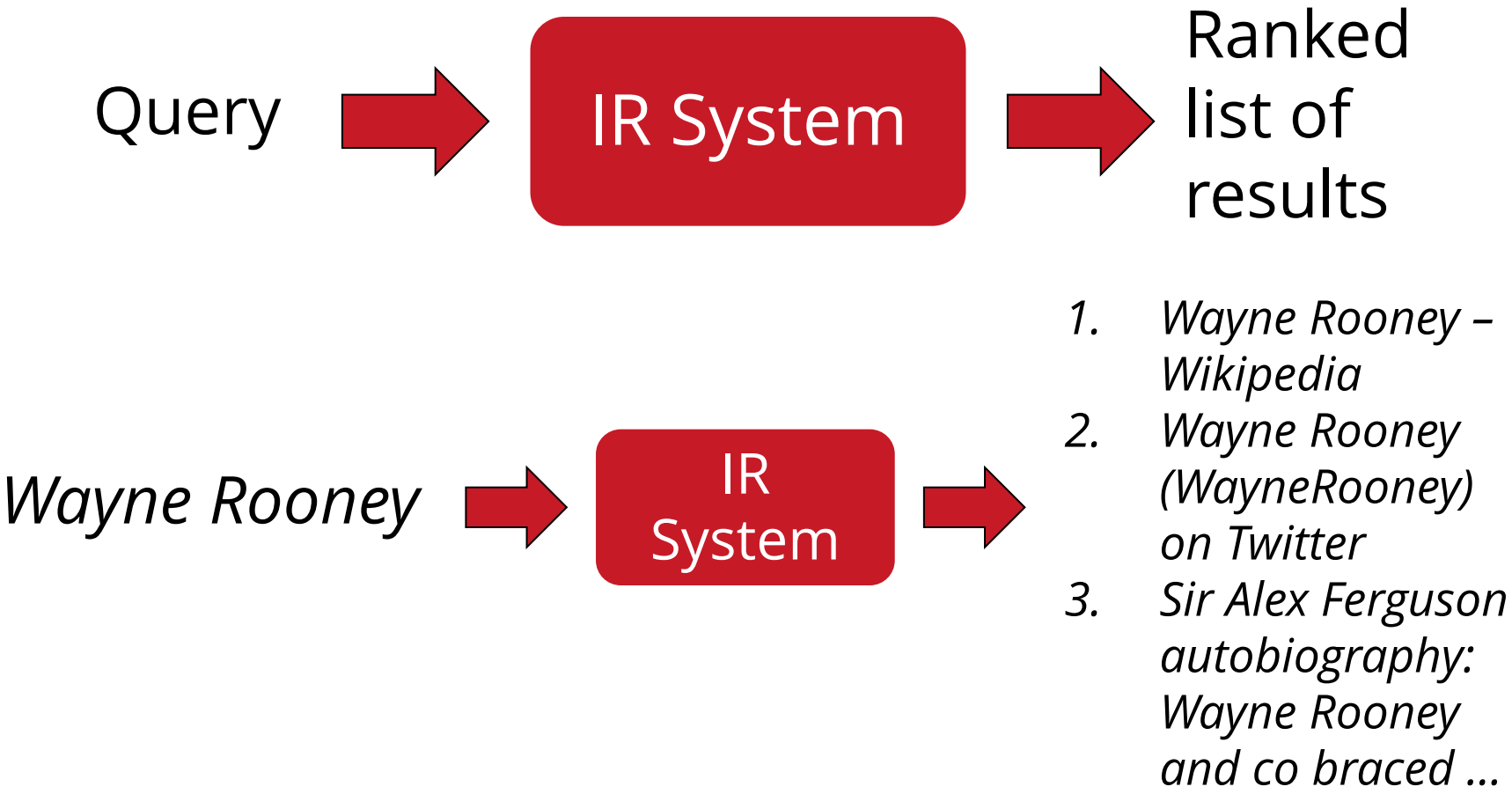
General to Focused

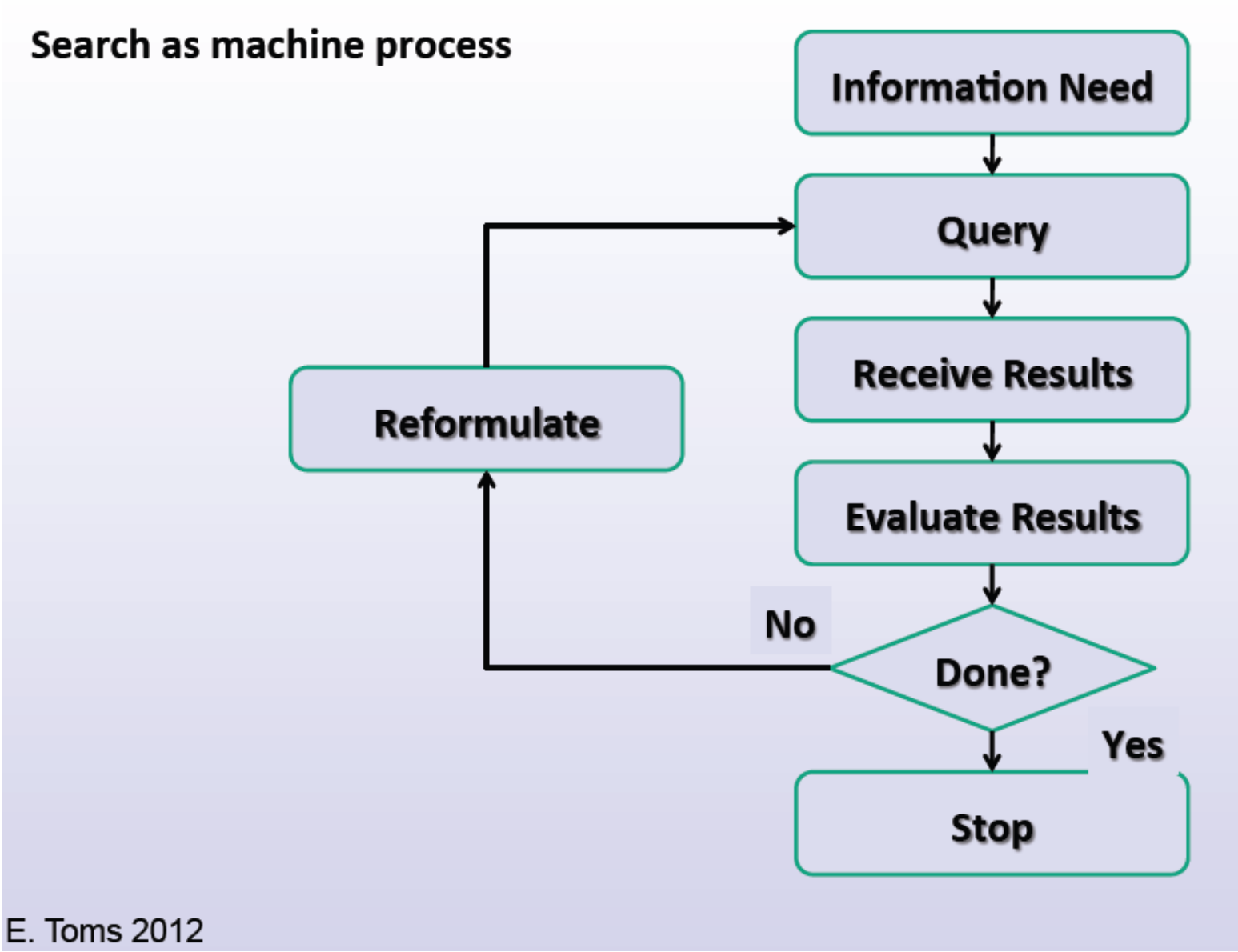
Stages in ISP	Feelings Common to Each Stage	Thoughts Common to Each Stage	Actions Common to Each Stage	Appropriate Task According to Kuhlthau Model
1. Initiation	Uncertainty	General/ Vague	Seeking Background Information	Recognize
2. Selection	Optimism			Identify
3. Exploration	Confusion/ Frustration/ Doubt		Seeking Relevant Information	Investigate
4. Formulation	Clarity	Narrowed/ Clearer		Formulate
5. Collection	Sense of Direction/ Confidence	Increased Interest	Seeking Relevant or Focused Information	Gather
6. Presentation	Relief/ Satisfaction or Disappointment	Clearer or Focused		Complete

Kuhlthau, C. C. (1991). Inside the search process: Information seeking from the user's perspective. *J. Am. Soc. Inf. Sci.*, 42: 361–371.

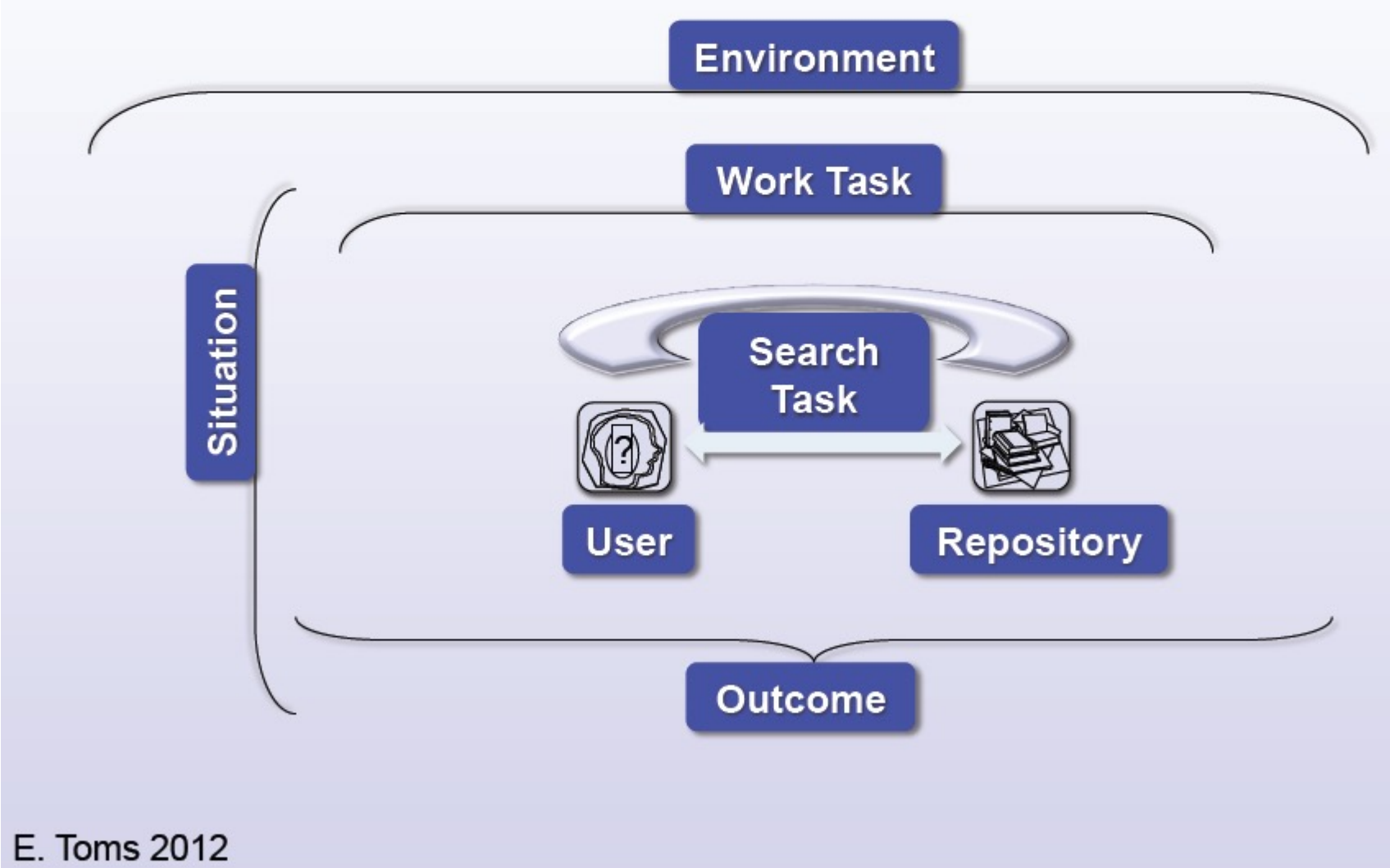
Classic view of IR interaction



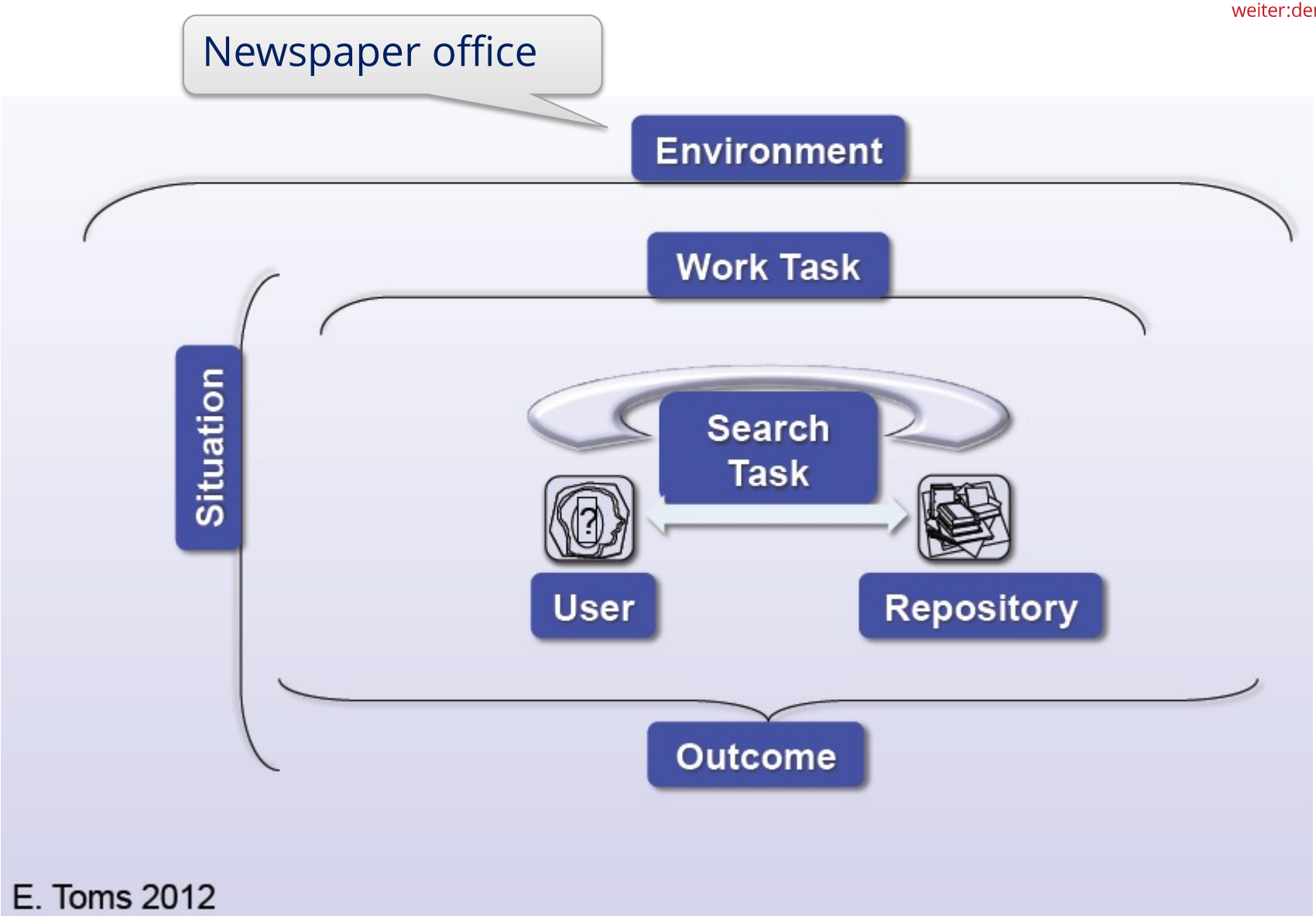
Search as a process



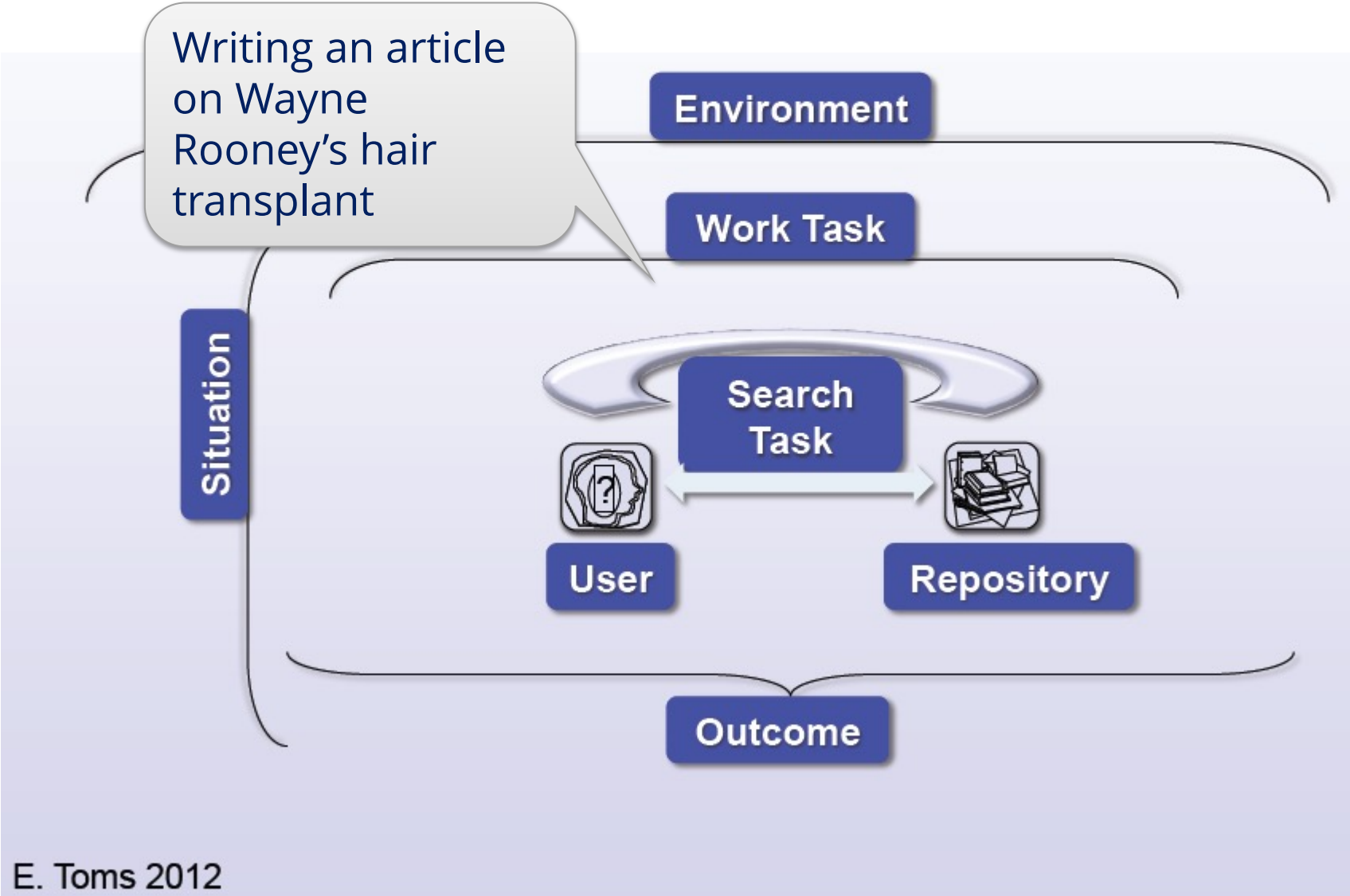
Search interface as part of a larger process



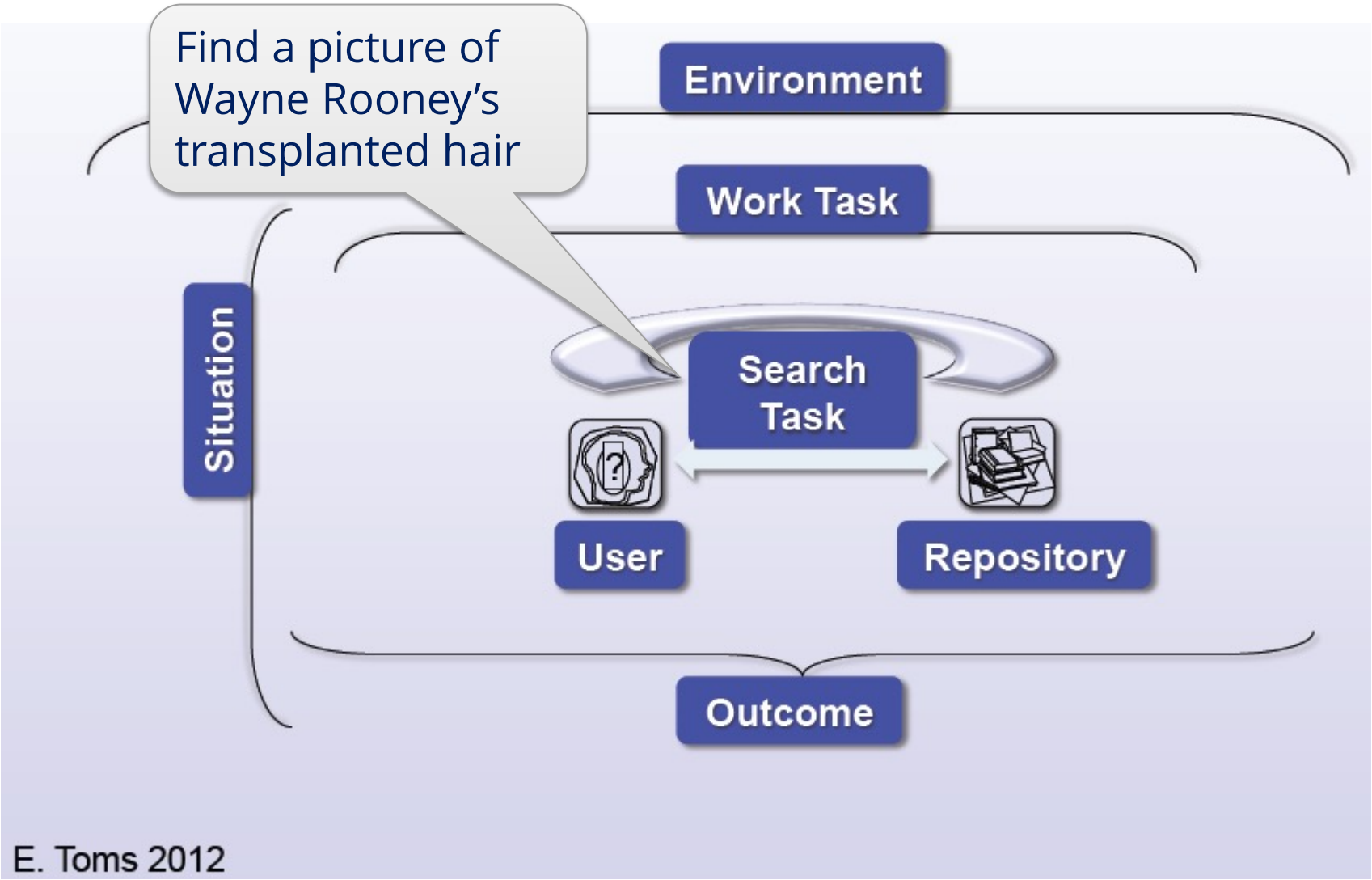
Example


Newspaper office
Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

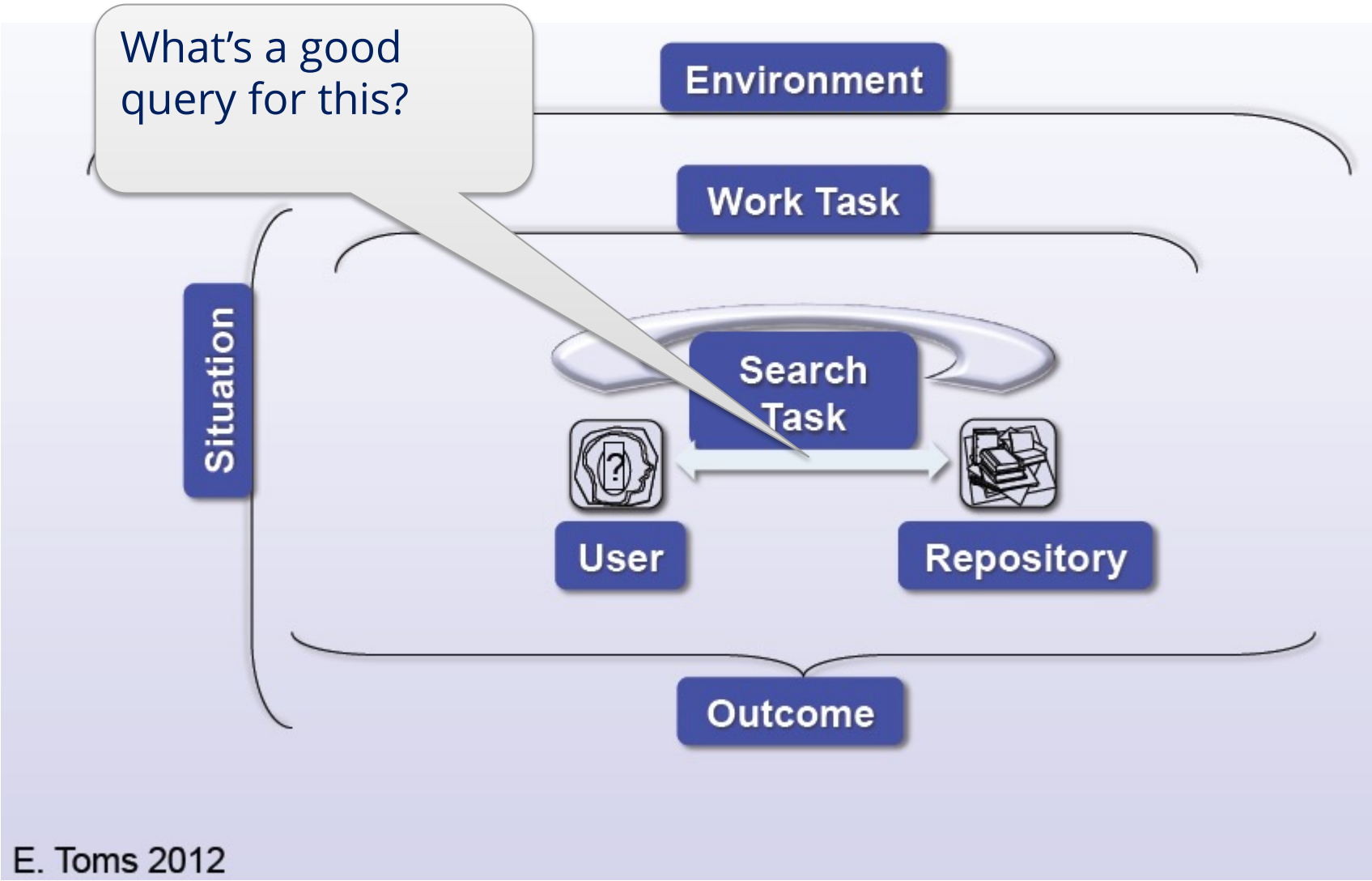
Example


Writing an article on Wayne Rooney's hair transplant
Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

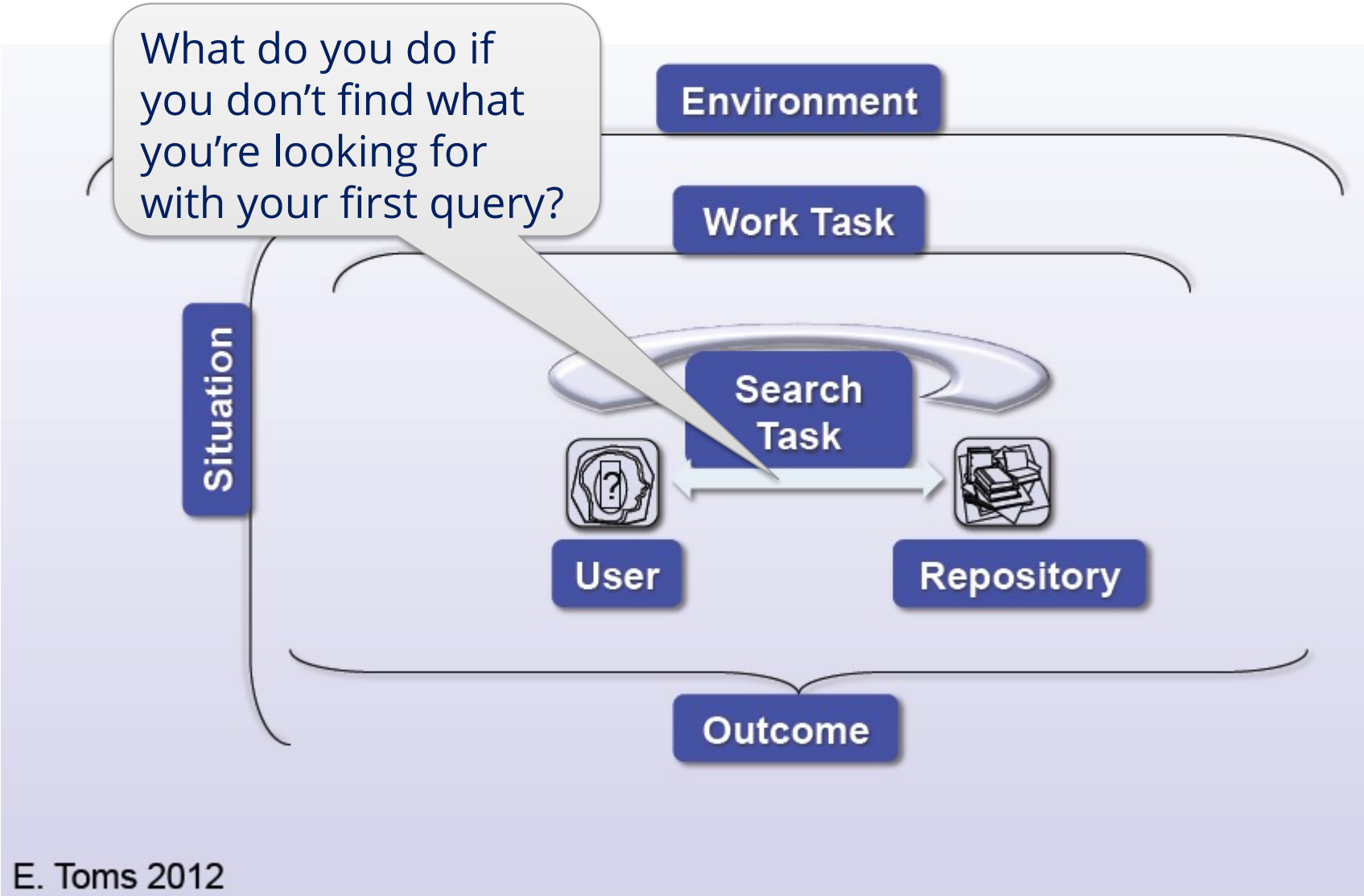
Example


Find a picture of Wayne Rooney's transplanted hair
Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

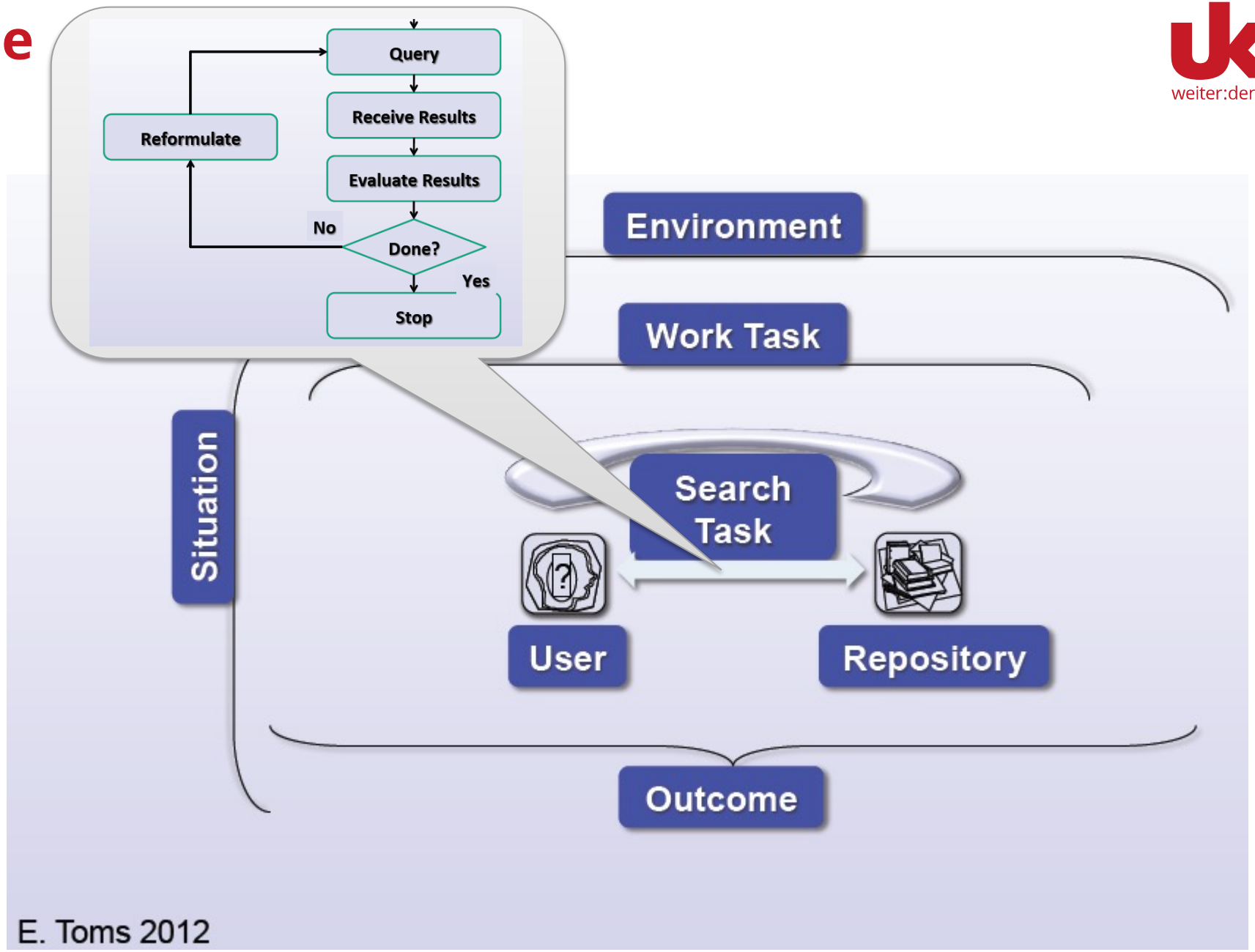
Example


What's a good query for this?
Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

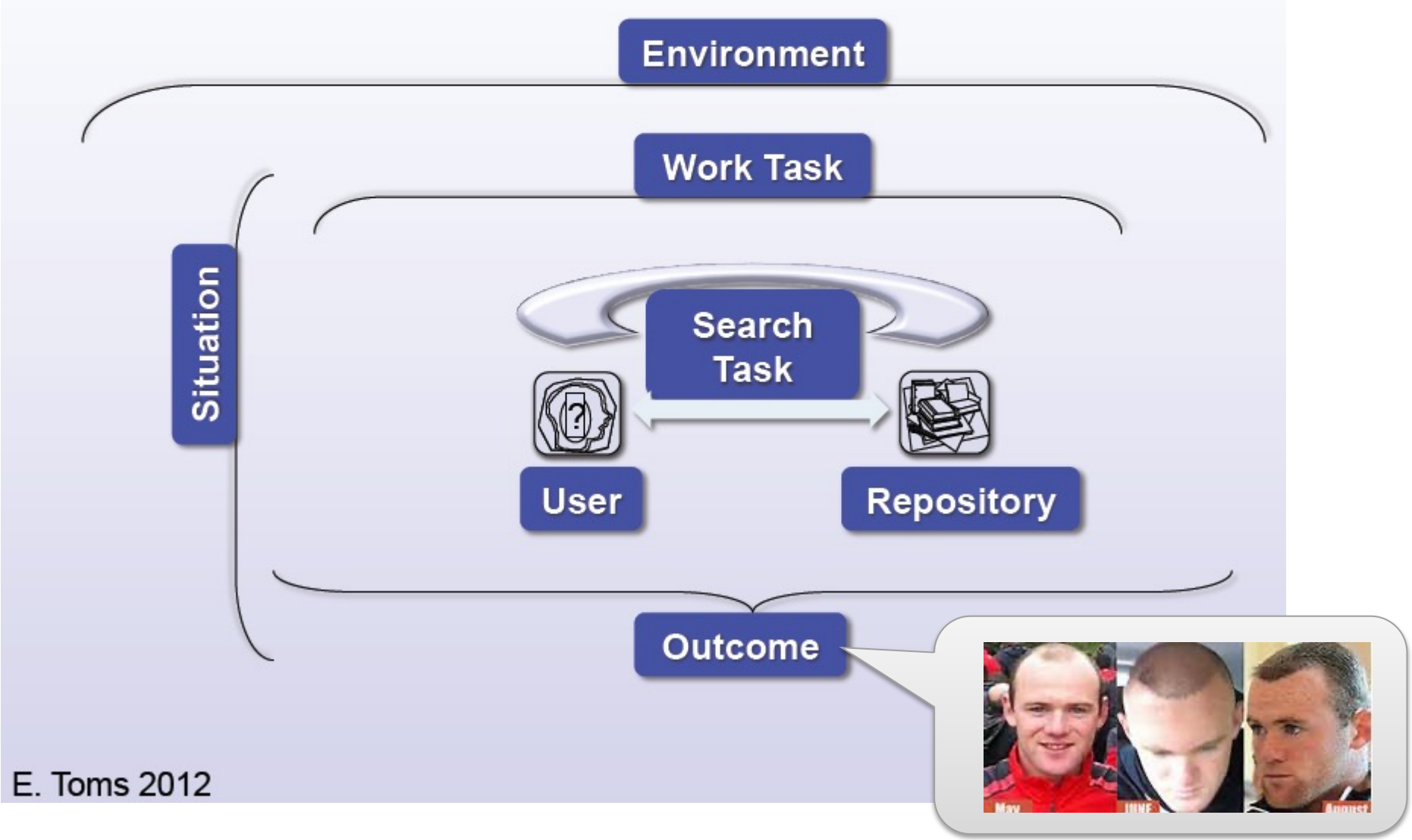
Example


What do you do if you don't find what you're looking for with your first query?
Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

Example


Query
Receive Results
Evaluate Results
Reformulate
No
Done?
Yes
Stop
Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

Example


Environment
Work Task
Situation
Search Task
User
Repository
Outcome
E. Toms 2012

Information needs and behaviours

Intrinsic information need variables – given a perceived work task type	Well-defined (Work task: Routine or Normal)	Ill-defined
Stable	***Known Item – Known Data Element*** ***Known Contents – Factual*** *Querying* *Filtering behavior*	**Genuine work task** ***Muddled: Item – Data Element – Contents – Factual*** *Search loops*
Variable	***Known Contents - Factual*** *Querying – Navigation* *Dynamic interaction*	**Genuine/normal work task** ***Muddled: Item – Data Element – Contents – Factual*** *Browsing* *Trial & error behavior*

Ingwersen & Jarvelin, 2005: 298

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3. Search User Interfaces

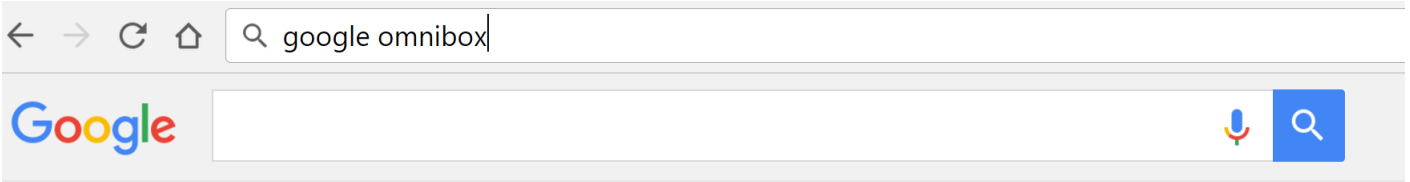
Key features

- Specifying the query
  - Dynamic term suggestion
  - Query languages
  - Automatic query expansion
- Presenting the search results
  - Ranked lists
  - Aggregated or “universal” search
  - Clustering the search results
- Reformulating the query
  - Manual query expansion
  - Relevance feedback
- Filtering
  - Faceted interfaces

The query box

www.altavista.com 1996
From the web.achive.org

www.google.com 2013



Google omnibox 2015

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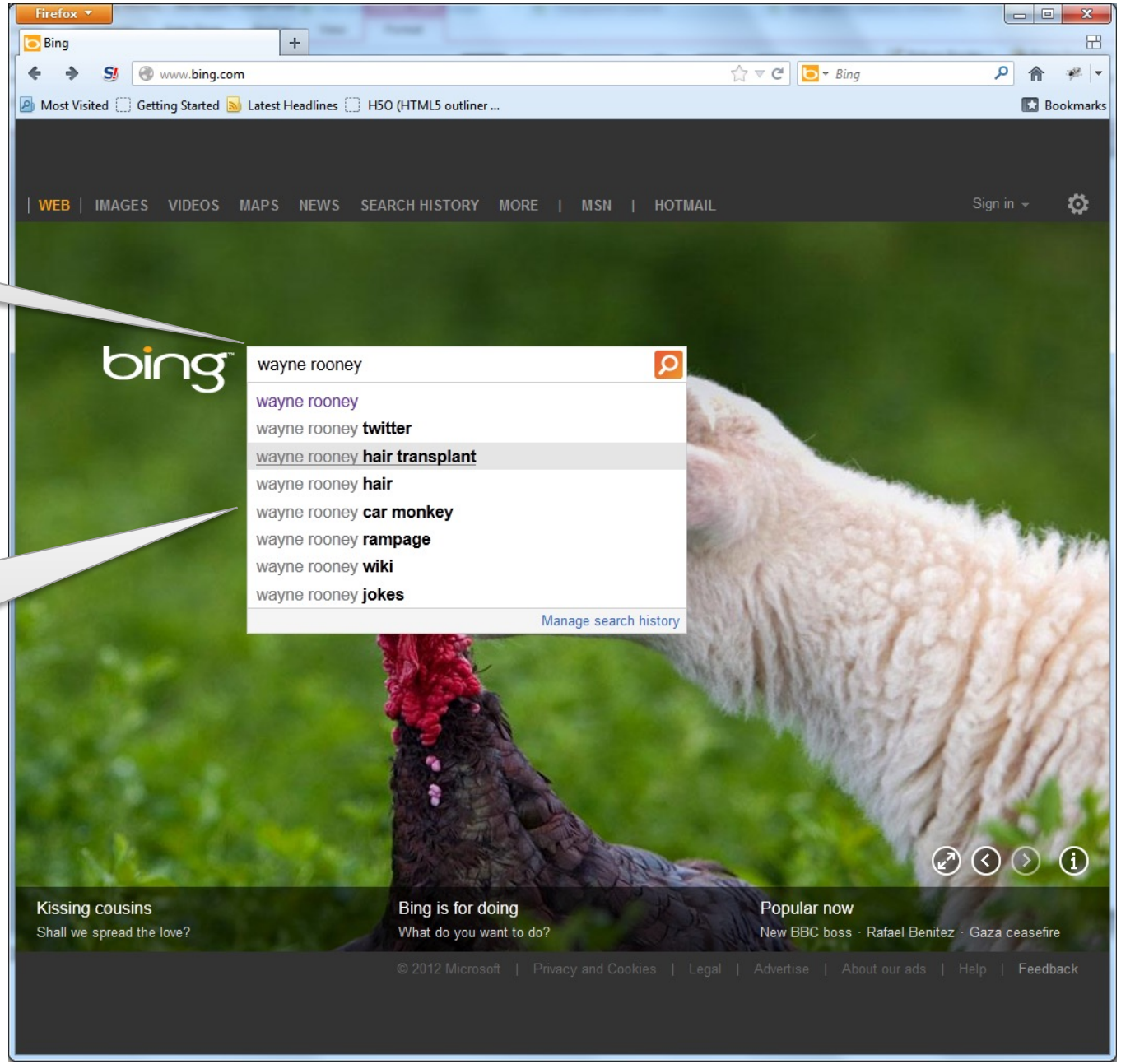
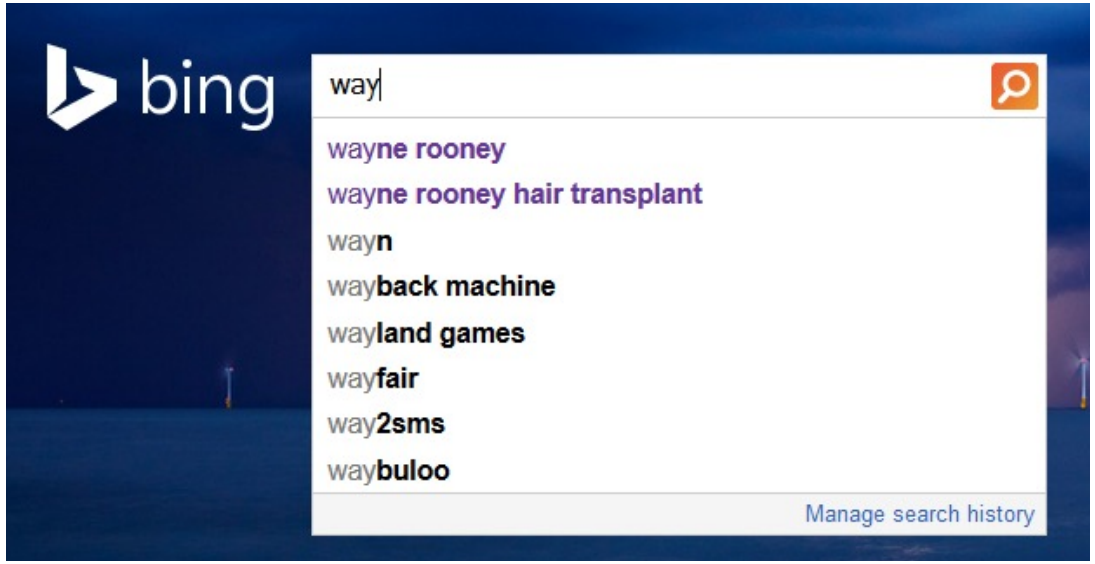
Query

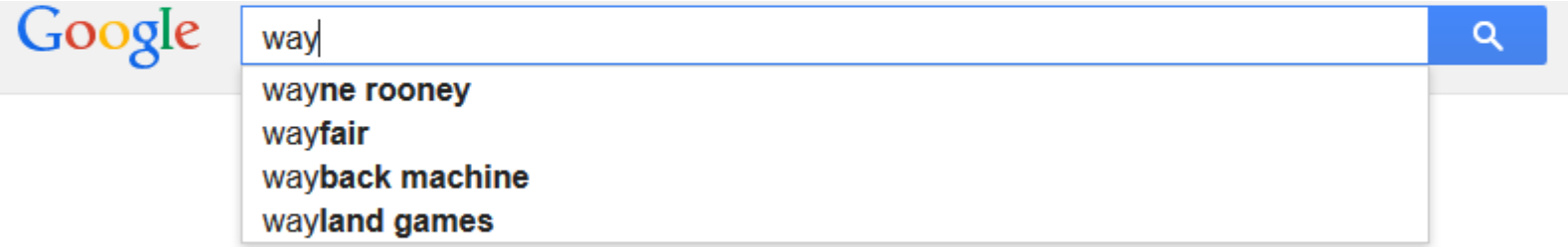
Dynamic query (term) suggestions



Dynamic term suggestion

- Shown before the user sees any search results
- Dynamically changes as you type
  - Also called “auto-suggest”, “auto-complete” or “search as you type”





Query languages

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Most modern IR systems assume **keyword queries**

- Queries can be written in “free text”, i.e. as a short number of terms, or full sentences
- The query is typically processed using techniques as described in earlier lectures
  - Remove stop words (e.g. “the”, “it”, etc.)
  - Stemmed (e.g. “walking” -> “walk”)
  - The query ends up as a “bag of words”

More control can be given to the searcher by supporting various query operators

Example query "operators"

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- Boolean queries
  - OR: e.g. "boxes OR containers"
    - Returned documents should contain the term "boxes" or the term "containers"
  - AND: "flower AND pots" (intersection)
    - Returned documents should contain both the term "flower" and the term "pots"
  - NOT: "geranium NOT red" or "geranium –red" (negation)
    - Returned document should contain the word "geranium" but must not contain the term "red"
- Phrase searching
  - E.g. "United Nations"
    - The documents returned should contain the phrase "United Nations"

Example query “operators”

- Proximity searching
  - Query terms must occur within a certain number of terms.
  - E.g. “#2(interactive retrieval)”
    - Returned documents can contain the phrase “interactive retrieval” or “interactive information retrieval” or “interactive document retrieval” etc.
- Matching part of a document
  - E.g. “allintitle: Koblenz”
    - Google will match “Koblenz” only to the “title” of web pages

More information

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- Google search operators:
  - https://support.google.com/websearch/answer/136861
- Bing search operators:
  - http://onlinehelp.microsoft.com/en-us/bing/ff808438.aspx
- For the brave, Indri is an advanced search engine which supported a very rich search syntax:
  - http://www.lemurproject.org/lemur/IndriQueryLanguage.php

Automatic query expansion

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- The search engine automatically adds terms to your query
  - E.g. the system could add synonyms to your query
    - You enter the query “car”
    - The system actually searches for “car automobile”
  - This happens “behind the scenes”, the user being unaware of it occurring (until the search results are displayed)
    - Contrast with manual term/query expansion (later)

Advanced search (Google)

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https://www.google.co.uk/advanced_search

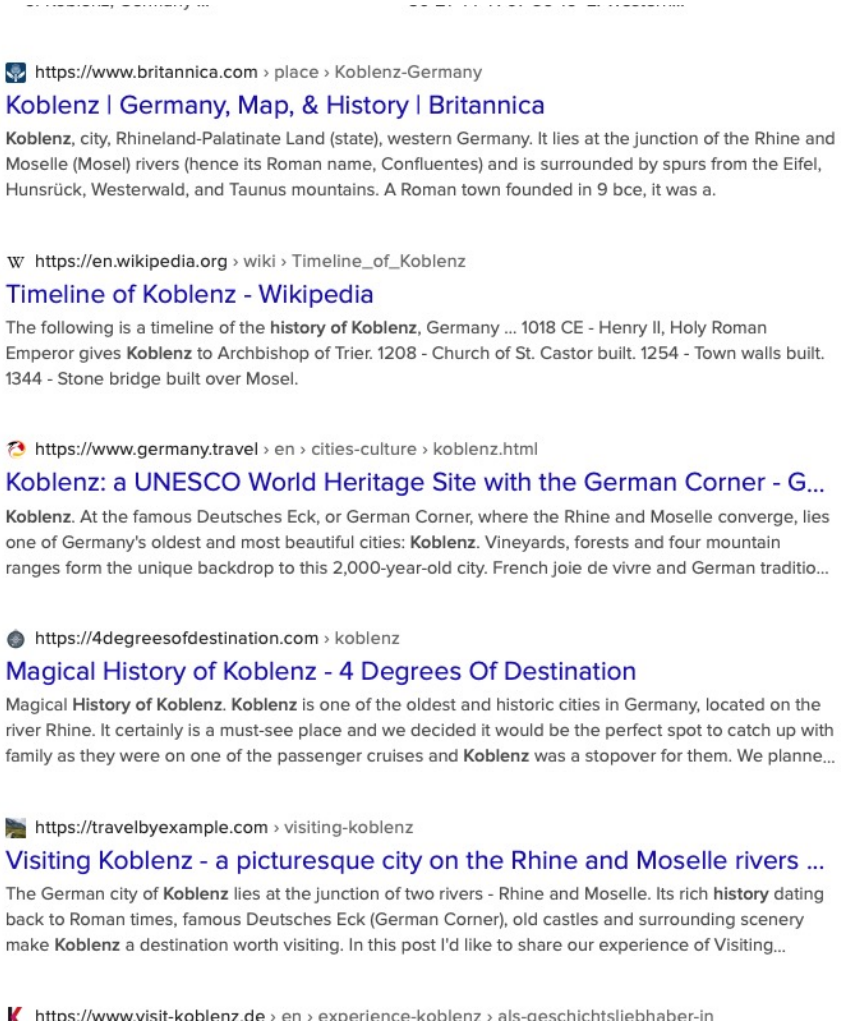
Find pages with...		To do this in the search box.
all these words:		Type the important words: `tri-colour rat terrier`
this exact word or phrase:		Put exact words in quotes: `"rat terrier"`
any of these words:		Type `OR` between all the words you want: `miniature OR standard`
none of these words:		Put a minus sign just before words that you don't want: `-rodent, -"Jack Russell"`
numbers ranging from:	to	Put two full stops between the numbers and add a unit of measurement: `10..35 kg, £300..£500, 2010..2011`

Then narrow your results by...		
language:	any language	Find pages in the language that you select.
region:	any region	Find pages published in a particular region.
last update:	anytime	Find pages updated within the time that you specify.
site or domain:		Search one site (like `wikipedia.org`) or limit your results to a domain like `.edu`, `.org` or `.gov`
terms appearing:	anywhere in the page	Search for terms in the whole page, page title or web address, or links to the page you're looking for.
SafeSearch:	Show most relevant results	Tell SafeSearch whether to filter sexually explicit content.
file type:	any format	Find pages in the format that you prefer.
usage rights:	not filtered by licence	Find pages that you are free to use yourself.

Advanced Search

Presenting the search results

- Almost all IR systems present search results as a ranked list
- Conventionally, search results are all of the same type (web pages, images, videos etc.)
- More recently a mix
- of result types are
- offered



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Search Engine Results Page (SERP)

Firefox
wayne rooney - Bing
www.bing.com/search?q=wayne+rooney&qs=n&form=QBLH&filt=all&pq=wayne+rooney&sc=8-12
Most Visited · Getting Started · Latest Headlines · H5O (HTML5 outliner ... · Bookmarks

WEB IMAGES VIDEOS MAPS NEWS MORE

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Sign in

5,570,000 RESULTS Narrow by language Narrow by region

Wayne Rooney £6.99 | TheBookPeople.co.uk — Ad
www.TheBookPeople.co.uk/**Wayne**
My Decade in the Premier League Save £13 today

Wayne Rooney - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/**Wayne_Rooney**
Early life · Club career · International career · Career statistics · Honours
Wayne Mark **Rooney** (born 24 October 1985) is an English footballer who plays as a striker for Premier League club Manchester United and the England national team. He ...

Manchester United striker **Wayne Rooney** poised to return to offer ...
www.telegraph.co.uk/sport/football/teams/manchester-united/9686729/...
Manchester United striker **Wayne Rooney** poised to return to offer pain relief following Norwich City setback While David de Gea missed the trip to Norfolk to have a ...

Wayne Rooney | Football | The Guardian - Latest news, sport and ...
www.guardian.co.uk/football/**wayne-rooney**
Latest news and comment on **Wayne Rooney** from guardian.co.uk

Images of **wayne rooney**
bing.com/images

News about **wayne rooney**
bing.com/news
Coleen **Rooney** heads 'holm thanks to hubby **Wayne**
The Sun · 1 day ago
SOME blokes with a baby on the way treat their wives to a spa break. But not **WAYNE ROONEY**. He is sending pregnant COLEEN on a more energetic trip, RAVING in...
Nick Powell: The next **Wayne Rooney**
hereisthecity.com · 22 hours ago
Wayne Rooney returns to Manchester United training ahead of Galatasaray game
SkySports · 3 days ago

Wayne Rooney: Latest News, Photos, Videos, Wallpapers

Ads

Wayne Rooney Biography
amazon.co.uk/**Wayne Rooney** Biography
Low Prices on **Wayne Rooney** Biography. Free UK Delivery on Amazon Orders

Wayne.rooney
www.ebay.co.uk/memorabilia
Great deals on **Wayne.rooney**. Grab a bargain on eBay today!

Wayne Rooney
Football.Inbox.com
Are You A Fan Of **Wayne Rooney**? Find Out More With Sports Toolbar!

See your message here

RELATED SEARCHES
Wayne Rooney **Pictures**
Wayne Rooney **Address**
Wayne Rooney **House**
Wayne Rooney **Girlfriend**
Wayne Rooney **Goals**
Wayne Rooney **News**
Wayne Rooney **Coleen McLoughlin**
Ryan Giggs

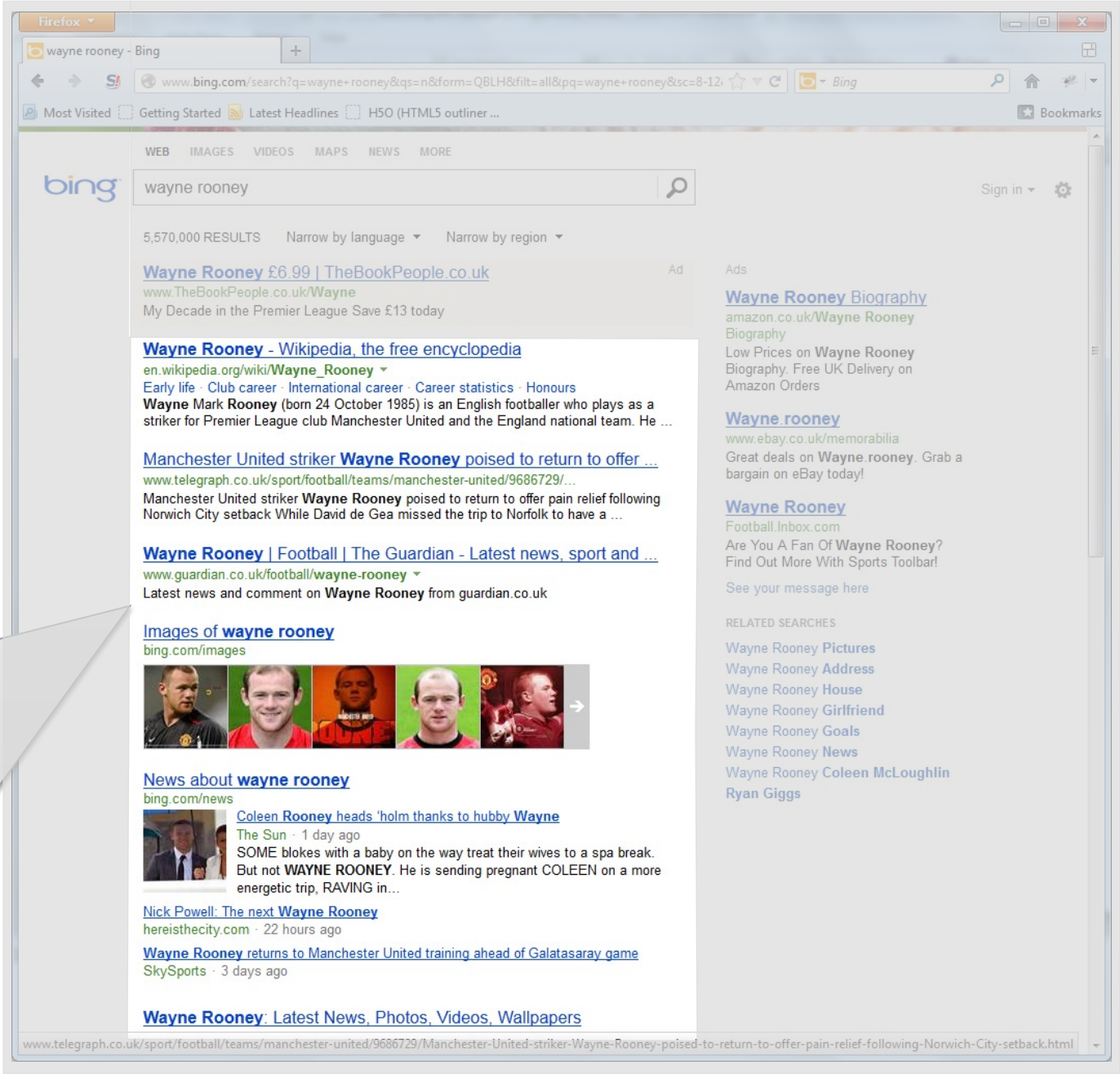
www.telegraph.co.uk/sport/football/teams/manchester-united/9686729/Manchester-United-striker-Wayne-Rooney-poised-to-return-to-offer-pain-relief-following-Norwich-City-setback.html

Search results, in this case:

- Web pages
- Images
- News

Results are ordered by *relevance*

Often called the "organic results"



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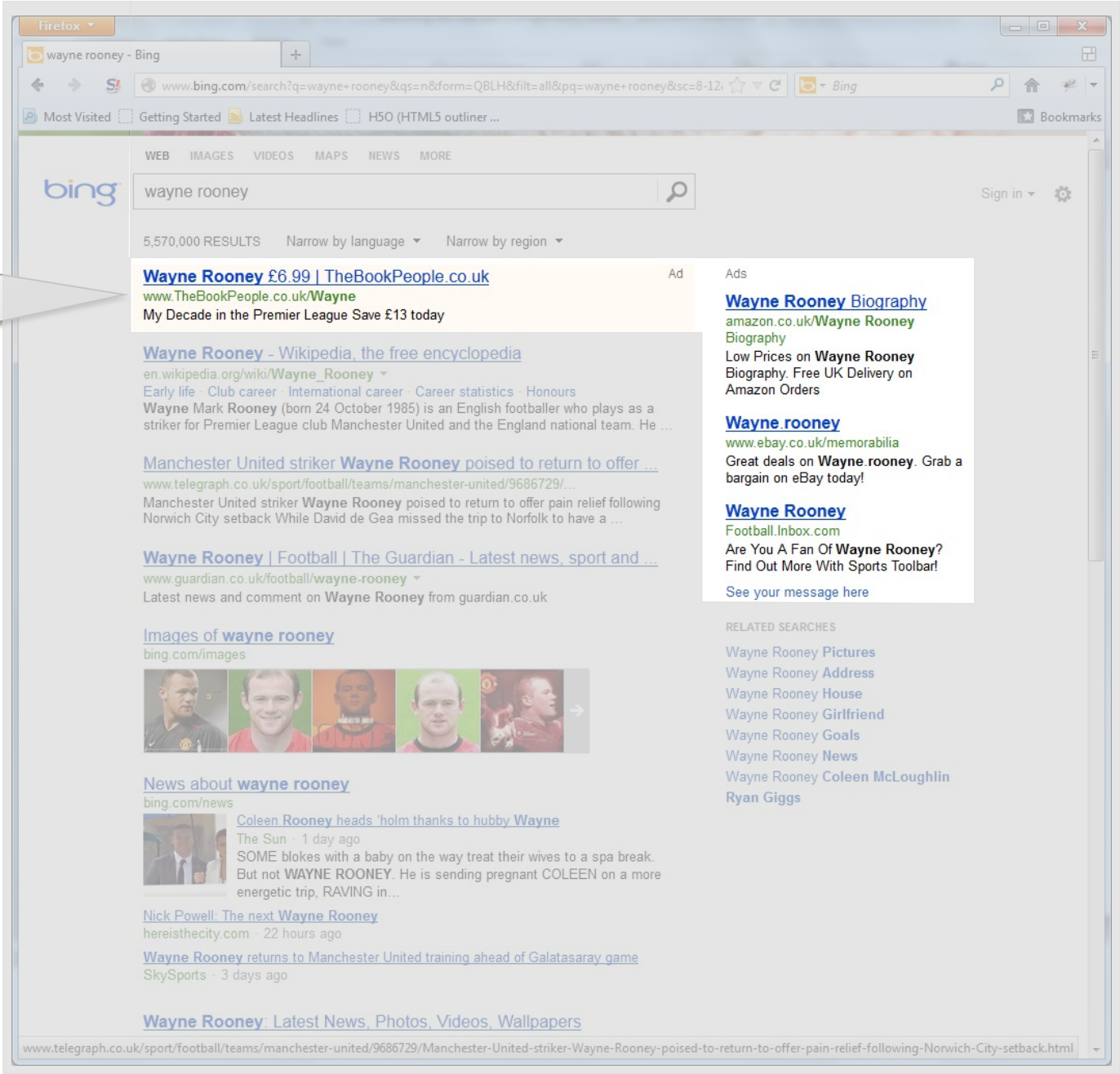
Adverts or “sponsored” results



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Related queries / Query recommendation

Images of **wayne rooney**
bing.com/images

News about **wayne rooney**
bing.com/news

Coleen **Rooney** heads 'holm thanks to hubby **Wayne**
The Sun · 1 day ago
SOME blokes with a baby on the way treat their wives to a spa break. But not **WAYNE ROONEY**. He is sending pregnant COLEEN on a more energetic trip, RAVING in...

Nick Powell: The next **Wayne Rooney**
hereisthecity.com · 22 hours ago

Wayne Rooney returns to Manchester United training ahead of Galatasaray game
SkySports · 3 days ago

RELATED SEARCHES

Wayne Rooney **Pictures**
Wayne Rooney **Address**
Wayne Rooney **House**
Wayne Rooney **Girlfriend**
Wayne Rooney **Goals**
Wayne Rooney **News**
Wayne Rooney **Coleen McLoughlin**
Ryan Giggs

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Wayne Rooney - Telegraph
www.telegraph.co.uk/sport/football/players/**wayne-rooney**
Get the latest news, reports and action photos on **Wayne Rooney**, the Manchester United and England footballer.

Wayne Rooney - Goal.com
www.goal.com/en-sg/people/england/1681/**wayne-rooney**
The Goal.com team/player ratings system is the product of the work of hundreds of local experts worldwide. Our ratings are subjective, based on the expertise of these ...

Wayne Rooney | Tribal Football - Football & Soccer News, Scores ...
www.tribalfootball.com/.../manchester-united/**wayne-rooney**
Wayne Rooney was born on the 24th of October 1985 in Croxteth, Liverpool. **Wayne** is an English football player who plays as a striker in the English premier league for ...

Related Searches for **wayne rooney**

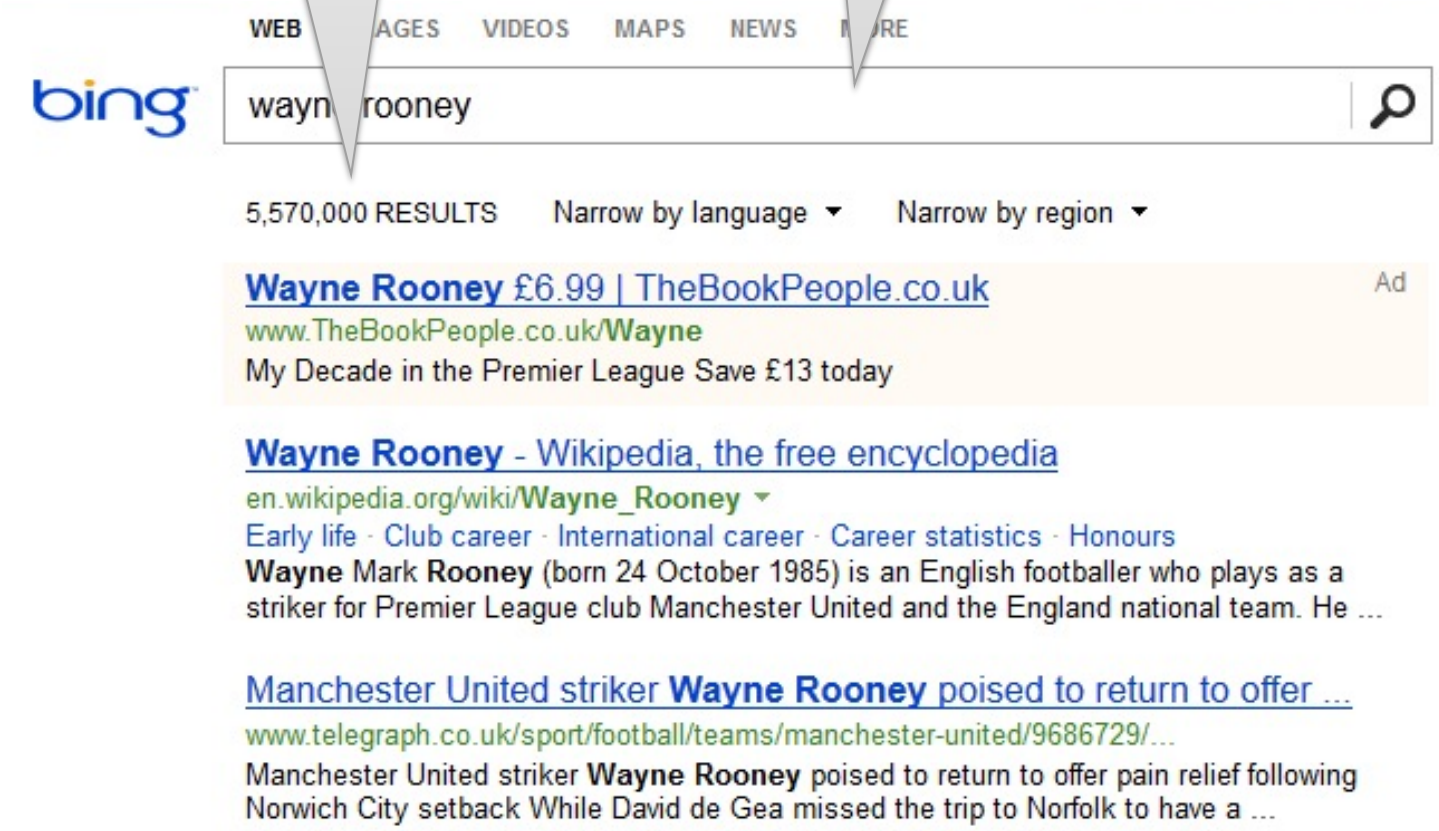
Wayne Rooney **News**
Wayne Rooney **Girlfriend**
Wayne Rooney **Allegations**
Wayne Rooney **Salary per Week**
Wayne Rooney **Coleen McLoughlin**
Rooney **Transfer News**
Robin Van Persie
BBC News Wayne Rooney

1 2 3 4 5 Next

Pagination controls / next page

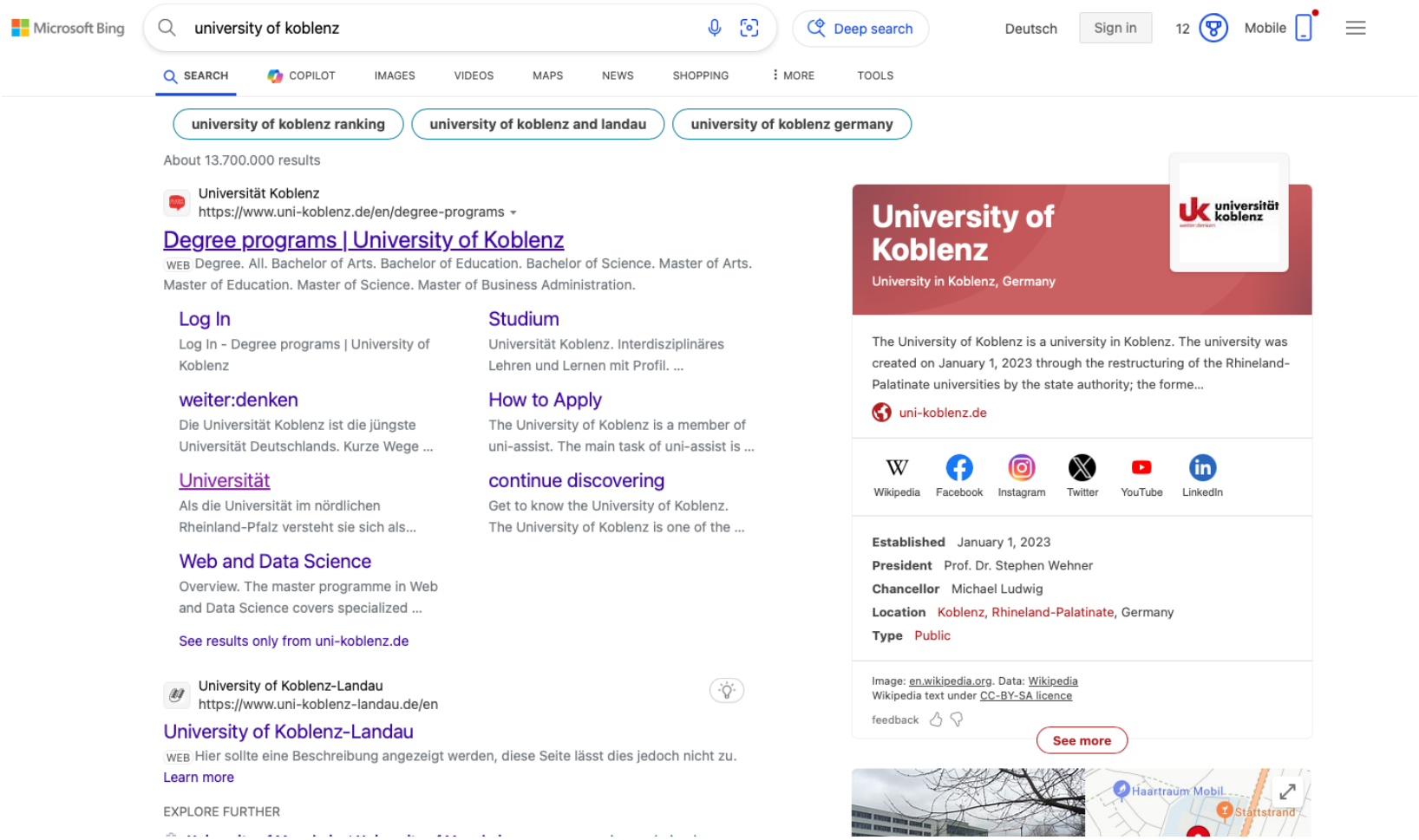
Rough information on the “number of results”

Restrict (“narrow”) the search results



Aggregated or universal search

Search results are a mixture of many different types of information



Search results listing

Title / link

URL of page

Wayne Rooney - Wikipedia, the free encyclopedia
en.wikipedia.org/wiki/**Wayne_Rooney**
Early life · Club career · International career · Career statistics · Honours
Wayne Mark **Rooney** (born 24 October 1985) is an English footballer who plays as a striker for Premier League club Manchester United and the England national team. He ...

A “snippet” or “document surrogate”, which is an automatically generated summary of the document.

Snippets are typically generated by using the words (“terms”) from the Query to highlight relevant parts of the page. Called “query biased summaries”.

[Reference: Anastasios Tombros and Mark Sanderson. 1998. Advantages of query biased summaries in information retrieval. In ACM SIGIR conference on Research and development in information retrieval (SIGIR '98). ACM, New York, NY, USA, 2-10.]

Clustering the search results

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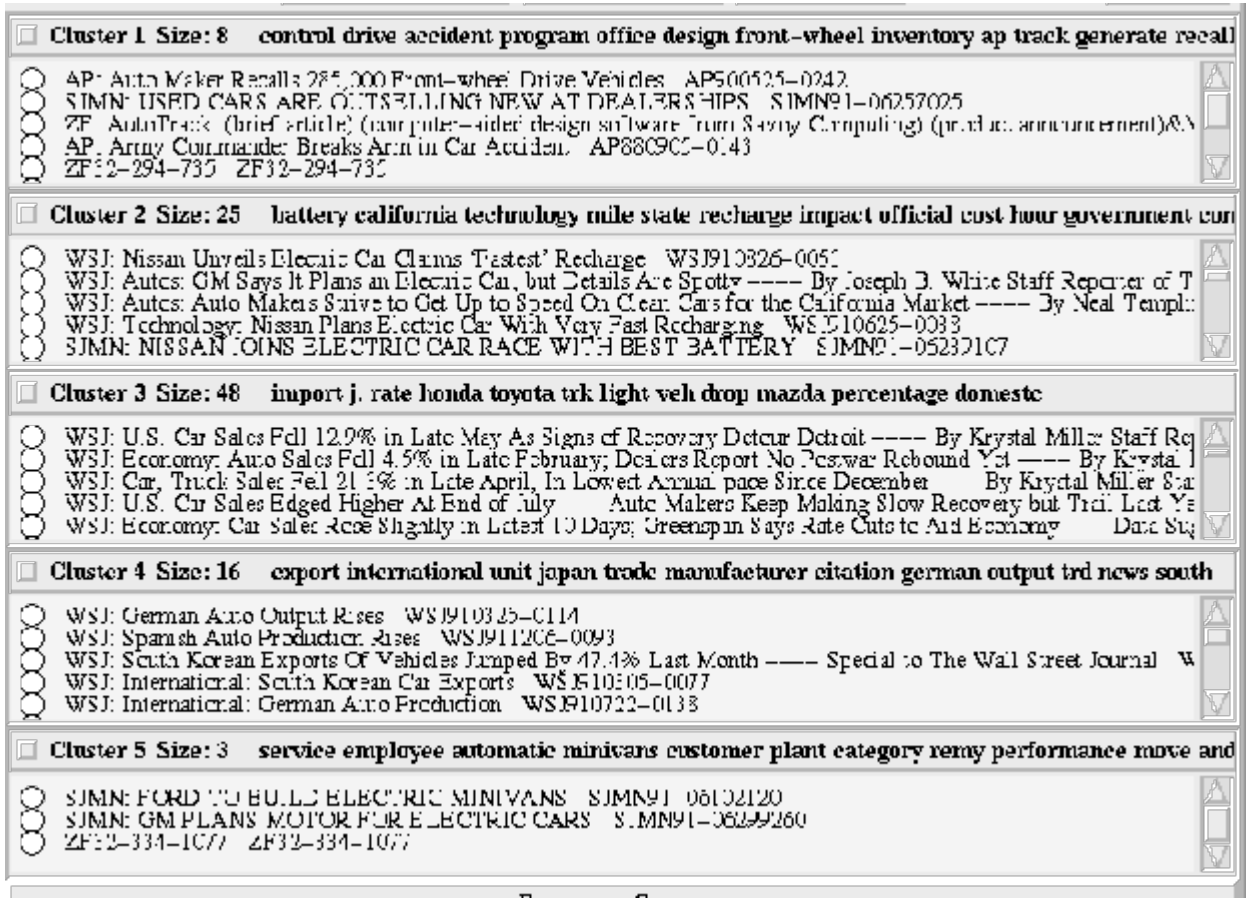
- Attempts to automatically group search results into “clusters”
- Each cluster will (hopefully) correspond to a “topically coherent” group of document
- Each cluster is also given an automatically generated description, to help the user identify the documents inside the cluster

Clusters: Hearst and Pedersen (1996)



Hearst, M.A. & Pedersen, J.O. (1996). Re-examining the cluster hypothesis: scatter/gather on retrieval results. *In Proceedings of the 19th annual international ACM SIGIR conference on Research and development in information retrieval (SIGIR '96).* ACM, New York, NY, USA, 76-84. DOI=10.1145/243199.243216.

Example: www.yippy.com

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yippy.com

yippy

brexit

Concept Clusters

- Investment 51
- Bank 34
- Prime Minister 23
- Financial 29
  - Financial services 8
  - Management 6
  - Political, Banking 3
  - Peers, London 2
  - After The Brexit Vote 3
  - News Analysis 2
  - Silver Prices 2
  - 7
- Talks 17
- London 18
- Migration 13

Top 2391 results of at least 3379 retrieved for the query **brexit**.

Warning Of 'Domino' Effect As Sentiment In U.K. Financial Services Falls To Lowest Since 2009

... firms in the financial services sector since the Brexit vote has found that optimism about the overall ...

http://www.forbes.com/forbes/welcome/?%2fsites%2fd (Yippy News)

World business, finance, and political news from the Financial Times - FT.com

... Prime minister will give parliament 'a say' on Brexit process NEW Download PotashCorp and Agrium in talks ... low Bank of England data fuel fears of Brexit slowdown Download FT View Challenges facing British housing ...

http://www.ft.com/home/uk (Yippy Index)

BREXIT: 'business as usual' for regulated financial services firms, experts say

... Filter Regions Special Reports The business impact of Brexit Special report on oil and gas M&A ... Click here to start your search Out-Law: BREXIT: 'business as usual' for regulated financial services firms, ... Commercial Advice for trustees Financial Services UK Europe BREXIT: no movement on central bank interest rate before ...

http://www.out-law.com/ (Yippy Index)

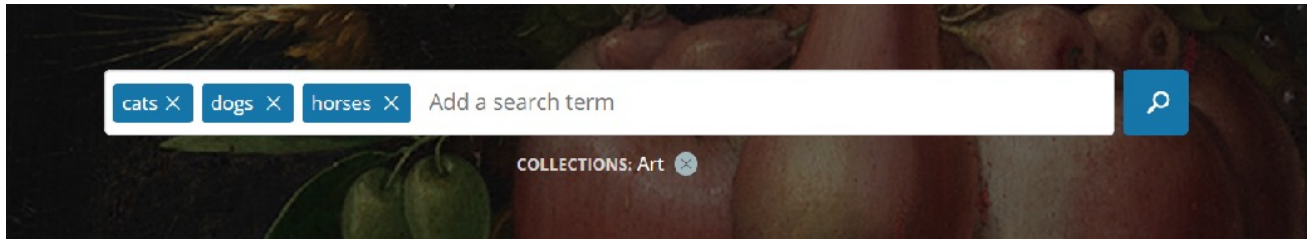
Reformulating the query: manual query expansion

- IR system suggests either terms of queries to the user, which can be used to reformulate the query
  - E.g. many search engines suggest “related searches”

RELATED SEARCHES

Wayne Rooney **Pictures**
Wayne Rooney **Address**
Wayne Rooney **House**
Wayne Rooney **Girlfriend**
Wayne Rooney **Goals**
Wayne Rooney **News**
Wayne Rooney **Coleen McLoughlin**
Ryan Giggs

- Users may also be encouraged to add more query terms



www.europeana.eu

Reformulating the query: manual relevance feedback

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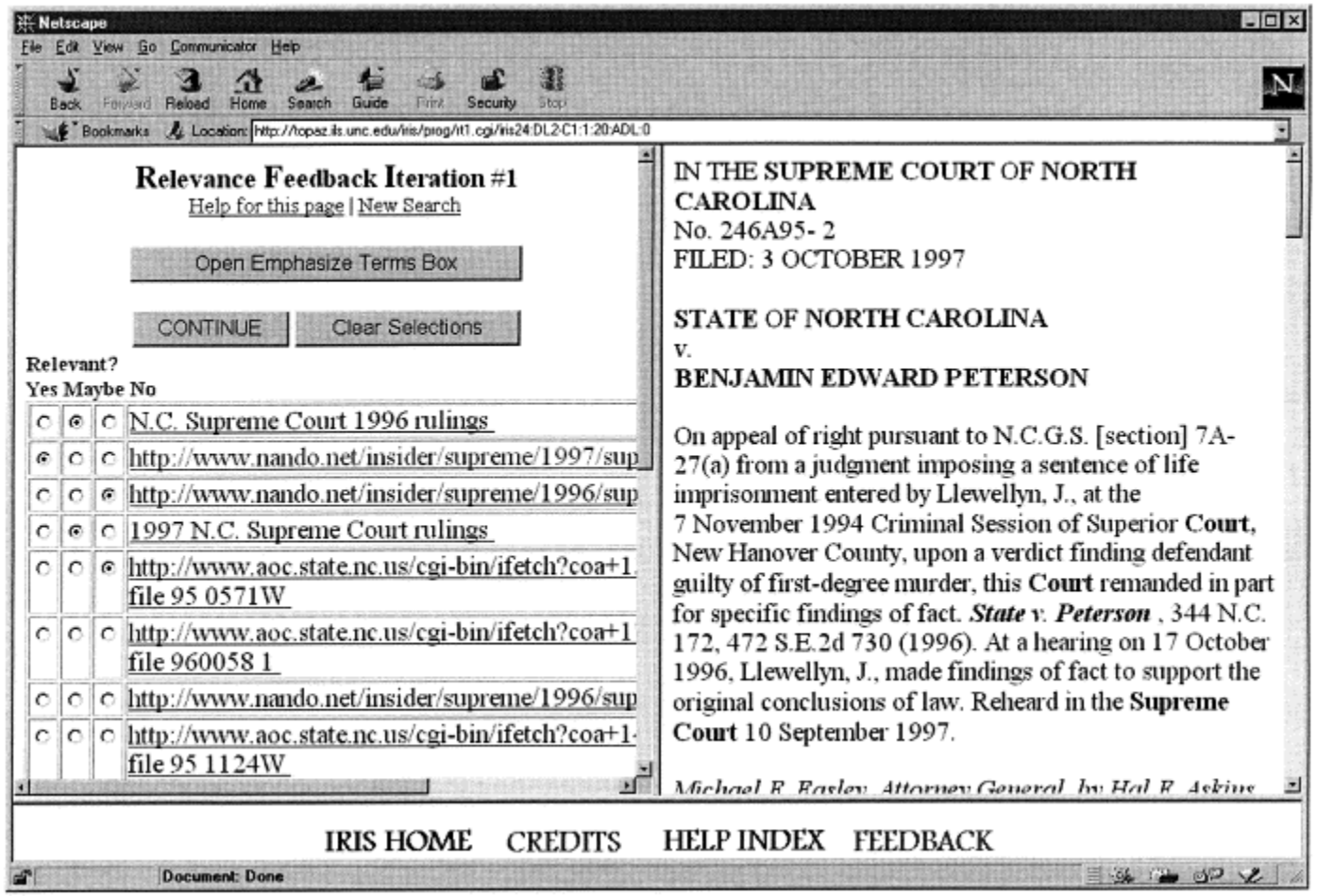
- The search interface allows the user to select documents which are “relevant” to their query
- When the query is rerun, the selected documents are used to improve the query

Using relevance feedback



Dempsey, B.J., Vreeland, R.C., Sumner Jr, R.G. & Yang, K. (2000). Design and empirical evaluation of search software for legal professionals on the WWW, *Information Processing & Management*, 36(2), 253-273. http://dx.doi.org/10.1016/S0306-4573(99)00057-6.

Faceted search interfaces

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- Documents or items are described by a set of categories and attributes
  - Use of “faceted metadata”
- Faceted search interfaces are common on shopping websites, where items have easily specified values
  - Prices, size, title, etc.
  - Allows the user to drill down using the facets

Example: dabs.com

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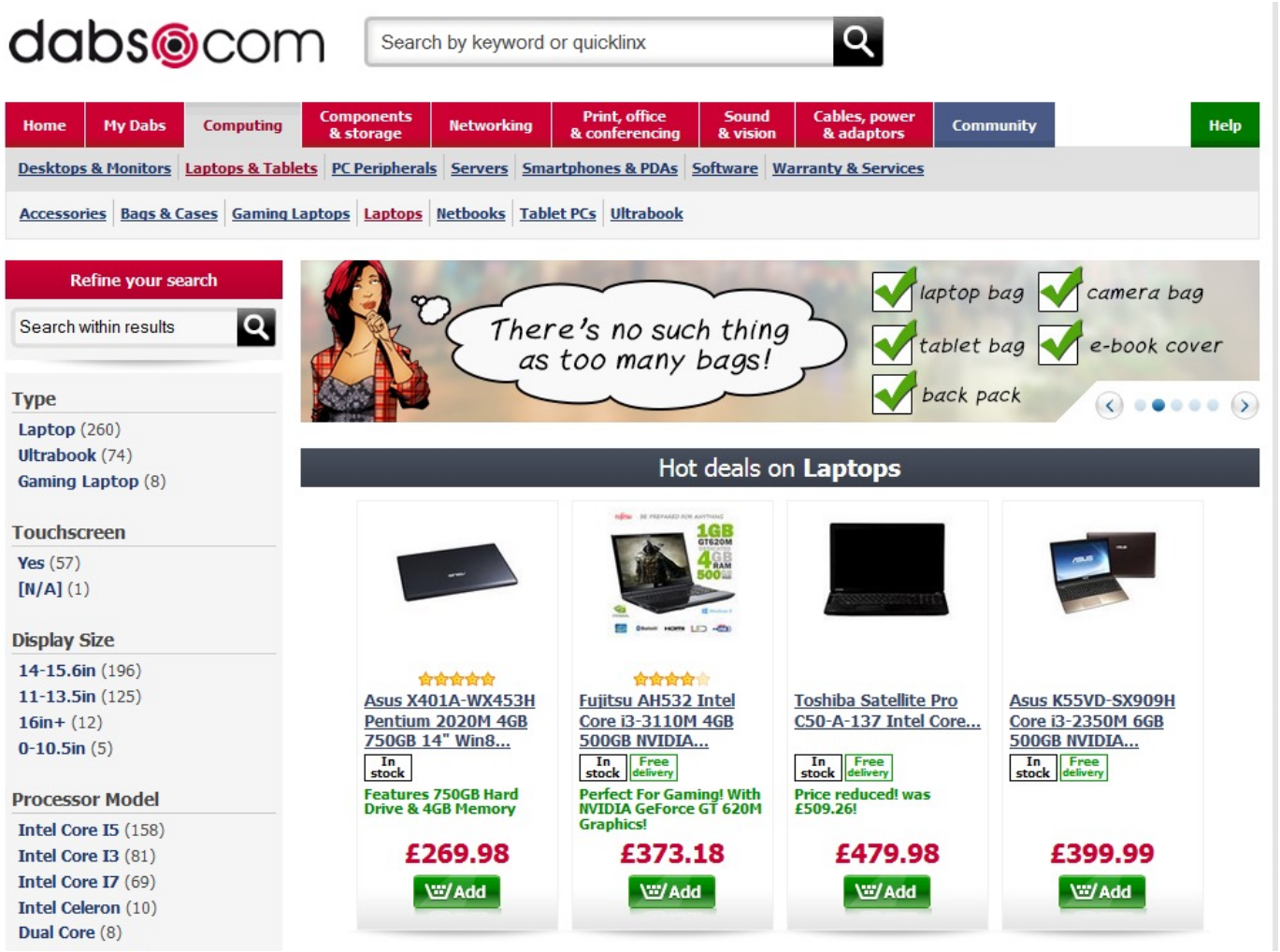

"Facets"

Example: search25

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M25 Library Catalogues

- Try outside the M25 libraries with the same search in Copac

Narrow your results

Source library

- Roehampton (22)
- UCL (22)
- Westminster (22)
- Brunel (22)
- Middlesex (22)

[30 more]

Subject area

- Information storage and retrieval systems (76)
- Computer Science (57)
- Information retrieval (44)
- Database management (42)
- Text processing (Computer science) (31)

[41 more]

Author

- Ridley, D. D (12)
- Chowdhury, G. G (10)
- Van RIJsbergen, C. J (8)
- Manning, Christopher D (8)
- Stacey, Alison (7)

[43 more]

Format

- Book (271)
- eBook (124)
- Journal (57)
- Serial (20)
- Thesis (16)

[5 more]

Results **1-30** of **417** 1 2 3 4 5 6 7 8 > >|

sort by: Title | Author | Latest | **Relevance**

Information Retrieval : SciFinder

eBook

By: Ridley, D. D
Year: 2009
Edition: 2nd ed
Available from:

- SOAS, Roehampton, University of Essex, Reading, City, Westminster, Surrey

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Information Retrieval : Searching in the 21st Century

eBook

By: Goker, Ayse
Year: 2009
Available from:

- SOAS, Roehampton, Reading, University of Essex

Human Information Retrieval

eBook

By: Warner, Julian
Year: 2009
Available from:

- Roehampton, Reading

Introduction to Modern Information Retrieval

Book

By: Chowdhury, G. G
Year: 2004
Edition: 2nd ed
Available from:

- Senate House, UCA, Brighton, Canterbury

Example: Europeana

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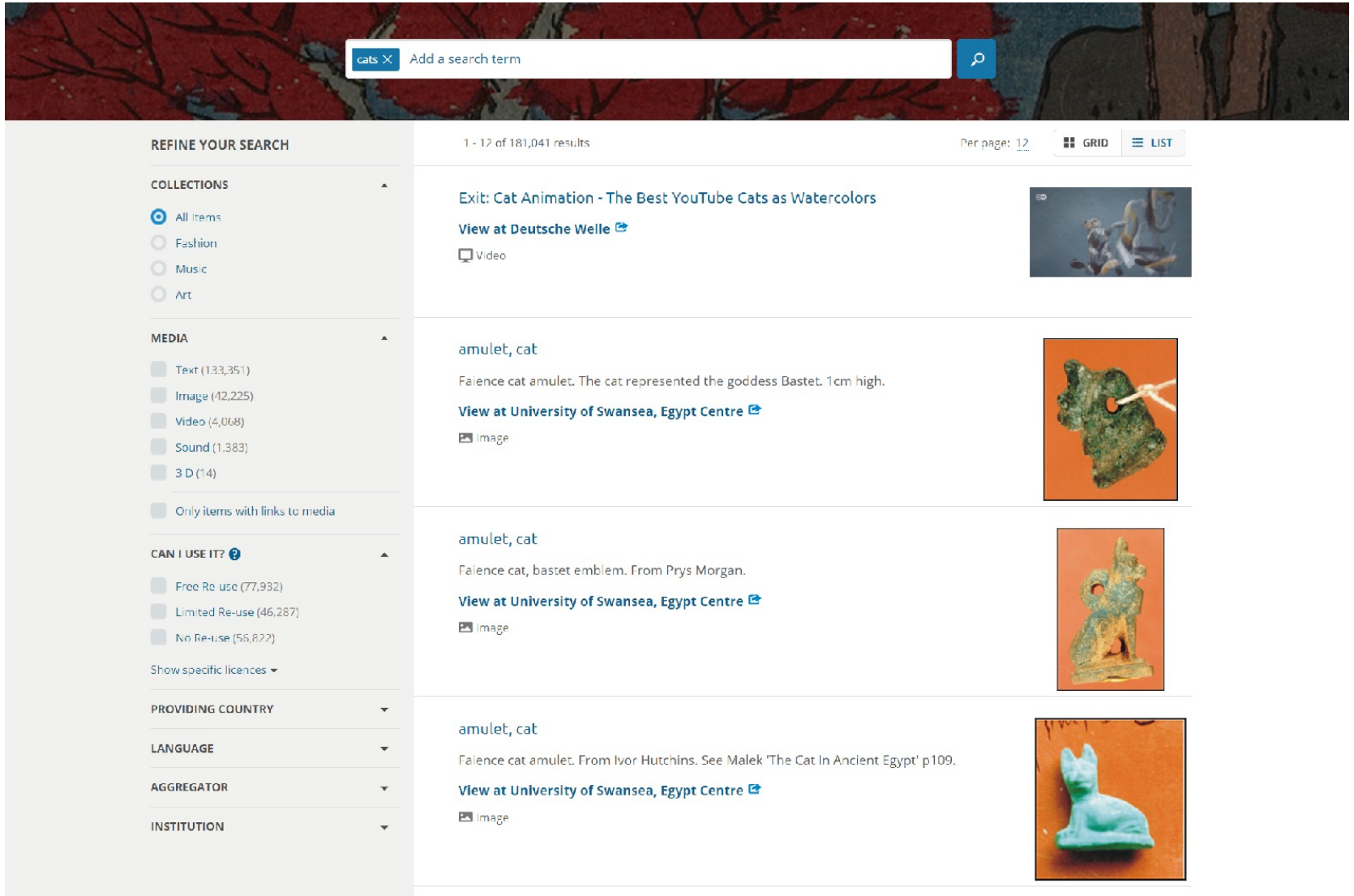

More innovations in interface design

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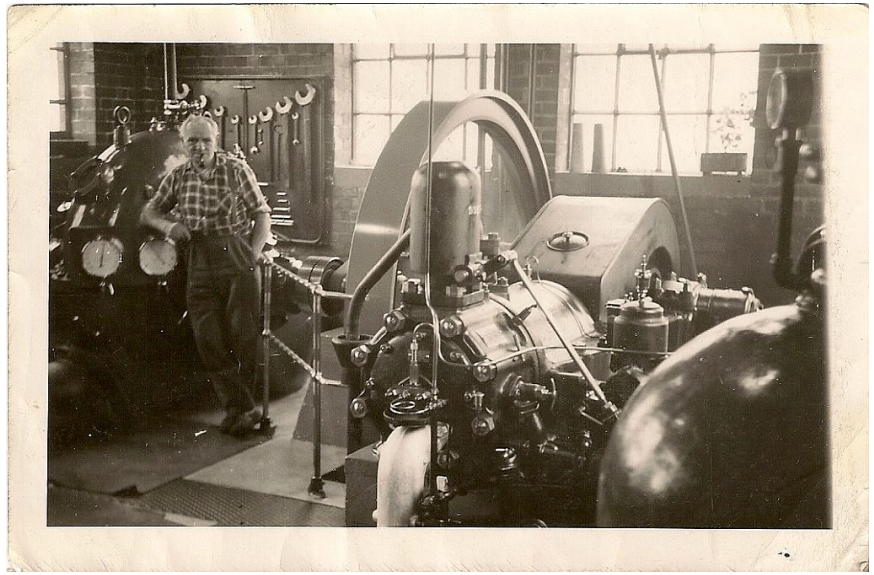
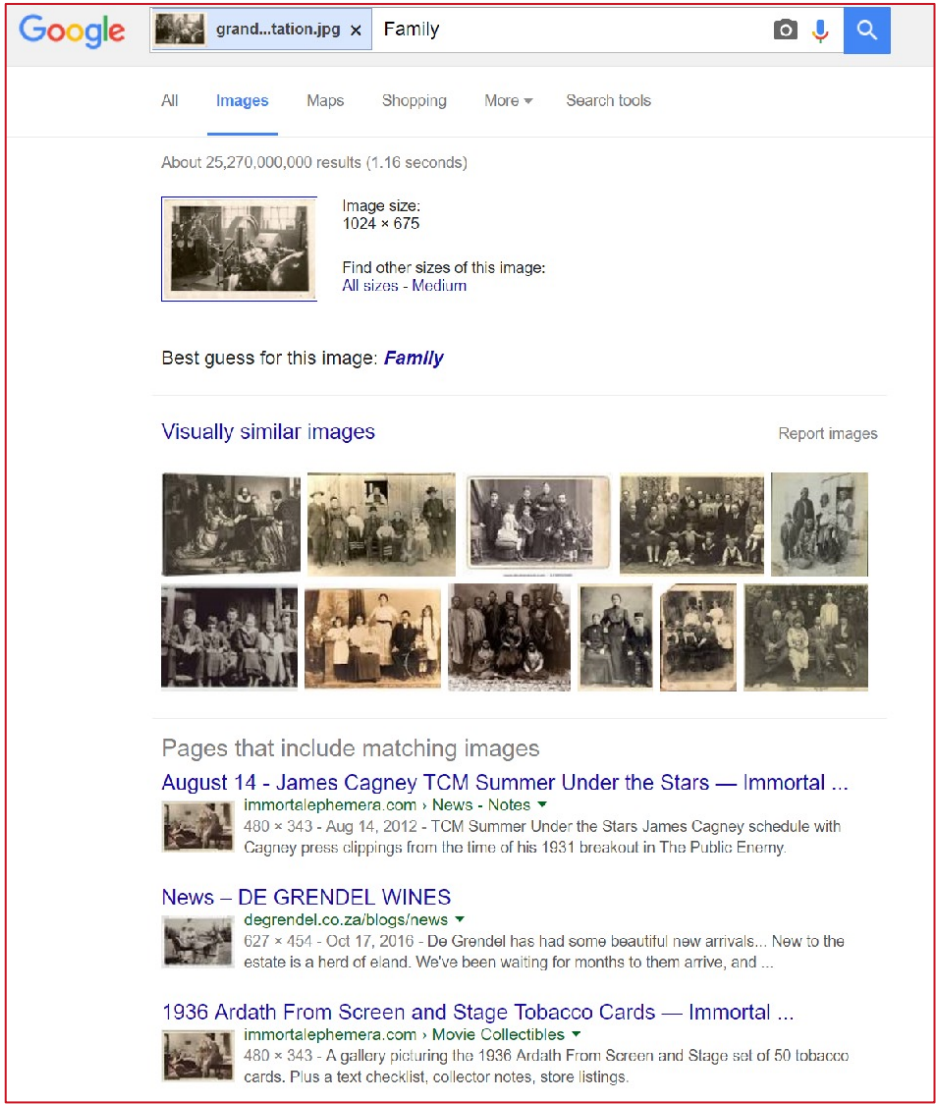
- Integrated search and navigation
  - Tools for browsing search results
  - Search within
- Voice-activated search
  - OK Google, Siri, etc.
  - More natural language queries
- Mobile search
  - Location-aware
- Content-based search
  - E.g. search by image, search by colour
- Visualisation of content / results
  - Tag clouds / topic maps
  - Networks

Example: Google image search



Google Image Search
– search by image



Example: Victoria and Albert Museum

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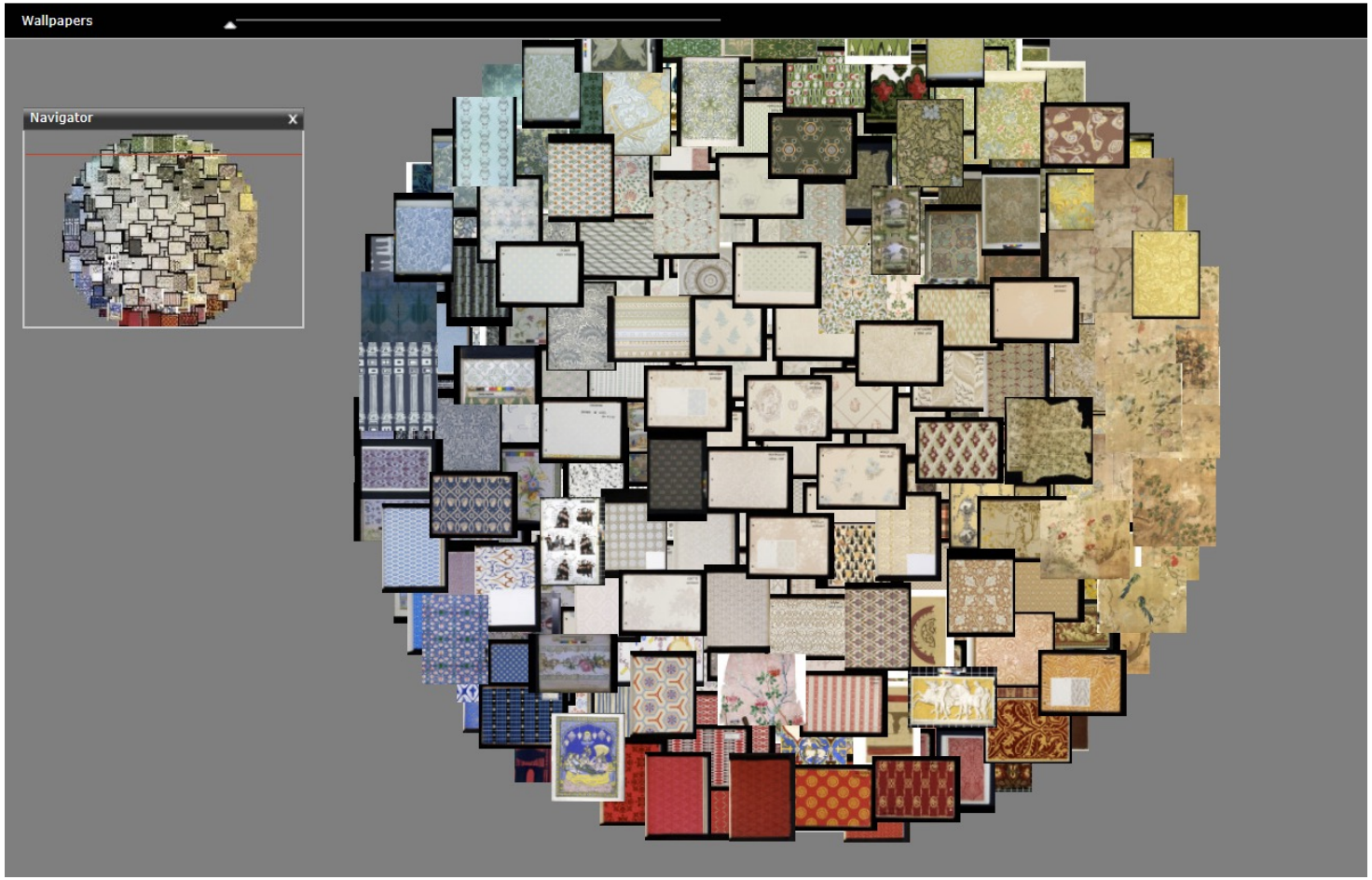
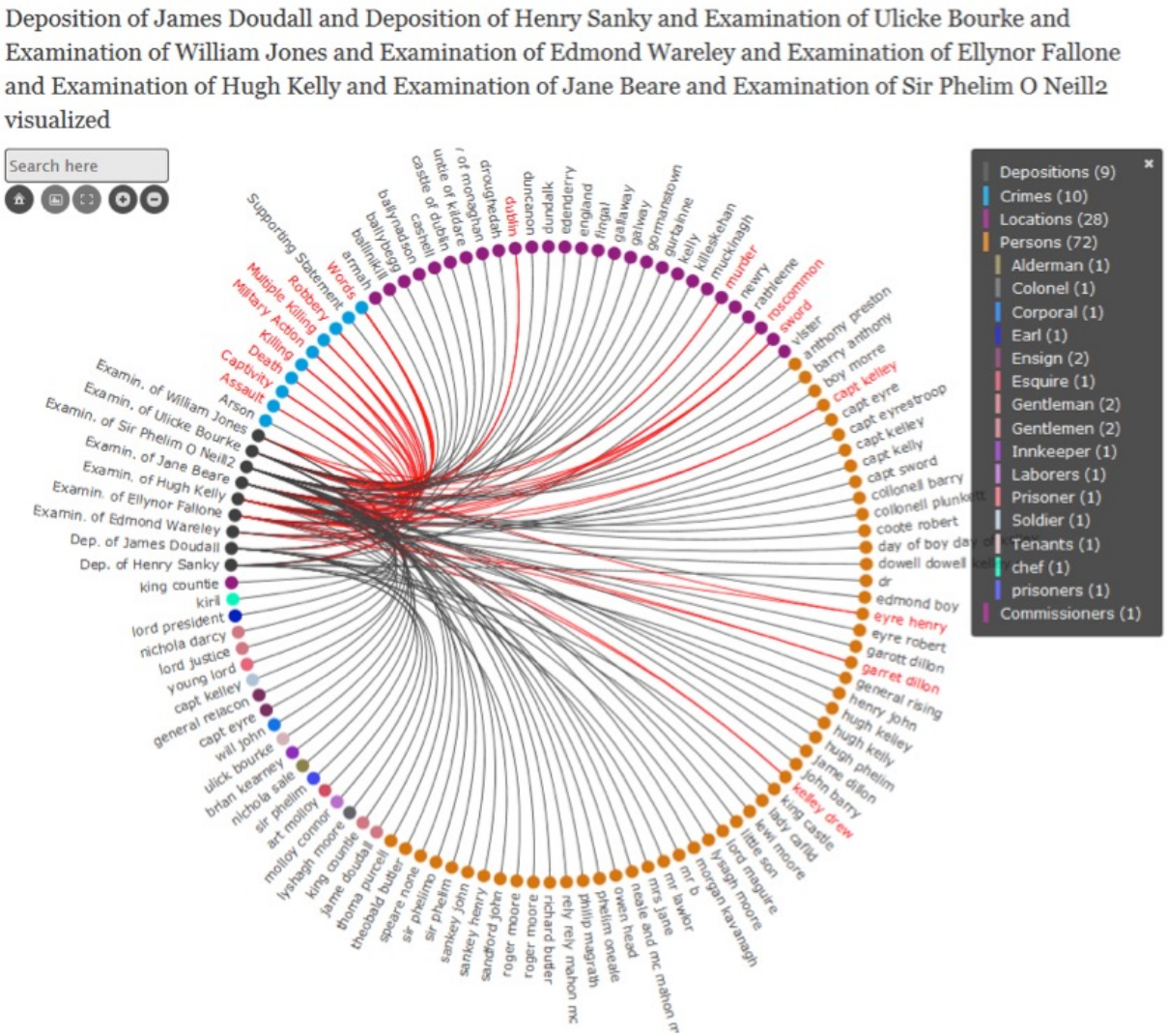
V&A FABRIC VISUALISER
Search the Collections



http://visualiser.ssl.co.uk/vis2dtest1.html?vo=1&data=wallp412&sf=0.006&title=Wallpapers

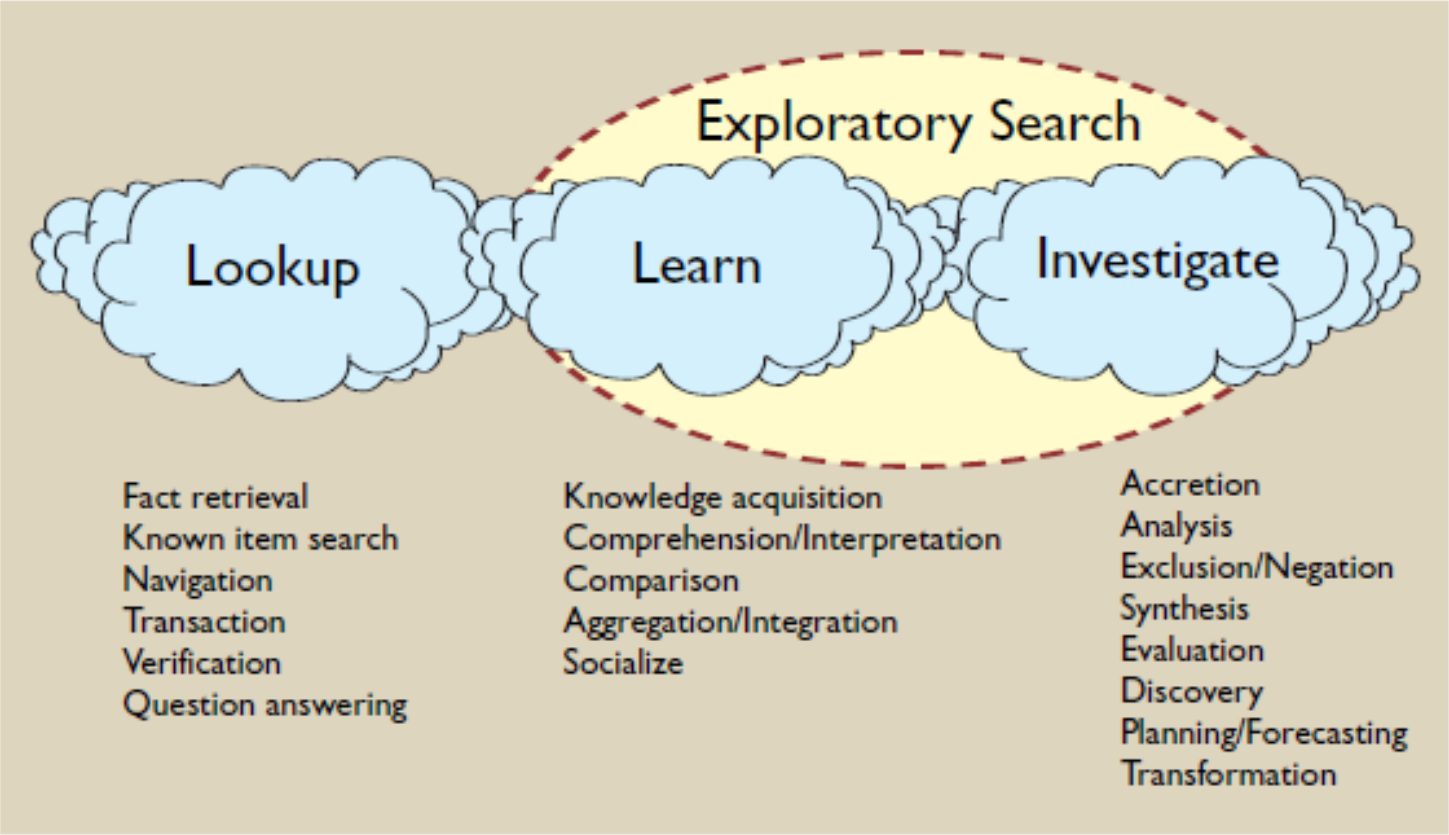
Example: Cultura



http://www.digitalmeetsculture.net/article/cultura-the-main-achiements/

4. Search modes

Search activities



From: Gary Marchionini. 2006. Exploratory search: from finding to understanding. Commun. ACM 49, 4 (April 2006), 41-46. http://doi.acm.org/10.1145/1121949.1121979

Search modes

- Lookup
  - *Locate:* find a specific item (possibly known item)
  - *Verify:* confirm an item meets specific objective criteria
  - *Monitor:* maintain awareness of the status of an item, for purposes of management or control
- Learn
  - *Compare:* examine two or more items to identify similarities and differences
  - *Comprehend:* generate independent insight by interpreting patterns within a data set
  - *Explore:* investigate an item or data set for purpose of knowledge discovery
- Investigate
  - *Analyze:* examine an item or data set to identify patterns and relationships
  - *Evaluate:* use judgement to determine the value of an item with respect to specific goal
  - *Synthesize:* create a novel or composite artefact from diverse inputs

Russell-Rose & Tate, 2013: Chapter 4

Information seeking modes

	Active	Passive
Directed	A: Active seeking and Searching	B: Passive monitoring
Undirected	C: Browsing and Scanning	D: Incidental acquisition of information

Savolainen, 2016 (modified from Bates, 2002, p.4)

Supporting search modes

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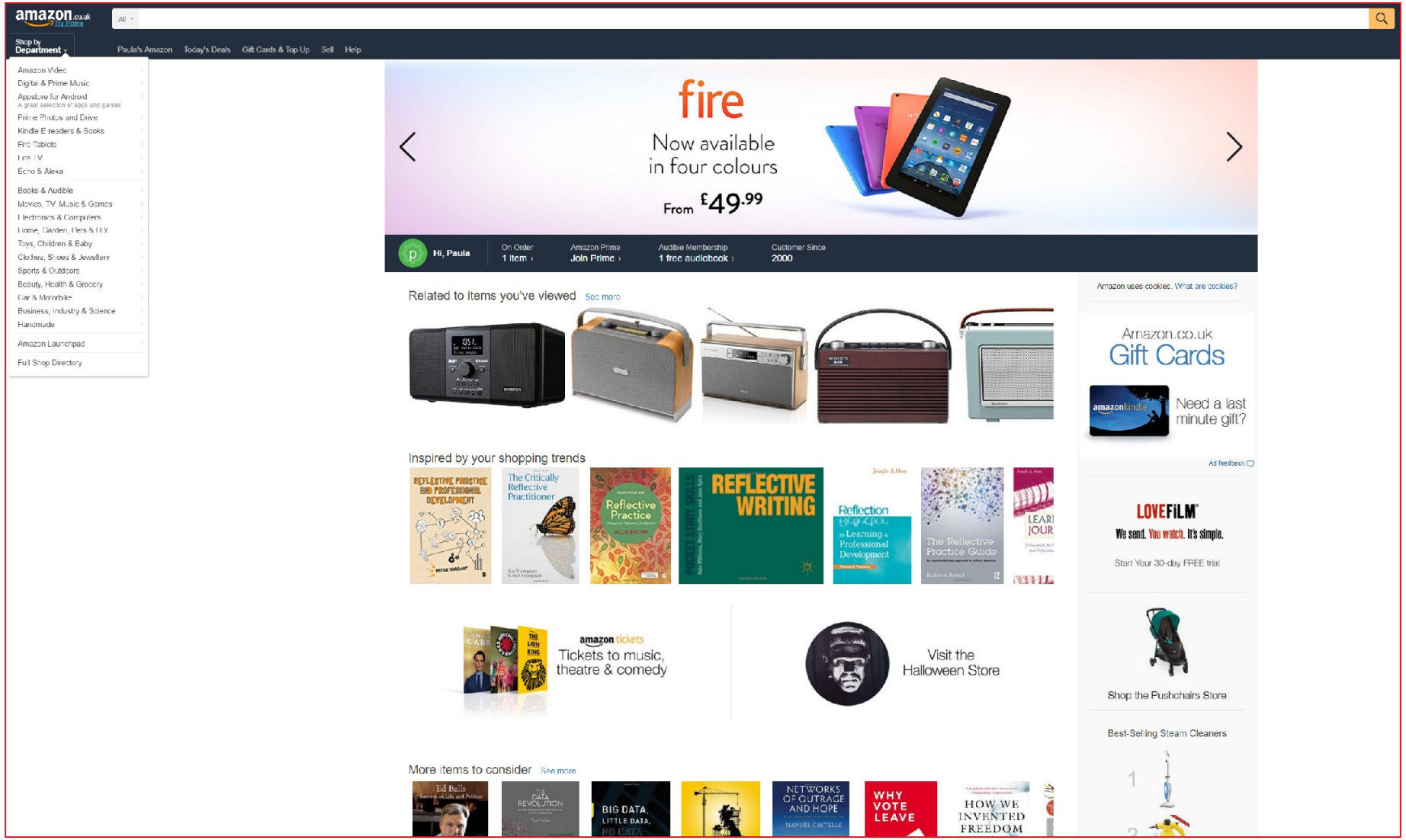

Amazon

Supporting search modes

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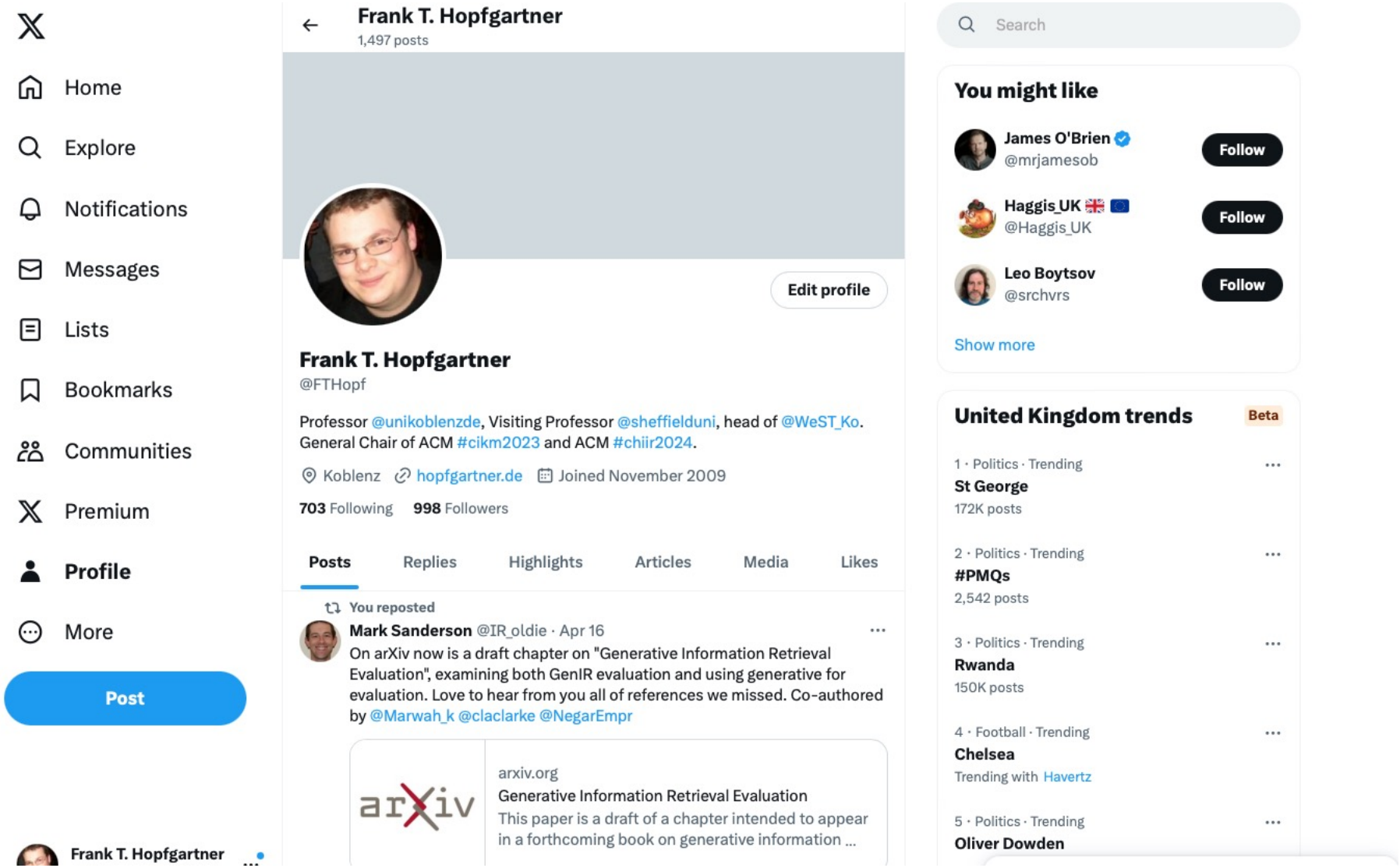

X

Supporting search modes

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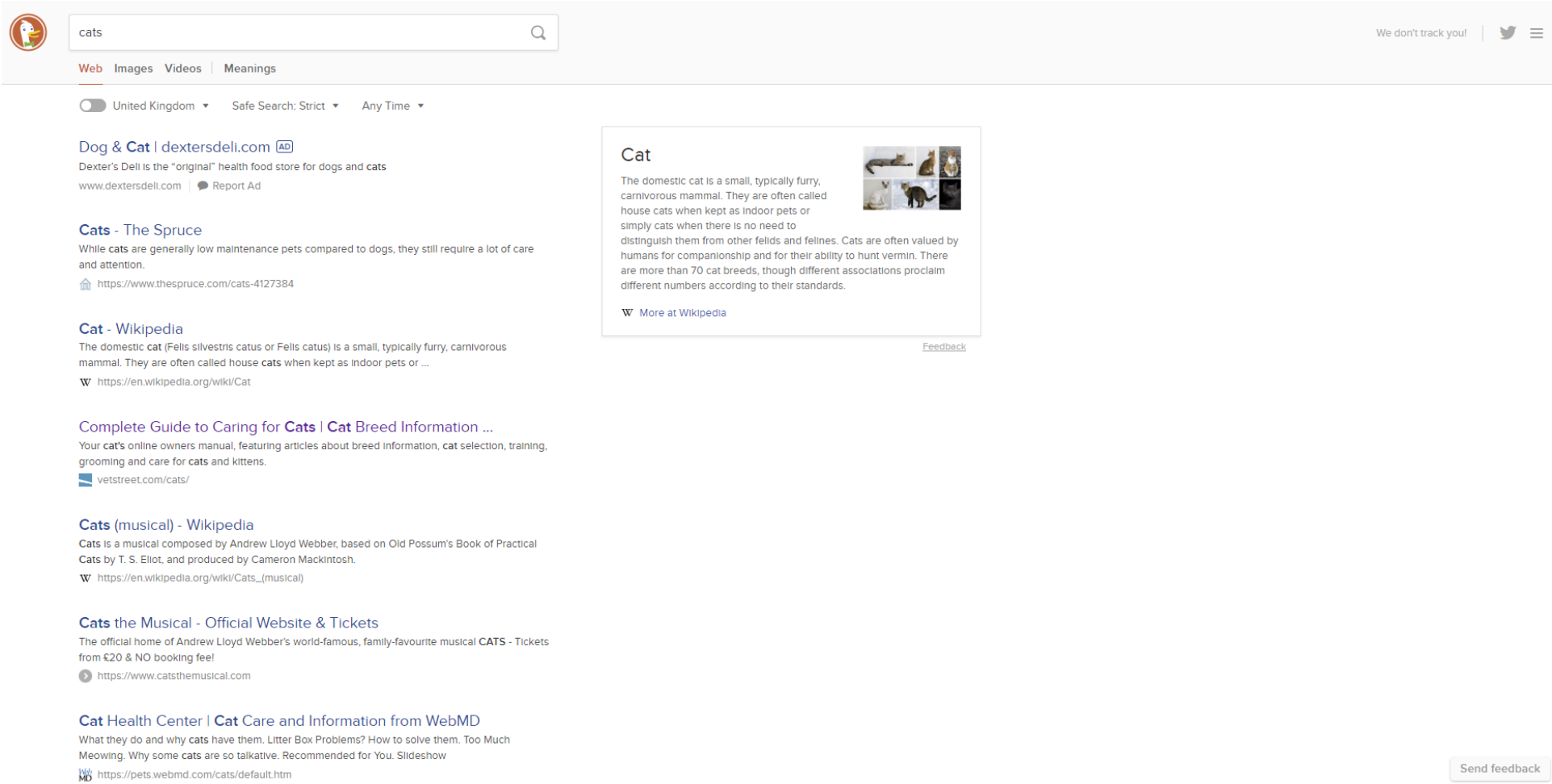

DuckDuckGo

Supporting search modes

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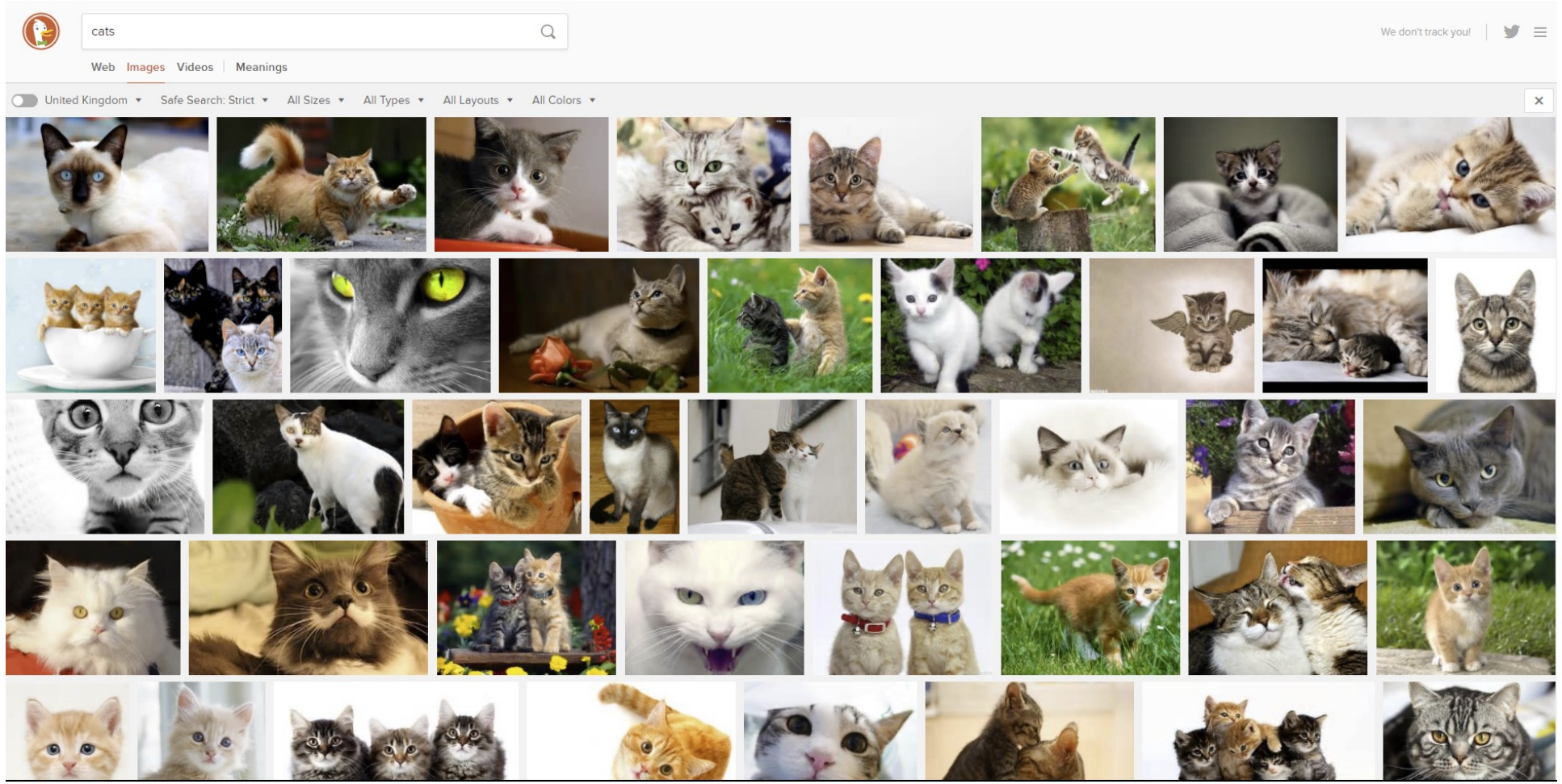

DuckDuckGo

Supporting search modes

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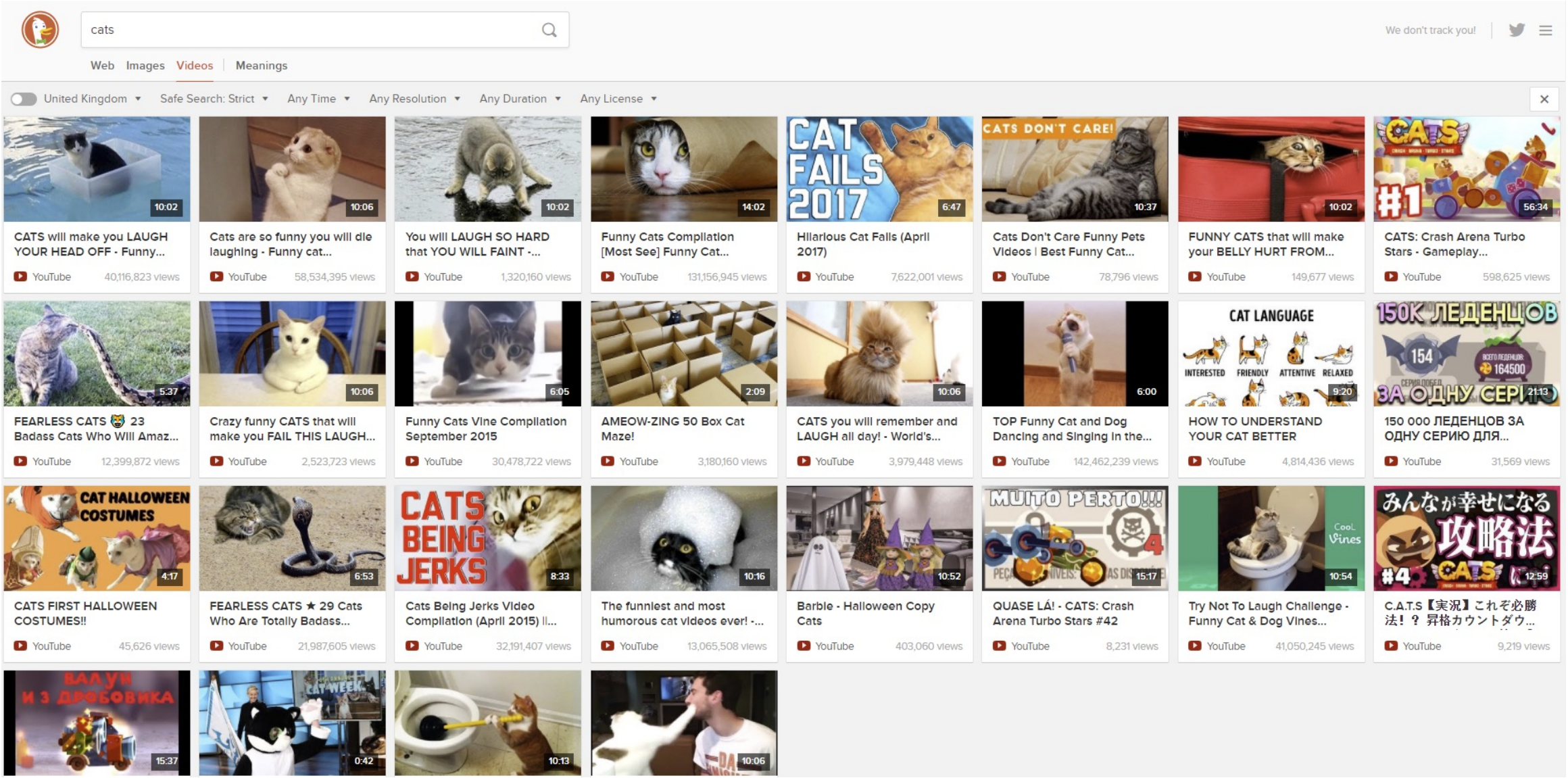

DuckDuckGo

Supporting search modes

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cats

We don't track you!

Web Images Videos | Meanings

Top 3 Entertainment And Media 4 People 2 Sports 2 Acronyms And Abbreviations 13 See Also 4

Cat
A small, typically furry, carnivorous mammal.

Cats
Musical
A musical composed by Andrew Lloyd Webber, based on Old Possum's Book of Practical Cats

Computer Active Technology...
A type of automotive suspension that controls the vertical movement of the wheels relative

Cats
1998 Film
A 1998 direct-to-video musical film of the long-running West End production of Cats, Andrew...

Cats
1925 Film
A 1925 silent-era British comedy film directed by Leslie S. Hiscott and featuring Sydney...

The Cats
A former rock band from Volendam, Netherlands.

The Cats
Reggae Band
A ska ensemble from Mile End, London.

Jacob Cats
A Dutch poet, humorist, jurist and politician. He is most famous for his emblem books.

United Kingdom Safe Search: Strict Any Time

Dog & **Cat** | dextersdeli.com AD
Dexter's Deli is the "original" health food store for dogs and cats
www.dextersdeli.com Report Ad

Cats - The Spruce
While cats are generally low maintenance pets compared to dogs, they still require a lot of care and attention.
https://www.thespruce.com/cats-4127384

Cat - Wikipedia
The domestic cat (Felis silvestris catus or Felis catus) is a small, typically furry, carnivorous mammal. They are often called house cats when kept as indoor pets or ...
https://en.wikipedia.org/wiki/Cat

Complete Guide to Caring for **Cats** | **Cat** Breed Information ...
Your cat's online owners manual, featuring articles about breed information, cat selection, training, grooming and care for cats and kittens.
vetstreet.com/cats/

Cats (musical) - Wikipedia
Cats is a musical composed by Andrew Lloyd Webber, based on Old Possum's Book of Practical Cats by T. S. Eliot, and produced by Cameron Mackintosh.
https://en.wikipedia.org/wiki/Cats_(musical)

Cat
The domestic cat is a small, typically furry, carnivorous mammal. They are often called house cats when kept as indoor pets or simply cats when there is no need to distinguish them from other felids and felines. Cats are often valued by humans for companionship and for their ability to hunt vermin. There are more than 70 cat breeds, though different associations proclaim different numbers according to their standards.

More at Wikipedia

Feedback

DuckDuckGo

Supporting search modes

WolframAlpha computational knowledge engine.

cats

Web Apps | Examples | Random

Assuming "cats" is referring to cat breeds | Use as a general topic or a species specification or a word instead

Input interpretation:

cat breeds

Open code

Members: More

Abyssinian | American Bobtail | American Curl | American Shorthair | American Wirehair | Australian Mist | Balinese | Bengal | Birman | Bombay | British Longhair | British Shorthair | Burmese | Burmilla | California Spangled | Chantilly | Chartreux | Chausie | Chinese Li Hua Mao | Colorpoint Shorthair | ... (total: 71)

Images: More

Abyssinian	American Bobtail	American Curl

Properties: Show non-metric

weight	highest	(6.7 to 14) kg (kilograms) (Savannah)
	lowest	(1.8 to 4.1) kg (kilograms) (Singapura)

Sources | Download page | POWERED BY THE WOLFRAM LANGUAGE

WolframAlpha

Supporting search modes

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FROM THE MAKERS OF WOLFRAM LANGUAGE AND MATHEMATICA

WolframAlpha

koblenz

NATURAL LANGUAGE | MATH INPUT | EXTENDED KEYBOARD | EXAMPLES | UPLOAD | RANDOM

Assuming Koblenz (Germany) | Use Koblenz (Switzerland) instead

Input interpretation

Koblenz, Rhineland-Palatinate

Population — Show history

city population	105 888 people (country rank: 74th) (2007 estimate)

Location — World map | Show coordinates

Rhineland-Palatinate

Satellite image »

Local map — 30 kilometers across | Non-metric

Administrative regions

region	Rhineland-Palatinate
country	Germany

Current local time

1:26 pm CEST | Wednesday, April 24, 2024

Current weather — Show history | Show non-metric

4 °C (wind chill: – 1 °C) | relative humidity: 70% | wind: 7 m/s | cloudy
using weather station ETSB: 43 km WSW and 410 meters above Koblenz, Germany

Nearby cities — Show non-metric | More

Neuwied, Rhineland-Palatinate	13 km (kilometers) northwest	65 750 people
Cologne, North Rhine-Westphalia	80 km (kilometers) north-northwest	1.024 million people
Frankfurt, Hesse	81 km (kilometers) east-southeast	679 664 people

(straight-line distances between city centers)

Nearby airports — Show non-metric | More

Koblenz–Winningen Airport	6 km (kilometers) west-southwest
Mendig Airport	20 km (kilometers) west
Siegerland Airport	52 km (kilometers) northeast
Cologne Bonn Airport	66 km (kilometers) north-northwest
Frankfurt International Airport	76 km (kilometers) east-southeast

(straight-line distances between city center and airport)

Geographic properties — Show non-metric

elevation	69 m
area	105.25 km²
population density	1006 people per square kilometer

Units »

Nearby features — Enlarge | Data | Customize | Plain Text

Nearest sea — Show map | Show non-metric | More

North Sea (253 km (kilometers) west-northwest)
(straight-line distance between city center and shore)

Notable people born in Koblenz — More | Show dates | Show deaths

Klemens Wenzel von Metternich (diplomat) (1773)
Valéry Giscard d'Estaing (politician) (1926)
Max von Laue (physicist) (1879)
Anton Diffring (actor) (1916)
Gus Kahn (Academy Award winner) (1886)
Johannes Peter Müller (anatomist, etc.) (1801)
Peter Joppich (fencer) (1982)
Hans Zassenhaus (mathematician) (1912)
Otto Griebling (circus performer) (1896)
Josef Swickard (actor) (1866)
…

Wikipedia page hits history — Log scale

(in hits per day)
(based on monthly averages of daily hits to English-language "Koblenz" page)

Sources | Download Page — POWERED BY THE WOLFRAM LANGUAGE

Related Queries:

- Ehrenbreitstein Fortress
- cities near Koblenz
- Neuwied
- words containing the letters koblenz
- cities in Germany

WolframAlpha

5. Summary

Intended Learning Outcomes

You will now be able to:

- clarify the role of context in search
- outline how to model search behaviour
- summarise key features of search interfaces
- describe various search modes