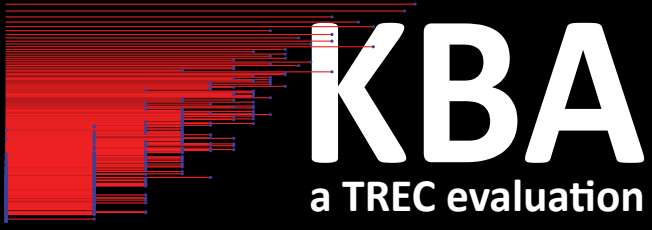

Entity-oriented Filtering of Large Streams

TREC KBA 2013

Knowledge Base Acceleration

John R. Frank
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Ellen Voorhees
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maxkw@mit.edu

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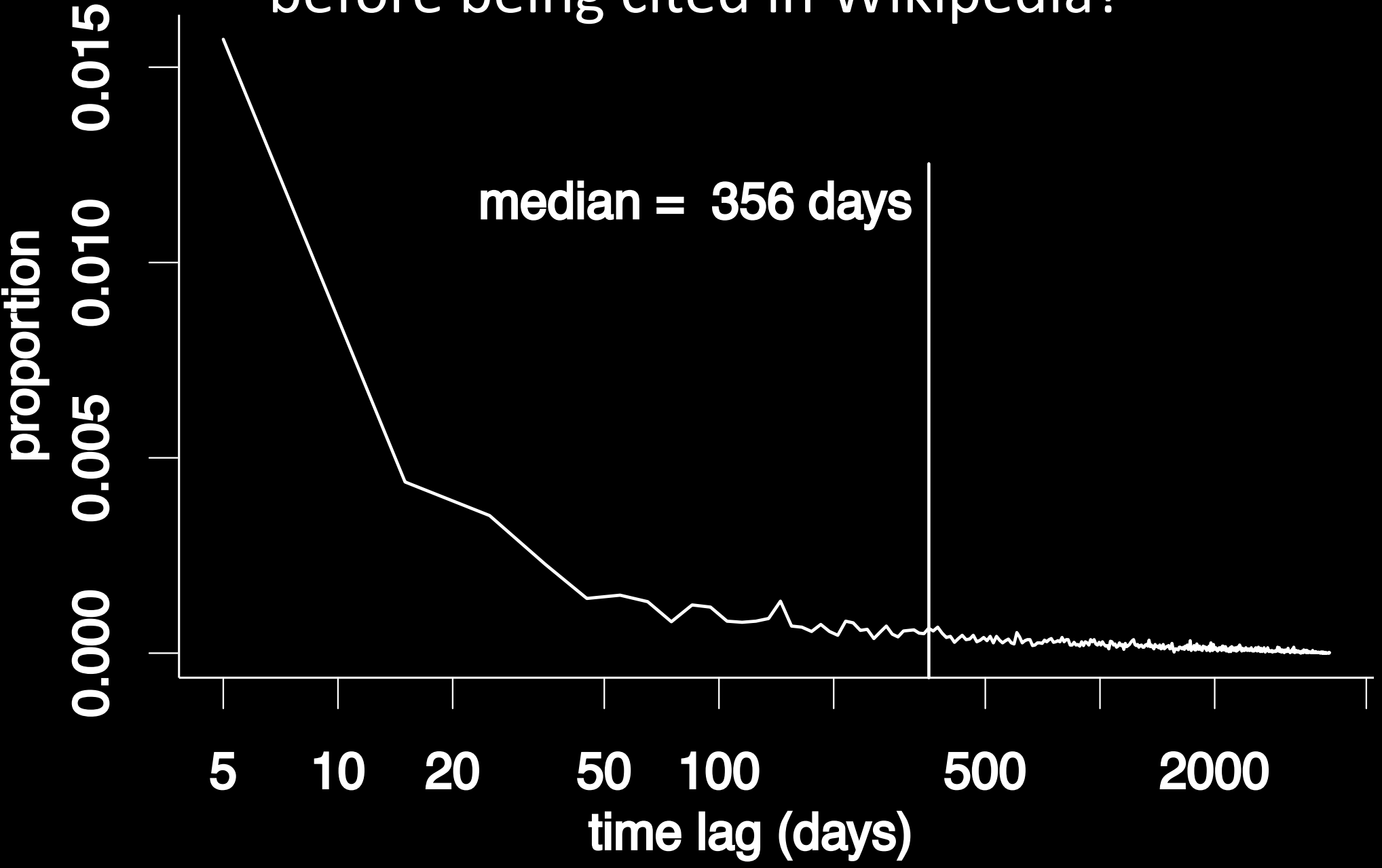
Ce Zhang
czhang@cs.wisc.edu

http://trec-kba.org

KBA
a TREC evaluation

How many days must a news article wait before being cited in Wikipedia?



KBA
a TREC evaluation

Accelerate?

rate of assimilation << stream size

editors << # entities << # mentions

(definition of a “large” KB)

KBA
a TREC evaluation

Date: Tue, 13 Mar 2012 02:45:40 +0000

From: Google Alerts <googlealerts-noreply@google.com>

Subject: Google Alert - "John R. Frank"

=== Web - 2 new results for **["John R. Frank"]** ===

John R. Frank

SPOKANE, Wash. - **John R. Frank**, **55**, died March 4, 2012, in **Coeur d' Alene, Idaho**. Survivors include: his wife, Miki; daughter, Patricia Frank; ...

<http://www.hutchnews.com/obituaries/Frank--John-CP>

In Memory of **John R Frank**

Biography. **John R. Frank**, **age 55**, passed away at **Sacred Heart Medical Center in Spokane, WA**, on March 4, 2012. **John** was born in Hutchison, KS, ...

<http://www.englishfuneralchapel.com/sitemaker/sites/Englis1/obit.cgi?user=583335F

KBA
a TREC evaluation

Key Questions

- What makes an alert "good"?
- How to measure it?
- How to scale entity-centric search?

=== Web - 2 new results for **["John R. Frank"]** ===

John R. Frank

SPOKANE, Wash. - **John R. Frank**, **55**, died March 4, 2012, in **Coeur d' Alene, Idaho**. Survivors include: his wife, Miki; daughter, Patricia Frank; ...

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Biography. **John R. Frank**, **age 55**, passed away at **Sacred Heart Medical Center in Spokane, WA**, on March 4, 2012. **John** was born in Hutchison, KS, ...

<http://www.englishfuneralchapel.com/sitemaker/sites/Englis1/obit.cgi?user=583335F

KBA
a TREC evaluation

TREC KBA 2013

Stream Filtering to Recommend Citations and Fill Slots

Automatically recommend new edits

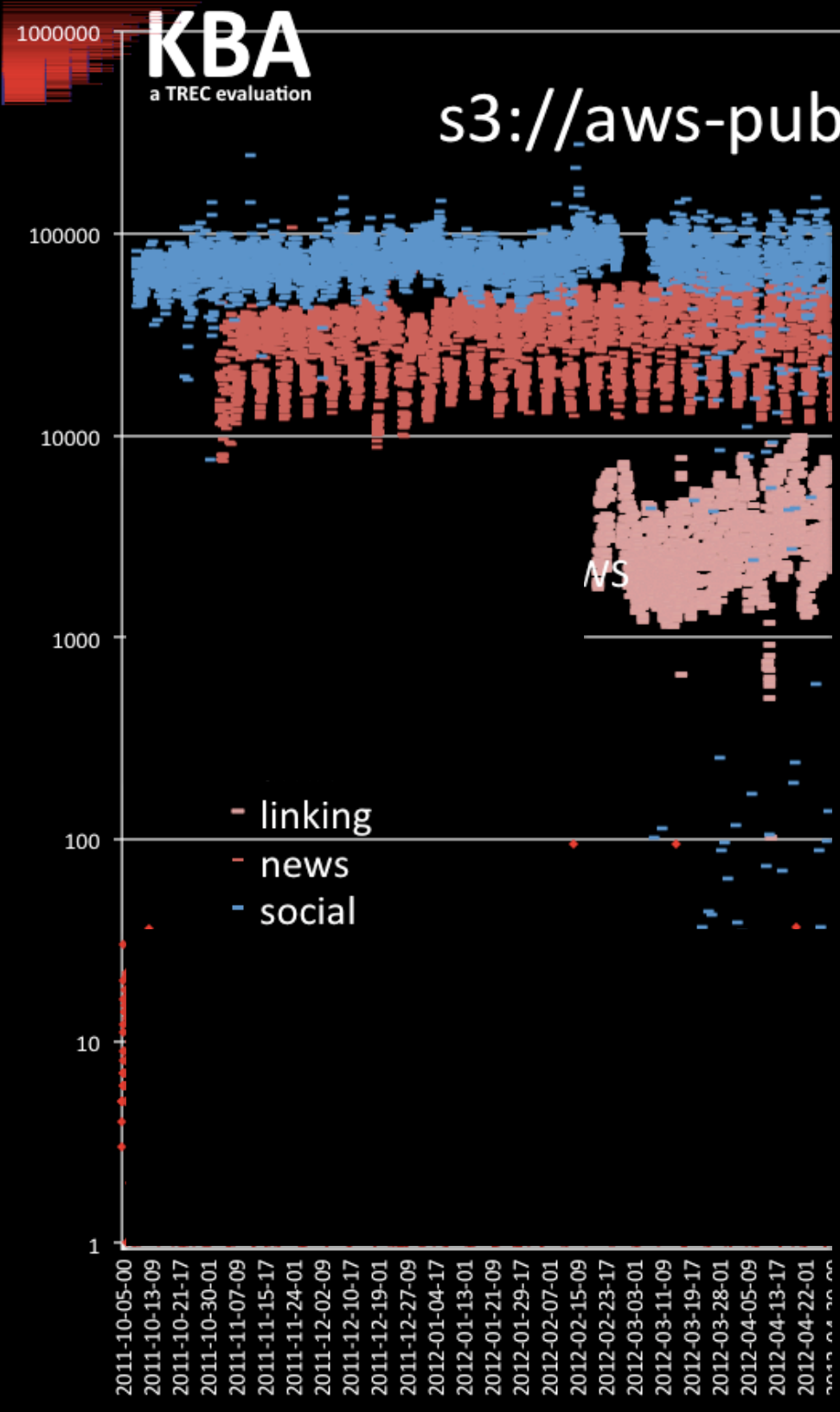
1) Initialize with target entities
   - Start with profiles from Feb 2012
   - Training labels from Oct 2011–Feb 2012
2) Iterate over stream of text items
3) Identify "Vital" texts that change the profile
4) Identify slot values that change

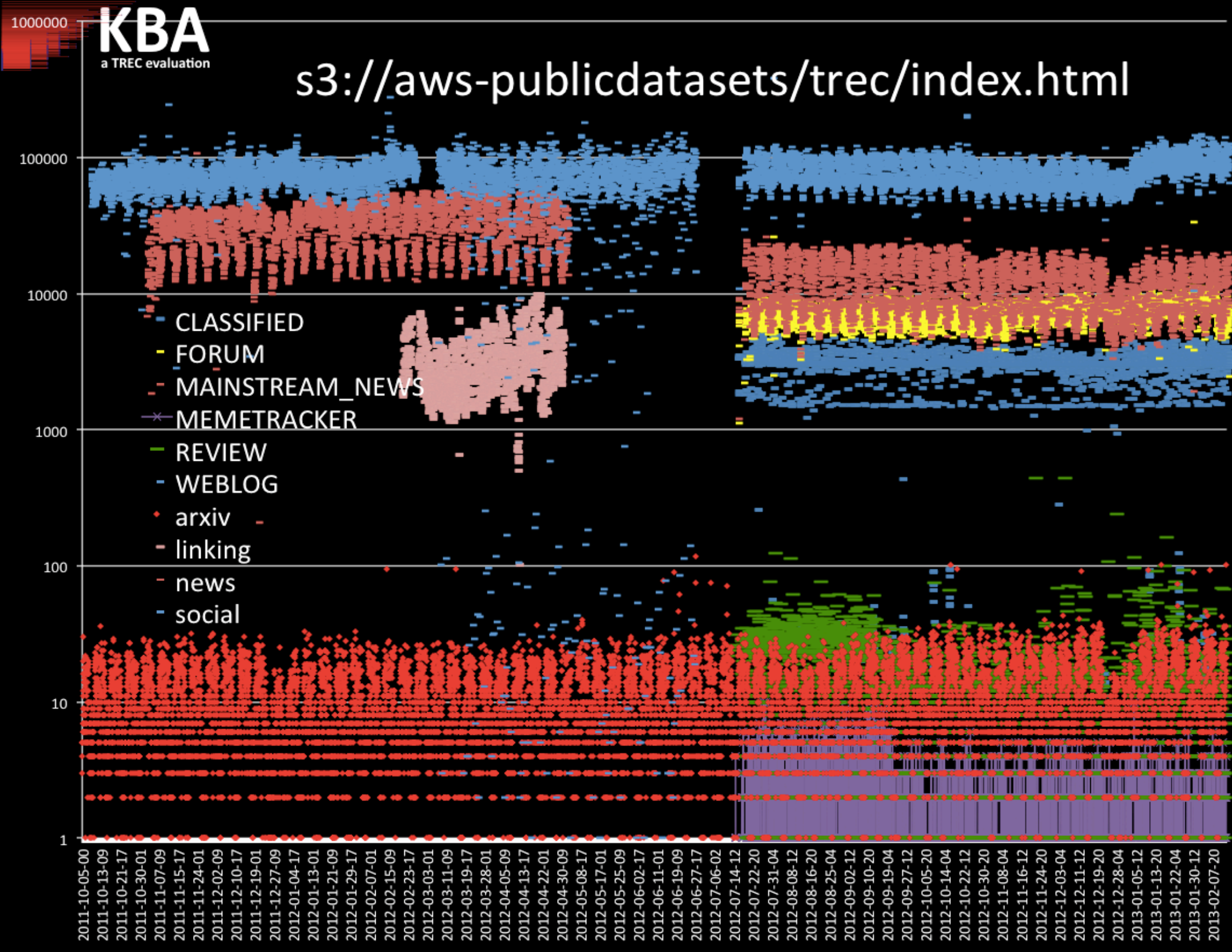
Your KBA System

Content Stream
- 1bn texts, 50% English
- 11,948 hours of data (17months)
- 10^5 docs-per-hour
- News, blogs, forums, and link shortening

KBA
a TREC evaluation

s3://aws-publicdatasets/trec/index.html




KBA
a TREC evaluation
s3://aws-publicdatasets/trec/index.html
1000000
100000
10000
1000
100
10
1
CLASSIFIED
FORUM
MAINSTREAM_NEWS
MEMETRACKER
REVIEW
WEBLOG
arxiv
linking
news
social
2011-10-05-00
2011-10-13-09
2011-10-21-17
2011-10-30-01
2011-11-07-09
2011-11-15-17
2011-11-24-01
2011-12-02-09
2011-12-10-17
2011-12-19-01
2011-12-27-09
2012-01-04-17
2012-01-13-01
2012-01-21-09
2012-01-29-17
2012-02-07-01
2012-02-15-09
2012-02-23-17
2012-03-03-01
2012-03-11-09
2012-03-19-17
2012-03-28-01
2012-04-05-09
2012-04-13-17
2012-04-22-01
2012-04-30-09
2012-05-08-17
2012-05-17-01
2012-05-25-09
2012-06-02-17
2012-06-11-01
2012-06-19-09
2012-06-27-17
2012-07-06-02
2012-07-14-12
2012-07-22-20
2012-07-31-04
2012-08-08-12
2012-08-16-20
2012-08-25-04
2012-09-02-12
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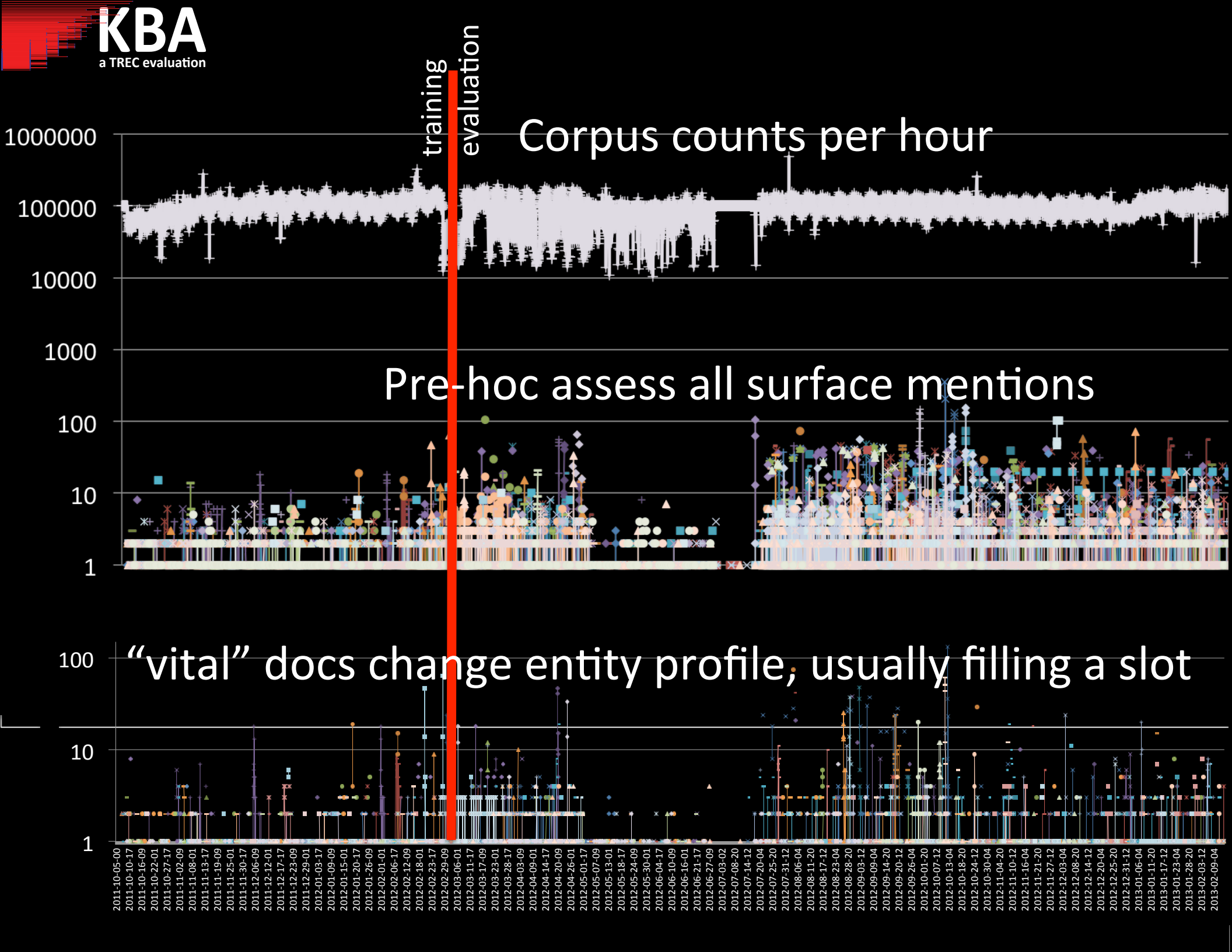
2012-10-05-20
2012-10-14-04
2012-10-22-12
2012-10-30-20
2012-11-08-04
2012-11-16-12
2012-11-24-20
2012-12-03-04
2012-12-11-12
2012-12-19-20
2012-12-28-04
2013-01-05-12
2013-01-13-20
2013-01-22-04
2013-01-30-12
2013-02-07-20

KBA
a TREC evaluation



KBA
a TREC evaluation

Refine “central” → “vital”

Masaru Emoto

From Wikipedia, the free encyclopedia

Masaru Emoto (江本 勝 *Emoto Masaru*[?], born July 22, 1943) is a Japanese author and entrepreneur,

Mentions	A	S	D	F
Zero Mention	Z	X	C	V
	Garbage	Neutral	Relevant	Central

2012

Published: March 31, 2012
Impact of Thoughts on Water
By Denis Gorce-Bourge

Water covers 70% of our Blue planet and our body is made of about 70% water.

Masaru Emoto is a Japanese Photographer and scientist. He is known over the world for his remarkable work on water and its deep connection with individual and collective consciousness.

For decades, Masaru took pictures of frozen crystals of water and tested the direct influence of the environment on the quality of those crystals.

KBA
a TREC evaluation

Refine “central” → “vital”

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Mentions	A	S	D	F
Zero Mention	Z	X	C	V
	Garbage	Neutral	Useful	Vital

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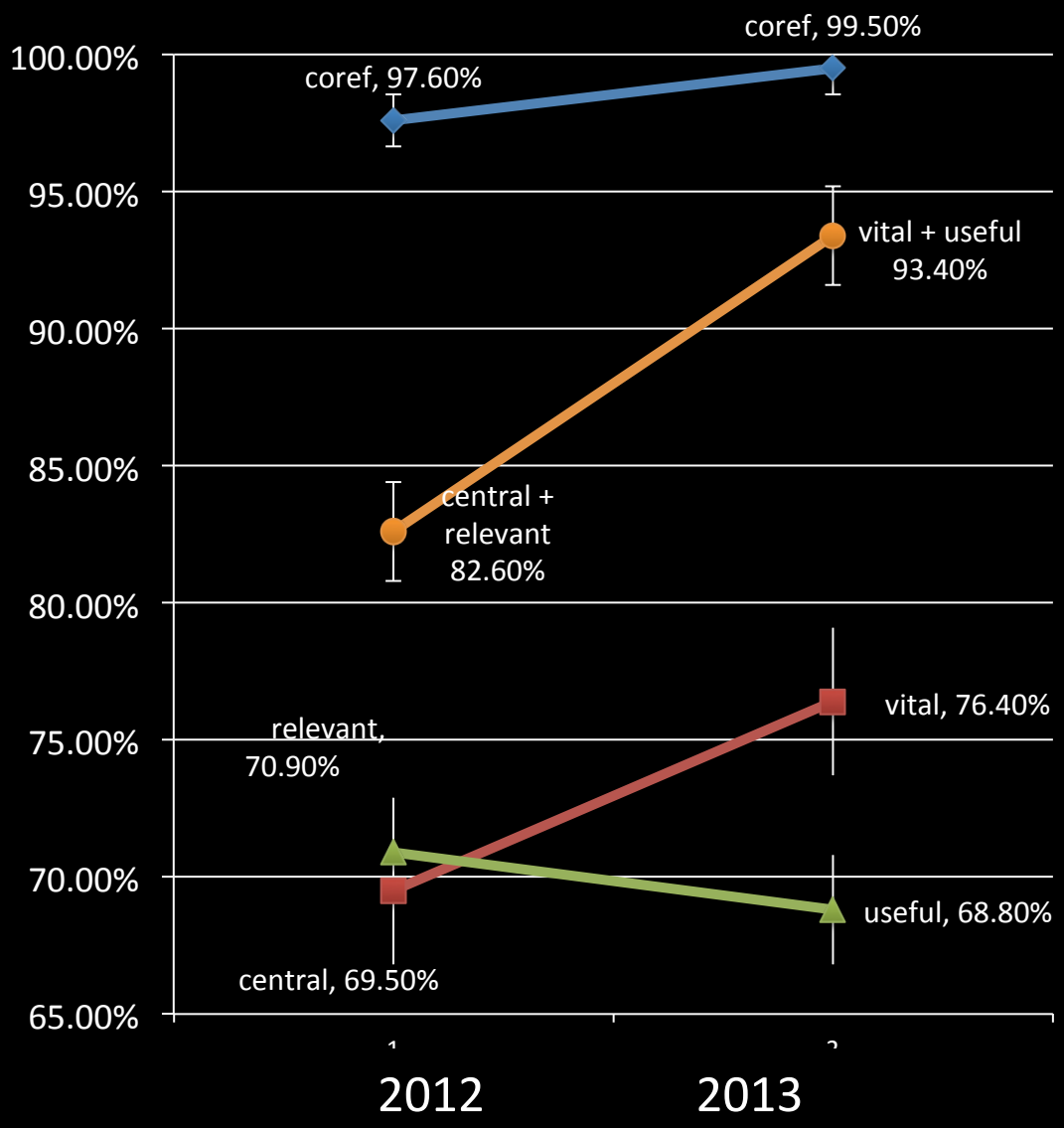
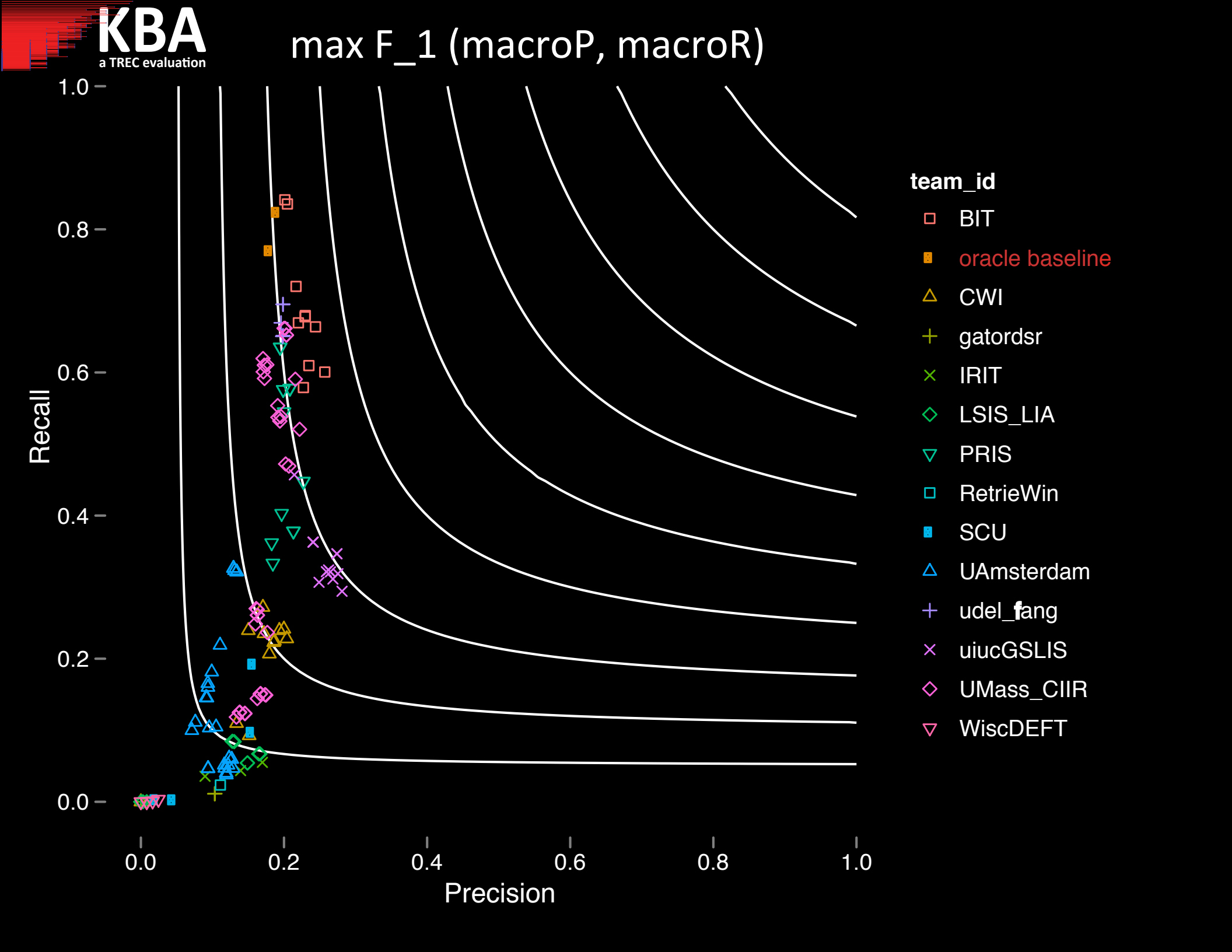
KBA
a TREC evaluation

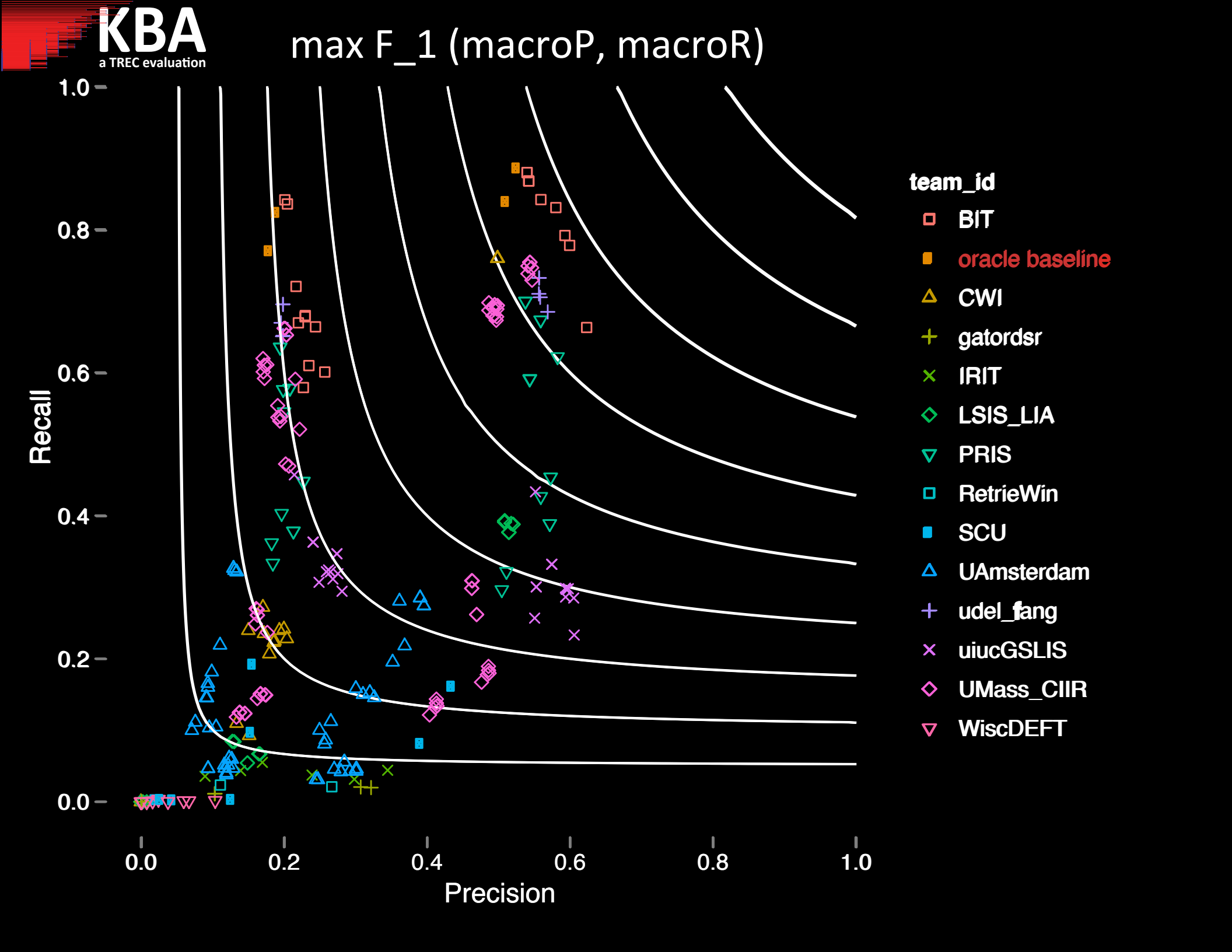
Timeliness



Mentions	A	S	D	F
Zero Mention	Z	X	C	V
	Garbage	Neutral	Useful	Vital

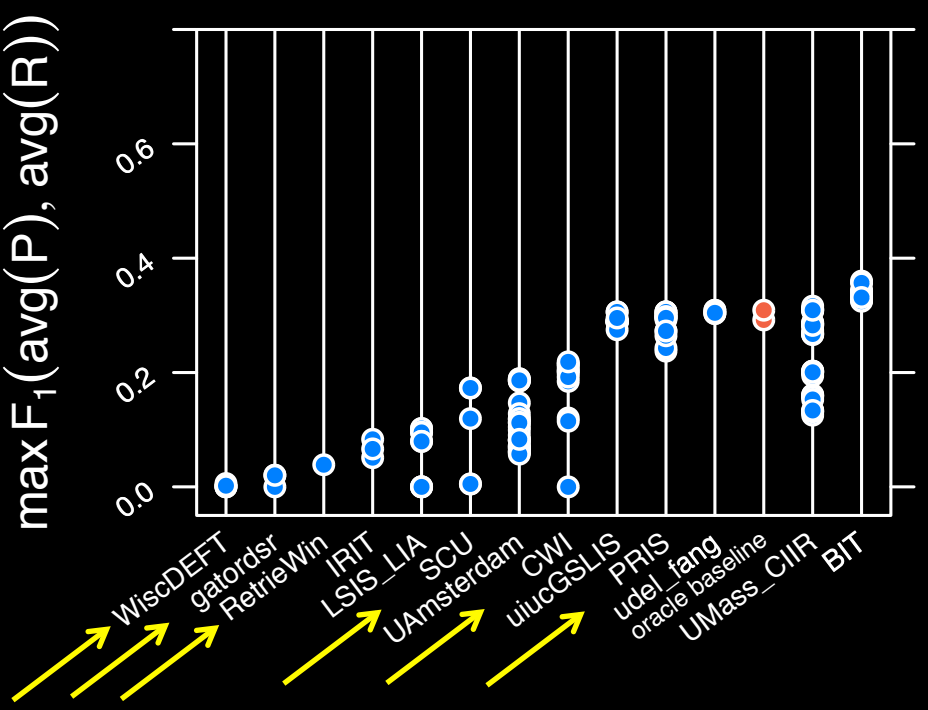
The majestic gray birds with red caps should be hundreds of miles south where it's warm at this time of year -- and not in Nebraska. "I've been there 50 years and I've never seen it," said noted ornithologist and author **Paul Johnsgard** of Lincoln.


KBA
a TREC evaluation
max F_1 (macroP, macroR)
Recall
Precision
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
team_id
BIT
oracle baseline
CWI
gatordsr
IRIT
LSIS_LIA
PRIS
RetrieWin
SCU
UAmsterdam
udel_fang
uiucGSLIS
UMass_CIIR
WiscDEFT

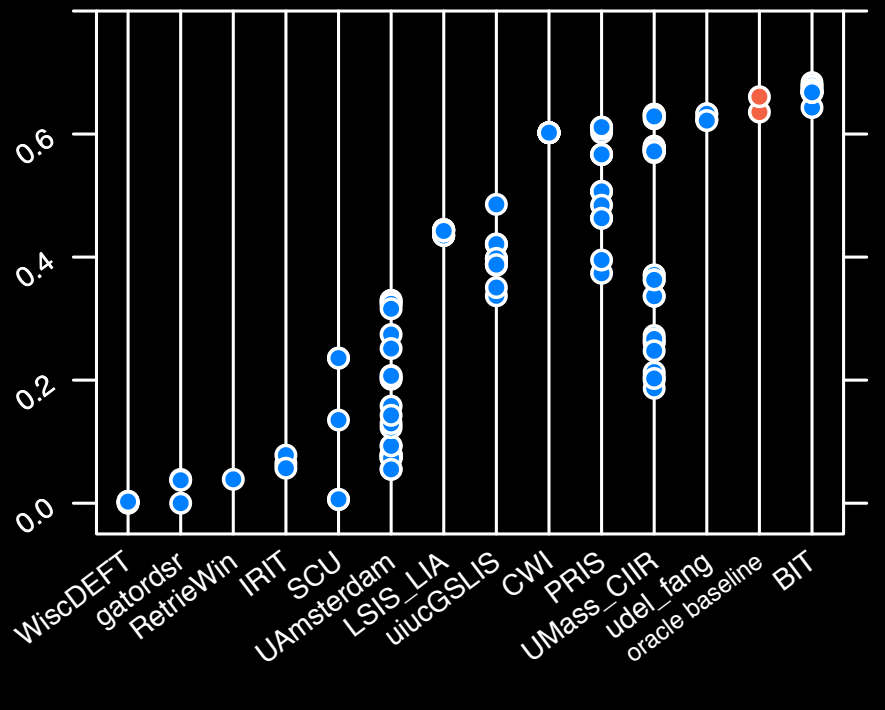

KBA
a TREC evaluation
max F_1 (macroP, macroR)
Recall
Precision
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
team_id
BIT
oracle baseline
CWI
gatordsr
IRIT
LSIS_LIA
PRIS
RetrieWin
SCU
UAmsterdam
udel_fang
uiucGSLIS
UMass_CIIR
WiscDEFT

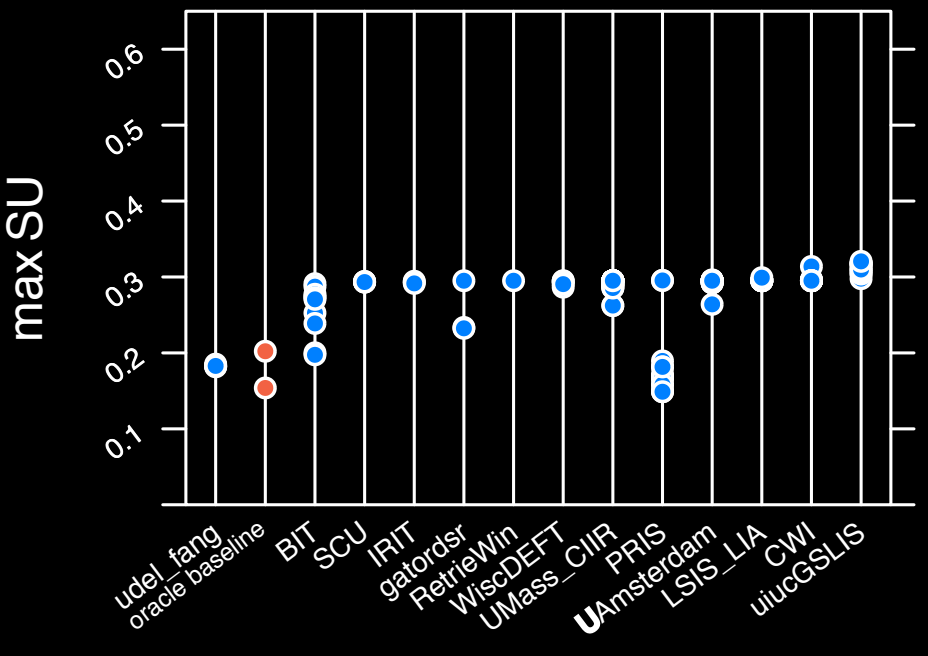
KBA
a TREC evaluation

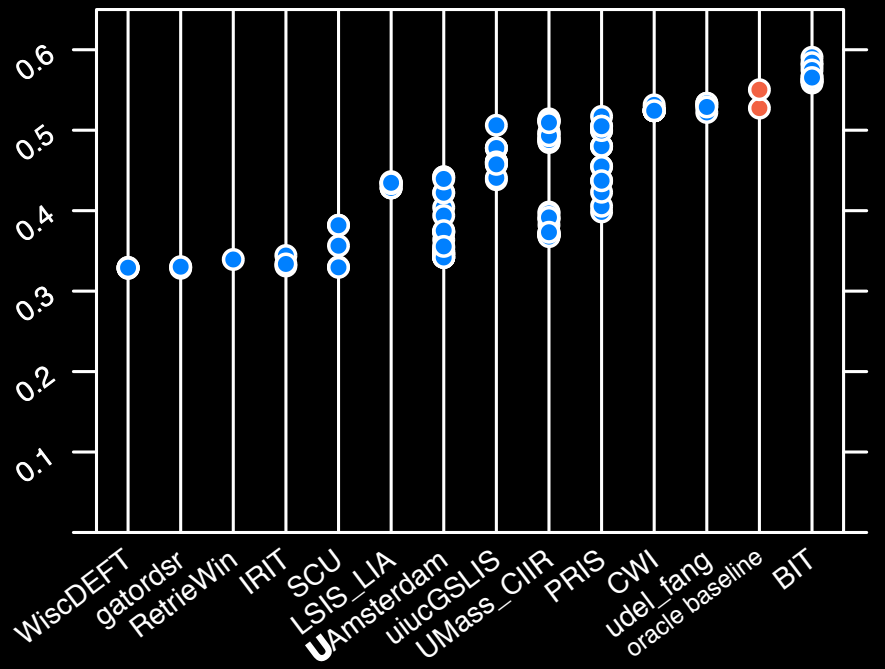
vital



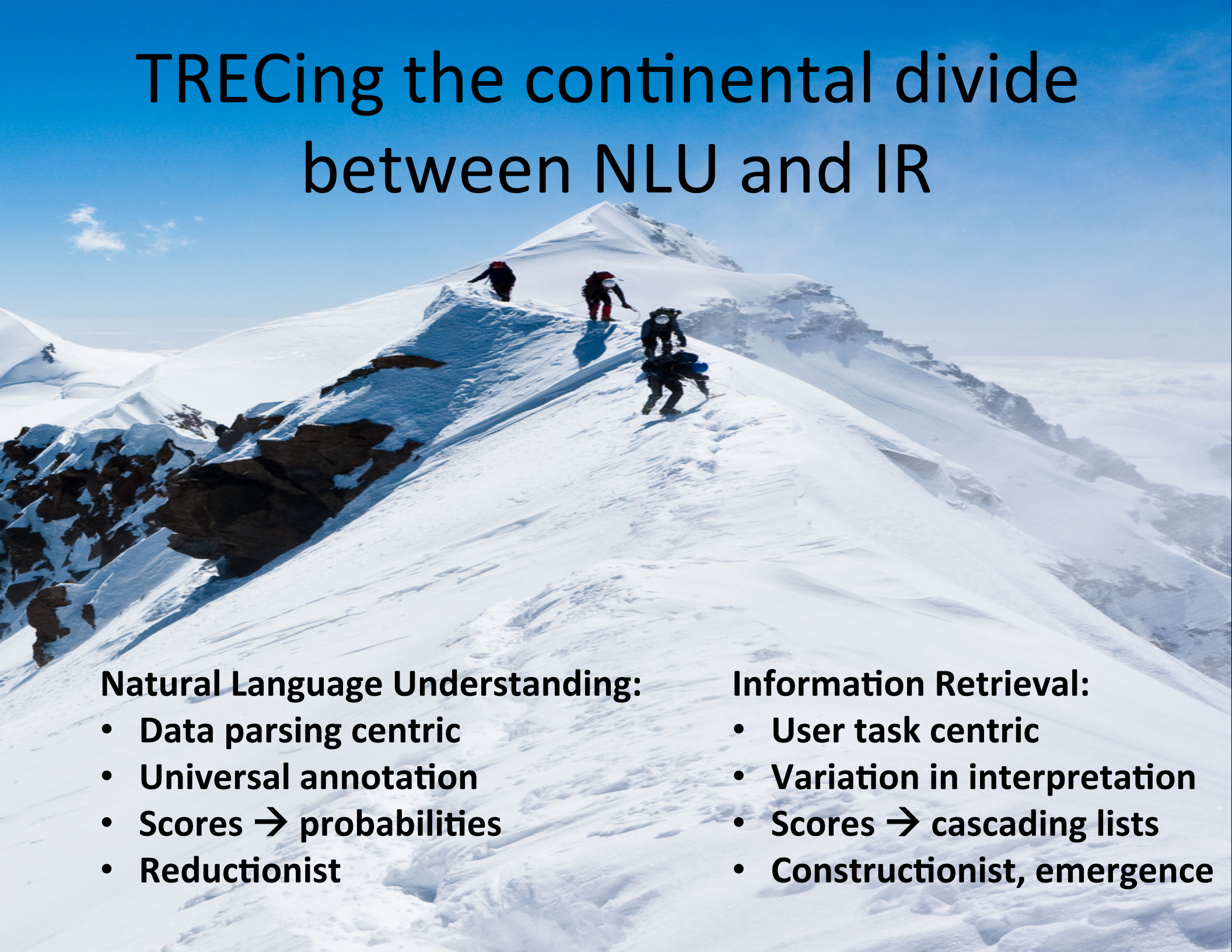
vital+useful







TRECing the continental divide between NLU and IR



Natural Language Understanding:

- **Data parsing centric**
- **Universal annotation**
- **Scores → probabilities**
- **Reductionist**

Information Retrieval:

- **User task centric**
- **Variation in interpretation**
- **Scores → cascading lists**
- **Constructionist, emergence**

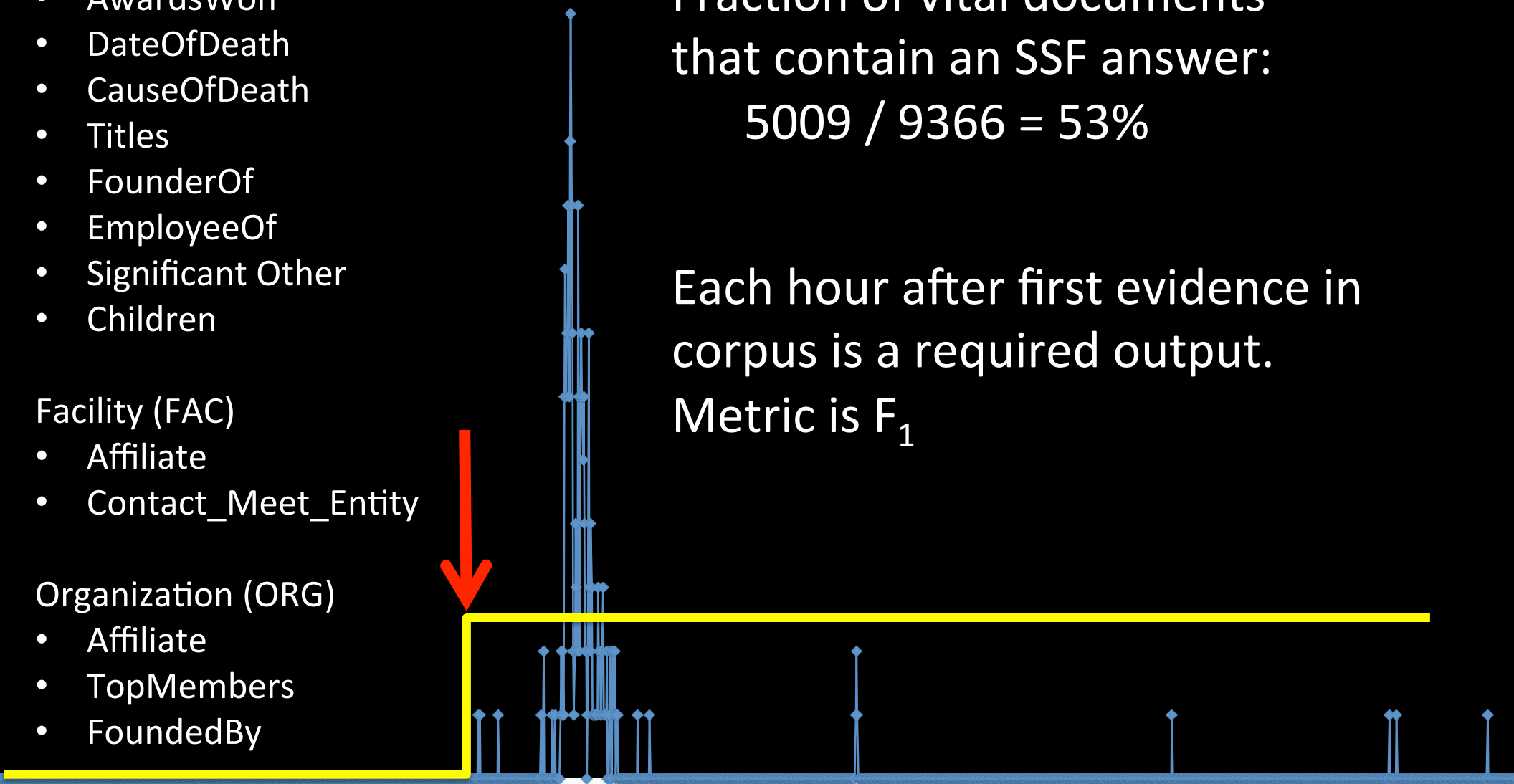
KBA
a TREC evaluation

Streaming Slot Filling

Person (PER)
- Affiliate
- AssociateOf
- Contact_Meet_PlaceTime
- AwardsWon
- DateOfDeath
- CauseOfDeath
- Titles
- FounderOf
- EmployeeOf
- Significant Other
- Children

Facility (FAC)
- Affiliate
- Contact_Meet_Entity

Organization (ORG)
- Affiliate
- TopMembers
- FoundedBy



Fraction of vital documents that contain an SSF answer:
5009 / 9366 = 53%

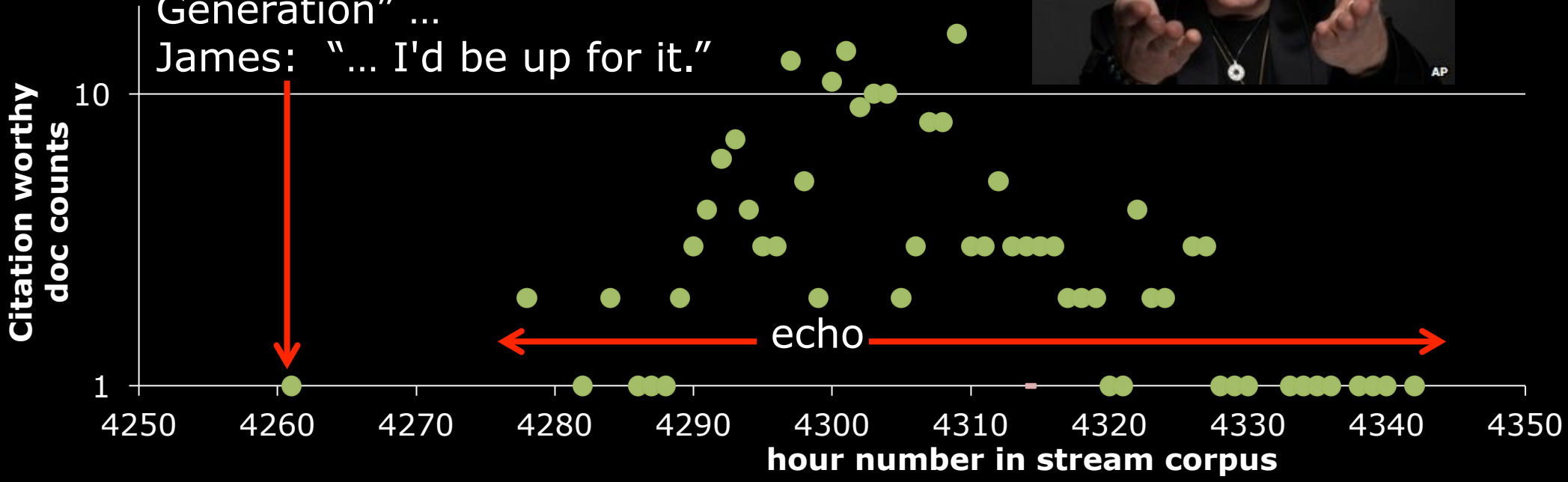
Each hour after first evidence in corpus is a required output.
Metric is F_1

KBA
a TREC evaluation

SSF example:

"FounderOf" slot on James McCartney

BBC: "What would you say to forming The Beatles - The Next Generation" …
James: "… I'd be up for it."



Confidence of sensitive versus insensitive systems

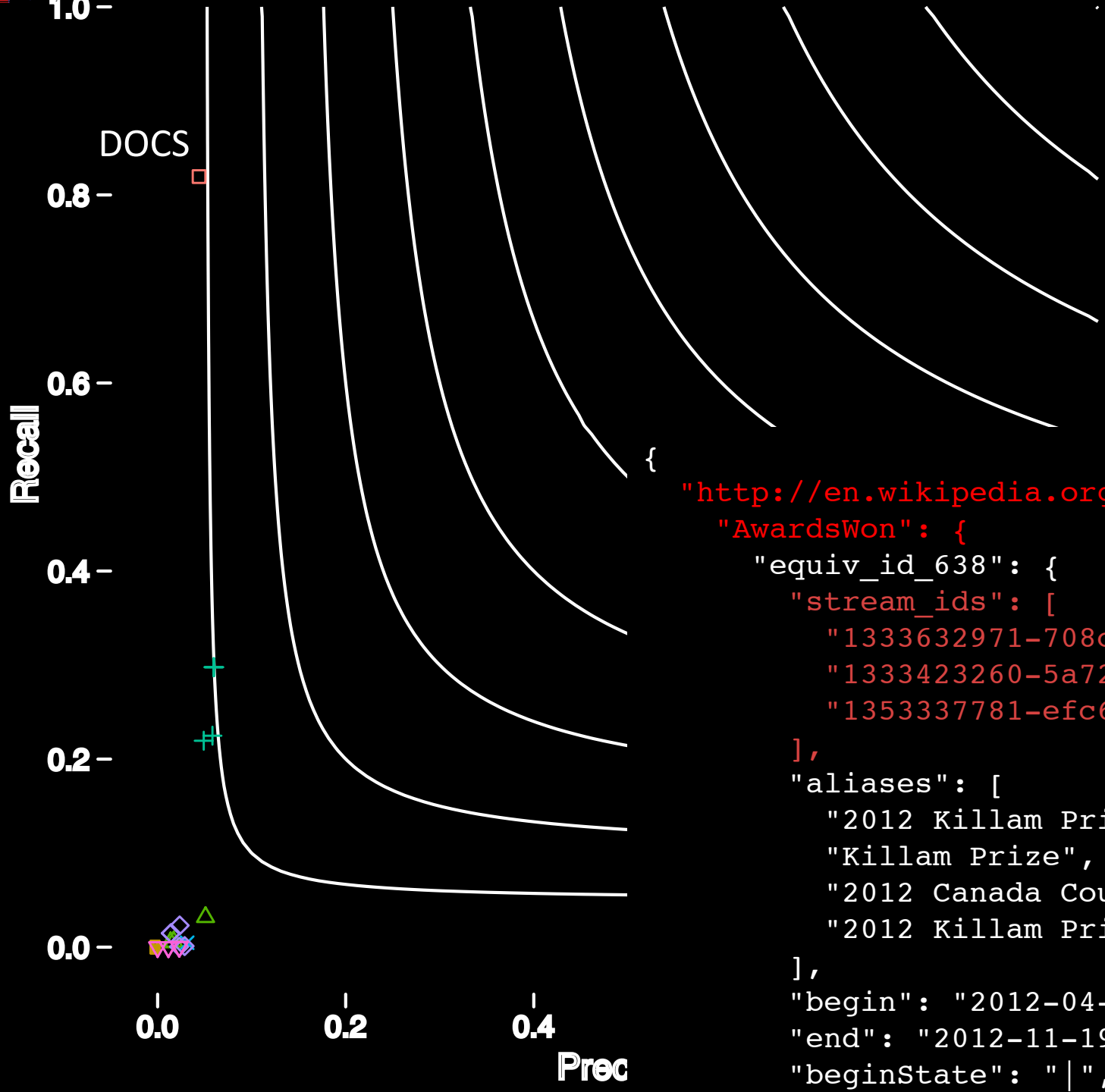
KBA
a TREC evaluation

SSF Truth Record


```
{
  "http://en.wikipedia.org/wiki/Geoffrey_E._Hinton": {
    "AwardsWon": {
      "equiv_id_638": {
        "stream_ids": [
          "1333632971-708c60ffdf54064e32eafeffbe145a51",
          "1333423260-5a728deb9b81ba22a0109ad767ba4457",
          "1353337781-efc6c892f4f07f33573451d818e8629c"
        ],
        "aliases": [
          "2012 Killam Prize in engineering",
          "Killam Prize",
          "2012 Canada Council's Killam Prize laureates",
          "2012 Killam Prize"
        ],
        "begin": "2012-04-03-03",
        "end": "2012-11-19-15",
        "beginState": "|",
        "endState": ">”
 },
```

KBA
a TREC evaluation

DOCS-level




```
{
"http://en.wikipedia.org/wiki/Geoffrey_E._Hinton"
  "AwardsWon": {
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```
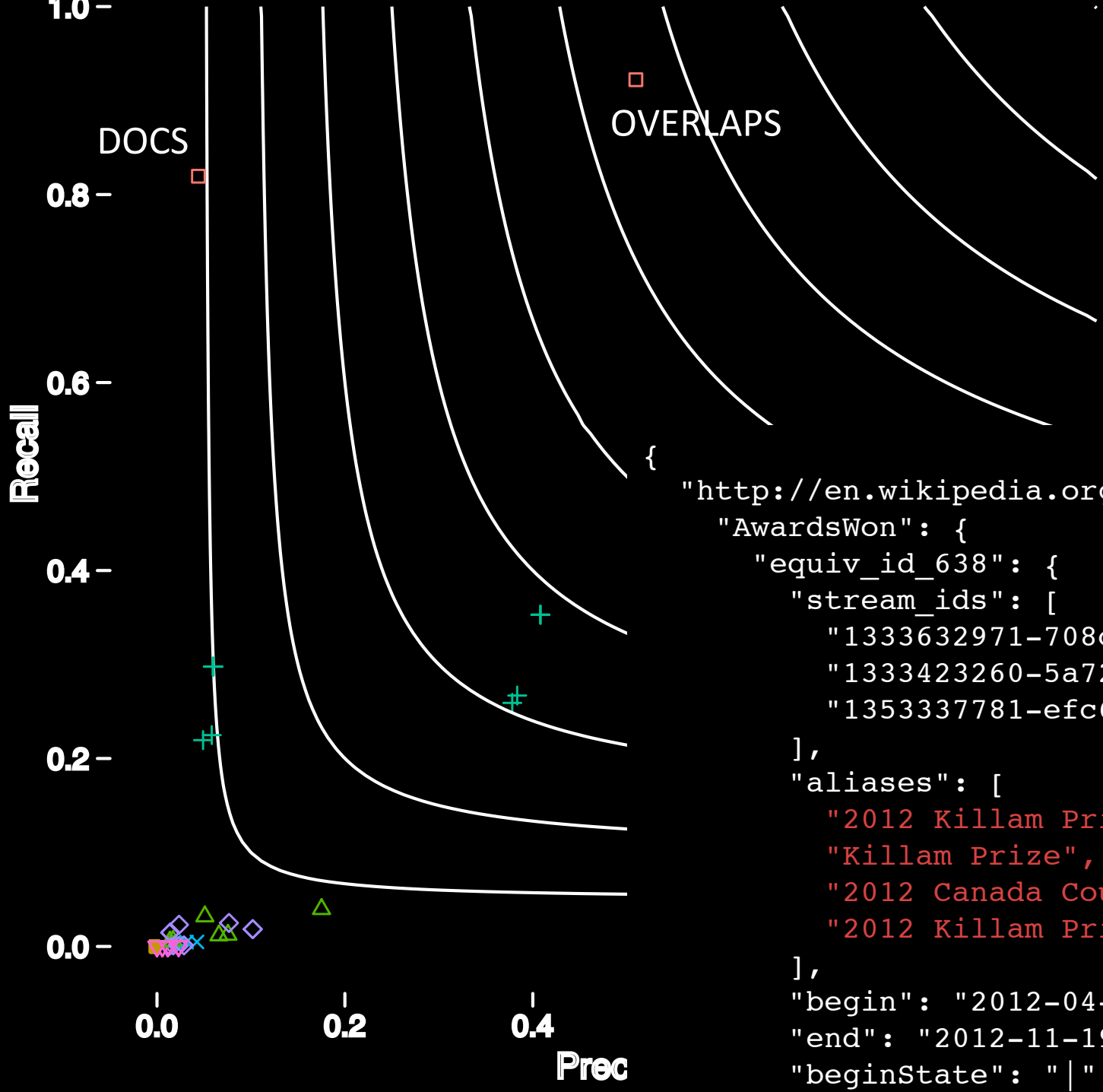

KBA
a TREC evaluation

OVERLAPS-level




```
{
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        ],
        "aliases": [
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          "2012 Canada Council's Killam Prize laure
          "2012 Killam Prize"
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        "begin": "2012-04-03-03",
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        "beginState": "|",
        "endState": ">"
```
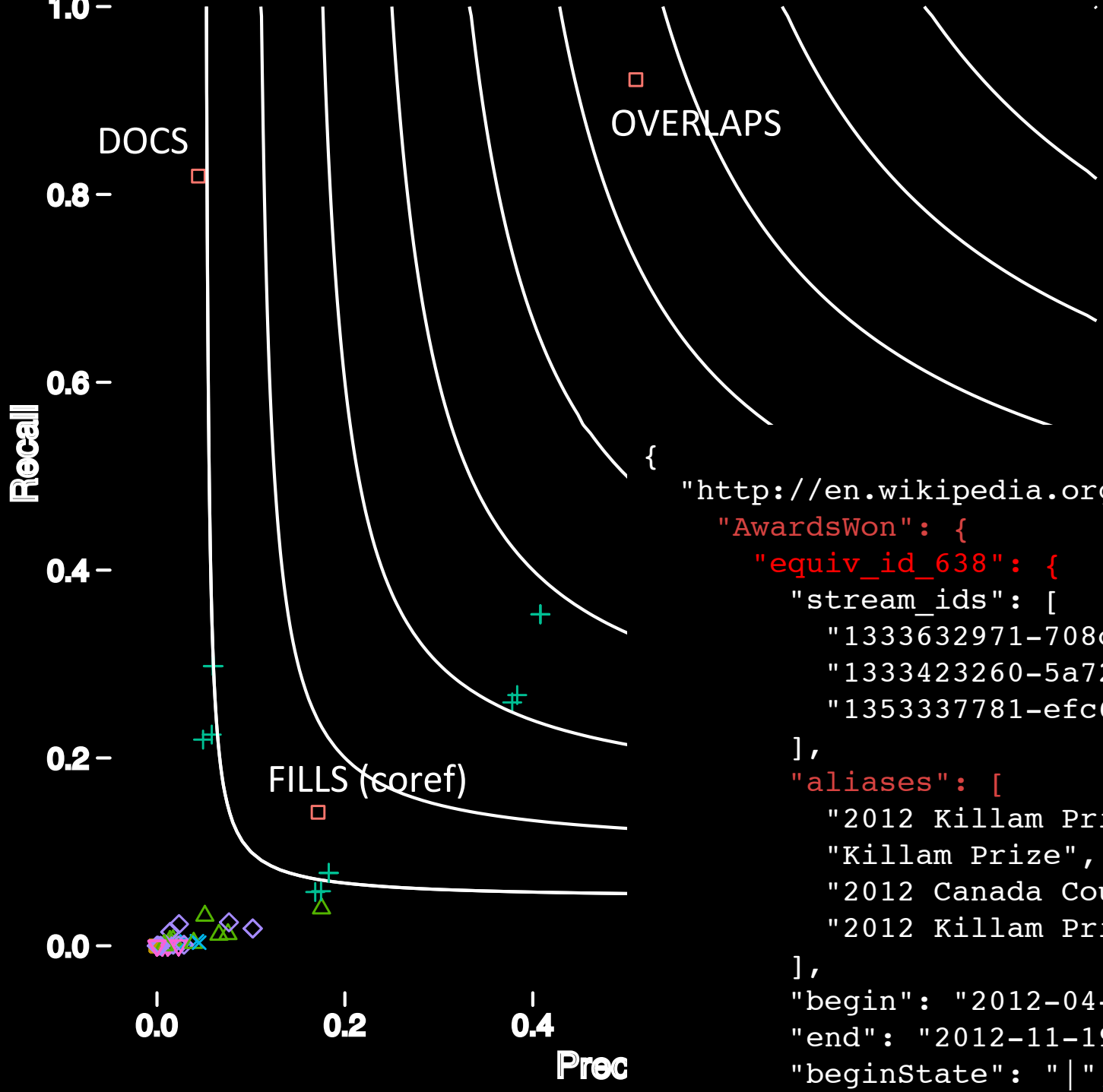
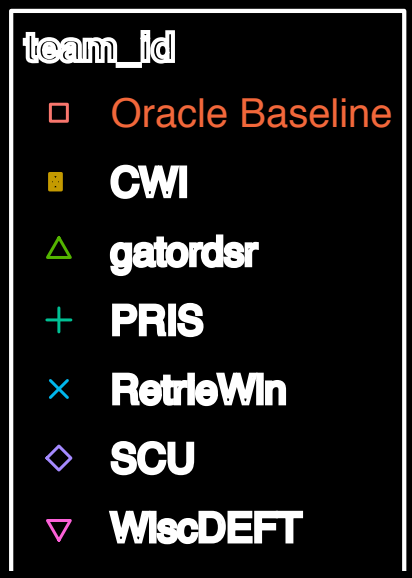

KBA
a TREC evaluation

FILLS-level (coref)






```
{
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          "2012 Killam Prize"
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```
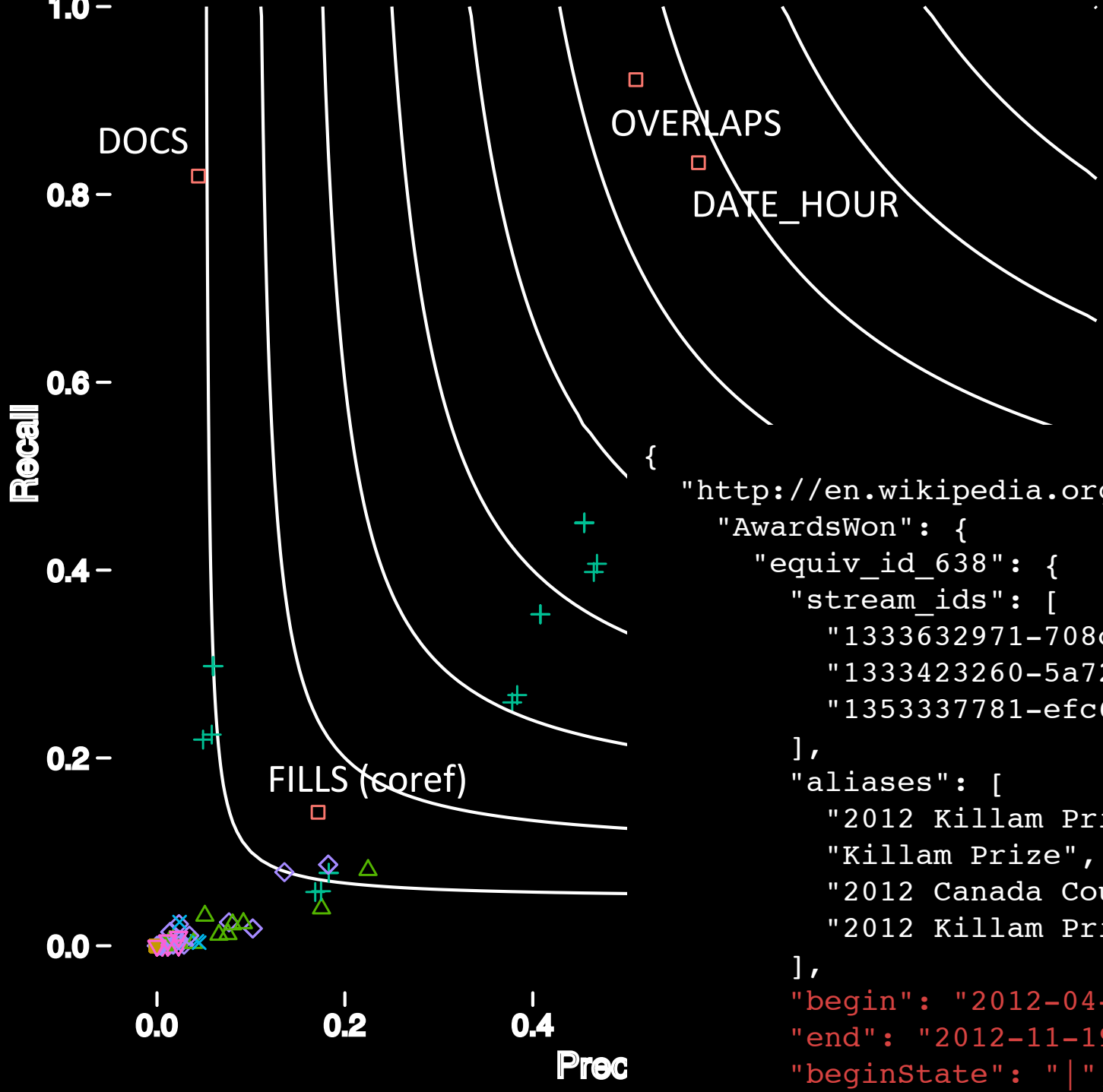
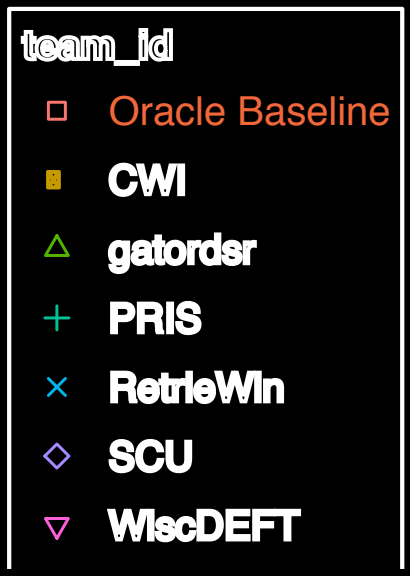

KBA
a TREC evaluation

DATE_HOUR-level






```
{
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  "AwardsWon": {
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        "1333632971-708c60ffdf54064e32eafeffbe145
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      ],
      "begin": "2012-04-03-03",
      "end": "2012-11-19-15",
      "beginState": "|",
      "endState": ">"
```

KBA
a TREC evaluation

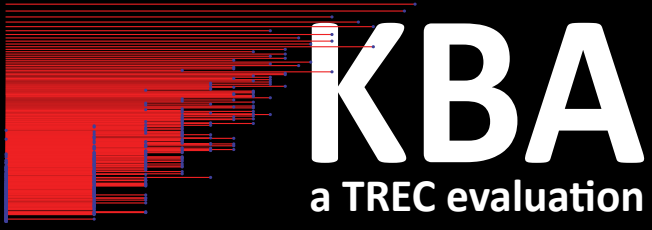
KBA 2014

- Repeat CCR
  - more training data?
  - open source fast name filter
    http://github.com/trec-kba/streamcorpus-filter
- Integrate SSF more closely with CCR
  - Do we need slots that are not in ACE or TAC?
- New metrics
  - Time-aware or slot-aware?

KBA
a TREC evaluation

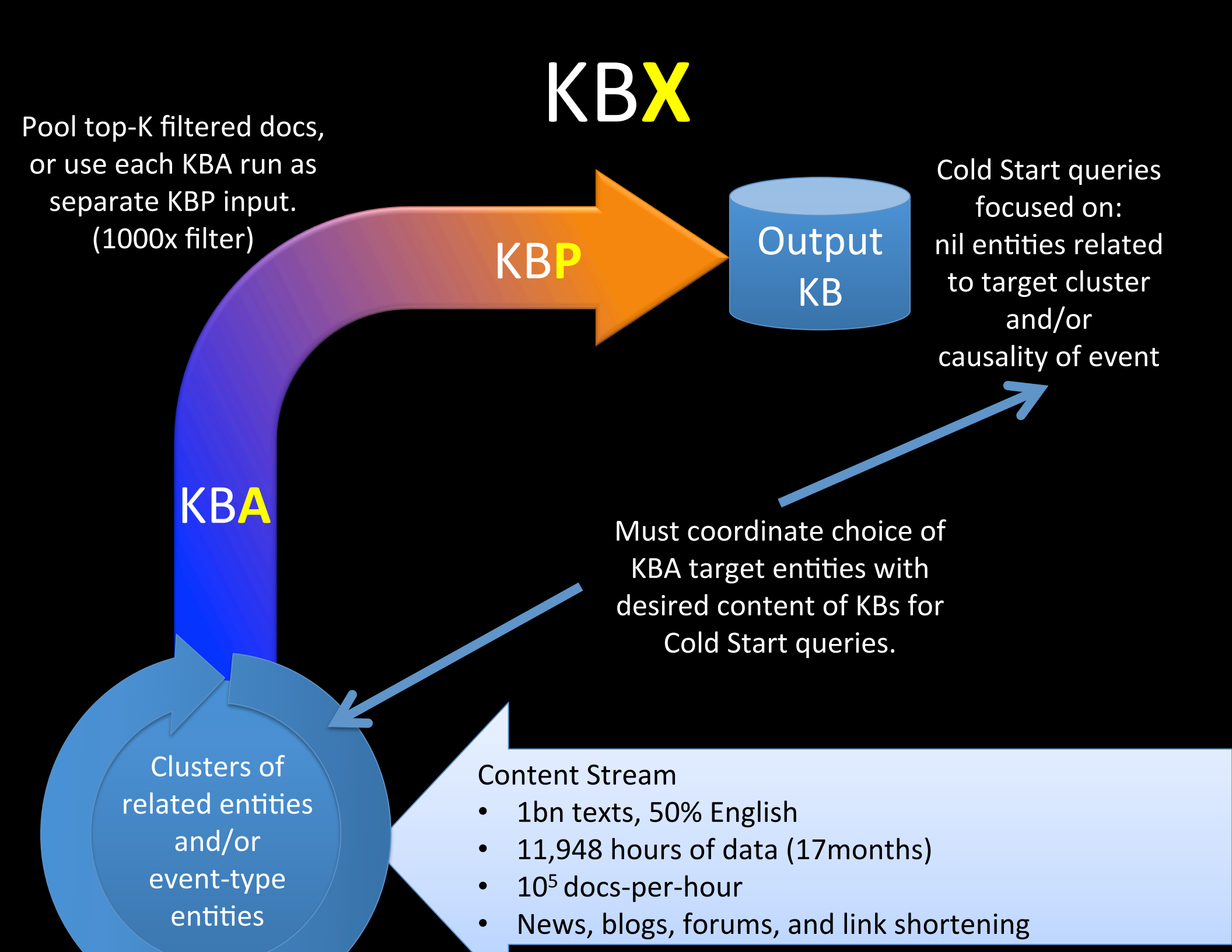
Sponsors: Thank You.

Raytheon
BBN Technologies

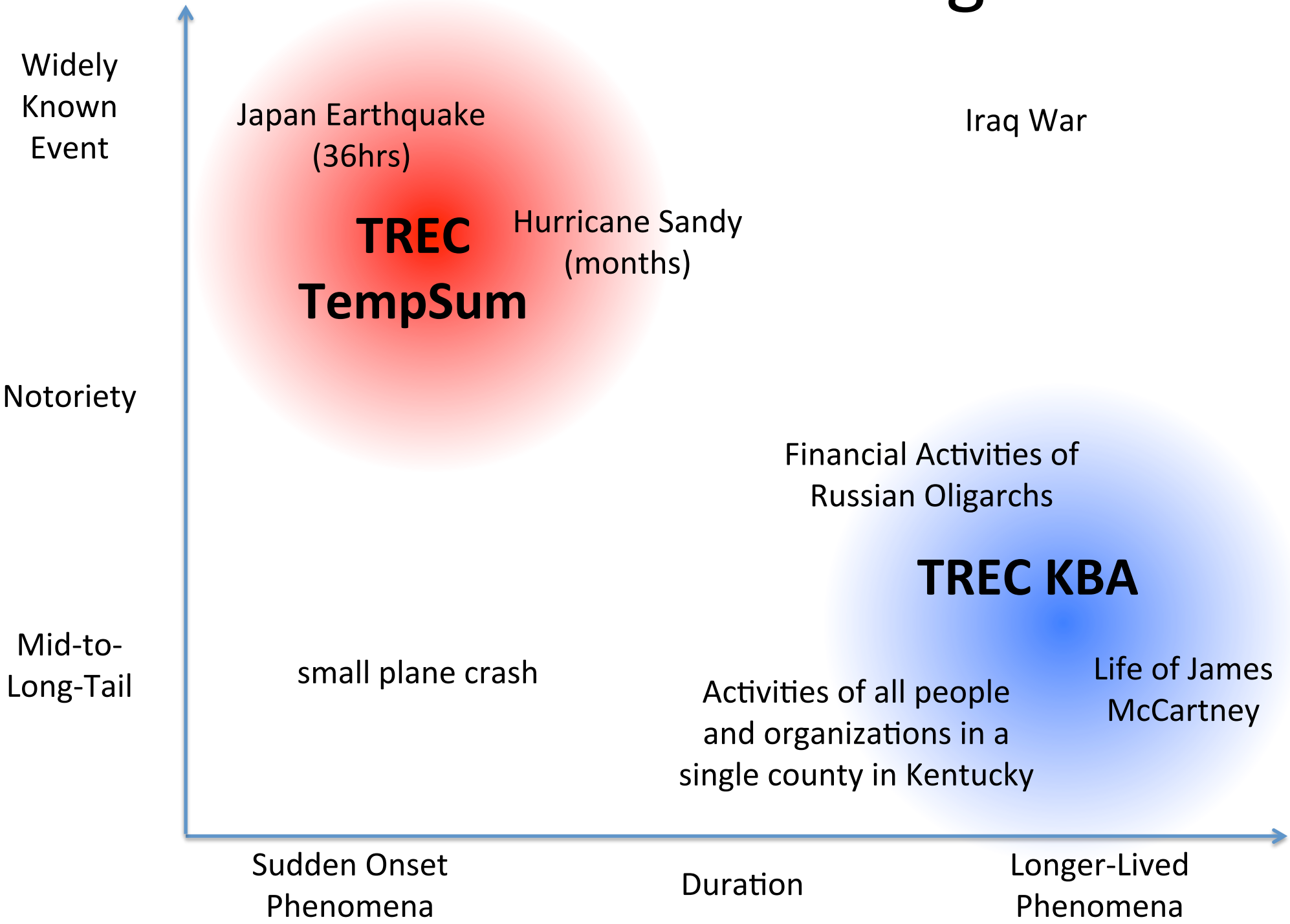


Thanks for your time.

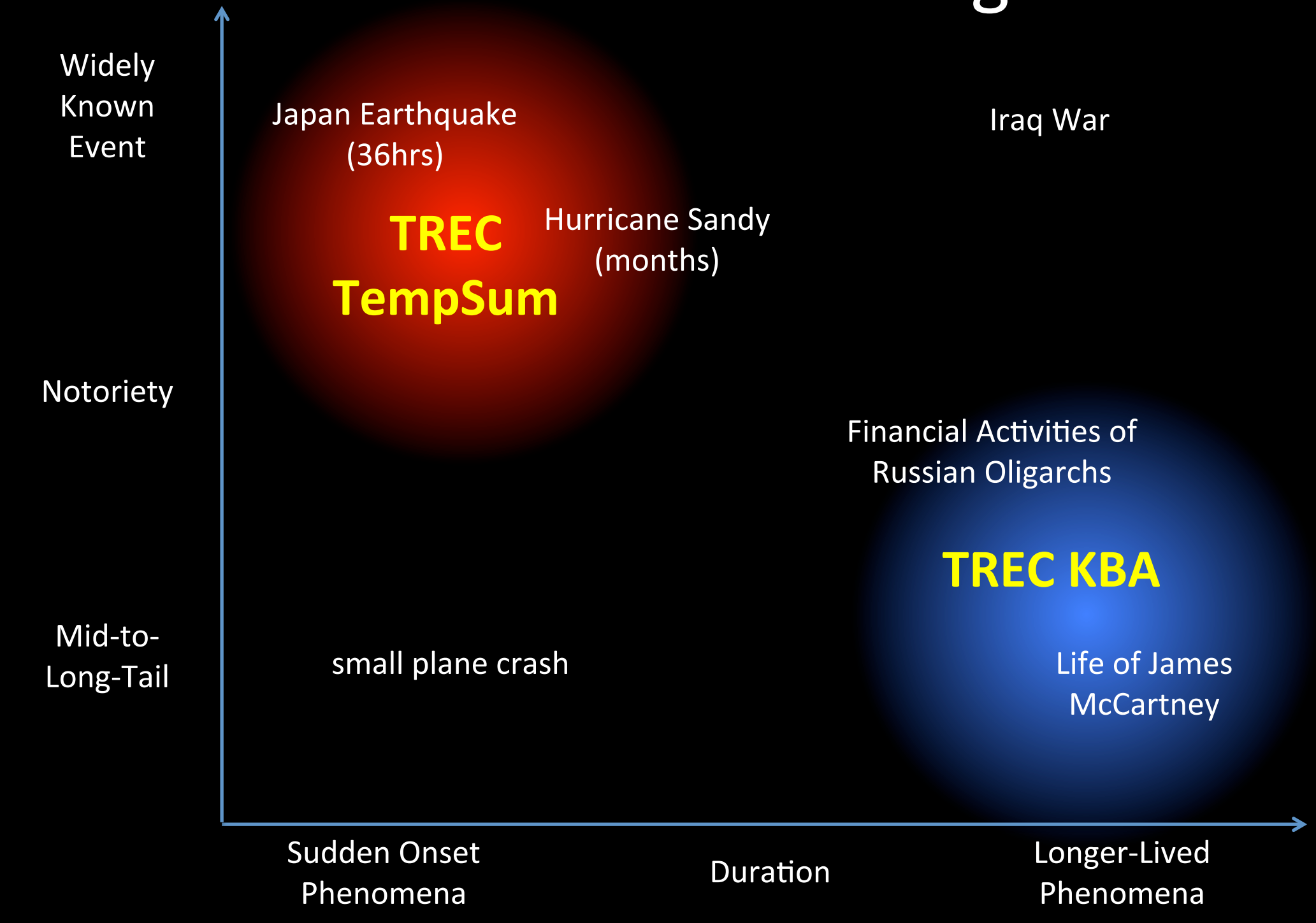
John R. Frank
jrf@mit.edu
http://trec-kba.org


KBX
Pool top-K filtered docs, or use each KBA run as separate KBP input. (1000x filter)
KBP
Output KB
Cold Start queries focused on: nil entities related to target cluster and/or causality of event
KBA
Must coordinate choice of KBA target entities with desired content of KBs for Cold Start queries.
Clusters of related entities and/or event-type entities
Content Stream
• 1bn texts, 50% English
• 11,948 hours of data (17months)
• 10^5 docs-per-hour
• News, blogs, forums, and link shortening

TREC 2013 Filtering Tasks

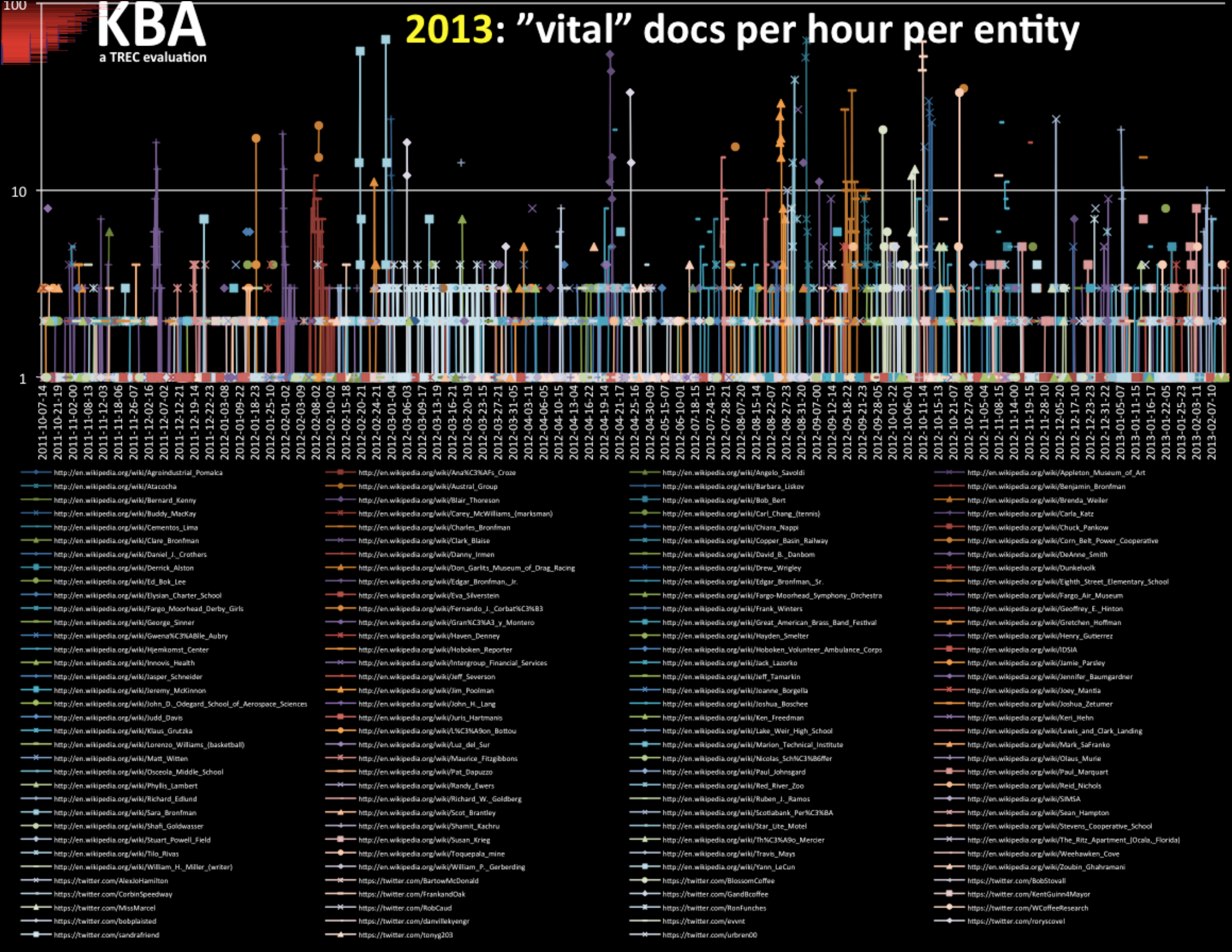


TREC 2013 Filtering Tasks



KBA
a TREC evaluation

- Beijing Institute of Technology
- Centrum Wiskunde & Informatica
- Computable Insights
- Institt de Recherche en Informatique de Toulouse
- LSIS/LIA
- Pattern Recognition and Intelligent System laboratory
- Stanford University
- Santa Clara University
- University of Amsterdam
- InfoLab at University of Delaware
- University of Florida CISE Dept
- Grad. School of Lib. & Info Sci; Univ. of Illinois, Urbana-Champaign
- CIIR, School of Computer Science, Univ. of Massachusetts Amherst
- Wisconsin DEFT Research Group


KBA
a TREC evaluation
2013: ”vital” docs per hour per entity
100
10
1
2011-10-07-14
2011-10-21-19
2011-11-02-00
2011-11-08-13
2011-11-12-03
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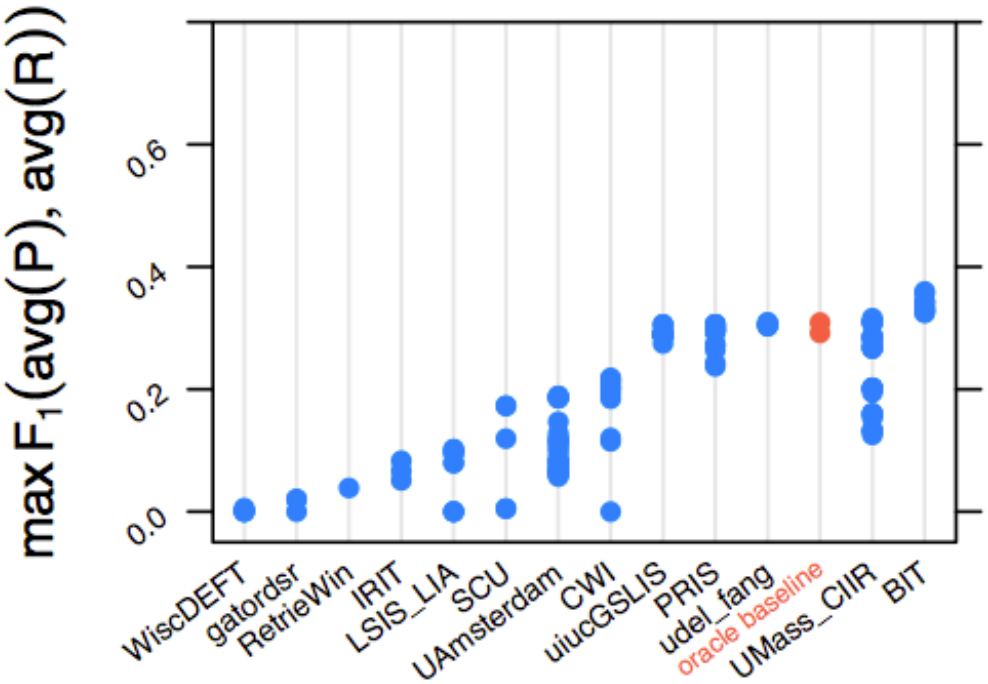

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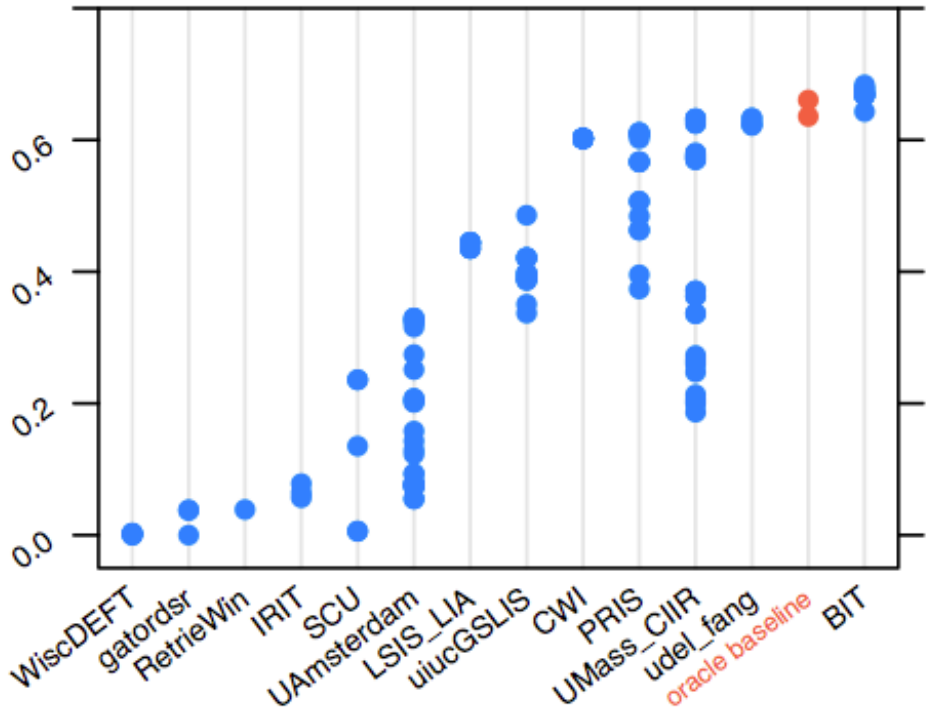

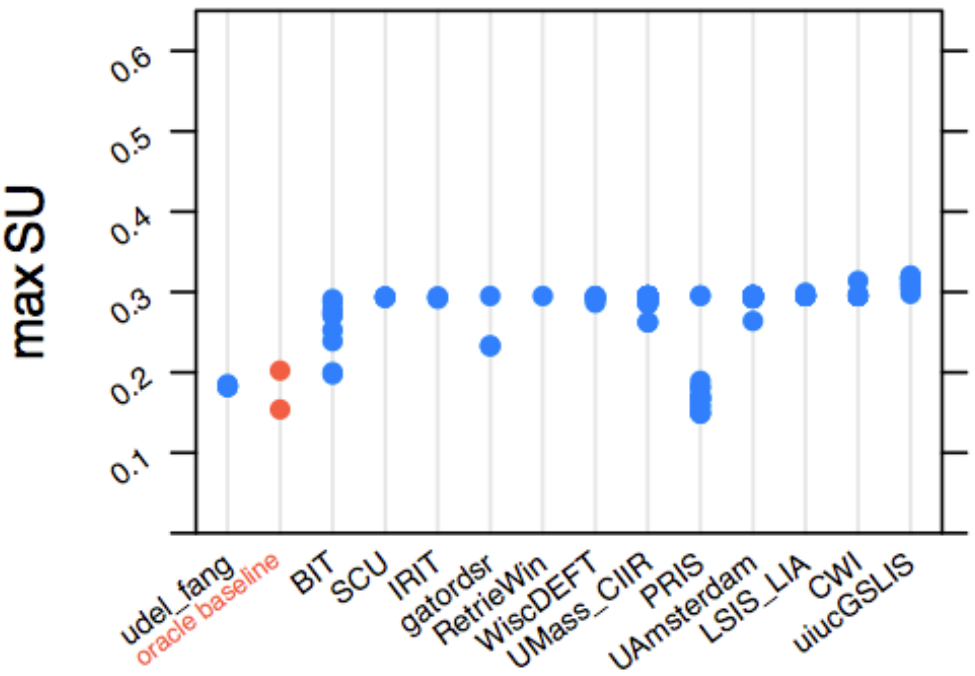

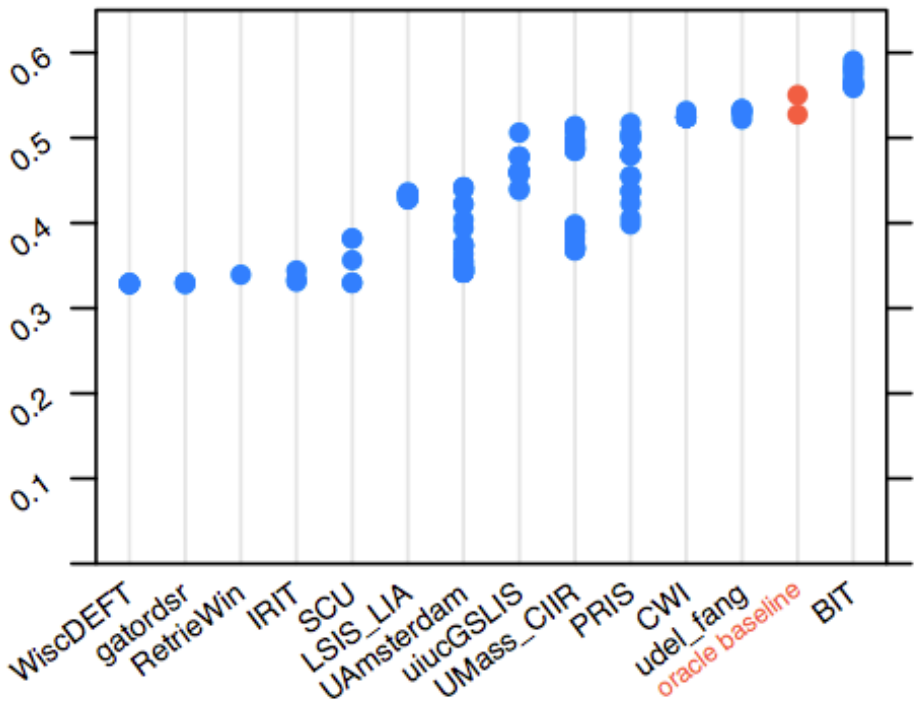

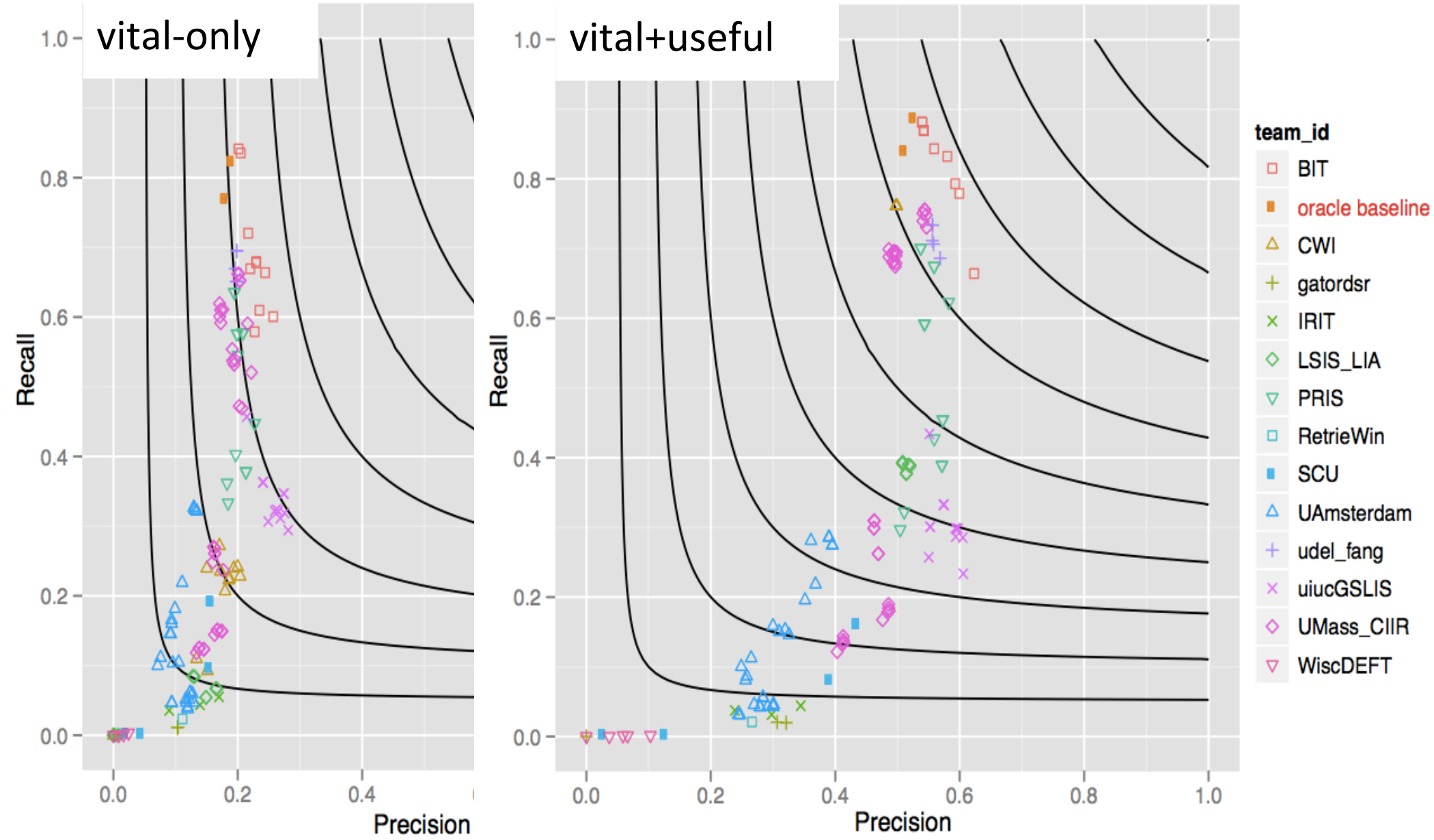
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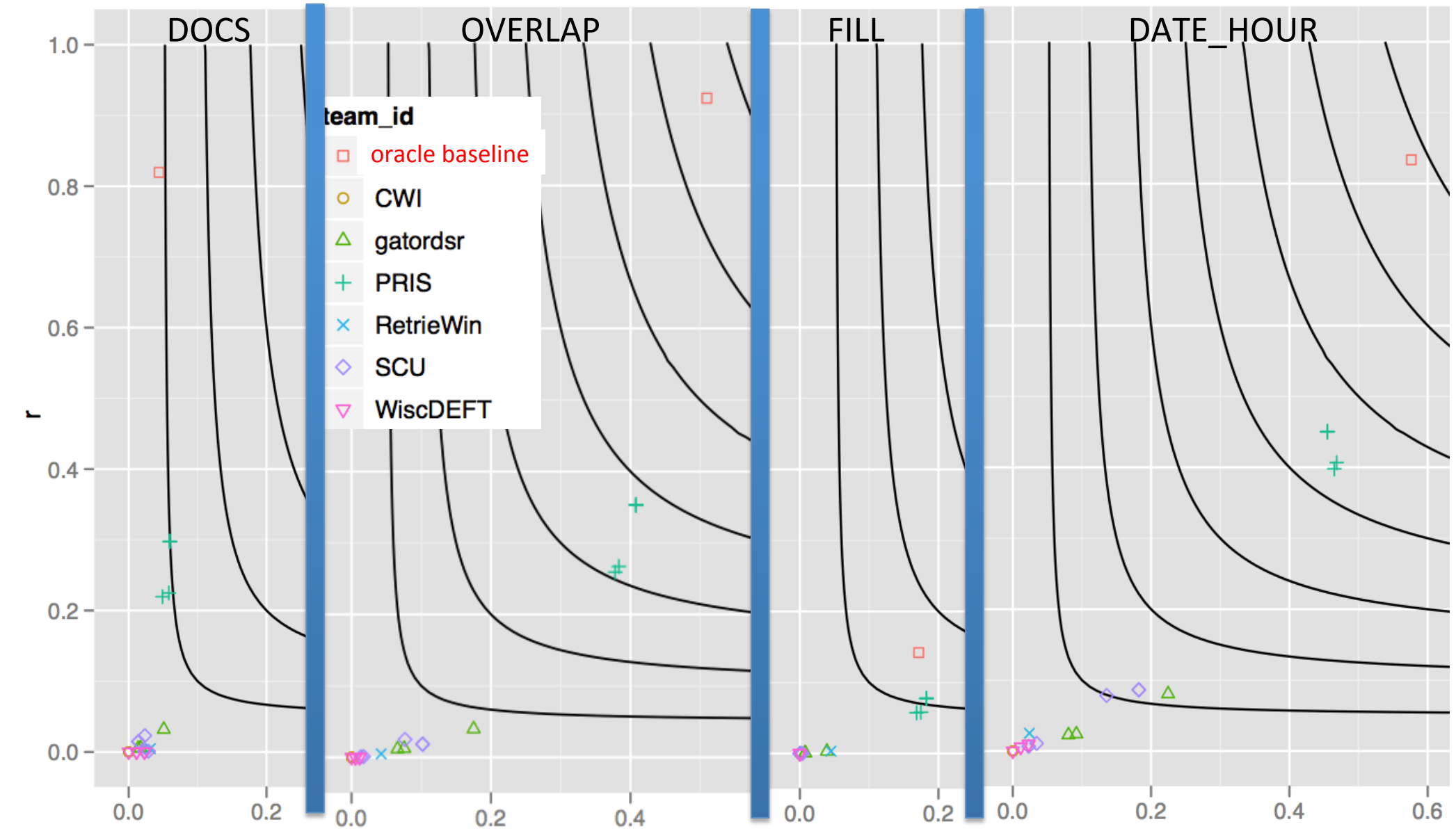
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