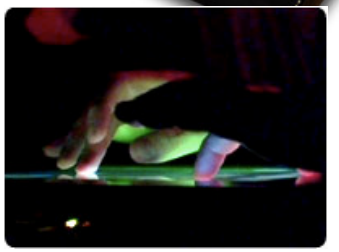
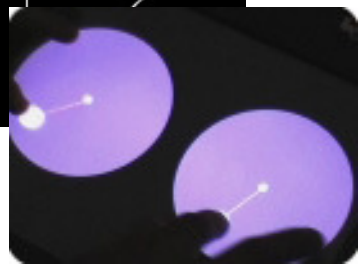
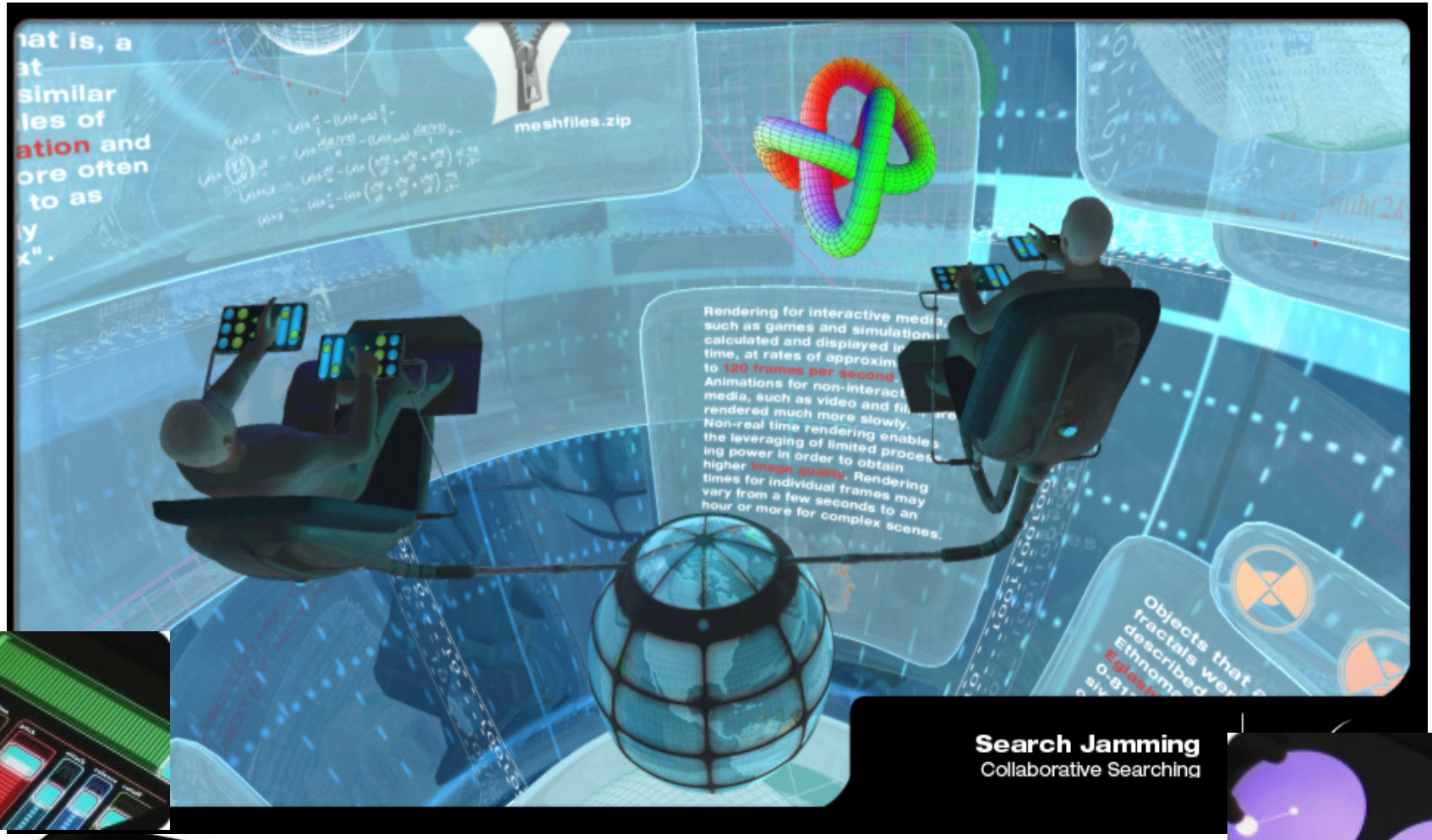
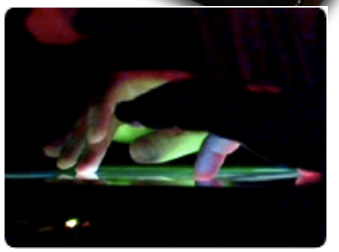
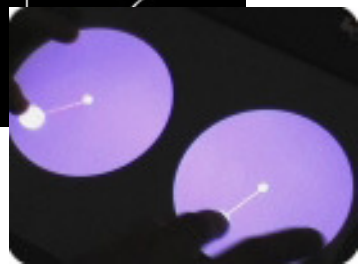




FXPAL at TRECvid 2007

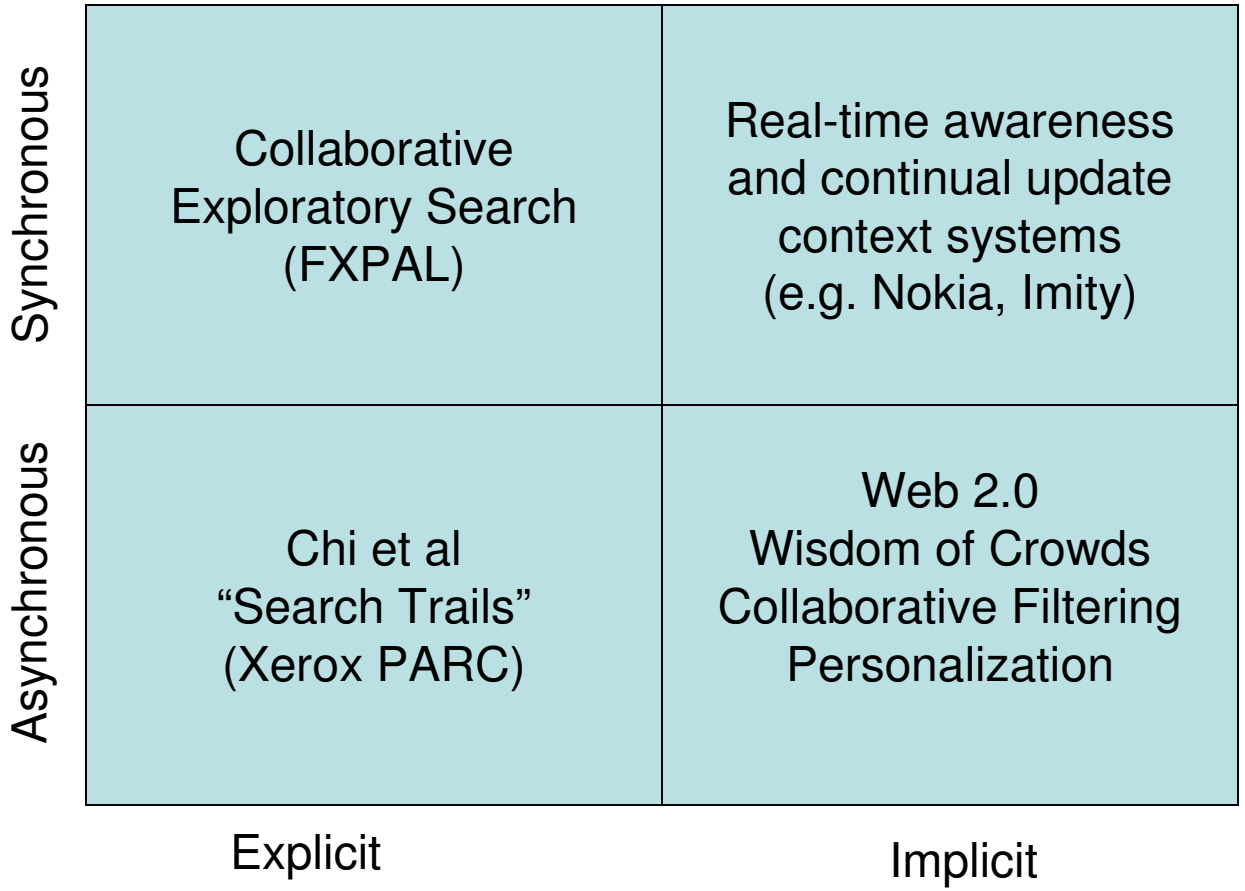




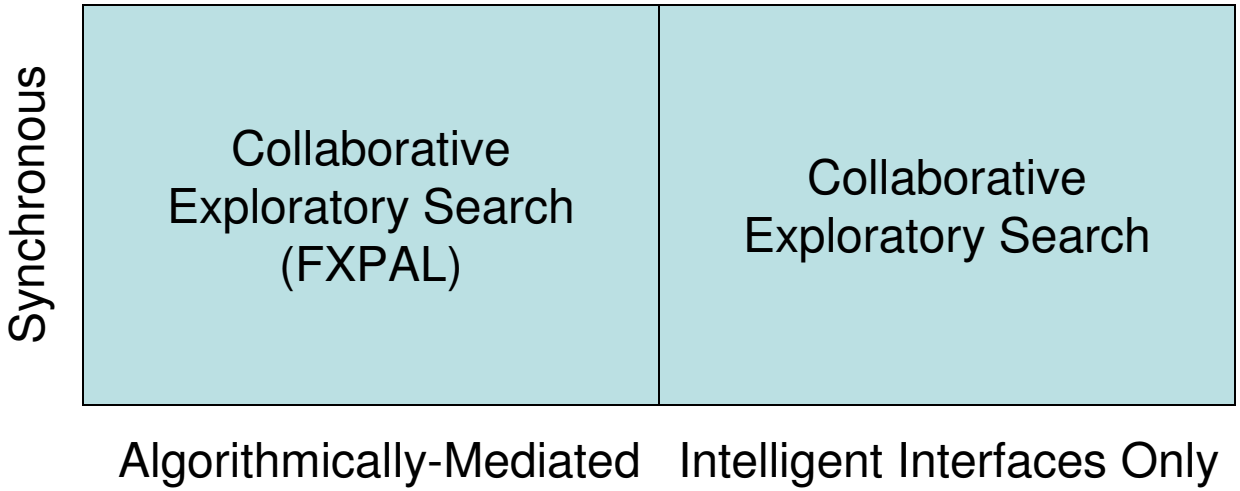


Collaborative Exploratory Search

“Collaborative” search is overloaded



“Collaborative” search is overloaded

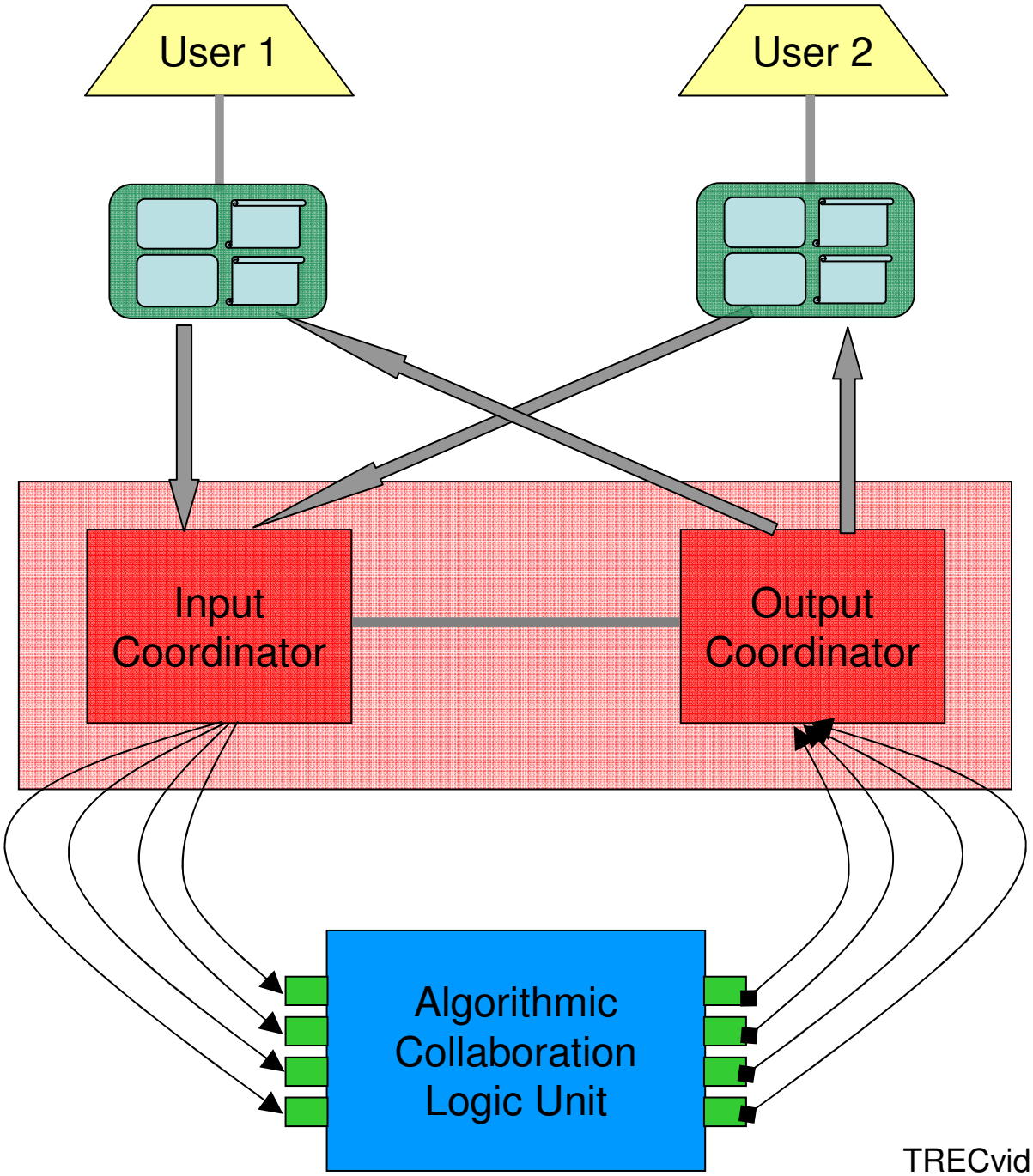


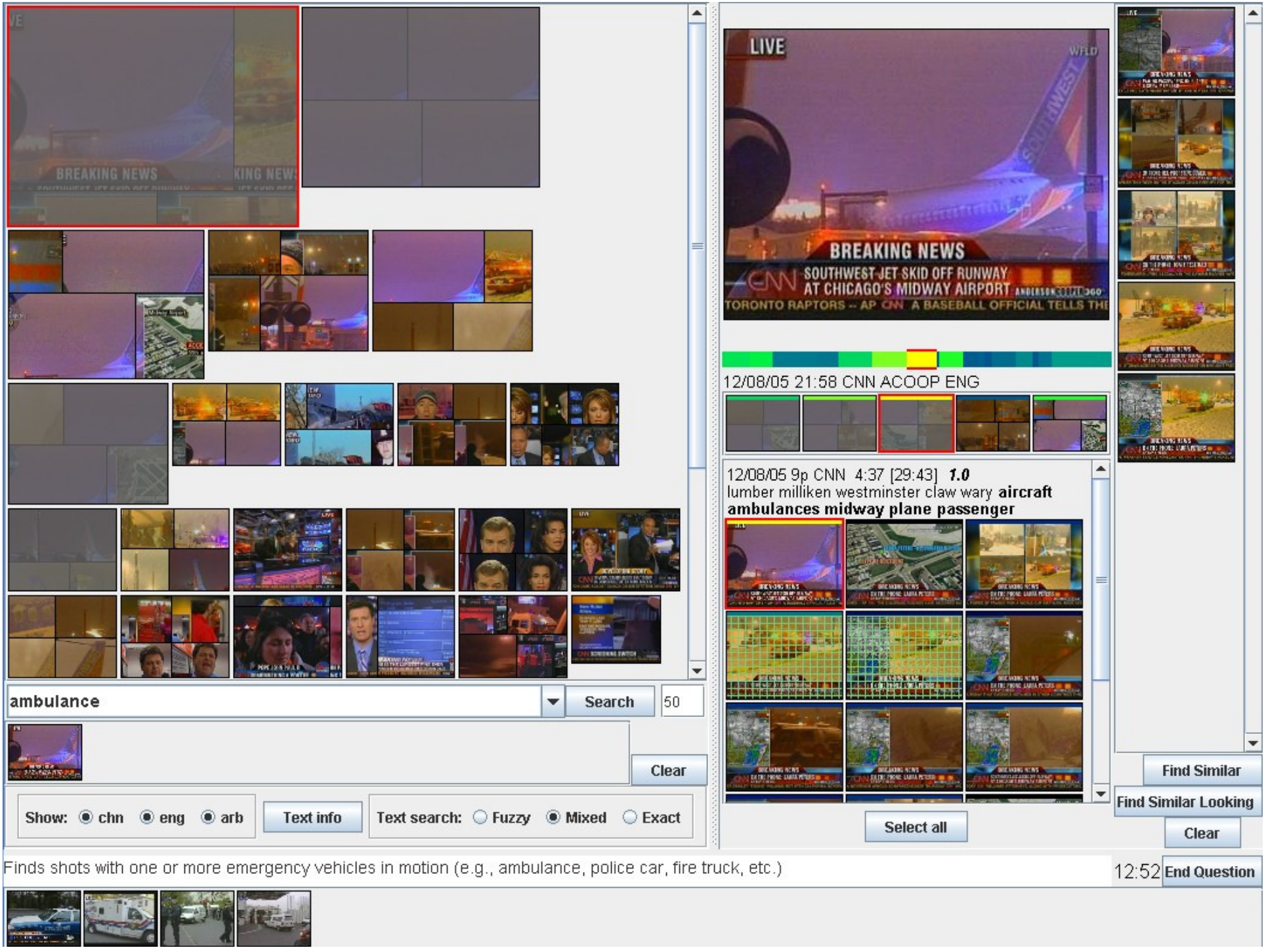
Explicit

- Fischlar-DiamondTouch: Collaborative Video Searching on a Table (Smeaton et al, 2005)
- Interfaces for Collaborative Exploratory Web Search: Motivations and Directions for Multi-User Designs (M. Morris, 2007)

Collaborative Exploratory Search

- Synchronous
  - Collaborating users use the system at the same time
- Explicitly Shared goals
  - Collaborating users share the information need
- Algorithmically-mediated
  - System combines users' inputs in various ways
    - Not just keyword pooling
  - System generates results based on users' roles
    - Terms, ranked lists, etc.


User 1
User 2
Input Coordinator
Output Coordinator
Algorithmic Collaboration Logic Unit


LIVE
BREAKING NEWS
SOUTHWEST JET SKID OFF RUNWAY
AT CHICAGO'S MIDWAY AIRPORT
12/08/05 21:58 CNN ACOOP ENG
12/08/05 9p CNN 4:37 [29:43] 1.0
lumber milliken westminster claw wary aircraft
ambulances midway plane passenger
ambulance
Search
50
Clear
Show: chn eng arb
Text info
Text search: Fuzzy Mixed Exact
Select all
Find Similar
Find Similar Looking
Clear
Finds shots with one or more emergency vehicles in motion (e.g., ambulance, police car, fire truck, etc.)
12:52
End Question

RSVP Delivery System

Time remaining: 12:48

ADVANCE

Shared Display

What you've explored...

meijer spoor (MIXED):13

railway (MIXED):12

(Image Only):11

train station subway (MIXED):10

salt 47 edition hoekig (MIXED):9

(Image Only):8

locomotive (MIXED):7

rail (MIXED):6

railroad (MIXED):5

(Image Only):4

RSVP User Queries:

railroad
rail
locomotive

System suggestions:

knocking
repaired
workshop
kuiper
provincial
groningse
tendered
verbruggen
temporarily
vijfennegentig

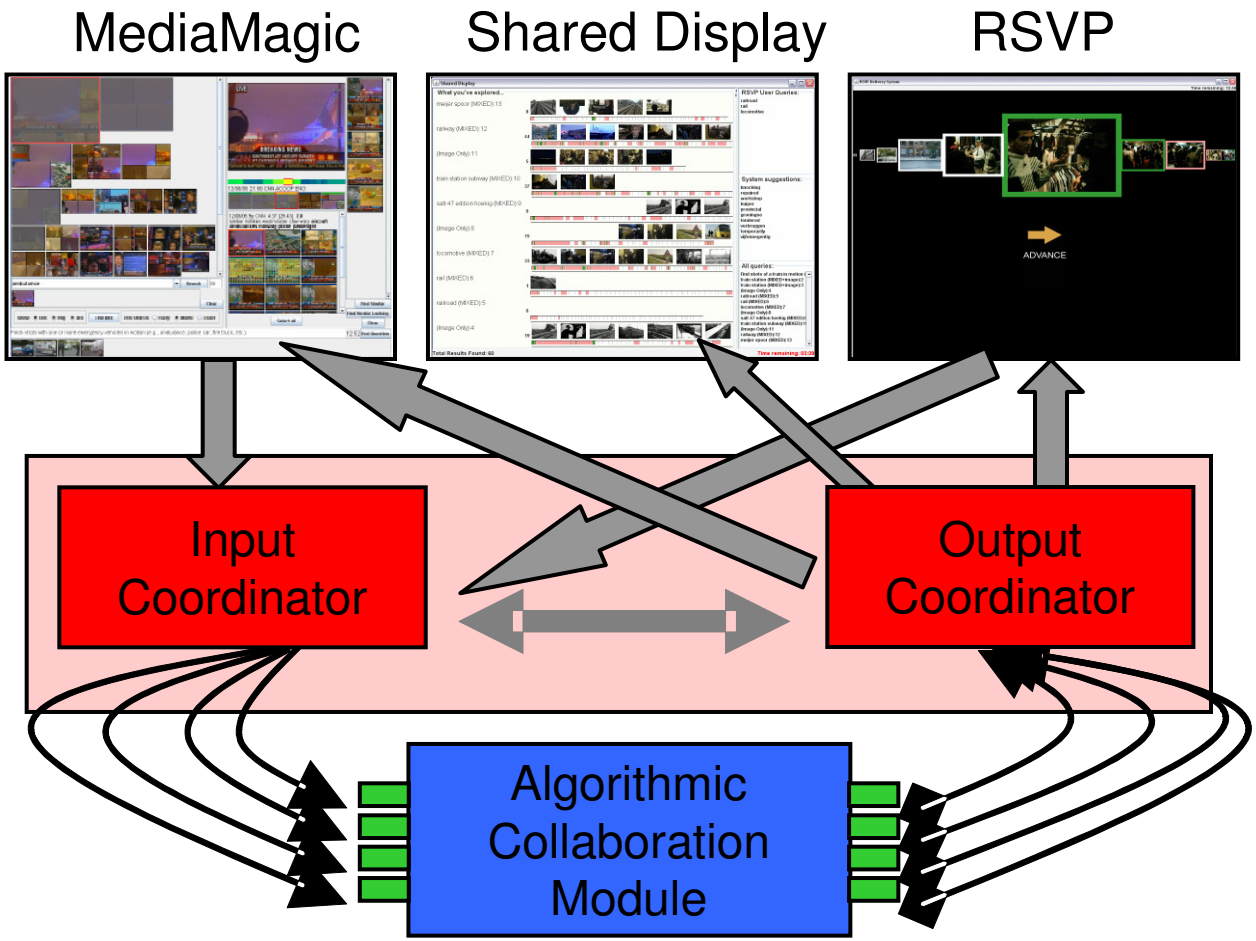
All queries:

Find shots of a train in motion (
train station (MIXED+image):2
train station (MIXED+image):3
(Image Only):4
railroad (MIXED):5
rail (MIXED):6
locomotive (MIXED):7
(Image Only):8
salt 47 edition hoekig (MIXED):9
train station subway (MIXED):1
(Image Only):11
railway (MIXED):12
meijer spoor (MIXED):13

Total Results Found: 60

Time remaining: 03:39

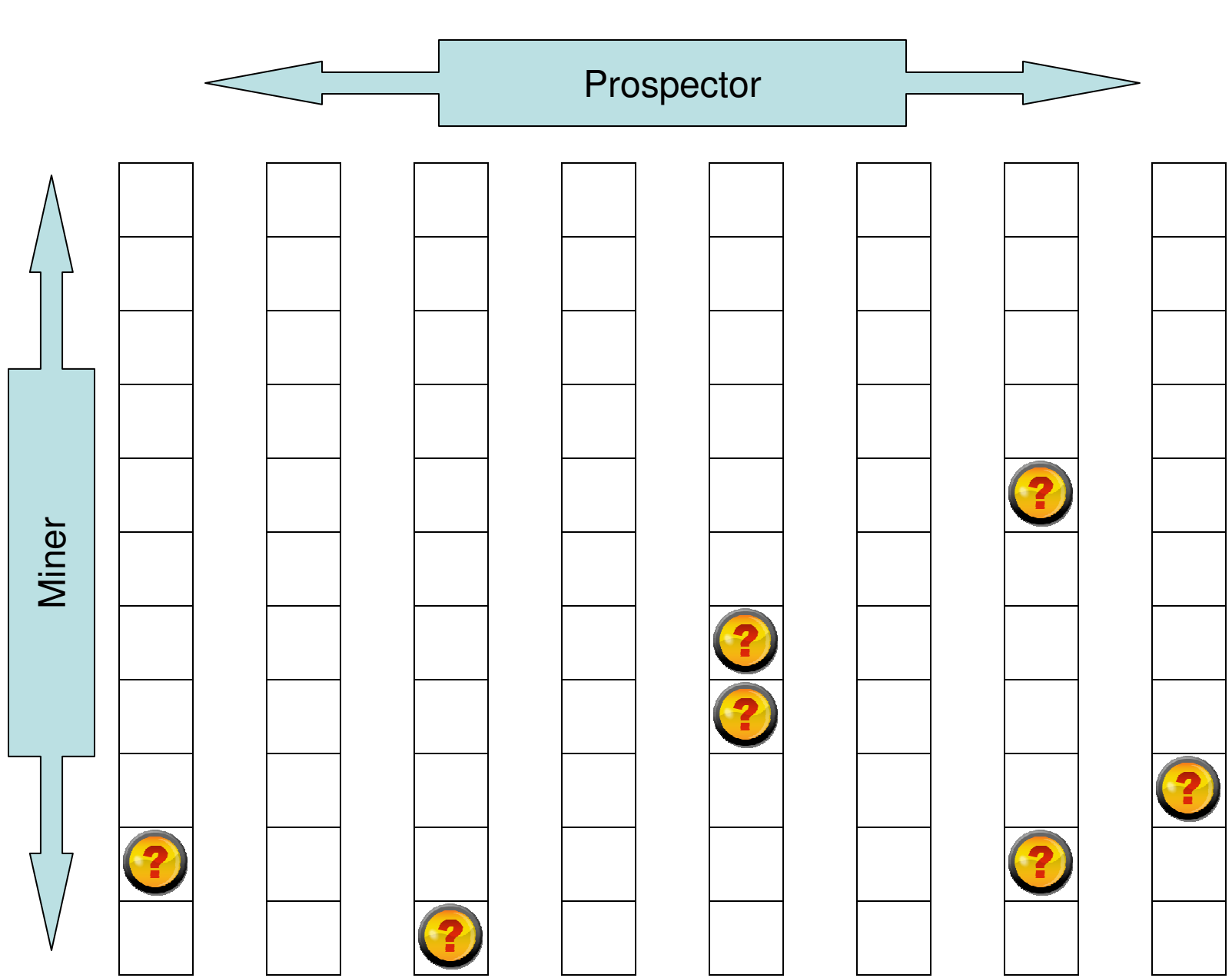
System overview




0218: Find shots of one or more people playing musical instruments such as drums, guitar, flute, keyboard, piano, etc.


0218: Find shots of one or more people playing musical instruments such as drums, guitar, flute, keyboard, piano, etc.
Total Results Found: 192


System suggestions:
All queries:
PLAYING


Prospector
Miner

RSVP Queue Priority

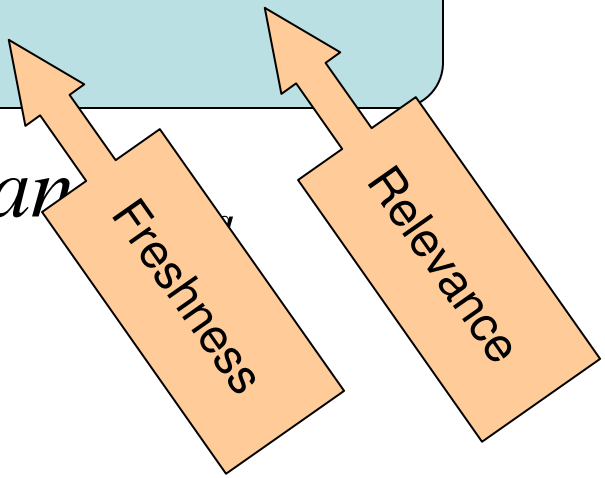
Weighted Borda Count fusion

$$rank_{doc} = \sum_{q} score_{doc,q} \cdot w_{seen,q} \cdot w_{rel,q}$$

$$score_{doc,q} = N_{retrieved,q} - ran$$

$$w_{seen,q} = N_{seen,q} / N_{unseen,q}$$

$$w_{rel,q} = N_{rel,q} / N_{nonrel,q}$$



Shared Display Suggested Query Term

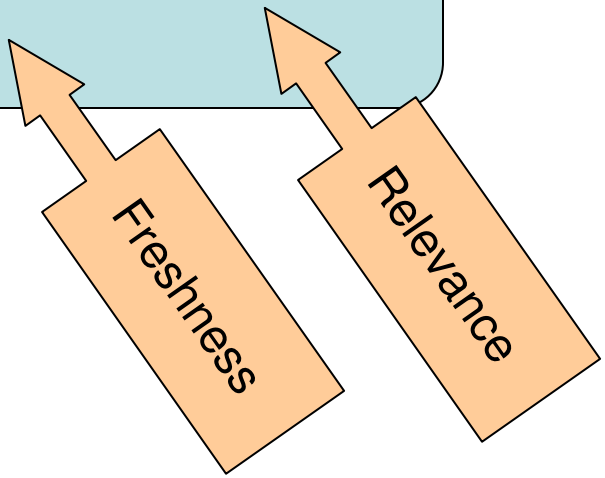
Weighted frequency fusion

$$rank_{term} = \sum_{q} score_{term,q} \cdot w_{seen,q} \cdot w_{rel,q}$$

$$score_{term,q} = TF_{retrieved,q}$$

$$w_{seen,q} = N_{seen,q} / N_{unseen,q}$$

$$w_{rel,q} = N_{rel,q} / N_{nonrel,q}$$



Example

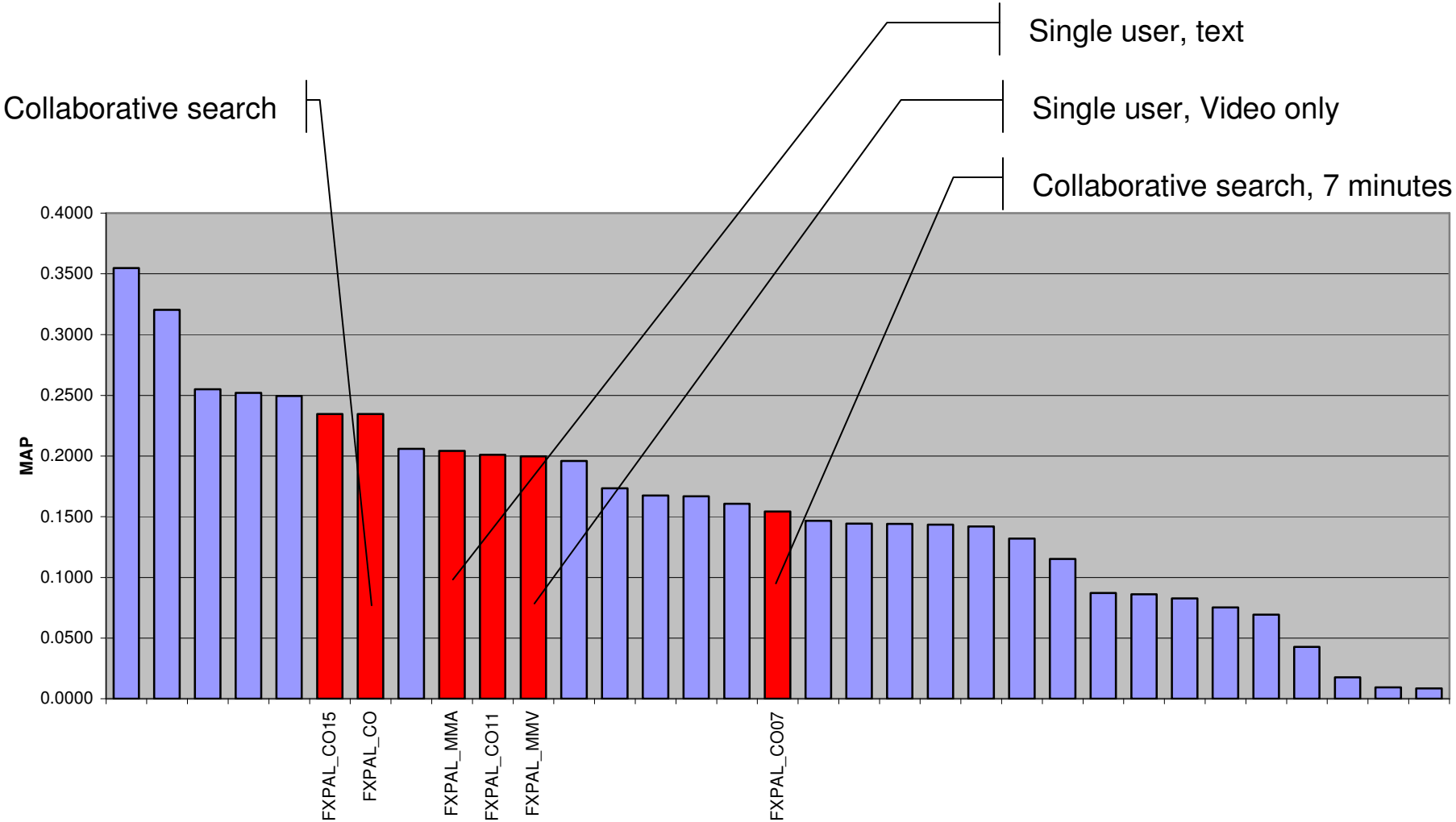
TRECvid Experiments

- 3 ½ Systems, 4 Users
  a. MMA: Single MediaMagic user (full capabilities)
  b. MMV: Single MediaMagic user (no text)
  c. MMA+V: Post hoc simulated MMA+MMV combination
     – Duplicates (both rel and nonrel) removed
  d. COLL: Collaborative search

TRECvid Experiments

- Problem: Learning effect?
  - All COLL runs done first
  - All MMA runs done second
  - All MMV runs done third

Results: Mean Average Precision



Additional Metrics

- Examine Recall and Precision separately
- Examine the manually-selected shot set
  - What actually happened during the run?

Precision

- COLL is: $\frac{TP}{TP + FP}$

1.47% relative improvement over MMA

-3.42% relative improvement over MMV

15.4% relative improvement over MMA+V

Legend explaining MMA,etc

Recall

- COLL is: $\frac{TP}{\#totalrel}$

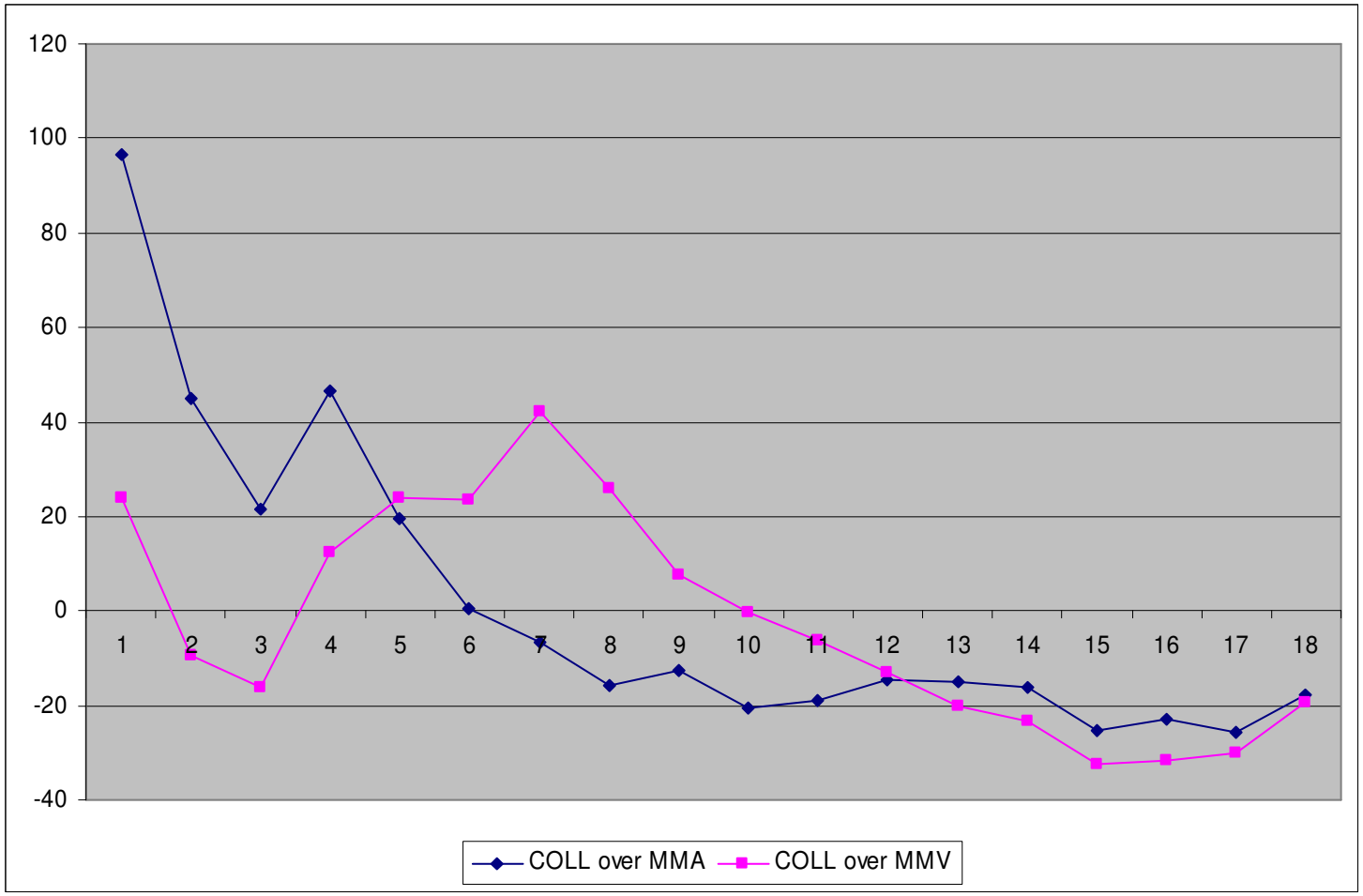
101.1% relative improvement over MMA

43.3% relative improvement over MMV

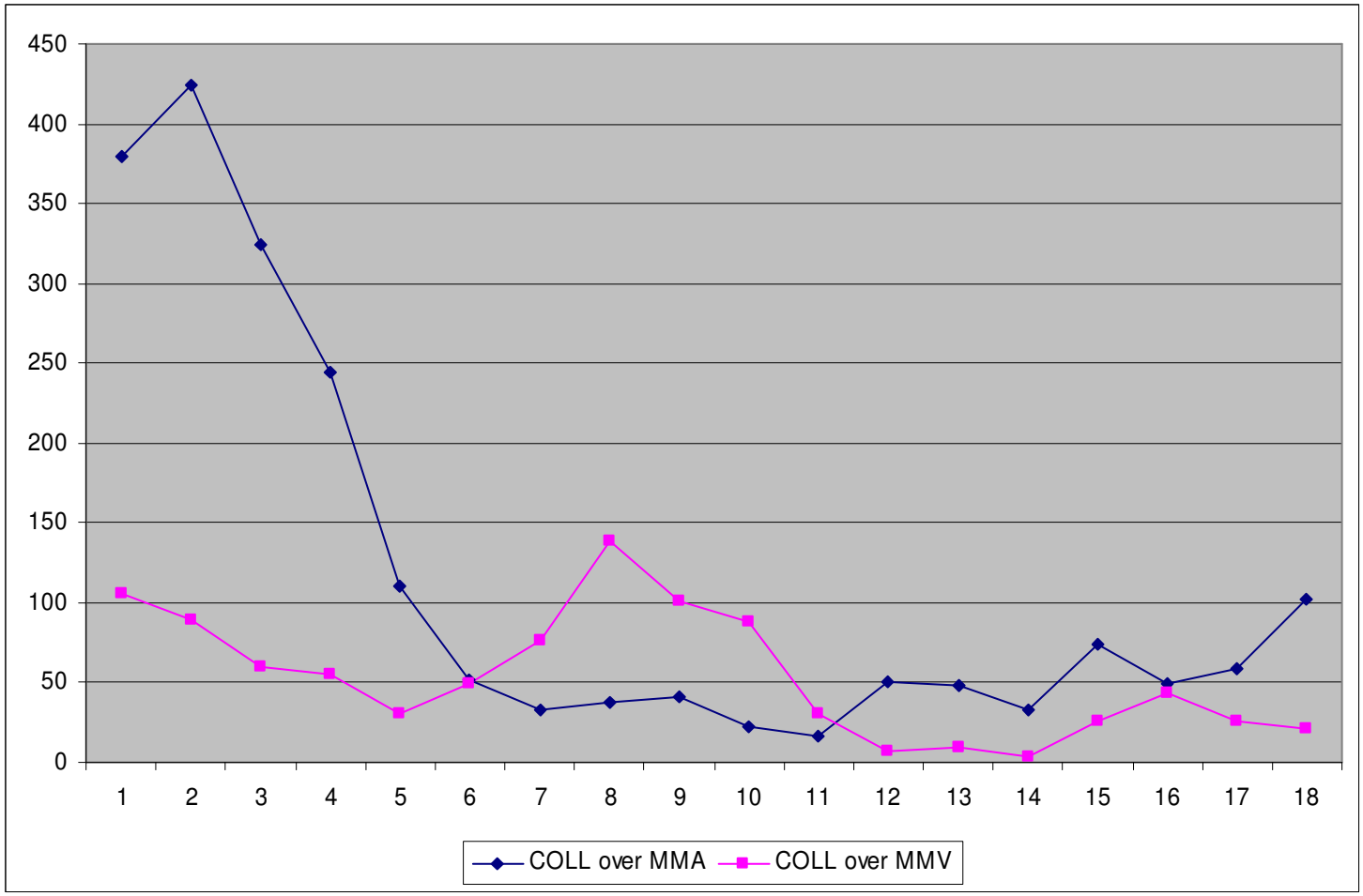
-10.7% relative improvement over MMA+V

- COLL outperforms MMA and MMV
- COLL is about the same against MMA+V
  - What does this suggest?
  - Why bother working collaboratively?
  - Let's examine closer

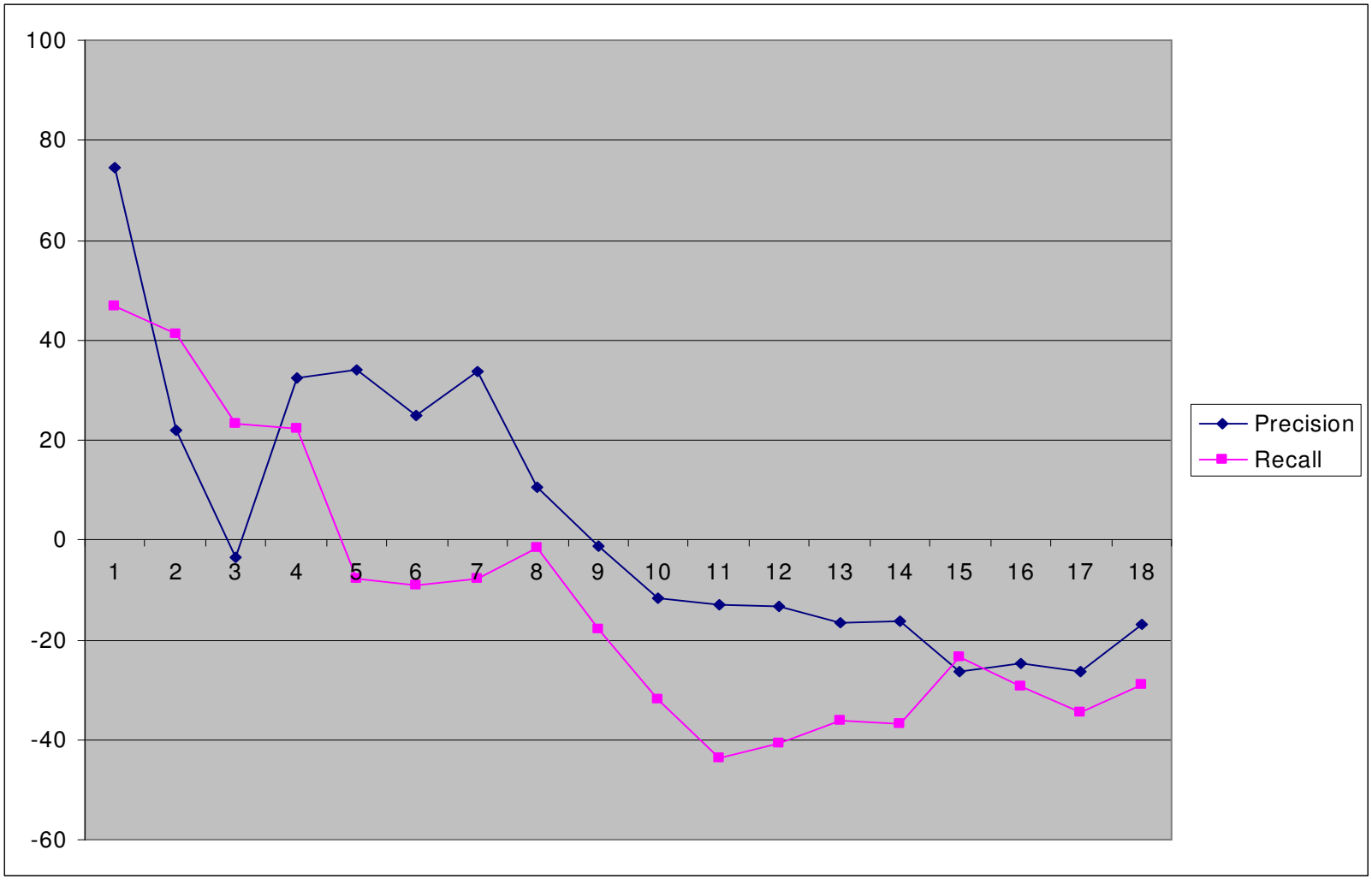
% improvement in precision



% improvement in recall



% improvement COLL over MMA+V



Tentative Conclusion:

Collaborative Search (*at least in our current implementation*) offers its best improvements when there are fewer relevant documents to be found

Normalizing by Shots Viewed

- Our RSVP system needed another design iteration (missed opportunity)
- Average number of shots viewed:
  - MMA: 2,123
  - MMV: 2,601
  - MMA+V: 4,184
  - COLL: 2,614

Work smarter not harder?

Precision

Precision, with counts normalized by the number of seen shots, does not change

$$\frac{\frac{TP}{\#seen}}{\frac{TP}{\#seen}+\frac{FP}{\#seen}}=\frac{TP}{TP+FP}$$

Recall

$$\frac{TP}{\frac{\#seen}{\#totalrel}}$$

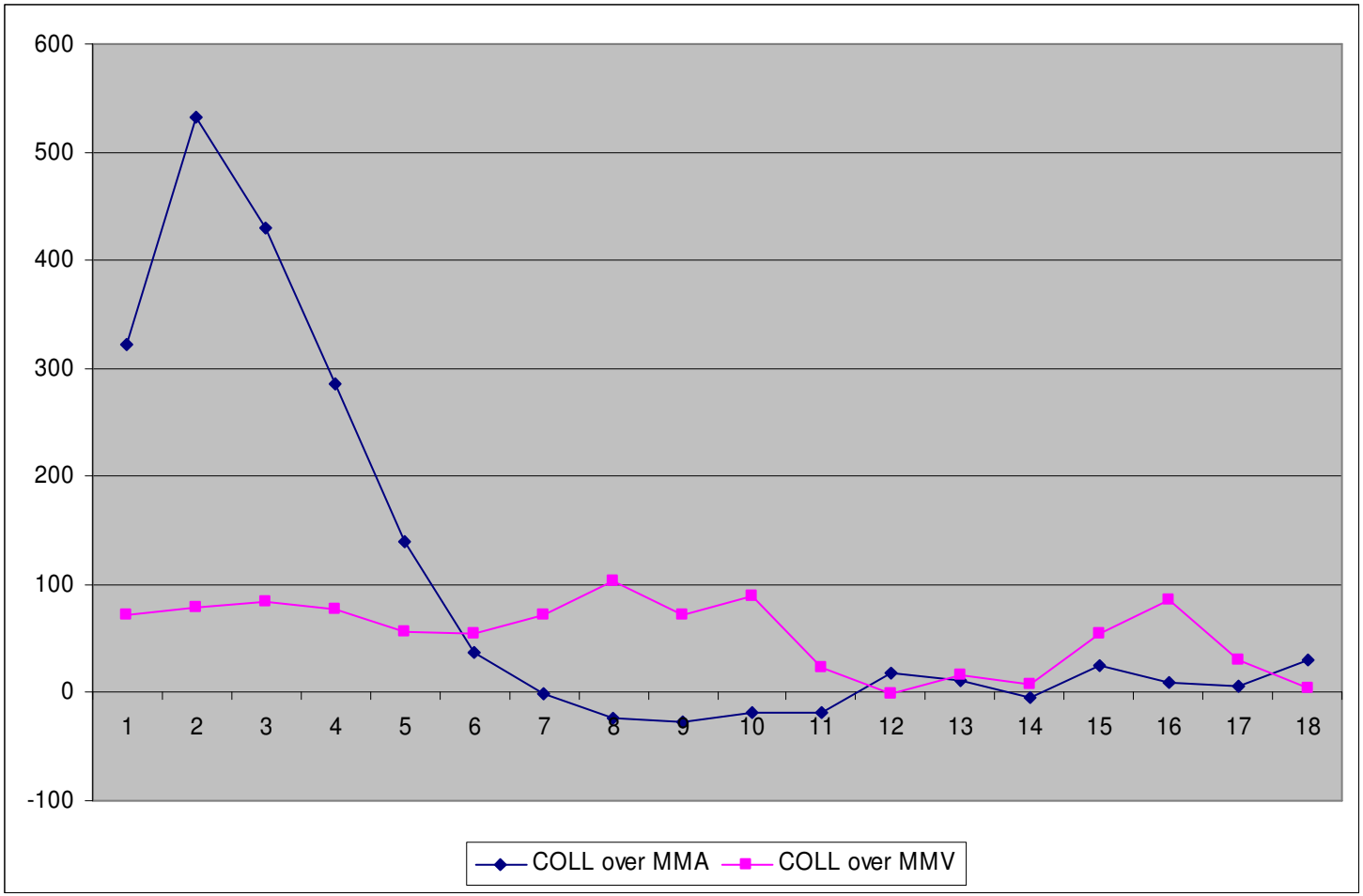
- COLL is:

73.9% relative improvement over MMA (101.1%)

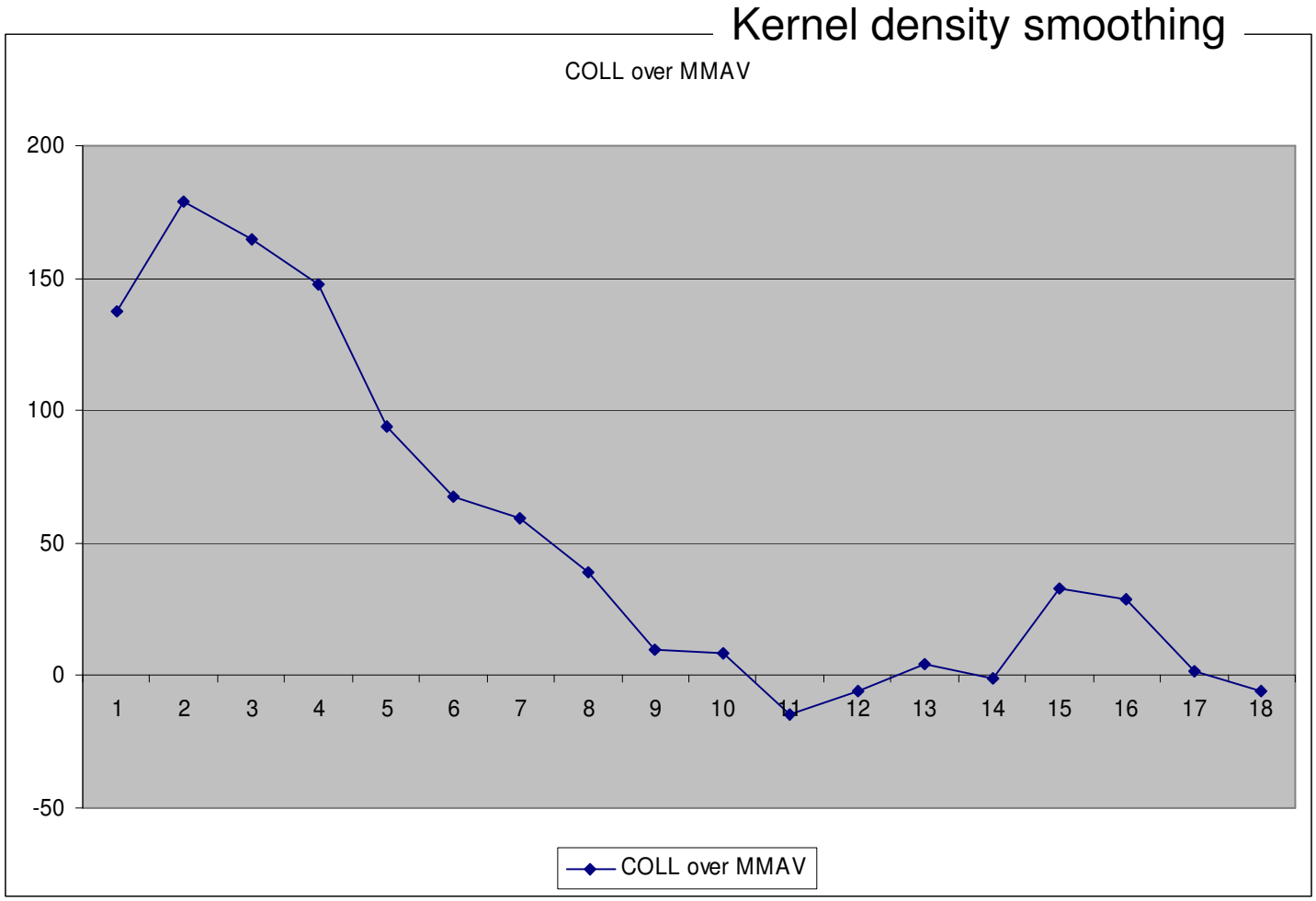
38.5% relative improvement over MMV (43.3%)

44.1% relative improvement over MMA+V (-10.7%)

% improvement in recall



% improvement in recall



Future Work

- Still like the idea of miner vs. prospector
  - But need to give the miner more ability to "steer"
  - And achieve higher throughput
- Also investigate other collaboration roles
- Also investigate types of queries in which different roles work better. Can we know this a priori?