# Hands-On: Visualization

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*IRS Cross-Border Reporting Workshop*
*May 2017, Vancouver BC*

**http://www.cs.ubc.ca/~tmm/talks.html#cb17**

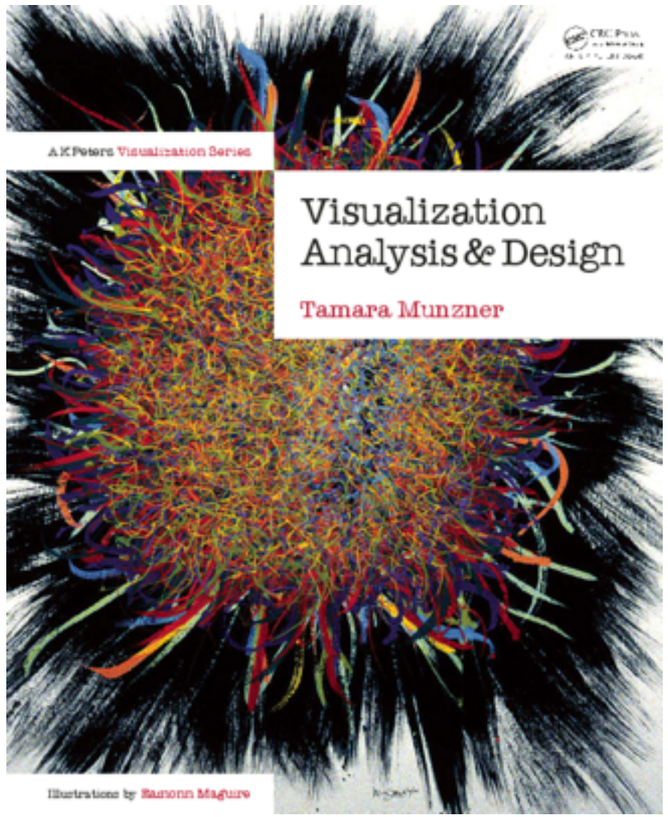
**@tamaramunzner**

# Visualization (vis) defined & motivated

**Computer-based visualization systems provide visual representations of datasets designed to help people carry out tasks more effectively.**

**Visualization is suitable when there is a need to augment human capabilities rather than replace people with computational decision-making methods.**

- human in the loop needs the details
  - doesn't know exactly what questions to ask in advance
  - exploration: longterm exploratory data analysis (EDA)
  - presentation: known results
  - stepping stone towards automation: refining, trustbuilding
- external representation: perception vs cognition
- intended task, measurable definitions of effectiveness




more at:
Visualization Analysis and Design, Chapter 1.
*Munzner. AK Peters Visualization Series, CRC Press, 2014.*

# Two vignettes

- a tale of two tools created for journalistic use
  - shared frameworks of interdisciplinary methods from my research group
    - thinking about collaboration
      - roles & rewards, for computer scientists & journalists
    - reasoning about visualization design
      - beyond pretty pictures
  - divergent goals & audiences
    - TimeLineCurator: presentation / explanatory
    - Overview: investigation / exploratory

# Collaboration incentives

- why do CS/vis people need to understand journalism's problems?
  - we work with you to understand your driving problems
  - we build tools intended to help
    - only works out if we understood the problems deeply enough
  - we observe how you use them
    - if they're good enough
      - CS win: research success stories
      - journalist win: access to better tools
  - we develop guidelines on how to build better tools in general
    - CS win: research progress in visualization

# Vignette 1:
# Vis Tool for Journalistic Presentation


# TimeLineCurator

## *Interactive Authoring of Visual Timelines from Unstructured Text*

Johanna Fulda
@jofu_

Matthew Brehmer
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Tamara Munzner
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http://about.timelinecurator.org

http://timelinecurator.org

TimeLineCurator: Interactive Authoring of Visual Timelines from Unstructured Text.
*Fulda, Brehmer, Munzner. IEEE Trans. Visualization and Computer Graphics (Proc IEEE VAST 2015) 22(1):300-309, 2015.*

# Origin story: Tedium in the newsroom

- Johanna Fulda: interactive infographics developer, Sueddeutsche Zeitung
  - then Munich CS master's student, visiting UBC

- what pain point could we address with interactive visualization?
  - plus some natural language processing (NLP)

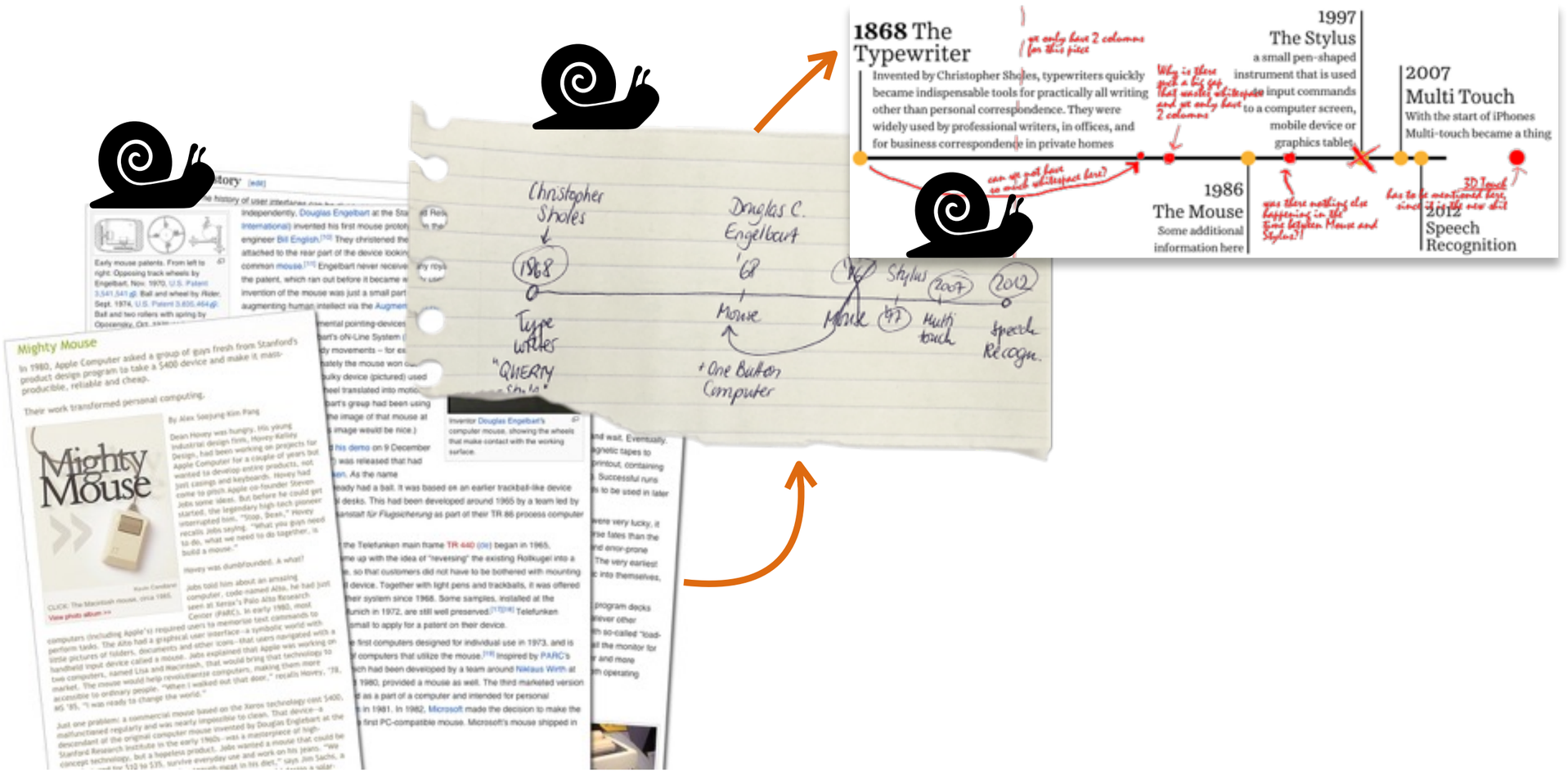
# TimeLineCurator

visual & browser-based

https://vimeo.com/jofu/tlc

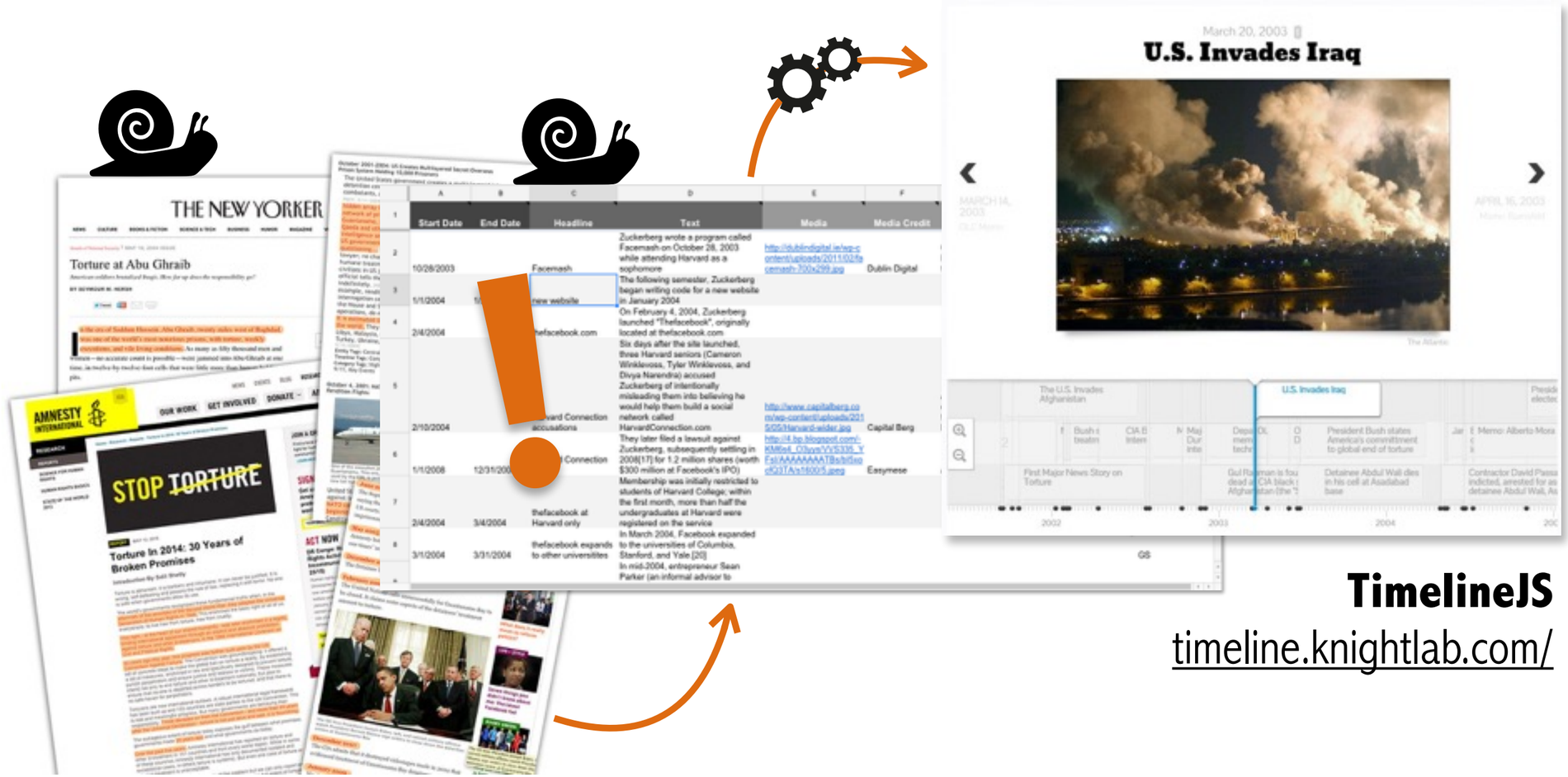
# Manual creation process

Browse → Extract → Format → Show → Update



# Structured creation process

Browse → Extract → Format → Show → Update

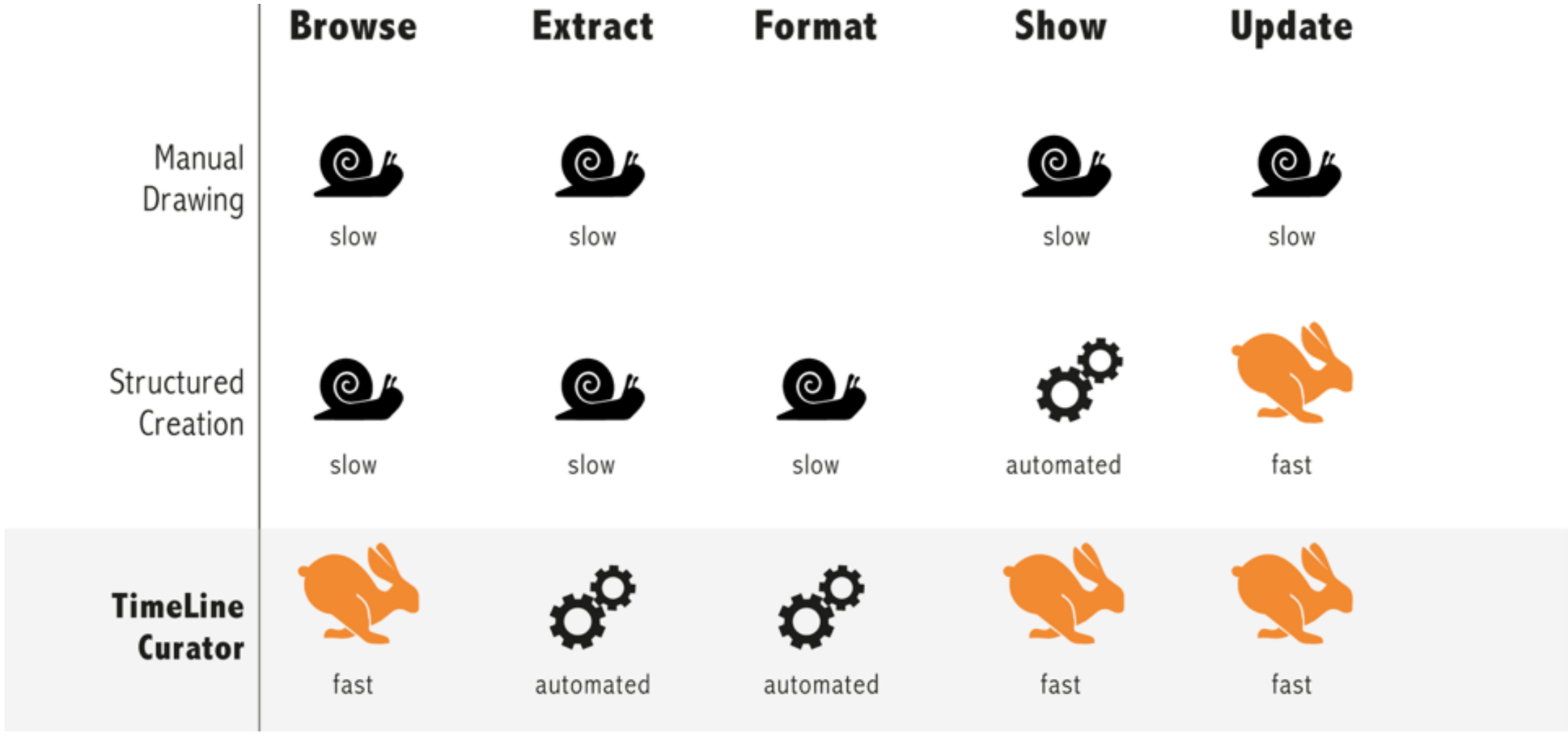



**TimelineJS**

timeline.knightlab.com/

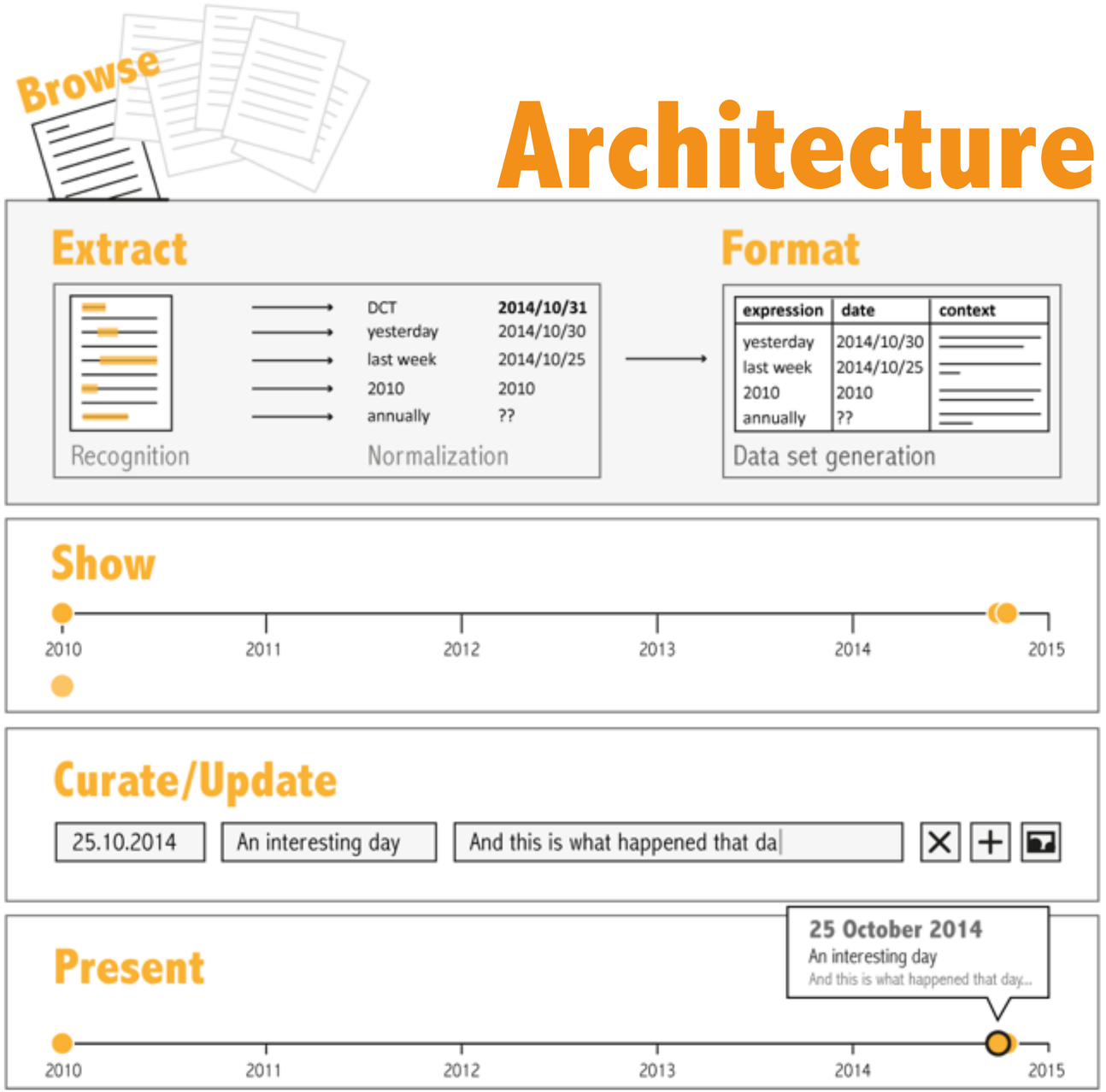
# Timeline authoring model

- time required for each task



# The general case for curation

- build for human in the loop as continuing need
  - automatic processing to accelerate not replace
  - assume computational results good but not perfect
    - for the indefinite future!
  - visual feedback to accelerate



# The importance of being brisk

- sexy use case: eureka moment
  - enable what was impossible before
  - vis tools for new insights & discoveries
- workhorse use case: workflow speedup
  - vis tools to accelerate what you're already doing
    - sometimes enables the previously infeasible
- TLC use cases
  - started with speedup use case, for presentation
    - make this doc into a timeline now!
  - two other use cases nudge towards exploration
    - comparison between multiple timelines
    - speculative browsing

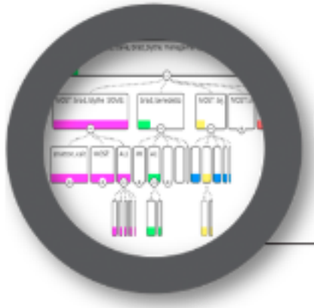
# TimeLineCurator: Speculative Browsing


https://vimeo.com/jofu/tlc

# Try it out!

http://timelinecurator.org

# Vignette 2:
# Vis Tool for Investigative Reporting



# Overview

## *The Design, Adoption, and Analysis of a Visual Document Mining Tool For Investigative Journalists*

http://www.cs.ubc.ca/labs/imager/tr/2014/Overview/

https://www.overviewdocs.com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@mattbrehmer

Stephen Ingram
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Jonathan Stray
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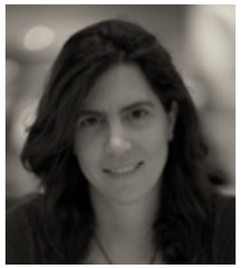
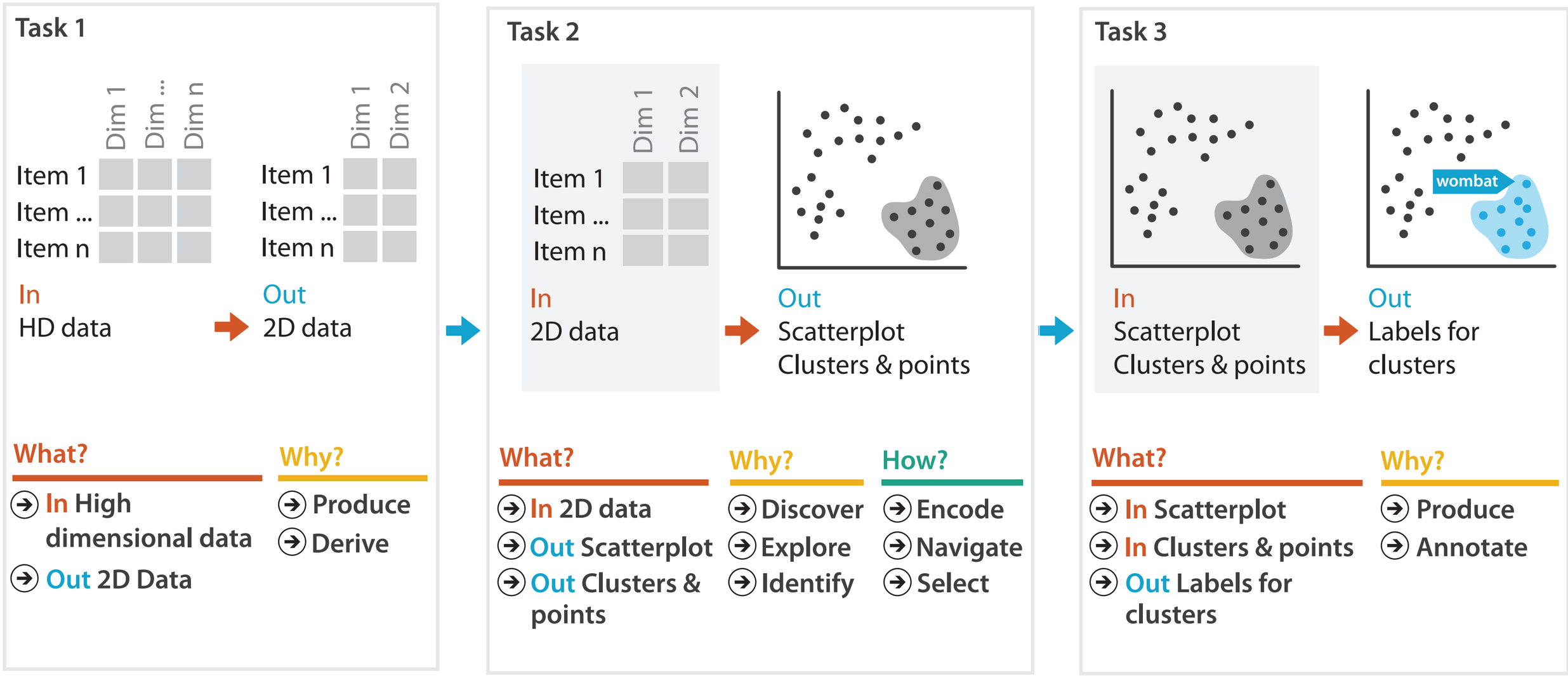
Tamara Munzner
@tamaramunzner





Overview: The Design, Adoption, and Analysis of a Visual Document Mining Tool For Investigative Journalists.
*Brehmer, Ingram, Stray, and, Munzner. IEEE Trans. Visualization and Computer Graphics (Proc. InfoVis 2014), 20(12):2271-2280, 2014.*

# Starting point: Dimensionality reduction for document datasets



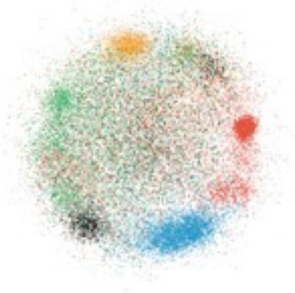

- more on DR: hour-long talk *Dimensionality Reduction from Several Angles*
  *http://www.cs.ubc.ca/~tmm/talks.html#kelowna16*

# Origin story: WikiLeaks meets Glimmer

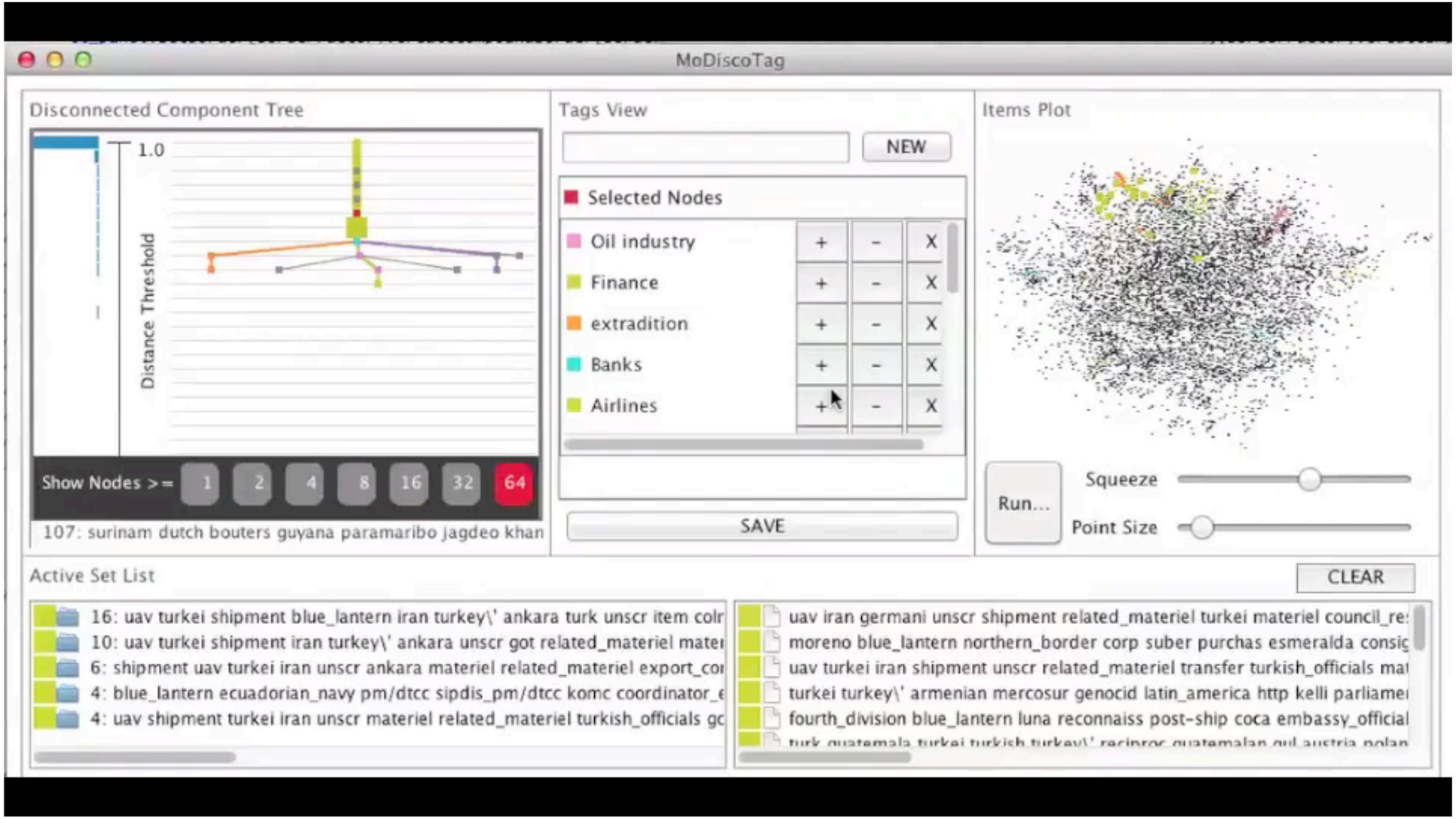
- WikiLeaks: hacker-journalist Jonathan Stray analyzing Iraq warlogs
  - one instance of general problem: Too Many Documents
  - conjectured that existing label classification falls short of showing all meaningful structure in data
    - friendly action, criminal incident, ...
  - he had some NLP, needed better vis tools


- Glimmer: multilevel dimensionality reduction algorithm
  - scalability to 30K documents and terms

*[Glimmer: Multilevel MDS on the GPU.*
*Ingram, Munzner, Olano. IEEE TVCG 15(2):249-261, 2009. ]*

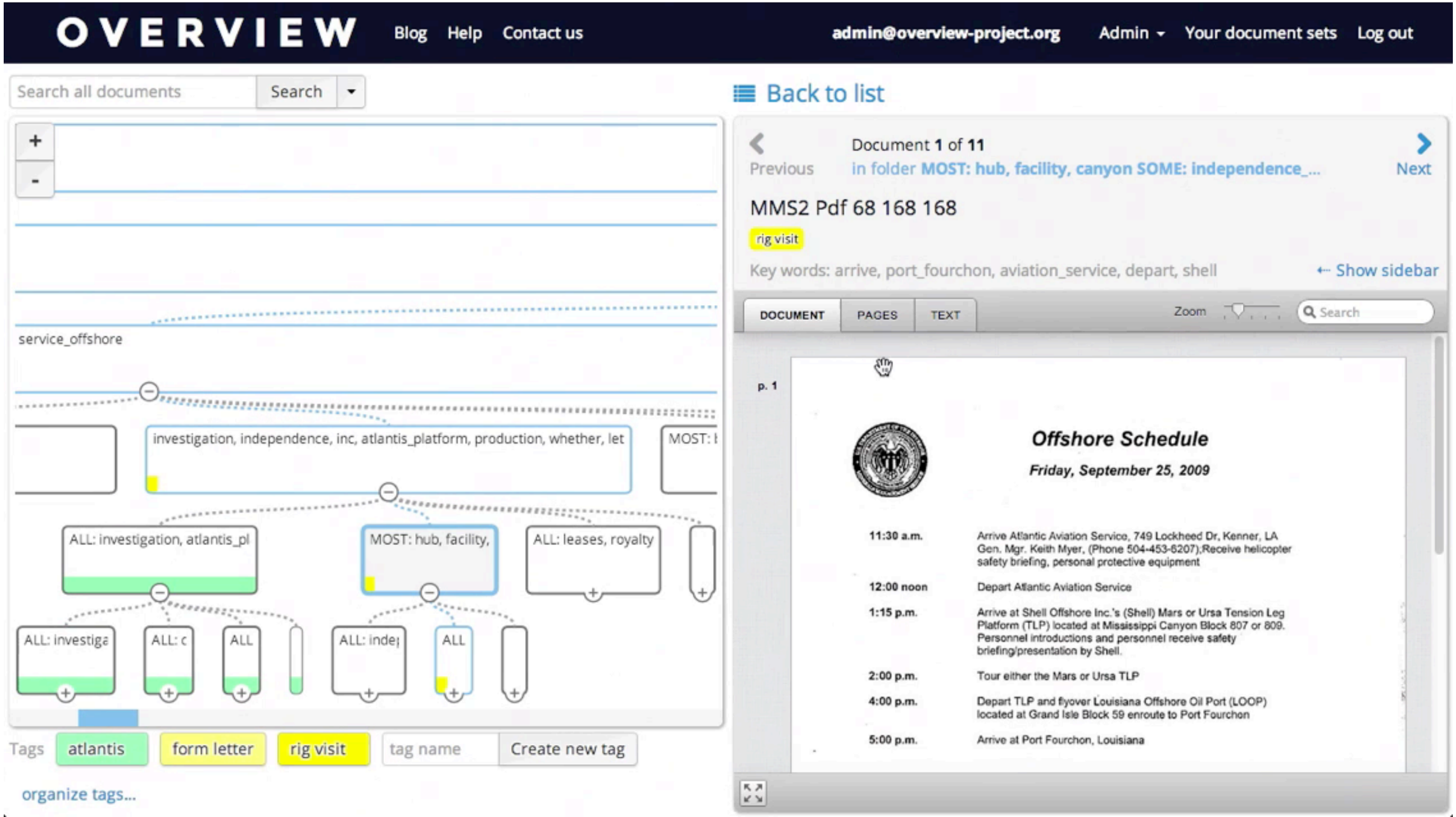


# Overview: Early version




http://www.cs.ubc.ca/labs/imager/tr/2012/modiscotag

# Overview: current version



# Deploy in the real world

| Case Study | #1 | #2 | #3 | #4 | #5 | #6 |
|---|---|---|---|---|---|---|
| Document Collection | 4,500 pages from FOIA | 5,996 emails from FOIA | 8,680 pages from FOIA | 1,278 survey comments | 4,653 emails from FOIA | 1,680 bills |
| Question | *What did security contractors do during Iraq war?* | *Were municipal police funds mismanaged?* | *Were Paul Ryan's campaign statements hypocritical?* | *What is the gun ownership debate about?* | *Was gov't response to emergency incident effective?* | *Did gov't fail to pass bills addressing police misconduct?* |

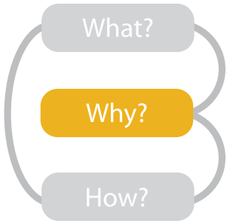
# Deploy in the real world, understand user goals

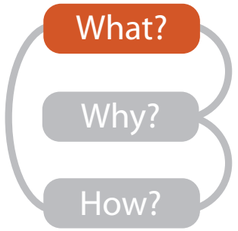
| Case Study | #1 | #2 | #3 | #4 | #5 | #6 |
|---|---|---|---|---|---|---|
| Document Collection | 4,500 pages from FOIA | 5,996 emails from FOIA | 8,680 pages from FOIA | 1,278 survey comments | 4,653 emails from FOIA | 1,680 bills |
| Question | *What did security contractors do during Iraq war?* | *Were municipal police funds mismanaged?* | *Were Paul Ryan's campaign statements hypocritical?* | *What is the gun ownership debate about?* | *Was gov't response to emergency incident effective?* | *Did gov't fail to pass bills addressing police misconduct?* |
| | the trend story: getting the big picture | find the needle in the haystack / smoking gun | wheat vs chaff: filtering out irrelevant material | categorize and count: turning docs into data | wheat vs chaff: filtering out irrelevant material | prove haystack contains no needles! |

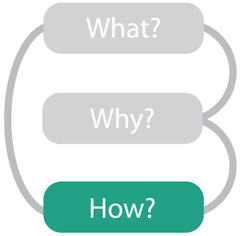
https://blog.overviewdocs.com/2014/01/09/what-do-journalists-do-with-documents-the-different-kinds-of-document-driven-stories/

# Evolution across levels

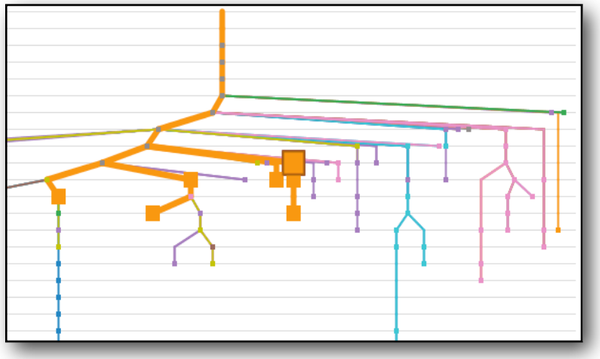
- evolution of task abstraction
  - task 1: generate hypotheses → explore → summarize
    - *obviously you can't read everything; speed up with tool for categorizing and counting*
  - task 2: verify hypotheses → locate → identify
    - *you really do read each doc; speed up with tool to keep track of findings*
- evolution of data abstraction & idioms
  - arrange cluster tree to emphasize nodes vs links
  - new vis insight: DR scatterplot less effective than cluster tree vis + tagging
    - better affordance for systematic traversal of document cluster hierarchy

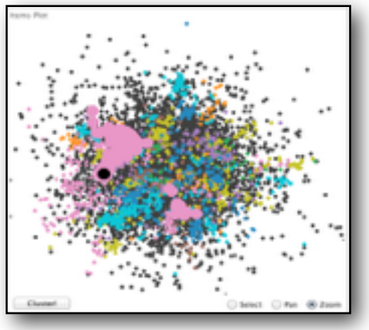


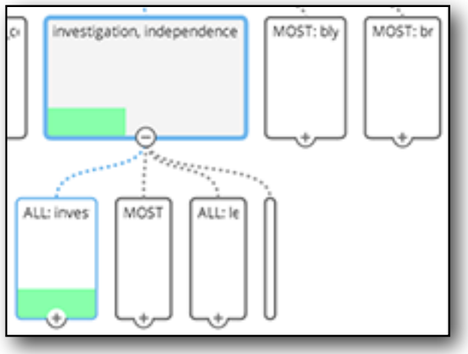




early





current



# Try it out!

**https://www.overviewdocs.com/**

https://blog.overviewdocs.com/completed-stories/

# Discussion

- how many of you have jumped into data journalism?
  - what kind of tools have you used?

- have any of you grappled with timelines?
  - what kind of tools did you use?
- have any of you grappled with large document collections?
  - what kind of story did you have in mind?

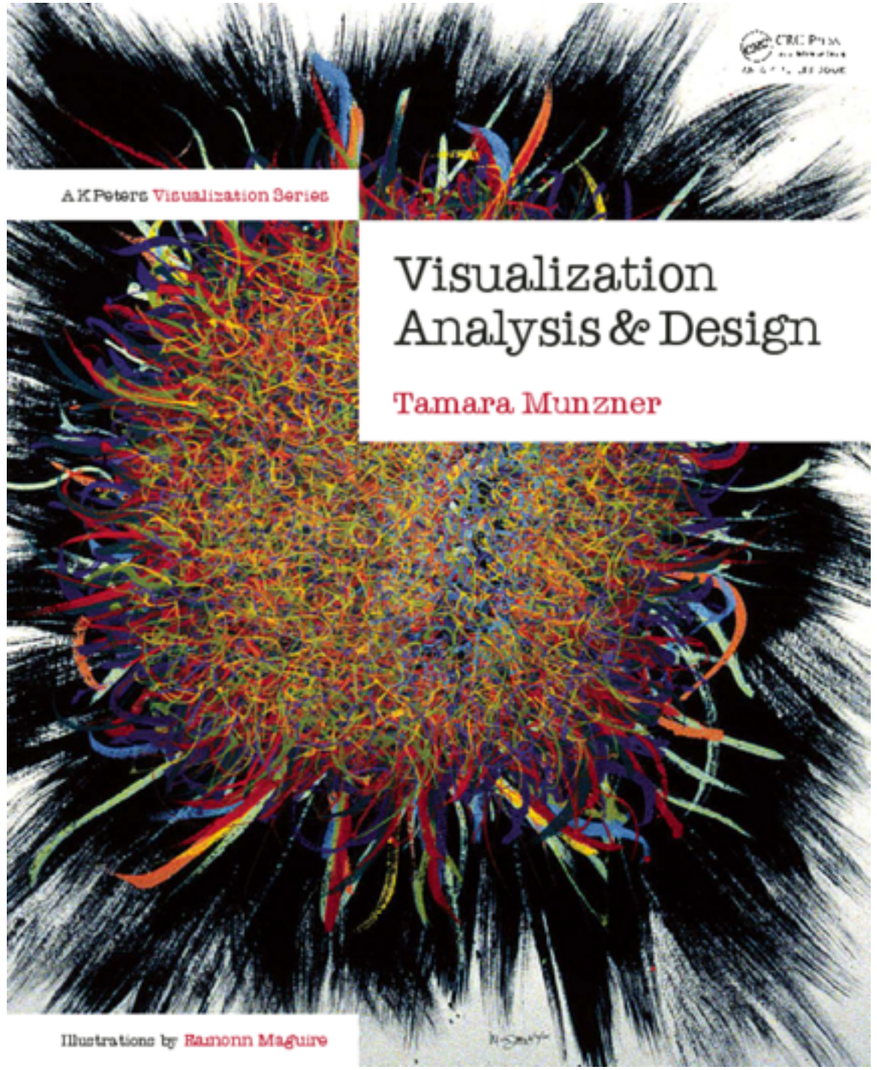
# More Information

@tamaramunzner

- this talk
  www.cs.ubc.ca/~tmm/talks.html#cb17

- book
  http://www.cs.ubc.ca/~tmm/vadbook
  - 20% off promo code, book+ebook combo: HVN17
  - http://www.crcpress.com/product/isbn/9781466508910

- papers, videos, software, talks, courses
  http://www.cs.ubc.ca/group/infovis
  http://www.cs.ubc.ca/~tmm




Visualization Analysis and Design.
*Munzner. A K Peters Visualization Series, CRC Press, Visualization Series, 2014.*