When To Walk Away: Questions To Ask In Infovis Projects

Dagstuhl Seminar on Information Visualization: Human-Centered Issues in Visual Representation, Interaction, and Evaluation

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Content Questions: Not The Subject of Talk

- A. is my technique a novel infovis research contribution?
  - is it new?
    - discussed extensively at Vis06 Publications panel
- B. does my technique work at a technical level?
  - does visual representation communicate the intended structure?
    - principled design, following known guidelines
    - iterative design, through conflicting tradeoffs
- if not, don't walk away - keep working!

Four Process Questions

- explicit questions to ask before starting projects
  - sometimes I asked them early
  - sometimes I wish I'd asked them early
  - maybe obvious in retrospect, but not at the time
- what flavor of collaborators do I have:
  - 1. real users, or fellow tool builders?
    - or none?
- is problem solvable?
  - 2. is there a real need for my new approach/tool?
  - 3. am I addressing a real task?
  - 4. does real data exist and can I get it?

Q1. Real Users or Fellow Tool Builders?

- real users
  - target end-users intended to use tool
- fellow tool builders (FTB)
  - non-infovis person, typically from CS domain
  - wants to work with me to build a (better) tool aimed at end-users
- example:
  - data mining FTB wants to add infovis “windshield” to steerable data mining system
  - intended real users are analysts with warehouse of market-basket transaaction data

Q1. Real Users or Fellow Tool Builders?

- FTB can be valuable collaborators
- but not a substitute for direct contact with real users
  - even if longstanding project
  - especially if new project
- different situation than user-centered design
  - in retrospect, failure to explicitly distinguish led to role confusion

Q2. Real Need?

- do users need a new tool/technique/approach?
  - are existing tools good enough to do the job?
  - even if not perfect from infovis research standpoint
  - some users do have infovis needs without knowing it
- is problem on the table best solved with infovis?
  - or other methods?
  - some users who ask for infovis, don't have real need
- are users willing to try new tool?
  - success is hard enough with enthusiastic end users
  - not worth uphill struggle to deal with reluctant users

Example: Power Grid Control Room Vis

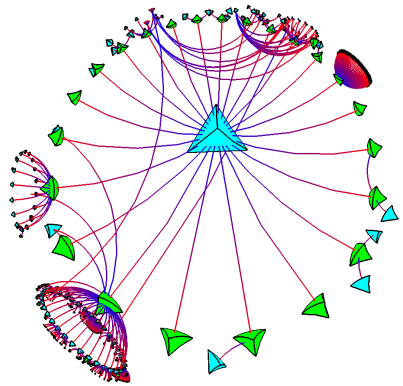
- FTB collaborator conjecture: control room operators had specific problem during crisis use that infovis would solve
  - new project, just funded
  - FTB connection with real users allowed control room visit
- investigation led me to disagree
  - existing tools satisfied users, were adequate for normal use
  - plus, in midst of upgrade to new systems
    - unclear if user buyin or available data
- outcome: walked away early, before engaging in earnest

Q3: Real Task - Showing the Right Structure?

- is the structure I'm showing really what they need to see?
  - or am I just showing data that's easy to gather?
  - or am I just addressing need of FTB, but not real users?
- example: showing fine-grained structure of search space
  - if user's main task is finding information, does user need to construct and maintain mental model of search space?
  - or does that add cognitive overhead, rather than reduce it?!

Examples: Showing Information Spaces

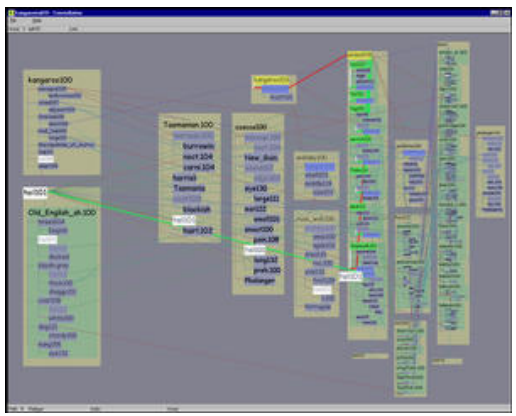
- visualize hyperlink structure of web for browsing users
  - my entry into infovis (common story!)
  - assertion of lost-in-hyperspace, without real use case
  - outcome: VRML 95 paper

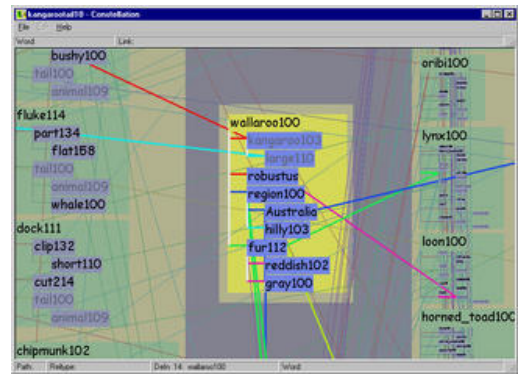


- later, H3 use case was for webmasters instead of browsers
  - outcome: InfoVis 99 paper
- semantic network vis
  - outcome: walk away very early, after initial discussion

Q3: Real Task - Will Their Need Persist?

- do they do chosen task seldom or occasionally or always?
- will they keep doing it?
- example: Constellation project
  - by the time system done, their needs had shifted
  - careful design study, but could not say users had adopted
  - outcome: InfoVis 99 paper





- later, with TreeJuxtaposer, pick task that's stable over centuries!
  - outcome: SIGGRAPH 03 paper

Q3: Real Task - Does It Exist?

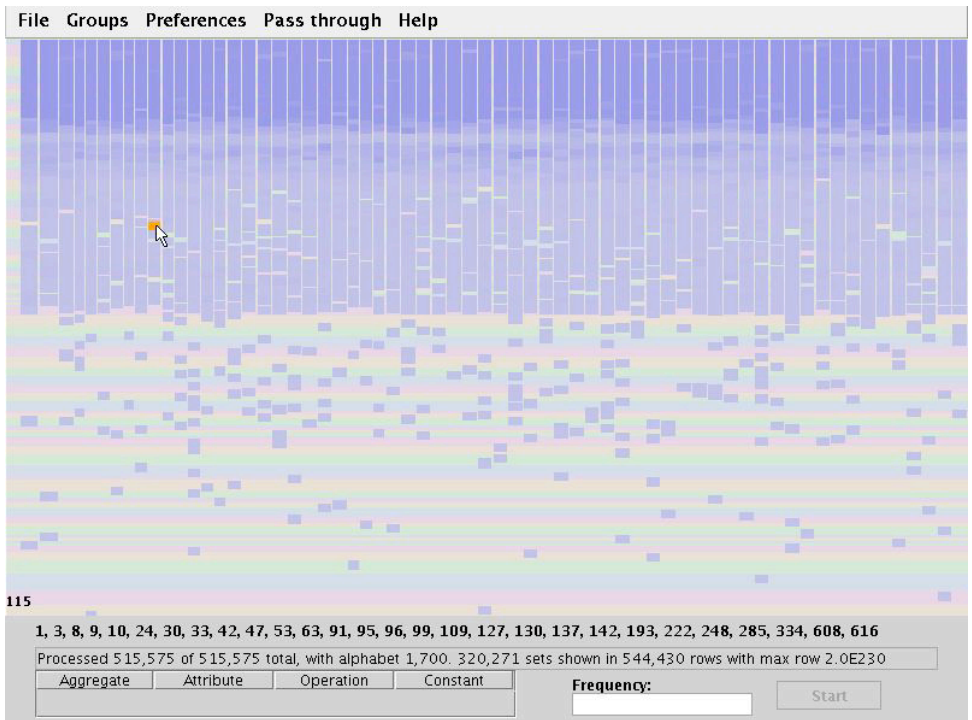
- real users, real data... but no clear questions
  - “maybe there’s something interesting lurking in there”
  - hard to know if you solved problem
  - hard to learn new things about infovis
- examples: networking, security
  - outcome: nascent collaboration possibilities not pursued

Q4: Real Data - Can I Have It?

- is data proprietary?
  - many reasons for data producer to not release it
  - expose intellectual property, embarass organization
- example: data mining dashboard
  - never occurred to me to ask if real data available
    - ...because collaborator approached me
    - did not explicitly consider FTB vs. RU roles!
  - discovered DM cultural norm of synthetic data for benchmarks, only after many months into project!
  - conjecture: we're not seeing something useful because nothing to see in fake data, will change when get real data
    - continued with major effort to extend datamining server, refine and scale up nifty technique for infovis client

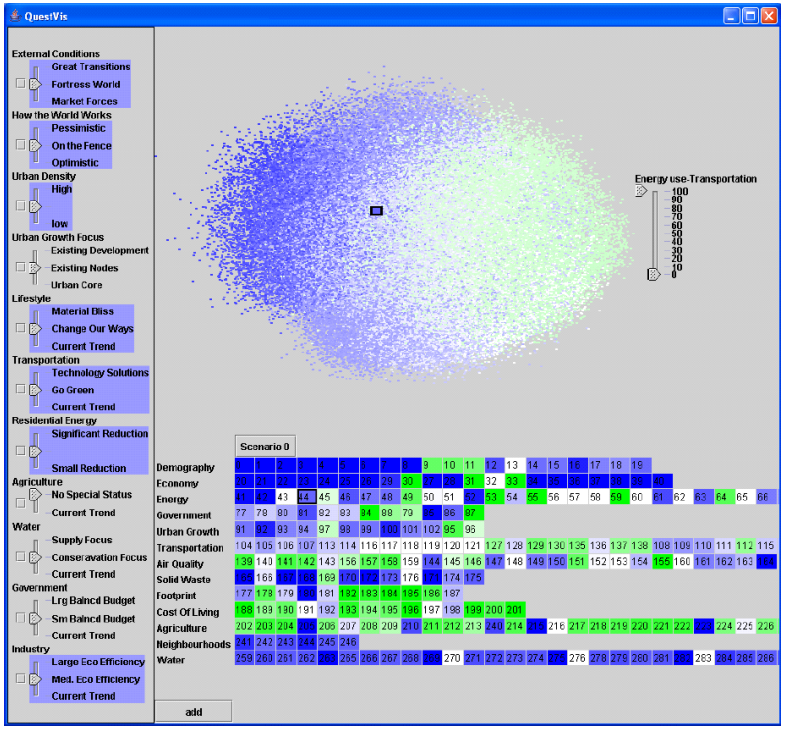
Q4: Real Data - Can I Have It?

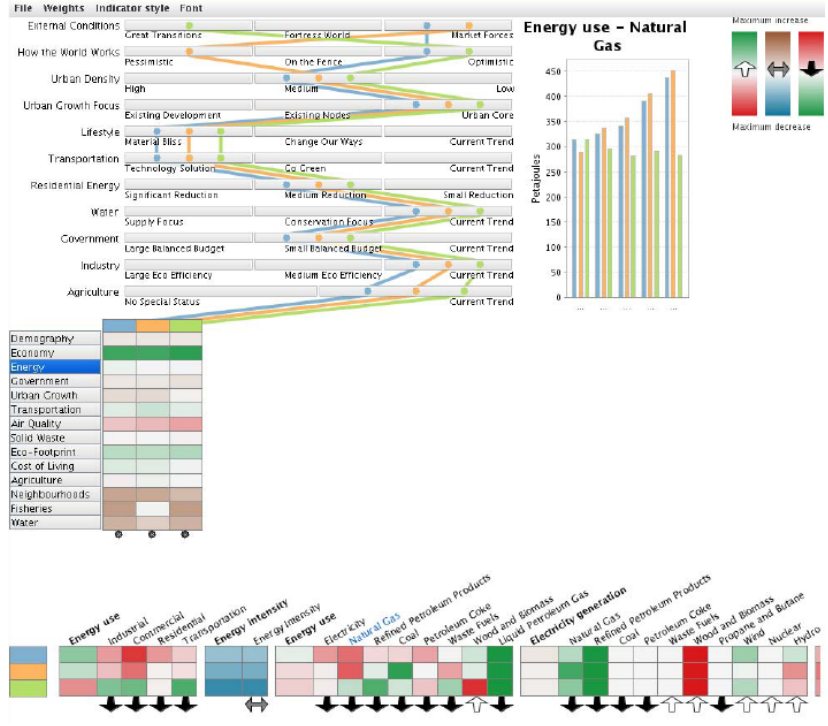
- example: data mining dashboard, cont.
  - reality: could not get real data
    - eventually scrounged quasi-real data
    - alas, nifty scalable technique still didn't show anything useful
    - realized approach didn't match task 2 years into project
  - outcome: tech report



Case Study: Sustainability Vis

- initial focus: high-dimensional dataset
  - 11 input variables, with 3 choices each
  - over 100,000 output scenarios, each measured in 300 dimensions
- showing linkages between inputs and outputs
- helping people infer correllations between dimensions





Four Years Later... Confusion On All 4 Questions

- 1. distinguishing between FTB collaborators and real users? not crisply enough!
- 2. real need for my new approach/tool? maybe not!
  - FTB intuitions: simplify radically, complexities cause unmanageable confusion
  - infovis intuitions: explore richness of underlying dataset
  - if FTB intuition was correct, then maybe infovis inappropriate
- 3. addressing a real task? shifting target!
- 4. does real data exist and can I get it? model troubles!
  - infovis tool could help show relationships in model
  - but FTB already knew correllations
  - and didn't want users too fixated on exact model details

Discussion

- agree or disagree with these questions?
- other questions you think are worth asking?
- would you find a paper on this topic interesting or boring?
- how can we as a field could learn more from null results?
  - given the size of the parameter space of designs, not so interesting to report on poor technique choices
  - process questions, in addition to technique questions?

Writing Bad Papers
Writing Good Papers

medium: A Panorama of Publication Pitfalls
http://www.cs.ubc.ca/~tmm/talks.html#vis06publish

long: CPSC 533C Fall 06 Lecture 15: Writing Papers
http://www.cs.ubc.ca/~tmm/courses/infovis/#writing

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Overview

- What Not To Do
- What To Do

Paper Pitfalls: Strategy

- What I Did Over My Summer Vacation
  - focus on effort not contribution
  - too low-level
- Least Publishable Unit
  - tiny increment beyond (your) previous work
  - bonus points: new name for old technique
- Dense As Plutonium
  - so much content that no room to explain why/what/how
  - fails reproducability test
- Bad Slice and Dice
  - two papers split up wrong
  - neither is standalone, yet both repeat
- Slimy Simultaneous Submission
  - often detected when same reviewer for both
  - instant dual rejection, multi-conference blacklist

Paper Pitfalls: Tactics

- Guess My Contributions Game
  - it's your job to tell reader explicitly
  - consider carefully, often different from original goals
- I Am So Unique
  - don't ignore previous work
  - both on similar problems and with similar solutions
- Enumeration Without Justification
  - "X did Y" not enough
  - must say why previous work doesn't solve your problem!
  - what limitations of theirs does your approach fix?
- Deadly Detail Dump
  - how allowed only **after** what and why
  - motivation: why should I care
  - overview: what did you do
  - details: how did you do it
- Jargon Attack
  - avoid where you can
  - define before using

InfoVis Paper Styles

- technique
  - most common
  - here's how to do X
  - do first, or do better
- design study
  - not just apply technique X to domain Y
  - justify visual encoding choices
- system
  - very hard to do well!
  - lessons learned: why do we care?
- evaluation
  - often but not always user studies
- model
  - frameworks, taxonomies
  - best case: taxonomy as aid to thinking, finding gaps

- actual paper may (should?!) have a mix of these elements
- more at www.infovis.org/infovis/2003/CFP/#papers

Paper Writing: InfoVis Technique/Design Study

- what problem are you solving
- why should I care
  - order depends on whether familiar
- why don't existing systems solve problem
- technique
  - how algorithm works: overview, then details
- design study
  - what is mapping from domain problem to visual encoding
  - why does it solve problem
    - abstraction and justification is critical
  - may include multiple design iterations
- results
  - complexity, performance, visual quality, efficacy
  - informal usability, formal user study, field study
  - anecdotes (insights found), user community (adoption),
  - usage scenarios, case studies