Towards A review of the empirical FLOSS literature

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Method for review paper

- ✓ Review of current research
  - ✓ What is known, where are the gaps?
- ✓ Looked for papers in Web of Science, ABI/Inform, journal special issues, AOM and AIS conferences, IntOSS (IFIP) conferences, ICSE workshops, opensource.mit.edu
- ✓ Restricted review to empirical papers on FLOSS development or use
- ✓ Found more than 500 papers in 1st pass
- ✓ Need to do a further pass to capture literature of past 18 months!

Literature Review Summary

- ✓ 586 articles reviewed
  - ✓ 295 Both Empirical and Relevant
    - ✓ Irrelevant excluded studies which simply used open source software for analysis or proof of concept
- ✓ Tagged in hierarchical categories
  - ✓ Level of Analysis
  - ✓ Method
  - ✓ Projects studied
  - ✓ Data Type
  - ✓ Constructs
  - ✓ Discipline
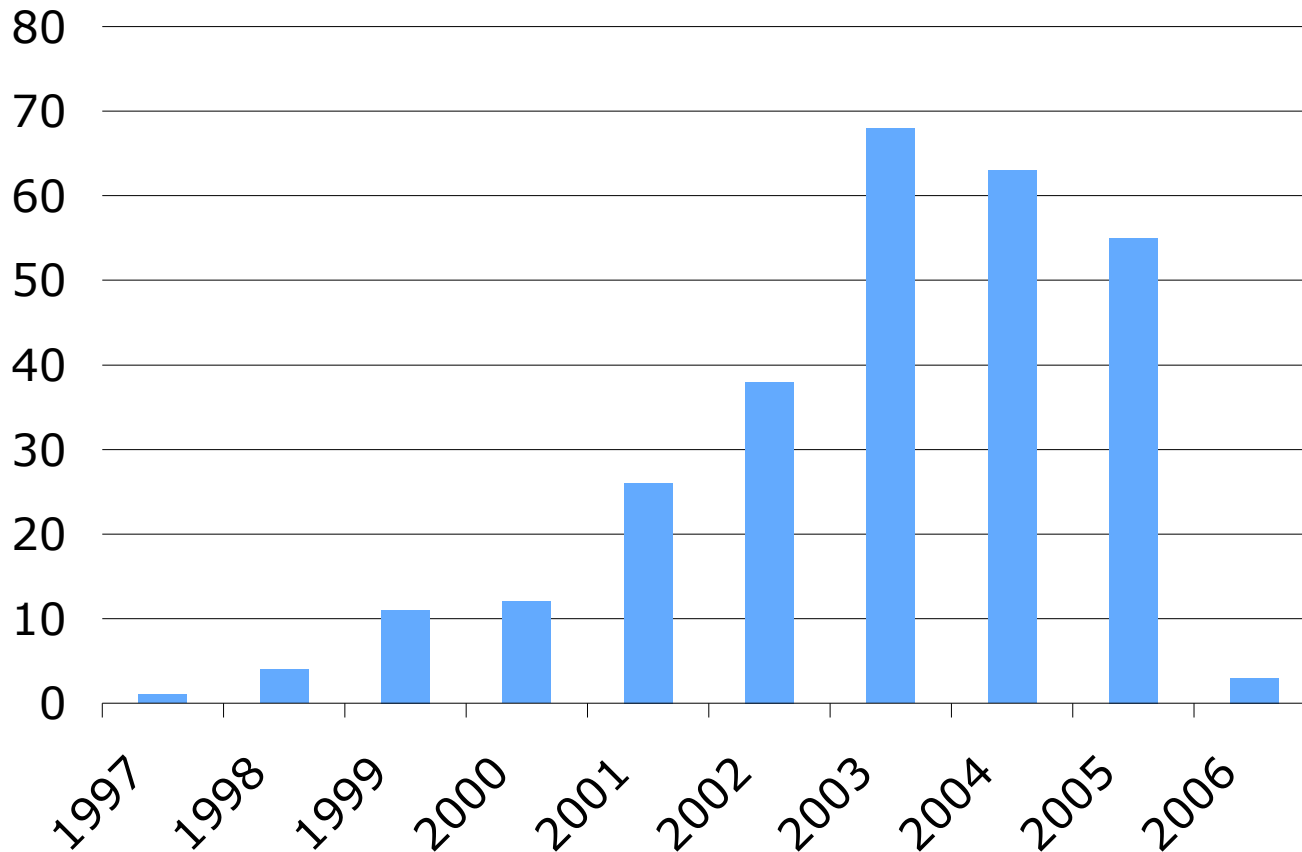- ✓ Tried tagging for theory, but almost one per paper!

Analysis technique (Clustering)
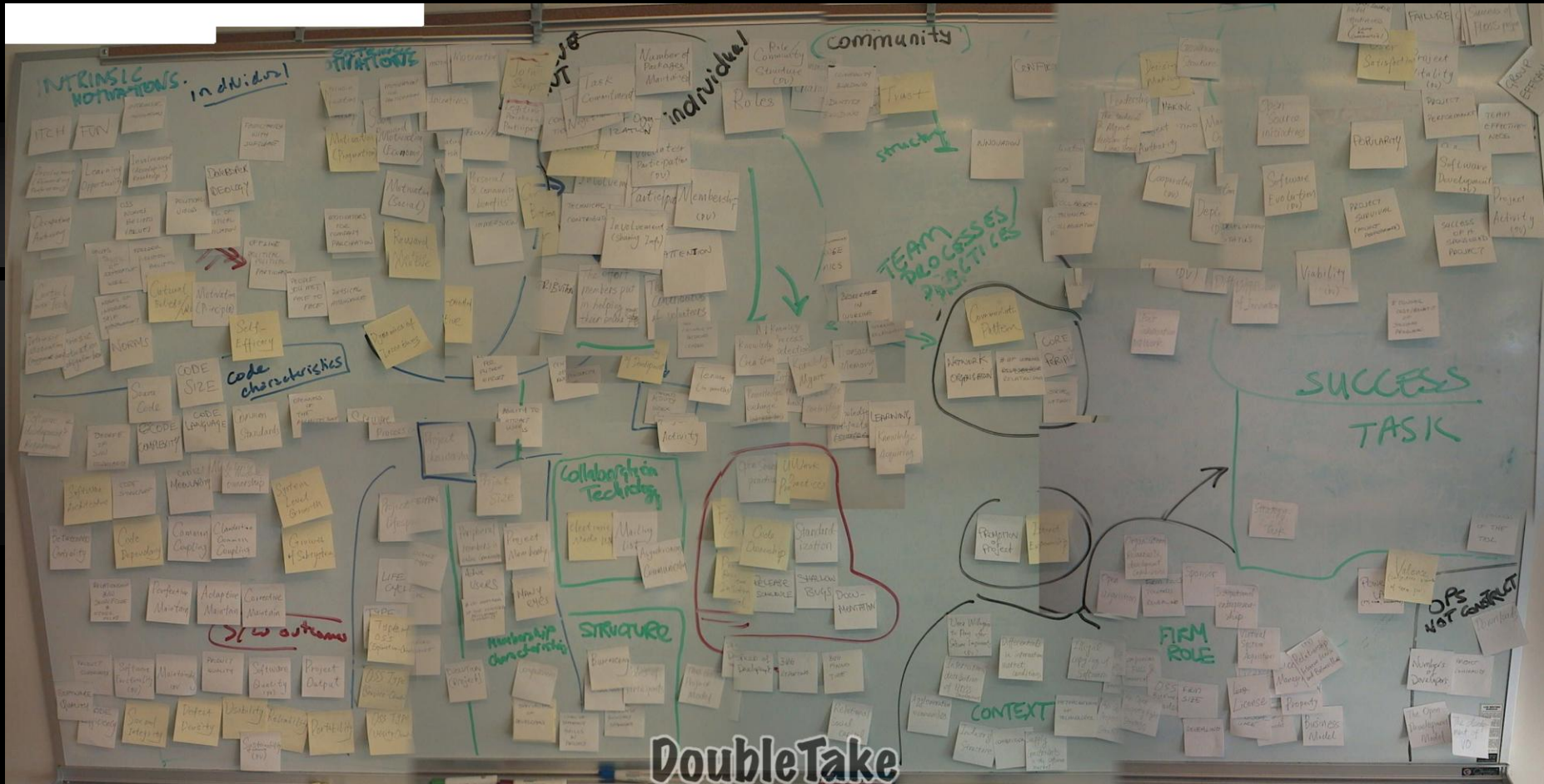
Demo

Relevant and Empirical Articles Per Year

Clearly Truncated in early 2006!

More articles to collect

1997 is a Roy Fielding working paper

Papers by Method used

- ✓ 150 In-depth study of small number of projects
    - ✓ 102 Case-study
    - ✓ 21 Interviews (non-case study)
    - ✓ 21 Participant observation
    - ✓ 11 Ethnographies
    - ✓ 6 Discourse analysis
- ✓ 70 Large scale sample measurement
    - ✓ 37 Surveys
    - ✓ 32 Other quantitative (eg correlation models)
- ✓ 13 Review Article
- ✓ 11 Not Specified/Unclear
- ✓ 6 Action Research/Design Science
- ✓ 4 Experiment

Other nuggets

- Top Projects Studied
  - 59 Linux
  - 32 Apache
  - 22 Mozilla
  - 13 Gnome
  - 10 Debian
  - Very long tail
- Very few longitudinal studies (~10)
  - Many others compounded data over lifetime but didn't study time-series or change
- About the same number studied for
  - Motivations, Coordination and Decision Making

Constructs

- ✓ Schema reorganization is ongoing, show current version but unfortunately without exact counts
- ✓ Inputs (~50%)
- ✓ Process (~30%)
- ✓ Outputs (~30%)
  - ✓ Some studies included all three (therefore > 100%)

Inputs

- ✓ Individuals
  - ✓ Characteristics
  - ✓ Motivations
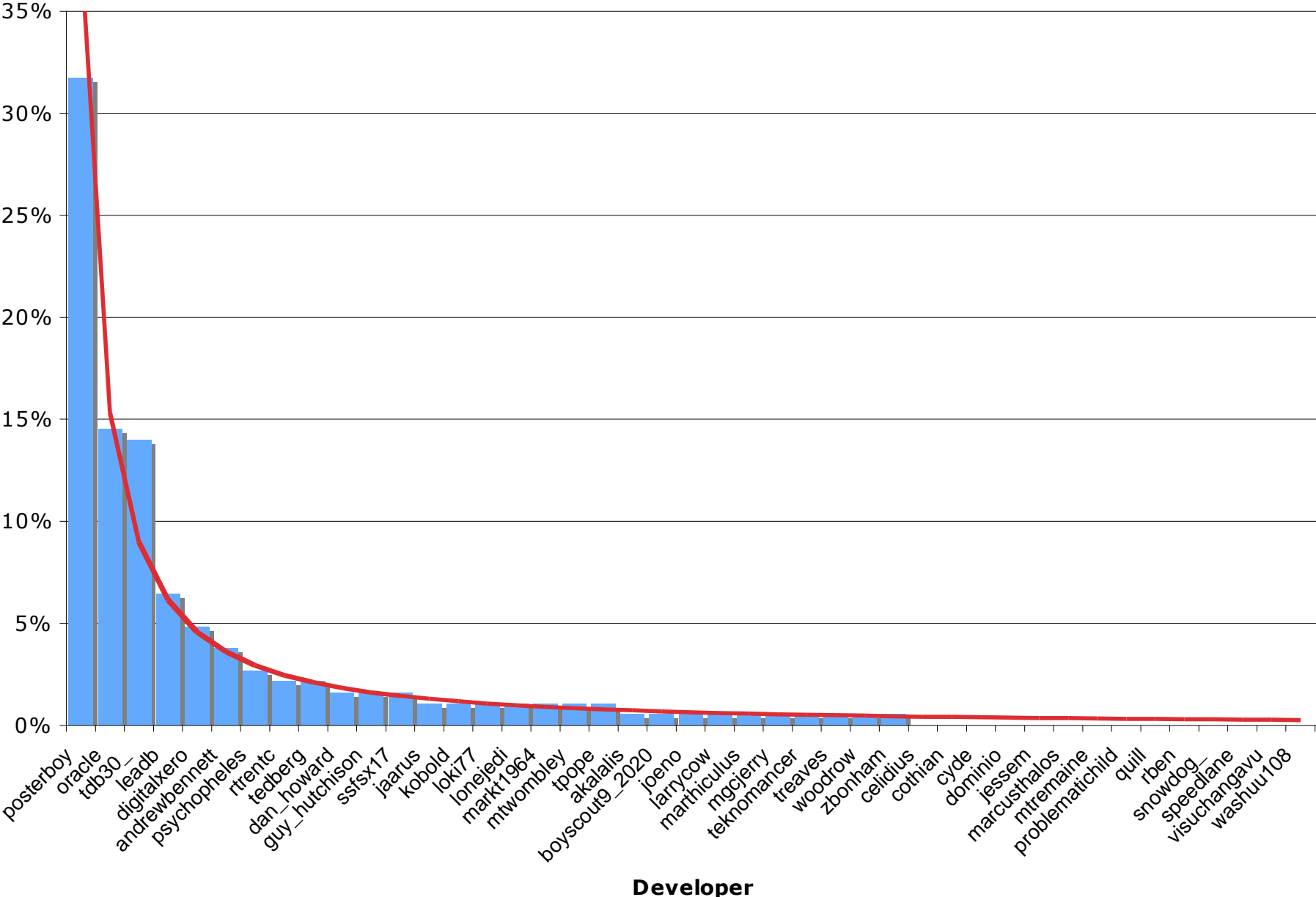 - ✓ Contributions (inc Time spent and Roles)
- ✓ Companies
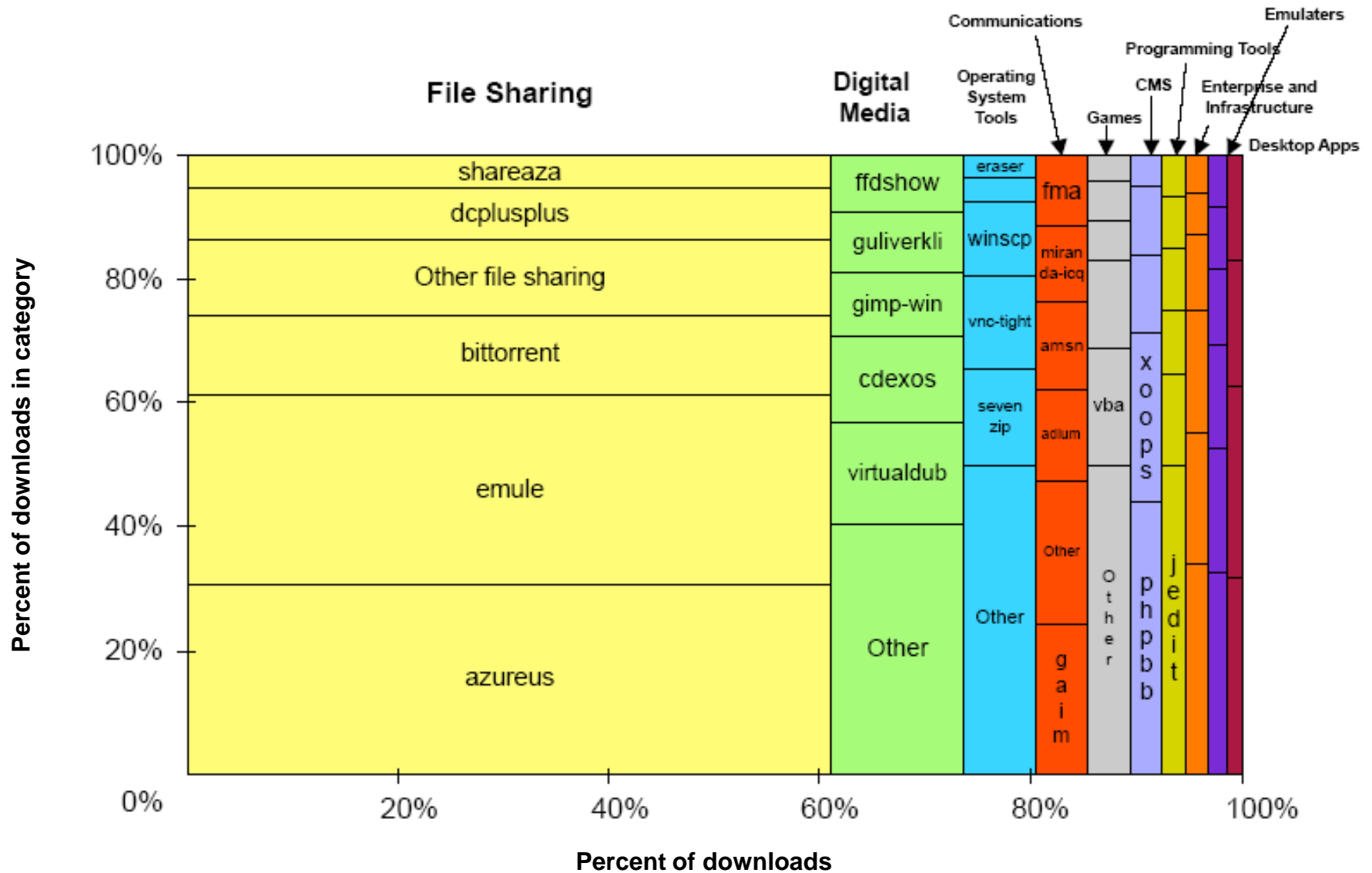 - ✓ Characteristics, Motivations and Contributions
- ✓ Teams
  - ✓ Project Characteristics (License etc)
  - ✓ Membership (Div of labor, distribution of effort)
  - ✓ Technology use
  - ✓ Interaction Structures (eg Onion Model)
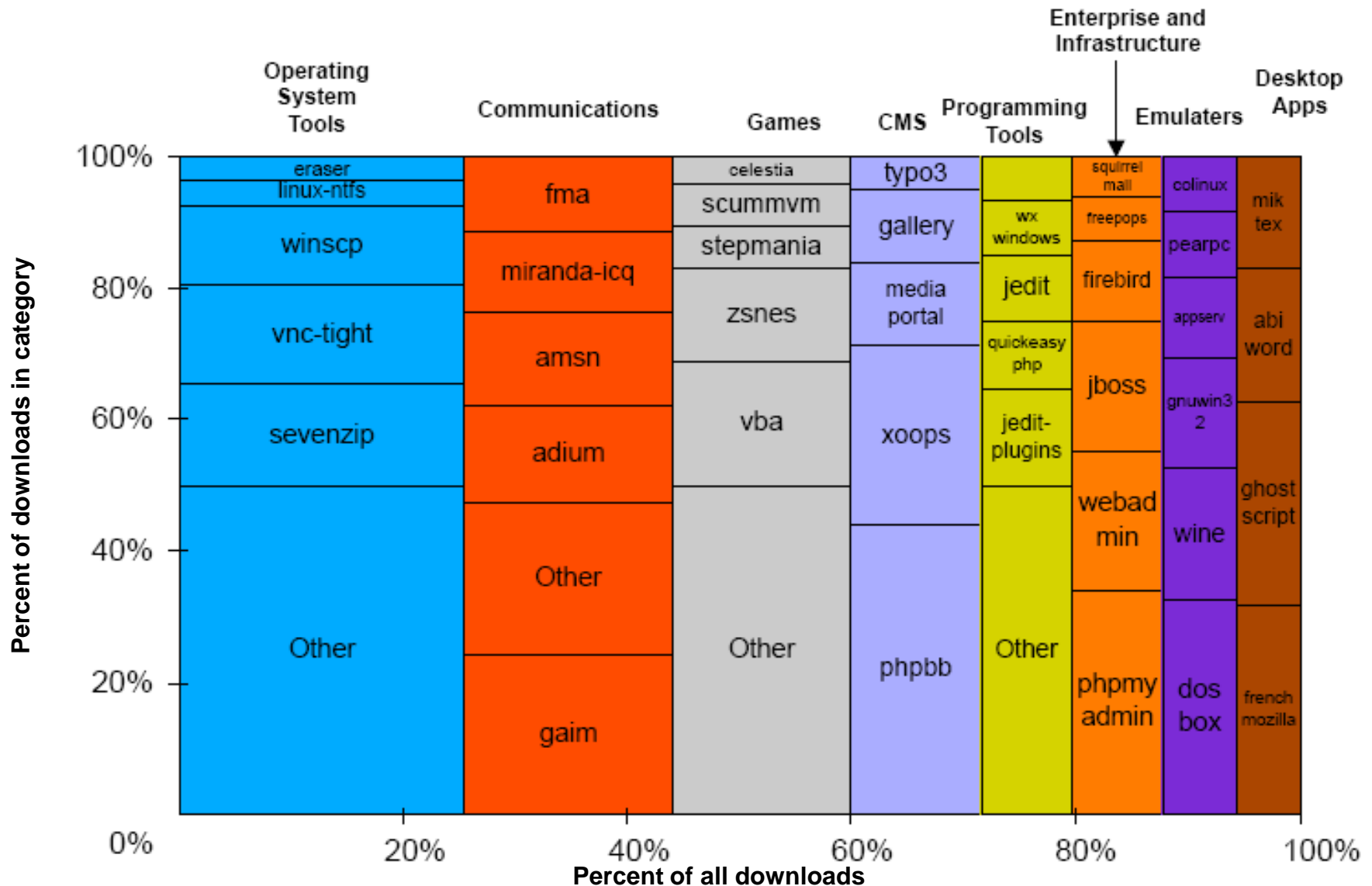
Contribution: So much by so few….
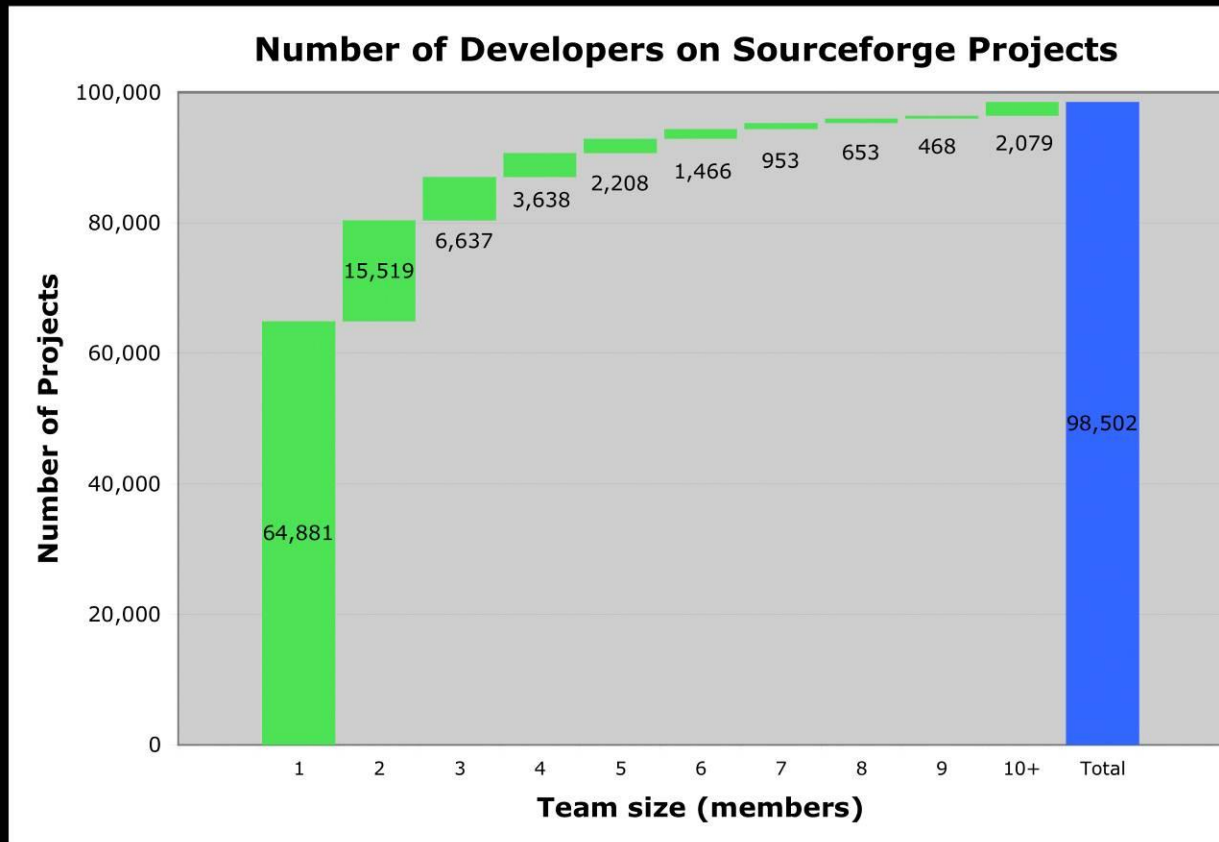
Project Topics
Sourceforge top 100 projects

Source: Sourceforge Weekly Download Stats, Week 1 2005.

With file sharing removed, the emphasis is tools that help technical tasks.

Developer numbers

67% never more than 1 developer, only 1.9% have had >10 developers
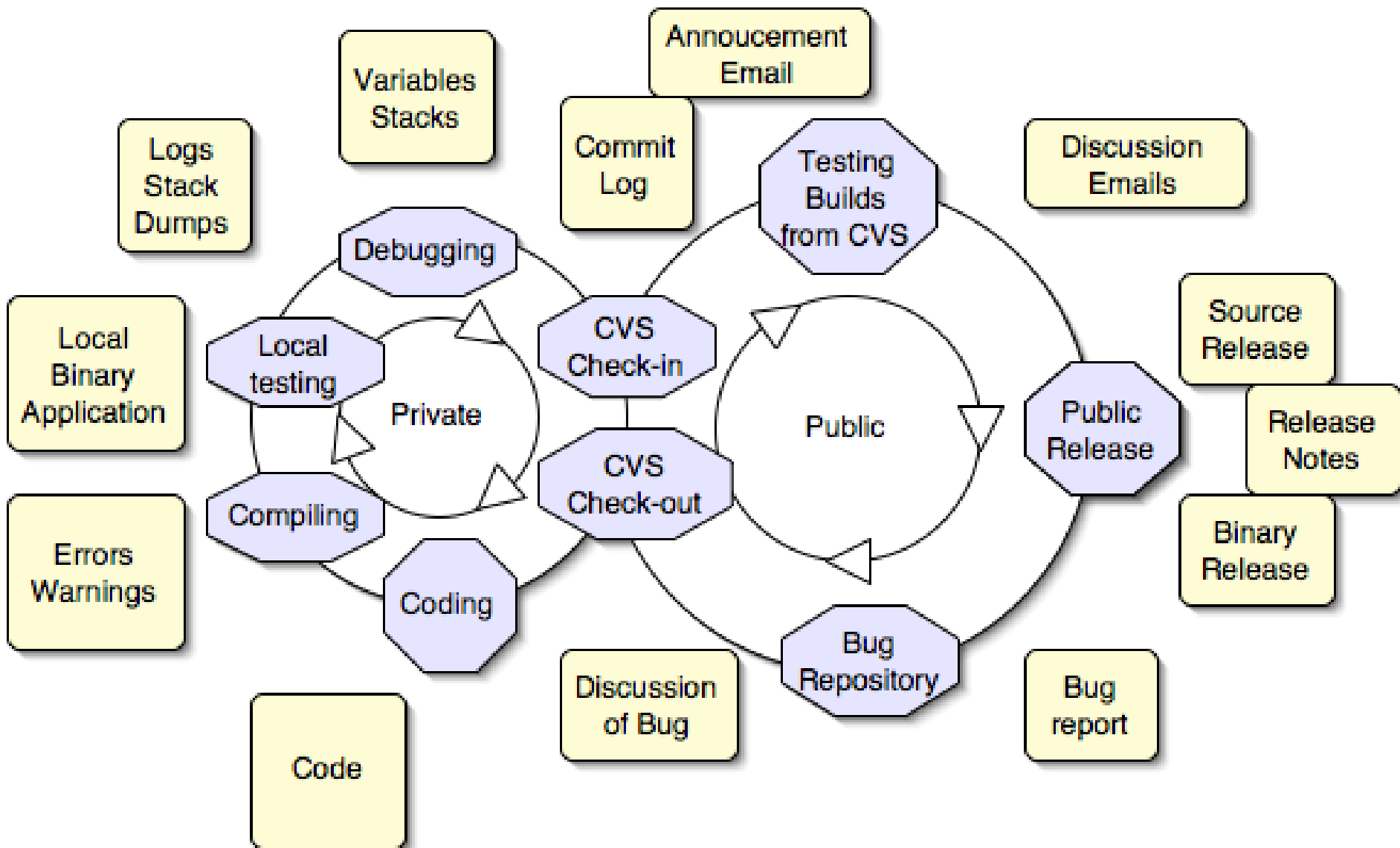
Processes (I)

- ✓ General Team Processes
  - ✓ Socialization
  - ✓ Governance (Group Decisions) and Leadership
  - ✓ Coordination
  - ✓ Team Maintenance
  - ✓ Knowledge Management

Process (II)

- ✓ Software Development Practices
  - ✓ Requirements
  - ✓ Planning and Design
  - ✓ Coding
  - ✓ Releases
  - ✓ Maintenance
    - ✓ Change cycle (bugs and features)
    - ✓ User support
  - ✓ Project Management

Public and Private Cycles in Development

Outputs

- ✓ Performance measures
    - ✓ System Quality (highest number)
    - ✓ Use (eg downloads)
    - ✓ User Satisfaction (few, using Freshmeat)
    - ✓ Impacts (Individual and Organizational)
        - ✓ Eg Learning or Revenue/Costs
    - ✓ Processes (eg bug-fixing speed)
    - ✓ Project member satisfaction
- ✓ Antecedents of performance
- ✓ Evolution
    - ✓ Of the software artifact
    - ✓ Of the team and its practices

Observations

- ✓ More work done than expected, more done since then!
- ✓ Less bias towards motivations than expected
- ✓ Substantial and cumulating body of work on software quality and other output measures
- ✓ Need to develop a shared taxonomy of organizational types
- ✓ Little longitudinal work, but it is very revealing, especially for taxonomy (Different paths to success and failure)

To Do

- ✓ Add recent literature
  - ✓ May do this during review, since one is always behind the curve
- ✓ Considering normalizing tags
  - ✓ So if study covers 5 topics in minimal depth, counts for less in an area than a paper in depth on single topic
- ✓ Considering tagging for contribution
  - ✓ Difficult to assess quality, will probably just do this in the text of the paper.
- ✓ Tags by year
  - ✓ Show the movement of research into different topics
- ✓ Finish text and finalize venue for submission
  - ✓ Considering MISQ Review and ACM Computing Surveys