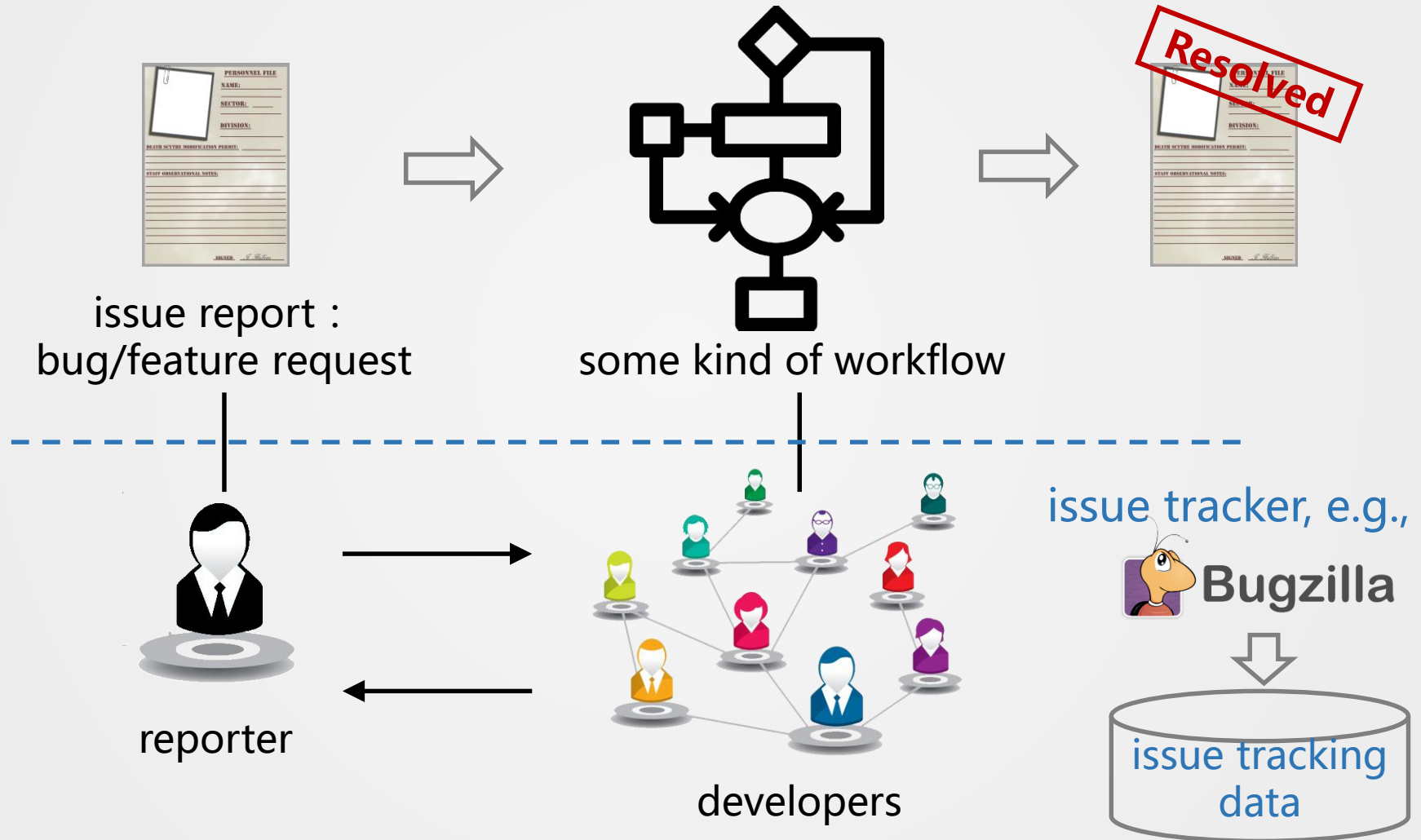# Issue Workflow Explorer

Jiaxin Zhu[1] , Zhen Zhong[2] and Minghui Zhou[2]

[1]Institute of Software, Chinese Academy of Sciences
[2]Peking University

Issue Workflow

issue report :
bug/feature request

some kind of workflow

reporter

developers

issue tracker, e.g.,
Bugzilla

issue tracking data
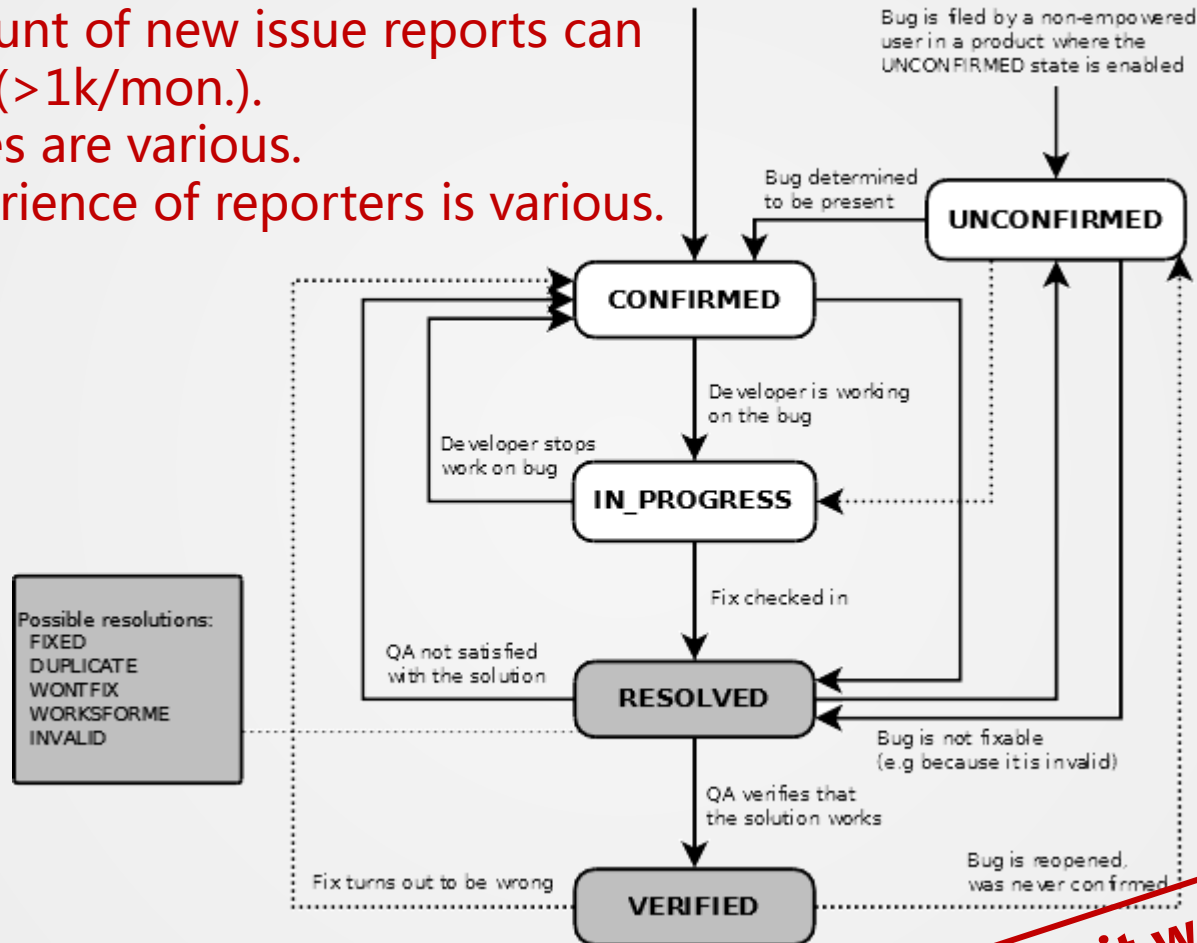
Bugzilla Issue Workflow

- The amount of new issue reports can be large (>1k/mon.).
- The issues are various.
- The experience of reporters is various.

Bug is filed by a non-empoowered user in a product where the UNCONFIRMED state is enabled

UNCONFIRMED

Bug determined to be present

CONFIRMED

Developer is working on the bug

Developer stops work on bug

IN_PROGRESS

Fix checked in

Possible resolutions:
  FIXED
  DUPLICATE
  WONTFIX
  WORKSFORME
  INVALID

QA not satisfied with the solution

RESOLVED

Bug is not fixable (e.g because it is invalid)

QA verifies that the solution works

Fix turns out to be wrong

Bug is reopened, was never confirmed

VERIFIED

One does not fit all.
The workflow is often customized.

Does it work well?

3

Issue Workflow Explorer (IWE)

Choose reports to observe.

Check the workflows.

Check the workload and throughput.

Check the efficiency.

4

Customizable Measures

Workload

  # of new reports per time unit

Throughput

  # of resolved reports per time unit

Efficiency

  Input-output ratio: proportion of reports with resolution R

  Latency: proportion of reports change to status S within time T

Empirical Evaluation

We evaluate IWE through conducting an empirical study using it.

Can IWE help users discover previous workflows in practice, evaluate their efficiency and get insights for improvement?

We study two project, GNOME and Mozilla (477K and 679K issues reports submitted in over 10 years).

RQ1: What manners are there for issue triage and what are their strength and weakness on issue resolution efficiency?

RQ2: What strategies are there for handling incomplete issue reports, and what are the advantages and disadvantages?
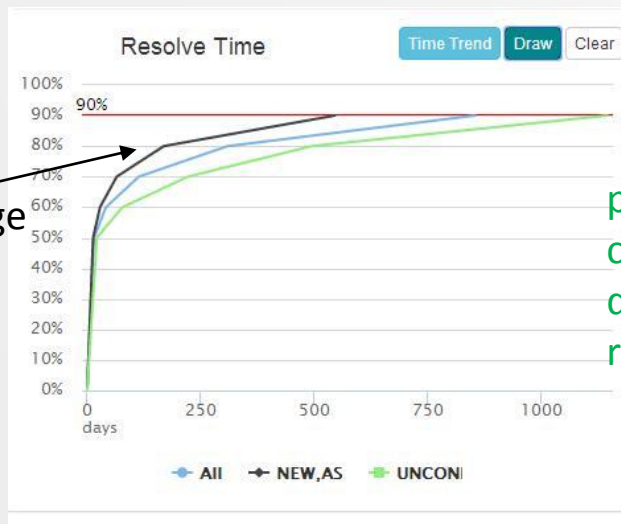
Issue Triage

Workflow discovery

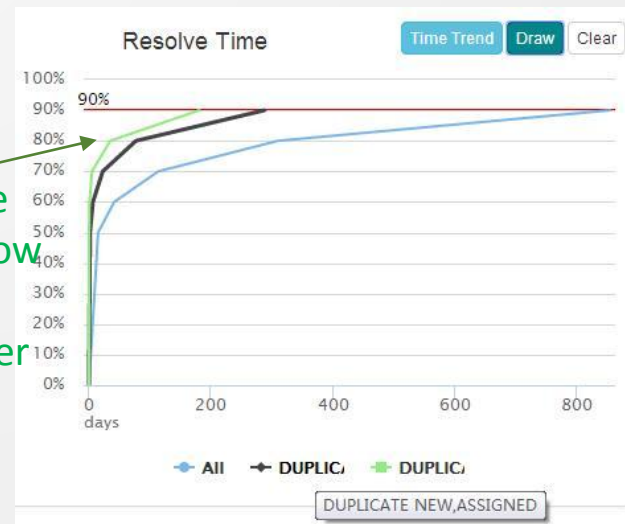public and private triage
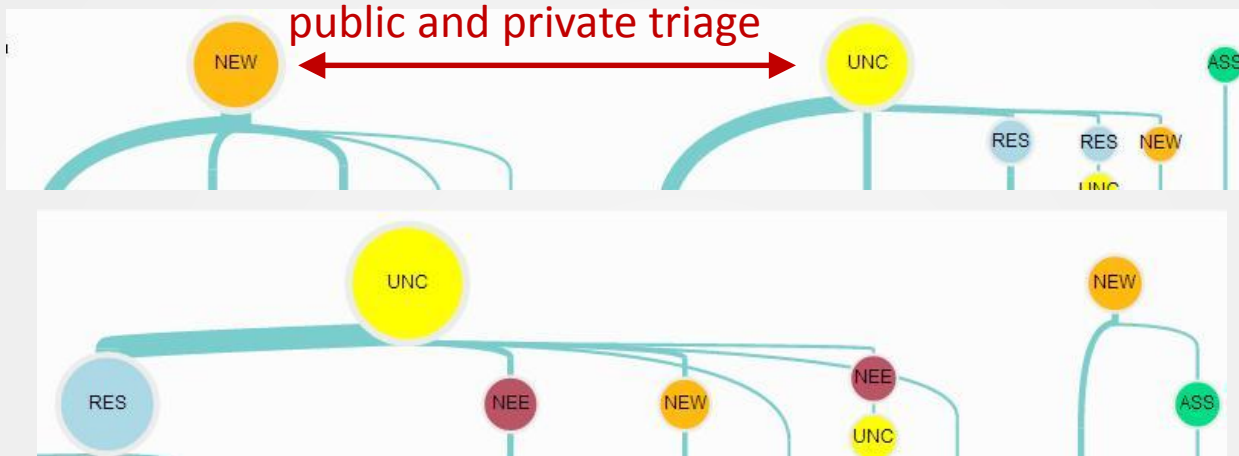
Mozilla

GNOME
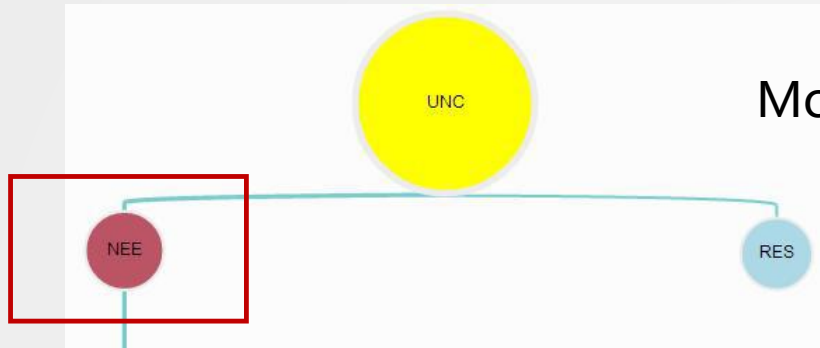
Workflow evaluation

private triage has lower latency

public triage can reveal low quality reports faster

Mozilla

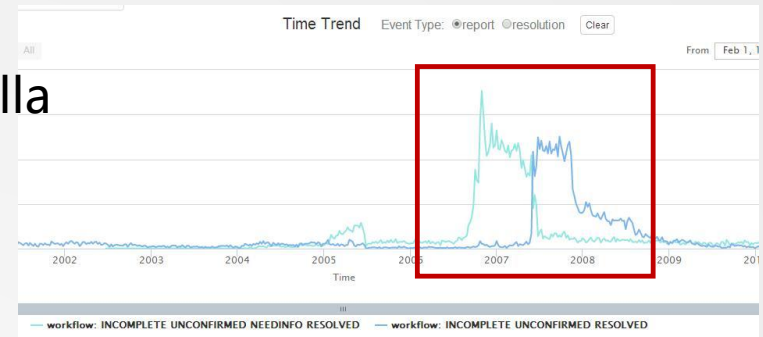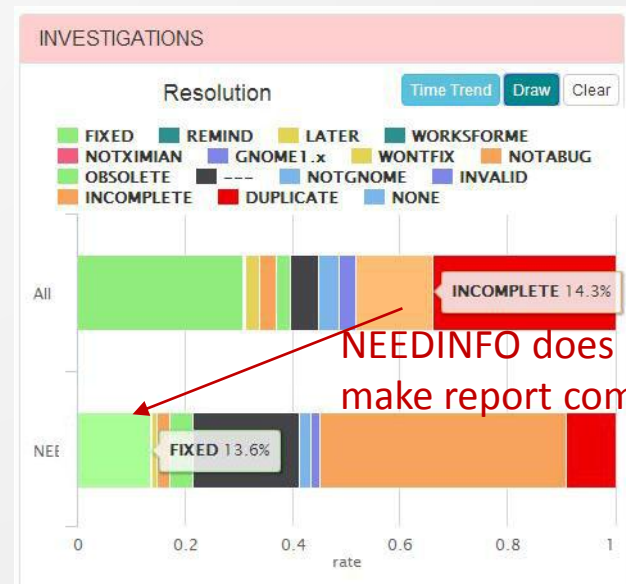# Handling of Incomplete Reports

Workflow discovery

Mozilla

Workflow evaluation

Skipping NEEDINFO has lower latency

NEEDINFO does not help to make report complete

Summary

We build IWE to support exploring issue workflow.

It has customizable and visualized measures.

Our empirical study shows that IWE makes it easy to discover and evaluate workflows.

Have a try:

https://github.com/johnarseal/IWE

Thank you !