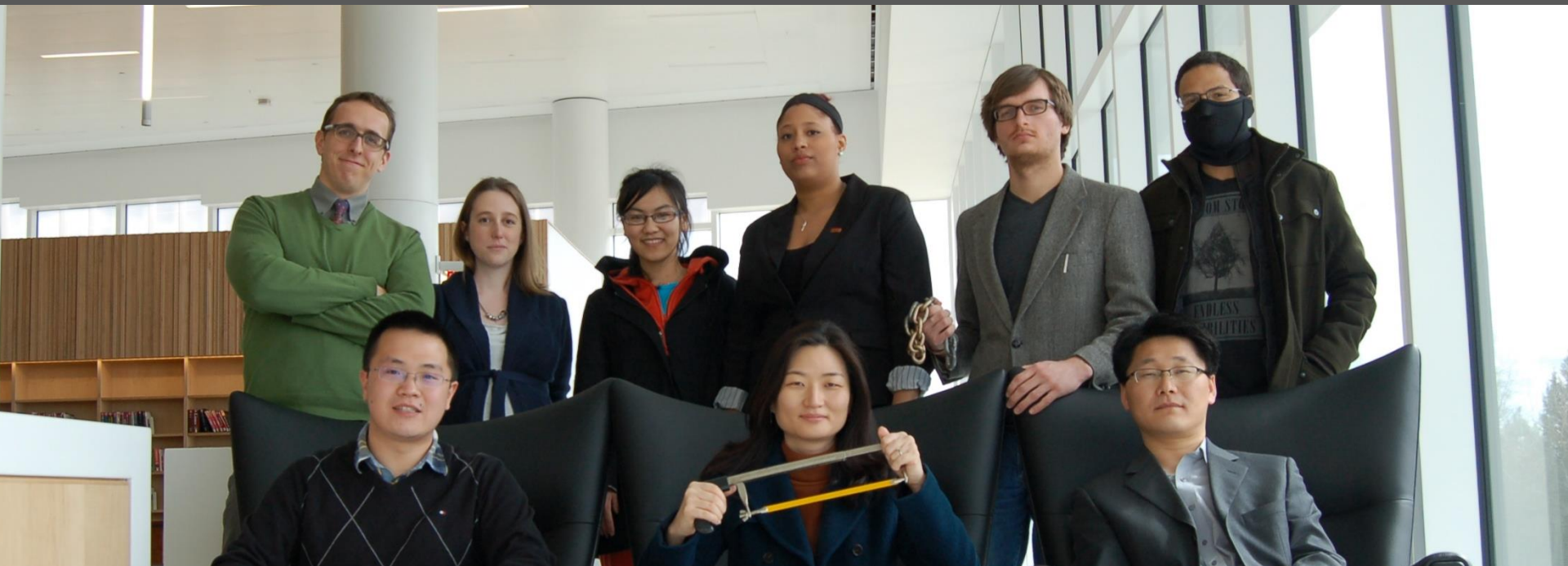
Emerson Murphy-Hill | North Carolina State University

# Helping Developers Find Useful Tools

Developer Liberation Front



# Helping Developers Find Useful Tools

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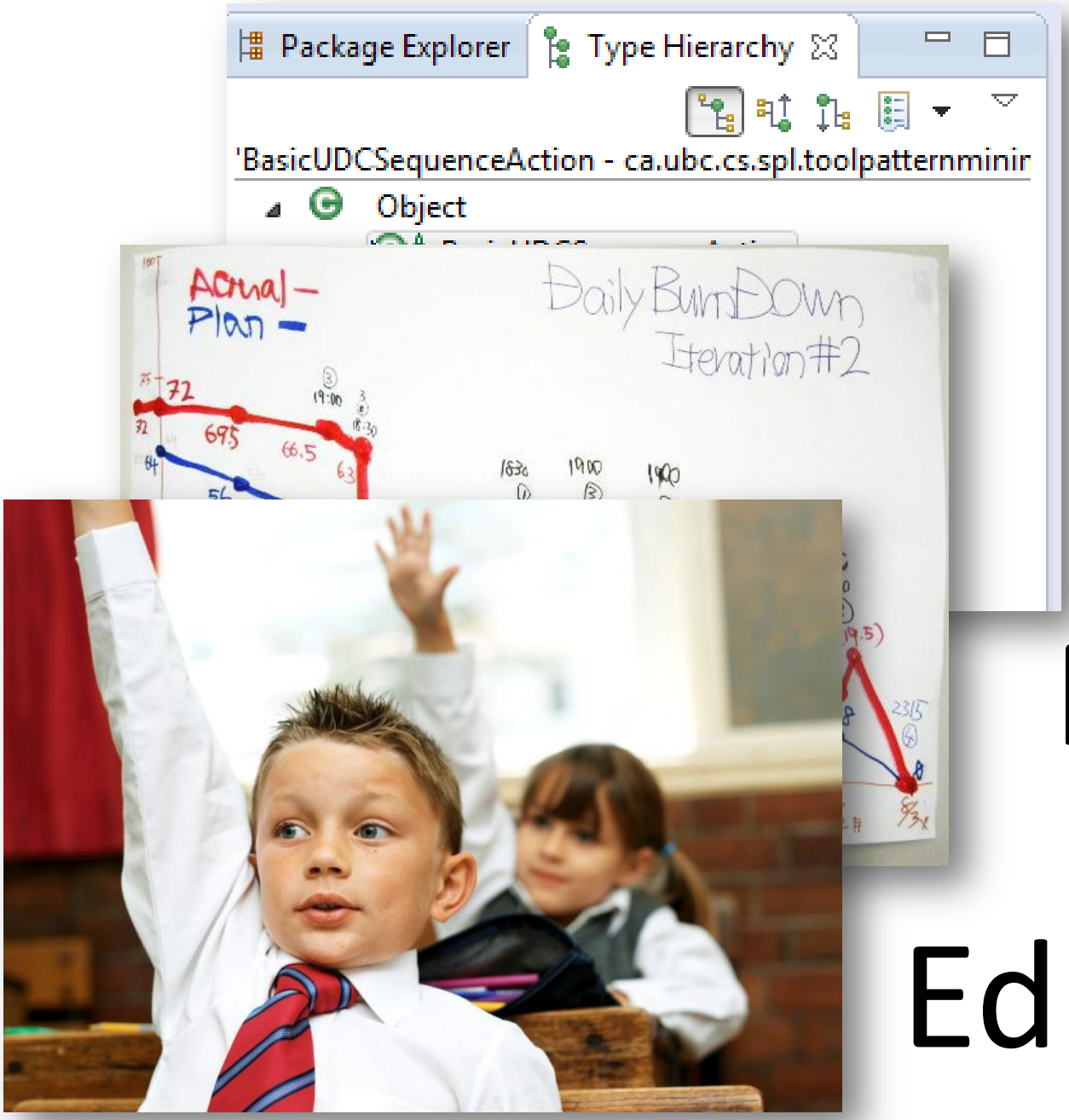



# Tools

# Process

# Education

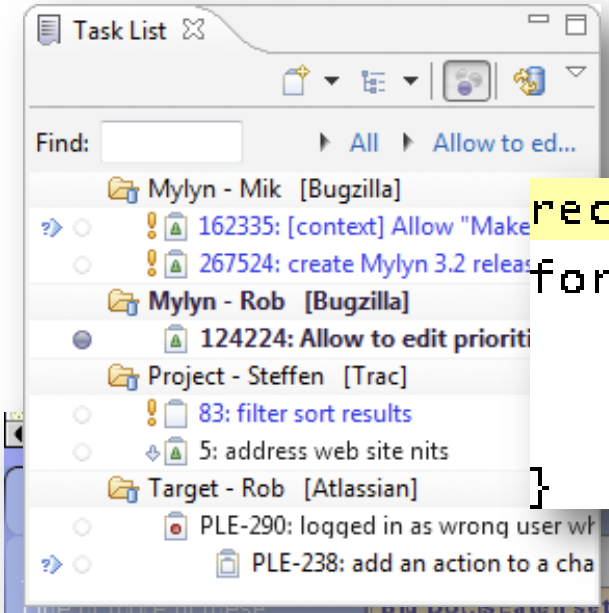
http://www.flickr.com/photos/kakutani/2761992149

# Tools

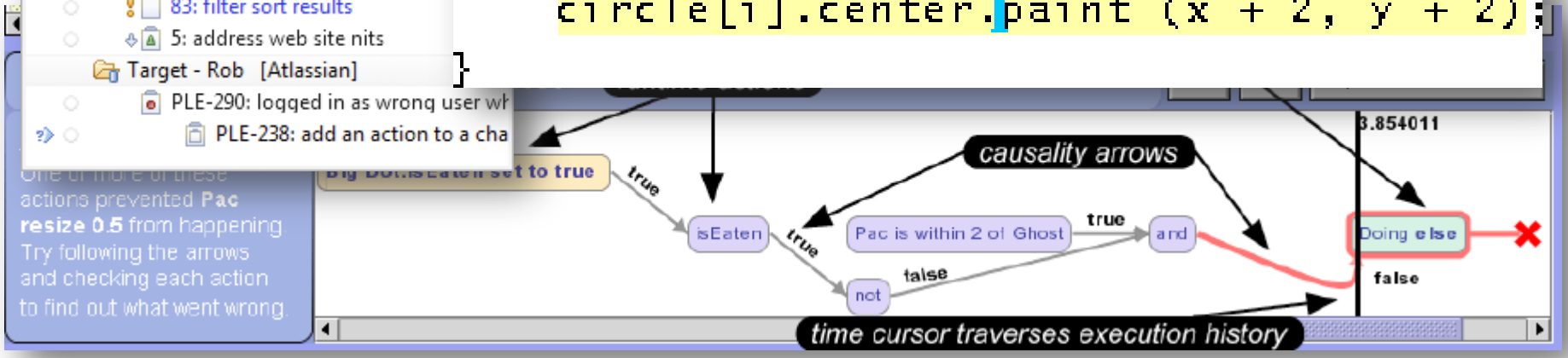
http://www.flickr.com/photos/kakutani/2761992149

# Helping Developers Find Useful Tools

# Useful Tools


```
rectangle.paint (0, 0);
for (int i = 0; i < circle.length; ++i) {
    circle[i].paint (x, y);
    circle[i].center.paint (x + 2, y + 2);
}
```





Checking system rules using system-specific, programmer-written compiler extensions. D Engler, B Chelf, A Chou, S Hallem. OSDI 2001.

Interactive simultaneous editing of multiple text regions. RC Miller, BA Myers. USENIX 2001.

Designing the Whyline: a debugging interface for asking questions about program behavior. AJ Ko, BA Myers. CHI 2004.

Mylar: a degree-of-interest model for IDEs. M Kersten, GC Murphy. ICSE 2004.

# One Kind of Tool: Refactoring Tools

```
class Gorilla{
  int paws(){
    return 4;
  }
}
```

INTRODUCE EXPLAINING VARIABLE →

```
class Gorilla{
  int paws(){
    int pawCount = 4;
    return pawCount;
  }
}
```

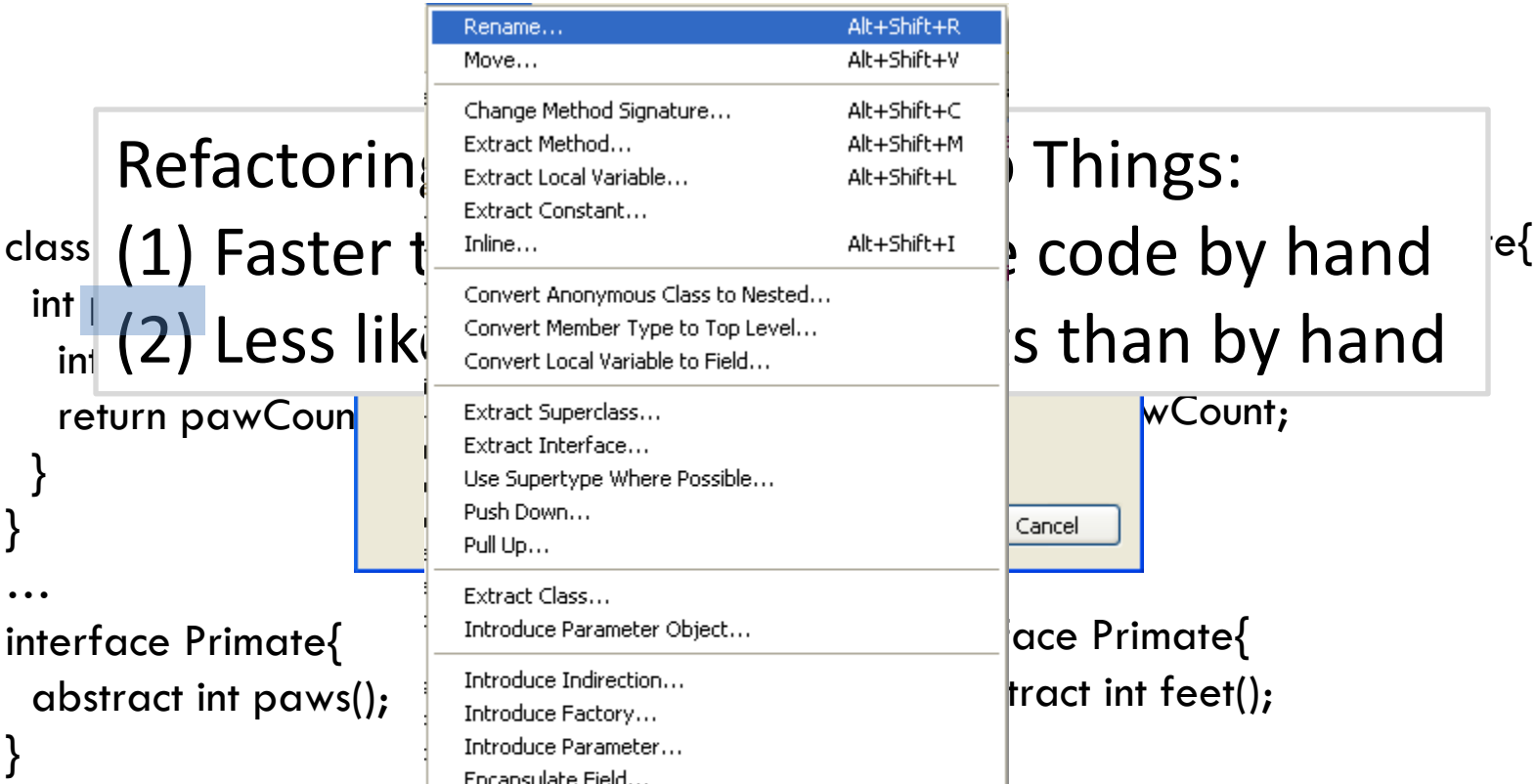
EXTRACT INTERFACE ↓

```
class Gorilla implements Primate{
  int paws(){
    int pawCount = 4;
    return pawCount;
  }
}
…
interface Primate{
  abstract int paws();
}
```

RENAME METHOD →

```
class Gorilla implements Primate{
  int feet(){
    int pawCount = 4;
    return pawCount;
  }
}
…
interface Primate{
  abstract int feet();
}
```

# One Kind of Tool: Refactoring Tools



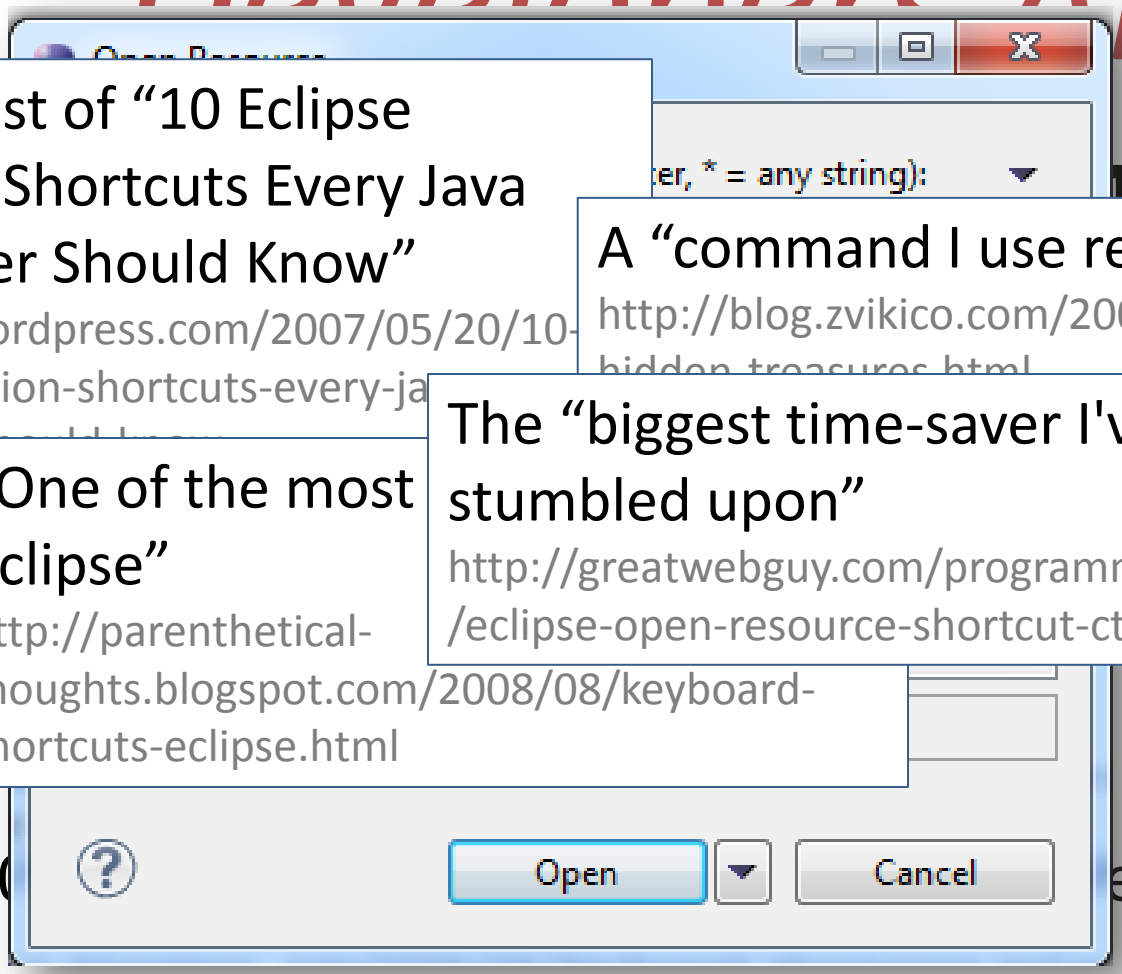
# Developers Aren't

#1 on the list of "10 Eclipse Navigation Shortcuts Every Java Programmer Should Know"
http://rayfd.wordpress.com/2007/05/20/10-eclipse-navigation-shortcuts-every-ja
programmer-should-know

A "command I use religiously"
http://blog.zvikico.com/2009/07/eclipse-35-hidden-treasures.html

The "biggest time-saver I've stumbled upon"
http://greatwebguy.com/programming/eclipse/eclipse-open-resource-shortcut-ctrlshiftr

"One of the most Eclipse"
http://parenthetical-thoughts.blogspot.com/2008/08/keyboard-shortcuts-eclipse.html




The ave
Eclipse t

9 out of 1 esource

How We Refactor, and How We Know It. Emerson Murphy-Hill, Chris Parnin, and Andrew P. Black. TSE, 2011.
Peer Interaction Effectively, yet Infrequently, Enables Programmers to Discover New Tools. Emerson Murphy-Hill and Gail Murphy. CSCW, 2011.

# *Developers Aren't Using* Useful Tools

*Why not?*

Power

Usability

Awareness

More bugs

More scalable verification

Reduce false positives

Better bug prediction model

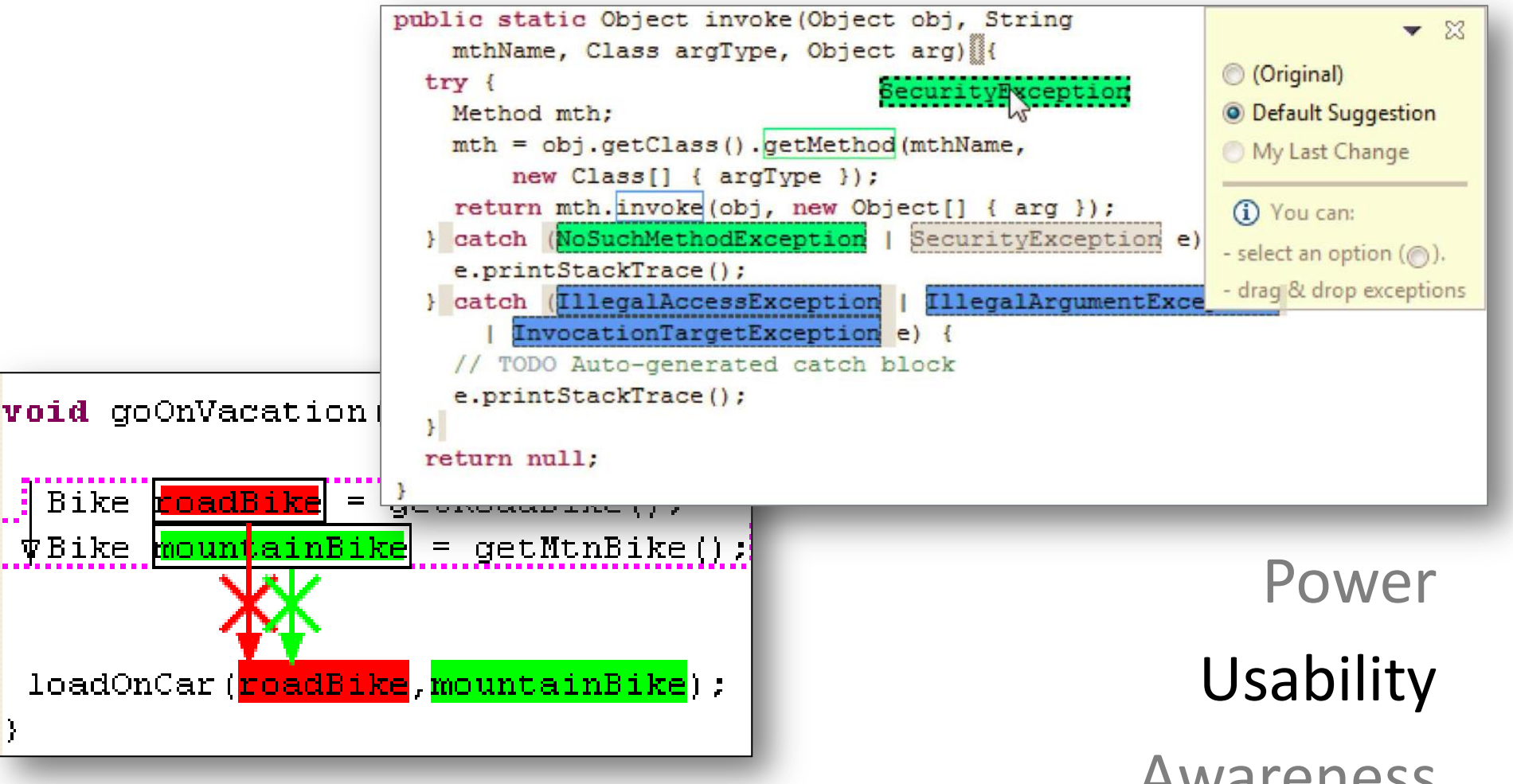
More expressive specifications


Power

Usability

Awareness

# Can developers use the tool in a manner that's quick, error-free, enjoyable, and easy to learn?




Power

Usability

Awareness

Programmer-Friendly Refactoring Errors. Emerson Murphy-Hill and Andrew P. Black. Transactions on Software Engineering, 2011.
Rethinking Quick Fixes: A Follow-through Principle for Tool Design. Yoonki Song, Titus Barik, Brittany Johnson and Emerson Murphy-Hill. In submission to FSE14.

# Helping Developers Find Useful Tools

# Discovering a tool that might be useful:

- You know you need it
  - The compiler
  - An editor
  - Basic search
- You don't know you need it
  - Refactoring tools
  - Navigation tools
  - Static analysis

Basic Tools → Search or Explore

Innovative Tools → ???

Power

Usability

Awareness

# Helping Developers

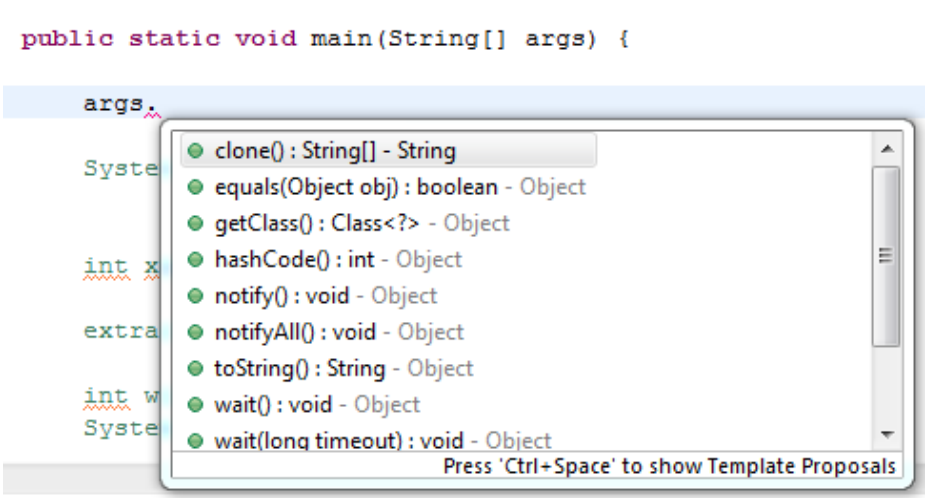
## Find Useful Tools

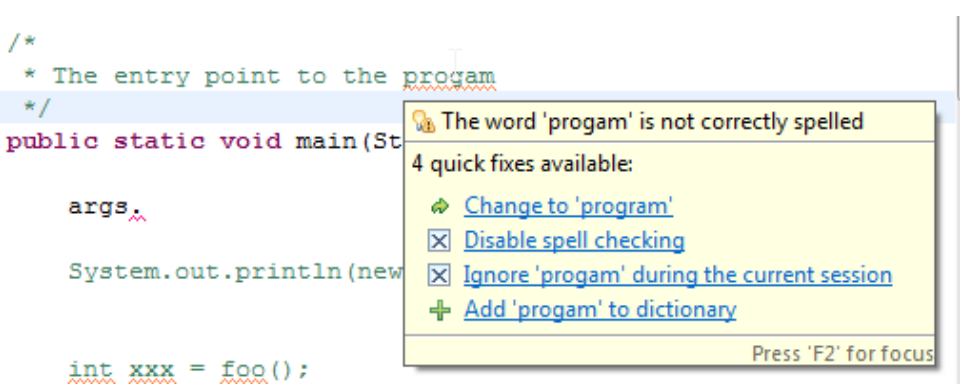
Innovative Tools → ???

Don’t Require Awareness Before Use

Tool Recommendation

Connect Developers Together




# What tools could you redesign this way?

– Refactoring: BeneFactor

# Don't Require Awareness Before Use

## Tool Recommendation

## Connect Developers Together

Improving program navigation with an active help system. Petcharat Viriyakattiyaporn and Gail C. Murphy. CASCON, 2010.

Improving Software Engineers' Fluency by Recommending Dev. Environment Commands. E Murphy-Hill, R Jiresal, and G Murphy, FSE, 2012.

```
CachePeer[] peers = new CLCacheDiscovery().lookup( torrent );
System.out.println( "peers=" + peers.length );
System.out.println();
printPeers(peers);
```

```
private static void printPeers(CachePeer[] peers) {
 for (int i=0;i<peers.length;i++){
  System.out.println("cache:" +
  peers[i].getAddress() + ":" + peers[i].getPort());}}
```

What tools could you redesign this way?

- Refactoring: BeneFactor
- Lesson: Identify first part of tool-less activity, offer tool support

Don’t Require Awareness Before Use

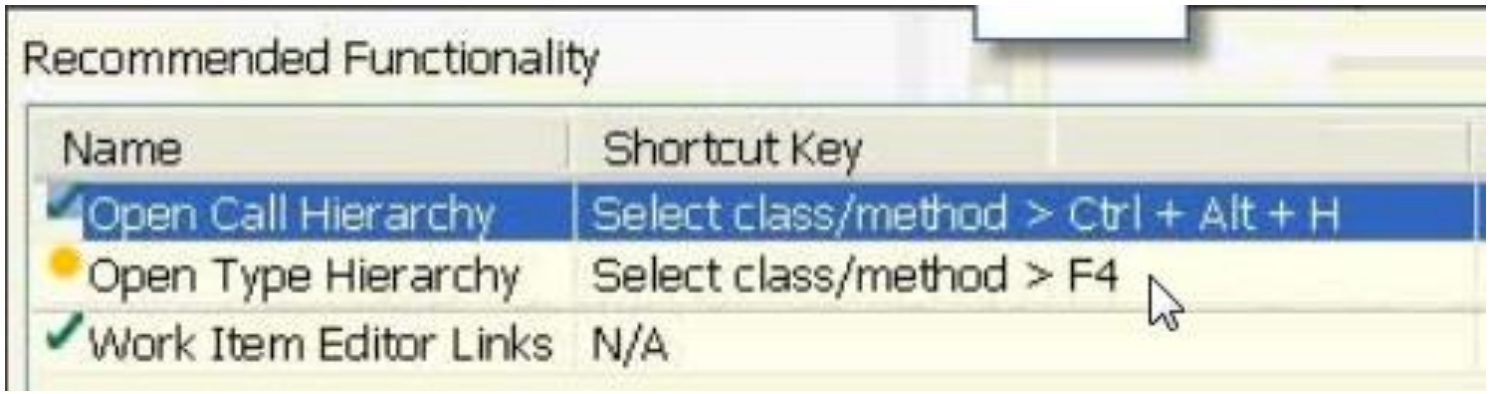
Tool Recommendation

Connect Developers Together

# Recommend tools that developers aren't using

## Examples

- Spyglass
- Collaborative Filtering




Don't Require Awareness Before Use

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relevance | real problem | self discovery | context association


Don’t Require Awareness Before Use

Tool Recommendation

# Connect Developers Together

www.flickr.com/photos/a2gemma/552208117

Peer Interaction Effectively, yet Infrequently, Enables Programmers to Discover New Tools. Emerson Murphy-Hill and Gail Murphy. CSCW, 2011.

# Pair Programming

Personal, contextual, efficient

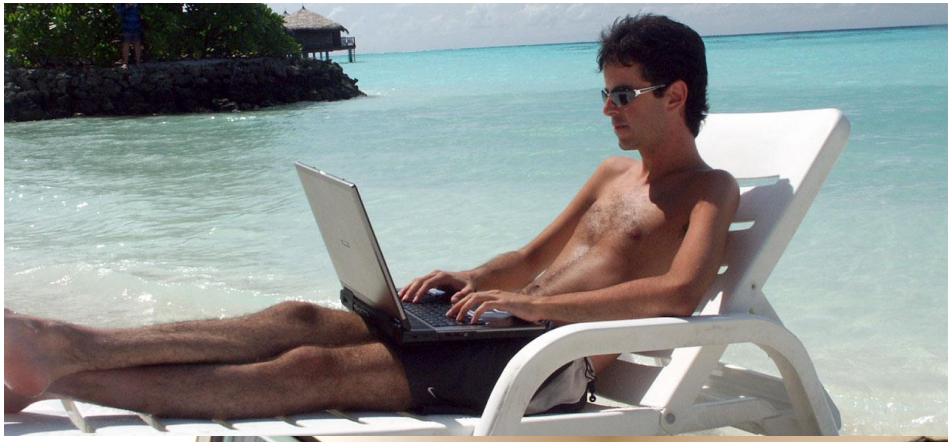
Doesn't work in remote work situations

Connect Developers Together

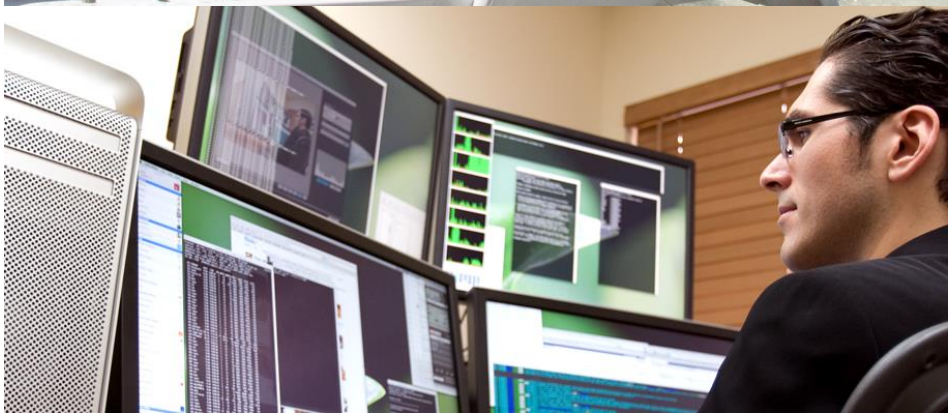
http://www.flickr.com/photos/menlopics/3928252631

# Remote Pair Programming

Works remotely



Doesn't work when people working asynchronously



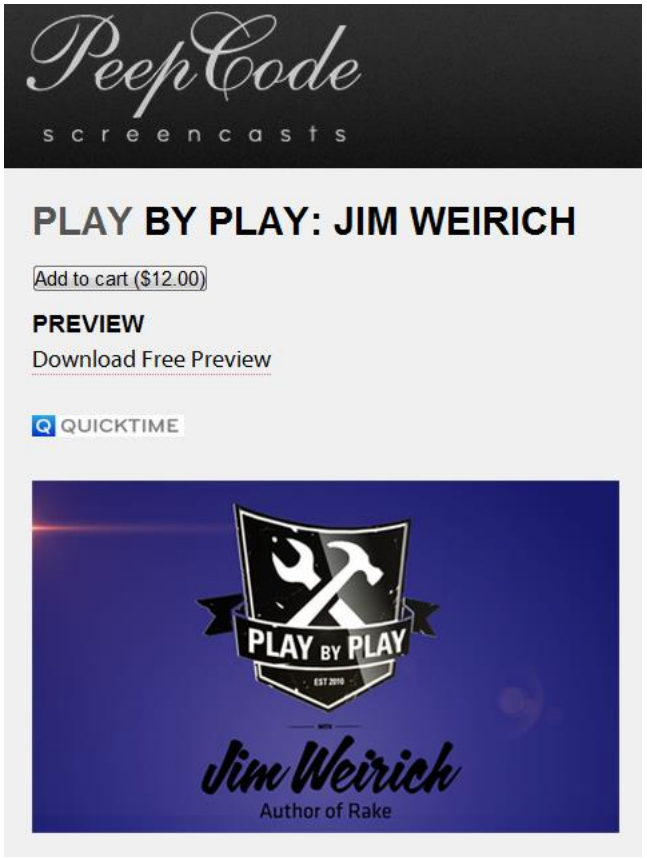
## Connect Developers Together

http://www.flickr.com/photos/novecentino/2339687721/
http://www.flickr.com/photos/totalaldo/2400635097

# Screencasts

Allows people to learn remotely and asynchronously

Not personal: your peers aren't making them



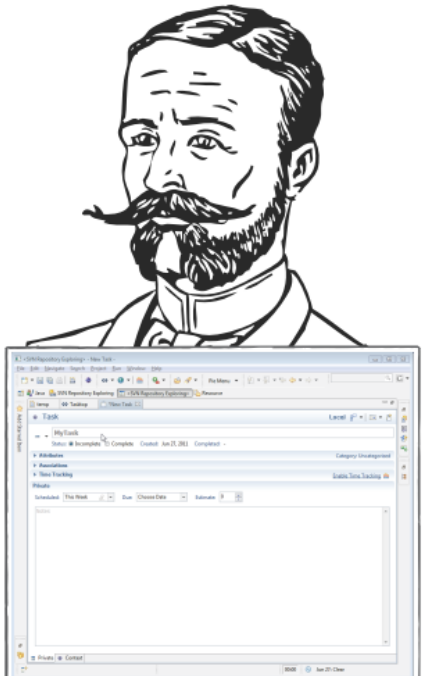

# Connect Developers Together

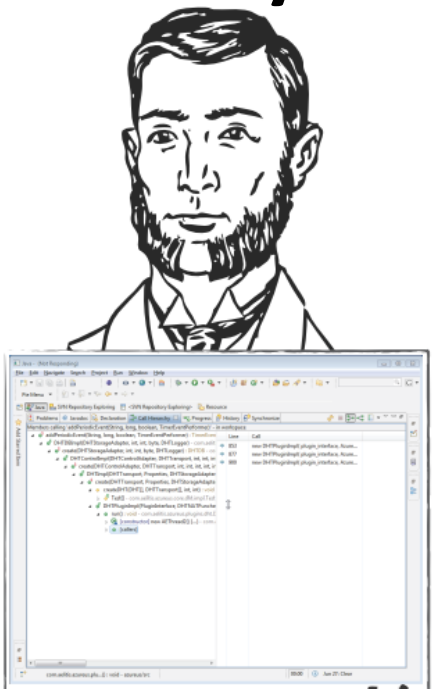
https://peepcode.com/products/play-by-play-jimweirich-ruby

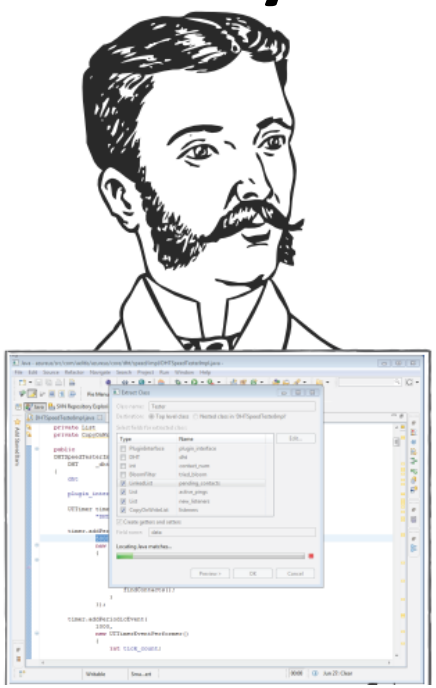
How can developers discover tools from **peers** when they work **remotely** and **asynchronously**?

Connect Developers Together

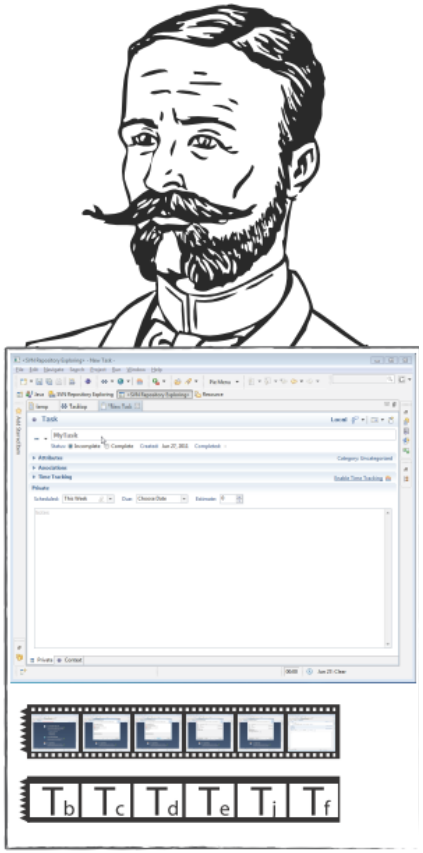
# How can developers discover tools from **peers** when they work **remotely** and **asynchronously**?

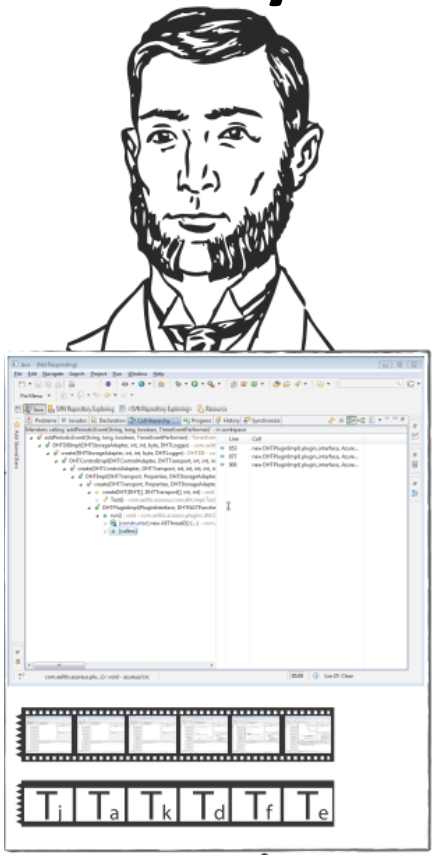


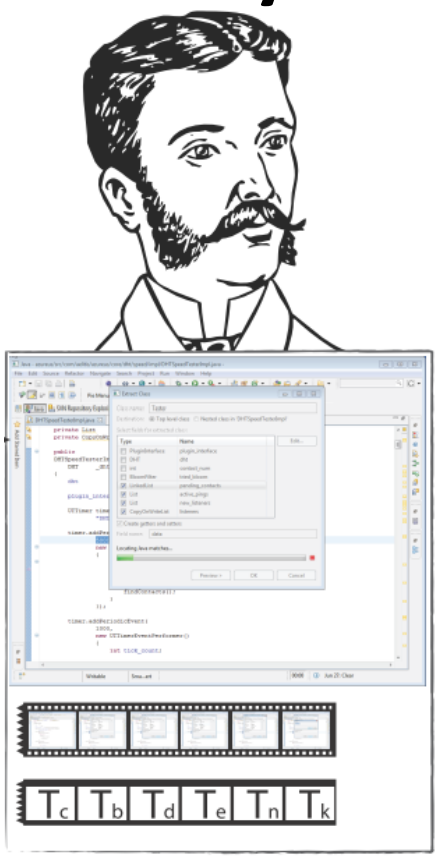




# How can developers discover tools from peers when they work **remotely** and **asynchronously**?




Server

| | | | | | | |
|---|---|---|---|---|---|---|
| *cm1* | Tb | Tc | Td | Te | Tj | Tf |
| *cm2* | Tj | Ta | Tk | Td | Tf | Te |
| *cm3* | Tc | Tb | Td | Te | Tn | Tk |

Continuous Social Screencasting to Facilitate Software Tool Discovery. Emerson Murphy-Hill. ICSE NIER, 2012.

Conclusion

# Helping Developers Find Useful Tools

All our toolsmithing is for naught if no one uses our tools.

We can encourage more tool use by:

- Designing our tools so that awareness is not a prerequisite
- Building environments that recommend useful tools
- Enable developers to learn from one another