

# Software Languages for the Construction of Mobile Applications

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# VUB Comp. Science Dept.

- 10 Professors
- 80 Researchers
- 5 Labs
  - Artificial Intelligence & Computational Modeling
  - Theoretical Computer Science
  - Web & Information Systems
  - Semantics Technologies and Applications Research
  - Software Languages Lab



# Software Languages Lab



Wolfgang  
De Meuter



Theo  
D'Hondt

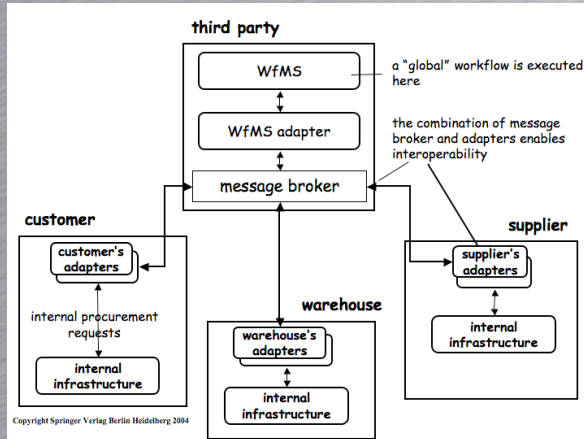


Viviane  
Jonckers

- Ambient & Context Oriented Programming
- Parallel & Quantum Computing
- Model-driven & Domain-specific Technologies
- Runtime Architectures & Middleware
- Crosscutting Phenomena & Sustainable Code



# Software Languages



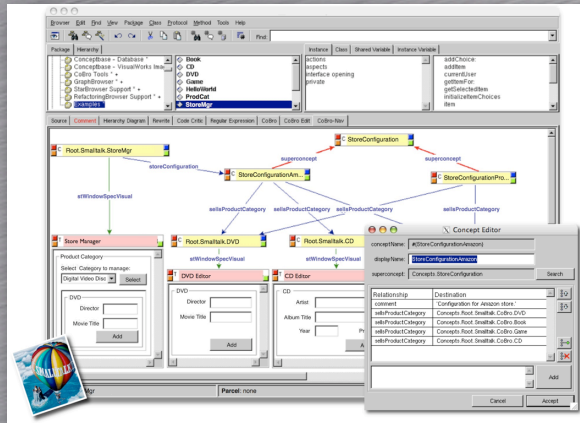
middleware



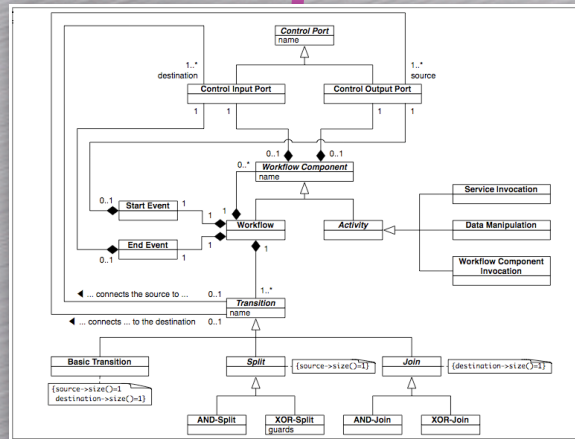
```

{ `load("MetaAbstractions.pco");
  withDct(exp(dct))::
    exp(META.FUN_DCT(exp));
  inDct(exp(),dct)::{
    META.FUN_DCT_(exp,dct);
    exp() };
  dct2tab(dct)::{
    inner(d,i)::
      if(is_void(d),
        result[i]:void,
        {t:inner(META.DCT_DCT(d),i+1);t[i]:=META.DCT_NAM(d);t});
    inner(dct,1));
  * SAMPLE CODE *
  currentDct:dct2tab(withDct(dct));
  display("Evaluation loaded",eoln)
}
    
```

programming languages



software quality languages



design languages



pattern languages



# Languages Matter

$$n! = \begin{cases} 1 & \text{if } n=0 \\ n \cdot (n-1)! & \text{if } n>0 \end{cases}$$

```
using System;

public class Program
{
    static long Factorial(long number)
    {
        if( number <= 1 )
            return 1;
        else
            return number * Factorial(number - 1);
    }

    static int Main(string[] args)
    {
        Console.WriteLine(Factorial(5));
        return 0;
    }
}
```

```
def fact(n) {
    n == 1 ? 1 : n * fact(n - 1)
}
fact(5)
```

readability

maintainability

stability

reliability



# Widely Recognized



Essential Complexity  
≠ Accidental Complexity

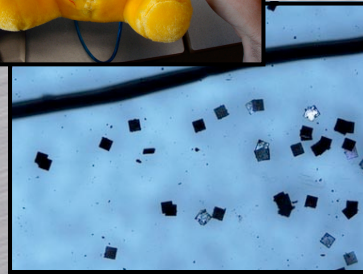
Frederick Brooks  
1986

“What does a high-level language accomplish? It frees a program from much of its accidental complexity. .... it eliminates a whole level of complexity that was never inherent in the program at all.”



# Computing Power Everywhere

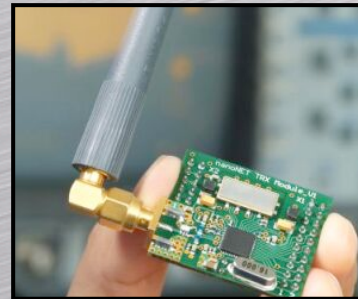
Miniaturisation



Wireless Connectivity



Internet of Things

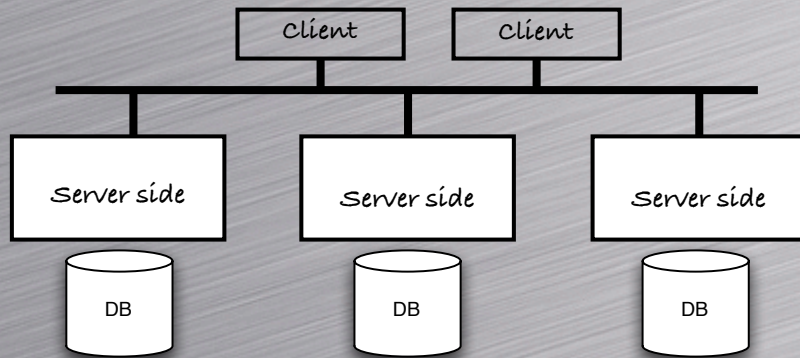


Spatio-Temporal Semantics

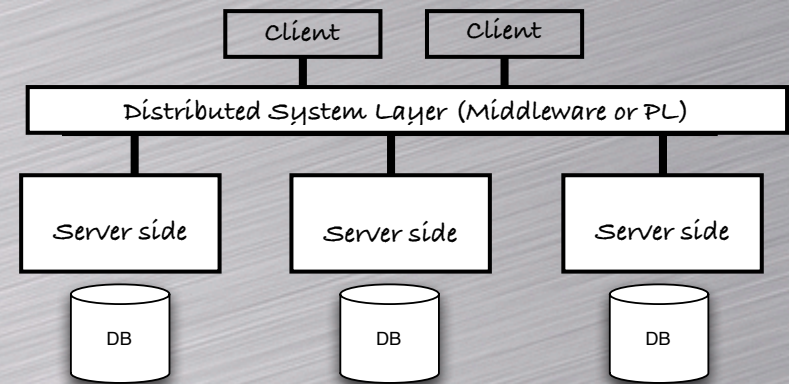




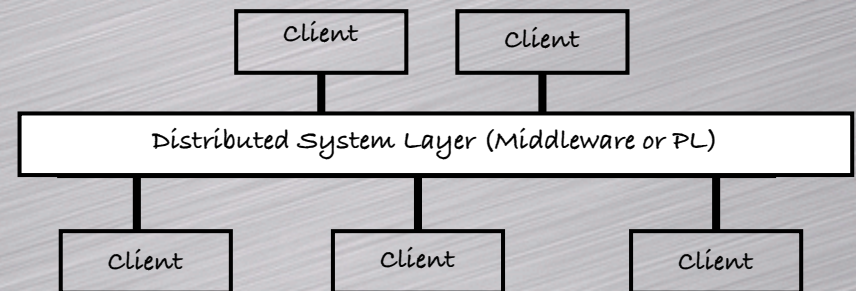
# Evolution in Classical Distributed/Web Systems



Mainframe Applications



Enterprise Application  
Intregation



Collaborative Applications

Price:

replication of data and code

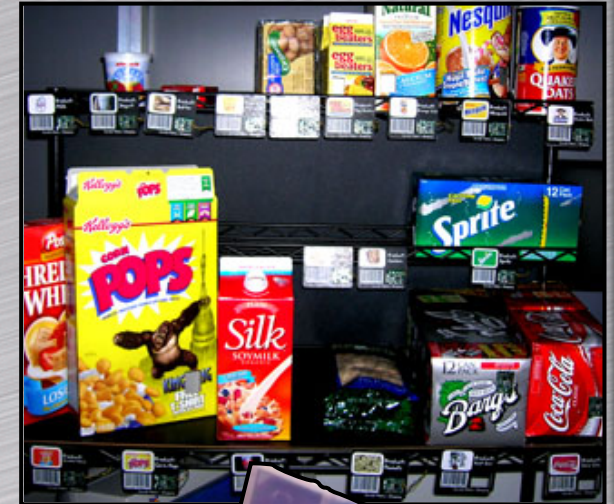
Hence:

complexity of keeping it

consistent



# Effect on software Languages



Current Software Technology is:

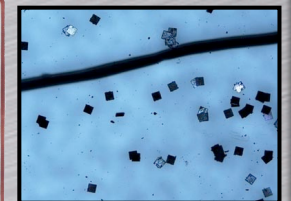
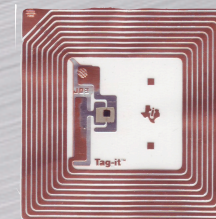
- Client/Server-driven (http, ajax, ...).

Poor support for:

- concurrency
- replication & consistency
- volatile connections

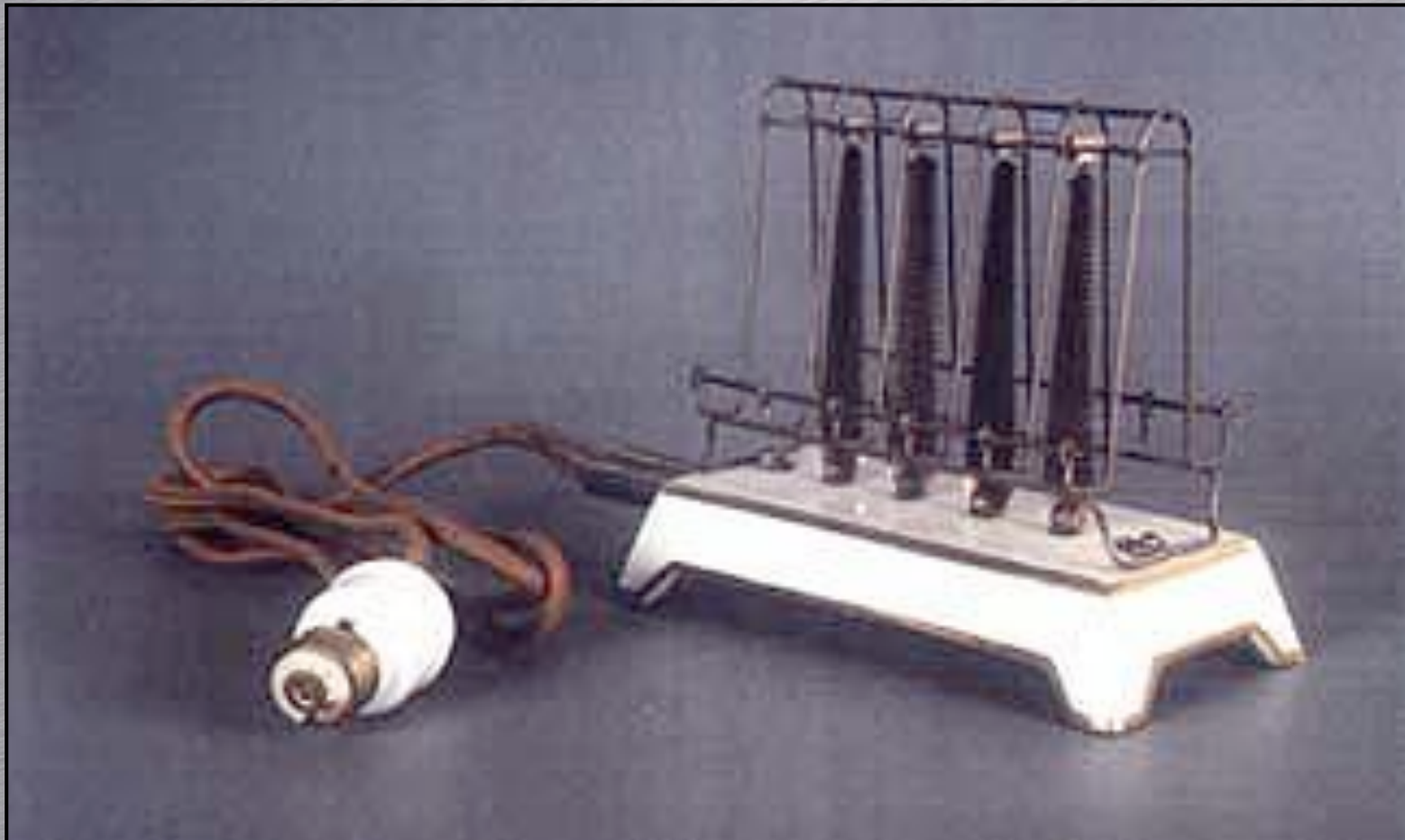


- Very heavyweight (http, xml, jvm, ...)





# Designing Mobile Applications with this Technology





# Our Research

Ambient-Oriented Software Development



AMBIENTTALK



2005



Qtek 9090

2007



HTC Touch  
Cruise

2009



iPhone



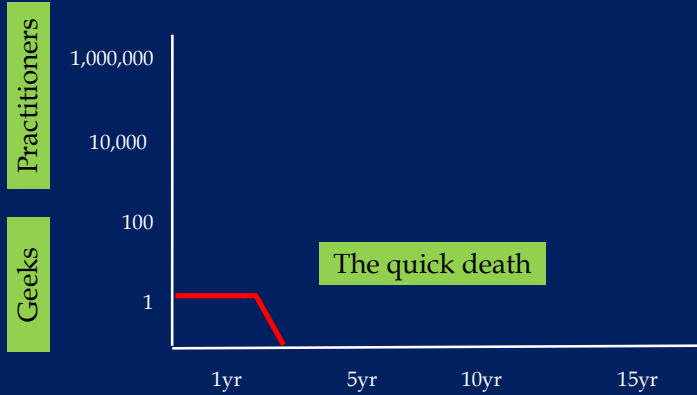
HTC Hero

[code.google.com/p/ambienttalk/](http://code.google.com/p/ambienttalk/)

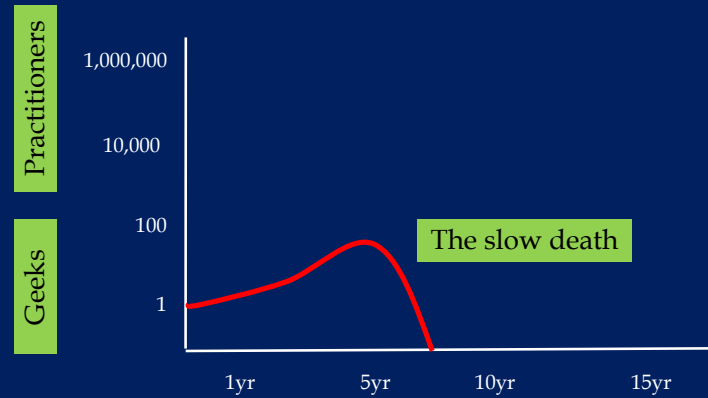


# Evolution of Languages

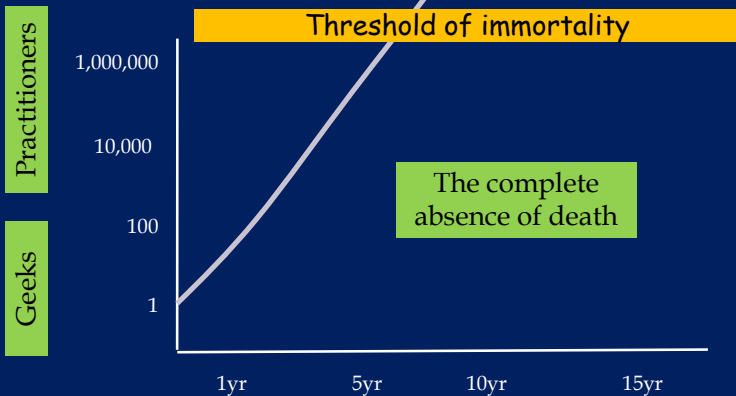
## Most new programming languages



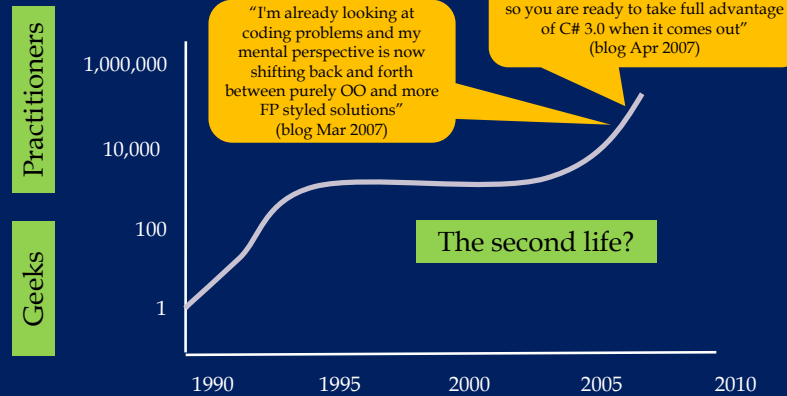
## Successful research languages



## C++, Java, Perl, Ruby



## Haskell

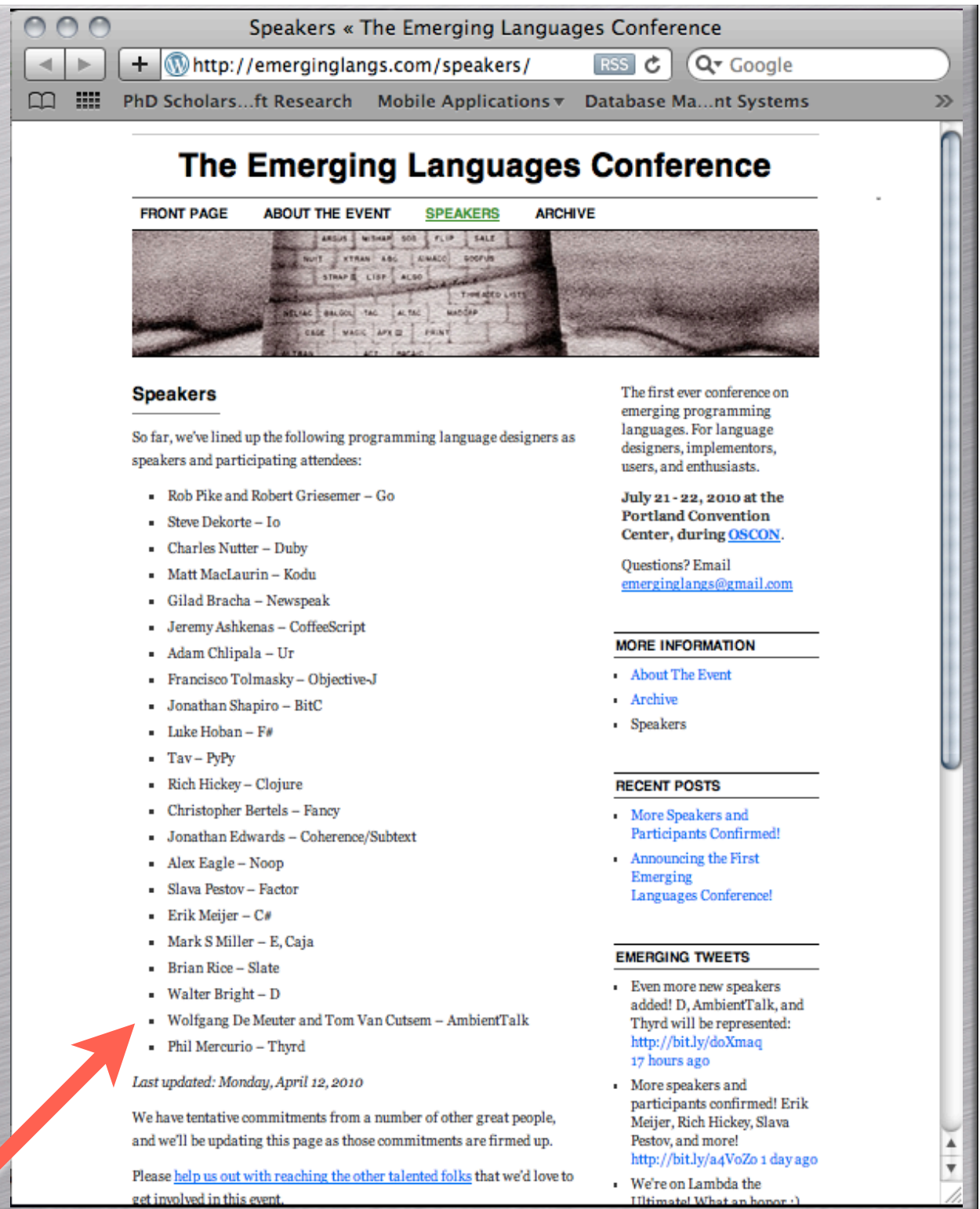




# The Second Life?



Tom Van Cutsem  
Google™



The screenshot shows a web browser window with the address bar containing <http://emerginglangs.com/speakers/>. The page title is "The Emerging Languages Conference". The navigation menu includes "FRONT PAGE", "ABOUT THE EVENT", "SPEAKERS" (highlighted), and "ARCHIVE". Below the navigation is a header image showing a close-up of a computer keyboard. The main content area is titled "Speakers" and contains the following text: "So far, we've lined up the following programming language designers as speakers and participating attendees:". Below this is a list of speakers and attendees, including Rob Pike and Robert Griesemer (Go), Steve Dekorte (Io), Charles Nutter (Duby), Matt MacLaurin (Kodu), Gilad Bracha (Newspeak), Jeremy Ashkenas (CoffeeScript), Adam Chlipala (Ur), Francisco Tolmasky (Objective-J), Jonathan Shapiro (BitC), Luke Hoban (F#), Tav (PyPy), Rich Hickey (Clojure), Christopher Bertels (Fancy), Jonathan Edwards (Coherence/Subtext), Alex Eagle (Noop), Slava Pestov (Factor), Erik Meijer (C#), Mark S Miller (E, Caja), Brian Rice (Slate), Walter Bright (D), Wolfgang De Meuter and Tom Van Cutsem (AmbientTalk), and Phil Mercurio (Thyrd). A red arrow points from the bottom left towards the "AmbientTalk" entry in the list. Below the list is the text "Last updated: Monday, April 12, 2010". At the bottom, there is a paragraph: "We have tentative commitments from a number of other great people, and we'll be updating this page as those commitments are firm up. Please [help us out with reaching the other talented folks](#) that we'd love to get involved in this event." On the right side of the page, there is a section titled "The first ever conference on emerging programming languages. For language designers, implementors, users, and enthusiasts." followed by the date "July 21 - 22, 2010 at the Portland Convention Center, during [OSCON](#)." and a contact email "Questions? Email [emerginglangs@gmail.com](mailto:emerginglangs@gmail.com)". Below this are sections for "MORE INFORMATION" (with links for "About The Event", "Archive", and "Speakers") and "RECENT POSTS" (with links for "More Speakers and Participants Confirmed!", "Announcing the First Emerging Languages Conference!", and "EMERGING TWEETS" which includes tweets about new speakers and confirmed participants).



# Life after death?

Apply research ideas to more conventional technology

