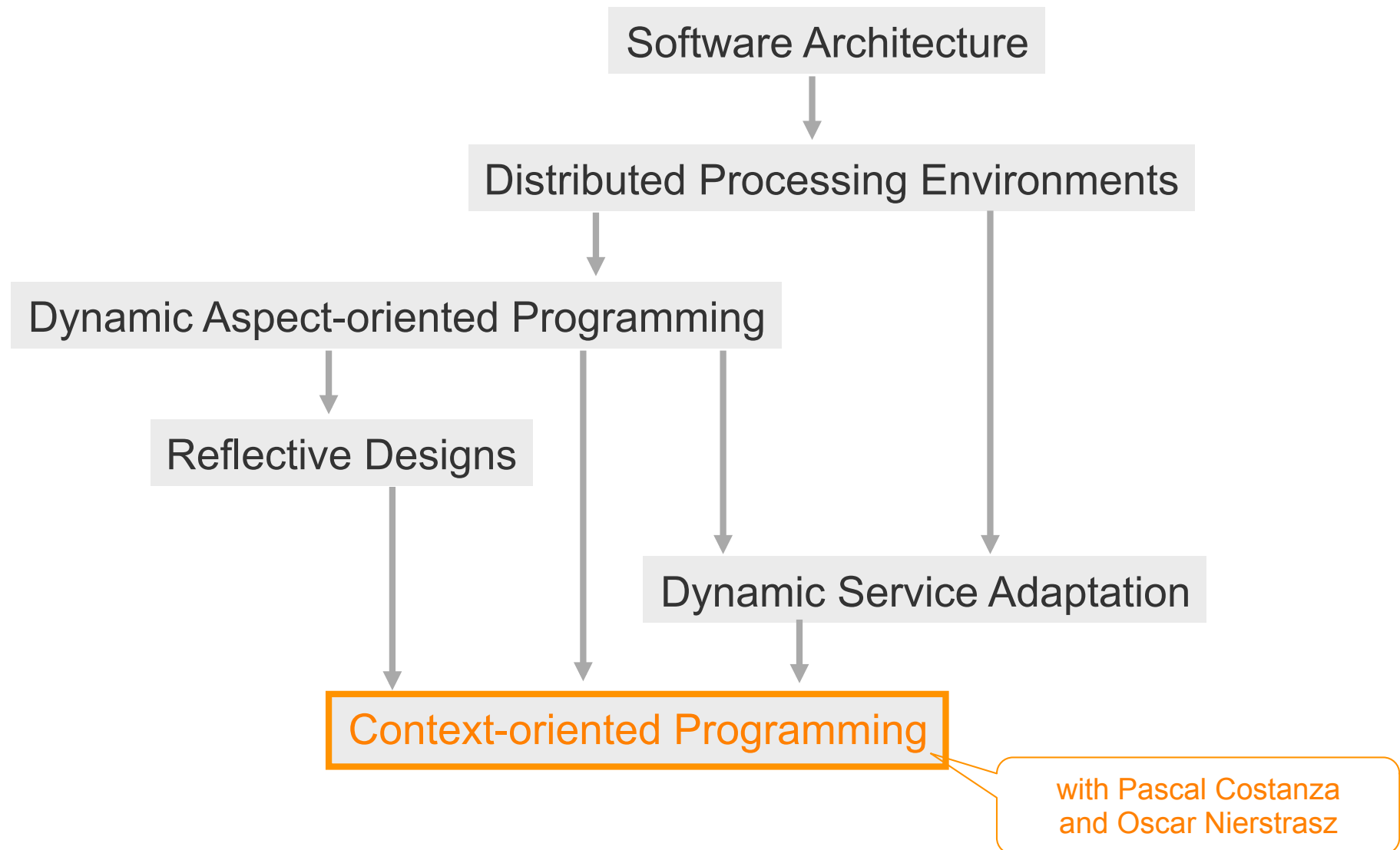


Recent Developments in Context-oriented Programming (at HPI)

Robert Hirschfeld
Hasso Plattner Institute
University of Potsdam
Germany
<http://www.hpi.de/swa/>

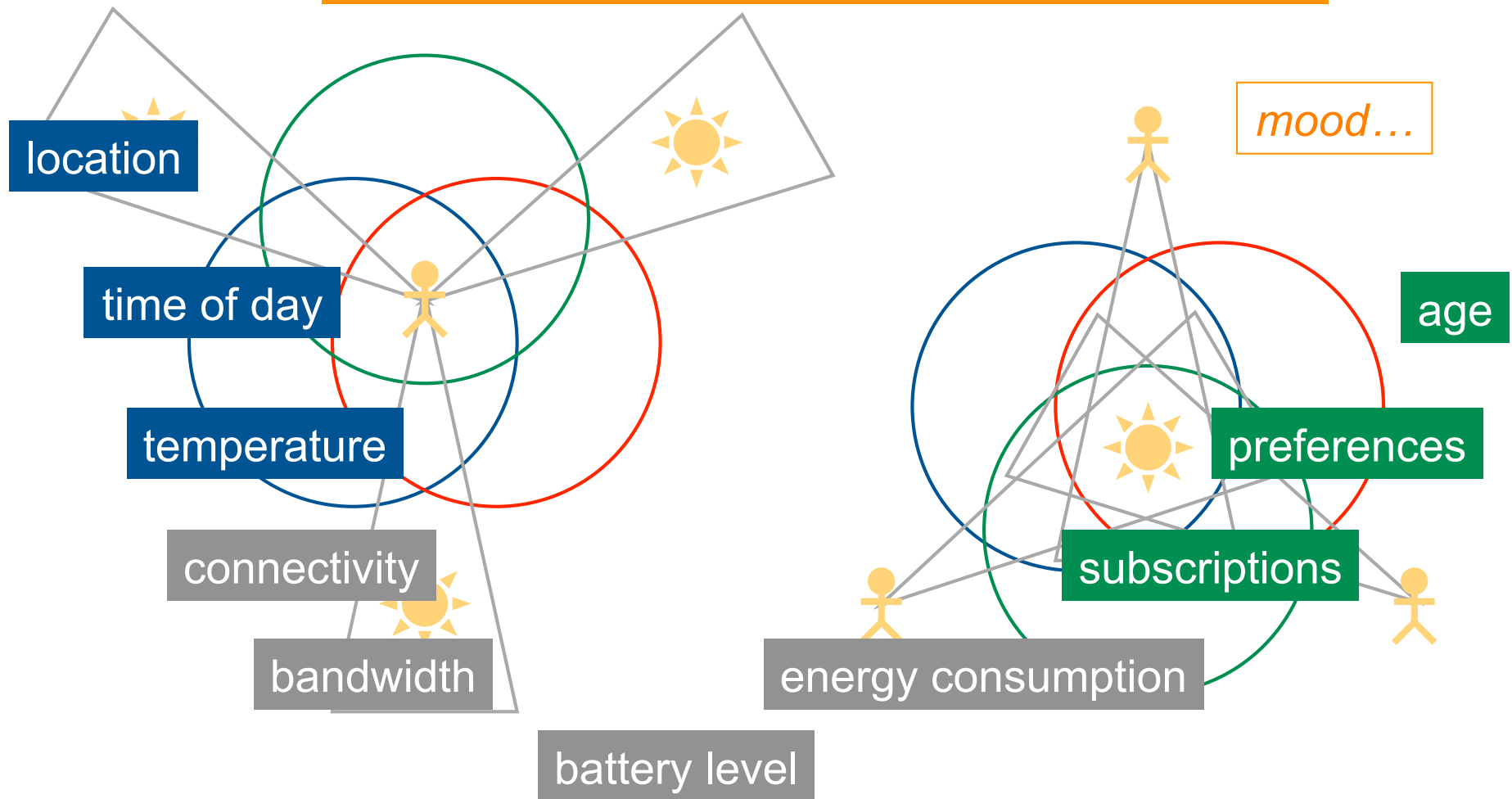
Colorado State University, Fort Collins, Colorado
2015-03-16

Some History...

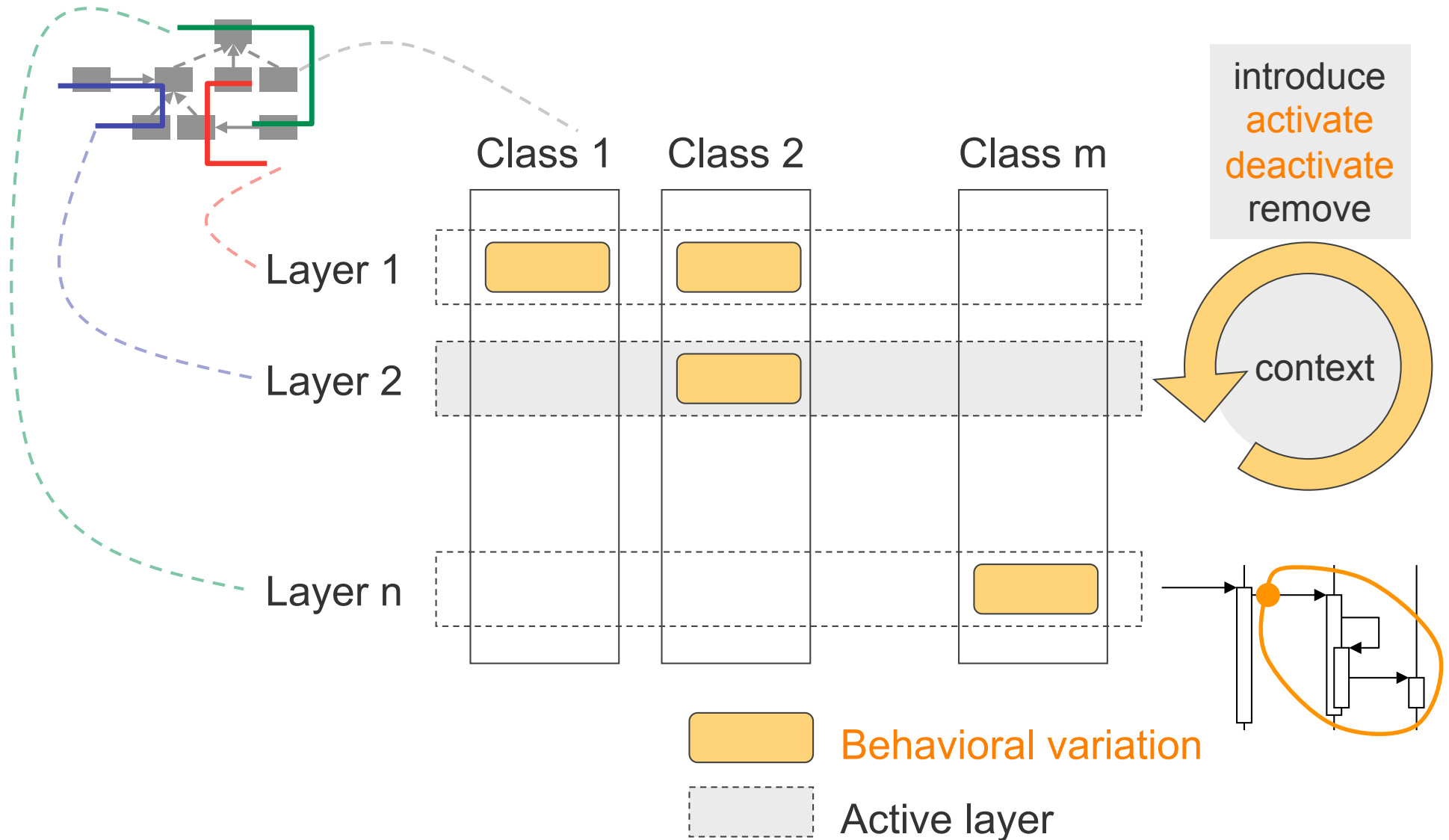


Context

context = everything computationally accessible

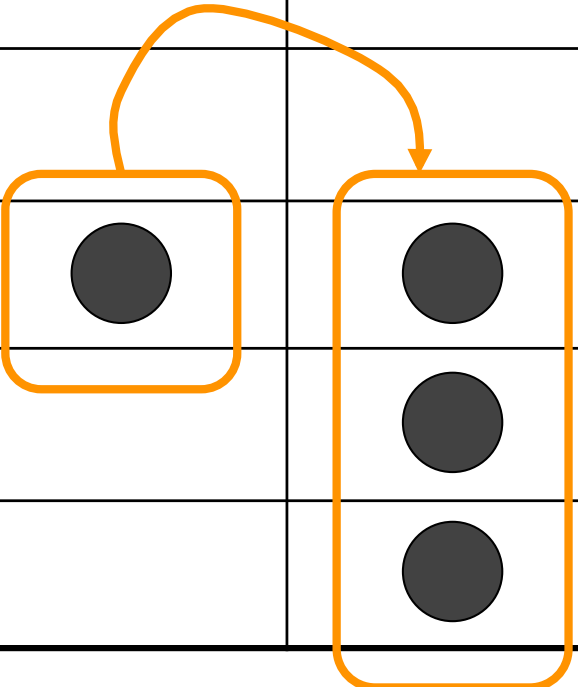


COP Basics Overview



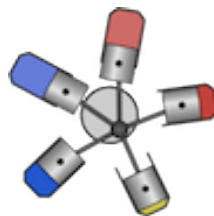
AOP, FOP, and COP

	AOP	FOP	COP
Inverse dependencies	●		
1:n relationships	●		
Layers		●	●
Dynamic activation			●
Scoping	●		●



COP Extensions (Some...)

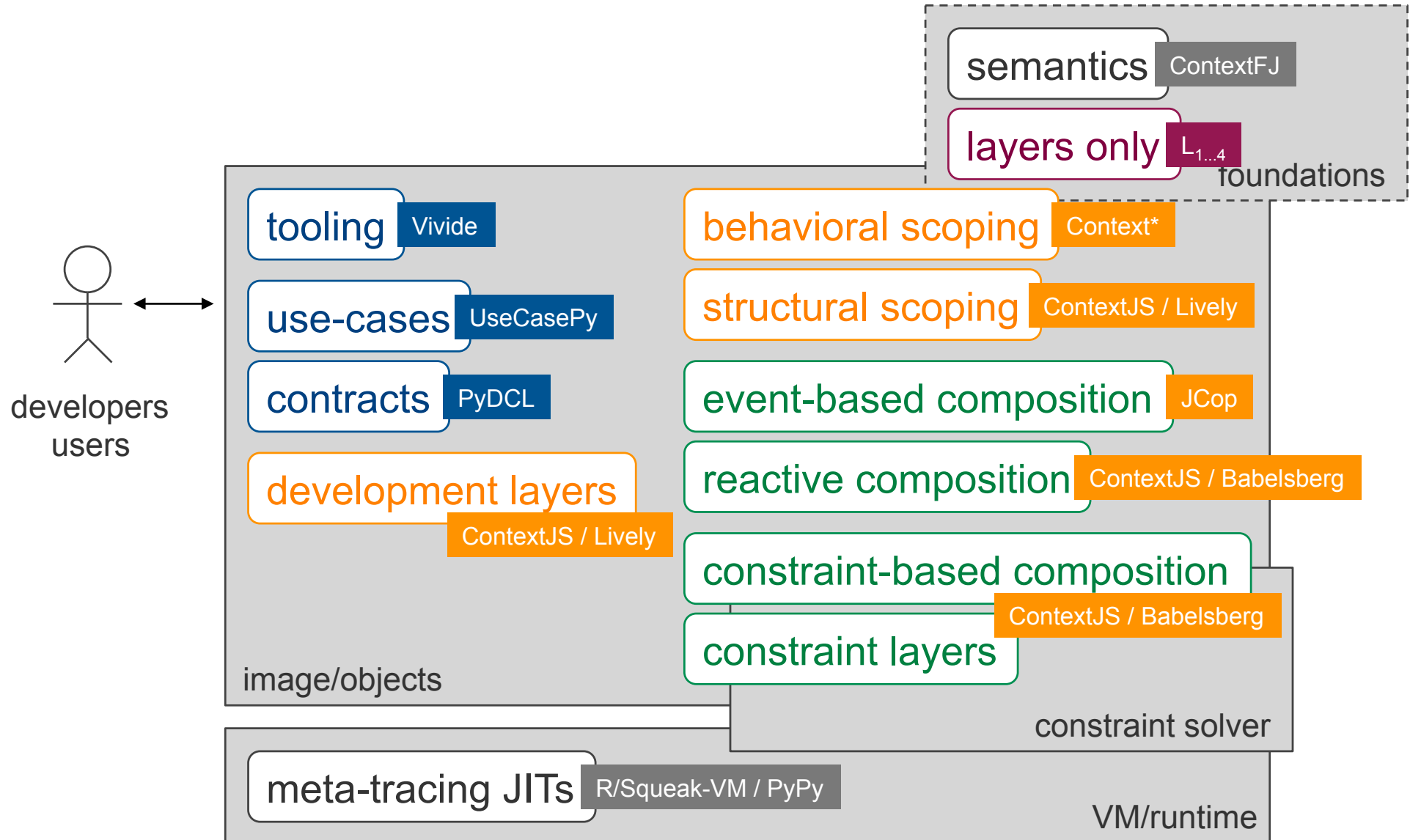
- ContextS
- ContextS2
- ContextJS
- JCop (ContextJ)
- ContextPy
- PyDCL
- UseCasePy
- PyContext
- ContextR
- ContextG
- ContextAmber
- $L_{1...4}$



- ContextL
- ContextScheme
- ContextJ*
- ContextErlang
- EventCJ
- Lambic
- Ambience
- COP.JS
- deIMDSCO/cj
- Phenomenal Gem
- Subjective-C
- Context Petri Nets



Recent COP Developments at HPI



Behavioral Variations

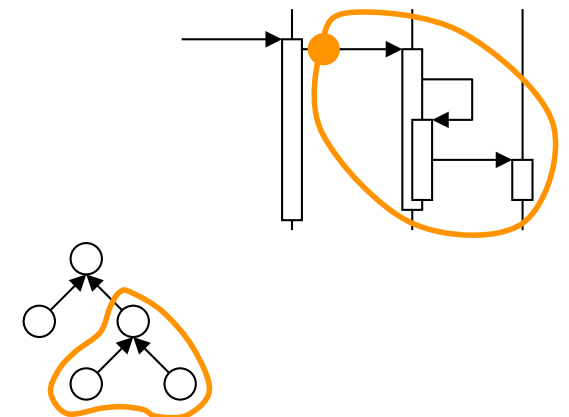
- **Behavioral** (dynamic) scoping
 - Dynamic extent of execution
 - Almost **all COP extensions**
- **Structural** (topological) scoping
 - ContextJS
 - **Development layers**
- Open implementation for scoping strategies
 - Allows for domain-specific scoping
 - Mainly applied to UI framework structures
 - Lively: Morphic
 - Webwerkstatt : Parts

behavioral scoping Context*

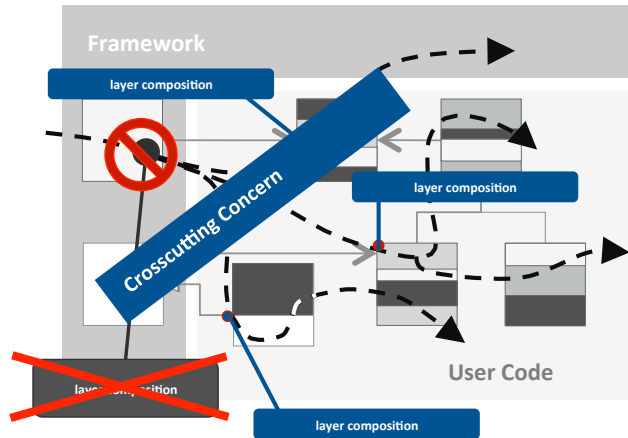
structural scoping ContextJS / Lively

development layers

ContextJS / Lively



Reactive Approaches

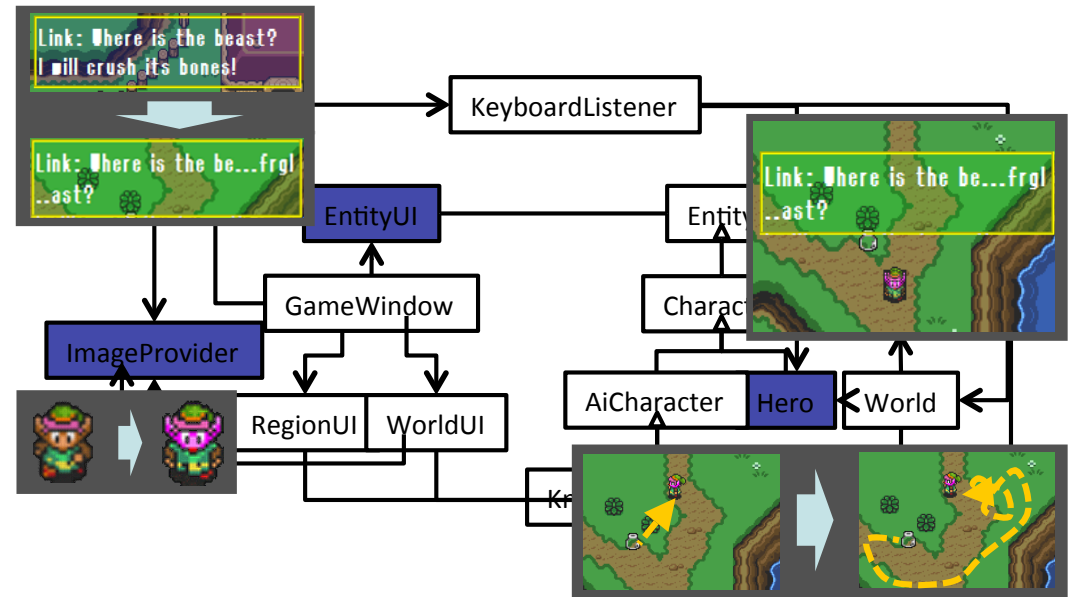


event-based composition JCop

reactive composition ContextJS / Babelsberg

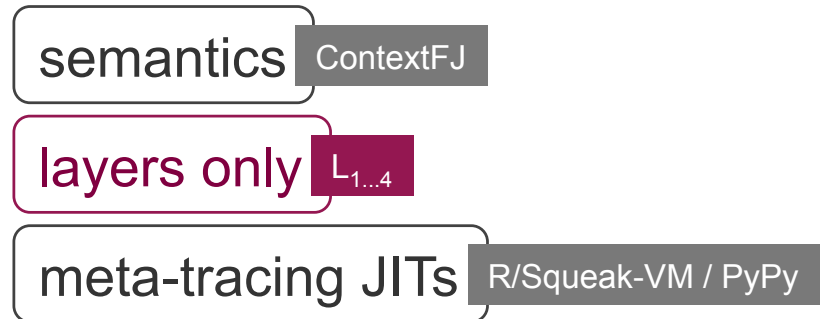
constraint-based composition ContextJS / Babelsberg

constraint layers

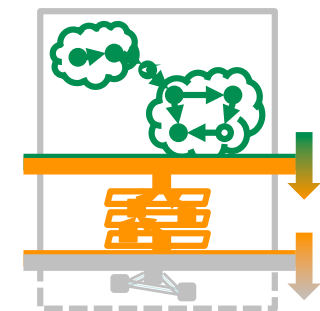
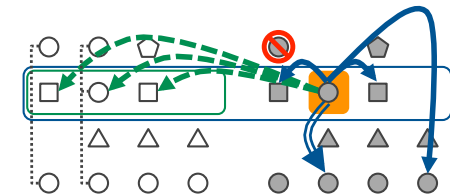


Foundations

- Semantics and types
 - ContextFJ
- **Symmetry**
 - No classes, only layers
 - No base system
 - $L_{1..4}$



- Sideways composition very expensive
 - **Runtime support for optimizations**
 - Meta-tracing JITs
 - R/Squeak-VM
 - Higher performance → more (meta-level) flexibility



$$\frac{PT(m, C, L_0) \text{ undefined} \quad mbody(m, C, \bar{L}', \bar{L}) = \bar{x}.e \text{ in } D, \bar{L}''}{mbody(m, C, (\bar{L}'; L_0), \bar{L}) = \bar{x}.e \text{ in } D, \bar{L}''}$$

Acknowledgements

Pascal Costanza, Hidehiko Masuhara, Atsushi Igarashi, Michael Haupt, Malte Appeltauer, Michael Perscheid, Bastian Steinert, Jens Lincke, Marcel Taeumel, Tobias Pape, Tim Felgentreff, Robert Krahn, Carl Friedrich Bolz, Marcel Weiher, Hans Schippers, Tim Molderez, Oscar Nierstrasz, Shigeru Chiba, Hiroaki Inoue, Tobias Rho, Stefan Udo Hanenberg, Dick Gabriel, Dave Thomas, Gilad Bracha, Alan Kay, Dan Ingalls, Alan Borning, Jeff Eastman, Christopher Schuster, Christian Schubert, Gregor Schmidt, Stefan Lehmann, Matthias Springer, ...

