

Eelco Visser



Delft University of Technology



VICI

1,500,000 EUR

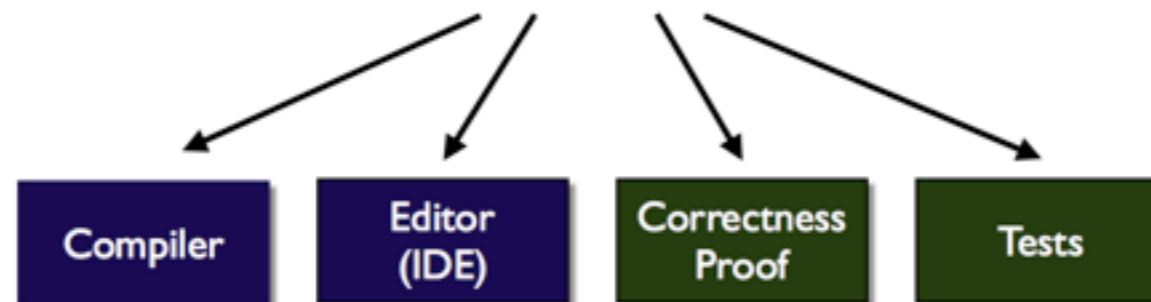
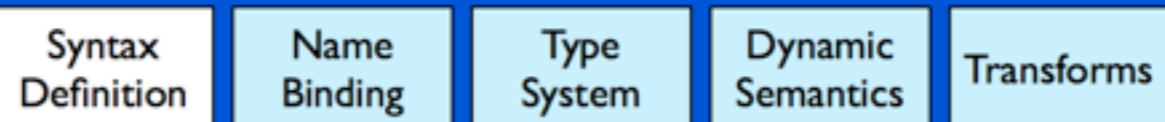
**Antoni van
Leeuwenhoek
Professor**

**SDF/SGLR
Stratego/XT
Spoofax**

**In Progress:
NaBL**

The Language Designer's Workbench

Declarative Language Definition



bridging the gap between language engineering and semantics engineering

**WebDSL
mobl**

**Next:
DynSem**



17 January 2014: Inaugural Speech

Software Language Design & Engineering

Language Design

Language Engineering

Semantics Engineering

Language Design

Linguistic Abstractions for Web Programming

Case Study

Linguistic Abstraction

Capture software knowledge
in domain-specific language

Domain-specific notation

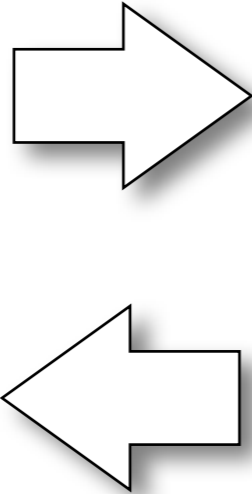
Implementation is correct by
construction

Domain-specific optimization

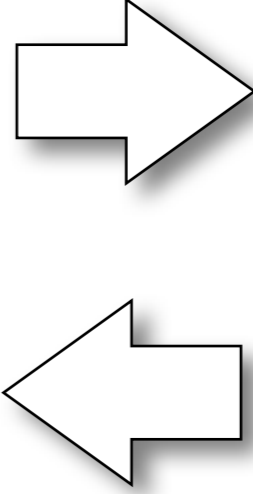
Solve (security) problems
generically

Early detection of failures
through cross-concern
consistency checking

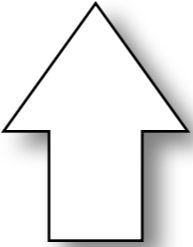
browser



server



database



web app

browser

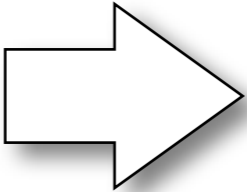
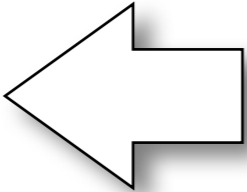
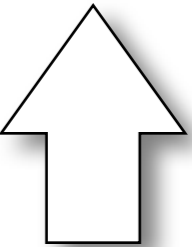
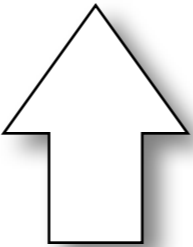
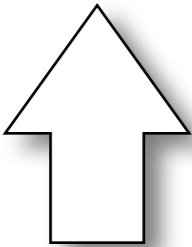
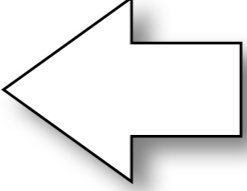
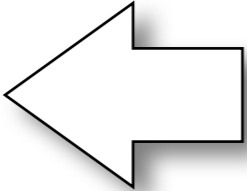
server

database

**HTML,
JS, CSS**

Java

SQL



Concerns in Web Programming

Data Persistence

Data Binding

Access Control

Routing

Search

Data Validation

Injection Attacks

...

XSS

...

Late Failure Detection in Web Applications

Category	Manifestation			Retraceability			Clarity		
	Ra	Se	Li	Ra	Se	Li	Ra	Se	Li
<i>Data model</i>									
Properties of non-existing types	R	C	C	-	+	+	-	+	+
Invalid inverse properties	R	D	C	-	+	+	+/-	+	+
Invalid data validation	R	C/D	C/D	-	+/-	+/-	-	+	+
<i>User interface</i>									
Invalid page elements	R	R	R	+	+	-	-	+	-
Invalid element nesting	B	B	B	-	-	-	-	-	-
Invalid references to data model	R	R	R	+	-	+	-	+	+
Invalid links to pages	R	B	B	+	-	-	-	-	-
Invalid links to actions	R	R	R	-	+	-	+	-	-
<i>Application logic</i>									
Invalid references to data model	R	C	C	+	+	+	-	+	+
Invalid redirect from actions	R	R	R	-	-	-	-	-	-
Invalid data binding	R	NA	NA	-	NA	NA	-	NA	NA
<i>Access control</i>									
References to data model	R	R	C	+	-	+	-	-	+

Ra = Ruby on Rails, Se = Seam, Li = Lift

B = Browser, C = Compile, D = Deploy

NA = Not applicable, R = Runtime

Zef Hemel, Danny M. Groenewegen, Lennart C. L. Kats, Eelco Visser.
Static consistency checking of web applications with WebDSL. Journal of Symbolic Computation, 46(2):150-182, 2011.

Complexity in Web Programming:

Multiple Languages x Multiple Concerns

Consistency not statically checked

Separation of Concerns & Linguistic Integration

`entity Page {
 title :: String
 authors -> set<Person>
 content :: WikiPage
}`

`entity Person {
 name :: String(name)}`

WebDSL

Eelco Visser. **WebDSL: A Case Study in Domain-Specific Language Engineering**. In Ralf Lämmel, Joost Visser, João Saraiva, editors, Generative and Transformational Techniques in Software Engineering II, International Summer School, GTTSE 2007. Volume 5235 of Lecture Notes in Computer Science, pages 291-373, Springer, Braga, Portugal, 2007.

Linguistically Integrated

- Persistent data model
- Logic
- Templates (UI, Email, Service)
- Data binding
- Access control
- Data validation
- Faceted search
- Collaborative filtering

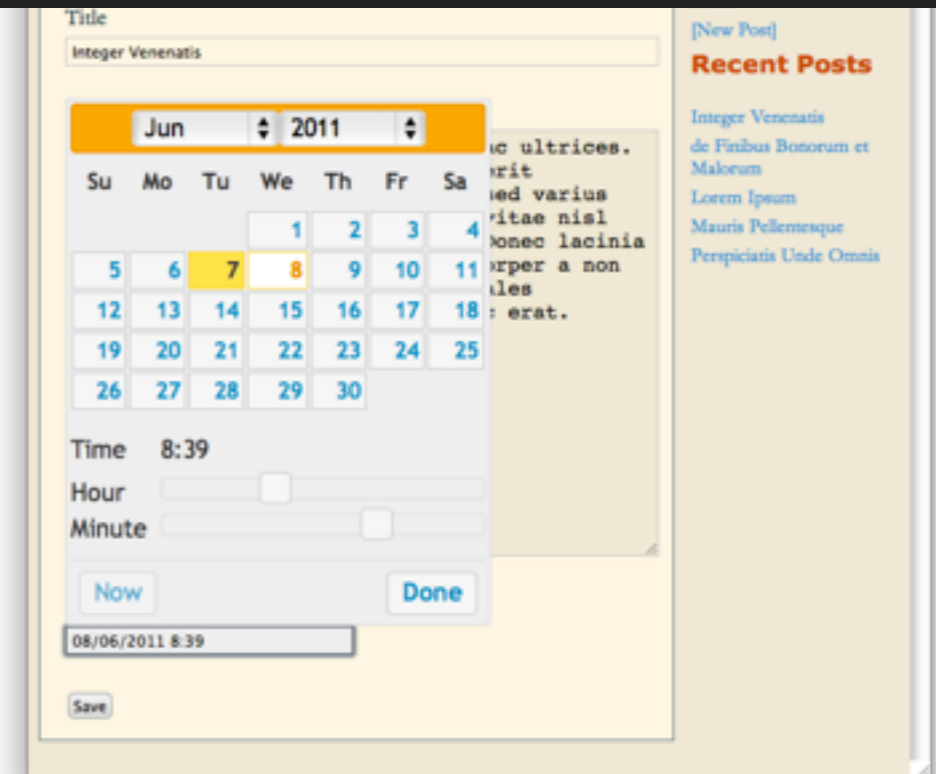
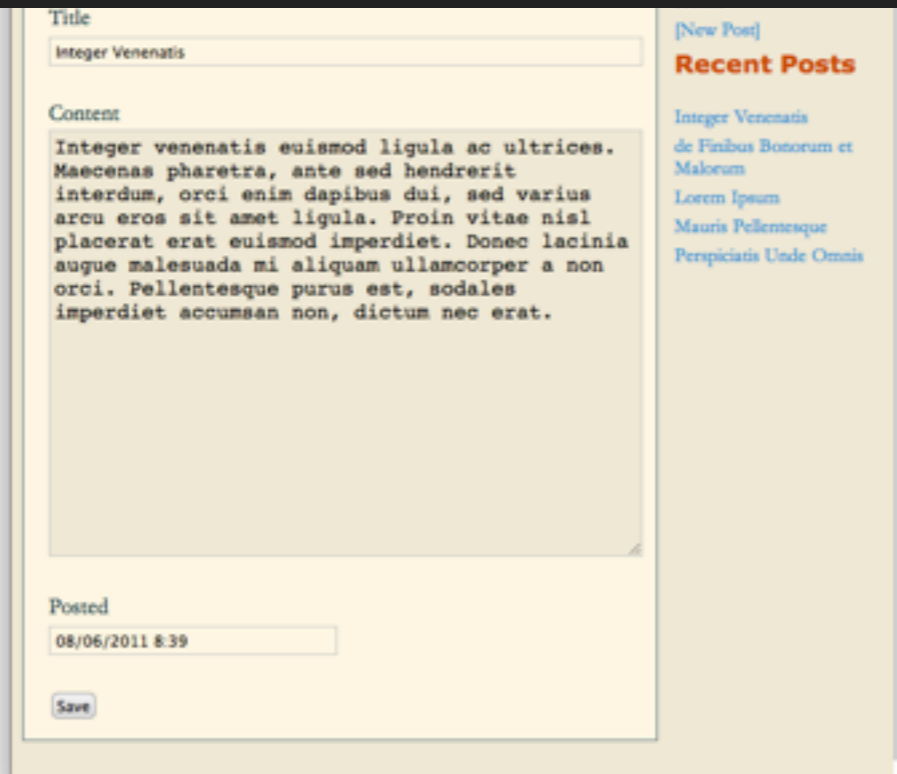
`entity Page {
 title :: String
 authors -> list<Person>
 ...
}`
WebDSL

Evaluation through case studies

- * **researchr** bibliography management system
- * **WebLab** e-learning
- * **EvaTool** course evaluation
- * **YellowGrass** issue tracker
- * **Blog** content management system
- * **Department Jobs** job workflow system
- * **CodeFinder** code search engine



Demo



**Status: Think about application design,
not implementation techniques**

Goal: Interaction Design

Higher-level abstractions for user interface design

Need: Reuse of Interaction Components

that are invasively composed with other components