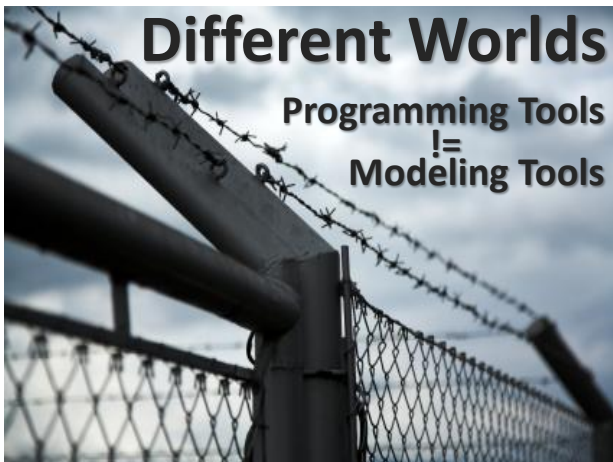
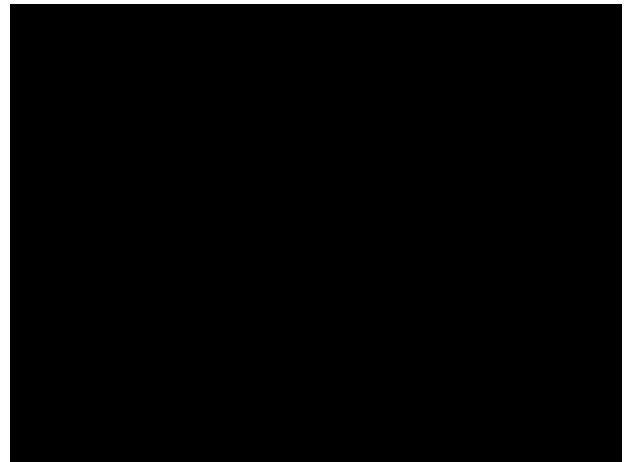


**Language Definition
and Extension**
with **MPS**

Markus Voelter
Independent/itemis
voelter@acm.org
itemis



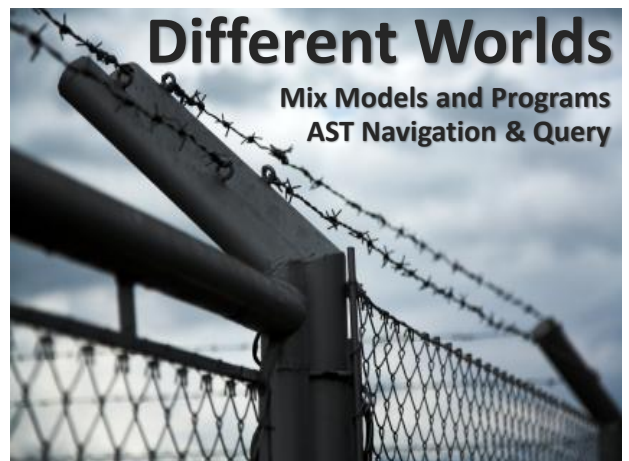
Different Worlds
Programming Tools
!=
Modeling Tools



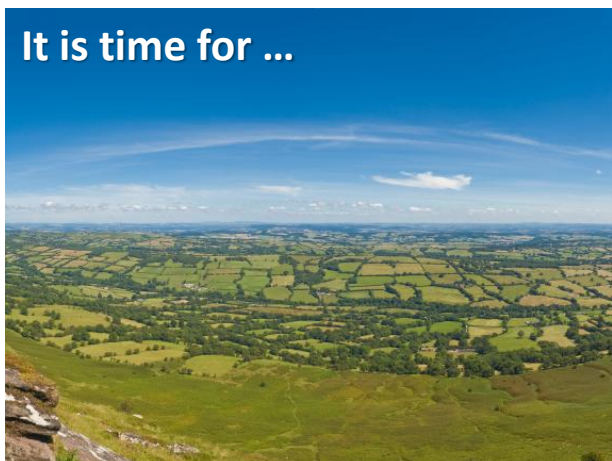
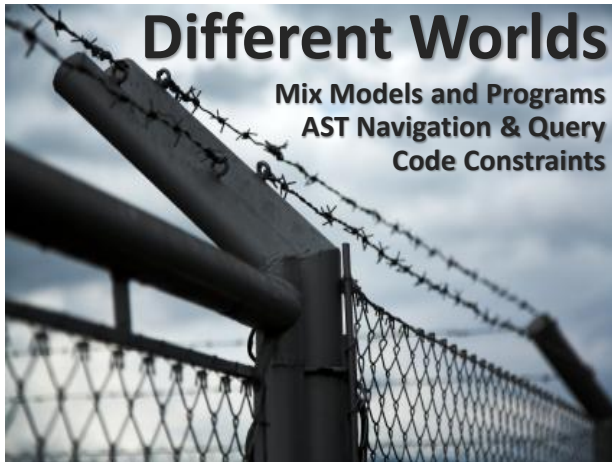
Different Worlds
Modeling Tool
!=
Modeling Tool

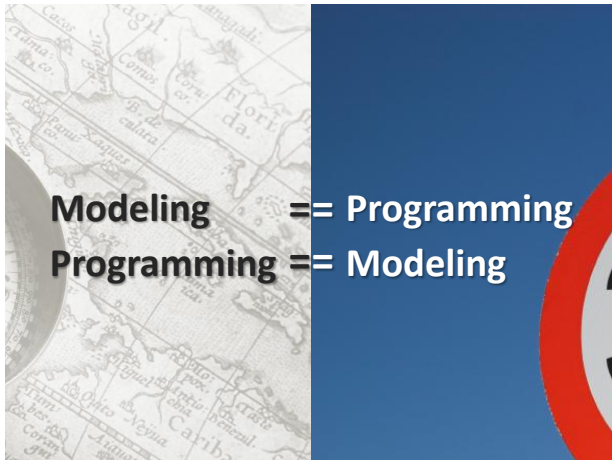


Different Worlds
Mix Models and Programs



Different Worlds
Mix Models and Programs
AST Navigation & Query





We don't want to
model,
we want to
program!

We don't want to
model,
we want to
program!

... at different levels of **abstraction**
... from different **viewpoints**
... **integrated!**

We don't want to
model,
we want to
program!

... with different degrees of
domain-specificity
... with suitable **notations**
... with suitable **expressiveness**

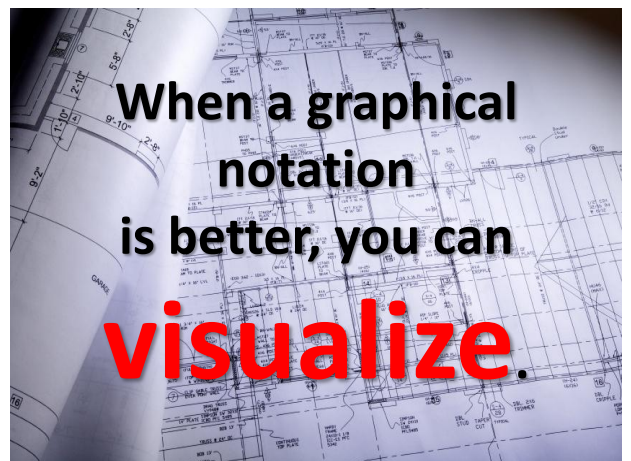
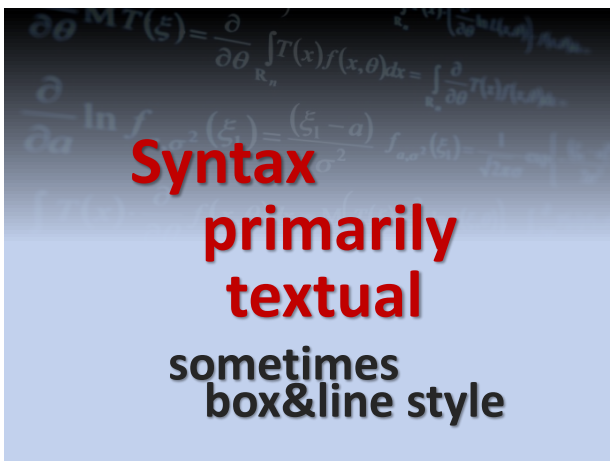
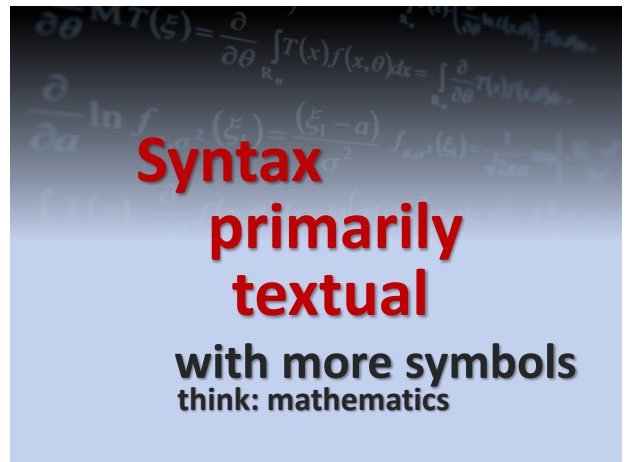
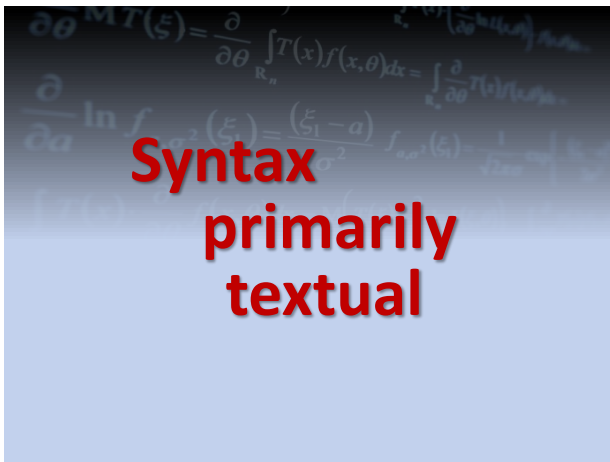
We don't want to
model,
we want to
program!

And always:
precise and **tool processable**



Language Workbench

(Martin Fowler)



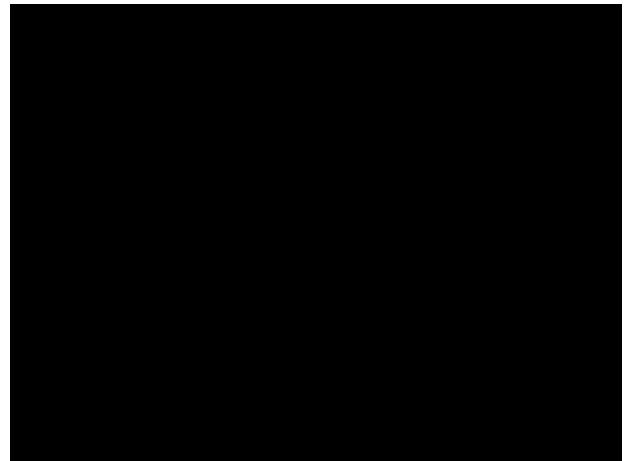


1 Available Tooling

Eclipse
Xtext SDF &
Spoofax

Modeling as Programmig

- ... (Mostly) Textual Notations
- ... Concrete Syntax Storage
- ... (Fancy) ASCII Editors
- ... Read-Only Visualizations




2 Available Tooling

Jetbrains'
Meta Programming System

Programming as Modeling

- ... (Mostly) Graphical Notations
- ... Abstract Syntax Storage
- ... Projecting Editors
- ... Different editable views for model



Programming as Modeling

- ... ~~(Mostly) Graphical~~ Any kind of Notations
- ... Abstract Syntax Storage
- ... Projecting Editors
- ... Different editable views for model

Language Composition

There's no parsing.

Unique Language Element Identity.

Unlimited language composition.

Flexible Notations

Textual
like ASCII

Graphical
box & line

Semi-Graphical
mathematical



treated the same
can be mixed

Automatic IDE Extension

tool support is inherent
for languages build with
projectional tools

language definition
implies
IDE definition

Multiple Notations

... for the same concepts

e.g. in different contexts
or for different tasks

Tree Editing

... is different from editing text

... try to make it feel like text

... takes some getting used to

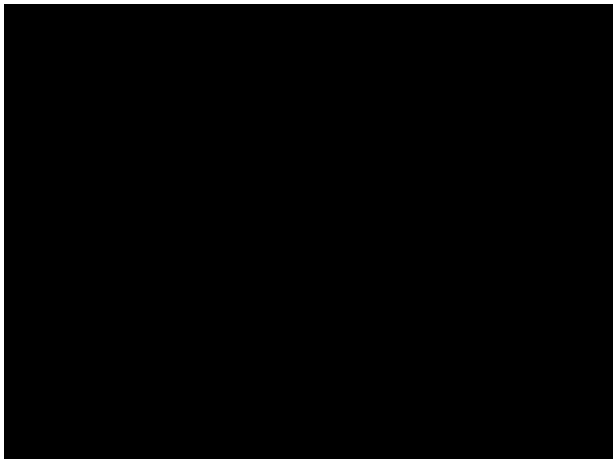
but: for more flexible notations
a more general editing paradigm
is needed

Infrastructure Integration

- ... storage is not text
- ... diff/merge must be in tool
- ... existing text tools don't work

Proprietary Tools

- ... no standards
- ... no interop



licensed under

Apache 2.0

released in

Q2 2009

currently

1.5

Build new **standalone** DSLs

Build new **standalone** DSLs
Build DSLs that **reuse** parts
of other languages

Build new **standalone** DSLs
 Build DSLs that **reuse** parts
 of other languages

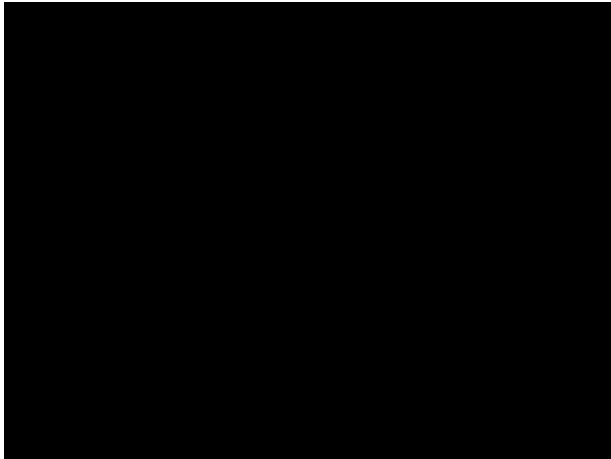
(MPS comes with ^{Java++} **BaseLanguage**)

extend base language


Build new **standalone** DSLs
 Build DSLs that **reuse** parts
 of other languages

(MPS comes with ^{Java++} **BaseLanguage**)

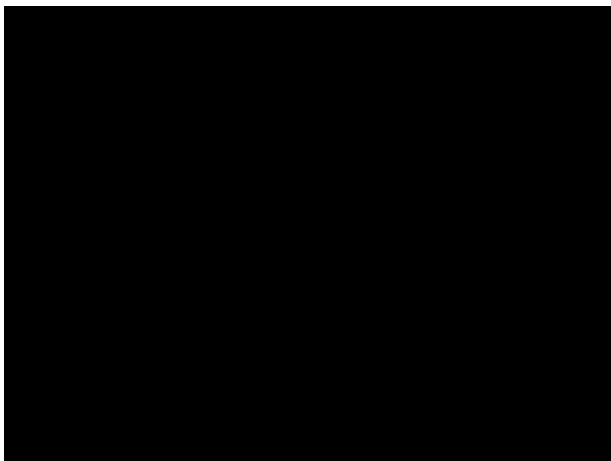
extend base language
 build DSLs that **reuse** parts
 of **BaseLanguage**



DEMO



Building/Extending DSLs with
 JetBrains MPS



3 A vision for
 Programming

Big Language?



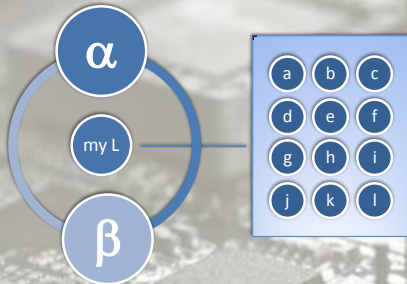
with **many** first class concepts!

Small Language?



with a **few**, **orthogonal** and **powerful** concepts

Modular Language



with **many optional, composable** concepts

Modular Language

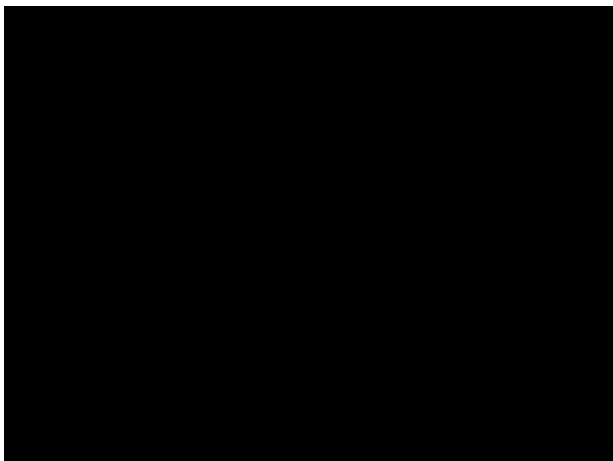
Like frameworks and libraries,

Modular Language

Like frameworks and libraries,

but with syntax and IDE support

Not a new idea...

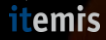


THE END.

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