

# The State of Stratego/XT

## Sixth Stratego User Days (SUD 2005)

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0.14

## 0.14

- ▶ 3.5 months
- ▶ 54 issues
- ▶ 231 commits
- ▶ `--dr new` is now default
- ▶ hierarchical library
- ▶ no bootstrapped sources in svn
- ▶ `pkg-config`
- ▶ ...and much more!

## Utrecht

- ▶ Eelco Visser – Stratego Language and Compiler
- ▶ Karina Olmos – Octave, Tiger
- ▶ Martin Bravenboer – Dryad, Stratego/XT
- ▶ Rob Vermaas – Octave, Dryad, Stratego/XT
- ▶ Eelco Dolstra – Nix Buildfarm and all-round guru
  
- ▶ Master Students: René de Groot – JavaBorg, Mart Kolthof – CIL, Vectorization, Huanwen Qu – ?, Jory van Zessen – LVM

## Utrecht/Bergen (Norway)

- ▶ Magne Haveraaen
- ▶ Anya Helene Bagge – MetaStratego, Codeboost
- ▶ Karl Trygve Kalleberg – Spoofox, Meta/AspectStratego

# People: What are others doing?

## EPITA (France)

- ▶ Akim Demaille, Valentin David, Clément Vasseur, Julien Roussel, Nicolas Despres, ChoJin, Alexandre Borghi, Renaud Durlin, Olivier Gournet, Thomas Largillier, Nicolas Pouillard, ...?
- ▶ C and C++, attribute grammars, extended SDF

## Université René Descartes (Paris 5, France)

- ▶ Mikal Ziane and Salima Chantit
- ▶ Refactoring, bad smells, Java

## TUE (The Netherlands) / Moskou

- ▶ Yaroslav Usenko and others
- ▶ muCRL linearizer

# People: What are others doing?

## Lucent / Bell Labs

- ▶ Daniel Waddington, Bin Yao, Ramesh Viswanathan
- ▶ Proteus (C transformation system)
- ▶ Harsha Nagesh, Pankaj Risbood – Evaluating

## OGI (Oregon, USA)

- ▶ Dick Kieburtz – Theorem prover for Programmatica

## DIKU (Copenhagen, Danmark)

- ▶ Julia Lawall
- ▶ Evaluating Stratego for use in Tarantula (driver evolution)

## University of Waterloo (Canada)

- ▶ Language extension projects by students

## Dynamic rules

- ▶ scope labels, `:+`. `bagof-R` and `bigbagof-R`
- ▶ boolean operations, `changesets`
- ▶ dependencies

⇒ talk by Eelco Visser

## Modules

- ▶ hierarchical module names
- ▶ ongoing work: design of module system

## Aspect Stratego

⇒ talk by Karl Trygve Kalleberg

## Sugar

- ▶ `if s then s (else s)? end`
- ▶ `switch s (case s : s)* (otherwise : s)? end`

## Separate compilation

- ▶ XTC programs
- ▶ Fixes for Mac OS X
- ▶ Supported by stand-alone compiler
- ▶ Detection of redefinition

## Usability

- ▶ Reporting of parse errors
- ▶ Report of ambiguities in concrete object syntax
- ▶ Disable heuristic SGLR filters
- ▶ `--xtc-repo`

## Ongoing work: strc-core

- ▶ Definition of core language
- ▶ Representation of annotations
- ▶ Refactoring and cleanup



- ▶ SSL to Stratego Library
- ▶ Hierarchical structure

```
collection
  /hash-table
  /list
  /set
  /tuple
```

```
lang
```

```
strategy
  /general
  /pack
  /traversal
```

```
system
  /io
  /posix

term

util
  /config
```

## term/string/newname

```
<newname> "var" // produces "var_0"  
<newname> "var" // produces "var_1"
```

## collection/hash-table/common

```
new-hashtable  
hashtable-put(|key, value)  
hashtable-get(|key)
```

## collection/set/indexed

```
new-iset  
iset-add(|t)  
iset-contains(|t)  
iset-values
```

## Concrete Syntax

- ▶ Major cleanup and update of SDF in Stratego/XT
- ▶ `sglri`  
fancy error reporting at command-line
- ▶ `pack-sdf`  
usability: module names, include mechanism
- ▶ `sdf2parenthesize`  
parenthesizer based on associativity and priorities in SDF
- ▶ `parse-unit`  
concrete syntax, usability
- ▶ `asfix-anno-comments`  
comment preserving transformations

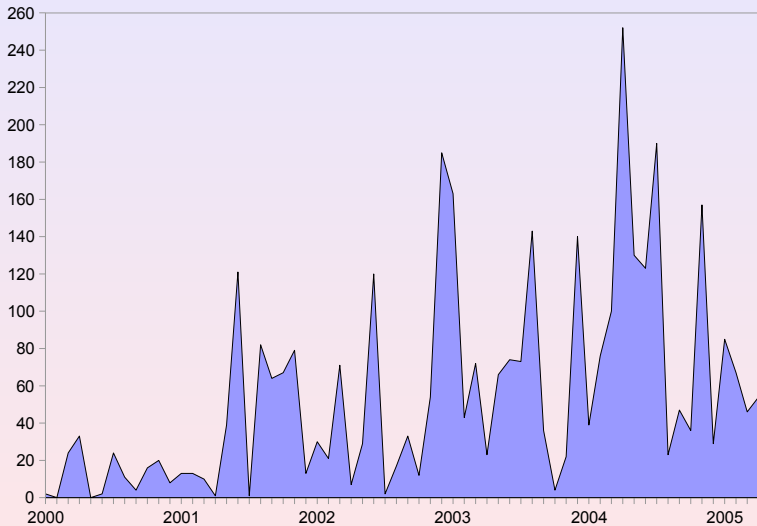
## Abstract syntax

- ▶ Introduction of `stratego-regular`: `rtg`
- ▶ `format-check` – visualization, performance
- ▶ `xml2aterm` and `aterm2xml` – conversion & roundtrip

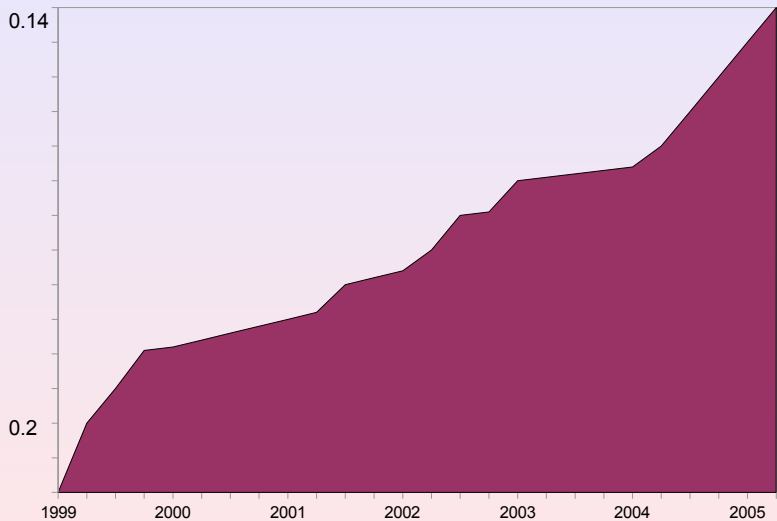
# News: Development and Deployment

- ▶ JIRA issue tracking
- ▶ Nix Buildfarm
  - ▶ Continuous distribution
  - ▶ Nix channels, RPMs
- ▶ Cygwin and Mac OS X Support
- ▶ Bootstrapping: baseline Stratego/XT
- ▶ Separate Stratego/XT Utils
- ▶ Shared libraries - Libtool
- ▶ pkg-config
  - ▶ Forward compatible `Makefile.xt`
  - ▶ Implicit configuration
- ▶ Build-time XTC repositories
  - ▶ Uninstalled packages (check without install)

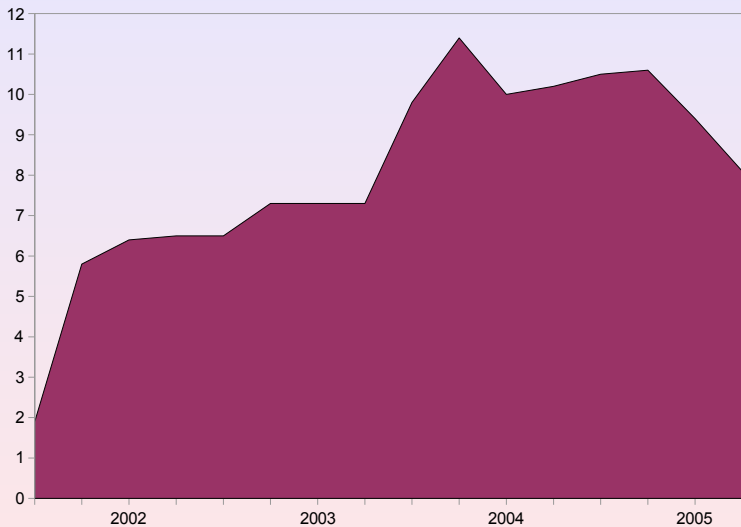
# Statistics: Number of Commits



# Statistics: Releases



# Statistics: Size of Sources



- ▶ API documentation
  - ▶ xDoc
    - ▶ Usability of API docs
    - ▶ Hierarchical modules
  - ▶ Continuous update
    - ▶ Stratego Library, XTC, Dryad
- ▶ Stratego/XT Manual
  - ▶ DocBook
  - ▶ More structure than Wiki
  - ▶ Mixture of languages, examples, tools
  - ▶ Contiguously build
- ▶ Publications
  - ▶ Dynamic rules, Concrete Object Syntax, Aspect Stratego



## Language

- ▶ Program Transformation with Scoped Dynamic Rewrite Rules.  
*Fundamenta Informaticae: Special Issue on Program Transformation*
- ▶ Composing Source-to-Source Data-Flow Transformations with Rewriting Strategies and Dependent Dynamic Rewrite Rules.  
*International Conference on Compiler Construction (CC'05)*
- ▶ Combining Aspect-Oriented and Strategic Programming.  
*International Workshop on Rule-Based Programming (RULE'05).*

## Surveys

- ▶ A Survey of Strategies in Rule-Based Program Transformation Systems.  
*Journal of Symbolic Computation special issue on Strategies in Rewriting and Programming*

## Applications

- ▶ Transformers: a C++ program transformation framework  
*Technical report – EPITA Research & Development Laboratory*
- ▶ Concrete Syntax for Objects. Domain-Specific Language Embedding and Assimilation without Restrictions  
*Conference on Object-Oriented Programming, Systems, Languages, and Applications (OOPSLA'04)*
- ▶ Retrofitting the AutoBayes Program Synthesis System with Concrete Object Syntax.  
*Domain-Specific Program Generation: International Seminar, Dagstuhl (LNCS)*

Master course on program transformation using Stratego/XT

- ▶ 10 weeks, 2 lectures per week
- ▶ 5 weeks: learn Stratego/XT
- ▶ 5 weeks: project

Challenging projects:

- ▶ Java refactoring: extract method
- ▶ Java bytecode obfuscation
- ▶ Java inner class lifting (lambda lifting)
- ▶ Driver evolution (Tarantula)
- ▶ SubJ – Subject Oriented Java Composition
- ▶ Compilation of embedded XPath (Java)

- ▶ **Transformers** – C and C++
- ▶ **Codeboost** – C++
- ▶ **Dryad & Java Front** – Java
- ▶ **Octave Compiler** – Octave
- ▶ **Tiger Compiler** – Tiger compiler and examples

Program transformation framework for the C and C++

- ▶ Transformers 0.3 (for Stratego/XT 0.14)
- ▶ ISO standard grammars
- ▶ C syntax definition and disambiguation tools, based on attribute grammars.
- ▶ C++ syntax definition and partial disambiguation
- ▶ Extensions of SDF (ast, pp, attributes)
- ▶ Talks later today

## Java-front (stable)

- ▶ Upgraded to full 1.5
- ▶ Extensive support for concrete syntax

## Dryad (beta)

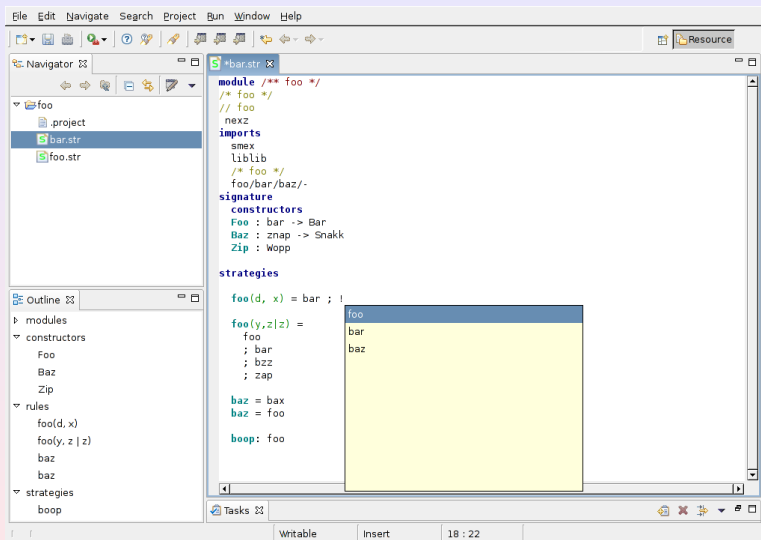
- ▶ Disambiguation, qualification and reclassification
- ▶ Type checker
- ▶ Java bytecode interface
- ▶ Unified model for classes in bytecode and Java

## AspectJ (alpha)

- ▶ SDF syntax definition (SGLR!)
- ▶ Pretty-printer
- ▶ Both extend Java-front

- ▶ Concrete Syntax for Objects (OOPSLA)
  - ▶ Embedding of DSL in Java
  - ▶ JavaBorg
  
- ▶ René de Groot (master student):
  - ▶ Swul (user-interface language)
  - ▶ Regular expressions
  - ▶ Talk later today
  
- ▶ Waterloo & Utrecht (PT): XPath embedding
  
- ▶ Demo and paper at GTTSE (Portugal)
  
- ▶ Continuing work on Java code generation

# News: Spoofox Stratego Editor



Later today: demo by Karl Trygve Kalleberg



## Octave

- ▶ Wednesday: Octave talk by Rob Vermaas
- ▶ Master project: Octave vectorizer

## Tiger

- ▶ Mostly demonstration and experiments

## Transformation Tool Composition (XTC)

- ▶ XTC2 (Eelco Visser)
  - ▶ Namespaces and scoped bindings (plugins)
- ▶ XTC3 (Niels Janssen)
  - ▶ Component definition, contracts, abstraction

## Stratego Shell

- ▶ Released
- ▶ Bug fixes and usability

## 2004-2005

- ▶ Stratego/XT is becoming mature
- ▶ More language-specific support
  - ▶ e.g. Dryad & Transformers
- ▶ Many contributors

## 2005-2006 (Utrecht)

- ▶ Stratego
  - ▶ Compiler: `strc-core`
  - ▶ Language: module system
- ▶ Maybe Stratego/XT 1.0 in 2006?
- ▶ Dryad
  - ▶ Complete type-checker for 1.5
  - ▶ High-level transformation
  - ▶ JVM bytecode backend