software assessment

tudorgirba.com

B-29

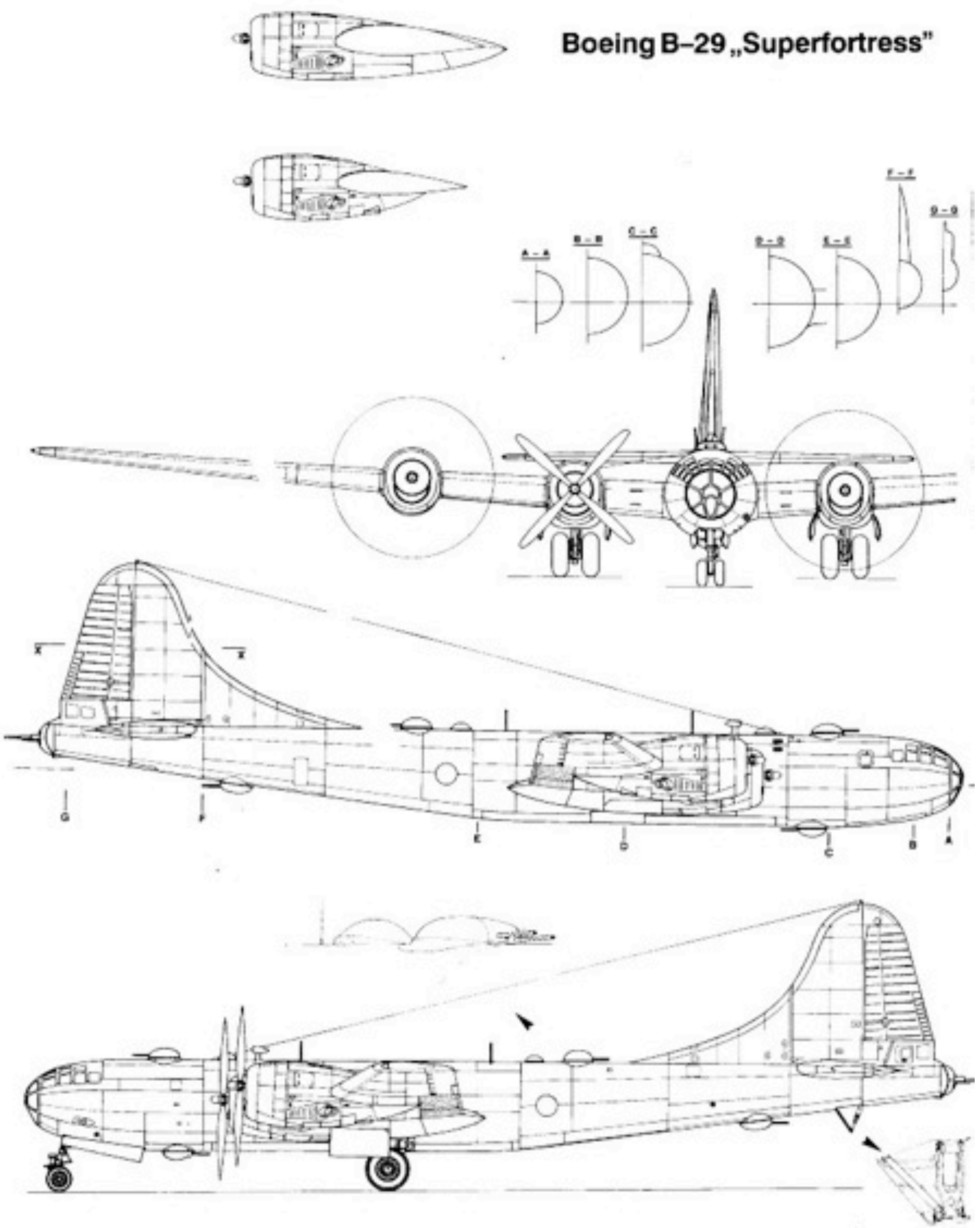
The B-29 was the main bomber of US Air forces and it provided the strategic advantage of reaching over the Pacific Ocean.

This three billion dollar project was the largest government commitment ever to a single project, including the Atomic Bomb.
http://en.wikipedia.org/wiki/B-29
http://en.wikipedia.org/wiki/Tupolev_Tu-4
http://www.rb-29.net/HTML/03RelatedStories/03.03shortstories/03.03.10contss.htm

Tuesday, October 25, 11

During 1944, 3 bombers had to land in Russia after bombing missions in Japan. The Russians refused to return them.
The B-29 was not a legacy system, but:
- it was tremendously valuable
- it was unknown to the Russians
- it was estimated that to build one from scratch would take about 5 years

http://en.wikipedia.org/wiki/B-29
http://en.wikipedia.org/wiki/Tupolev_Tu-4



The challenge was to understand the planes well enough to be able to build a factory that would build them. This had to go beyond just the structure.

Tuesday, October 25, 11

They approached the problem from several directions:
- one plane was disassembled into pieces,
- one plane was used for flying, and
- one plane was used as a comparison model and for training pilots.

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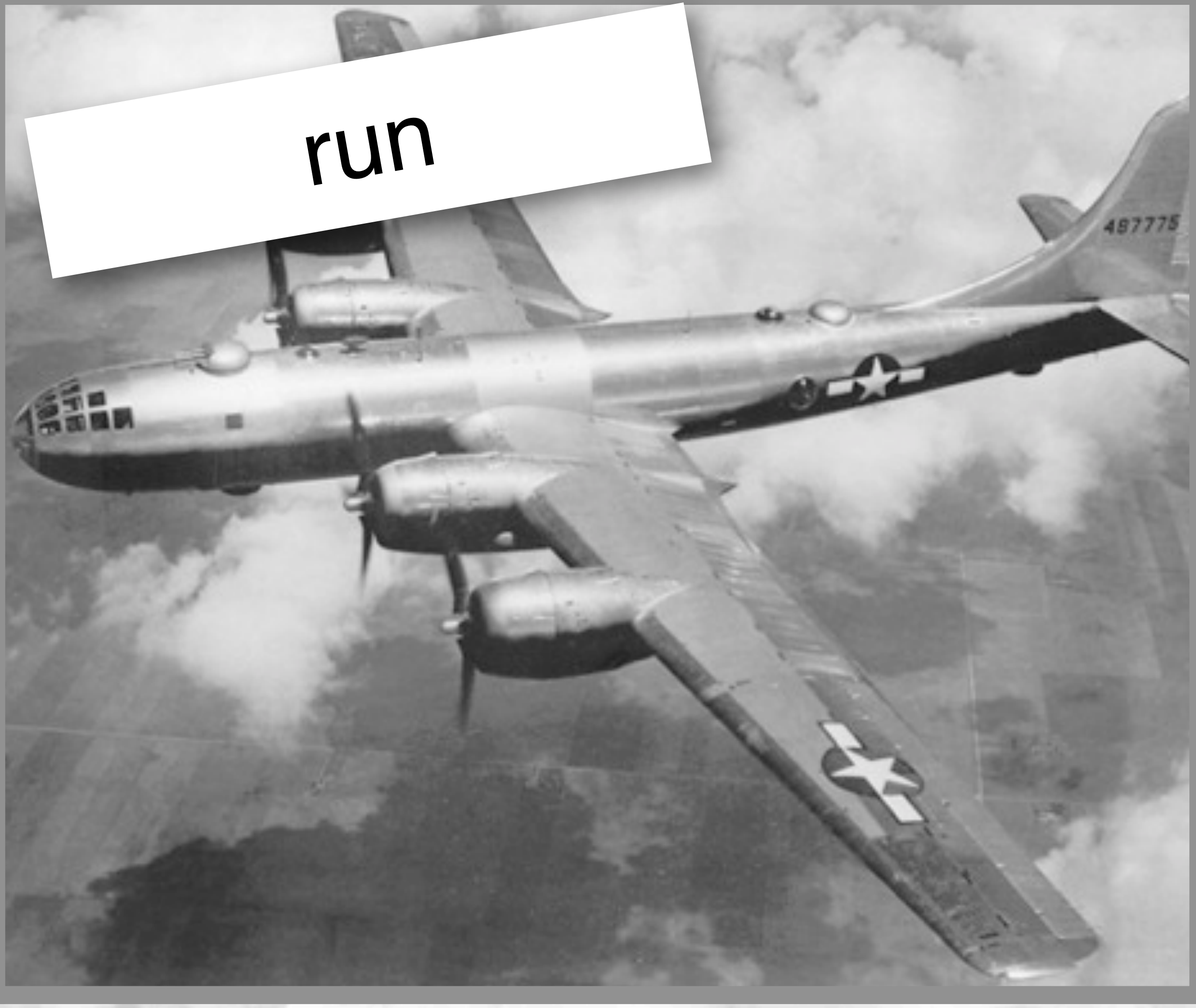

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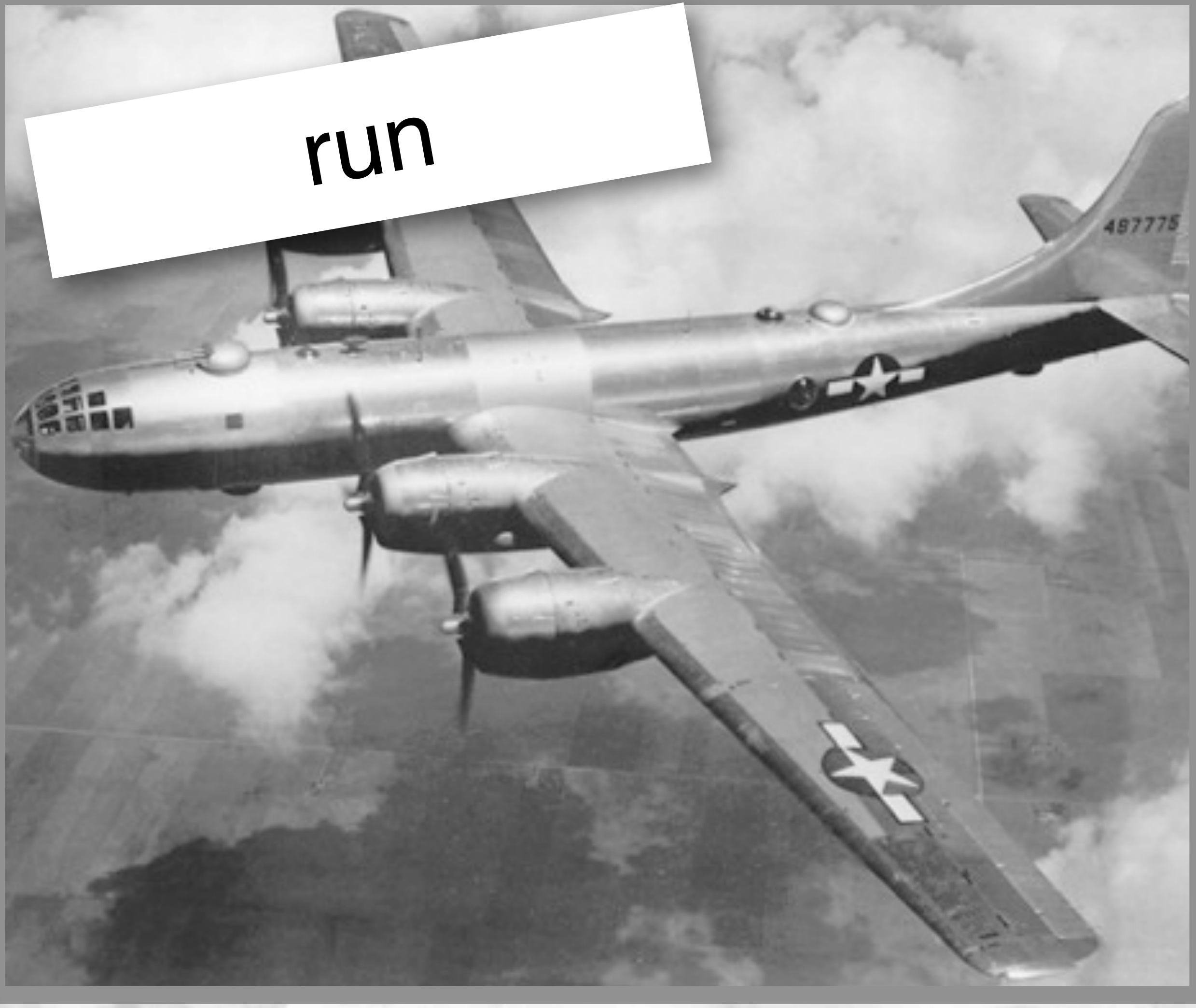
disassemble



run

test and compare

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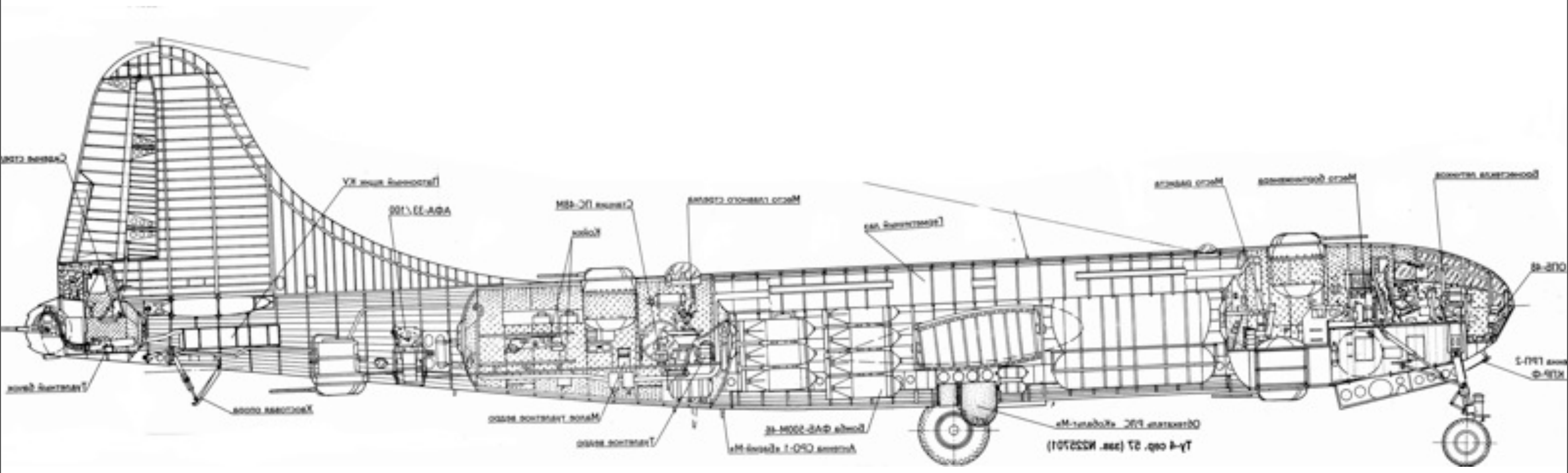
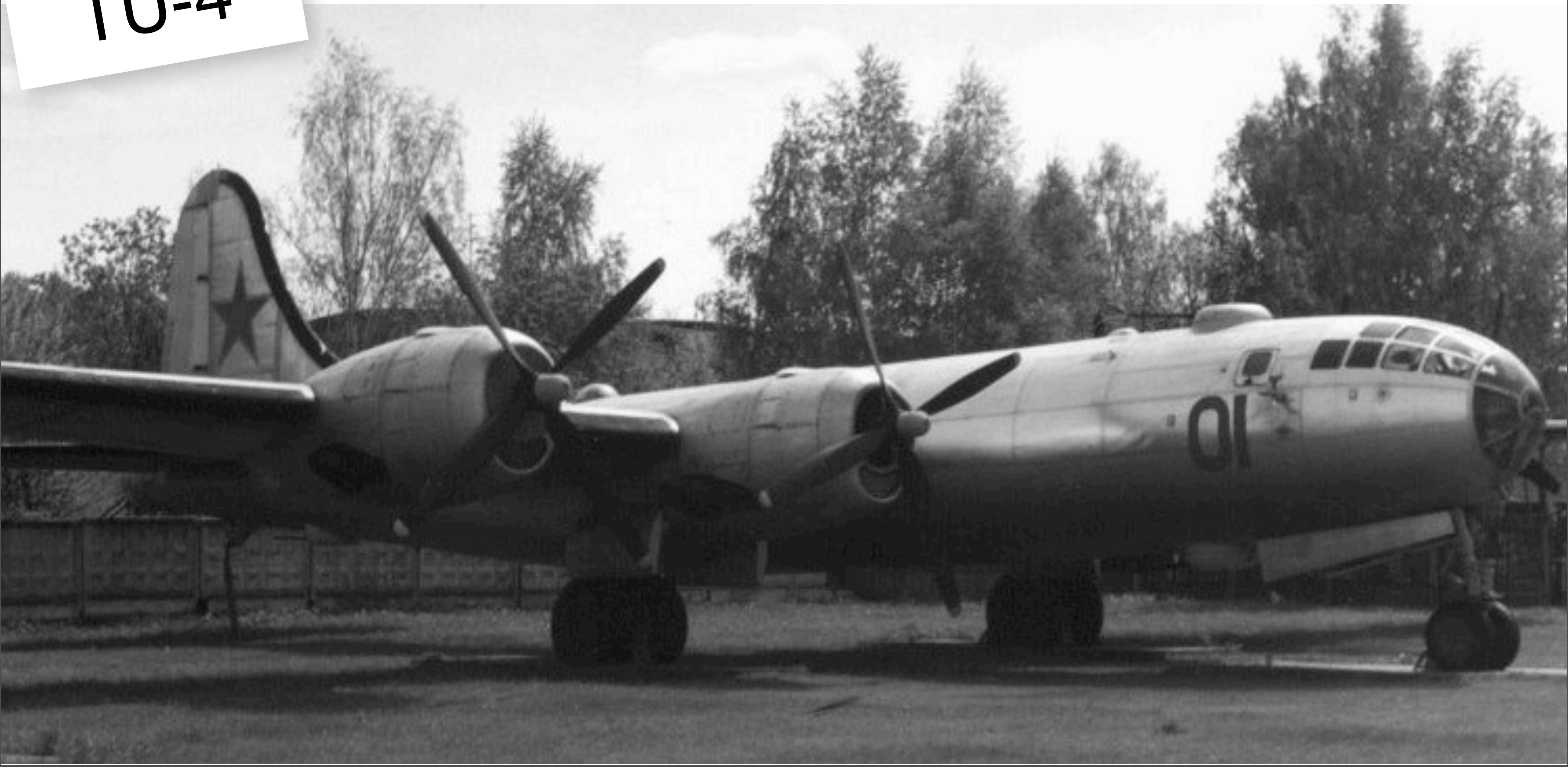


Tuesday, October 25, 11

They eventually managed to build their own plans.

TU-4



The Russians reverse engineered the plans in 1 year and produced the first piece 1 year later: 105,000 pieces assembled in 2 years
Tu-4 first flew on May 19, 1947. Serial production started immediately, and the type entered large scale service in 1949.
It is said that they copied even the flaws, as the engines were as unreliable as in the American version

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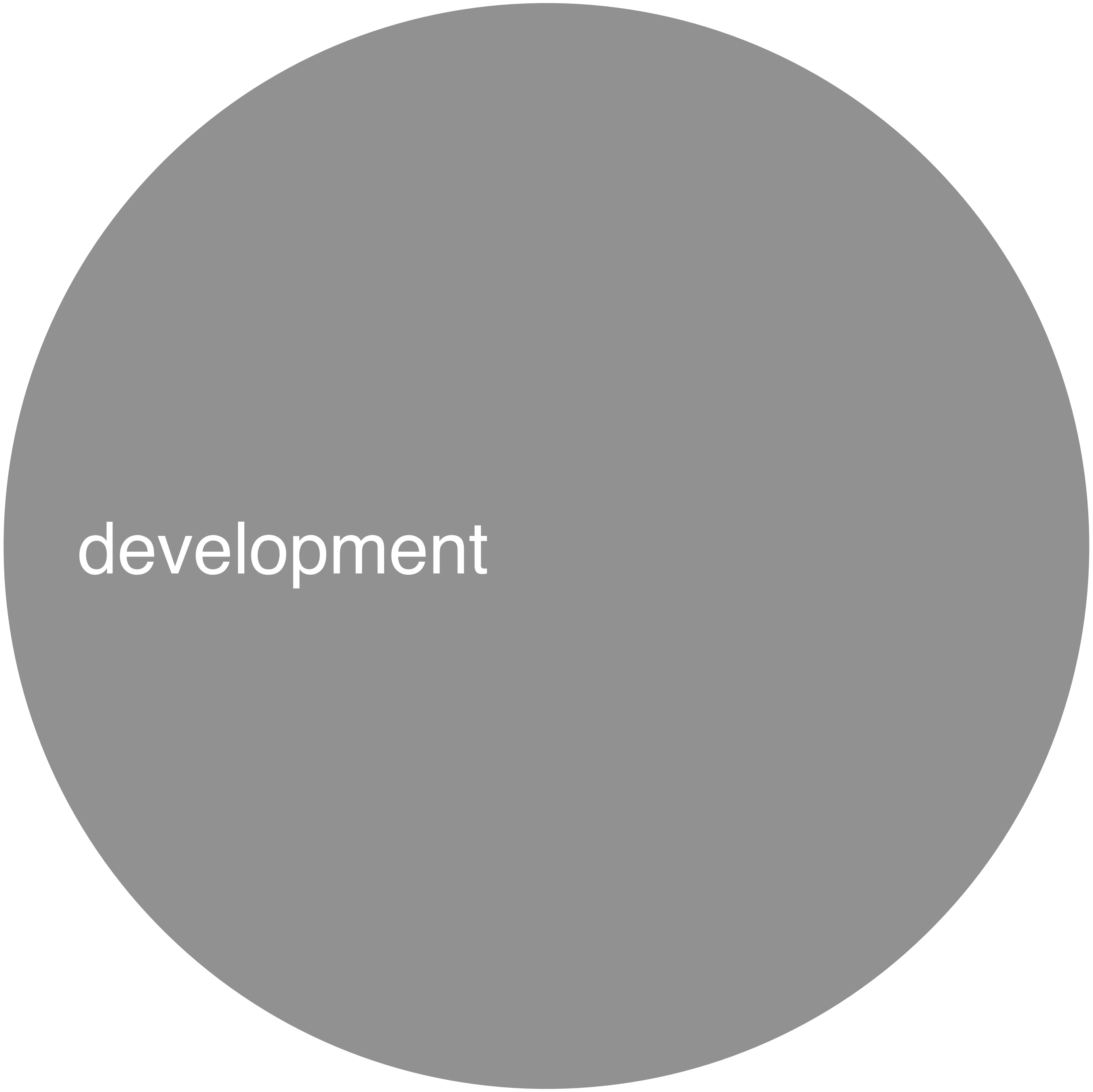
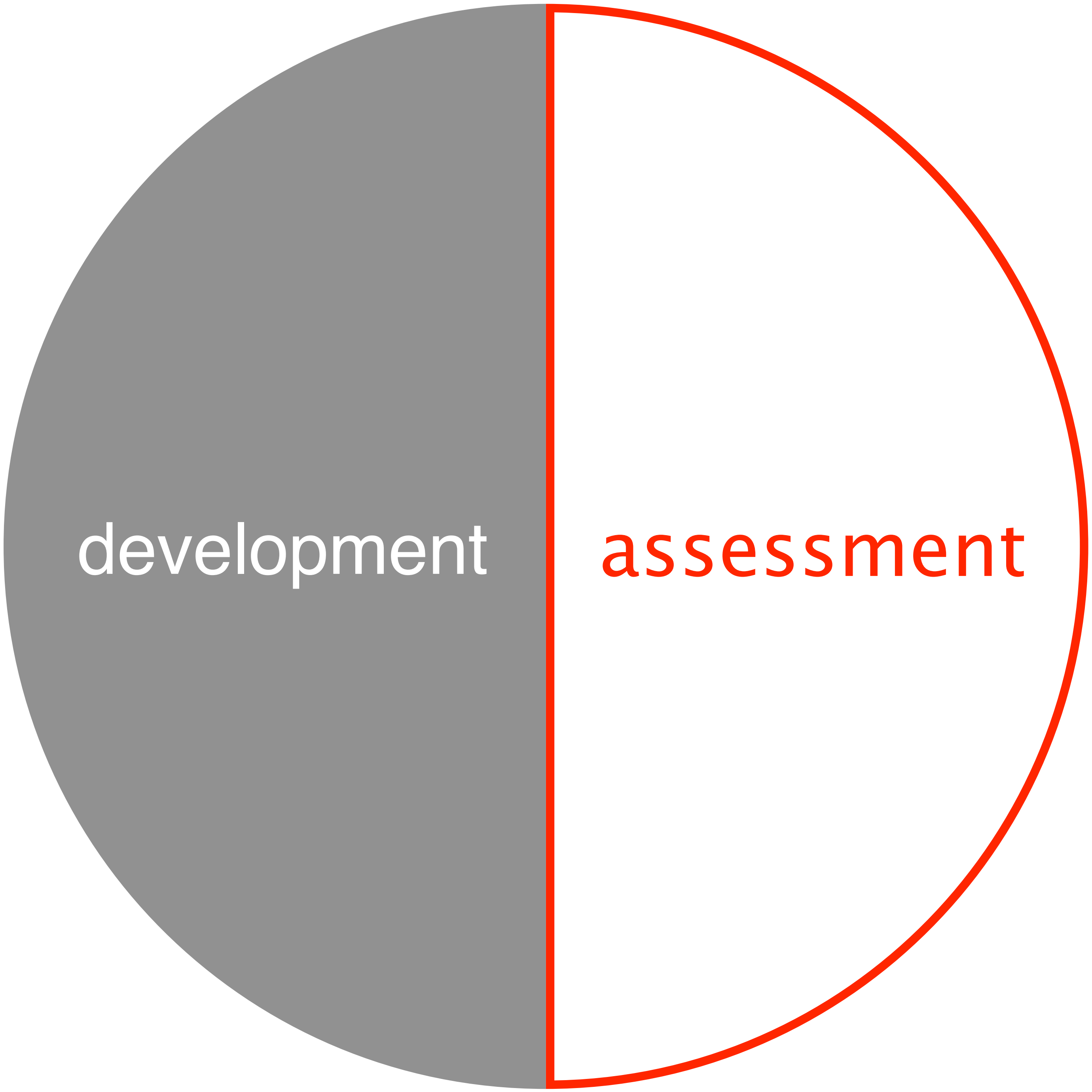


development

Tuesday, October 25, 11

When we think of software development, we think of building something. That is we do not have the system, then we develop it, and then we have it.



http://www.humane-assessment.com/minibook/assessment-costs

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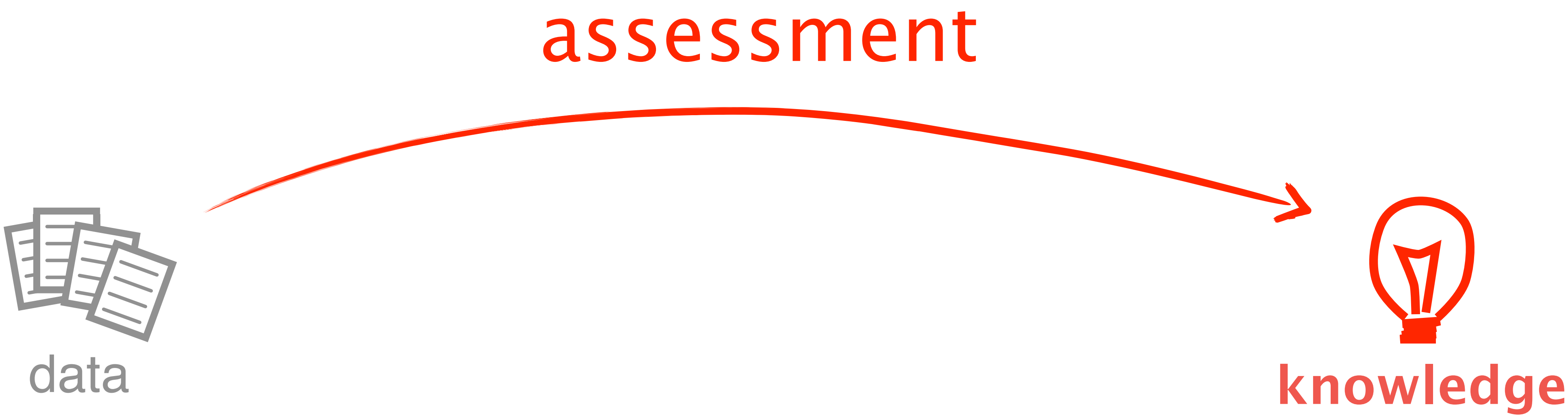
However, multiple studies show that up to 50% of the time developers do not develop, they read code as a means to understand it.

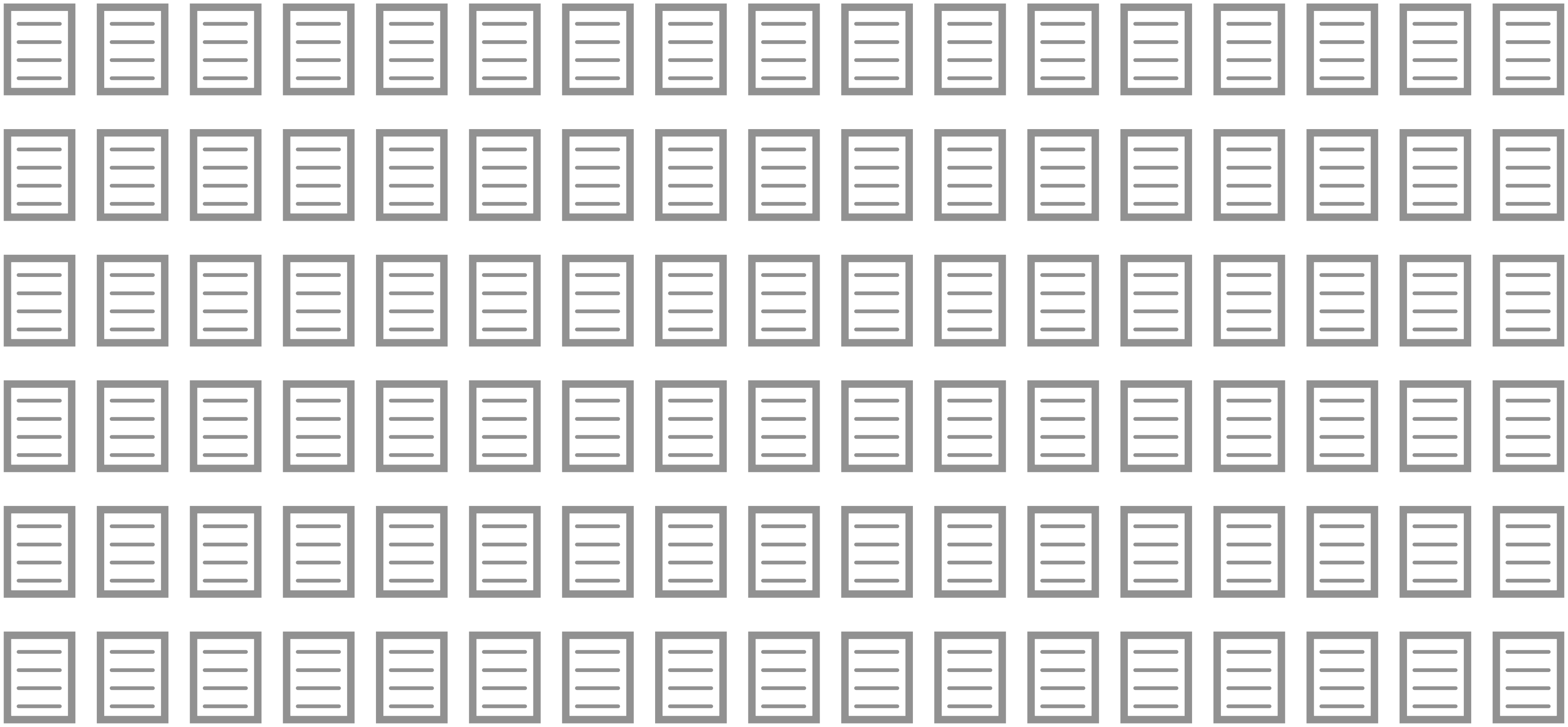
http://www.humane-assessment.com/minibook/assessment-costs



assessment

data

knowledge



Tuesday, October 25, 11

Systems are large. Supposing that you read one line in 2 seconds, it would take about one man-month of work to read a quarter million lines of code:

250’000 lines of code
* 2 = 500’000 seconds
/ 3600 = 140 hours
/ 8 = 17.5 days

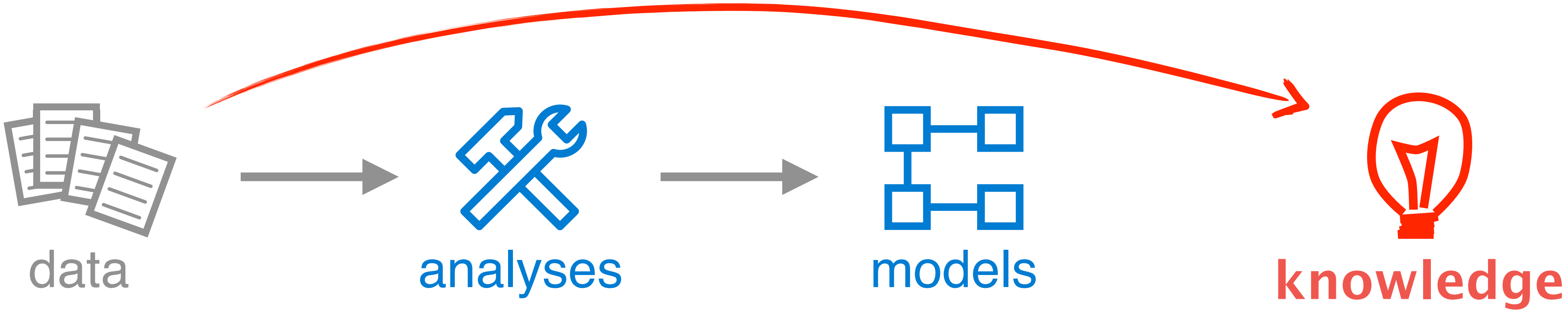
data

knowledge

data

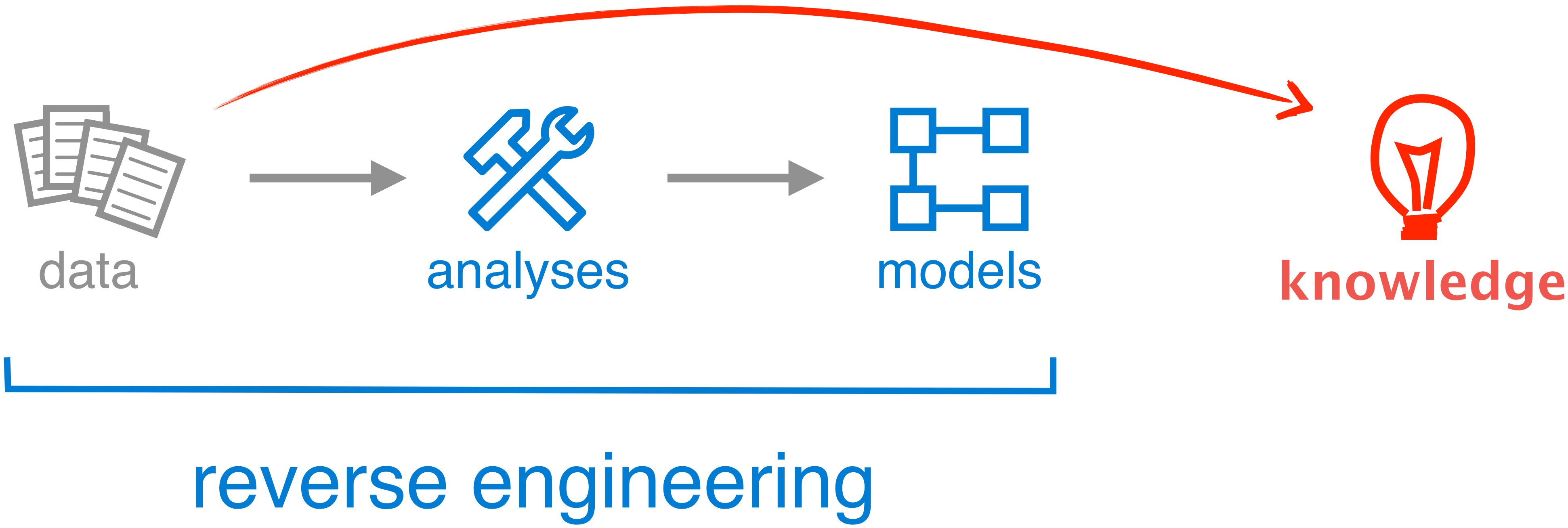
analyses

knowledge



reverse engineering is analyzing a subject system to:
- identify components and their relationships, and
- create more abstract representations

Elliot Chikofsky and James Cross II, “Reverse Engineering and Design Recovery: A Taxonomy,” IEEE Software, vol. 7, no. 1, January 1990, pp. 13–17.
http://dx.doi.org/10.1109/52.43044



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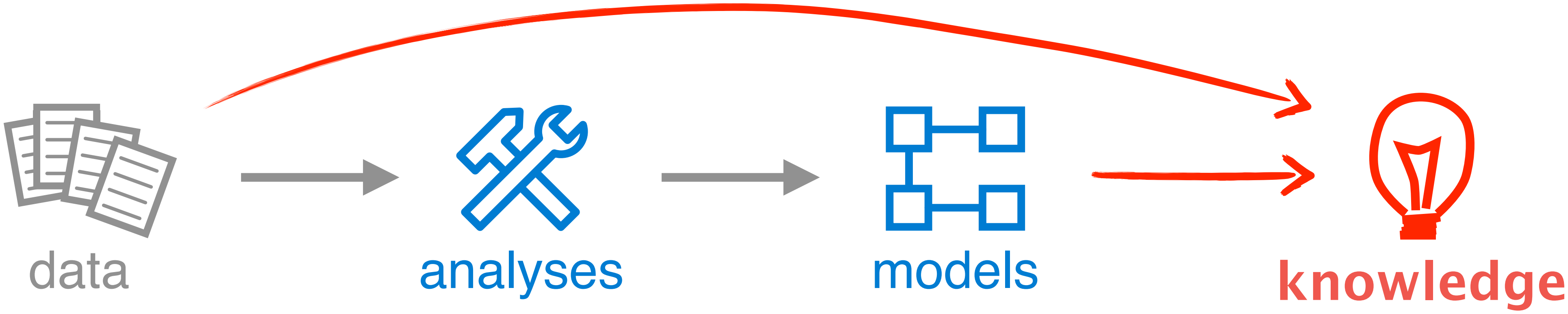
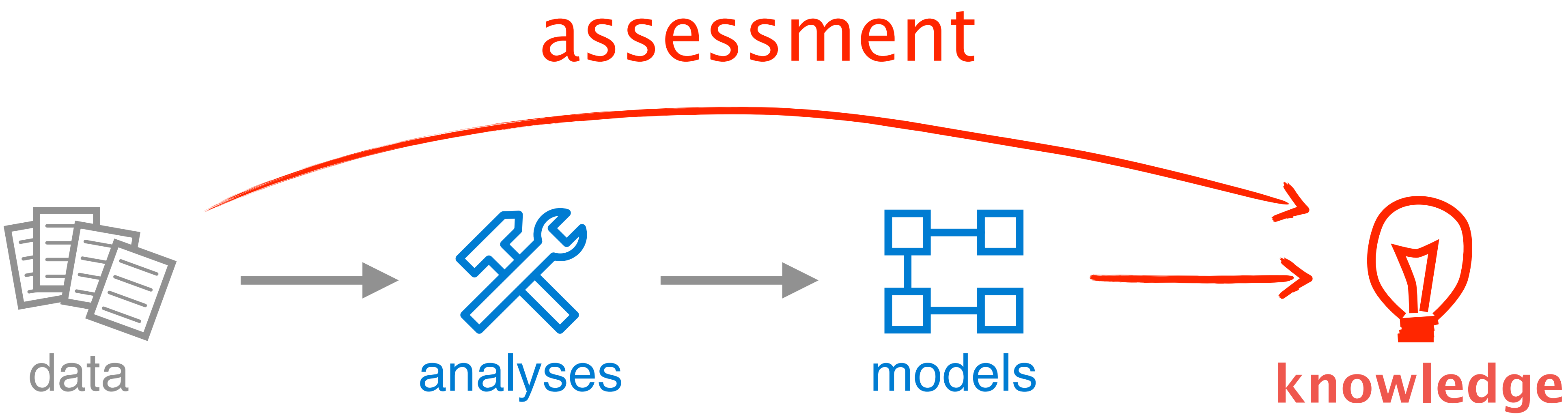


data

analyses

models

knowledge



assessment

data

analyses

models

knowledge

interview during demo

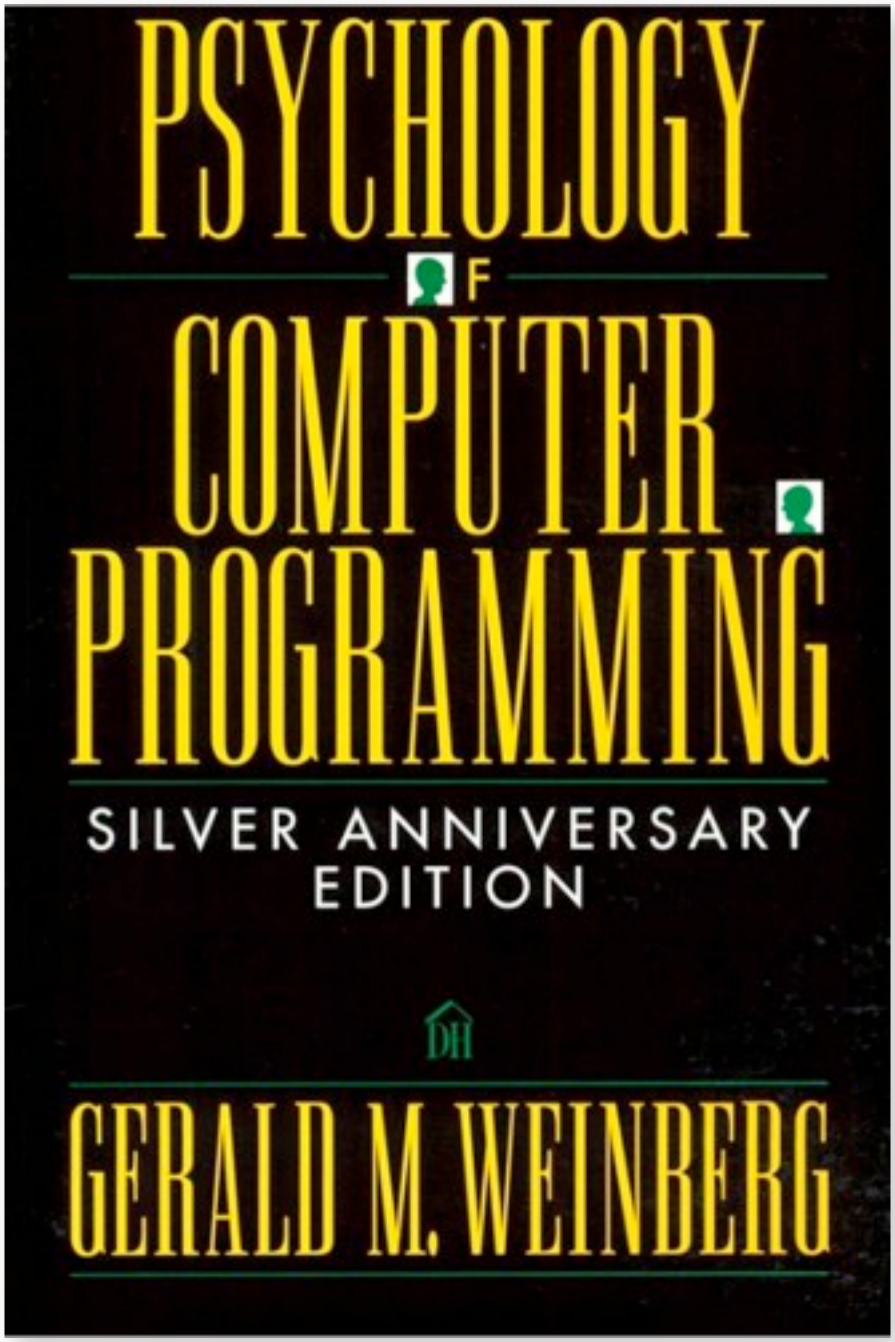
Serge Demeyer, Stéphane Ducasse, Oscar Nierstrasz

Object-Oriented Reengineering Patterns

chat with maintainers

Tuesday, October 25, 11

This book is used as inspiration for the course. The book is now open source and can be found at:
http://www.iam.unibe.ch/~scg/OORP/

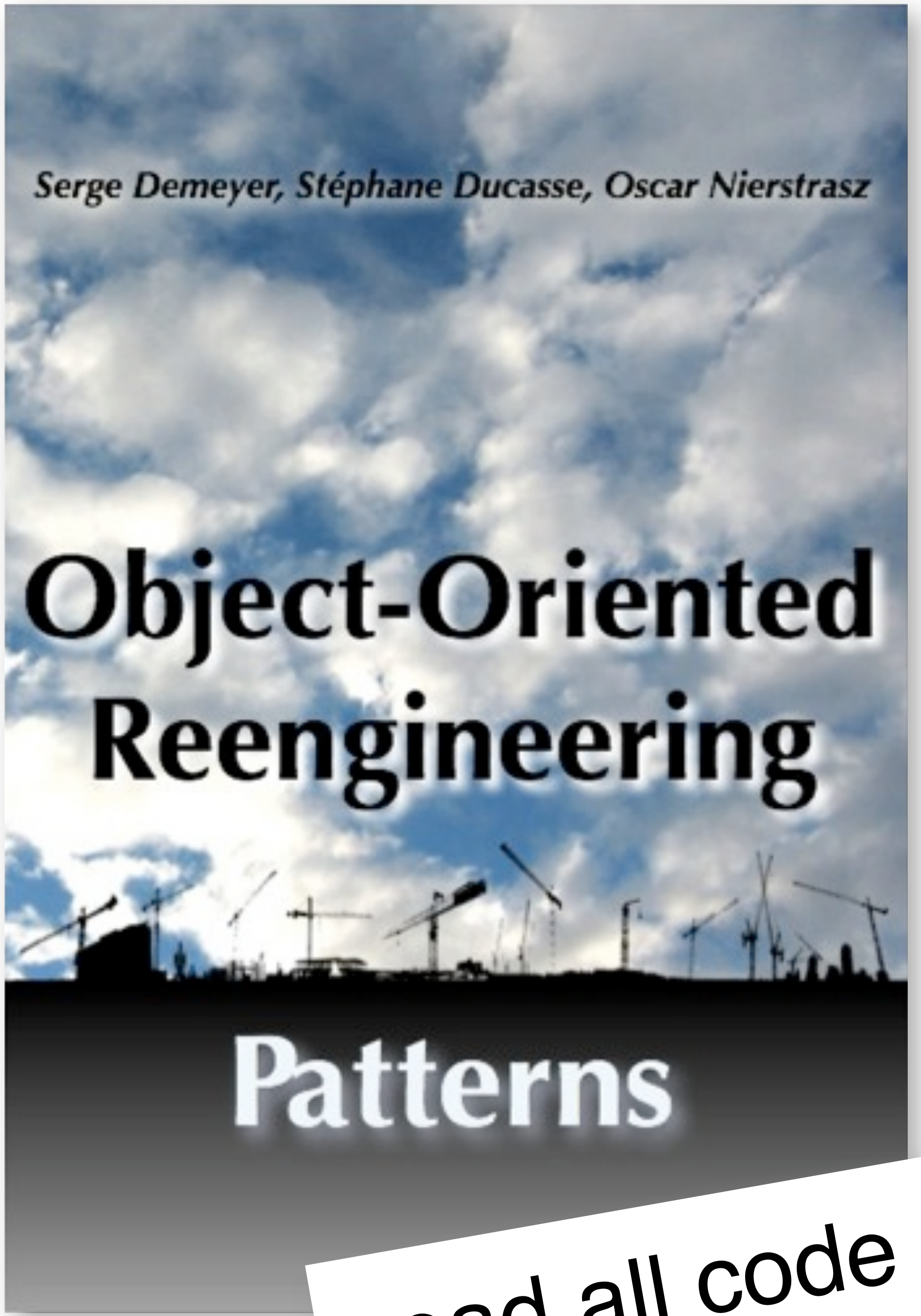


PSYCHOLOGY OF COMPUTER PROGRAMMING

SILVER ANNIVERSARY EDITION

GERALD M. WEINBERG

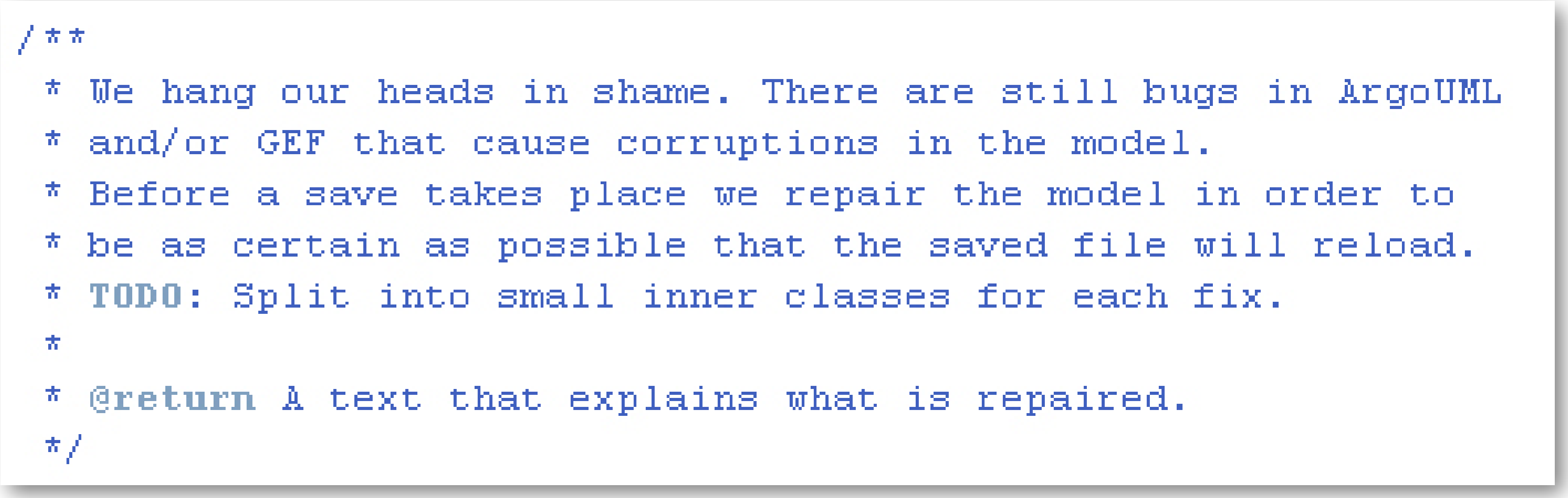
Weinberg was among the first to point out that programming is a human activity. In one of his stories, he points out how chatting around a vending machine helped solving problems. You can read about the vending machine story here:
http://www.crosstalkonline.org/storage/issue-archives/2008/200808/200808-0-Issue.pdf


Serge Demeyer, Stéphane Ducasse, Oscar Nierstrasz
Object-Oriented Reengineering
Patterns

read all code in one hour

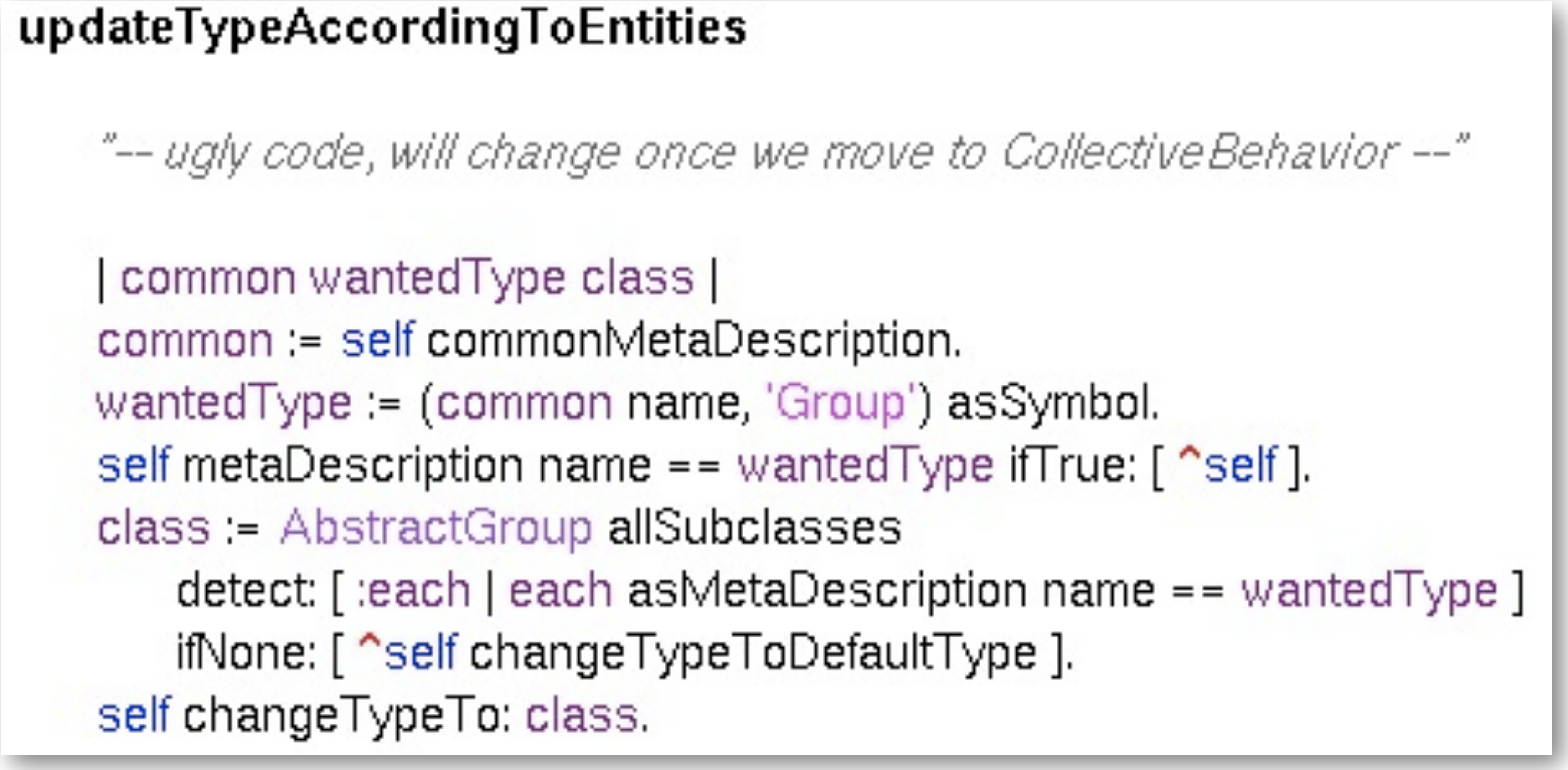
Read all code in one hour
Problem: How to get a first impression of the code?
Solution: Scan all code in one short session.
Issues:

- limit your time, and isolate from interruptions.
- use a checklist.
- look for root and abstract classes.
- beware of misleading comments.
- log your questions and findings.



```
/**
 * We hang our heads in shame. There are still bugs in ArgoUML
 * and/or GEF that cause corruptions in the model.
 * Before a save takes place we repair the model in order to
 * be as certain as possible that the saved file will reload.
 * TODO: Split into small inner classes for each fix.
 *
 * @return A text that explains what is repaired.
 */
```

Snippet from ArgoUML

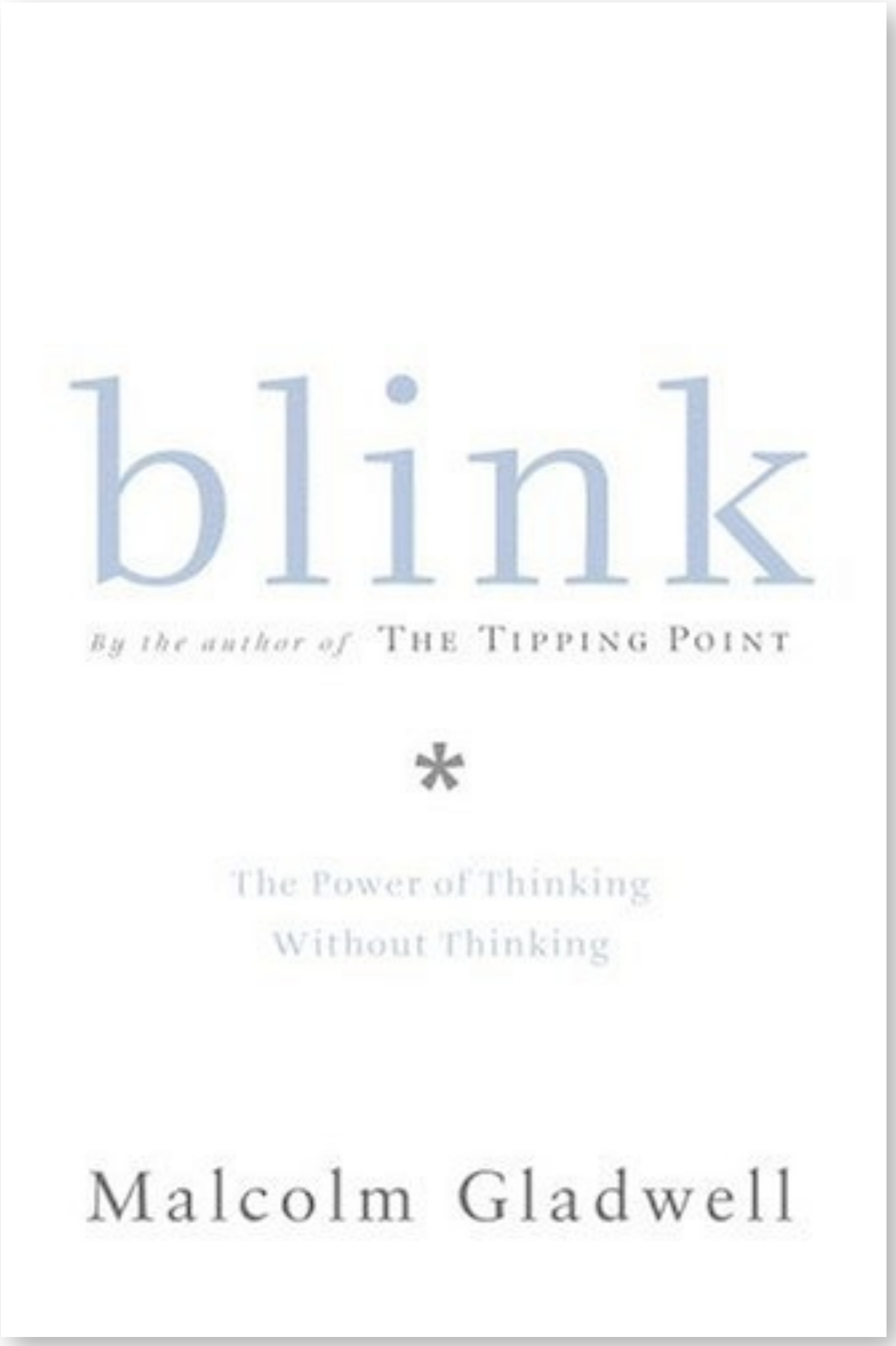


```
updateTypeAccordingToEntities

    "-- ugly code, will change once we move to CollectiveBehavior --"

    | common wantedType class |
    common := self commonMetaDescription.
    wantedType := (common name, 'Group') asSymbol.
    self metaDescription name == wantedType ifTrue: [ ^self ].
    class := AbstractGroup allSubclasses
        detect: [ :each | each asMetaDescription name == wantedType ]
        ifNone: [ ^self changeTypeToDefaultType ].
    self changeTypeTo: class.
```

Snippet from an old Moose

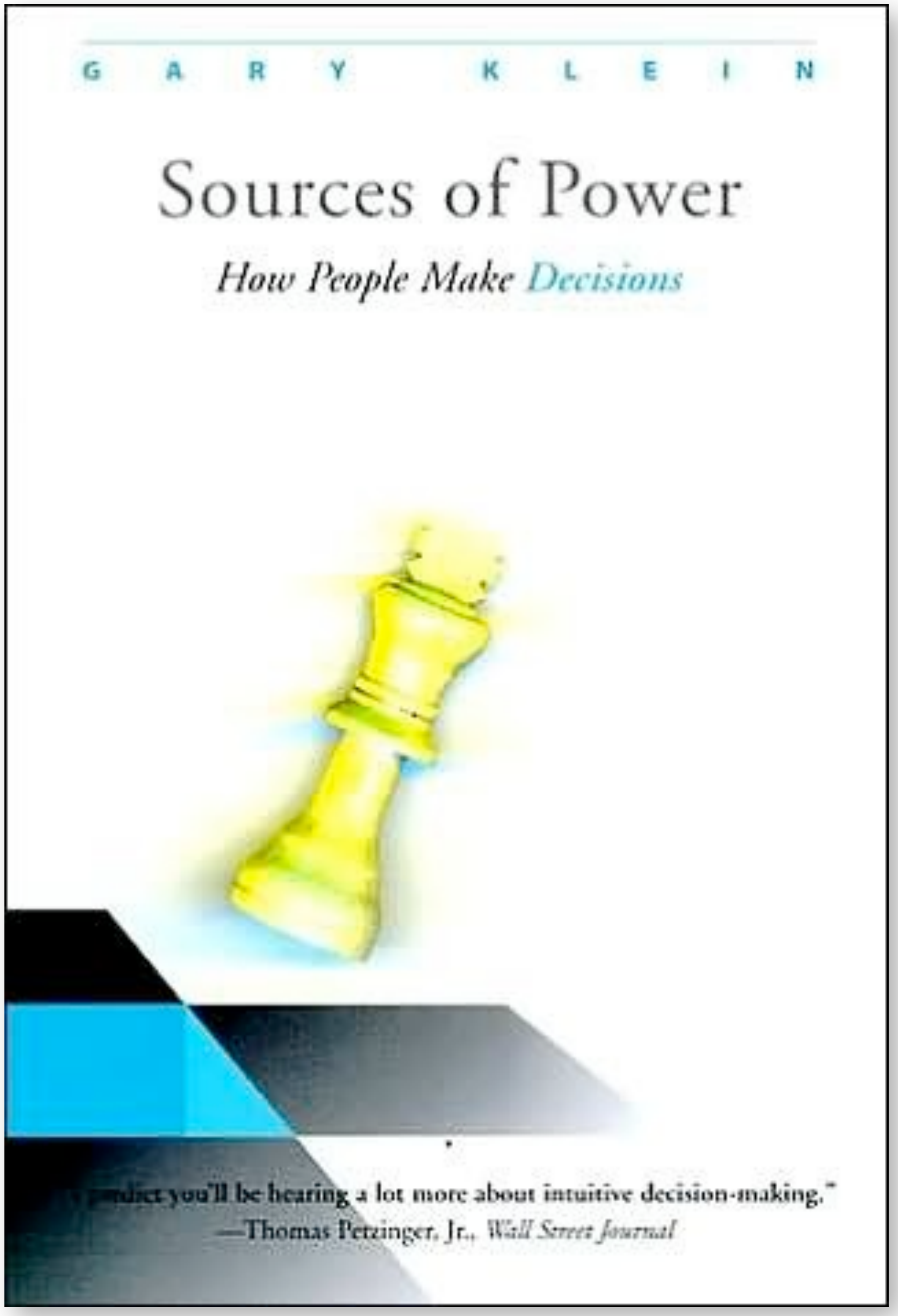

blink

By the author of THE TIPPING POINT

*

The Power of Thinking Without Thinking

Malcolm Gladwell


GARY KLEIN

Sources of Power

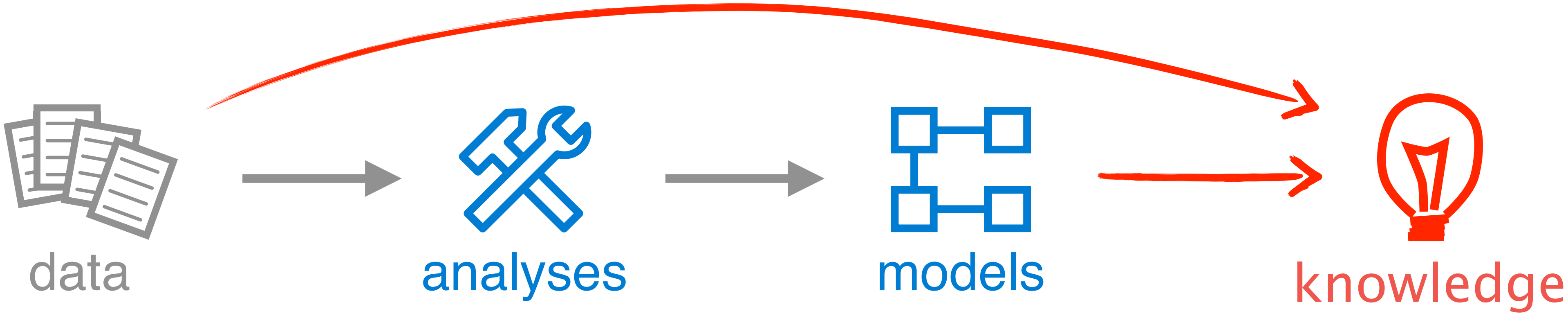
How People Make Decisions

"I predict you'll be hearing a lot more about intuitive decision-making."
—Thomas Petzinger, Jr., *Wall Street Journal*

I took a course in speed reading and read “War and Peace” in twenty minutes. It’s about Russia. - Woody Allen

Why read all code in 1 hour? Because we have a built-in mechanism to think fast.

Get a first impression, but do not rely on it.
Use it for guiding your future investigations.



Tuesday, October 25, 11

What is an analysis in general?

Webster’s definition of analysis:
- Detailed examination of the elements or structure of something, typically as a basis for discussion or interpretation.
- The process of separating something into its constituent elements. Often contrasted with synthesis.

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
  private boolean hasBook(Book b) {…}
  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = ?

Here is a small example: How many methods are there in this class?

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
  private boolean hasBook(Book b) {…}
  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = 7

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
  private boolean hasBook(Book b) {…}
  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = ~~7~~ 6

But, is a constructor a method? If the metric computation does not consider it as a method, we get 6 instead of 7.

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
  private boolean hasBook(Book b) {…}
  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = ~~7~~ ~~6~~ 4

What about setters and getters? Are they to be considered as methods? If no, we have only 4.

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
  private boolean hasBook(Book b) {…}
  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = ~~7~~ ~~6~~ ~~4~~ 3

Do we count the private methods as well? Perhaps the metrics is just about the public ones. In this case, we actually have only 3 methods.

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
  private boolean hasBook(Book b) {…}
  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = ~~7~~ ~~6~~ ~~4~~ ~~3~~ 2

equals() is a method expected by Java, so we might as well not consider it a real method.

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
  public void removeBook(Book b) {…}
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  public boolean equals(…) {…}
}
```

NOM = 7, 6, 4, 3, 2 ?

So how many methods are there? All these are valid answers depending on what we understand by the question.

Now, if we turn the situation around, and you get a report that says a class has 70 methods. What does it mean? You have to know what the actual computation does.

And this is a simple metric.

```
public class Library {
  List books;
  public Library() {…}
  public void addBook(Book b) {…}
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  protected List getBooks() {…}
  protected void setBooks(List books) {…}
  public boolean equals(…) {…}
}
```

NOM = 7, 6, 4, 3, 2 ?

your responsibility

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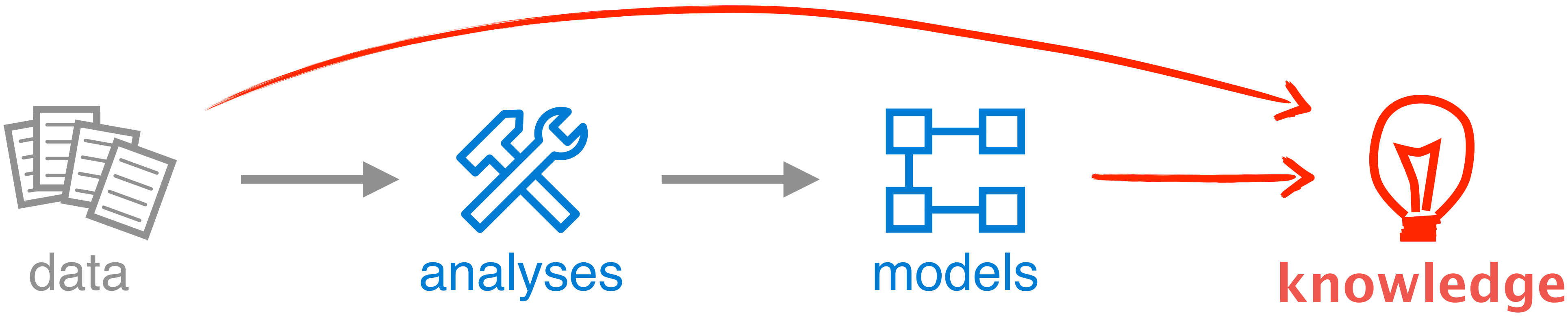

data

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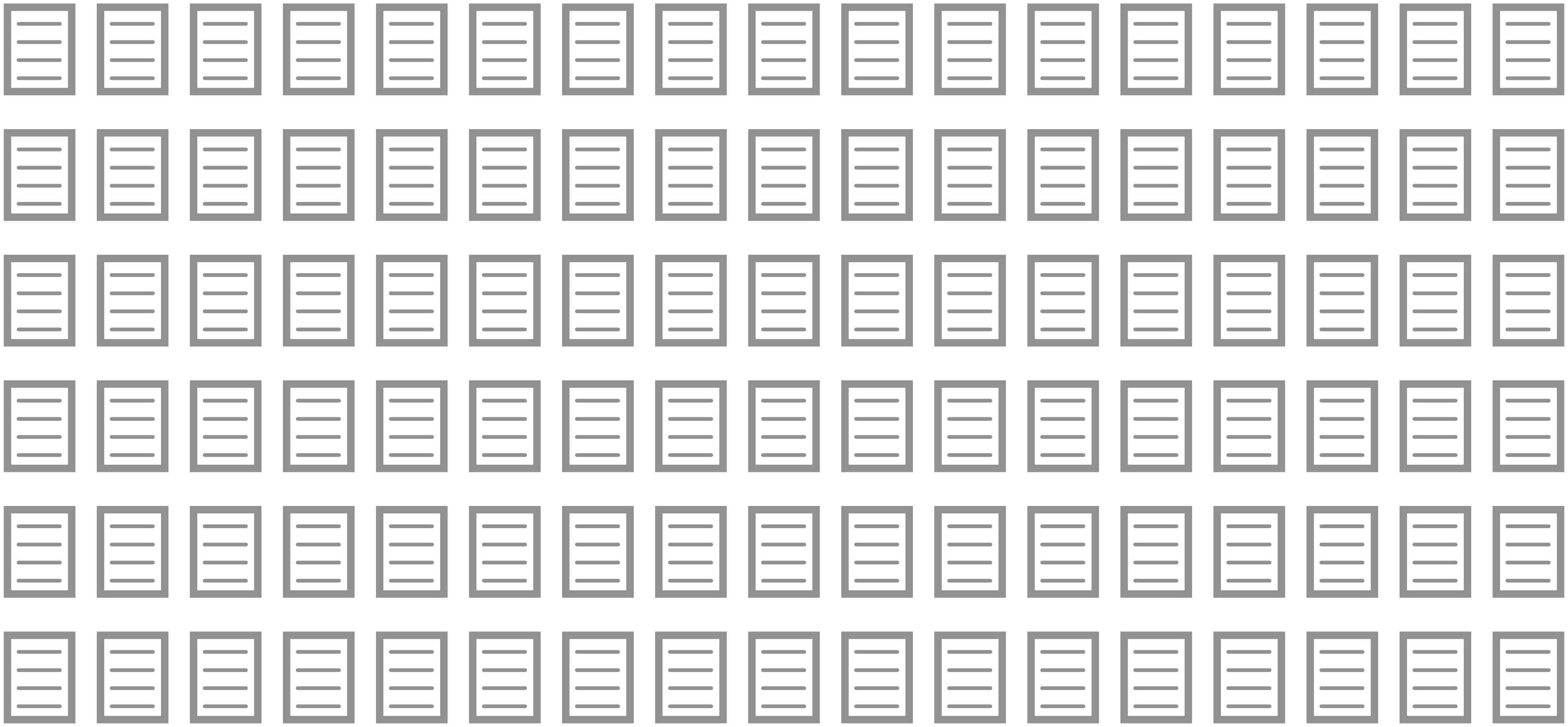

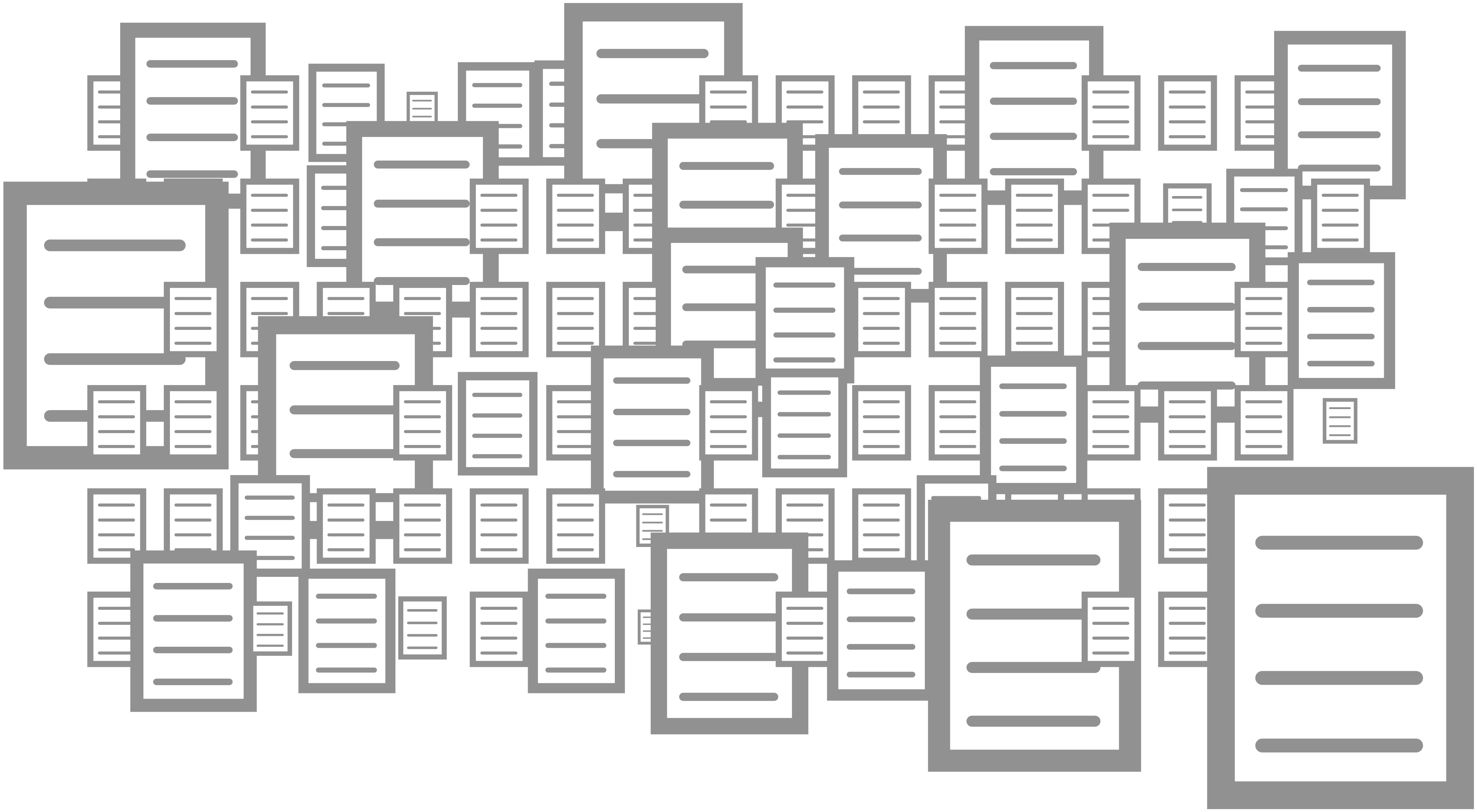

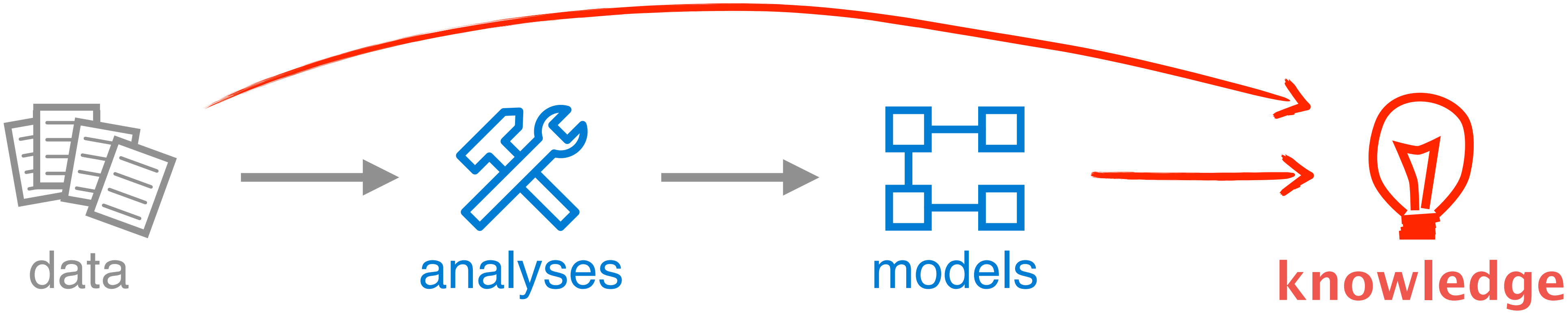
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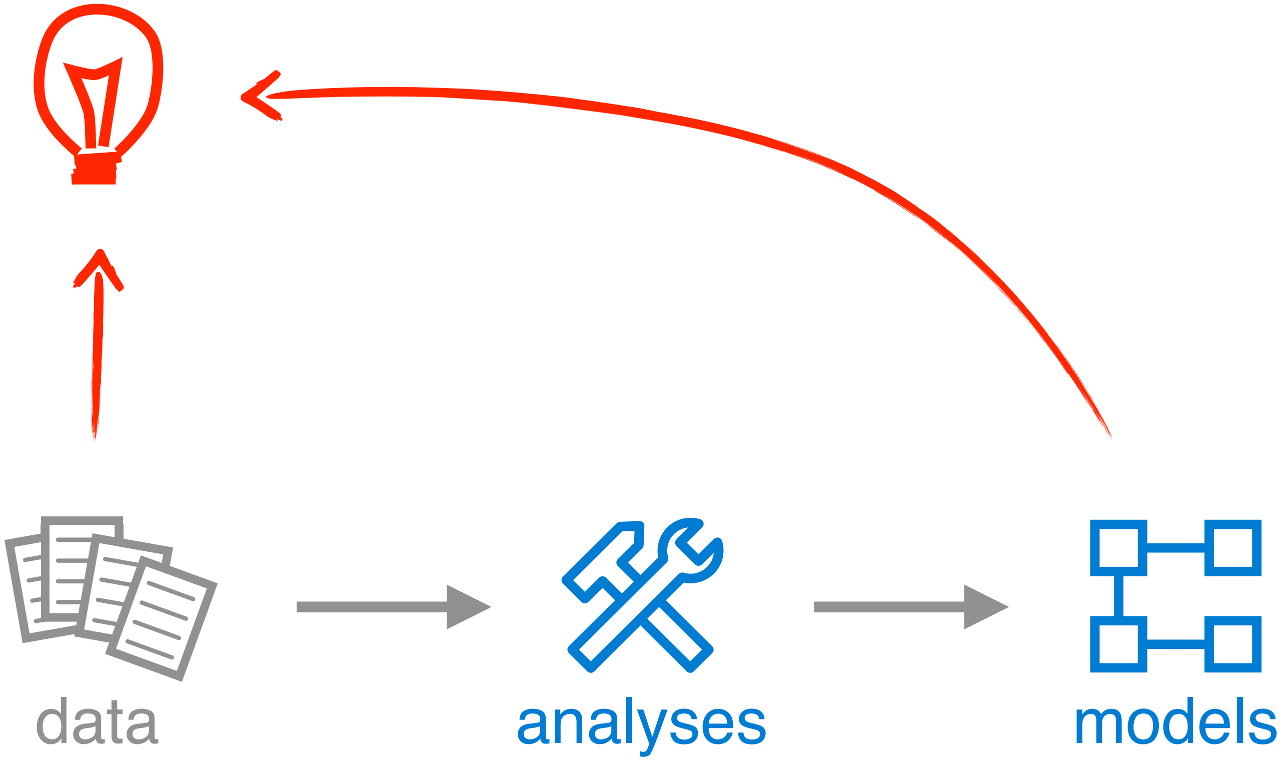

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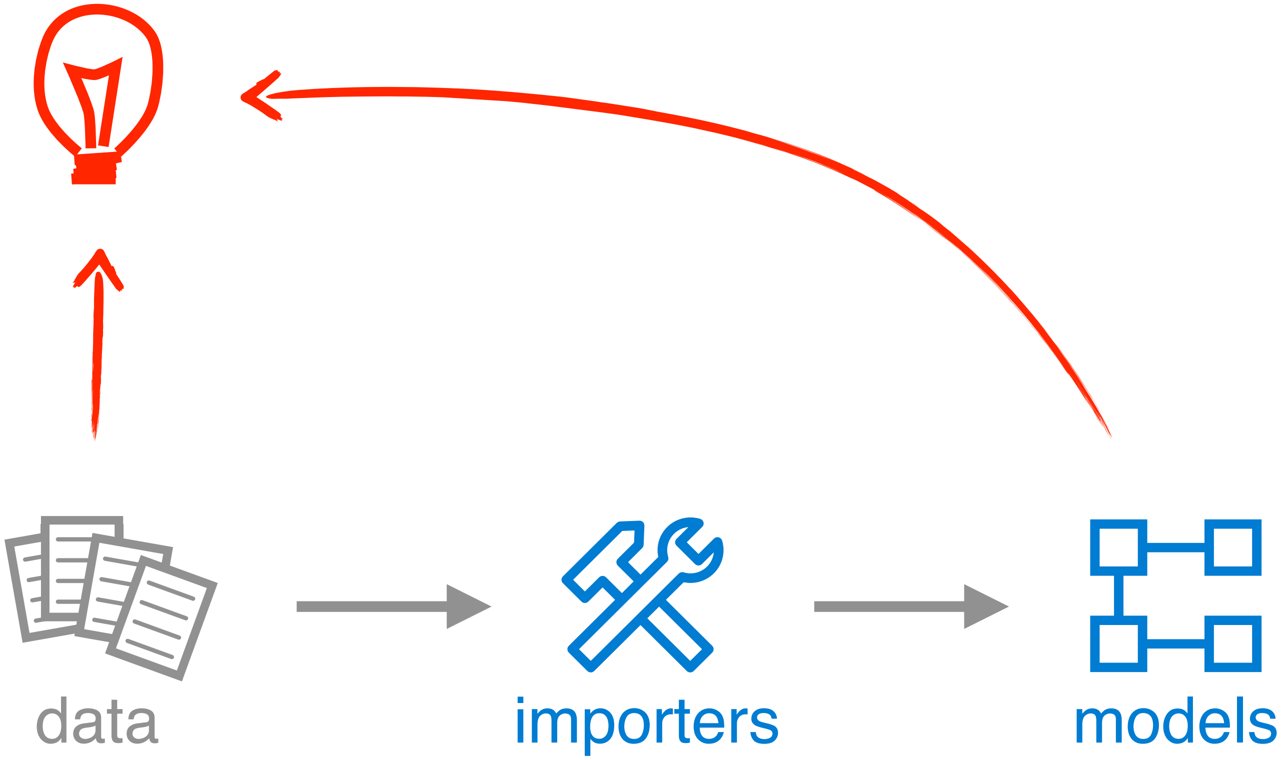
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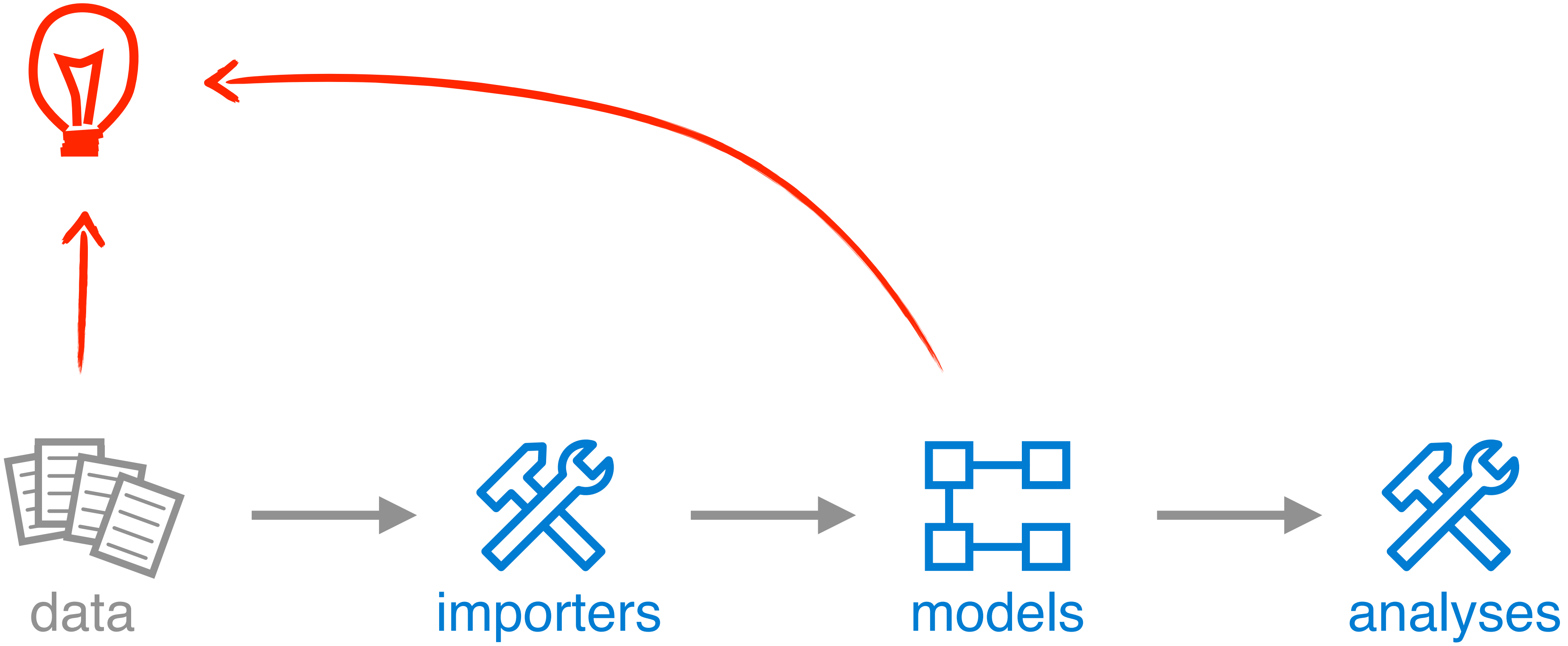
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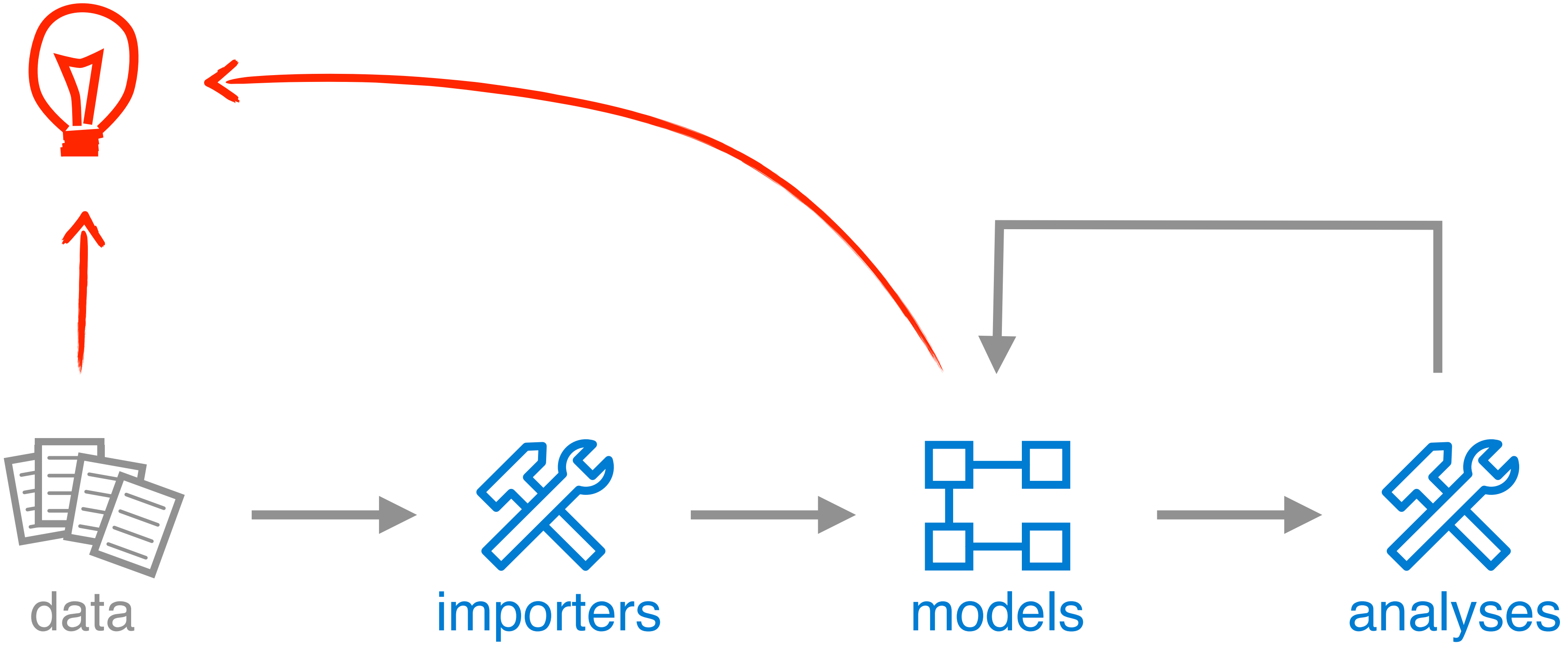
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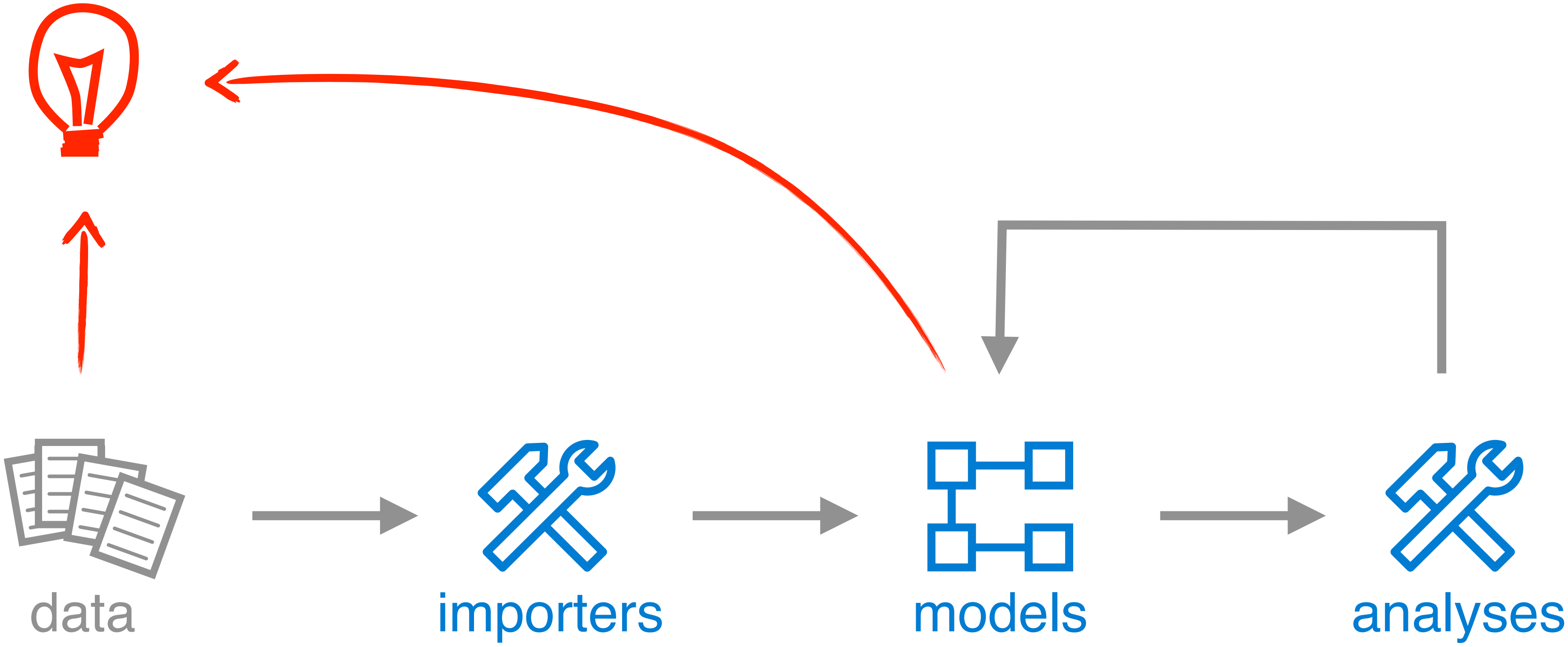
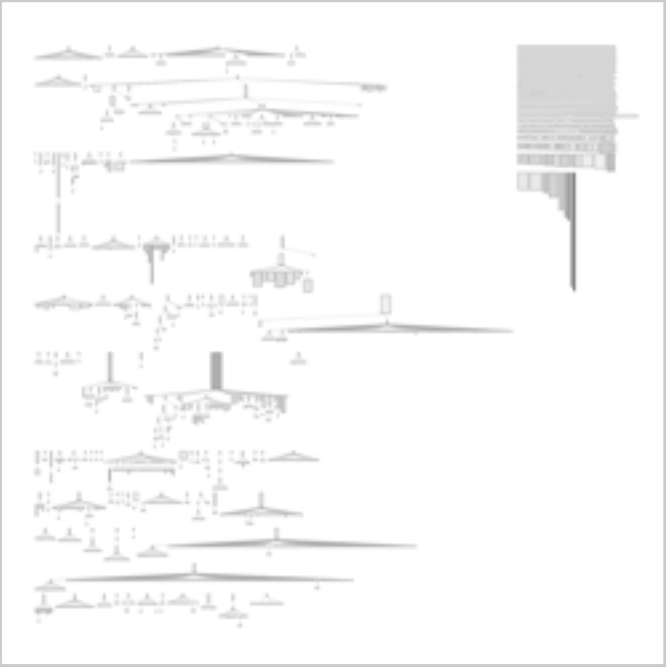


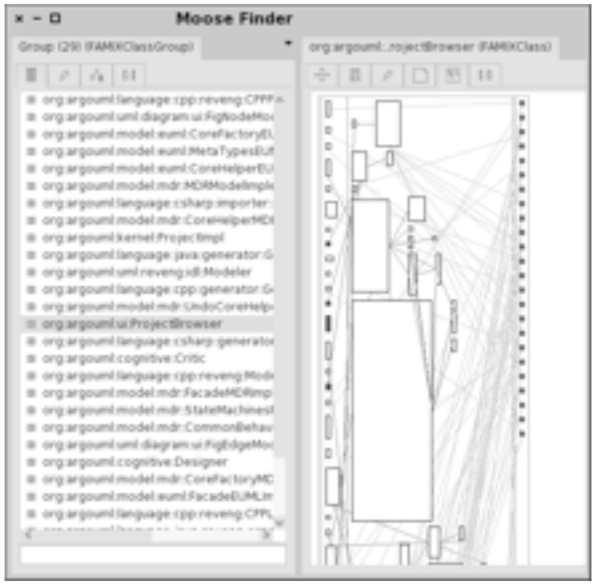
moosetechnology.org

classes select: #isAnnotated

McCabe = 21

LOC = 753,000




Moose Finder
Group (29) (FAMIXClassGroup)
org:argouml:..rojectBrowser (FAMIXClass)

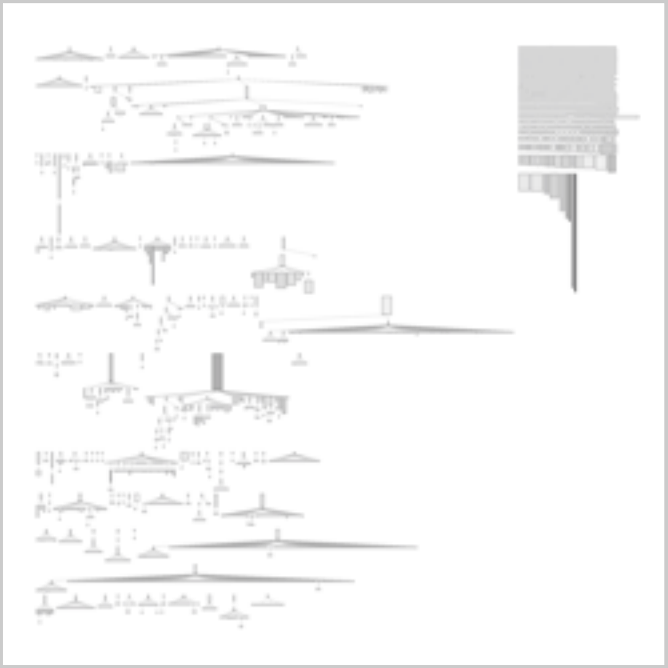
- org:argouml:language:cpp:reveng:CPPF
- org:argouml:uml:diagram:ui:FigNodeMo
- org:argouml:model:euml:CoreFactoryEU
- org:argouml:model:euml:MetaTypesEU
- org:argouml:model:euml:CoreHelperEU
- org:argouml:model:mdr:MDRModelImple
- org:argouml:language:csharp:importer:
- org:argouml:model:mdr:CoreHelperMD
- org:argouml:kernel:ProjectImpl
- org:argouml:language:java:generator:G
- org:argouml:uml:reveng:idl:Modeler
- org:argouml:language:cpp:generator:G
- org:argouml:model:mdr:UndoCoreHelp
- org:argouml:ui:ProjectBrowser
- org:argouml:language:csharp:generato
- org:argouml:cognitive:Critic
- org:argouml:language:cpp:reveng:Mod
- org:argouml:model:mdr:FacadeMDRImp
- org:argouml:model:mdr:StateMachines
- org:argouml:model:mdr:CommonBehav
- org:argouml:uml:diagram:ui:FigEdgeMo
- org:argouml:cognitive:Designer
- org:argouml:model:mdr:CoreFactoryMD
- org:argouml:model:euml:FacadeEUMLIm
- org:argouml:language:cpp:reveng:CPPL

• • •

classes select: #isGod

McCabe = 21

LOC = 753,000



Moose Finder

Group (29) (FAMIXClassGroup)

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- org::argouml::model::mdr::CoreFactoryMD
- org::argouml::model::euml::FacadeEUMLIr
- org::argouml::language::cpp::reveng::CPPL

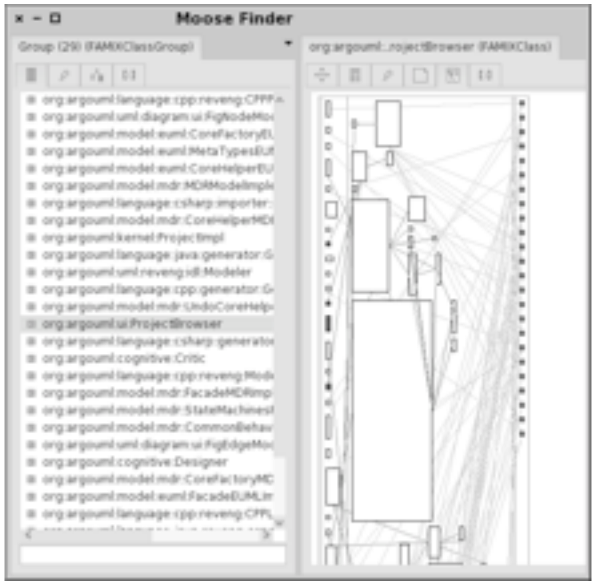
org::argouml::...rojectBrowser (FAMIXClass)

• • •

classes select: #isGod

McCabe = 21

LOC = 753,000


Moose Finder
Group (29) (FAMIXClassGroup)
org::argouml...rojectBrowser (FAMIXClass)

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- org::argouml::model::mdr::CommonBehav
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- org::argouml::model::euml::FacadeEUMLIr
- org::argouml::language::cpp::reveng::CPPL

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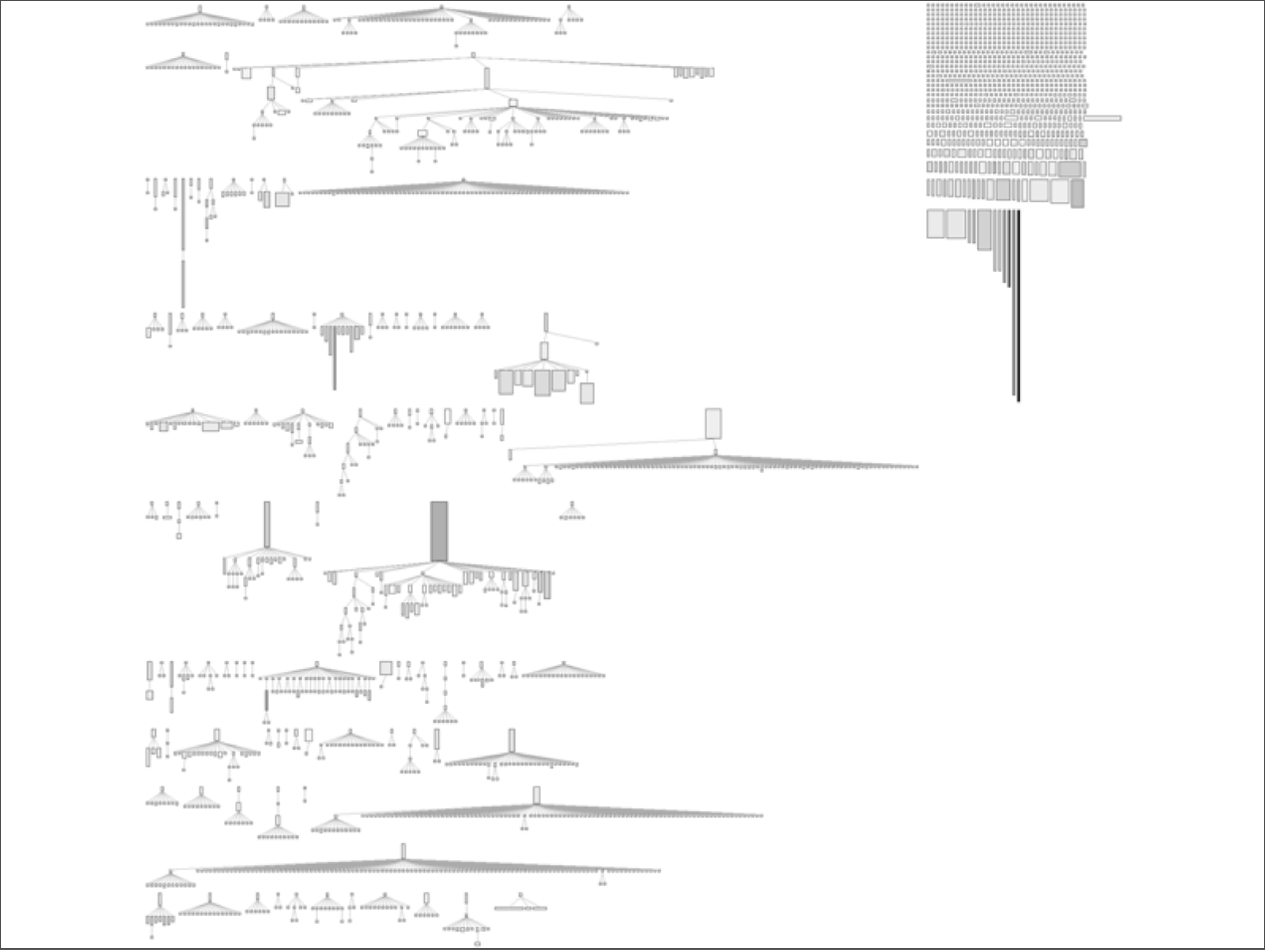
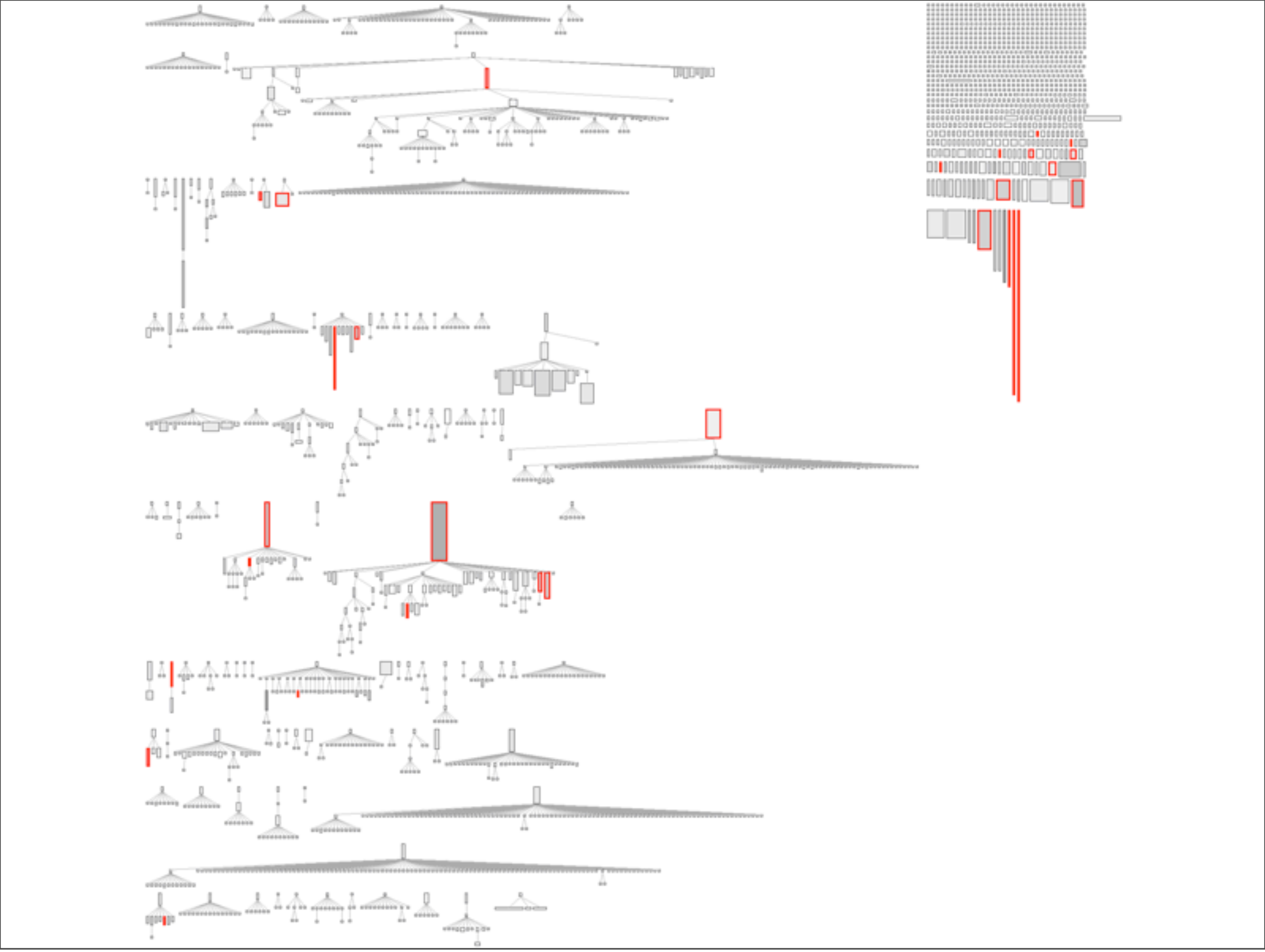


Tuesday, October 25, 11

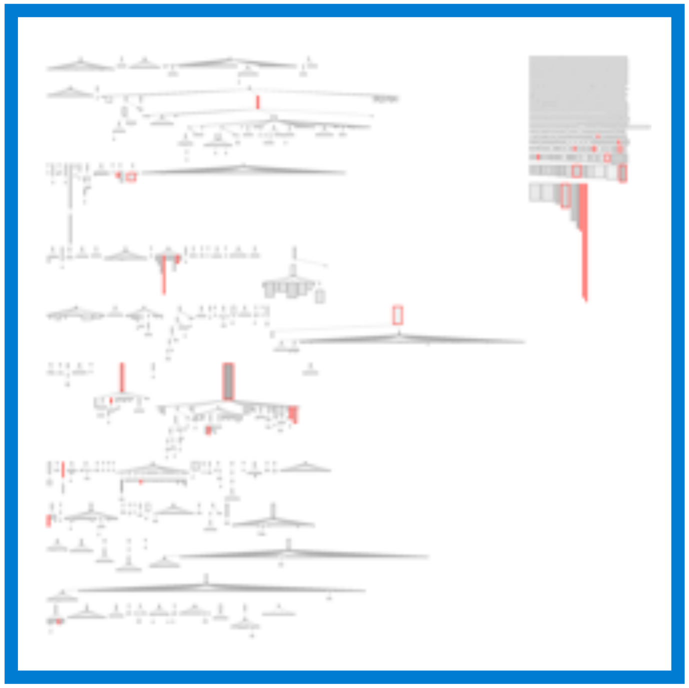


Tuesday, October 25, 11

classes select: #isGod

McCabe = 21

LOC = 753,000



Moose Finder

Group (29) (FAMIXClassGroup)

org:argouml::rojectBrowser (FAMIXClass)

- org:argouml:language:cpp:reveng:CPPF
- org:argouml:uml:diagram:ui:FigNodeMo
- org:argouml:model:euml:CoreFactoryEL
- org:argouml:model:euml:MetaTypesEU
- org:argouml:model:euml:CoreHelperEU
- org:argouml:model:mdr:MDRModelImpl
- org:argouml:language:csharp:importer:
- org:argouml:model:mdr:CoreHelperMD
- org:argouml:kernel:ProjectImpl
- org:argouml:language:java:generator:G
- org:argouml:uml:reveng:idl:Modeler
- org:argouml:language:cpp:generator:G
- org:argouml:model:mdr:UndoCoreHelp
- org:argouml:ui:ProjectBrowser
- org:argouml:language:csharp:generato
- org:argouml:cognitive:Critic
- org:argouml:language:cpp:reveng:Mod
- org:argouml:model:mdr:FacadeMDRImp
- org:argouml:model:mdr:StateMachines
- org:argouml:model:mdr:CommonBehav
- org:argouml:uml:diagram:ui:FigEdgeMo
- org:argouml:cognitive:Designer
- org:argouml:model:mdr:CoreFactoryMD
- org:argouml:model:euml:FacadeEUMLIn
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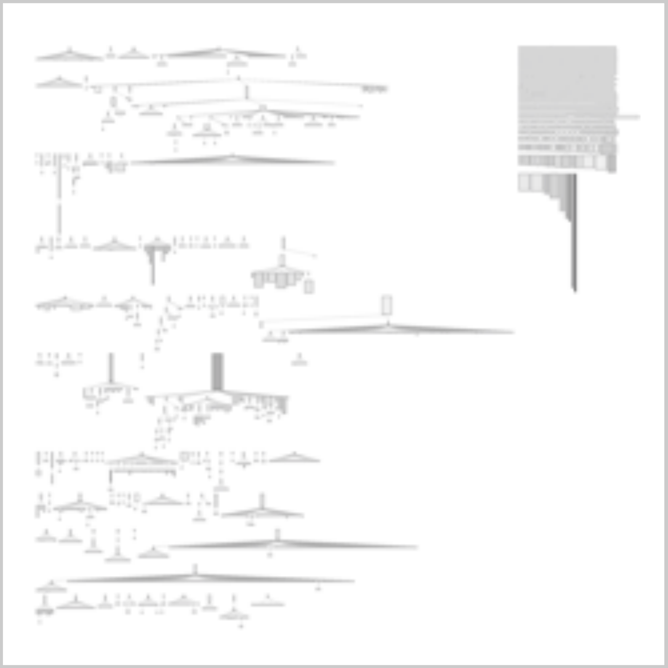

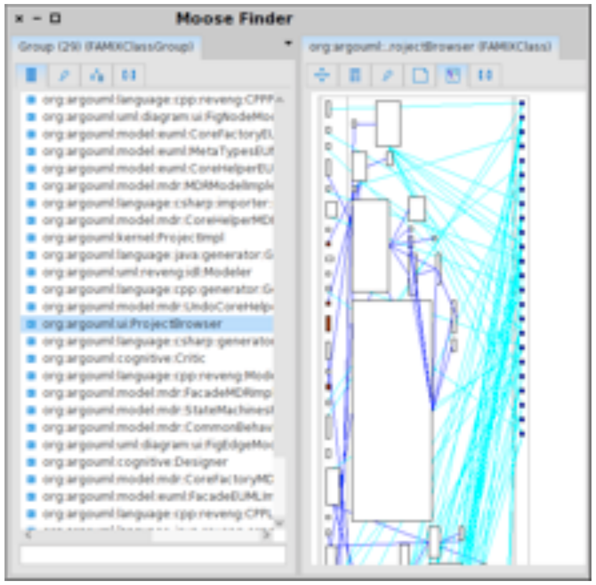

Moose Finder

Group (29) (FAMIXClassGroup)

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- org:argouml:language:cpp:reveng:CPPF
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- org:argouml:model:mdr:MDRModelImpl
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- org:argouml:kernel:ProjectImpl
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- org:argouml:language:cpp:reveng:CPPL

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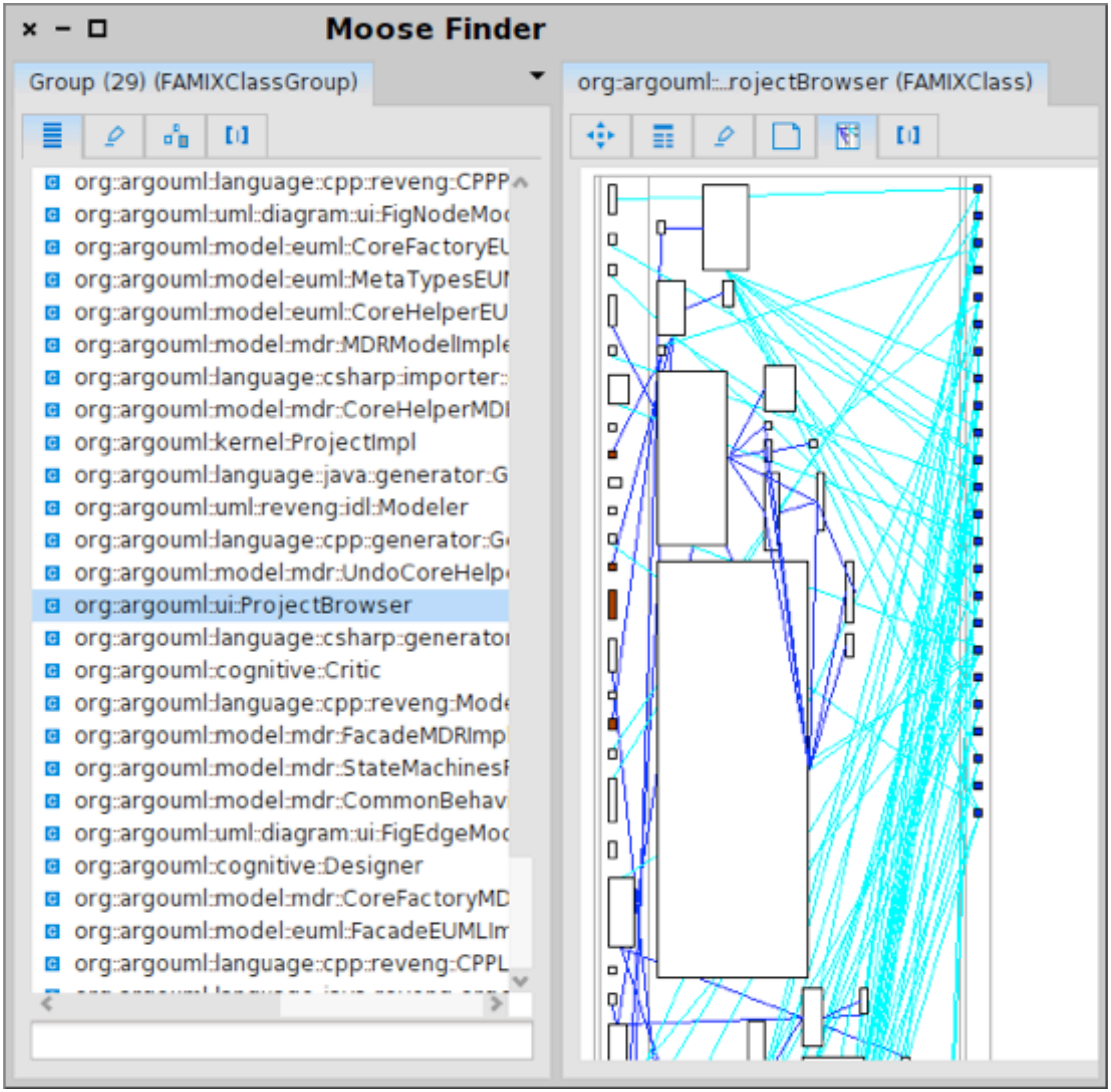

Moose Finder

Group (29) (FAMIXClassGroup)

org::argouml::...rojectBrowser (FAMIXClass)

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org::argouml::model::euml::MetaTypesEUI
org::argouml::model::euml::CoreHelperEU
org::argouml::model::mdr::MDRModelImple
org::argouml::language::csharp::importer::
org::argouml::model::mdr::CoreHelperMDI
org::argouml::kernel::ProjectImpl
org::argouml::language::java::generator::G
org::argouml::uml::reveng::idl::Modeler
org::argouml::language::cpp::generator::G
org::argouml::model::mdr::UndoCoreHelp
org::argouml::ui::ProjectBrowser
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org::argouml::cognitive::Critic
org::argouml::language::cpp::reveng::Mode
org::argouml::model::mdr::FacadeMDRImp
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org::argouml::model::euml::FacadeEUMLIm
org::argouml::language::cpp::reveng::CPPL

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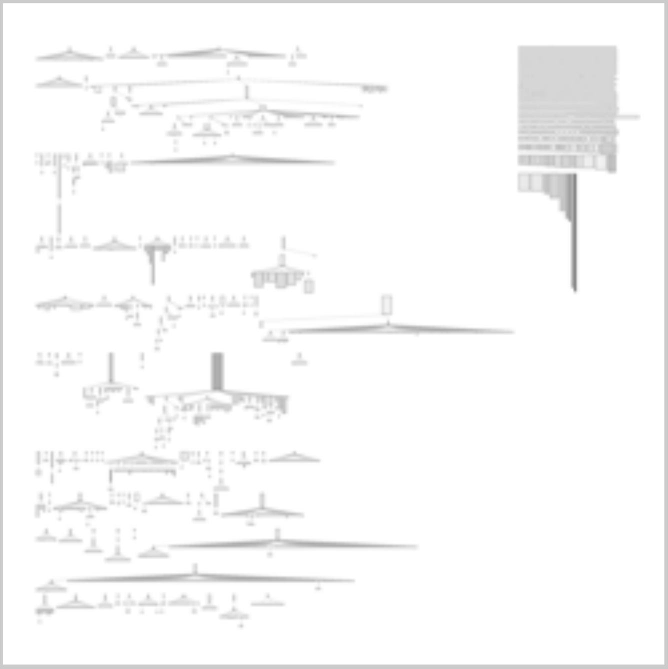

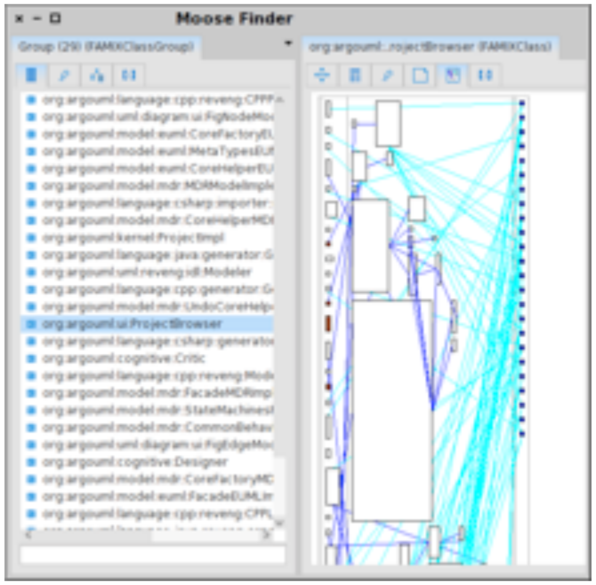
Moose Finder
Group (29) (FAMIXClassGroup)
org:argouml:..rojectBrowser (FAMIXClass)

- org:argouml:language:cpp:reveng:CPPP
- org:argouml:uml:diagram:ui:FigNodeMo
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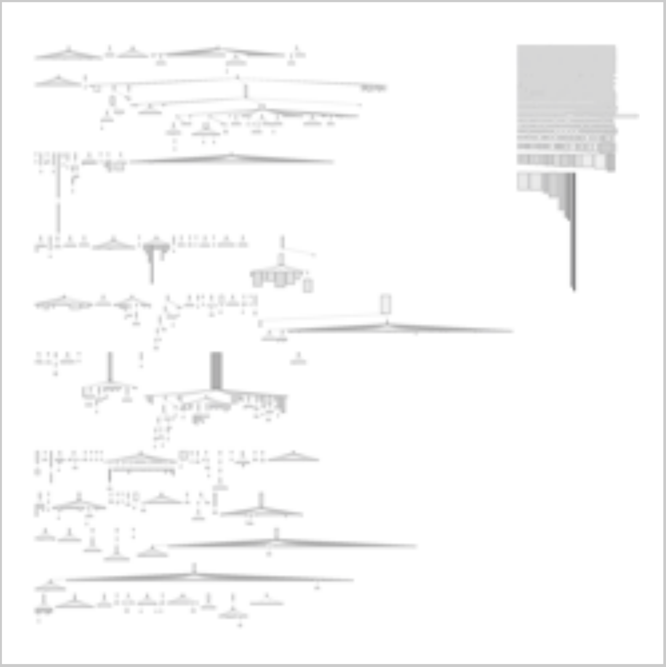

Group (29) (FAMIXClassGroup)

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- org::argouml::uml::diagram::ui::FigNodeMo
- org::argouml::model::euml::CoreFactoryEL
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org::argouml...rojectBrowser (FAMIXClass)

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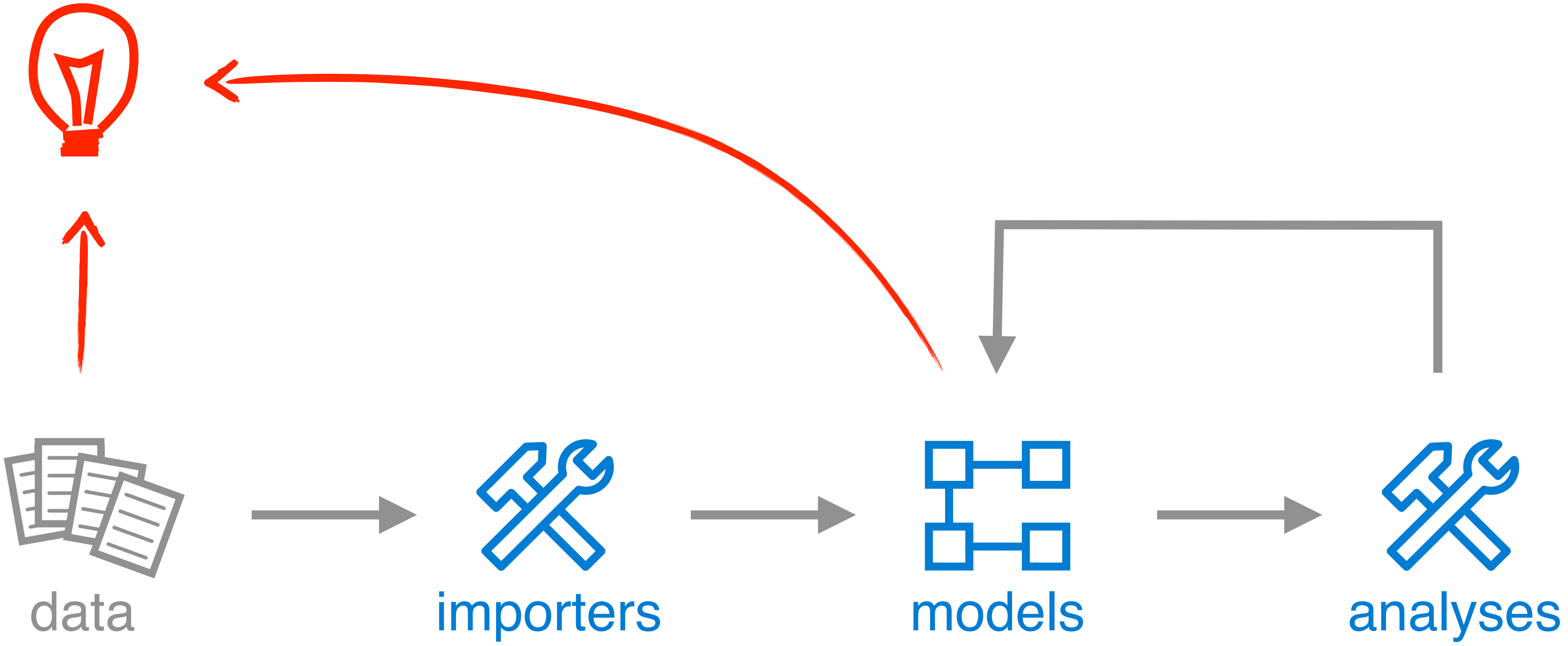
data
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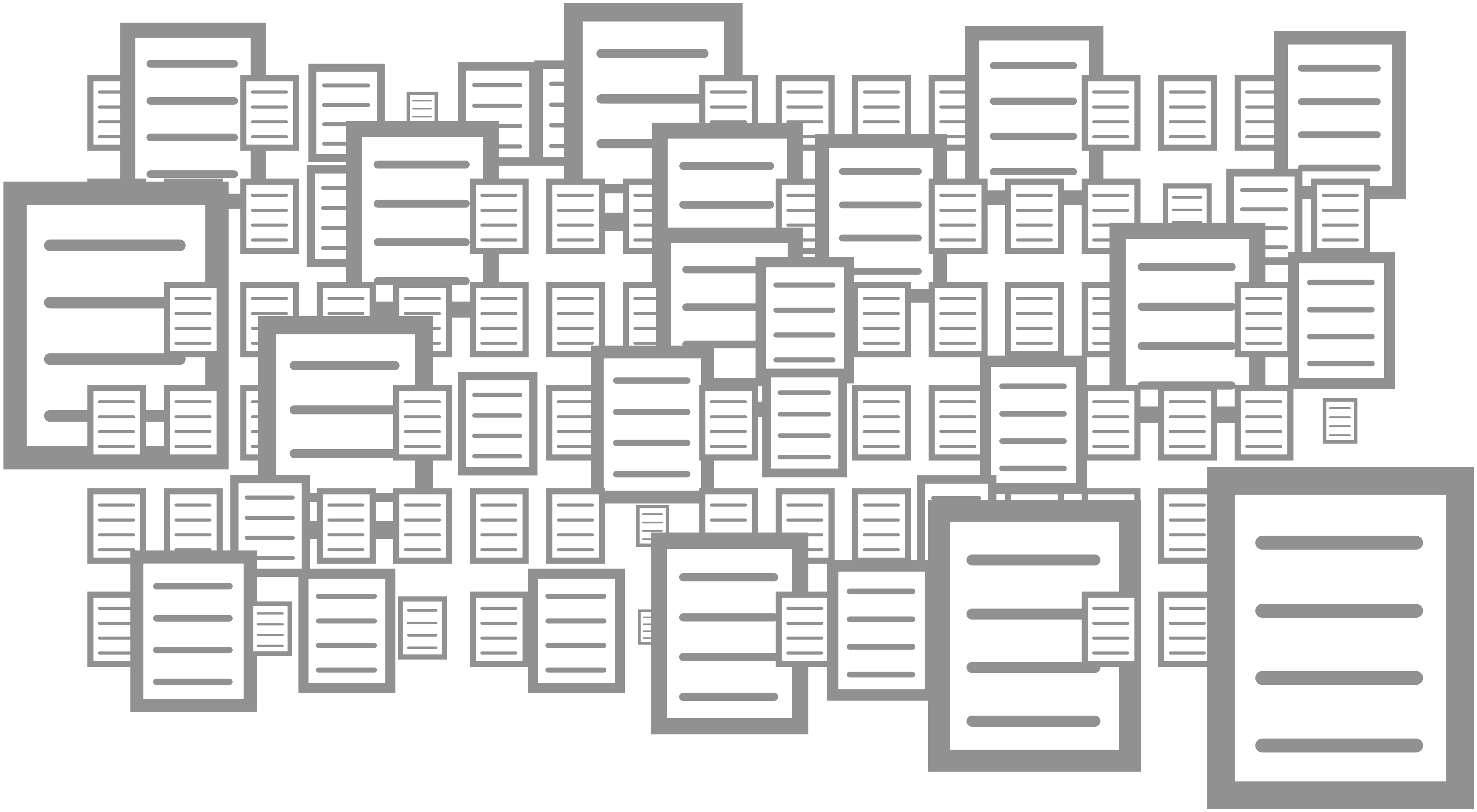

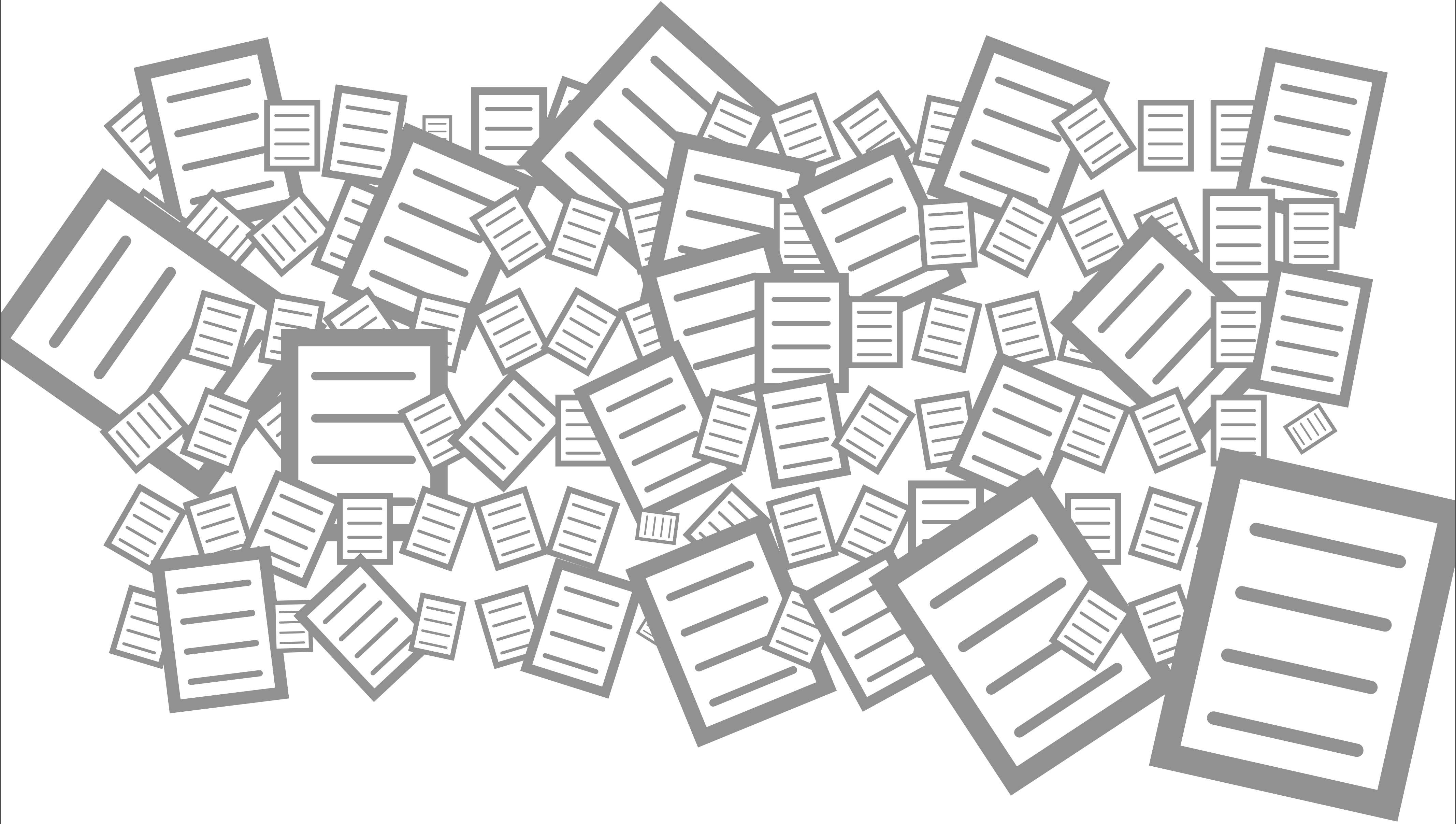

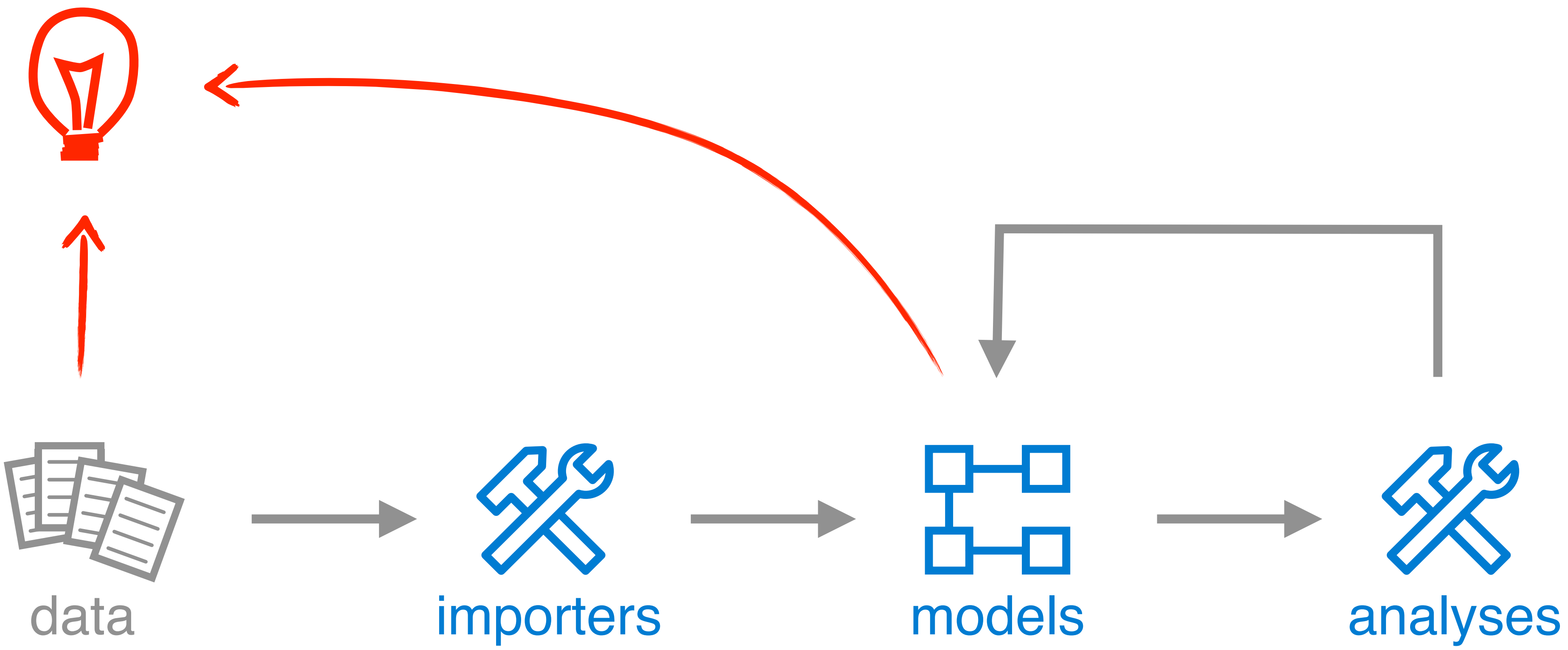
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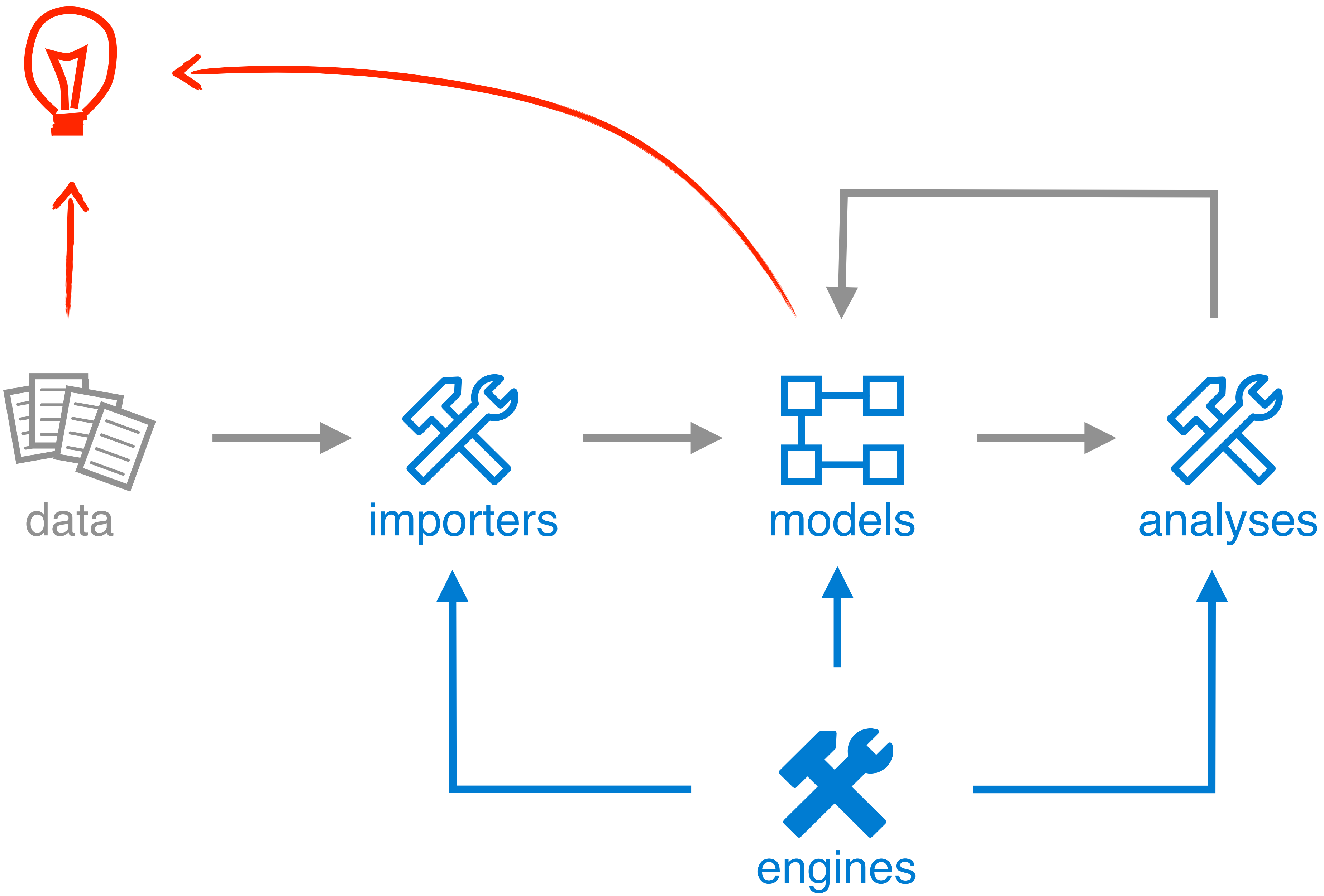
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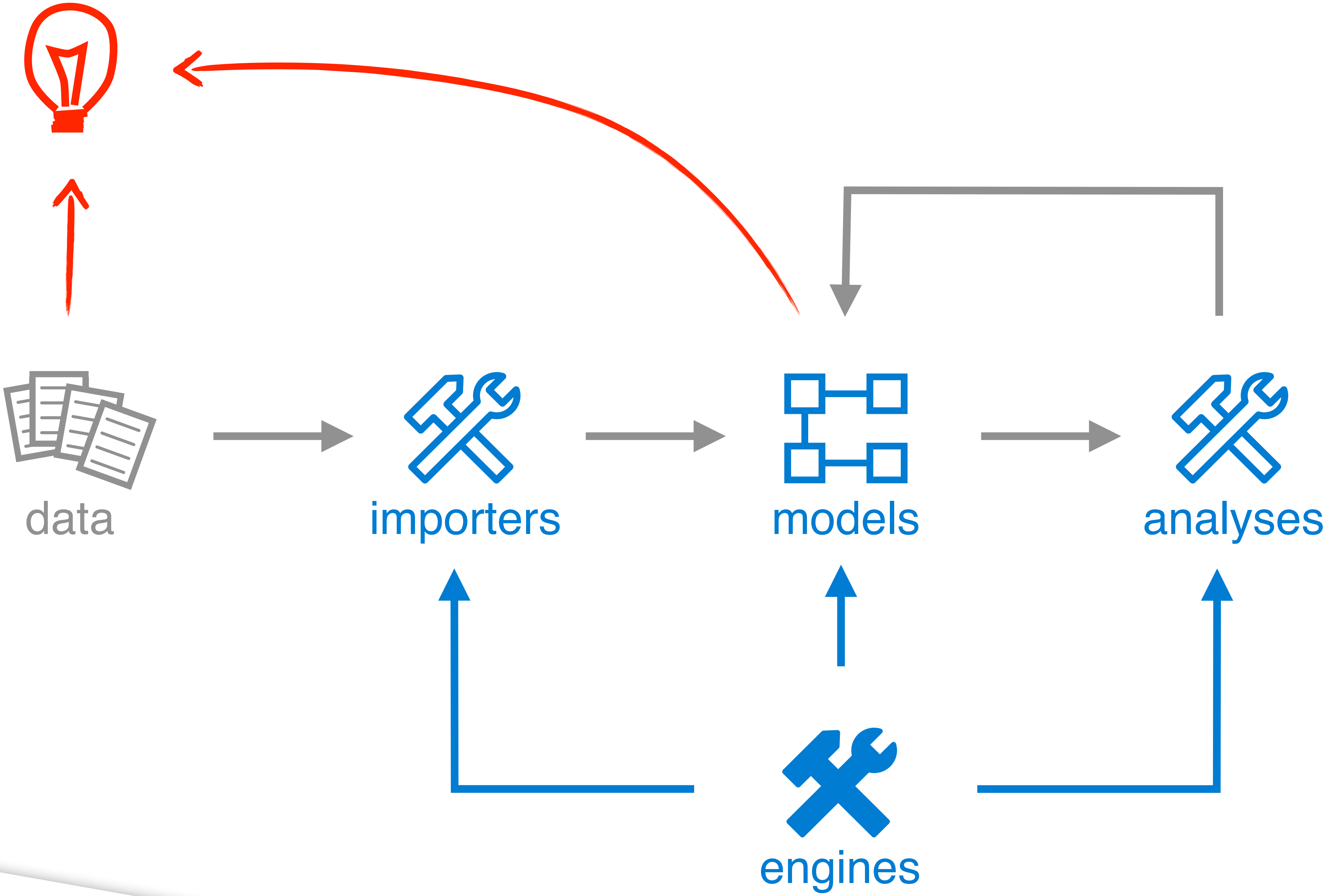

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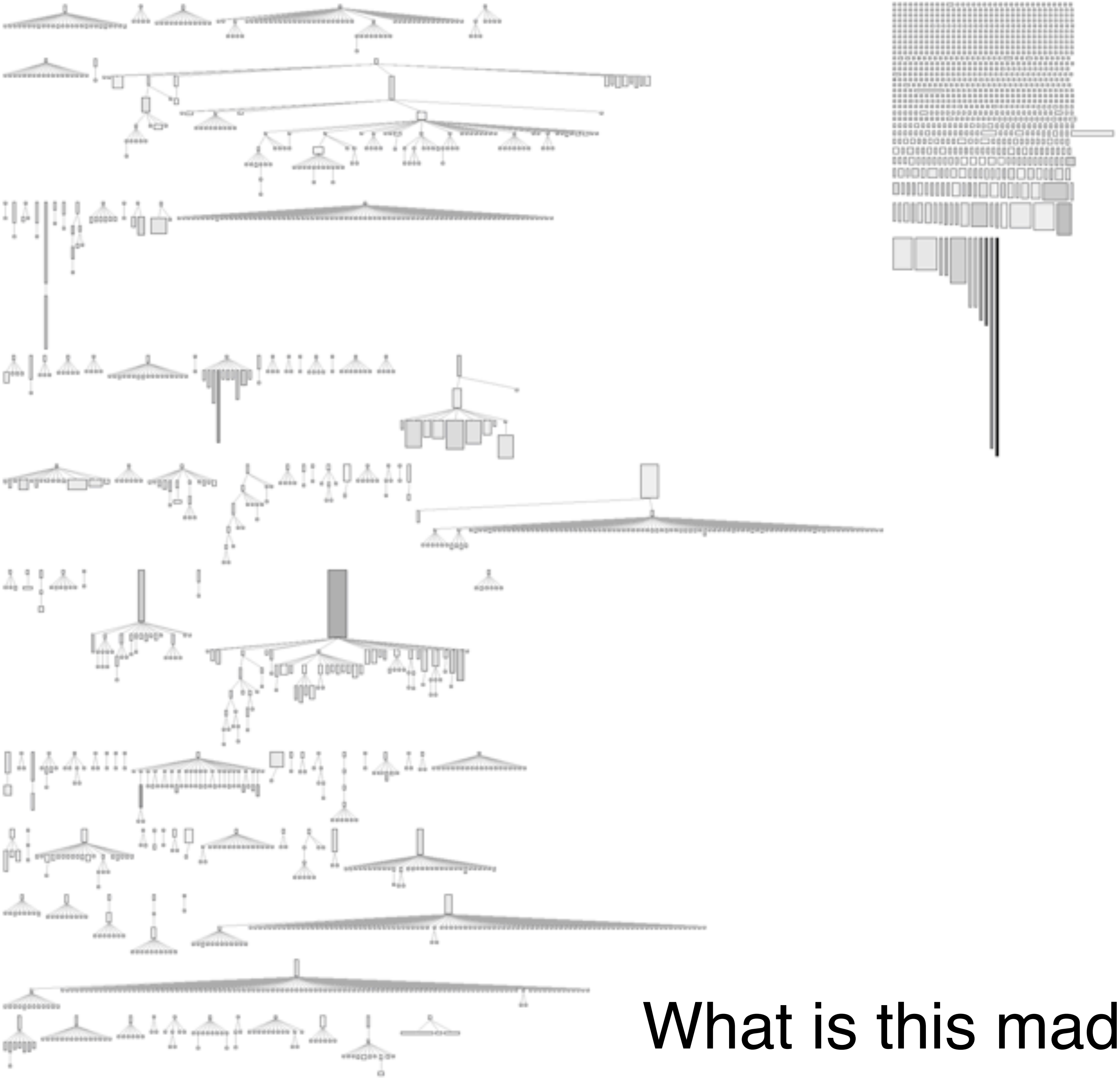
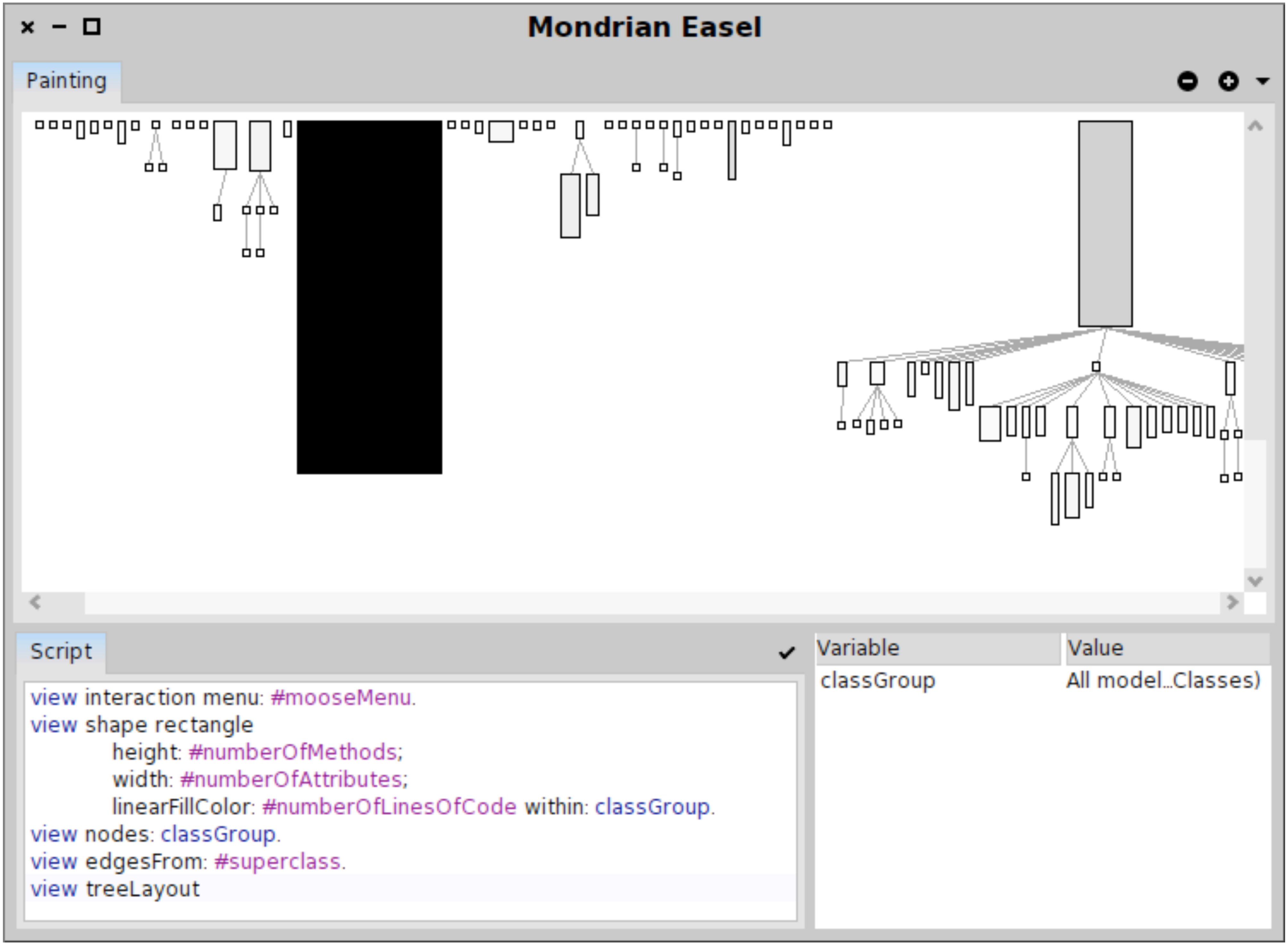


What is this made of?



```
view interaction menu: #mooseMenu.
view shape rectangle
        height: #numberOfMethods;
        width: #numberOfAttributes;
        linearFillColor: #numberOfLinesOfCode within: classGroup.
view nodes: classGroup.
view edgesFrom: #superclass.
view treeLayout
```

Variable	Value
classGroup	All model...Classes)

```
view interaction menu: #mooseMenu.
view shape rectangle
    height: #numberOfMethods;
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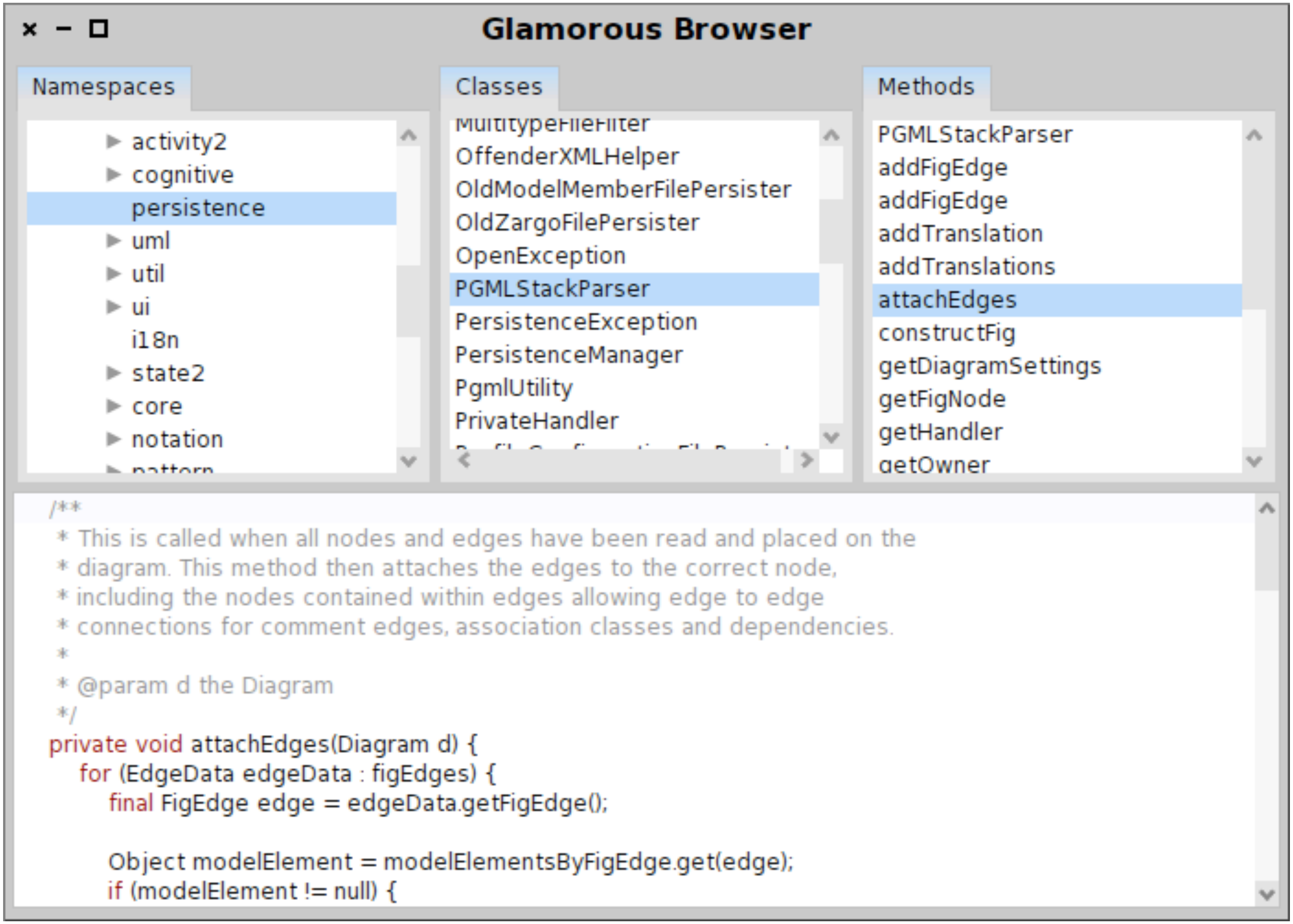


- activity2
- cognitive
- persistence
- uml
- util
- ui
- i18n
- state2
- core
- notation
- pattern

MultitypeFileFilter
OffenderXMLHelper
OldModelMemberFilePersister
OldZargoFilePersister
OpenException
PGMLStackParser
PersistenceException
PersistenceManager
PgmlUtility
PrivateHandler

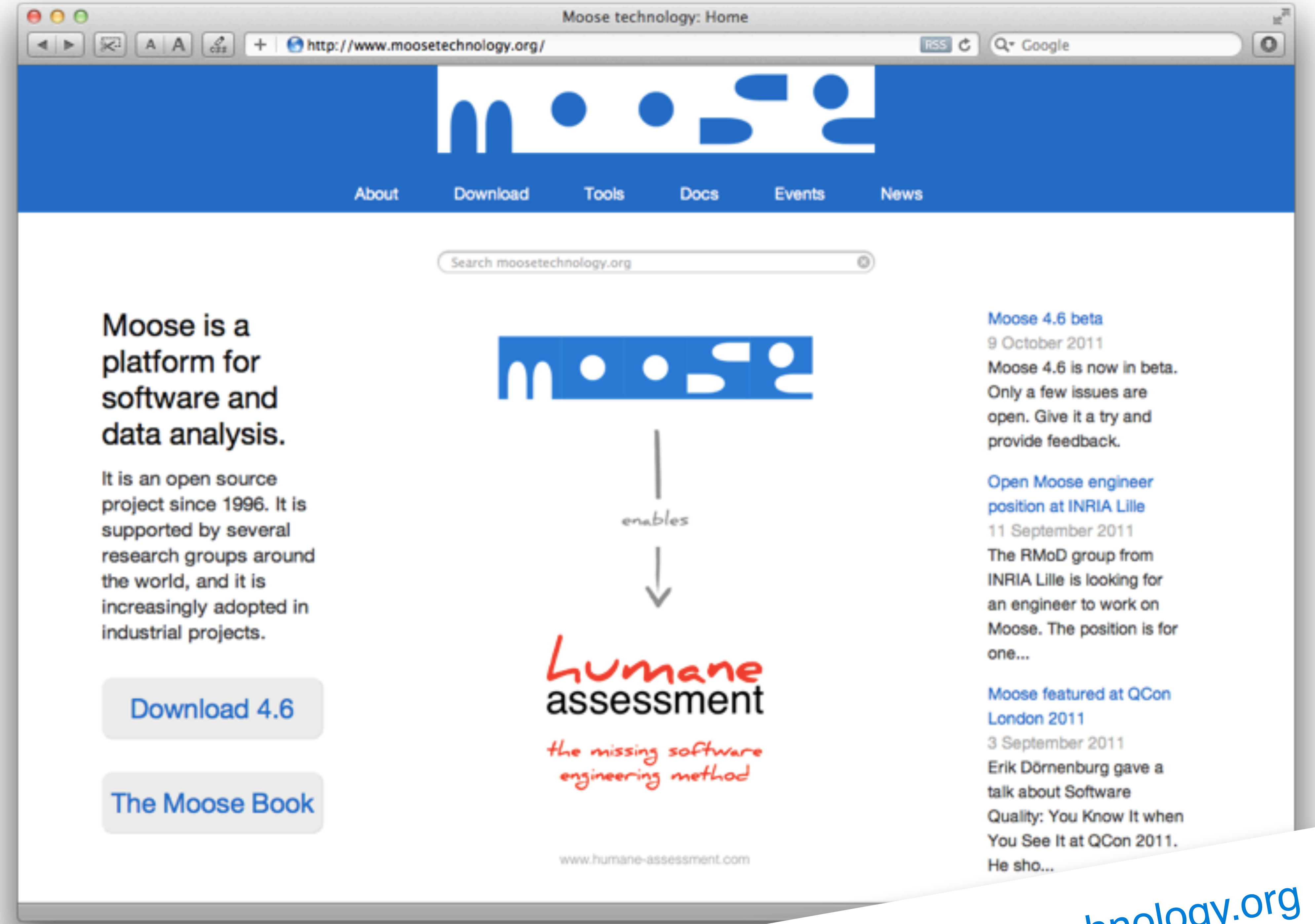
PGMLStackParser
addFigEdge
addFigEdge
addTranslation
addTranslations
attachEdges
constructFig
getDiagramSettings
getFigNode
getHandler
getOwner

```
/**
 * This is called when all nodes and edges have been read and placed on the
 * diagram. This method then attaches the edges to the correct node,
 * including the nodes contained within edges allowing edge to edge
 * connections for comment edges, association classes and dependencies.
 *
 * @param d the Diagram
 */
private void attachEdges(Diagram d) {
    for (EdgeData edgeData : figEdges) {
        final FigEdge edge = edgeData.getFigEdge();

        Object modelElement = modelElementsByFigEdge.get(edge);
        if (modelElement != null) {
```

What is this made of?

```
composer tabulator with: [:t |
  t row: [:r | r column: #namespaces;
                 column: #classes; column: #methods];
    row: #details.
  t transmit to: #namespaces; andShow: [:a |
    a tree
      title: 'Namespaces';
      display: [:m | m allNamespaces select: #isRoot ];
      children: #childScopes;
      format: #name ].
  t transmit from: #namespaces; to: #classes; andShow: [:a |
    a list
      title: 'Classes';
      display: [:n | n classes ];
      format: #name].
  t transmit from: #classes; to: #methods; andShow: [:a |
    a list
      title: 'Methods';
      display: [:c | c methods ];
      format: #name].
  t transmit from: #methods; to: #details; andShow: [:a |
    a text
      display: #formattedSourceText ]
    ].
composer openOn: model
```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Moose is a platform for software and data analysis.

It is an open source project since 1996. It is supported by several research groups around the world, and it is increasingly adopted in industrial projects.

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the missing software engineering method
www.humane-assessment.com

Moose 4.6 beta
9 October 2011
Moose 4.6 is now in beta. Only a few issues are open. Give it a try and provide feedback.

Open Moose engineer position at INRIA Lille
11 September 2011
The RMoD group from INRIA Lille is looking for an engineer to work on Moose. The position is for one...

Moose featured at QCon London 2011
3 September 2011
Erik Dörnenburg gave a talk about Software Quality: You Know It when You See It at QCon 2011. He sho...

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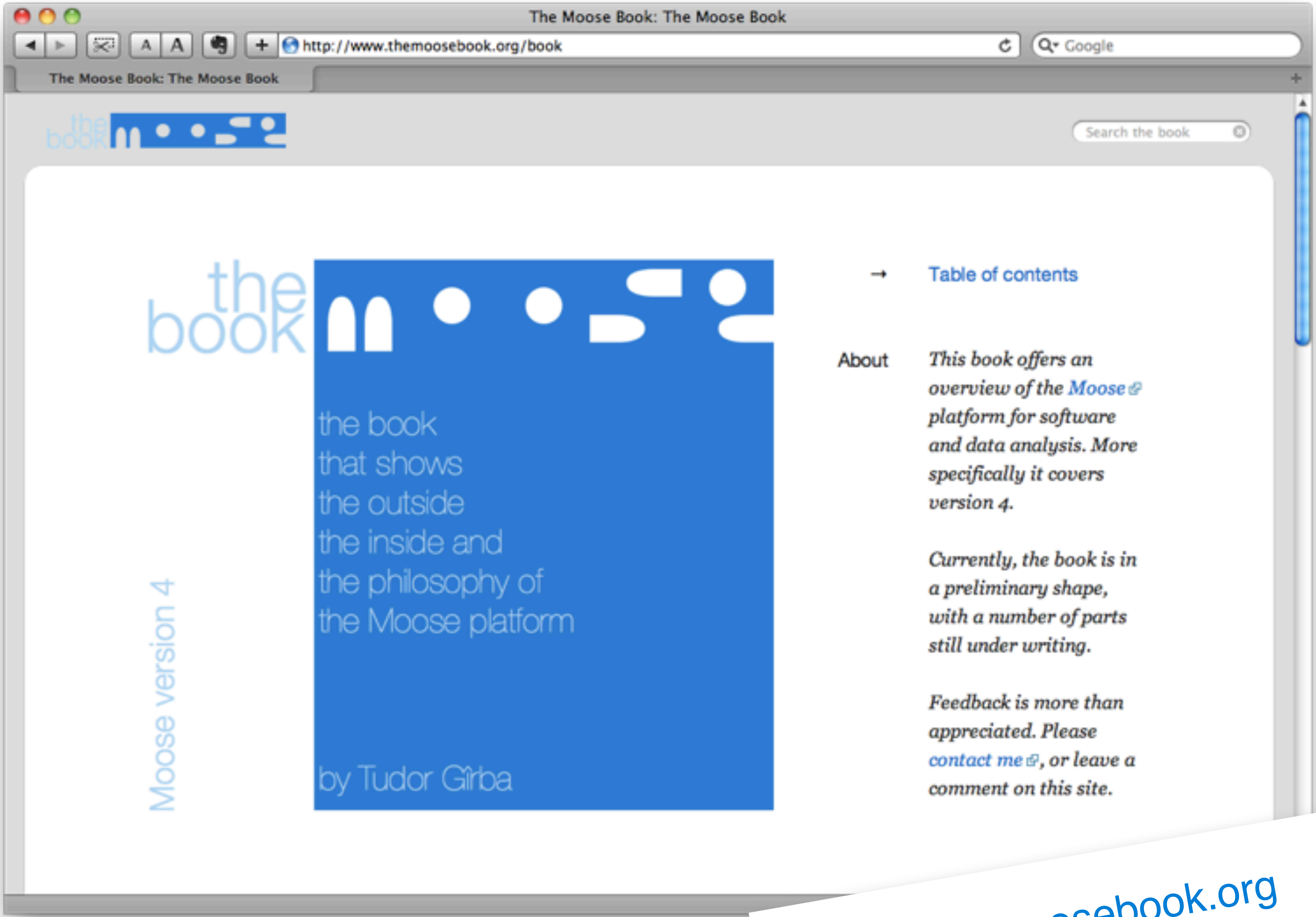
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the book
that shows
the outside
the inside and
the philosophy of
the Moose platform

by Tudor Gîrba

Moose version 4

→ Table of contents

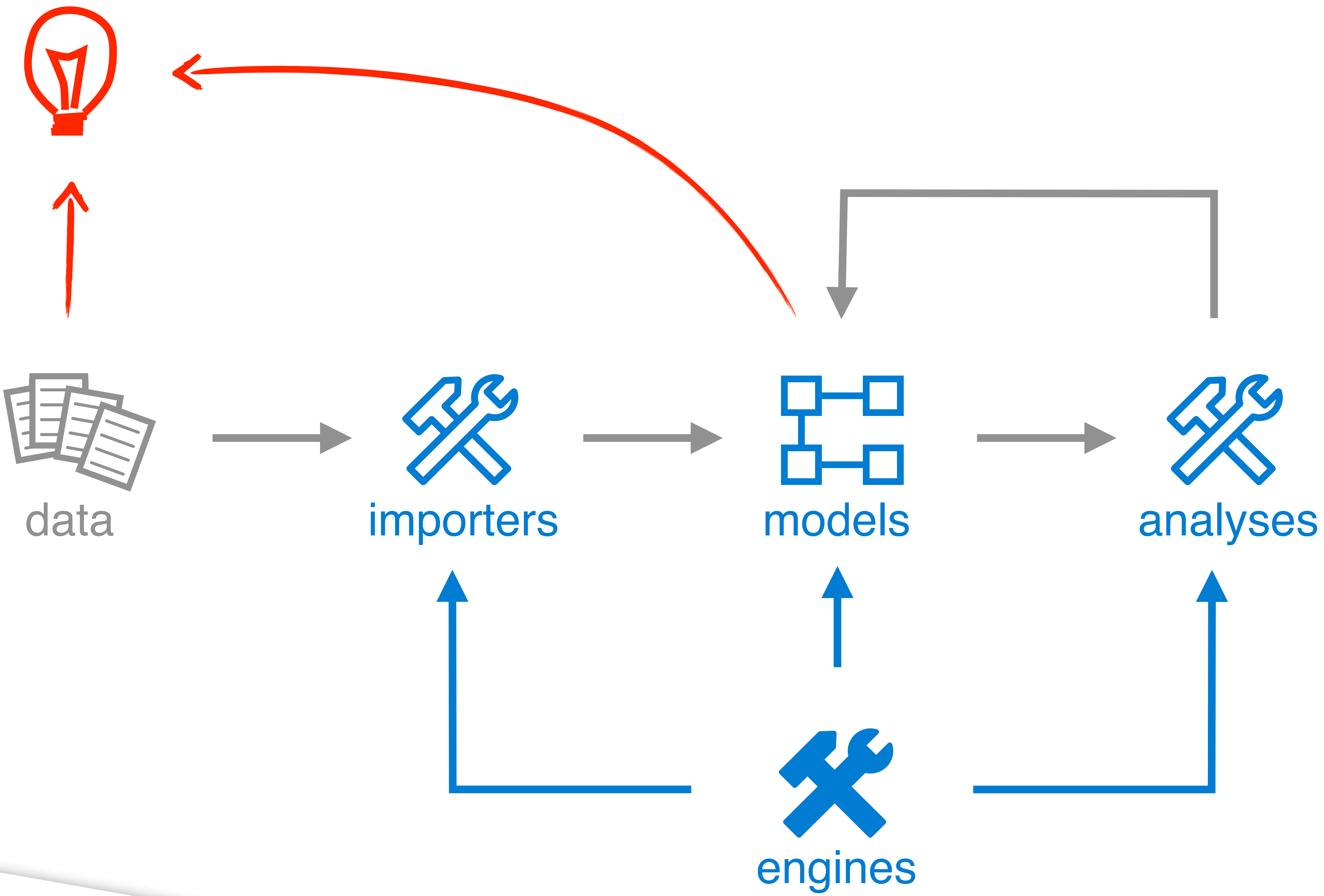
About

This book offers an overview of the Moose platform for software and data analysis. More specifically it covers version 4.

Currently, the book is in a preliminary shape, with a number of parts still under writing.

Feedback is more than appreciated. Please contact me, or leave a comment on this site.

themoosebook.org



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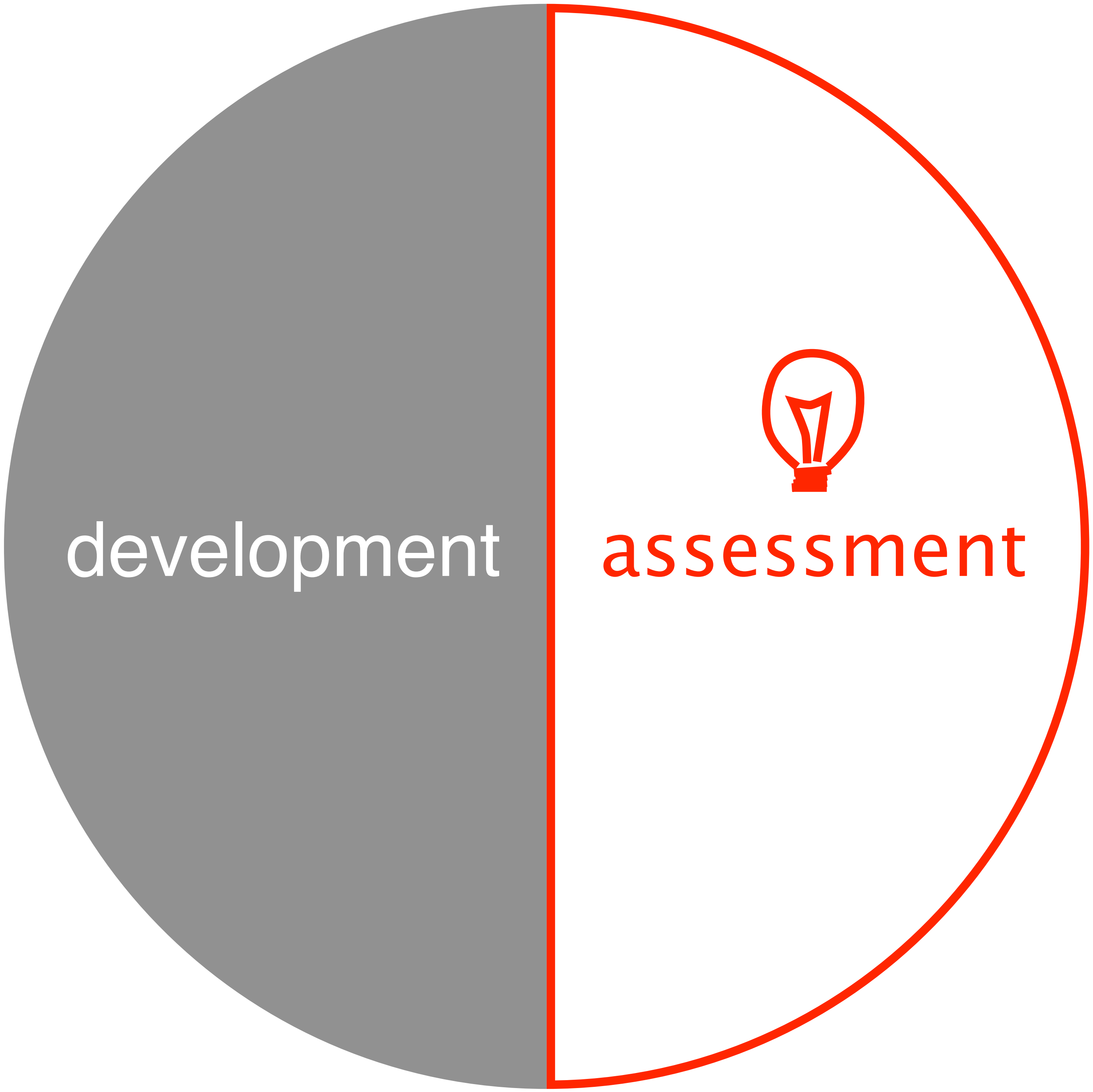
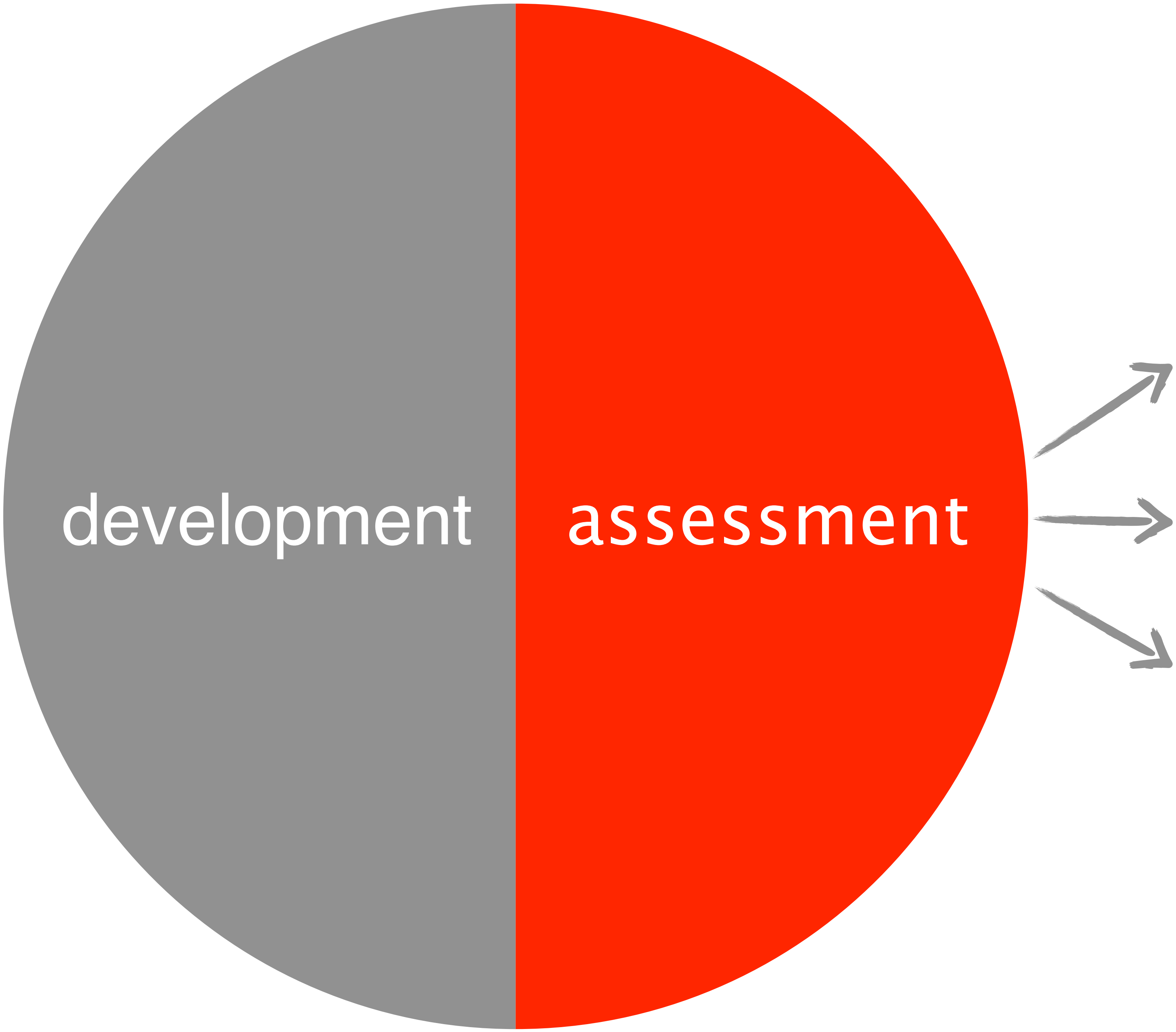


development

assessment

development

assessment



development

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explicit

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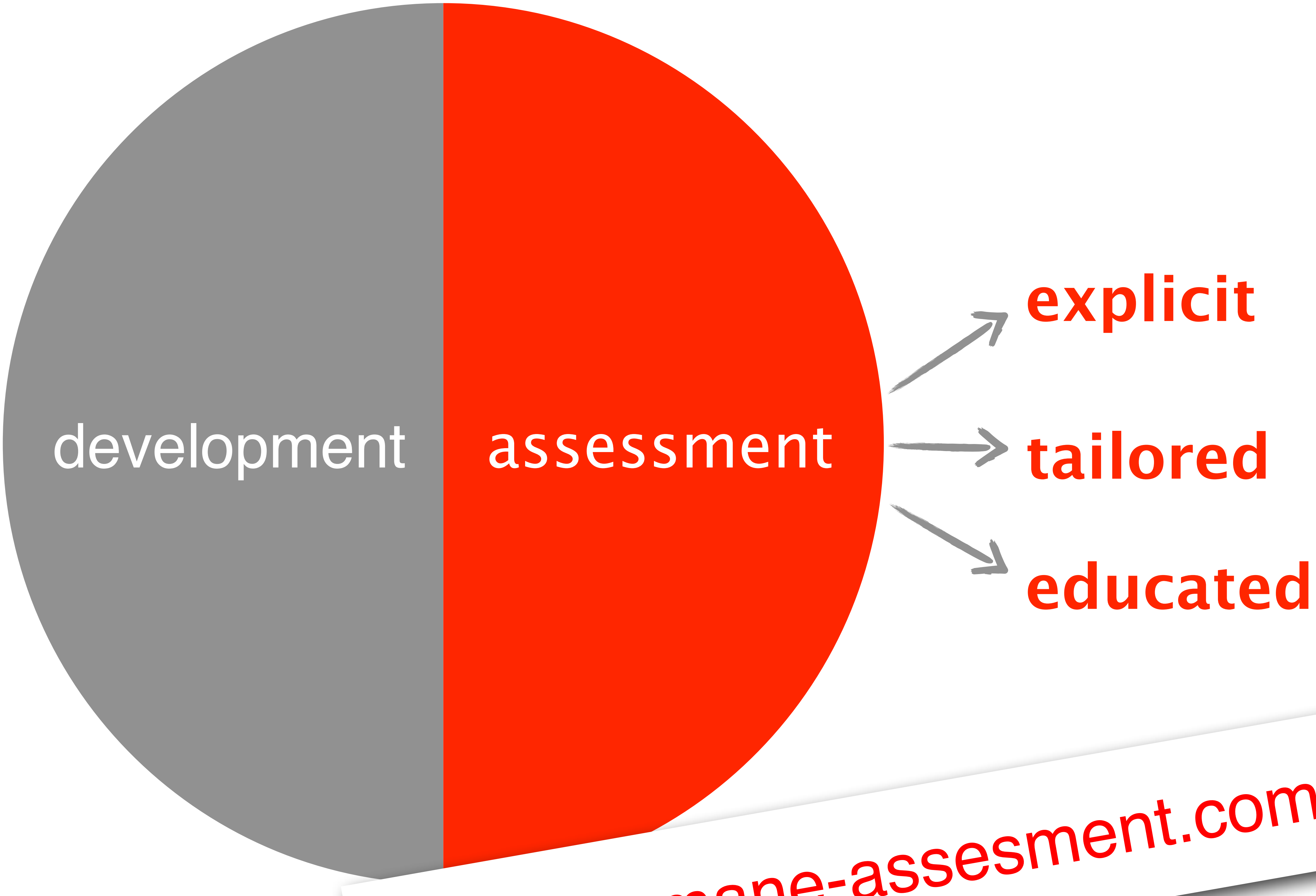
educated



development

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explicit

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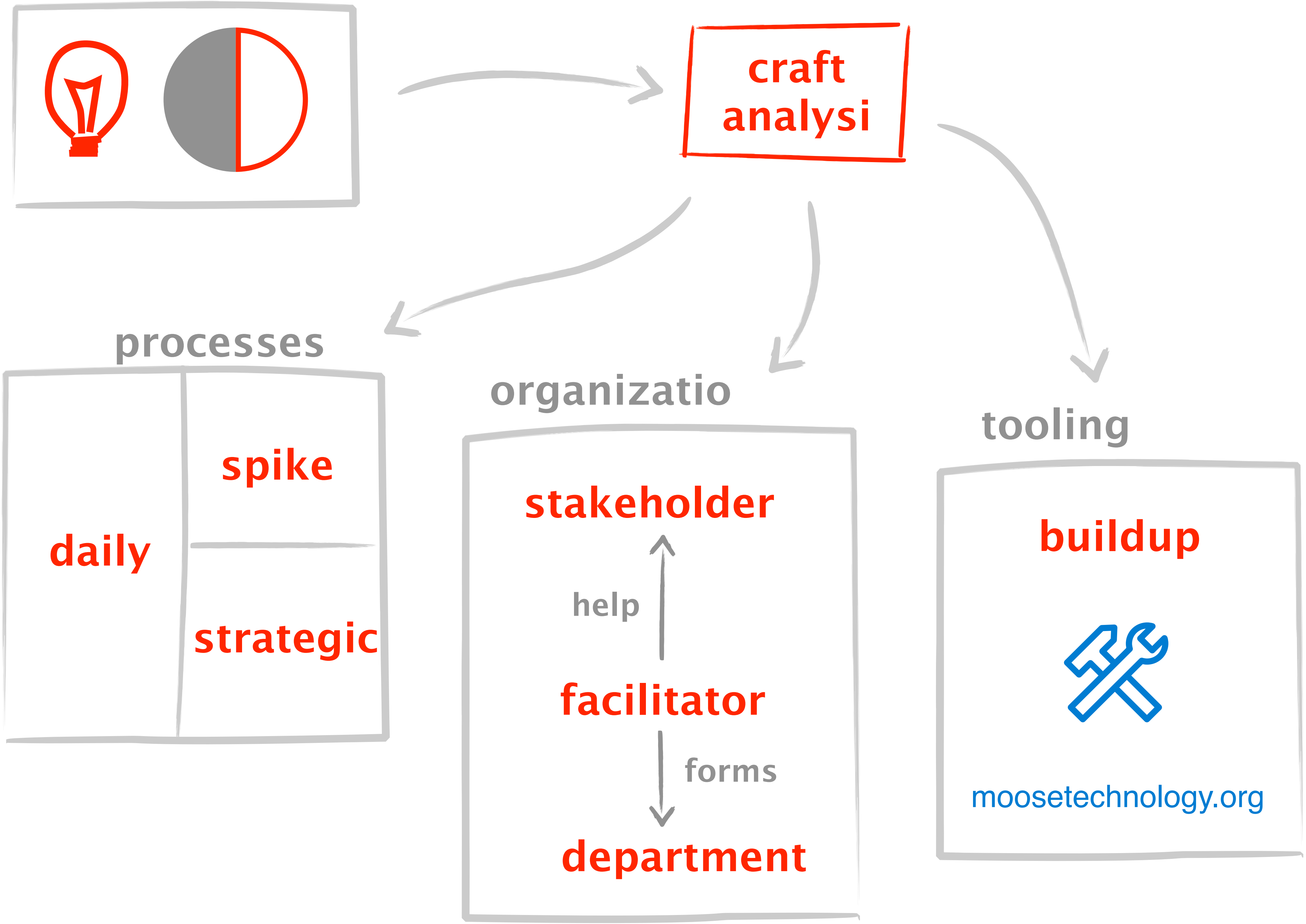
Tuesday, October 25, 11

More details at: http://humane-assessment.com



craft analysi

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spike

strategic

organizatio

stakeholder

help

facilitator

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department

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