An Open Models Project:

http://www.openmodels.at

The $i*$ Method
'Conceptualization' for ADOxx v1.0

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What is the Open Models Initiative?

Vision and Goal of the Open Model Initiative - "Models for Everyone"
Open Model Initiative the concrete goal has to be the *"establishment of a community that deals with the creation, maintenance, modification, distribution, and analysis of models".*
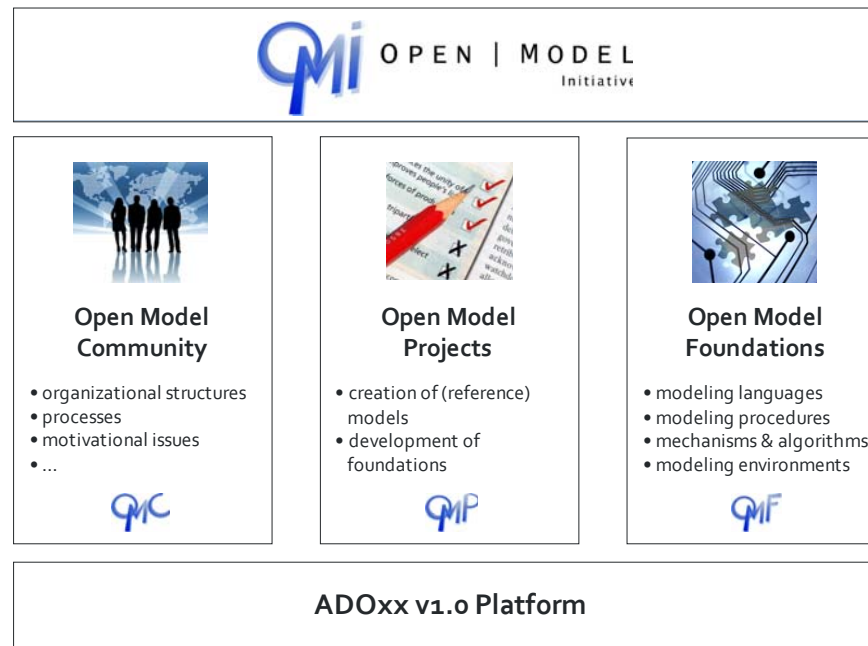
ADOxx v1.0
Is an open, flexible and through its implemented Meta-Modelling Approach highly adaptable modelling platform. It also integrates a structure to manage complexity in the software development and requirement definition process. This technical distinctiveness allows fast solution development phases.

The *i** Project: The Community

Main Contact for all activities related to the *i Method and their "permission": @Eric Yu**

*i** related Topics and Current Contacts

Focus "within" *i**	'Contact'	Projects
Security	@Lin Liu	-
Risk Management	@Eric Dubois @André Rifaut	-
iStarML Transformation 'Standards'	@Xavier Franch @Carlo Cares	bilateral project
Organisational IS	@John Mylopoulos	ADO*uni* programme *
Software Engineering	@Angelo Susi, @Anna Perini	Paper?
Compliance	@Margit Schwab	Dissertation

* Project Report: Organizational Information Systems "AllSpark" available on request of Prof. Mylopoulos

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The *i** Project: The Community

The Goal …

"…conceptualization of an existing modelling method in this i* case for the later realization on a meta-modelling platform."

The *i** Method 'Conceptualization' for ADOxx v1.0:

Background: What is the *i** Method?

- Method which has been developed to **show social relationships** for their analysis and design

- In particular helpful to understand complex relationships among actors with strategic intent

- It includes human and IT resources

- **Does not:** aim to map and design the execution of certain steps in a certain temporal dimension

- First developed 1995 by associate **Professor Eric Yu** as a PhD Thesis and **Professor John Mylopoulos** as supervisor, Faculty of Information, University of Toronto

The *i** Method 'Conceptualization' for ADOxx v1.0:

## Background: The Open Models Initiative and the *i** Community

The talk is intended to be a "status report" of an initial project of the Open Models Initiative with this community and for the i Method!*

At this stage the initial project should help to answer of how Open Models Initiative projects of this kind are to be
"planned, organised and set-up".

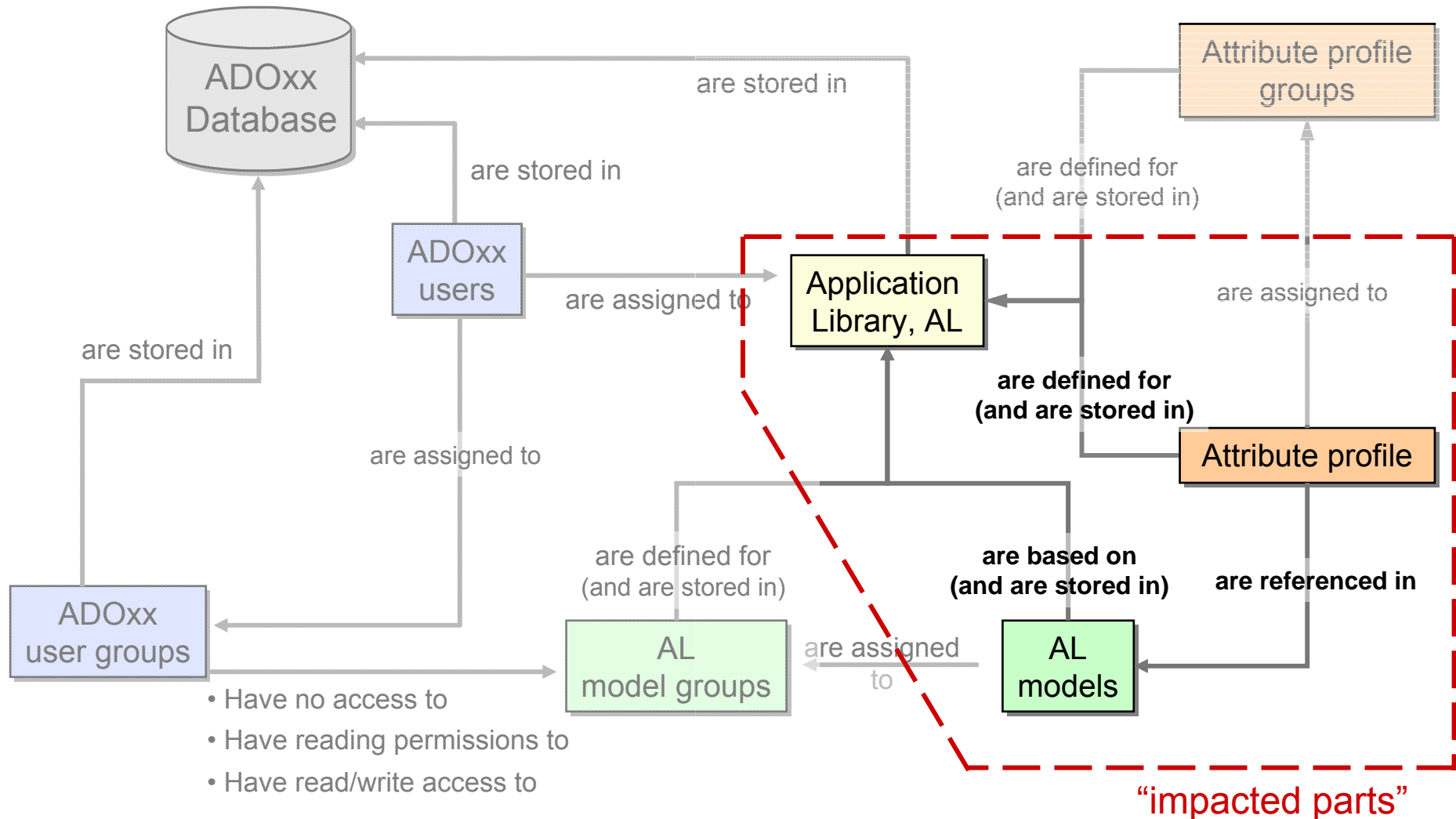# The *i** Method 'Conceptualization' for ADOxx v1.0:

Background: The Used Meta-Modelling Framework
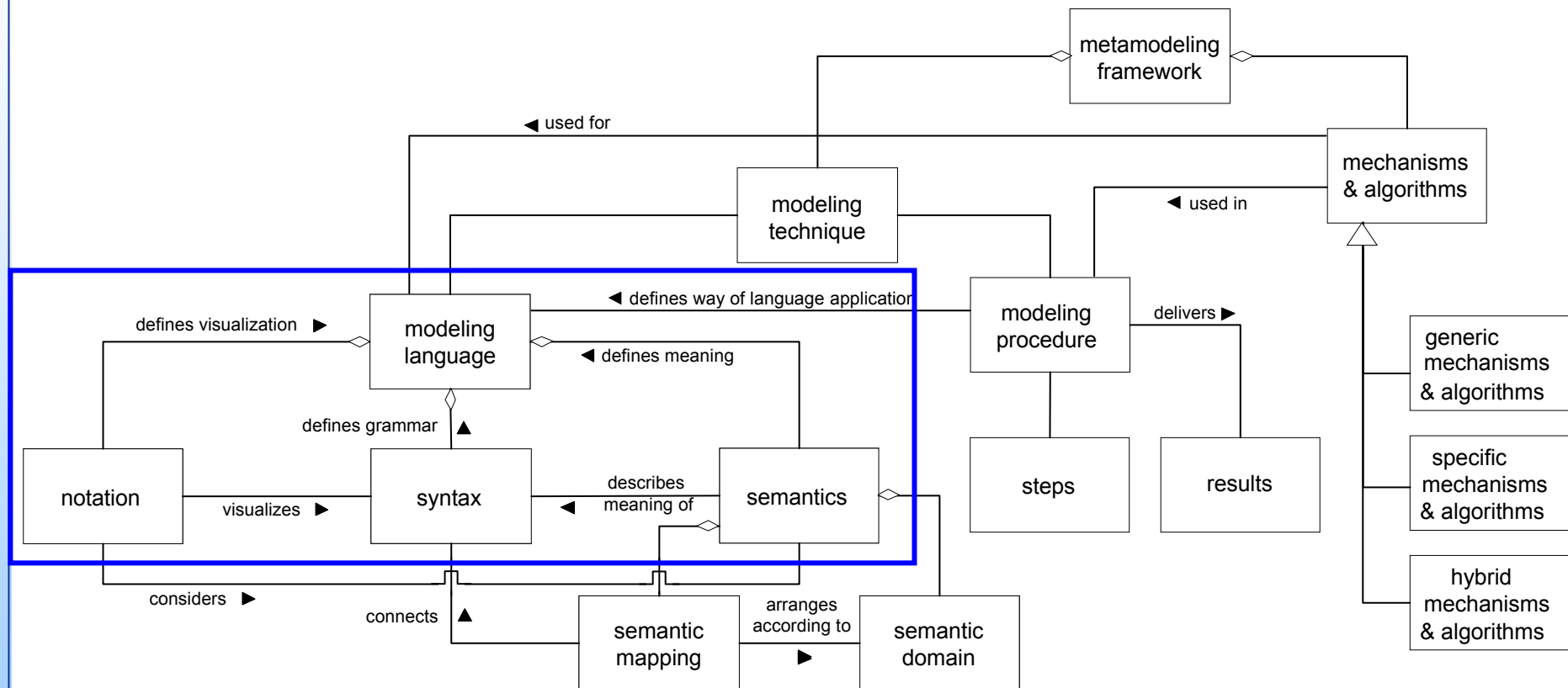
Karagiannis, D., Kühn, H.: „Metamodelling Platforms". In Bauknecht, K., Min Tjoa, A., Quirchmayer, G. (Eds.): Proceedings of the Third International Conference EC-Web 2002 – Dexa 2002, Aix-en-Provence, France, September 2002, LNCS 2455, Springer, Berlin/Heidelberg, p. 182 ff.
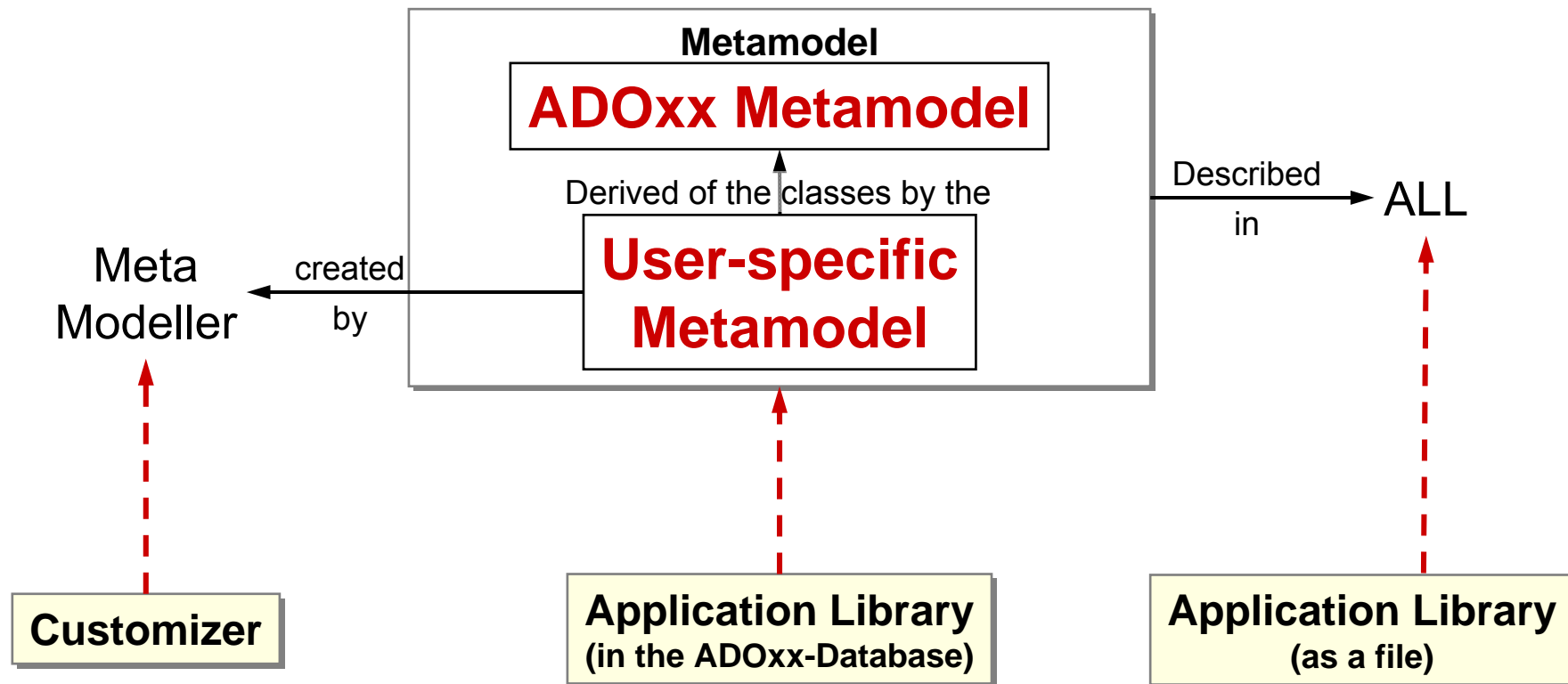
The *i** Method 'Conceptualization' for ADOxx v1.0:

Background: "Parts" of ADOxx v1.0 and their "Connections"

The i^* Method 'Conceptualization' for ADOxx v1.0:

Background: The Starting Point for Customization

Metamodel

ADOxx Metamodel

Derived of the classes by the

User-specific Metamodel

Described in

ALL

Meta Modeller

created by

Customizer

Application Library
(in the ADOxx-Database)

Application Library
(as a file)

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The *i** Method 'Conceptualization' for ADOxx v1.0:

Background: GraphRep-Customizing - Examples of Shapes

```
PEN w:0.05cm color:dodgerblue endcap:flat join:round
IF (bl = "dashed" AND ka="no")
  PEN w:0.05cm color:dodgerblue endcap:flat join:round style:dashdot
ELSIF (ka= "yes" AND bl="solid")
  PEN w:0.1cm color:red endcap:flat join:round
ELSIF (bl = "dashed" AND ka="yes")
  PEN w:0.1cm color:red endcap:flat join:round style:dashdot
ENDIF

IF (rb = "top right" AND b = "with")
  CLIP_ELLIPSE x:3.0cm y:-3.0cm rx:3.88cm ry:3.88cm
  GRADIENT_RECT x:-3.88cm y:-7.88cm w:10.8cm h:10.8cm style:downdiag color1:white color2:aliceblue
  FILL style:null
  CLIP_OFF
  ELLIPSE x:3.0cm y:-3.0cm rx:-3.88cm ry:3.88cm layer:0 sizing:keep-aspect-ratio
```
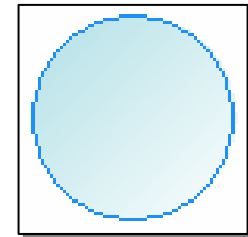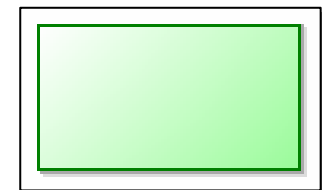
```
GRAPHREP

 AVAL set-default: "outside" r: "Representation of name"
 AVAL set-default: "na" s: "State of fulfilment"
 AVAL i: "Order"

 GRADIENT_RECT x:-1.1cm y:-.6cm w:2.2cm h:1.2cm style:downdiag color1:white color2:palegreen
 PEN w:0.05cm color:green endcap:round join:round
 FILL style:null
 RECTANGLE x:-1.1cm y:-.6cm w:2.2cm h:1.2cm

 FONT h:10pt
 AVAL set-default: "10" grad:"Font size"
 FONT h:(PT grad)
```
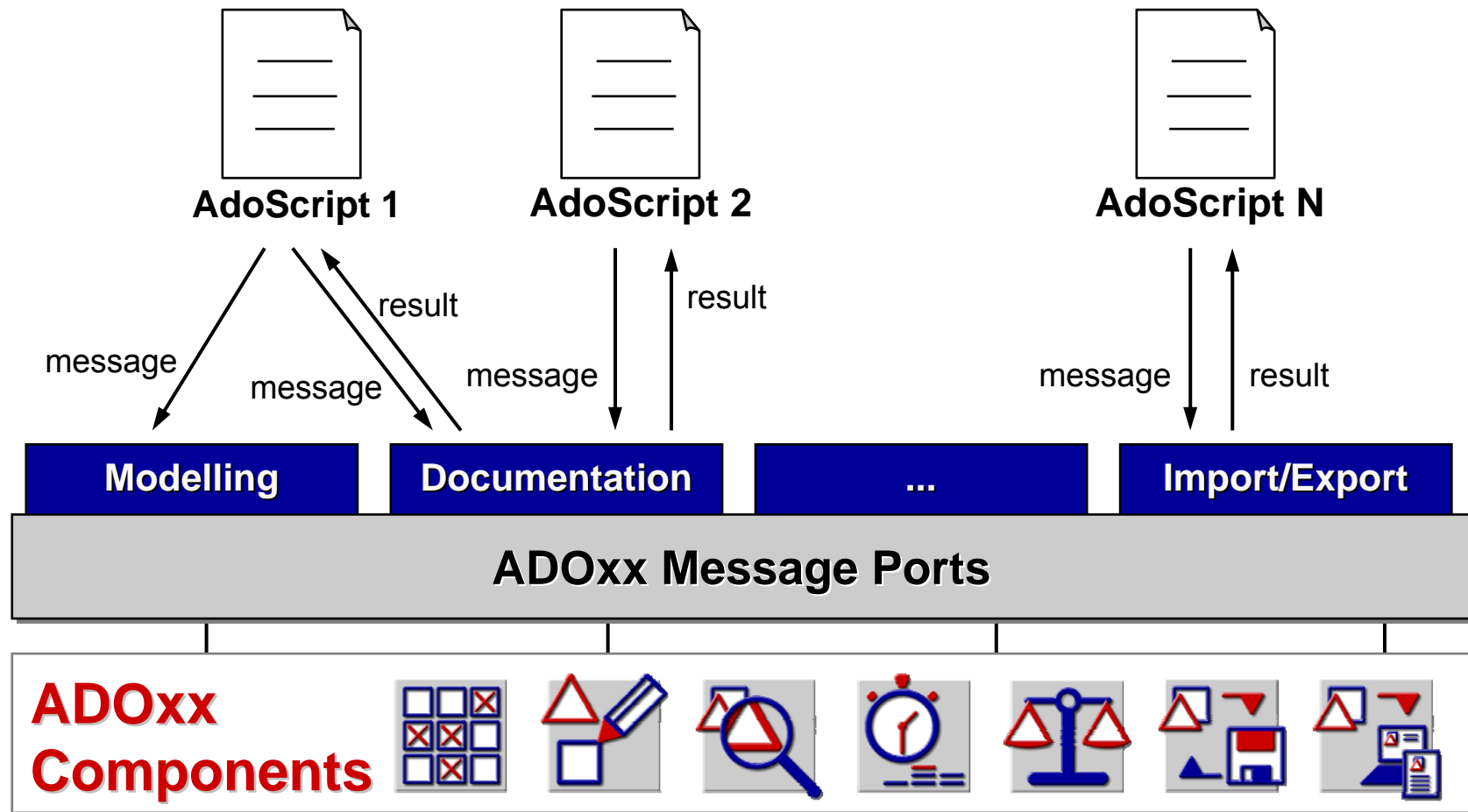
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The *i** Method 'Conceptualization' for ADOxx v1.0:

Background: Available "Tools" in ADOxx v1.0 - AdoScript

AdoScripts can be integrated via program calls or external coupling.

AdoScript 1 AdoScript 2 AdoScript N

result result

message message message message result

Modelling	Documentation	...	Import/Export

ADOxx Message Ports
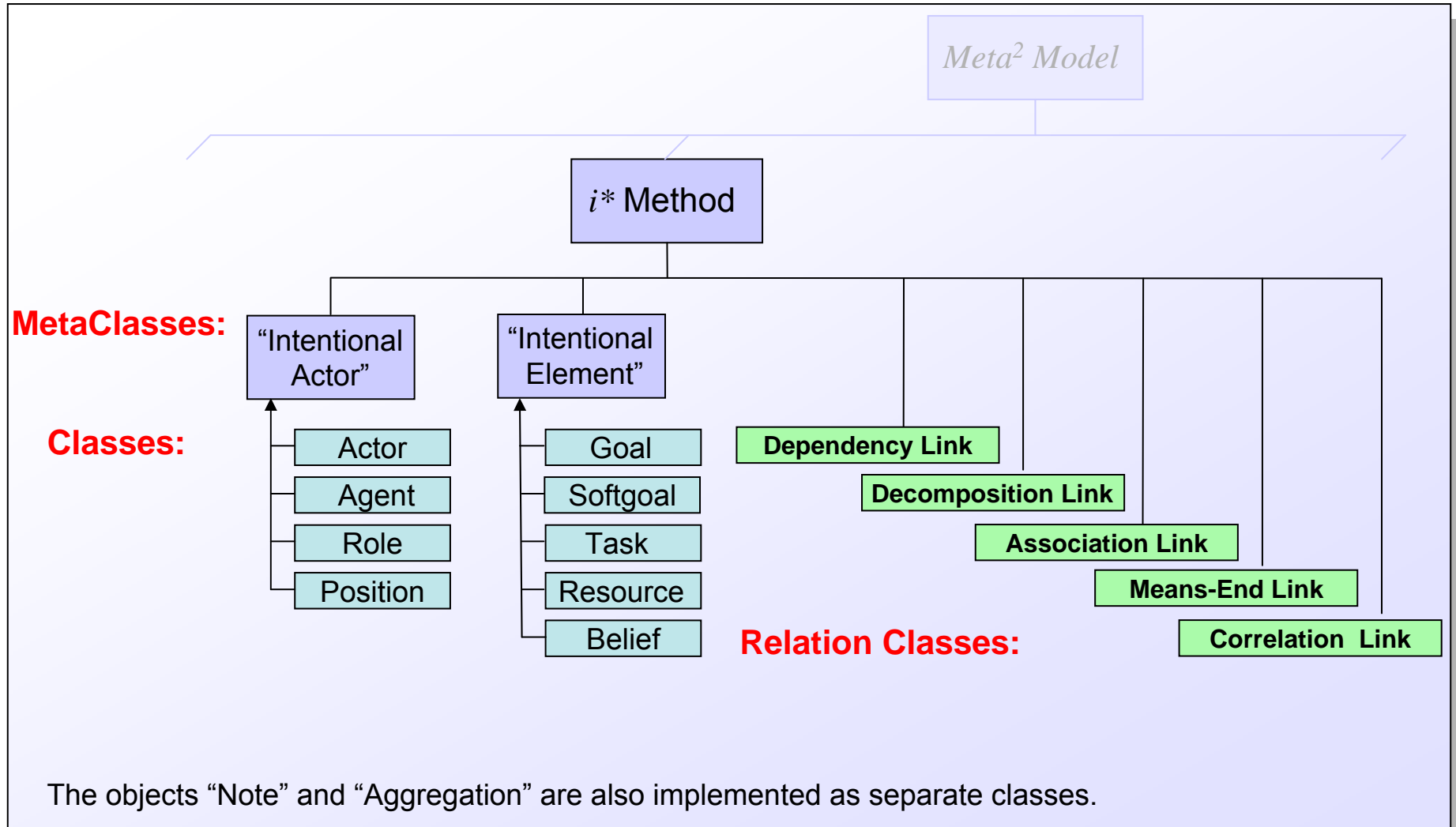
ADOxx Components

Conceptual Transfer of the $i*$ Method in ADOxx v1.0

Preparation Phase

- **Step 1: Analysis of the method description** ✓
  - Research for relevant papers
  - Required classes and relation classes

- **Step 2: Analysis of existing modelling constraints** ✓
  - Determination if these might have influence on the actual implementation on ADOxx v1.0

- **Step 3: Analysis of six preselected tools where the $i*$ Method has already been implemented** ~
  - Identify eventual prerequisites for the later implementation
  - Analysed Tools: OpenOME, TAOME4E, GR-Tool, T-Tool, Visio Shapes, DesCARTES

- **Step 4: Write the conceptual method description** ✓
  - Considering the analysis requirements

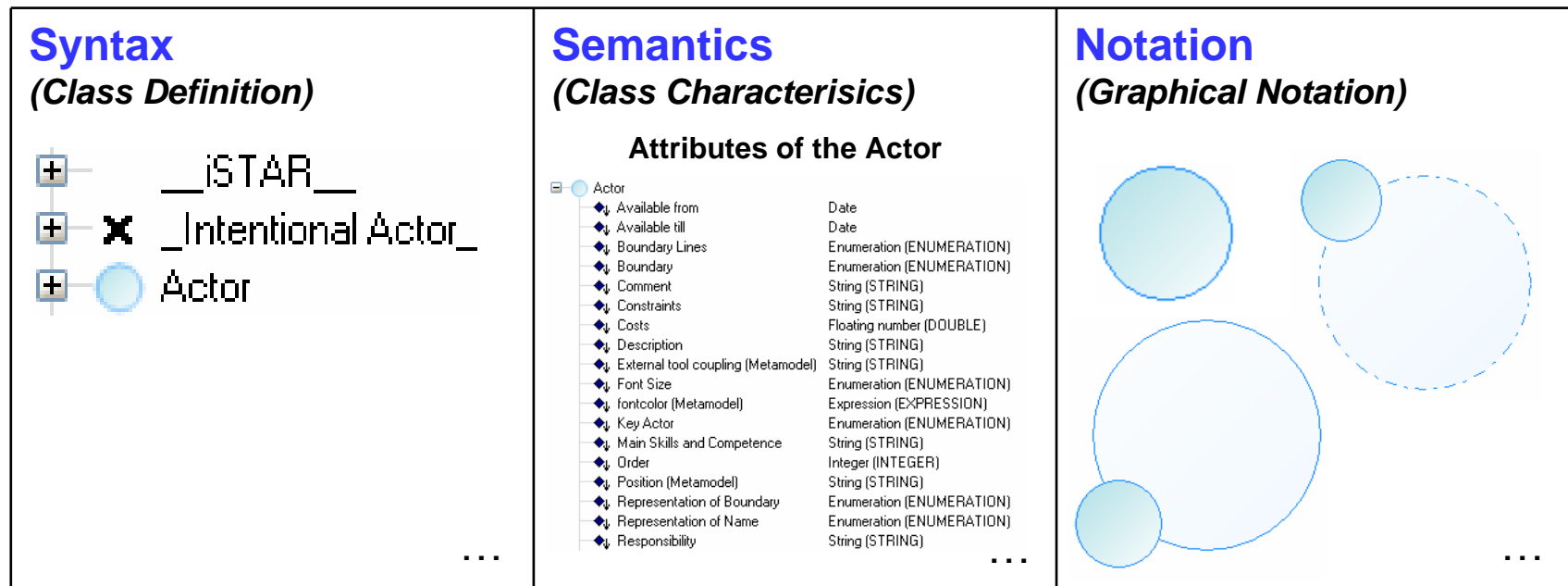# Conceptual Transfer of the *i** Method in ADOxx v1.0

Analysis Results: Required Classes and Relations

Meta² Model

*i** Method

MetaClasses:

"Intentional Actor"

"Intentional Element"

Classes:

Actor	Goal
Agent	Softgoal
Role	Task
Position	Resource
	Belief

Dependency Link

Decomposition Link

Association Link

Means-End Link

Correlation Link

Relation Classes:

The objects "Note" and "Aggregation" are also implemented as separate classes.

Conceptual Transfer of the *i** Method in ADOxx v1.0

Ascertainment of Notation, Syntax and Semantic

- "Translation" of "verbal" descriptions in the elements of a Modelling Language, which are …
  - **Syntax** -> Object and Relation definition
  - **Semantics** -> Object and relation characteristics definition
  - **Notation** -> Graphical representation of objects/relations

- Example: "Actor" of the *i** Method

| **Syntax** *(Class Definition)*	**Semantics** *(Class Characterisics)*	**Notation** *(Graphical Notation)*
⊞— __iSTAR__ ⊞ ✖ _Intentional Actor_ ⊞ ◯ Actor	**Attributes of the Actor** ⊟—◯ Actor ◆↓ Available from Date ◆↓ Available till Date ◆↓ Boundary Lines Enumeration (ENUMERATION) ◆↓ Boundary Enumeration (ENUMERATION) ◆↓ Comment String (STRING) ◆↓ Constraints String (STRING) ◆↓ Costs Floating number (DOUBLE) ◆↓ Description String (STRING) ◆↓ External tool coupling (Metamodel) String (STRING) ◆↓ Font Size Enumeration (ENUMERATION) ◆↓ fontcolor (Metamodel) Expression (EXPRESSION) ◆↓ Key Actor Enumeration (ENUMERATION) ◆↓ Main Skills and Competence String (STRING) ◆↓ Order Integer (INTEGER) ◆↓ Position (Metamodel) String (STRING) ◆↓ Representation of Boundary Enumeration (ENUMERATION) ◆↓ Representation of Name Enumeration (ENUMERATION) ◆↓ Responsibility String (STRING) …	…
…		

Conceptual Transfer of the *i** Method in ADOxx v1.0

Ascertainment of Notation, Syntax and Semantic

… for every single element of *i the Method:**

Classes

Actor	**Actor**	"Actors" are active entities that carry out actions to achieve goals by exercising its know-how. The term actor refers generically to any unit to which intentional dependencies can be ascribed.
Agent	**Agent**	A "Agent" is a actor with concrete, physical manifestations, such as a human individual.
Role	**Role**	A "Role" is an abstract characterization of the behavior of a social actor within some specialized context or domain of endeavor. Its characteristics are easily transferable to other social actors. The dependencies associated with a role apply regardless of the agent who plays the role.
Position	**Postition**	A "Position" is an intermediate abstraction that can be used between a role and an agent. It is a set of roles typically played by one agent (e.g., assigned jointly to that one agent). We say that an agent occupies a position. A position is said to cover a role.
Actor with Boundary	**Actor, Role, Agent, Position - with Boundary**	Actor "Boundaries" indicate intentional boundaries of a particular actor. All of the elements within a boundary for an actor are explicitly desired by that actor.

	Goal	A "Goal" is a condition or state of affairs to be achieved. An actor can choose freely among different ways to achieve a goal.
	Softgoal	A "Softgoal" is a goal without a clear-cut criterion for achievement, thus requiring further refinement and judgment. Softgoals are typically used to represent quality goals.
	Task	A "Task" is a course of action to be carried out. It specifies a particular way of doing something, typically to achieve some goal.
	Resource	A "Resource" is a physical or informational entity needed to achieve some goal or to perform some task.
	Belief	A "Belief" expresses assumptions, claims or beliefs of a strategic actor. It is subjective, though a belief is a condition about the world that the actor holds to be true.

Supporting Classes

Note	**Note**	The 'Note' allows free text to be placed within a model.
	has Note	The "has Note" relation connects the note class with any particular other class of the model
Aggregation	**Aggregation**	The "Aggregation" supports the logical structure of model contents on the drawing area.

Relations

|		
—D—	**Dependency Link**	In a "(Goal) Dependency", the depender depends on the dependee to bring about a certain state of affairs in the world. The dependum is expressed as an assertion statement.
—Is-part-of—	**Association Link**	The relationships between actors are described by graphical association links between actors.

Implementation of the i^* Method on the "Open Models" Platform

The Modeltype "Strategic Dependency Model"

The Strategic Dependency Model

The **Strategic Dependency Model** describes a **network of dependency relationships**. As it forms the **basis** for further analysis it is prepared as a **separate "modeltype"** and **created** with the "New Model"-Dialog.
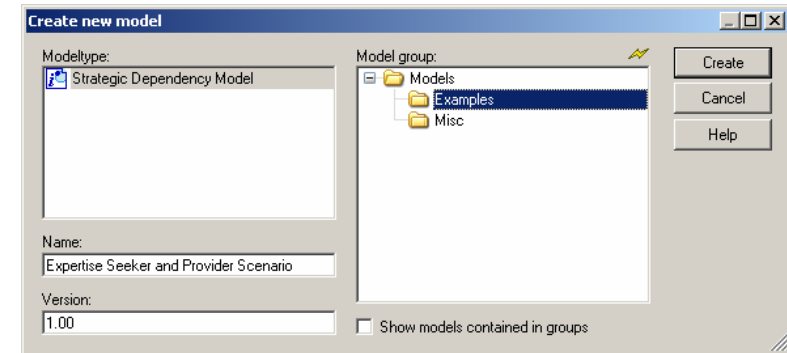
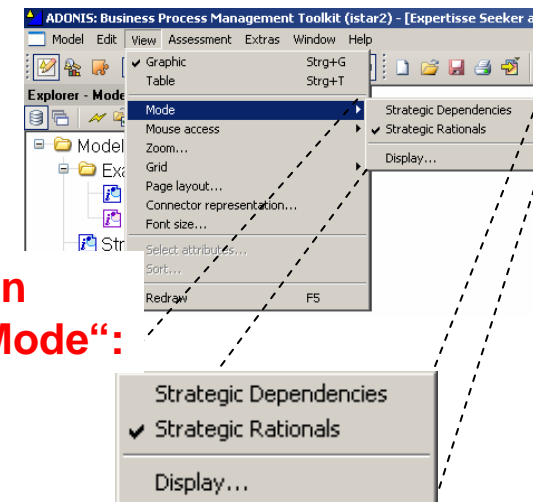### The Strategic Rational Model

The **Strategic Rational Model** is elaborated through a thorough **analysis** of the **Strategic Dependency Model**.
It allows the mapping of the reasons associated with a **strategic relationship** of **intentional actors** and how they achieve their **goals or needs**.

Additional Relation Classes:

→	**Means-End Link**	The "Means-end" shows a particular way (typically a task) to achieve a goal. IT provides an understanding "why" an actor would engage in some tasks, pursue a goal, need a resource or want a soft goal.
—+—	**Decomposition Link**	The "Decomposition Link" shows how an intentional element (typically a task) is decomposed into s... elements, which can include goals, tasks, resources, and soft goals. It provides a hierarchical description of intentional elements that make up a routine.
—Some +—→	**Contribution / Correlation Link**	A "Contribution Link" shows a contribution toward satisfying a soft goal, typically from a task or another soft goal.

Implementation in form of a "Mode":

Examples of Implemented Functionality -1-

Examples of Implemented Functionality -2-

Implementation of the *i** Method on the "Open Models" Platform

Complete Implementation of the Result of the "Ascertainment Phase"
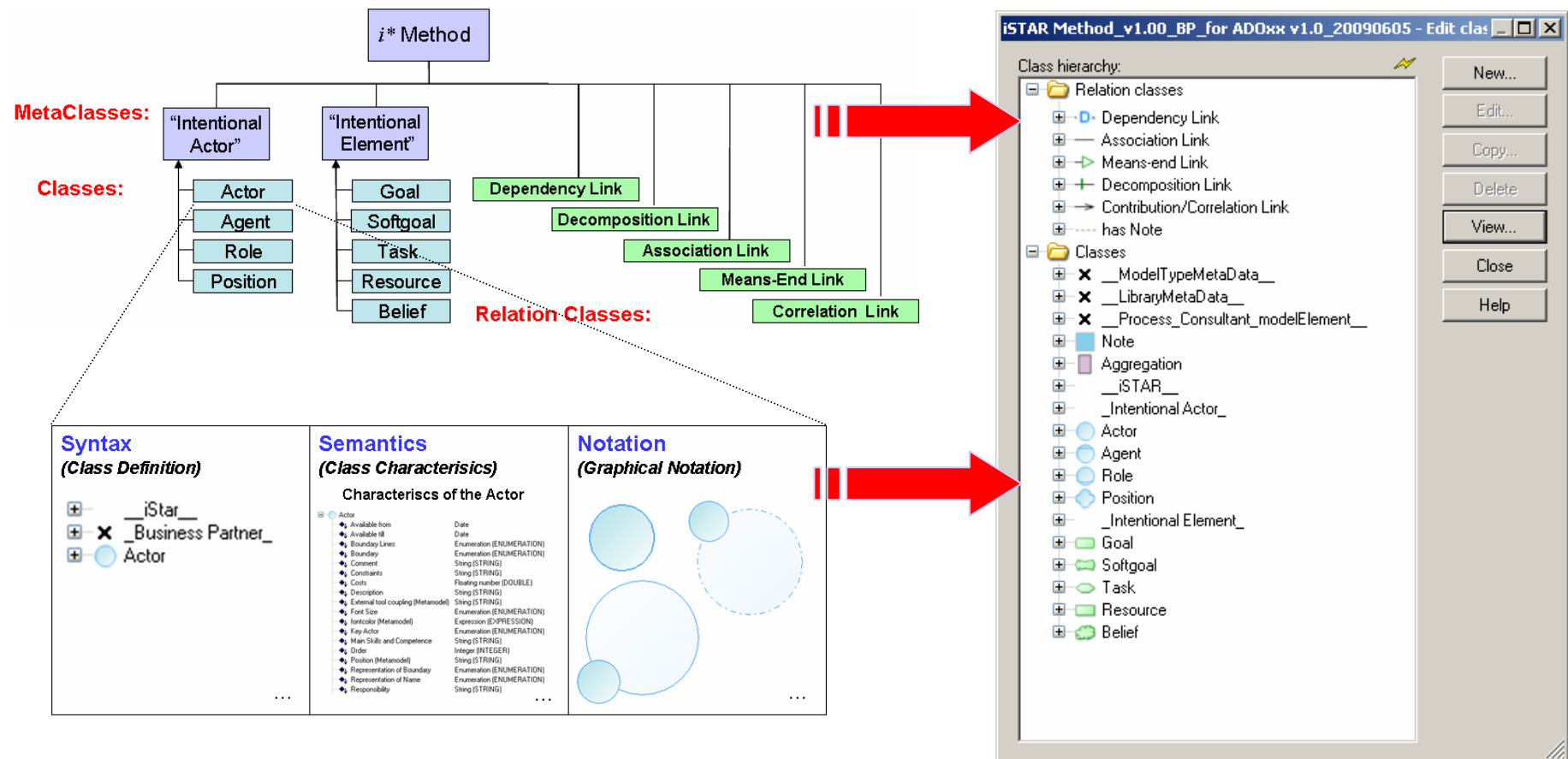
The *i** Method 'Conceptualization' for ADOxx v1.0:

Example of the Realization

Example Description:

For the illustration of the realization an existing example has been taken.

The simple example considers an "expertise seeker" and an "expertise provider".

The "expertise provider" has the top level goals of "Keep the job" and "Get promotion". In order to achieve the former goal s/he needs to "Finish his/her own required functions" on time. "Satisfying management" can also have a positive impact on both of the top level goals and to achieve this goal the "expertise provider" needs to "Help expertise seekers" in addition to "Finish his/her own required functions".

The "expertise seeker", on the other hand, depends on the "expertise provider" to provide him/her with the required information or knowledge and/or teach him/her the required skills needed for completing a project. Note that the "means-end link" is used to indicate that the goal of "Help expertise seeker" can be achieved by "Provide information" or "Teach expertise seeker".

Reference:
Fazel-Zarandi, M., Yu, E.: "Ontology-Based Expertise Finding", In Proceedings of the 7th International Conference of Practical Aspects of Knowledge Management, Yokohama, Japan, 2008. Springer-Verlag, Berlin Heidelberg (2008), pp. 232-243

The *i** Method 'Conceptualization' for ADOxx v1.0:

Example of a "Strategic Dependency Model"
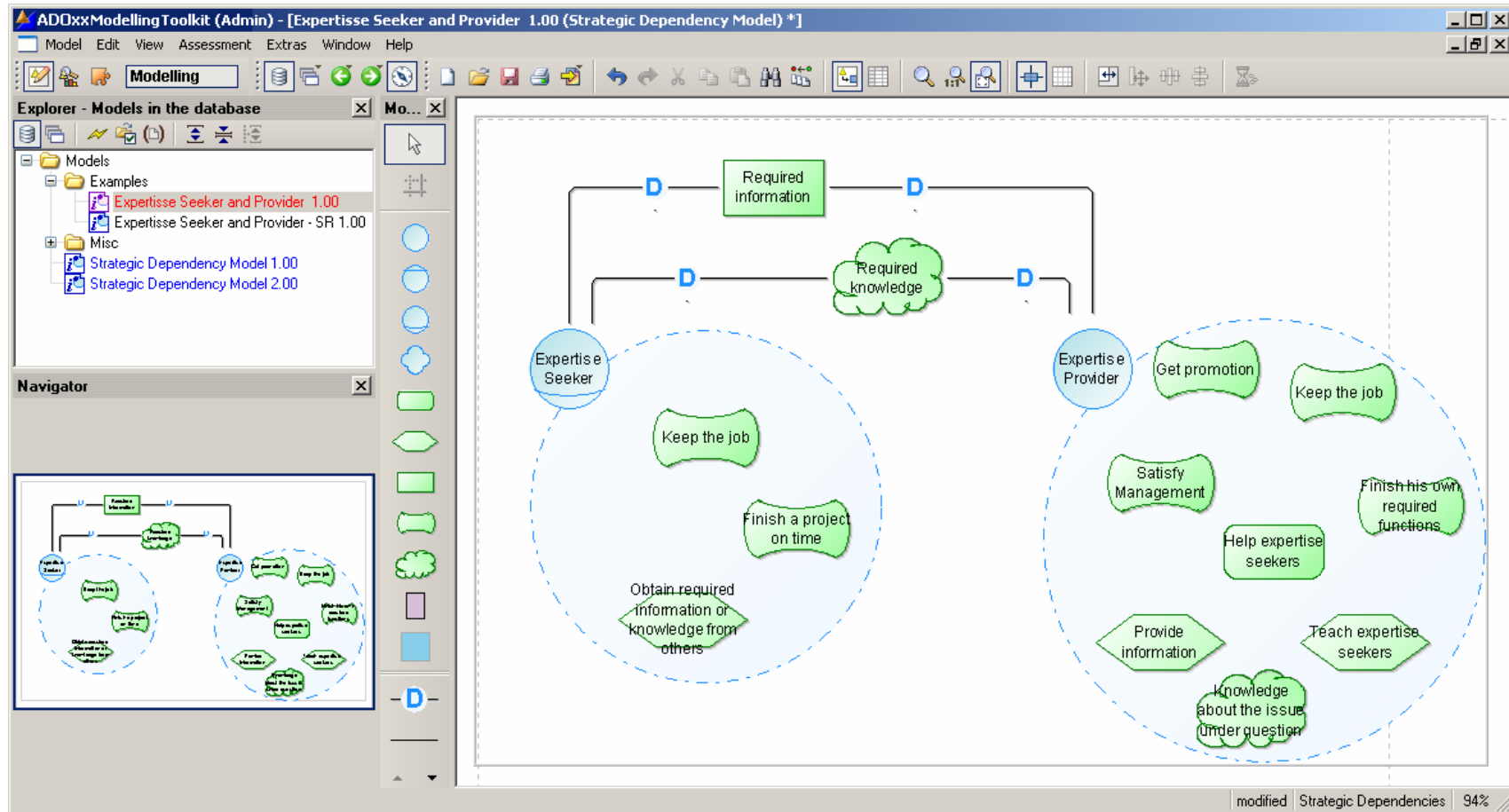
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The *i** Method 'Conceptualization' for ADOxx v1.0:

Example of a "Strategic Rational Model":
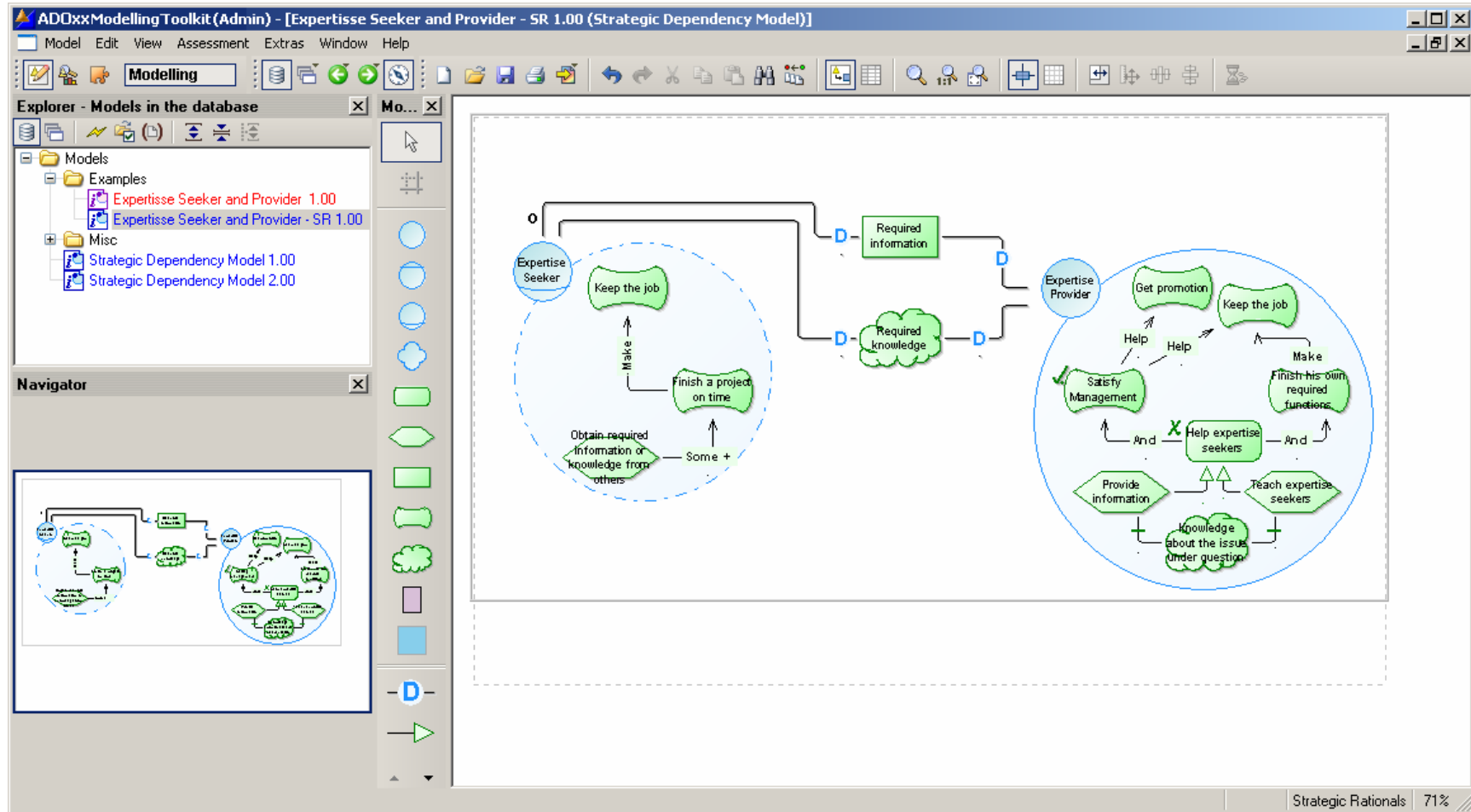
The i* Method 'Conceptualization' for ADOxx v1.0:

Lessons Learned -1-

Considerations for the Implementation of the Classes:

- **Which properties does the class have according to the method description?**
  To answer for example the question: "Is the class with a **certain value assigned** / in a certain condition, i.e. syntax or semantic related, **used in a different way than in the "default" condition**.

- **Modelling Guidelines**
  According to **syntax**, is it necessary to **use different relation classes** for different "values" of the object?
  e.g. implementation of "Wants" as **one class or as separate classes** as "Goals", Tasks", … "Beliefs";
  whenever an intentional actor has a "Belief" the relation may be displayed "dashed".

- **Meaningful according to semantics**

- **Usability - intuitive to use for the modeller**
  To which extend is it **easier for the user to handle the different properties** of the classes? E.g. as separate classes for different "states" or "values" of a class **OR** as one class **with options** to show or hide including different graphical elements.

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The *i** Method 'Conceptualization' for ADOxx v1.0:

Lessons Learned -2-

Advantages of ADOxx v1.0 in Comparison to other Tools

- **Platform functionality is rather advanced –**
  in addition, it offers "series readiness" installation routine in comparison to
  open source development environment,

- **Powerful graphical editor -**
  though comparing the different implementations
  there is sometimes a "muddling through" of functionality, graphical
  representation of the classes and modelling guidelines - e.g. Visio,

- **Usability of the realized solution –**
  easy and intuitive to use for the "end user"; most of the existing *i** Method
  implementations are on eclipse

- **Cardinality checks at a later stage may easily be included,**

- **Conceivable extensions to other functionality of the platform –**
  e.g. scalability, queries, reports of various formats like html or word.

The *i** Method 'Conceptualization' for ADOxx v1.0:

Open 'Organisational' Aspects

For an Intended Project of the Open Models Initiative

- Who may participate and are there any prerequisites?

- Who maintains the content and who releases the content of the project?

- Is the content of the project "free to use" or restricted?

- etc.

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The $i*$ Method 'Conceptualization' for ADOxx v1.0:

Open Research Questions

Further Steps

- Verification of the realization of the $i*$ Method in ADOxx v1.0
    - notation of the method
    - usability
    - extensions – in form of "reports"

- Elaboration of a Case Study

- Elaboration of a Training Concept – depending on "Target Group"
    - Slides
    - Examples
    - Software Package

- Finalisation of the "User Manual" including documentation of the implementation for the $i*$ Method on ADOxx v1.0

- For Margit's dissertation: Is the $i*$ Method an appropriate instrument for "modelling the non-functional requirements of compliance".

References

[1] Fazel-Zarandi, M., Yu, E.: "Ontology-Based Expertise Finding", In Proceedings of the 7th International Conference of Practical Aspects of Knowledge Management, Yokohama, Japan, 2008. Springer-Verlag, Berlin Heidelberg (2008), pp. 232-243

[2] Franch, X.: "On the Quantitative Analysis of Agent-Oriented Models", In Dubois E., Pohl K. (Eds.): CAiSE 2006, LNCS 4001, pp. 495 – 509, Barcelona, Spain.

[3] Karagiannis, D., Kühn, H.: „Metamodelling Platforms". In Bauknecht, K, Min Tjoa, A., Quirchmayer, G. (Eds.): Proceedings of the Third International Conference EC-Web 2002 – Dexa 2002, Aix-en-Provence, France, September 2002, LNCS 2455, Springer, Berlin/Heidelberg, p. 182 ff.

[4] Mylopoulos, J., Chung L., and Nixon, B., "Representing and using Non-functional Requirements: A Process-oriented Approach", IEEE Transactions on Software Engineering, June 1992.

[5] Mylopoulos, J., Chung, L., Yu, E.: "From Object-Oriented to Goal-Oriented Requirements Analysis", Communications of the ACM, Vol. 42, No. 1, January 1999.

[6] Retschitzegger, W., Kappel, G., Schwinger, W., Wimmer, M.: "Lifting Metamodels to Ontologies: A Step to the Semantic Integration of Modeling Languages". Proceedings of ACM/IEEE 9th International Conference on Model Driven Engineering Languages and Systems (MoDELS/UML 2006), Genova, Italy, October 2006

[7] Samavi, R., Yu, E. Topaloglou, Th.: "Strategic Reasoning about Business Models: A Conceptual Modeling Approach", Information Systems and E-Business Management, Springer , Berlin / Heidelberg, Vol. 7, No. 2, March 2009.

[8] Yu, E.: "Strategic Actor Relationships Modelling with i*, Part 1, Part 2, Part3", A tutorial given at IRST/University of Trento, Italy, December 2001; http://www.cs.toronto.edu/~eric/#istar-tut-ppt; last access 12th of February 2009.

[9] Open Models Initiative; http://www.openmodels.at/web/istar/1-5; last access 20th of May 2009.

[10] http://www.cs.toronto.edu/~eric/; last access 20th of May 2009.