The $i^*$ Framework: The Way Ahead

Xavier Franch
Universitat Politècnica de Catalunya (Barcelona, Spain)
RCIS’12, Valencia, May 2012

Group of Software Engineering for Information Systems
UNIVERSITAT POLITÈCNICA DE CATALUNYA
Outline

- Motivation
- Open Issues
- Community Actions
Motivation: why strategic modeling?

- Commitment
- Intentions
- Abilities
- Desires
- What-if
- Rationale
Approaches to intentional modeling
Why *i*?

I need to go to Valencia

- By plane
- By train
- By car

Cheap

Fast

Passport number

Decide dates
i* used in several disciplines

Requirements Engineering

Business Modeling

Architectural Design

Business Intelligence
* current use

The i* Framework: The Way Ahead

i* wiki

FIFTH INTERNATIONAL i* WORKSHOP
18-20 August 2011
Trento, Italy
The i* Framework: The Way Ahead

i* current use

i* community

outside world
Is that strange?

- Kuhn’s concept of “scientific revolution”

The Framework: The Way Ahead

i* emerges
community agreement
creative momentum

We are here (?)
Or here 😐?

Let’s move here!

Theories do not satisfy findings
A new analysis perspective borns.
A new ontology evolves
Knowledge is generated using established perspective

Pre-paradigmatic stage
Revolutionary stage
Normal Science stage
The Way Ahead

Which are the open issues to face during this journey?
Open Issues
Open Issue 1. The Language
Open Issue 1. The Language

- How is the $i^*$ framework used by modellers?
Open Issue 1. The Language

- Which are the usual variations?

Extensions
Open Issue 1. The Language

• Which are the usual variations?

Paradigm shifts
Open Issue 1. The Language

- Which are the usual variations?

Small variations on core constructs
The Way Ahead

- Identification of a language core

- Core concepts, common to all $i^*$ variants
- Particular concepts of widespread $i^*$ variants
- Particular concepts of emerging $i^*$ variants
- Particular tool implementations and additional concepts from existing $i^*$ variants

Other modeling spaces
The Way Ahead

• Specifying the language core: syntax
The Way Ahead

• Specifying the language core: semantics

Foundational ontologies
The Way Ahead

• \textit{i*} for practitioners?

Meaningful, value-oriented concepts for practitioners
Open Issue 2. The Method
Open Issue 2. The Method

- How are \( i^* \) models built?

What about lower level?
Open Issue 2. The Method

• How are $i^*$ models built?

- Travel to RCIS’12
  - e-ticket
  - Buy ticket
- Travel to RCIS’12
  - e-ticket

Ubiquitous
The Way Ahead

• Promoting some prescriptive rules for model building
  – Steps
  – Refinement rationale: type of element; stop condition
  – Correctness checks
  – Patterns
  – Lexical conditions
The Way Ahead

- Special emphasis on element decision
Open Issue 3. Model Analysis
Open Issue 3. Model Analysis

• “You can’t control what you can’t measure”

How good is this diagram?
• what does “good” mean?
• how do we know “how”?

Customer as Buyer [Service]

Low Price Service Provider Be Found

Name a Price [Service]

Pay for Purchase [Service]

Middleman as Seller [Service]

Attract More Customers [Service]

Agreement on Price [P]

Supplier [Service]

Loyalty

Good Quality [Service]

Acceptable Price [Service]
Open Issue 3. Model Analysis

- Quantitative measures

<table>
<thead>
<tr>
<th>Diagrams</th>
<th>Measure</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-R</td>
<td>Nb. of Entities</td>
<td>Simplicity</td>
</tr>
<tr>
<td></td>
<td>Nb. of Entities and Relationships</td>
<td>Simplicity</td>
</tr>
<tr>
<td>Class</td>
<td>Depth of Inheritance Trees</td>
<td>Complexity</td>
</tr>
<tr>
<td></td>
<td>Nb. of children</td>
<td>Reusability</td>
</tr>
<tr>
<td></td>
<td>Nb. of associations</td>
<td>Maintainability</td>
</tr>
<tr>
<td>Business Process</td>
<td>Activity Automation Factor</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>Branch Automation Factor</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>Coupling</td>
<td>Maintainability</td>
</tr>
<tr>
<td>Statechart</td>
<td>Nb. of activities</td>
<td>Maintainability</td>
</tr>
<tr>
<td></td>
<td>Nb. of Transitions</td>
<td>Maintainability</td>
</tr>
<tr>
<td>i*</td>
<td>???</td>
<td>???</td>
</tr>
</tbody>
</table>
Open Issue 3. The Way Ahead

- Define a suite of $i^*$ measures

<table>
<thead>
<tr>
<th>Diagrams</th>
<th>Measure</th>
<th>Property</th>
</tr>
</thead>
<tbody>
<tr>
<td>$i^*$</td>
<td>Nb. of Elements</td>
<td>Simplicity</td>
</tr>
<tr>
<td>$i^*$</td>
<td>Nb. of Goals with 1 Means</td>
<td>Workability</td>
</tr>
<tr>
<td>$i^*$</td>
<td>Actor Centrality</td>
<td>Performance</td>
</tr>
<tr>
<td>$i^*$</td>
<td>Nb. of Automated Tasks</td>
<td>Performance</td>
</tr>
</tbody>
</table>
Open Issue 4. Scalability et al.
Open Issue 4. Scalability et al.

- $i^*$ models do not scale well

<table>
<thead>
<tr>
<th>Evaluation Criteria</th>
<th>Evaluated issue</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modelling Language</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refinement</td>
<td>Not Well Supported</td>
<td></td>
</tr>
<tr>
<td>Modularity</td>
<td>Not Supported</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>Not Well Supported</td>
<td></td>
</tr>
<tr>
<td>Complexity mgmt.</td>
<td>Not Well Supported</td>
<td></td>
</tr>
<tr>
<td>Expressiveness</td>
<td>Well Supported</td>
<td></td>
</tr>
<tr>
<td>Traceability</td>
<td>Not Well Supported</td>
<td></td>
</tr>
<tr>
<td>Reusability</td>
<td>Not Supported</td>
<td></td>
</tr>
<tr>
<td>Pragmatics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Scalability</td>
<td>Not Supported</td>
<td></td>
</tr>
<tr>
<td>Domain applicability</td>
<td>Well Supported</td>
<td></td>
</tr>
</tbody>
</table>

cf. Estrada et al., CAiSE’06
Open Issue 4. The Way Ahead

• Domain-oriented proposals
Open Issue 4. The Way Ahead

- Generic proposals
Open Issue 4. The Way Ahead

- Generic proposals

Means-end module
Open Issue 4. The Way Ahead

• Generic proposals
Open Issue 5. Integration
Open Issue 5. Integration of $i^*$

- Effort on $i^*$ modeling: Return on Investment
Open Issue 5. The Way Ahead

• How adequate are the models for this purpose?
Open Issue 5. The Way Ahead

• What extensions are needed in the $i^*$ language?
Open Issue 5. The Way Ahead

• What changes are needed in an extended $i^*$ model according to the value of these measures?
Open Issue 5. The Way Ahead

• What changes are needed in an extended i* model according to the value of these measures?

<table>
<thead>
<tr>
<th>Measure</th>
<th>Alert</th>
<th>Result</th>
<th>Locator</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTR</td>
<td>Critical</td>
<td>1 R non-transform.</td>
<td>Work Request Status</td>
</tr>
<tr>
<td>WAG</td>
<td>Critical</td>
<td>1 IR non-transform.</td>
<td>Personal Data</td>
</tr>
<tr>
<td>ECG</td>
<td>Warning</td>
<td>3 classes without att.</td>
<td>Photographer Production Dept. Work Request</td>
</tr>
<tr>
<td>NIPR</td>
<td>Warning</td>
<td>1 PR without task</td>
<td>Work Request</td>
</tr>
</tbody>
</table>
Open Issue 5. The Way Ahead

- What changes are needed in an extended $i^*$ model according to the value of these measures?
Open Issue 6. Tool support
Open Issue 6. Tool support

- Repetition of effort
- Waste of opportunities
- No diagram catalogues

etc…
Open Issue 6. The Way Ahead

• Provide means for interoperability
Open Issue 6. The Way Ahead

- Adopt an interchange format

```
<istarml version="1.0">
  <diagram name="Tropos's decomposition example">
    <actor id="100" name="A">
      <actor id="200" name="B">
        <boundary>
          <element name="T1" type="task">
            <elementLink type="decomposition" value="and">
              <element name="U1" type="task"/>
              <element name="U2" type="task"/>
              <element name="U3" type="task"/>
            </elementLink>
            <elementLink type="decomposition" value="or">
              <element name="V12" type="task"/>
              <element name="V13" type="task"/>
            </elementLink>
          </element>
        </boundary>
      </actor>
      <actor>
        <element type="goal" name="G">
          <dependency>
            <dependee aref="100"/>
            <dependee aref="200"/>
          </dependency>
        </element>
      </actor>
  </diagram>
</istarml>
```
Open Issue 6. The Way Ahead

- Use of general metamodelling tools; SOA tools
Community actions
Community actions

• Formulation and adoption of a fully agreed language core (metamodel + ontology)

Yes, we agree!!
Community actions

• Facilitate powerful tool support
  – OpenOME? jUCMNav? AdoXX?
  – Import/export format (iStarML?)
  – Service-oriented?
  – Make it commercial!!
    • Usability, ...
Community actions

- Run empirical studies
  - About the language
  - About its practical use (case studies)
Community actions

- Facilitate dissemination:
  - Practitioner- / student-oriented textbook
  - Model repositories
Take-away messages

• Research on $i^*$ is in a great moment
• Adequate moment for consolidation
• Some open research issues to be overcome
• Most of them require a community effort
Acknowledgements

To many people but in particular:

- Carlos Cares, for the foundational aspects
- Lidia López, for discussions on the language core
- Renata and Giancarlo Guizzardi, for the ontological touch
References Relevant to this Position

- Guizzardi, Franch, Guizzardi. Applying a Foundational Ontology to Analyze the i* Framework. RCIS 2012
- Cares, Franch. A Metamodelling Approach for i* Model Translations. CAiSE 2011
- Franch. Incorporating Modules in the i* Framework. CAiSE 2010
- Franch. Fostering the Adoption of i* by Practitioners: Some Challenges and Research Directions. In Intentional Perspectives on IS Engineering, 2010
- Franch et al. Systematic Construction of i* SD Models. IJSEKE 17(1), 2007
Comments and Questions?