Using i* and Tropos in a Software Engineering Contest: Lessons Learnt and Some Key Challenges

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FOURTH INTERNATIONAL I* WORKSHOP – ISTAR2010

Motivation

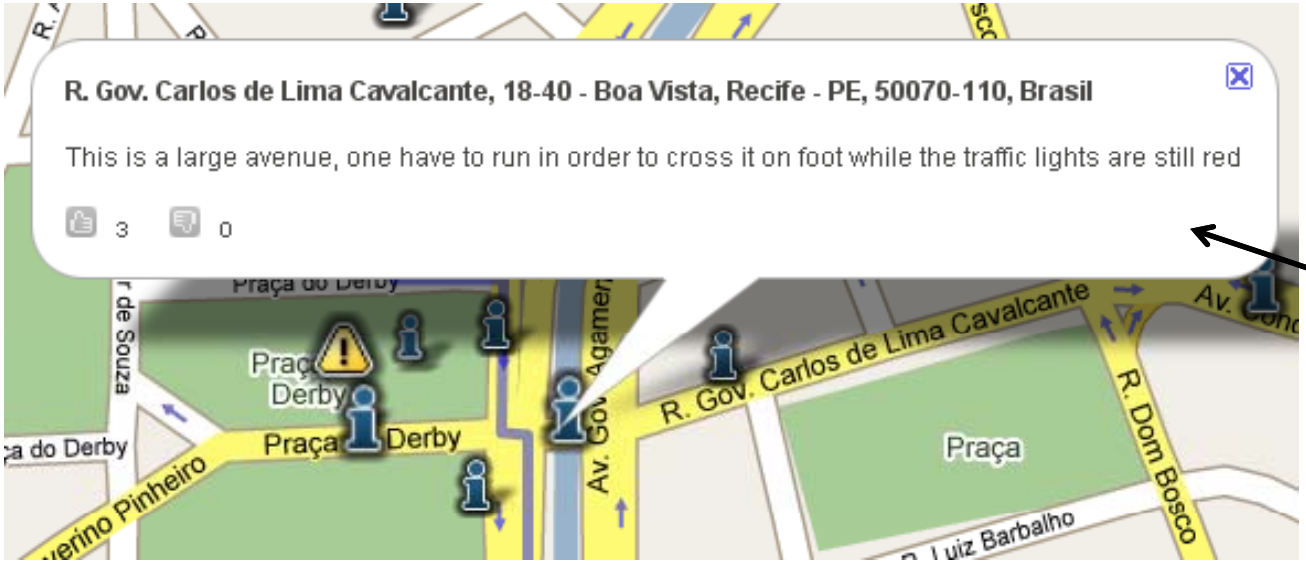
- Project developed for SCORE @ ICSE 2009
  - Finalist
  - Using Tropos
    - Requirements and architecture modeled with i*
    - Some gaps were identified

Scenario: OscarmPastor is **travelling** with his familly to Recife, Brazil. There, he will need to go **from his hotel to Olinda**. Checking this route in BTW, he will see **user comments** about how jammed the traffic usually is during rush hour in the main avenue, then he will **find a new route** going through a parallel avenue.

BTW

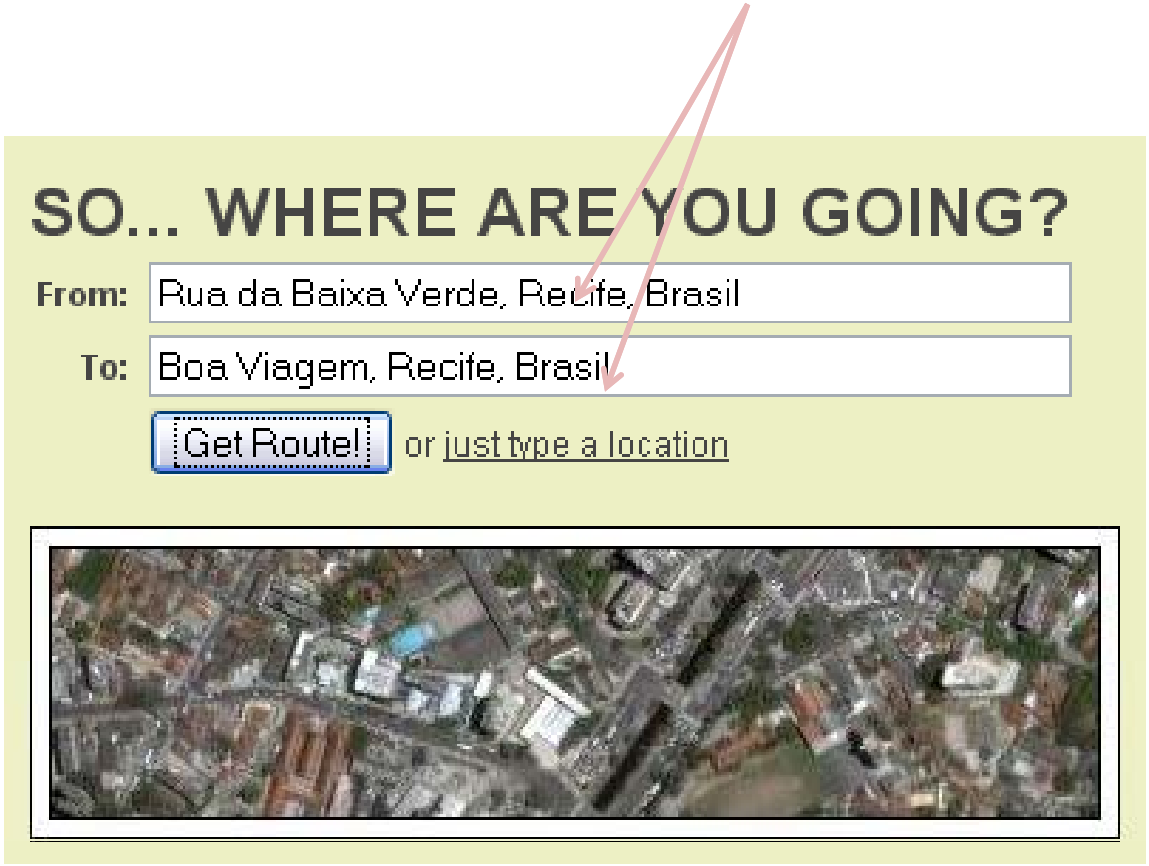
Route

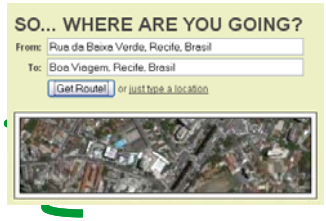
Weighted advice icons



Advice

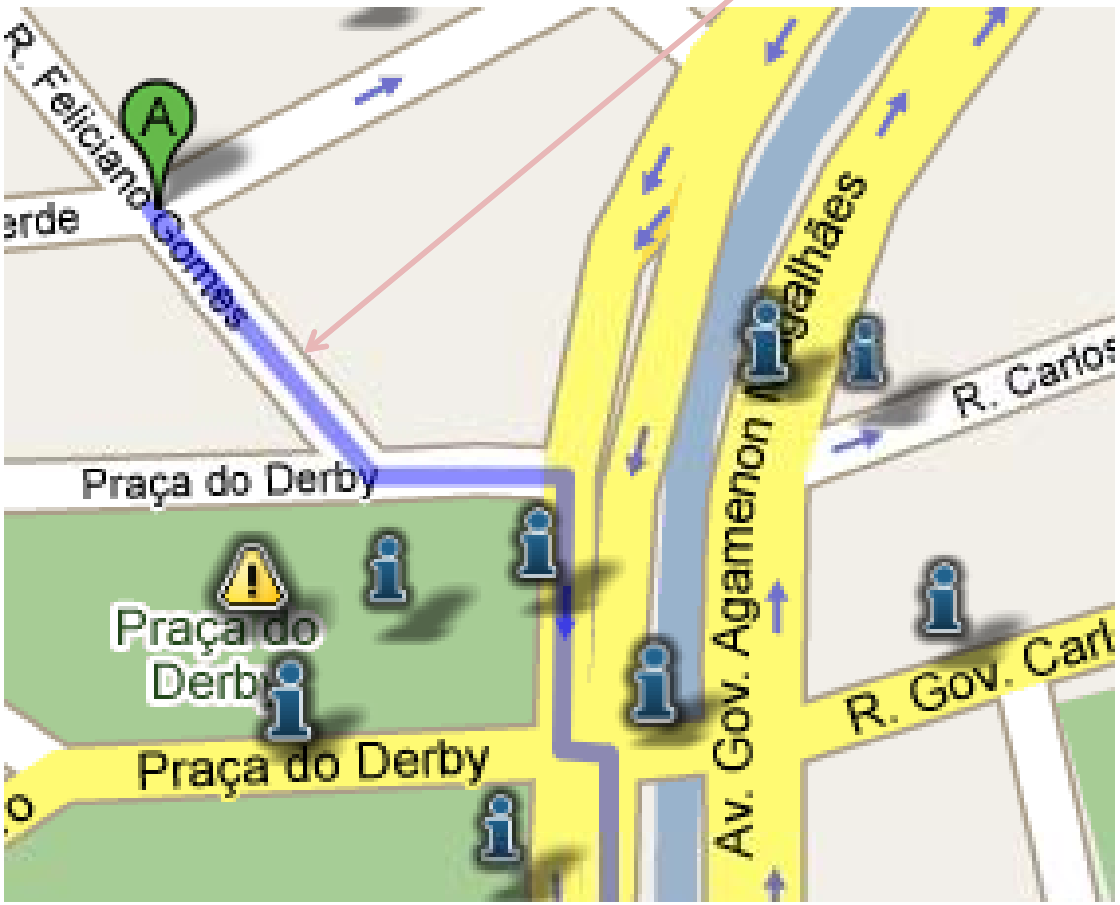
1) Type your destination

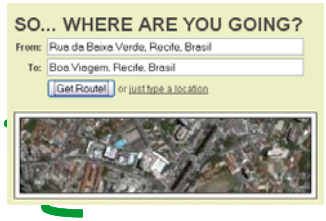




1) Destination

2) See the route





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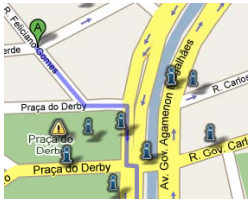

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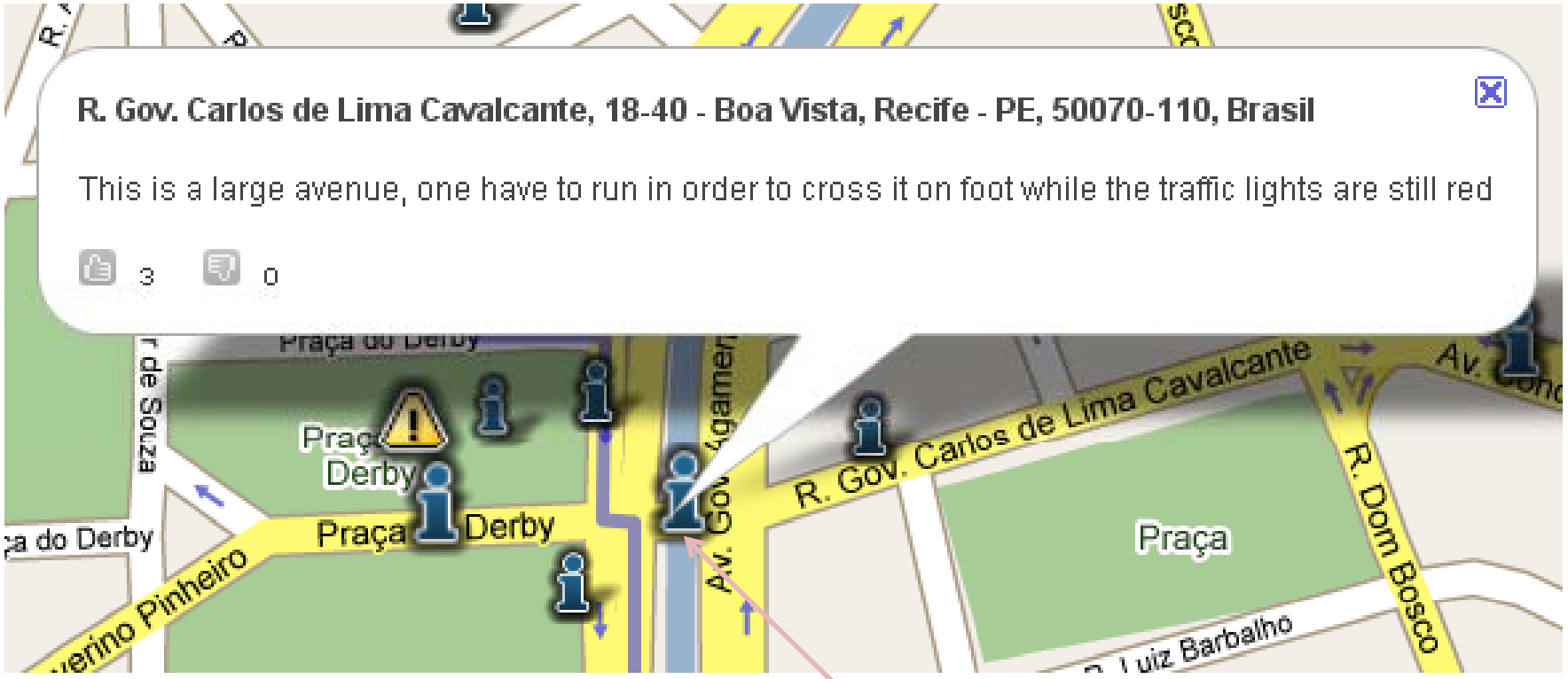

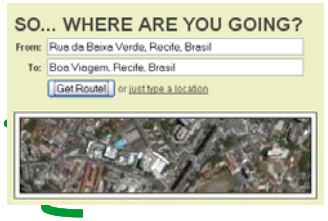

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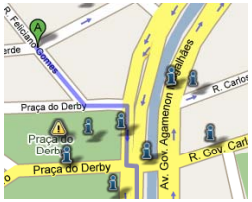


2) See route

3) See advices

0) Register

Register

Name*:

E-mail*:

Password*:

Gender*: Male Female

Birth date*: Day 1 Month May Year 2009

Country*: Canada

Which of the following transportation you use the most when travelling?*

Walking

Select your preferred places for entertainment below*

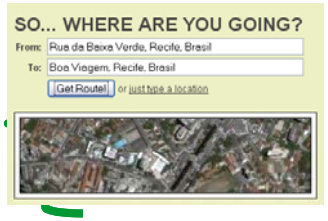
Museums Theathers Parks
Historical places Sightseeing Music concerts

Your travels are usually...*

VIP treatment

Physical conditions* Physically challenged Sensorially impaired Cognitive challenged

Register



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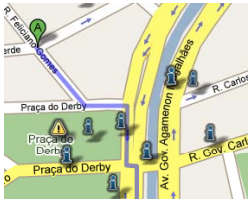
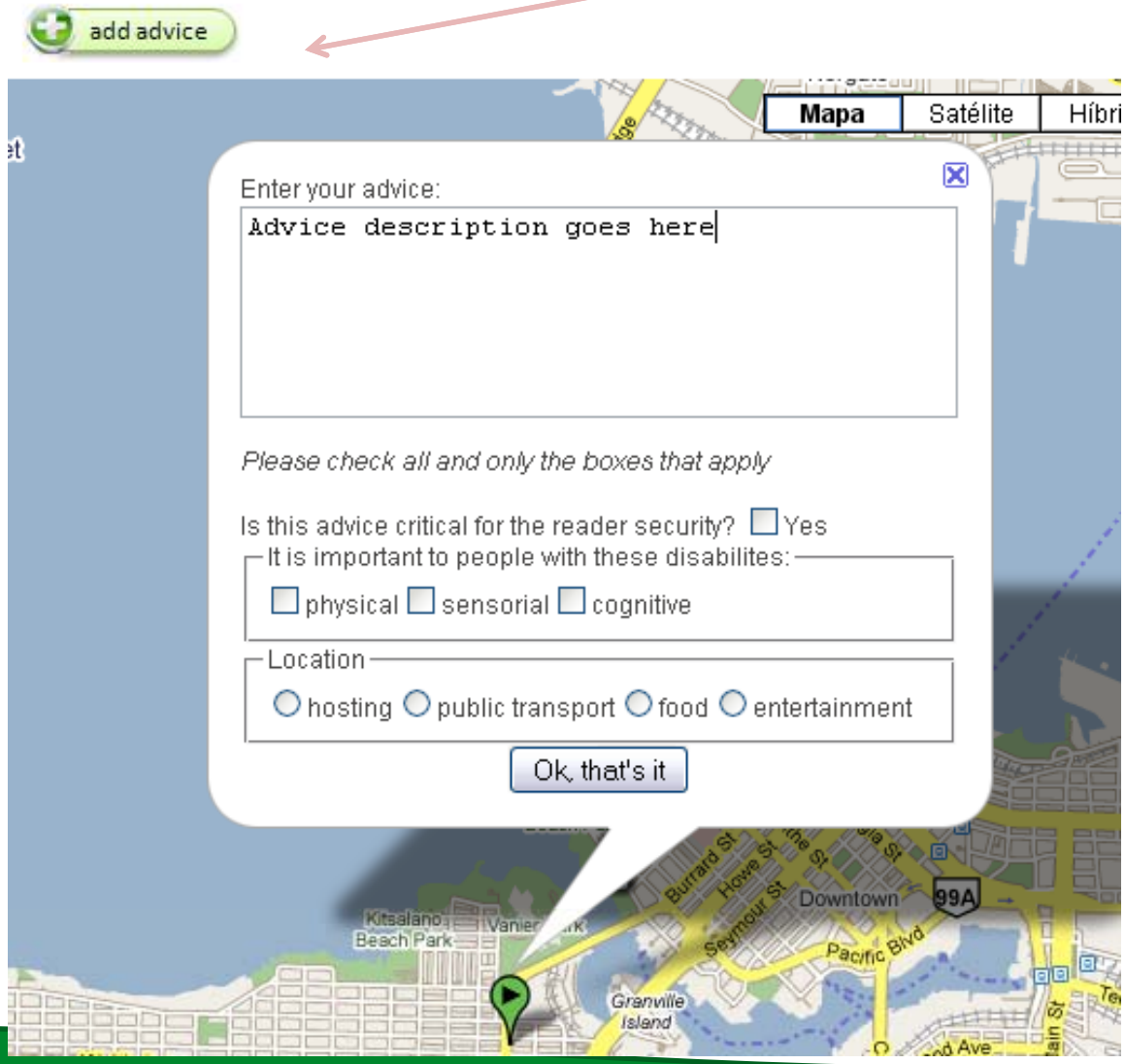
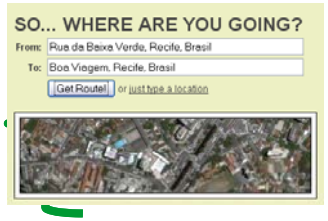


2) See route

3) See

4) Add advice





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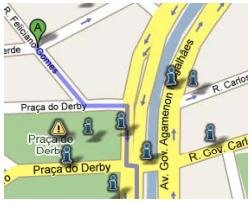
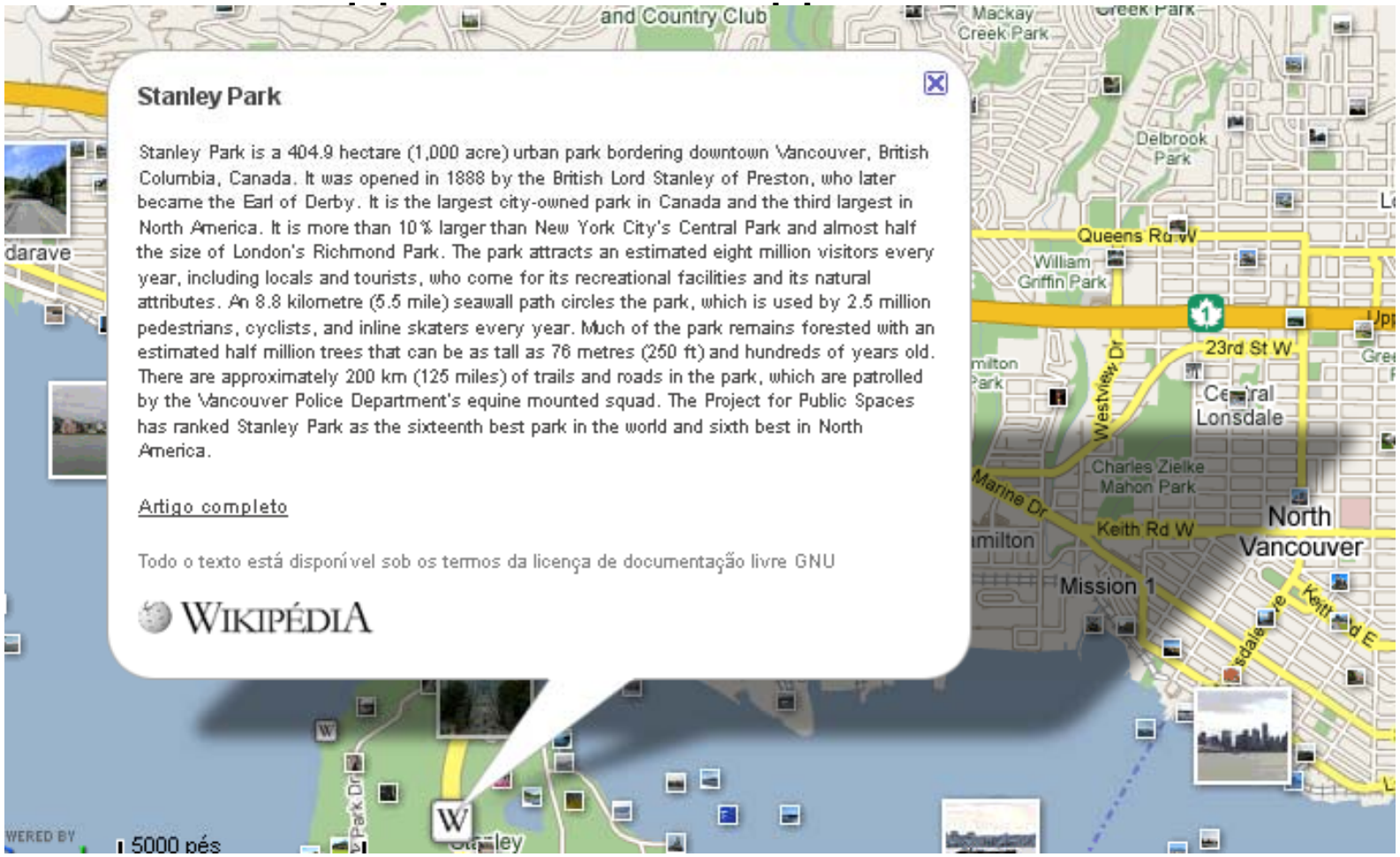


2) See

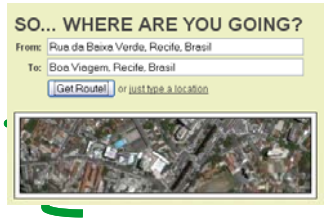
3) See

4) Add



5) Wikipedia, Panoramio and YouTube media

0) Register



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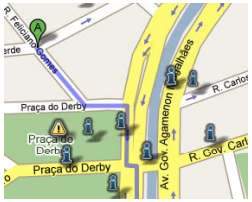
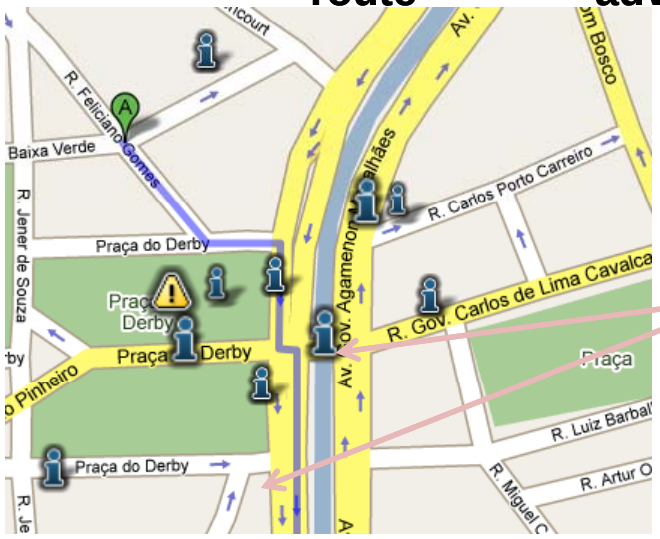


2) See route

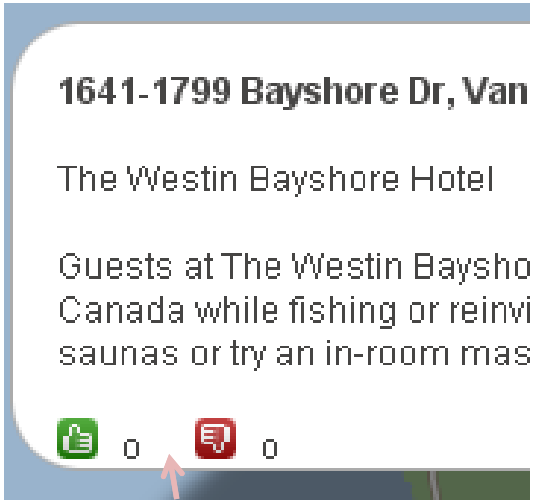
3) See advices

4) Add advice



6) The bigger the icon, the bigger the relevance

5) 3rd-party info



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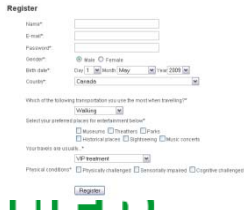
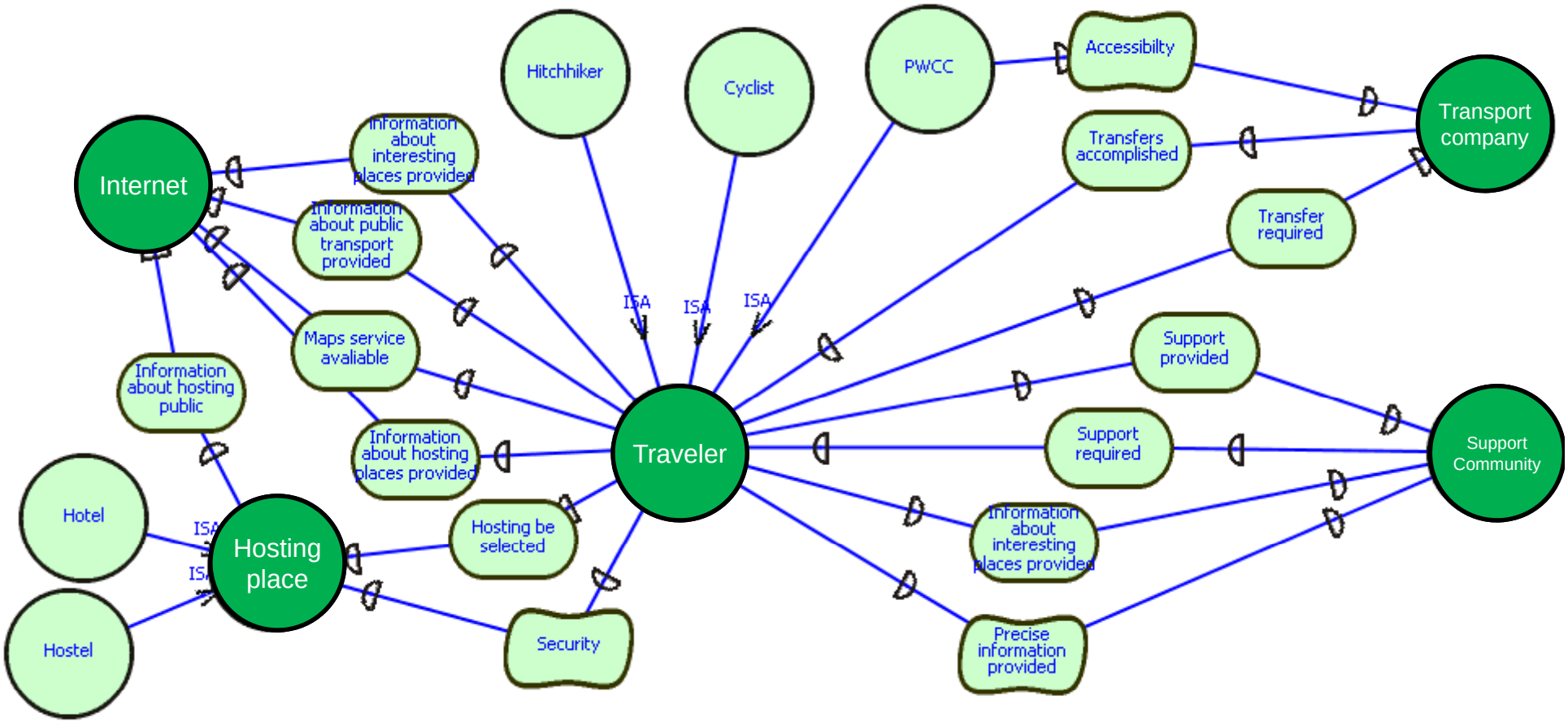
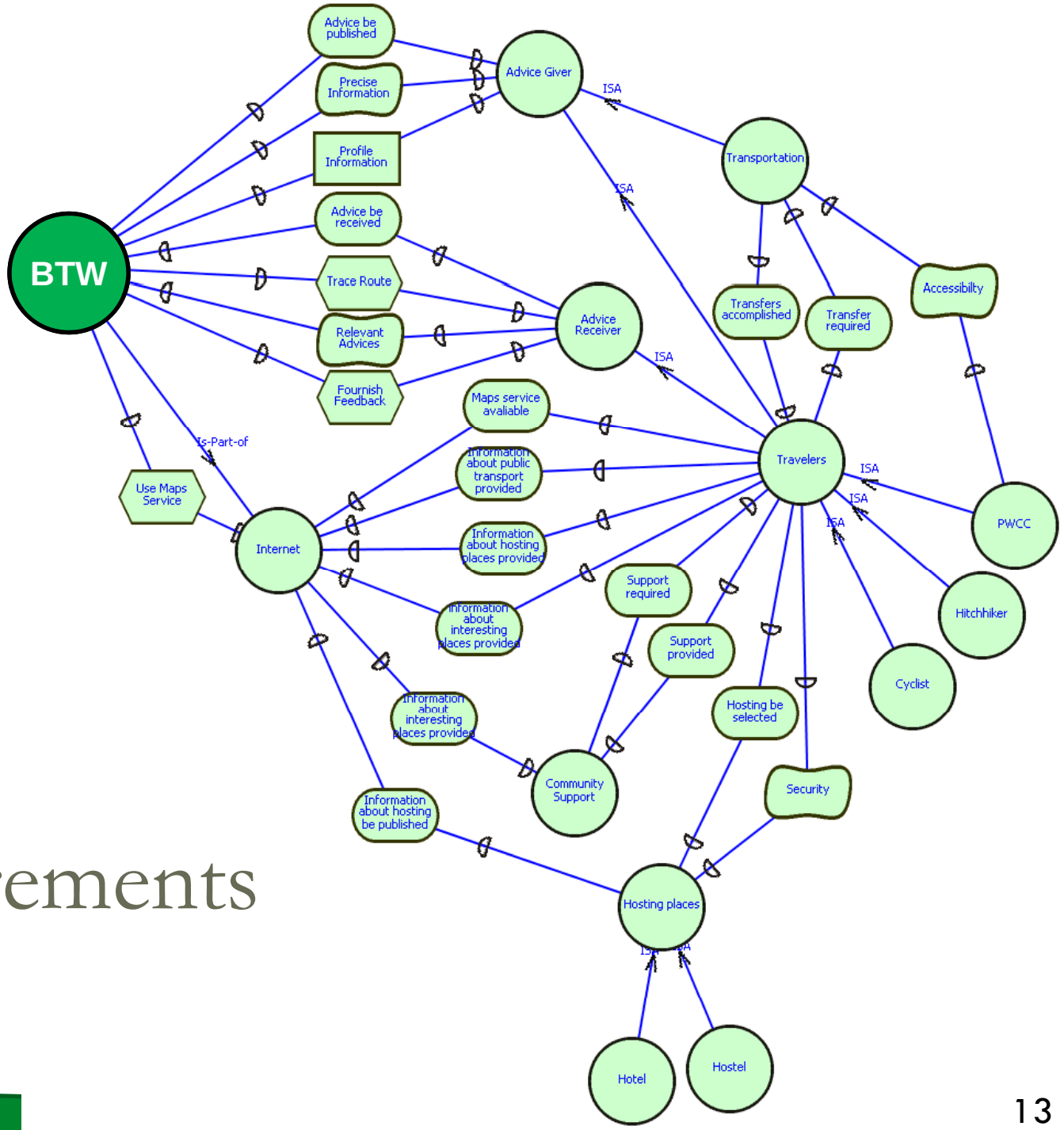


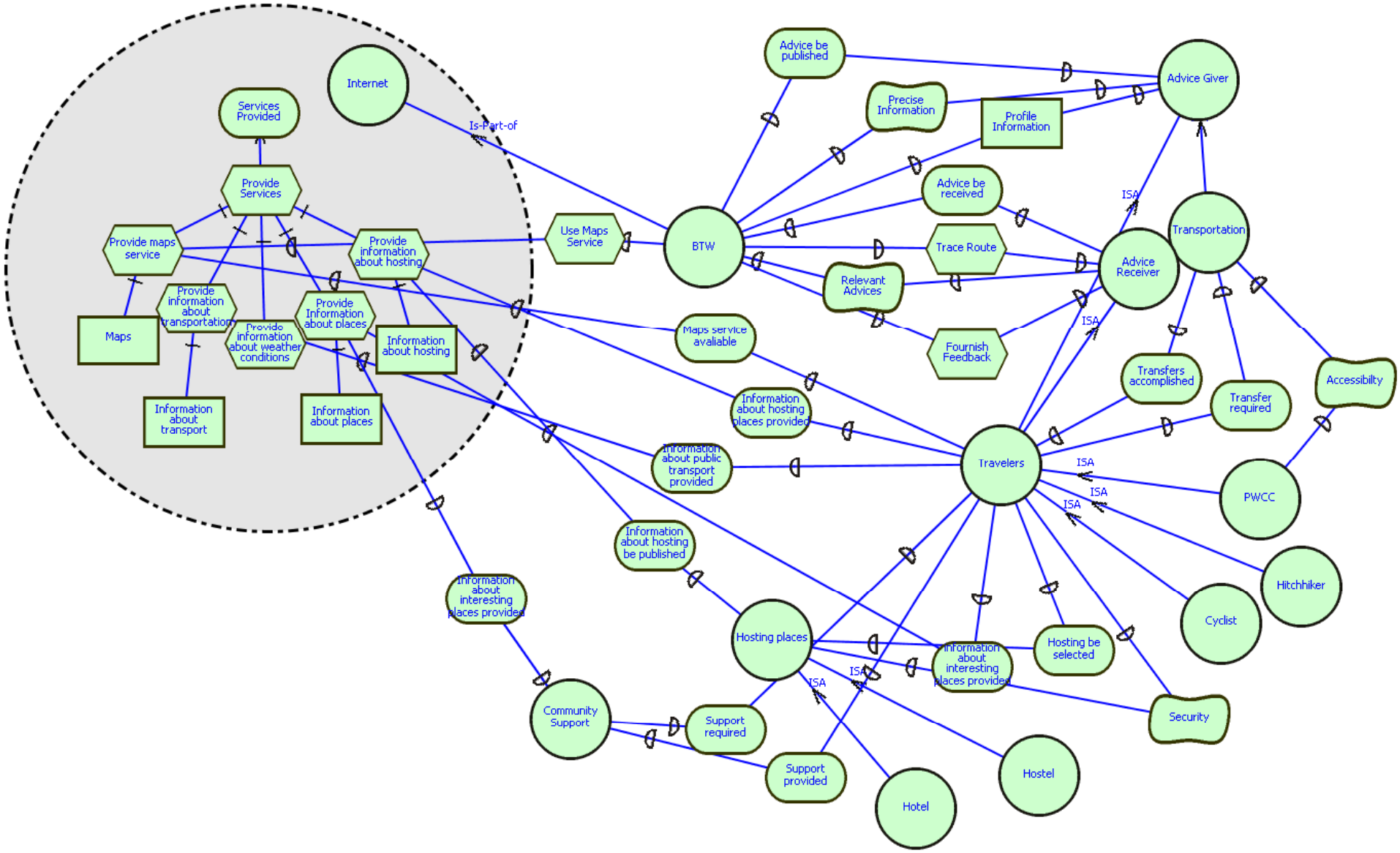
Based on explicit feedback and profile matching

Early requirements (the environment)



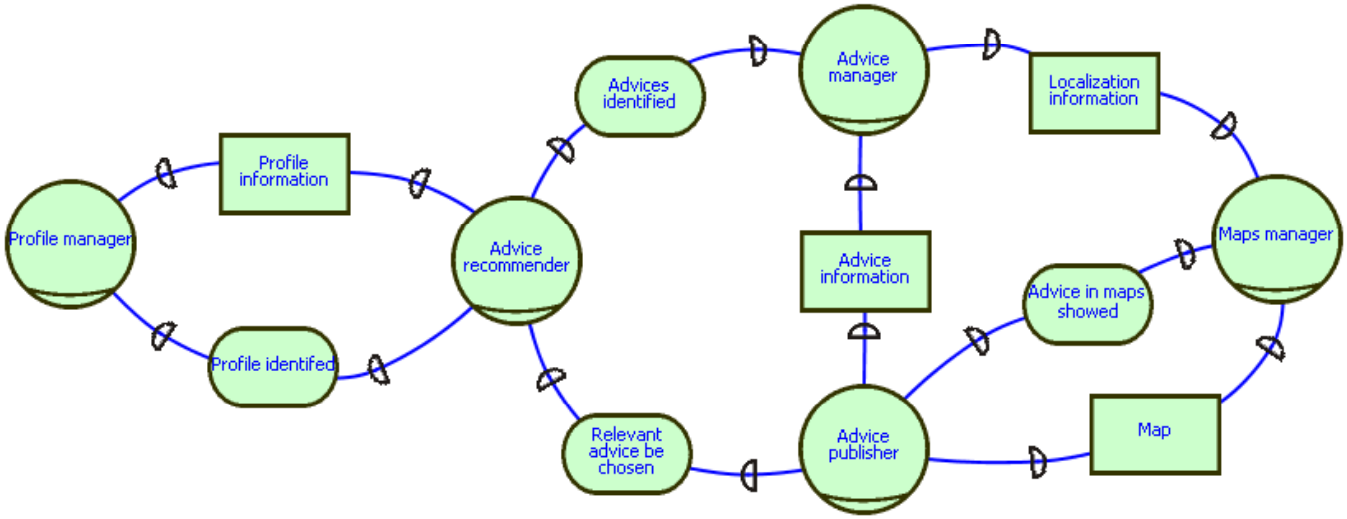
Late requirements





Late requirements (2)

Recommendation Agency Architecture



Detailed design models [7]

- Detailed architecture
- Communication
- Environment
- Rational

Identified gaps

- Related to
  - **Different versions of the modeling language and tool support**
  - **Reuse of Multi Agent Systems**
  - Requirements elicitation
  - Quality of models
  - Transition from requirements to architecture models
  - Transition from architecture models to detailed design
  - Transition from detailed design to source code

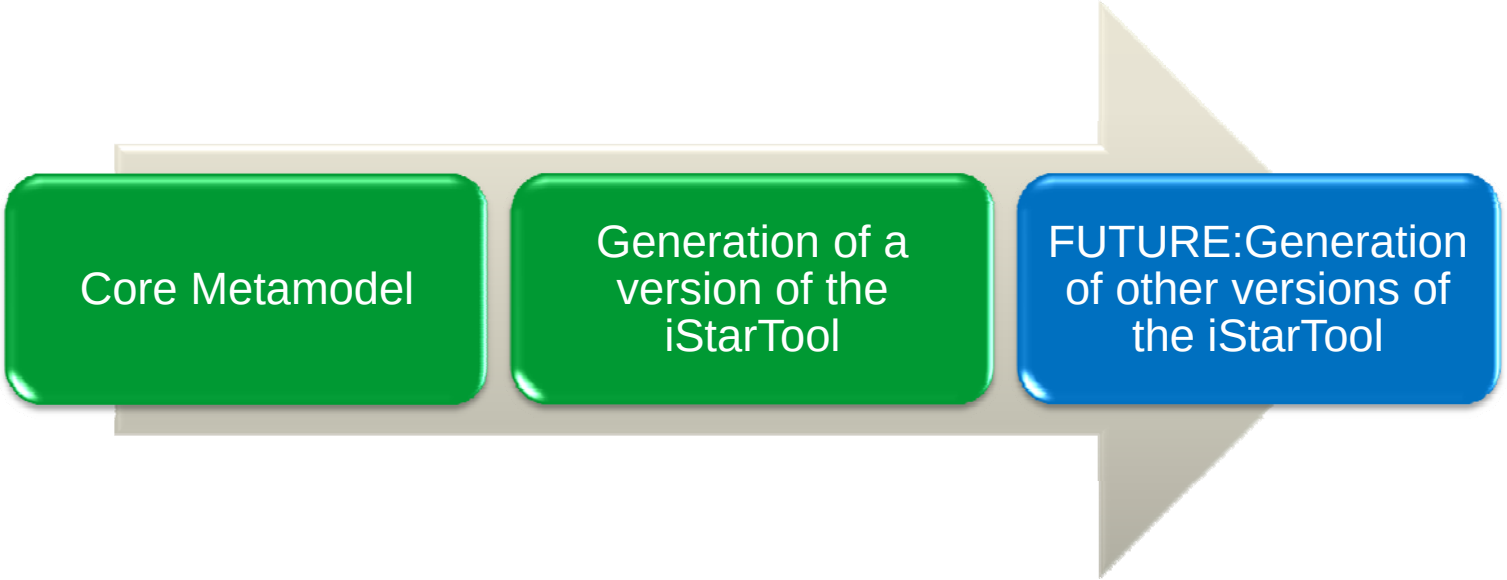
Research objectives

Tool support	MAS reuse
• A SPL approach	• A SPL approach

MAS: Multi-Agent Systems
SPL: Software Product Line

Tool support – a SPL approach

- Use the SPL principles to generate specific goal modeling tools
  - Core asset: core i* metamodel
  - Configuration: accordingly to specific i*/Tropos languages
  - Launching: automation and tools generation



i* Metamodel

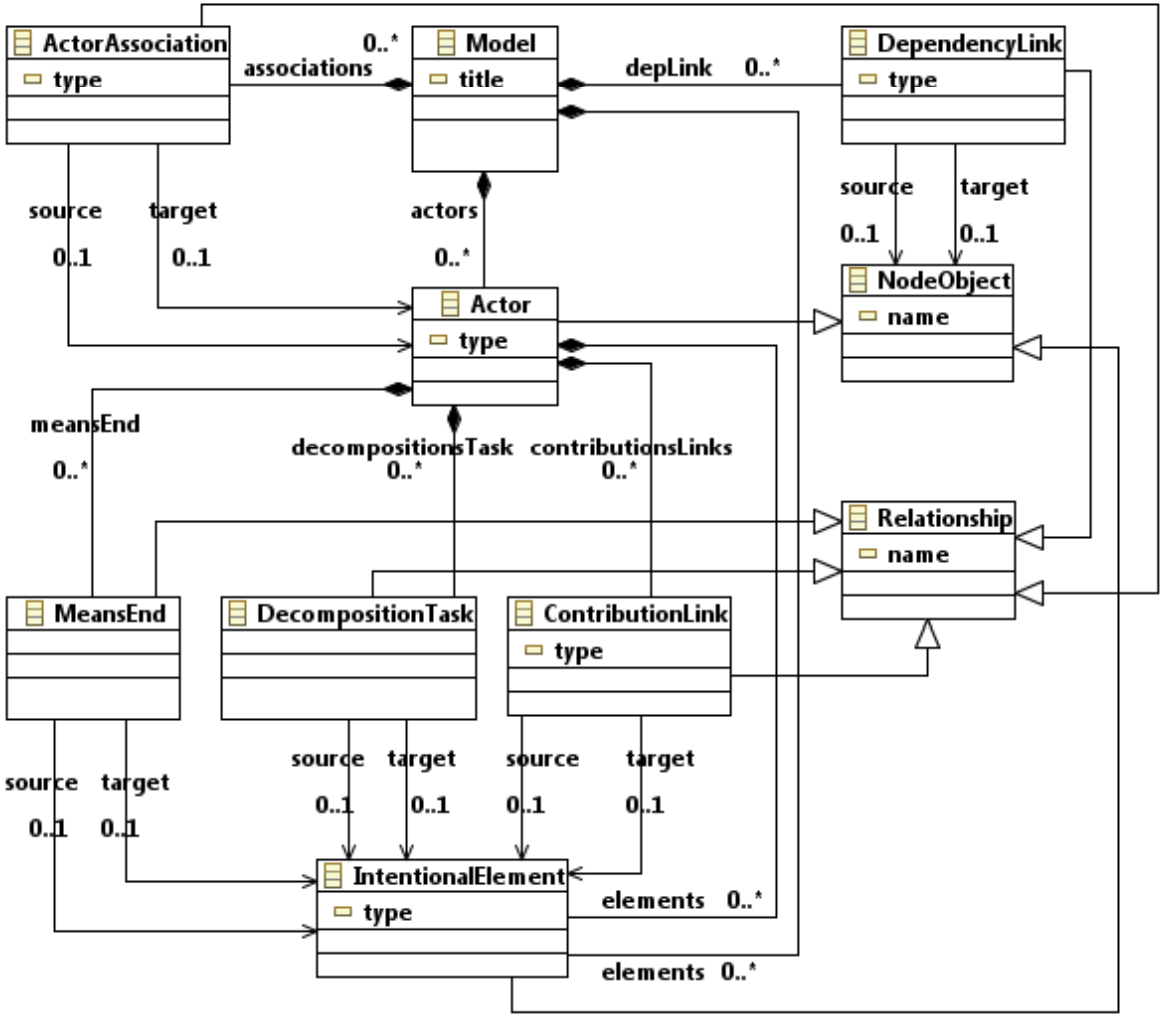
ActorType
- AGENT
- ROLE
- POSITION

ElementType
- GOAL
- SOFTGOAL
- TASK
- RESOURCE

DependencyLinkType
- COMMITED
- OPEN
- CRITICAL

ActorAssociationType
- ISA
- COVERS
- ISPARTOF
- OCCUPIES
- PLAYS
- INS

ContributionType
- MAKE
- BREAK
- UNKNOWN
- SOMEPLUS
- SOMEMINUS
- AND
- OR
- HELP
- HURT

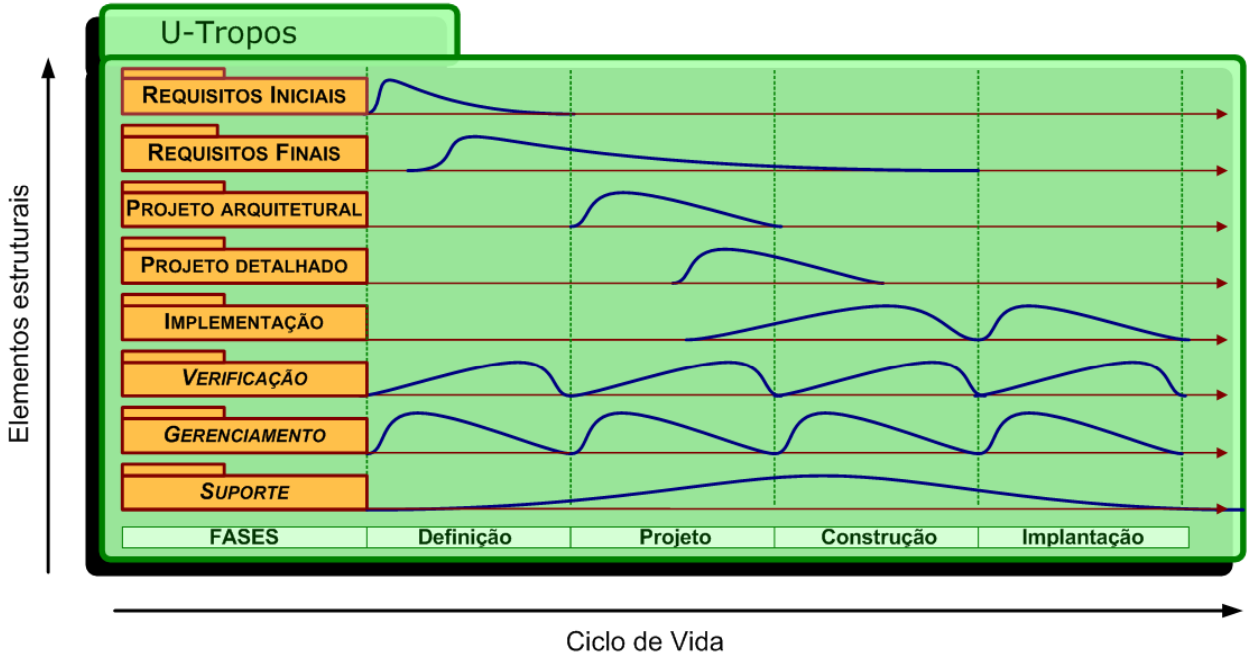


MAS reuse – a SPL approach

- Our goal is to extend the Tropos process to enable the development of multi-agent systems according to the SPL approach
  - Domain Engineering (DE)
  - Application Engineering (AE)

U-Tropos

- A process based on different versions of the Tropos methodology, techniques and templates

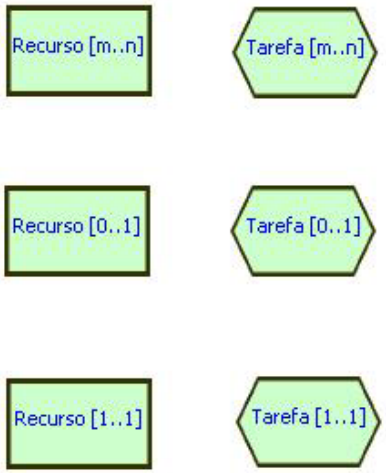


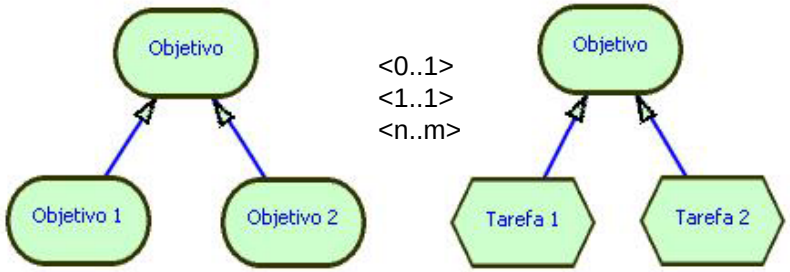
i* language for SPL

- Attempts to overcome the limitations presented by existent approaches
  - A goal-oriented language that fully represents variabilities and commonalities in SPLs

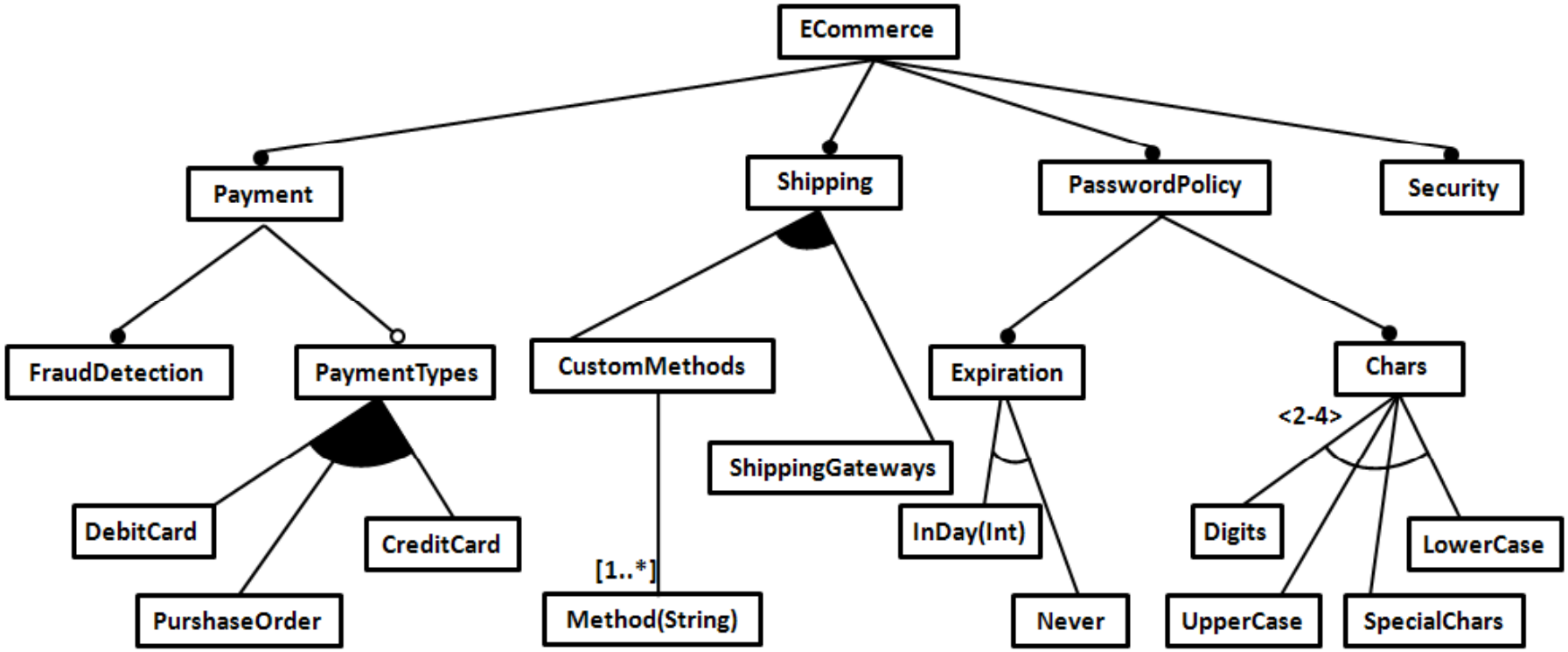
i*-c (*i* with cardinality*)

- Extension of the i* language to include cardinality
  - Tasks, resources and means-end

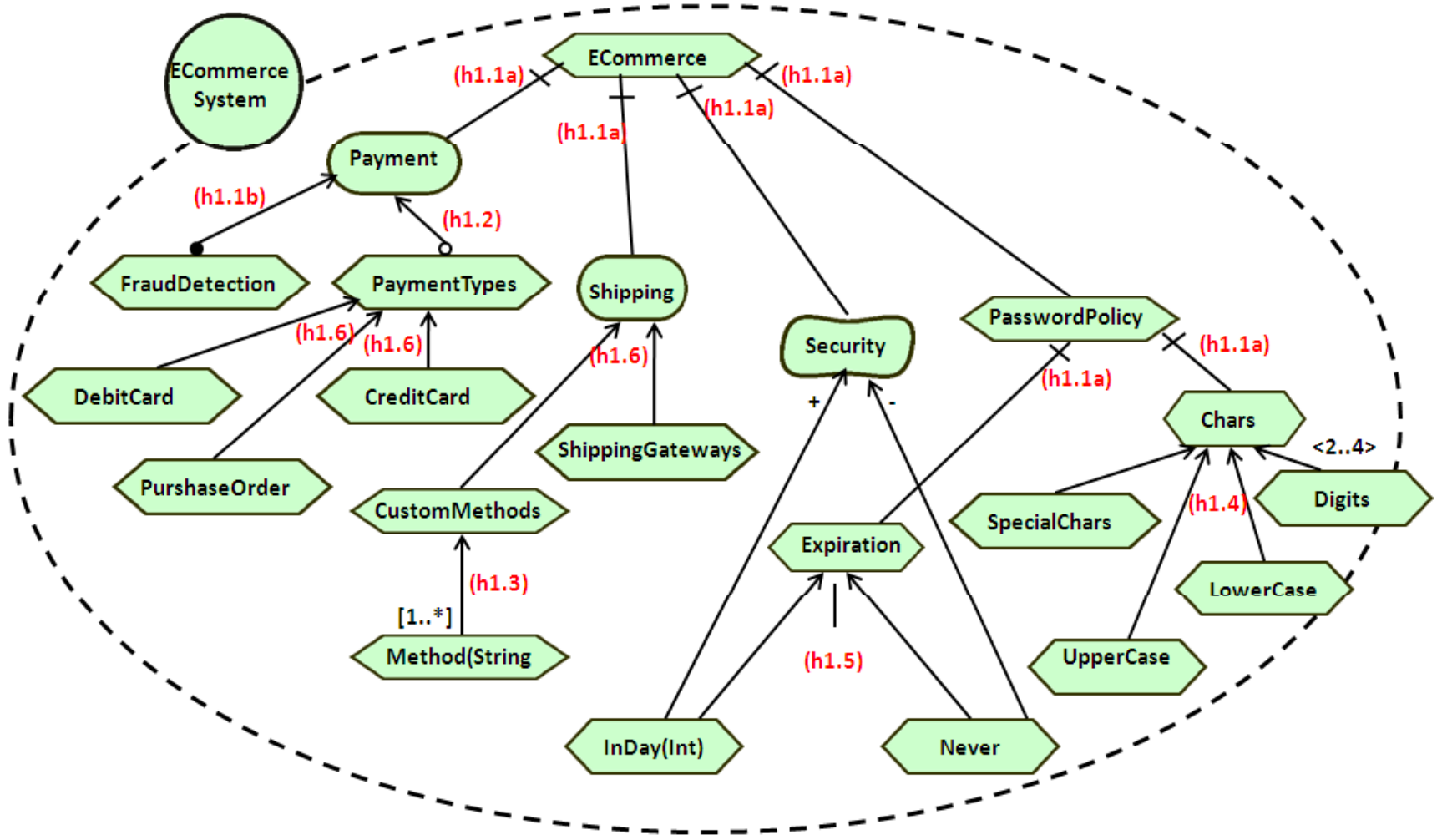




eCommerce Feature Model



eCommerce i* Model



Results

Feature Model	Goal Model	PL-AOVGraph	Aspectual i*	Our approach
Solitary Feature with cardinality [m..n]	**Not supported**	**Not supported**	**Not supported**	Supported
Solitary Feature with cardinality [0..1] (optional)	Supported.	Supported	**Not supported**	Supported
Solitary Feature with cardinality [1..1] (mandatory)	Supported	Supported	Supported	Supported
Binary relations which includes optional, mandatory and cardinality–based like relations	**Not supported**	**Not supported**	**Not supported**	Supported
Feature Group with group Cardinality <i-j>	**Not supported**	**Not supported**	**Not supported**	Supported
Feature Group with group Cardinality <1-k>, k= size of the group (inclusive-or)	Supported	Supported	Supported	Supported
Feature Group with group Cardinality <1-1> (exclusive-or)	Supported	Supported	**Not supported**	Supported

Authors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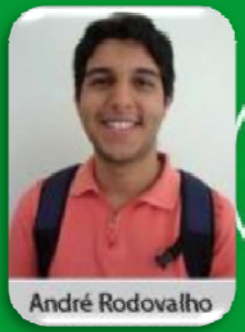
André Rodovalho


Carla Silva


Josias Paes


João Henrique


Bárbara Santos


Fernanda Alencar


Jaelson Castro


Thanks!