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

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FOURTH INTERNATIONAL I* WORKSHOP - ISTAR2010





Project developed for SCORE @ ICSE 2009 Finalist

- Using Tropos
 - Requirements and architecture modeled with i*
 - Some gaps were identified



 <u>Scenario</u>: 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.







1) Type your destination

SO... WHERE ARE YOU GOING?

From: Rua da Baixa Verde, Re*l*ífe, Brasil

To: Boa Viagem, Recife, Brasil/

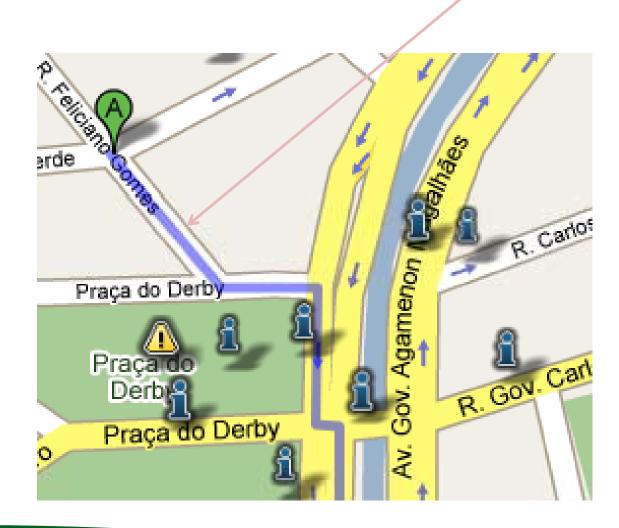
Get Routel or just type a location



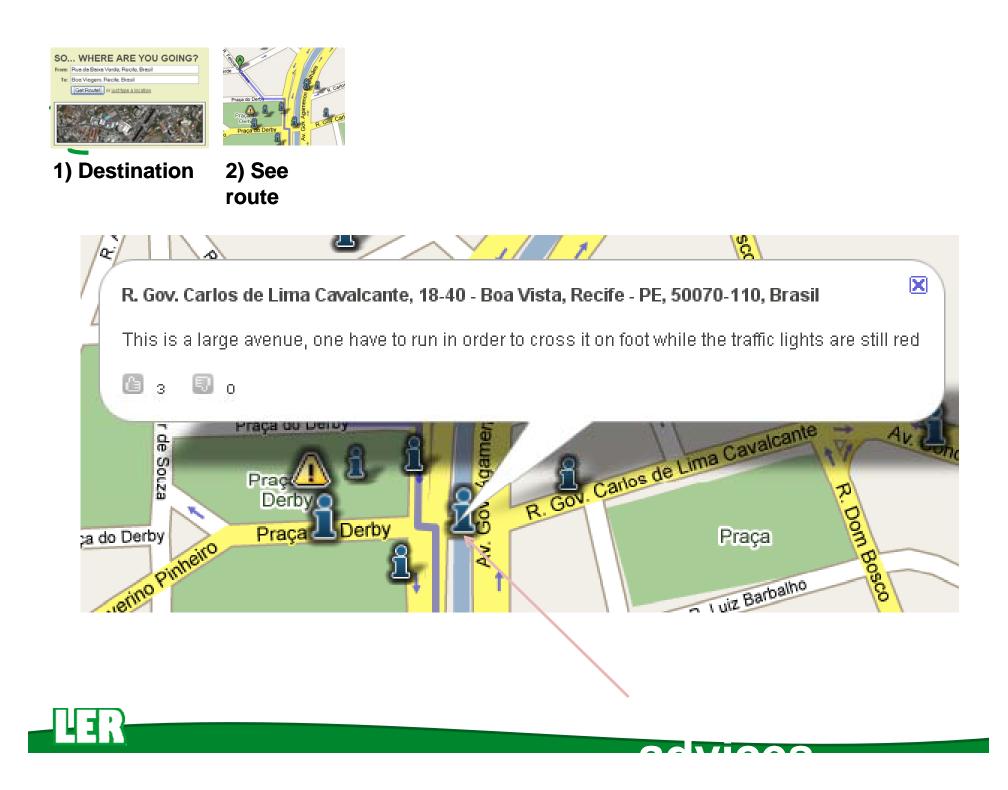




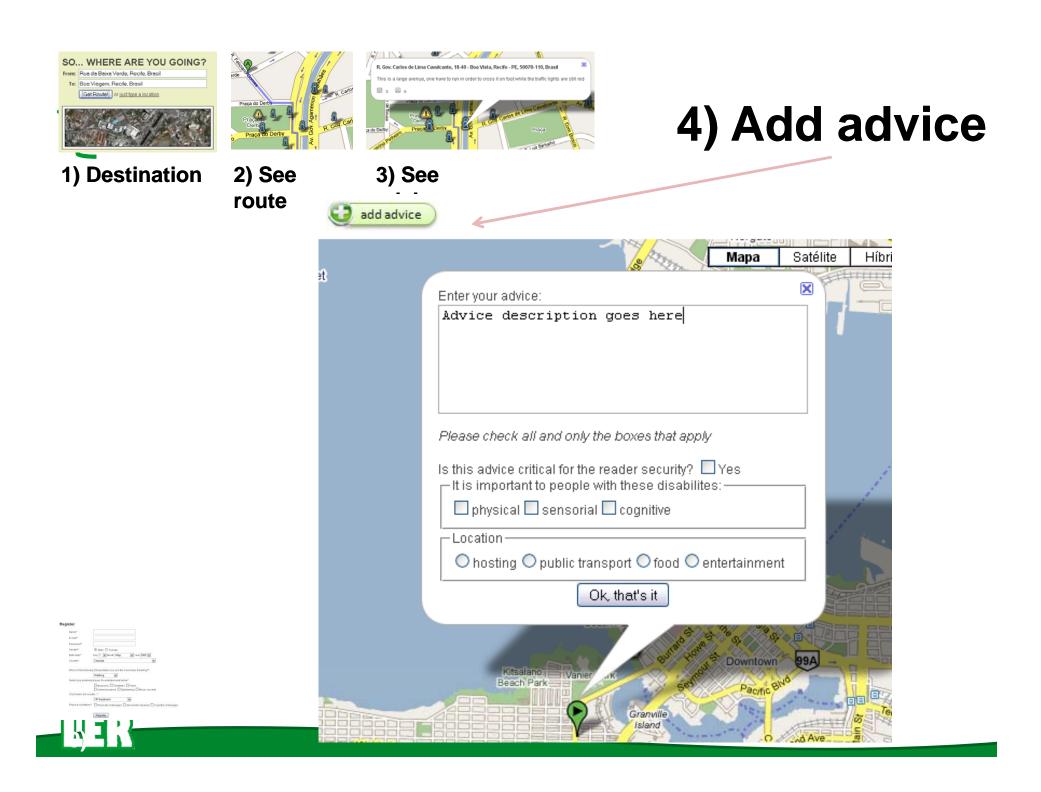
2) See the route







| SO WHERE ARE YOU GOING? Frem: Rue de Beav Vorde, Roche, Bread Te: Boo Vlagem, Roche, Bread [Ger Routel] or just the a location (Ger Routel] (Ger Routel] (| Project do Dortry Prograd do Dortry Prograd do Dortry Prograd to Dortry Prograd to Dortry Prograd to Dortry Prograd to Dortry | is a large avenue, one have to run in order to cross if on foot while the traffic lights are still red | 0) Register |
|---|---|--|-----------------------------------|
| 1) Destination | - |) See dvices | |
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| | E-mail*: | | |
| | Password*: | | |
| | Gender*: | 💿 Male 🔘 Female | |
| | Birth date*: | Day 1 💌 Month 🛛 May 🛛 🖌 Yea | ar 2009 💌 |
| | Country*: | Canada | ▼ |
| | Which of the follow | ring transportation you use the most when tr Walking | avelling?* |
| | Select your preferm | ed places for entertainment below* | |
| | | Museums Theathers Parks Historical places Sightseeing | Music concerts |
| | Your travels are us | ually* | |
| | | VIP treatment | |
| | Physical condition | s* 🔲 Physically challenged 🔲 Sensorially | / impaired 🔲 Cognitive challenged |
| | | Register | |





3) See

4) Add

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and Country Club

Stanley Park

2) See

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Stanley Park is a 404.9 heotare (1,000 acre) urban park bordering downtown Vancouver, British Columbia, Canada. It was opened in 1888 by the British Lord Stanley of Preston, who later became the Earl of Derby. It is the largest city-owned park in Canada and the third largest in North America. It is more than 10% larger than New York City's Central Park and almost half the size of London's Richmond Park. The park attracts an estimated eight million visitors every year, including locals and tourists, who come for its recreational facilities and its natural attributes. An 8.8 kilometre (5.5 mile) seawall path circles the park, which is used by 2.5 million pedestrians, cyclists, and inline skaters every year. Much of the park remains forested with an estimated half million trees that can be as tall as 76 metres (250 ft) and hundreds of years old. There are approximately 200 km (125 miles) of trails and roads in the park, which are patrolled by the Vancouver Police Department's equine mounted squad. The Project for Public Spaces has ranked Stanley Park as the sixteenth best park in the world and sixth best in North America.

<u>Artigo completo</u>

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WIKIPÉDIA

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0) Register

1) Destination

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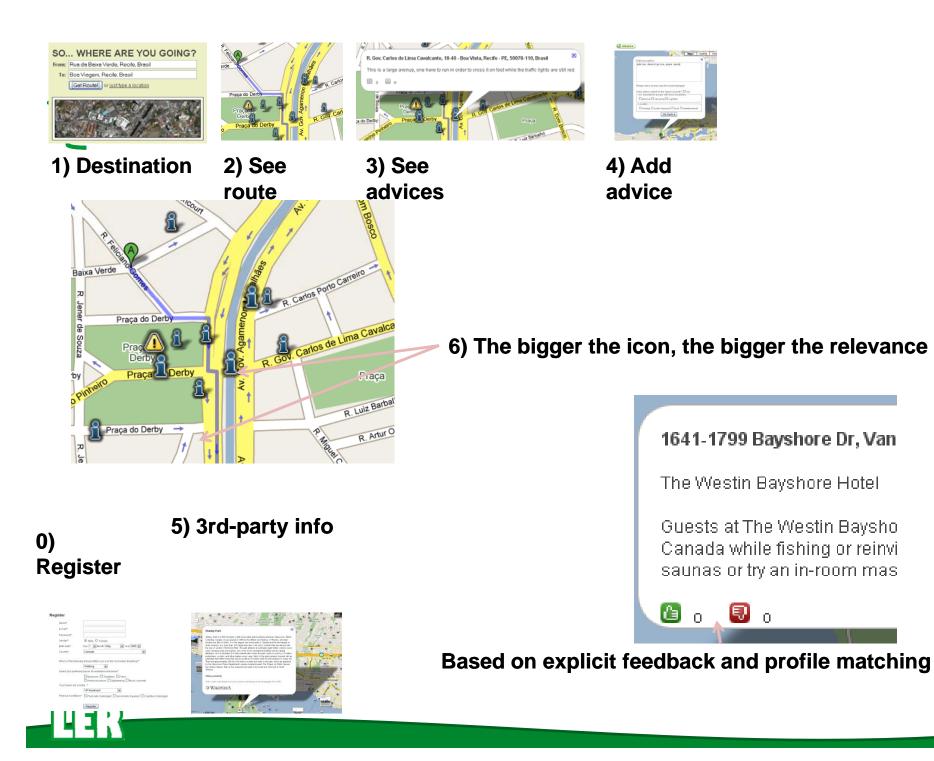
5) Wikipedia, Panoramio and YouTube media

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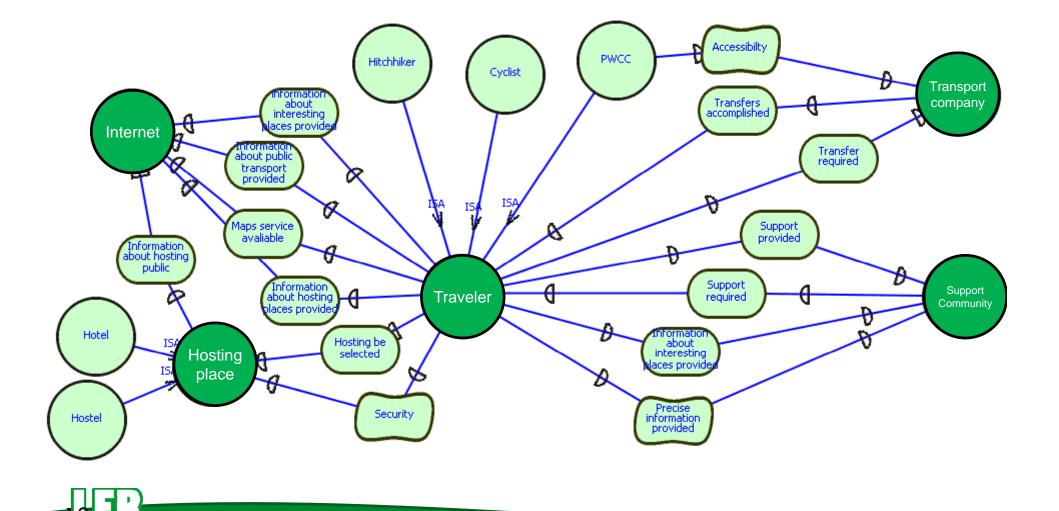
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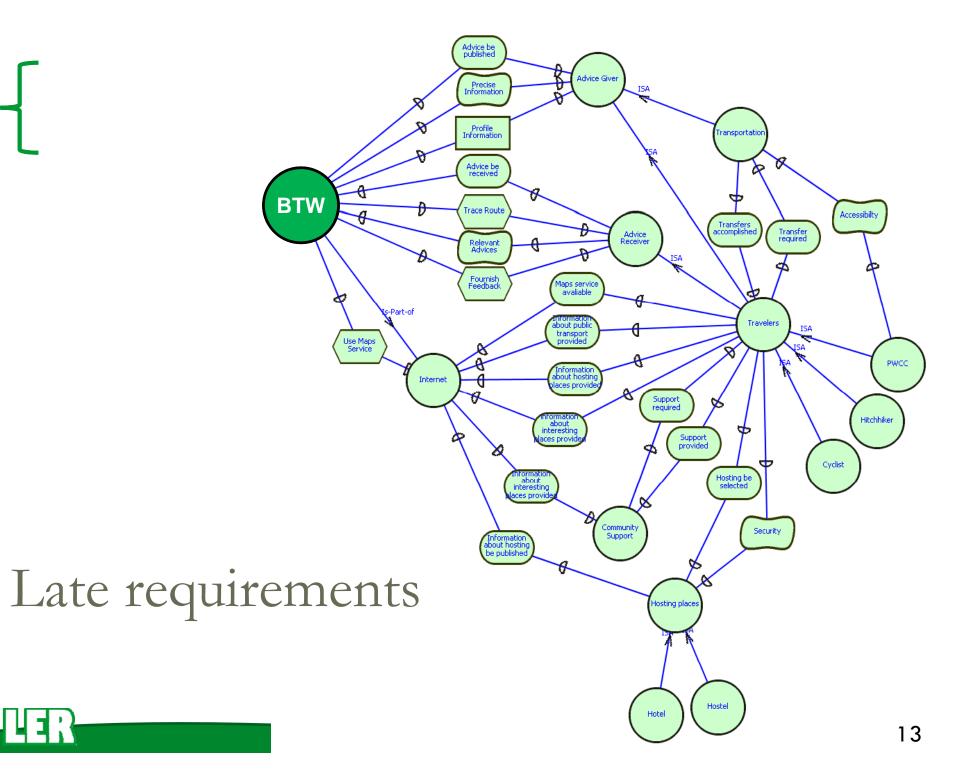
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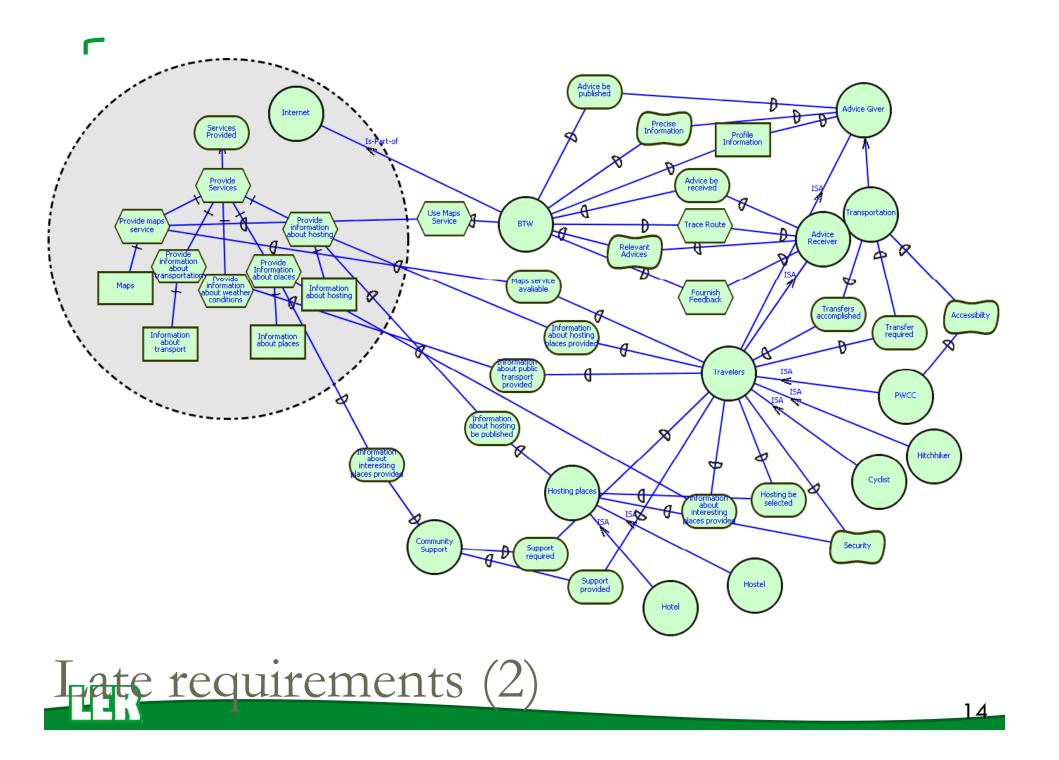
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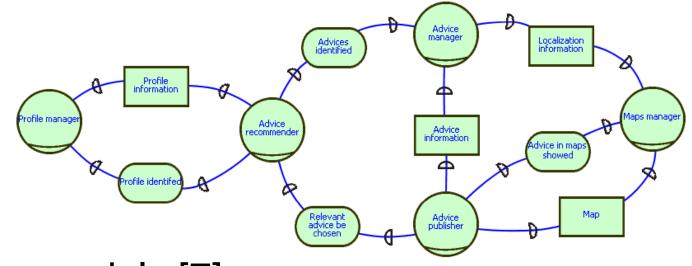
Early requirements (the environment)







Recommendation Agency Architecture



Detailed design models [7]

- Detailed architecture
- Communication
- Environment
- Rational





- 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





Tool supportMAS reuse• A SPL
approach• A SPL
approach

MAS: Multi-Agent Systems SPL: Software Product Line

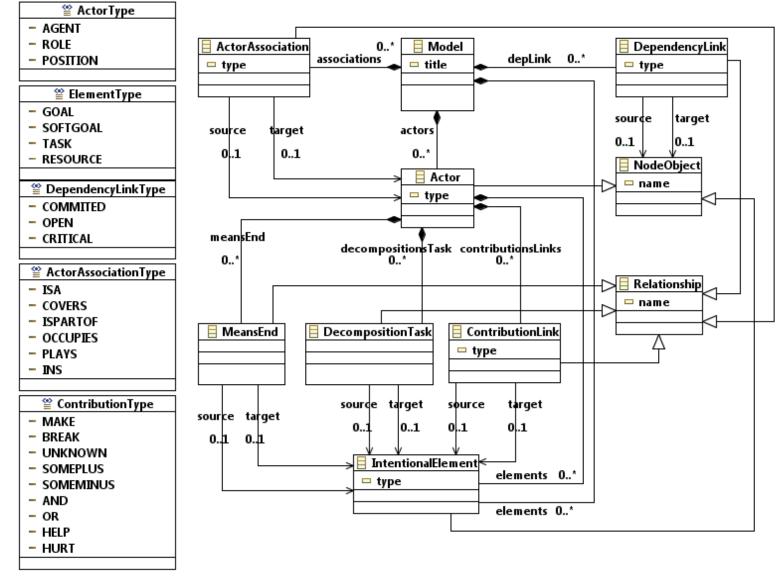


Tool support – a SPL approach

- 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



- 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)

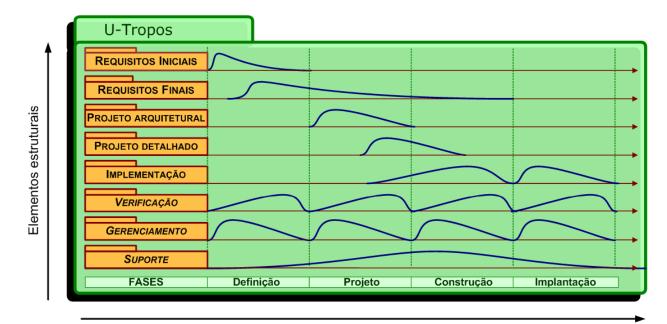
Unified Tropos process (U-Tropos) Relating goal models to feature models (i*-c and G2SPL)

FUTURE: Include DE and AE in U-Tropos (Tropos-SPL)





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





Ciclo de Vida

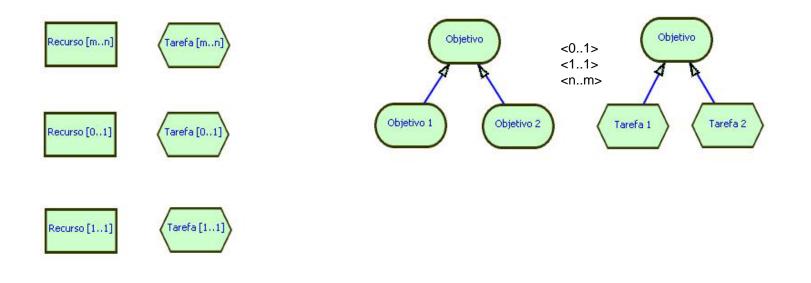


- Attempts to overcome the limitations presented by existent approaches
 - A goal-oriented language that fully represents variabilities and commonalities in SPLs



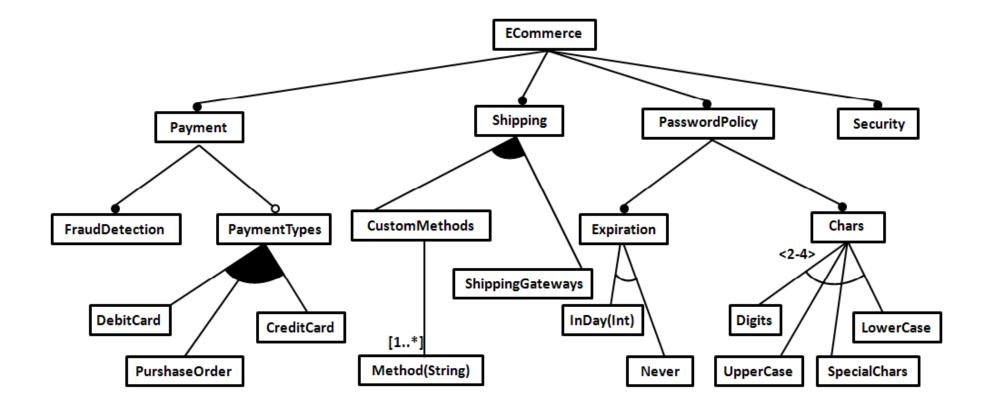
Extension of the i* language to include cardinality

Tasks, resources and means-end

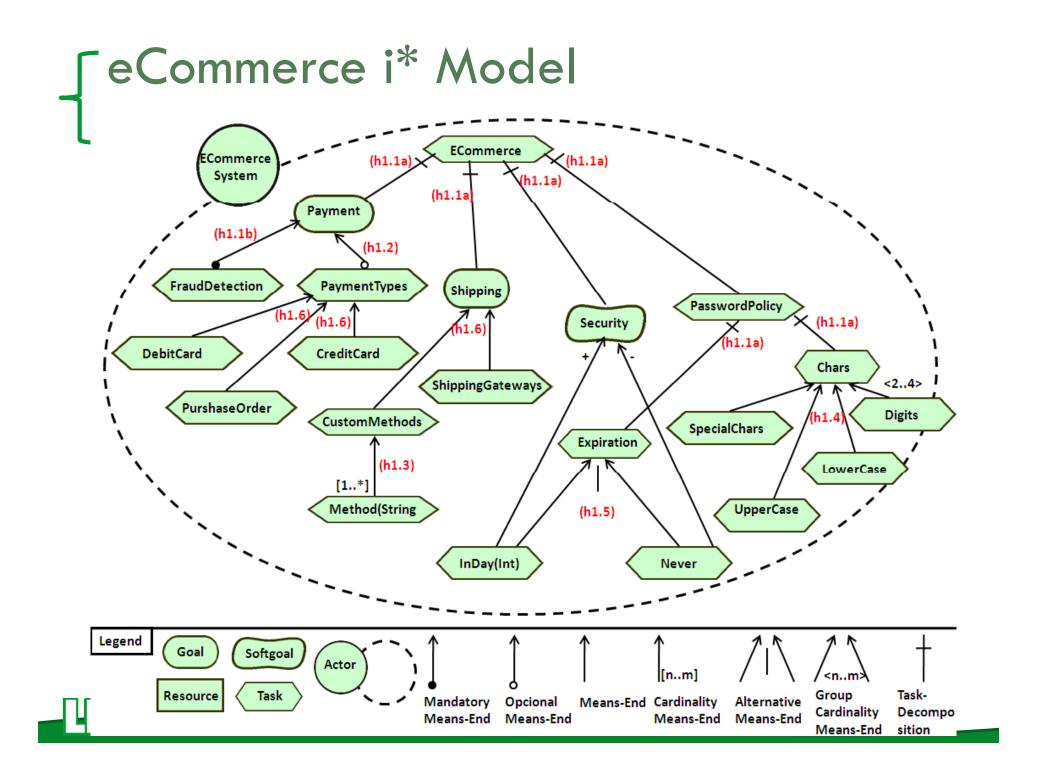




- eCommerce Feature Model







| Feature Model | Goal Model | PL- AOVGraph | Aspectual i* | Our approach |
|--------------------------------------|---------------|-----------------|---------------|--------------|
| Solitary Feature with cardinality | Not supported | Not supported | Not supported | |
| [mn] | | | | Supported |
| Solitary Feature with cardinality | Supported. | Supported | Not supported | |
| [01] (optional) | | | | Supported |
| Solitary Feature with cardinality | Supported | Supported | Supported | |
| [11] (mandatory) | | | | Supported |
| Binary relations which includes | Not supported | Not supported | Not supported | |
| optional, mandatory and cardinality- | | | | Supported |
| based like relations | | | | |
| Feature Group with group | Not supported | Not supported | Not supported | |
| Cardinality <i-j></i-j> | | | | Supported |
| Feature Group with group | Supported | Supported | Supported | |
| Cardinality <1-k>, k= size of the | | | | Supported |
| group (inclusive-or) | | | | |
| Feature Group with group | Supported | Supported | Not supported | Supported |
| Cardinality <1-1> (exclusive-or) | | | | |





