

# Using $i^*$ for Transformational Creativity in Requirements Engineering

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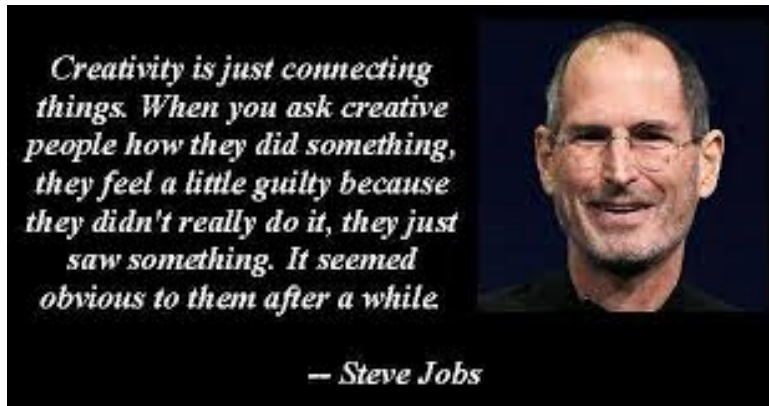
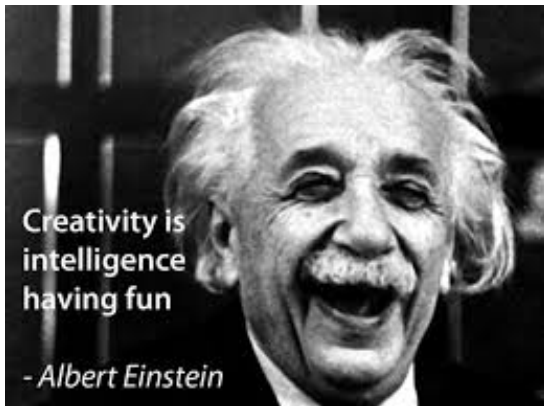
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# INTRODUCTION

► What is creativity?

Creativity is defined as the ability to produce work which is both *novel* and *appropriate*.



# IMPORTANCE

## ► Why do we need creativity in RE?

- Creativity will be the next economic activity replacing the current focus on information.
- With the increase in demand for sustainable, cost-effective software there is an increasing need for software engineers to develop products which are innovative and novel.

Steve Jobs was right when he declared the iPhone a revolutionary product. It redefined the smartphone category and put a powerful computer in the hands of more than a billion people around the world. – cnet.com

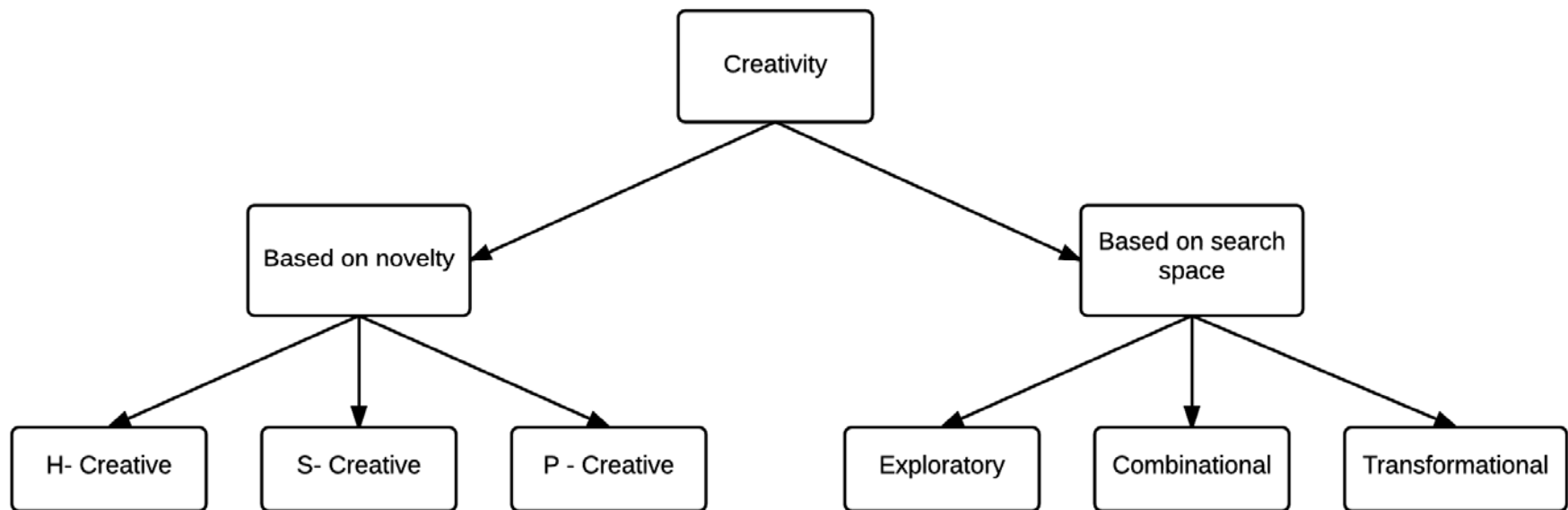


# THE REALITY ABOUT REQUIREMENTS

***“Our job is to give the client, on time and on cost, not what he wants, but what **he never dreamed he wanted**; and when he gets it, he recognizes it as something he wanted all the time.”***

**– Sir Denys Lasdun (English architect)**

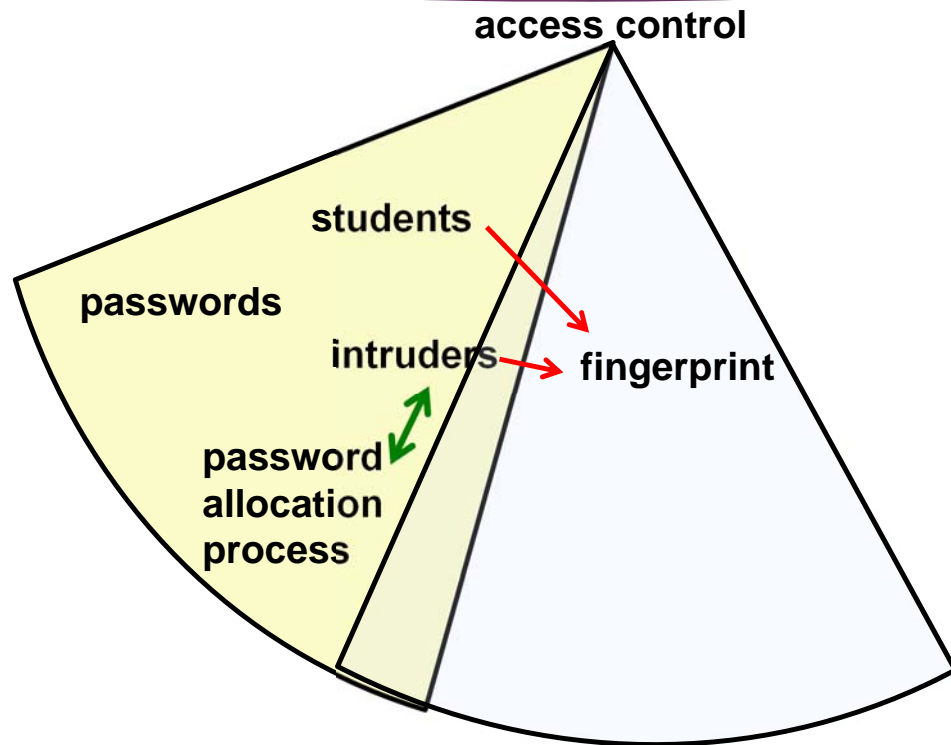
# TYPES OF CREATIVITY



## RELATED WORK

- ▶ Different ways to engineer creative requirements
- **Exploratory creativity**  
Snowballing, Traditional brainstorming, Free association, Serial association
- **Combinational creativity**  
Fixed and random stimuli, Selecting multiple random stimuli
- **Transformational creativity**  
Assumption surfacing, Boundary relaxation

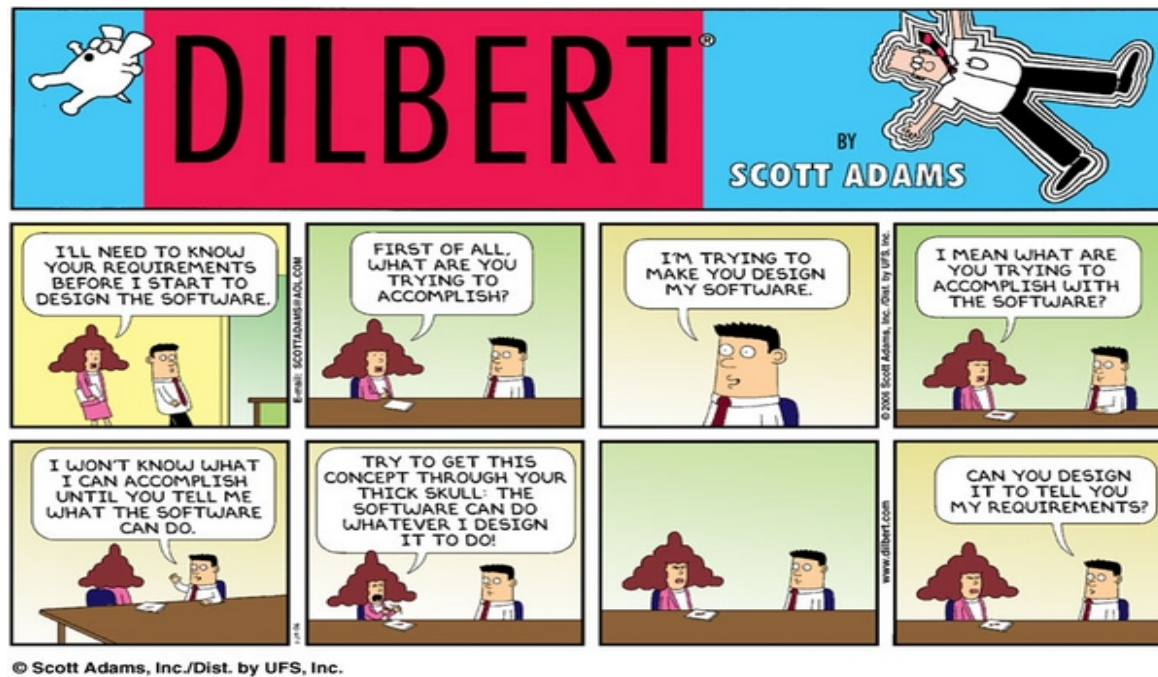
# EXAMPLE





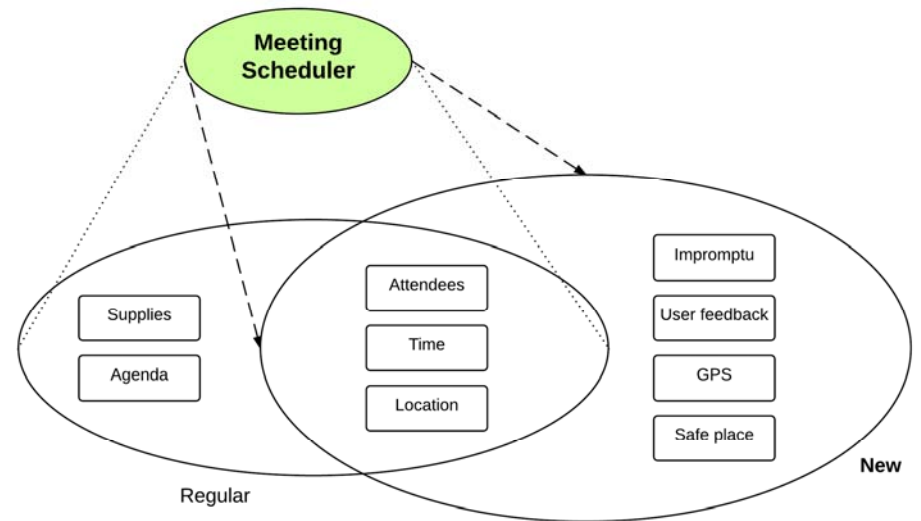
# RESEARCH OBJECTIVE

- What is the role of  $i^*$  in transformationally creative RE?



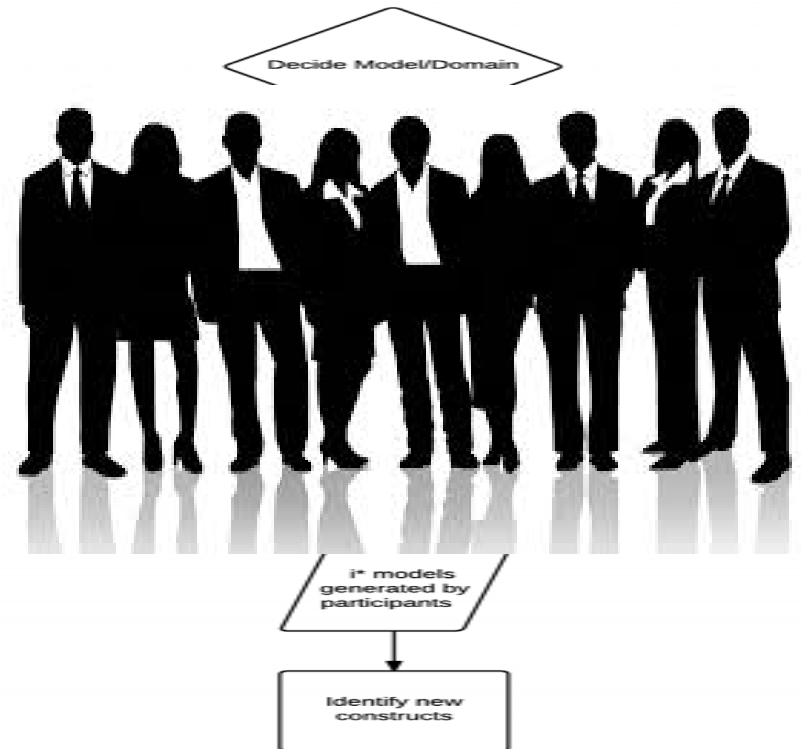
# RESEARCH QUESTIONS

- ▶ How do analysts perform transformational creativity in goal modeling?
- ▶ Which are the analysts' common practices & struggles?
- ▶ Can we provide additional support to  $i^*$  model to help in transformational creativity?



# STUDY DESIGN

- ▶ Decide on a domain to be used and collect data
- ▶ Clean up data and present a table to the participants
- ▶ Manually go through the submissions and classify them into categories
- ▶ Judge whether the submissions are transformative or not

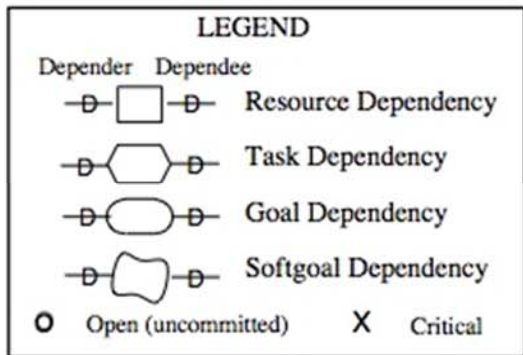
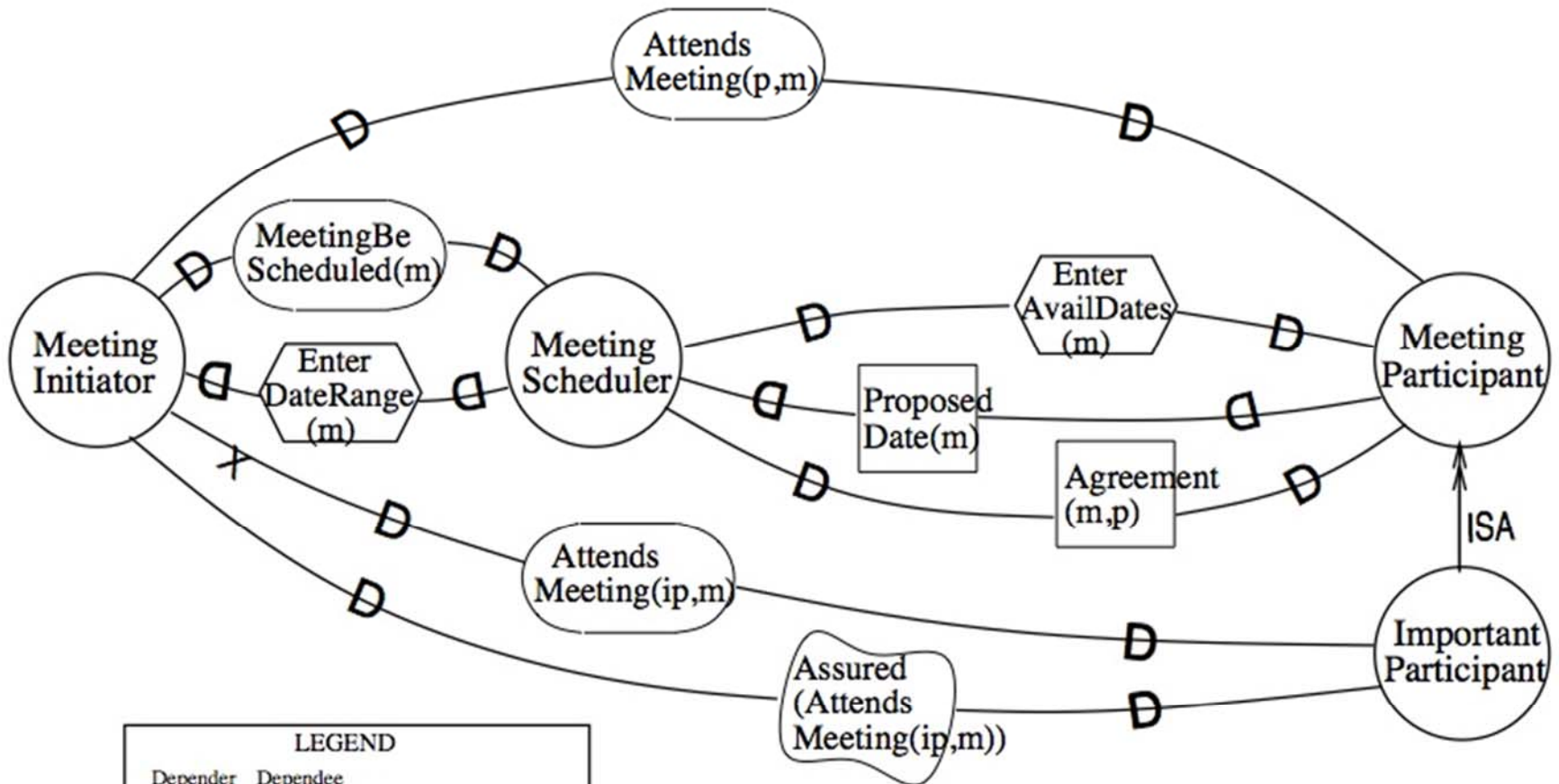


# PREPARATION (PART 1)

**The following 13 references include 'Meeting Scheduler' in i\* notations:**

- (1) [an RE'14 presentation](#), (2) [an RE'12 paper](#), (3) [an i\\*'12 paper](#), (4) [a VaMoS'07 paper](#), (5) [a CASCON'06 paper](#),
- (6) [a DEAS'05 paper](#), (7) [another RE'12 paper](#), (8) [an i\\*'13 paper](#), (9) [a technical report](#), (10) [an ER'13 paper](#),
- (11) [an RE'02 paper](#), (12) [an ER'07 workshop paper](#), and (13) [an RE'97 paper](#).

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# PREPARATION (PART 3)

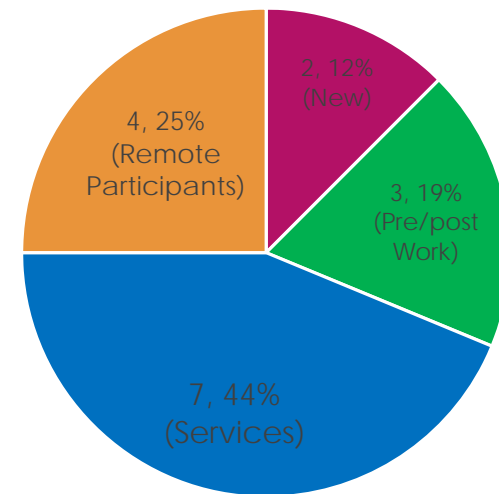
## Existing modeling constructs and their frequencies of occurrence.

Actor	Goal	Softgoal	Task	Resource
Mtg. Initiator (7)	Mtg. Be Scheduled (14)	Low Effort (10)	Attend Mtg. (4)	Details (3)
Mtg. Scheduler (5)	Agreeable Mtg. Date (4)	Quick (4)	Organize Mtg. (3)	Proposed Date (2)
Mtg. Participant (5)	Solicit Response (4)	Accuracy of Constraints (4)	Determine Mtg. Date (3)	Agreement (2)
Important Participant (5)	Collect Timetables (4)	Collection Effort (3)	Participate in Mtg. (3)	Facilities Confirmed Room (1)
...	...	...	...	...

# RESULTS

- ▶ Only 30.2% of the constructs were transformationally creative.
- ▶ Majority of them were focused in the same domain of meeting scheduler.
- ▶ The submitted domains were classified into meeting prep/post work, remote participants, services and new domains.

Distribution of "new" domains.

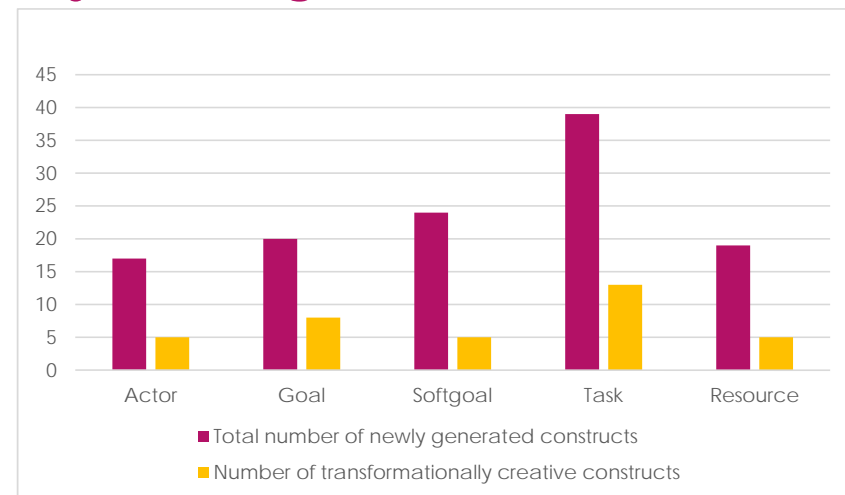


■ New Domains ■ Meeting Prep/post work ■ Services ■ Remote Participants

# RESULTS

- ▶ Majority of the constructs were exploratory.
- ▶ Exploratory creativity might be a precondition to explorative creativity.
- ▶ Softgoals are less likely to provoke transformational creativity.
- ▶ Tasks can be a starting point for transformational creativity.

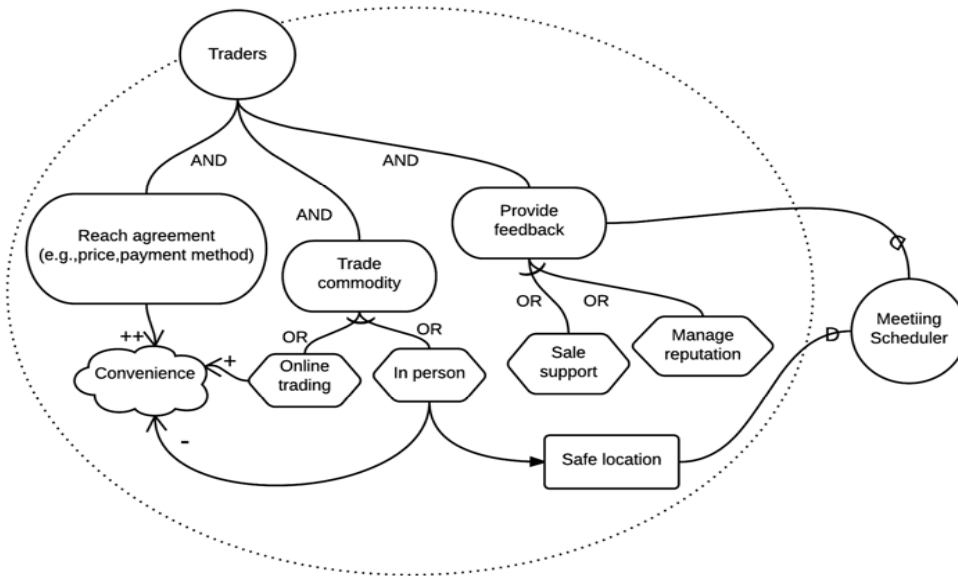
## Modeling constructs grouped by i\* categories



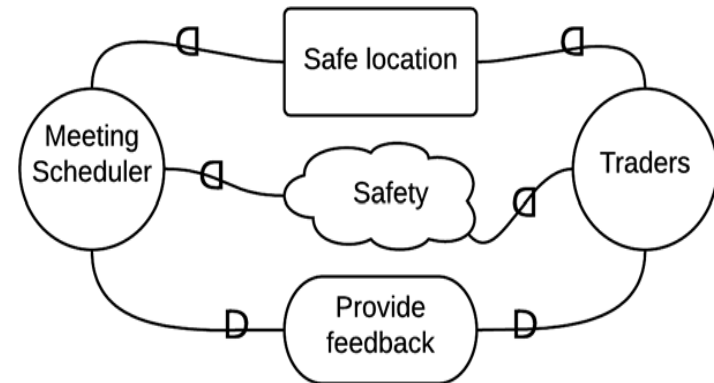


# i\* models for online trading

## Strategic rationale



## Strategic dependency



# ANALYSIS

Process to find a new domain which is transformationally creative.

- 1 Identify the bridging node.
- 2 Model new domain.
- 3 Refining transformative relationship.

Example: Location -> Safe Location -> Safety.

Meeting Feedback -> Product Feedback

# CONCLUSIONS

- ▶ Exploratory creativity is a stepping stone for transformational creativity.
- ▶ Tasks serve as a common starting point for transformational creativity.
- ▶ Softgoals will likely generate domains which will be within the meetings scheduler domain.
- ▶ Important to identify a bridging node to identify a new domain.

## FUTURE WORK

- ▶ Provide automated support using data analysis.
- ▶ Include diverse and heterogeneous participants in the study.
- ▶ Research ways in which domains and their interdependence could be visualized.
- ▶ Define measures and metrics to help guide the creative RE process.

# Using *i\** for Transformational Creativity in RE

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