



CITY UNIVERSITY
LONDON

Supporting Creative RE with i*

Jennifer Horkoff, Neil Maiden



EIGHTH
INTERNATIONAL
i* WORKSHOP



Country be
awesome!

iStar 2015 - 24 ~25 August 2015
Ottawa, Canada

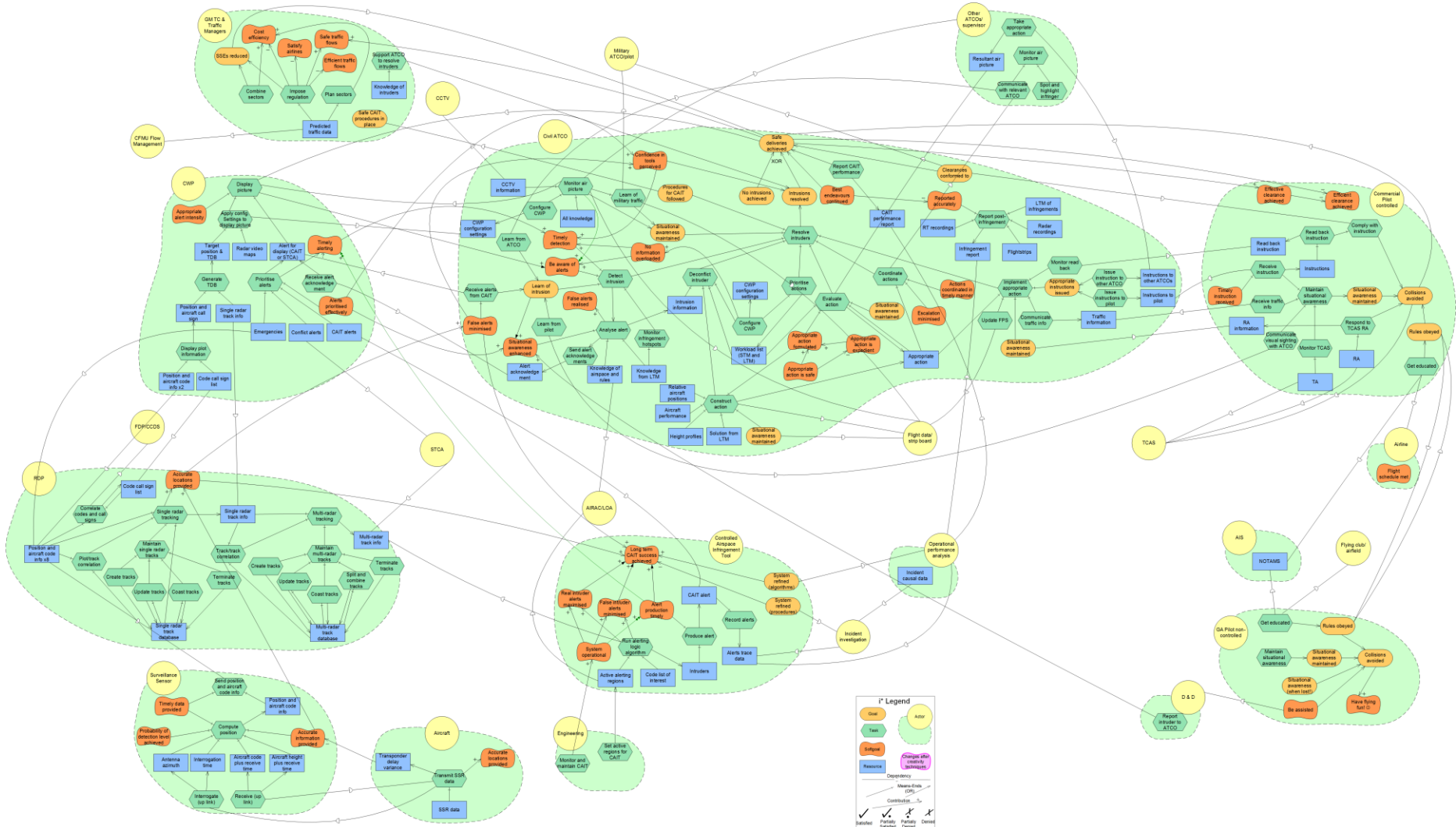


Creativity and Goal Modeling

- Successful software, particularly in business, must be both **useful** and **innovative**
- RE has focused mainly on software **utility**
- Goal-oriented methods aim to systematically ensure that requirements meet user needs
- Little emphasis has been placed on **creativity**
 - How do we make sure goal models capture creative ideas and alternatives?

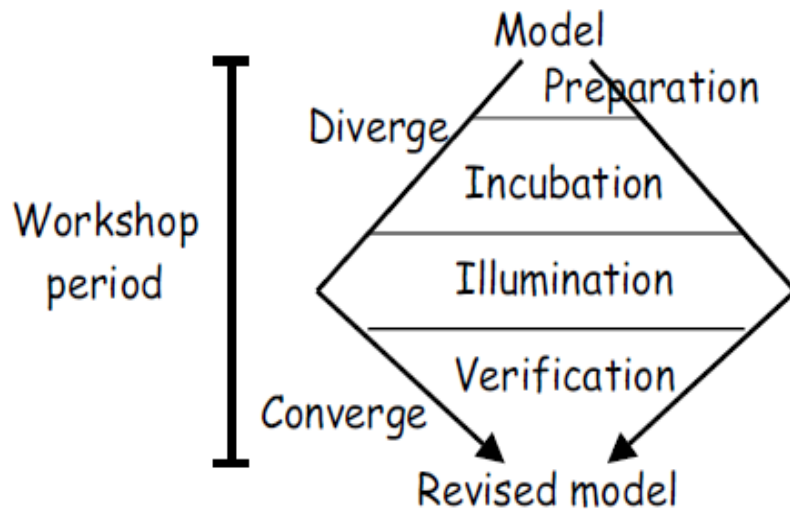


Background: Goal Modeling 😊



Background: Creativity

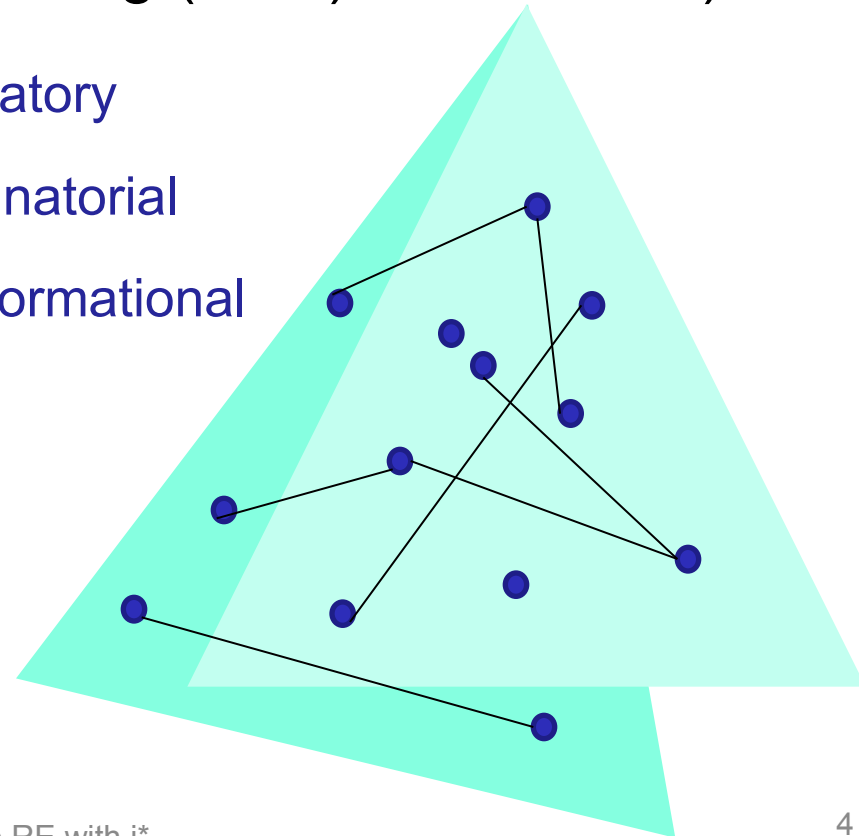
- Many people studying creativity outside of RE for 80+ years, much work in the social sciences... (Boden, 1990) (Osborn's Creative Problem Solving (CPS) model 1993)



Exploratory

Combinatorial

Transformational



Maiden et al., IEEE
Software 2004



Creativity Activities

<http://becreative.city.ac.uk/>

The screenshot shows the 'Creative Engine' website interface. At the top left is the logo, a stylized yellow bird-like shape. To its right is the text 'Creative Engine'. In the top right corner, there are two circular icons: one with an 'i' for 'About' and one with an '@' for 'Contact'. Below the header is a navigation bar with three tabs: '1. Problem description', '2. Search results' (which is highlighted with a yellow underline), and '3. Technique'. On the left side, there is a yellow sidebar with a search bar labeled 'Search for Technique' and a 'Search here' input field. Below the search bar is a 'Refine Search' section with three categories: 'Problem-solving stage' (with radio buttons for 'Problem definition', 'Idea Generation', 'Idea Selection', and 'Idea implementation'), 'Number of people' (with a 'Number' input field), and 'Problem solving characteristic' (with radio buttons for 'Exploratory', 'Combinational', and 'Transformational'). A blue 'Reset all' button is at the bottom of the sidebar. The main content area on the right displays a list of creativity techniques, each in a dark blue box with a white border. The techniques shown are: 'Analogical Reasoning', 'Assumption Busting', 'Backwards Forwards Planning', 'Boundary Examination', 'Brainsketching', and 'Brainstorming'. Each technique box contains a brief description and a line of metadata: 'Stage: Problem definition', 'People: 1-Many', and 'Boden: Exploratory, Combinational'.

Creative Engine

About Contact

1. Problem description 2. Search results 3. Technique

Search for Technique

Search here

Refine Search

Problem-solving stage:

- Problem definition
- Idea Generation
- Idea Selection
- Idea implementation

Number of people:

Number

Problem solving characteristic:

- Exploratory
- Combinational
- Transformational

Reset all

Analogical Reasoning

Analogical reasoning is a process of generating ideas from similarities between your problem and something else – a different domain, product, service or even world...

Stage: Problem definition People: 1–Many Boden: Exploratory, Combinational

Assumption Busting

Assumption busting is a simple technique that involves listing all of the assumptions that are important to your problem, including the obvious ones, and then challenging the correctness of each assumption in turn...

Stage: Problem definition People: 1–6 Boden: Exploratory

Backwards Forwards Planning

Backwards forwards planning is a simple creativity technique that helps you to discover, scope and define a complex problem most appropriately, by creating a hierarchy of problems and solutions...

Stage: Problem definition People: 1–6 Boden: Exploratory

Boundary Examination

Boundary examination is a simple creativity technique that does exactly what its name suggests – it guides you to explore the boundaries of your original problem and, as needed, change them to support and enable more creative thinking...

Stage: Problem definition People: 1–5 Boden: Exploratory, Combinational, Transformational

Brainsketching

Brain-sketching is a problem solving technique during which people sketch to illuminate a problem statement or solution concept then build on other peoples' sketches...

Stage: Idea Generation People: 4–8 Boden: Exploratory, Combinational

Brainstorming

Brainstorming is a group problem-solving technique that involves gathering spontaneously contributed



Creativity Workshops

- Part of RESCUE process, applied to Air Traffic Control, Food Safety, Work Integrated Learning
- Input: some diagrams (context, rich picture, use case), textual use cases
- Stages:
 - Round Robin (exploratory)
 - Scoping (transformational)
 - Creativity Triggers (exploratory)
 - Constraints (transformational)
 - Ideas from presented design features (exploratory)
 - Storyboarding (combinatorial)
- Output: collages using mappings and pictures, storyboards, idea cards, and mock-ups.

Creativity Workshops

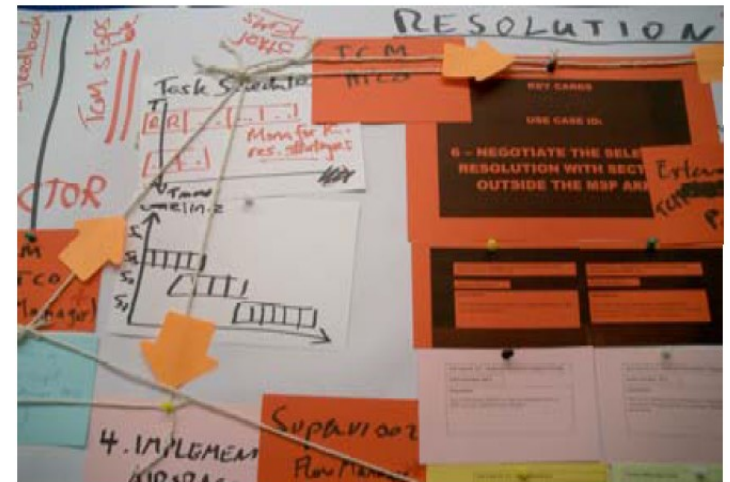
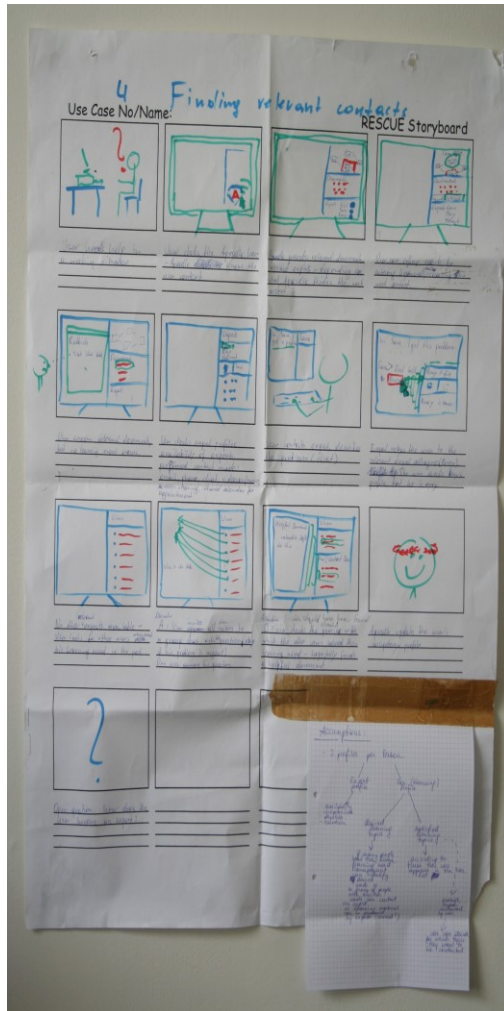


Figure 4. A section of the rich storyboard for the MSP system.



Creativity in RE

- Stakeholders are limited by what they perceive to be possible and influenced by their experiences
- Creative RE is about discovering requirements stakeholders were not aware of
 - Not requirements elicitation, but requirements discovery



Creativity and Goal Modeling Affordances

Goal Modeling for RE	Creativity Approaches for RE
Graphics facilitates communication and shared understanding	Lack of structure means that domain conceptualization may not be well-shared
Emphasizes intentions, motivations, purpose, “why?”	No explicit recording of purpose, goals, rationale
Emphasizes social relationships, “who?”, dependencies	Beyond context diagram, techniques don’t emphasize “who?”, dependencies
Facilitates more complete analysis, visualization helps to find gaps	Difficult to visualize the creative search space, completeness of creative search hard to visualize
Explicitly captures alternatives, allows reasoning over alternatives, ideas, rationale for choices	No explicit support for alternatives, exploring consequences, or rational capture for choices
Reasoning allows to check the sanity of a model, check domain understanding	No reasoning, no checks



Creativity and Goal Modeling Affordances

Goal Modeling for RE	Creativity Approaches for RE
No explicit support for creativity or innovation.	Participants come up with new and useful ideas – facilitate innovation
Structures means limited expressiveness	Rich pictures allows for high expressiveness
Goal models are viscous (difficult to make large changes)	Rich allow for free flowing and quickly changing conceptualization of the domain
Goal modeling can be difficult to learn and use. Easy to get caught up in language details	Uses easy to learn and use diagrams (context, journey maps), rich pictures. Little distraction from syntax and semantics.

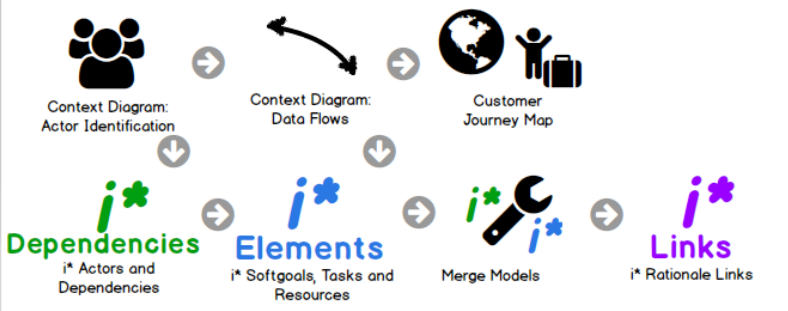
- Techniques are complementary
- In some cases creativity enhances goal models, in other cases goal modeling enhances creativity
- (1) Understand nature and direction of enhancements
- (2) Design method/supporting tool to take advantage



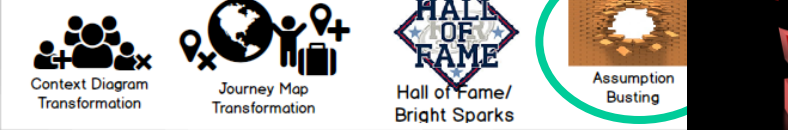
Tooling/Method (Wireframe!) Prototype

Creativity Activities

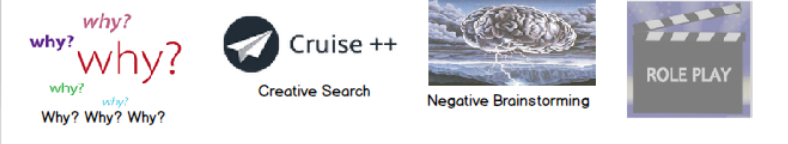
Preparation



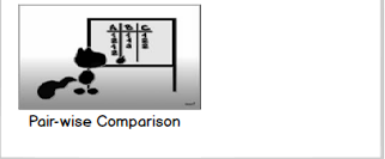
Transformation



Exploration



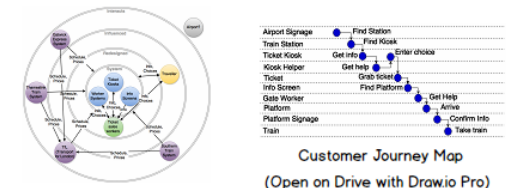
Combination



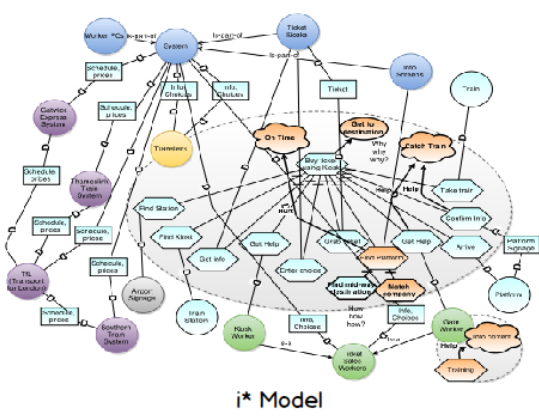
Evaluation



Creative Outputs



Context Diagram (Open on Drive with Drawio Pro)





Understanding and Designing Individual Activities

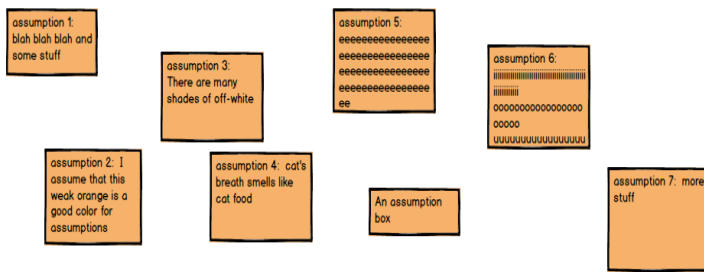
- In order to capitalize on the advantages of each technique:
 - When to use/introduce goal model?
 - How to use goal model?
- Understanding how people do this “naturally”
 - What works and what doesn’t
 - Emulate “natural” behaviour with method and tool design
 - Pilot studies for individual techniques
 - First with paper, then using digital models (smart boards)
 - Looking for participants! horkoff@city.ac.uk or just talk to me 😊



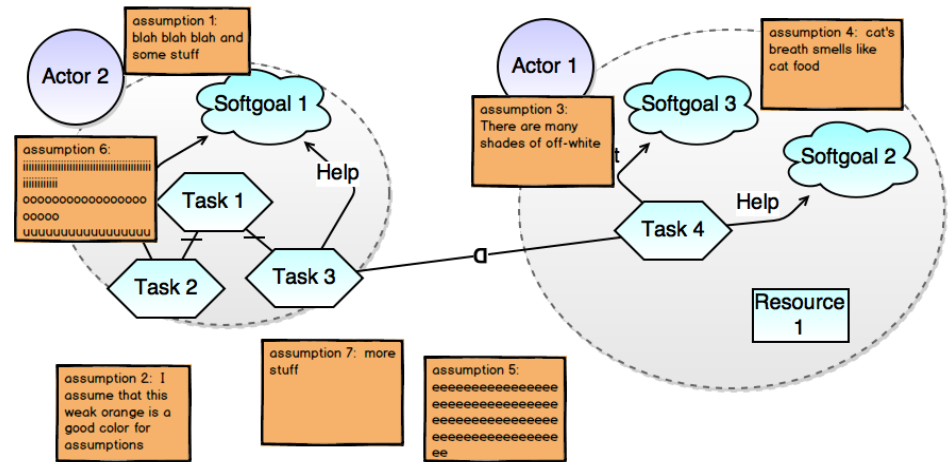
CREATIVITY & GOAL MODELING ACTIVITY EXAMPLES

Assumption Busting (Transformational/Exploratory)

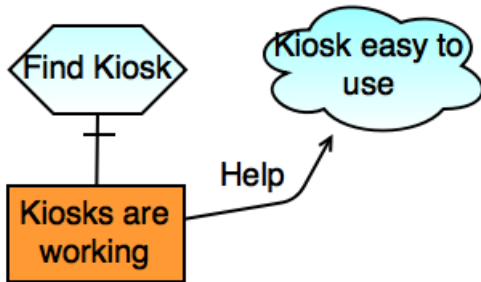
1. Find Assumptions



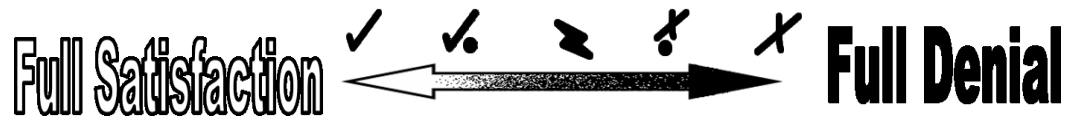
2. Cluster Assumptions



3. Model Assumptions



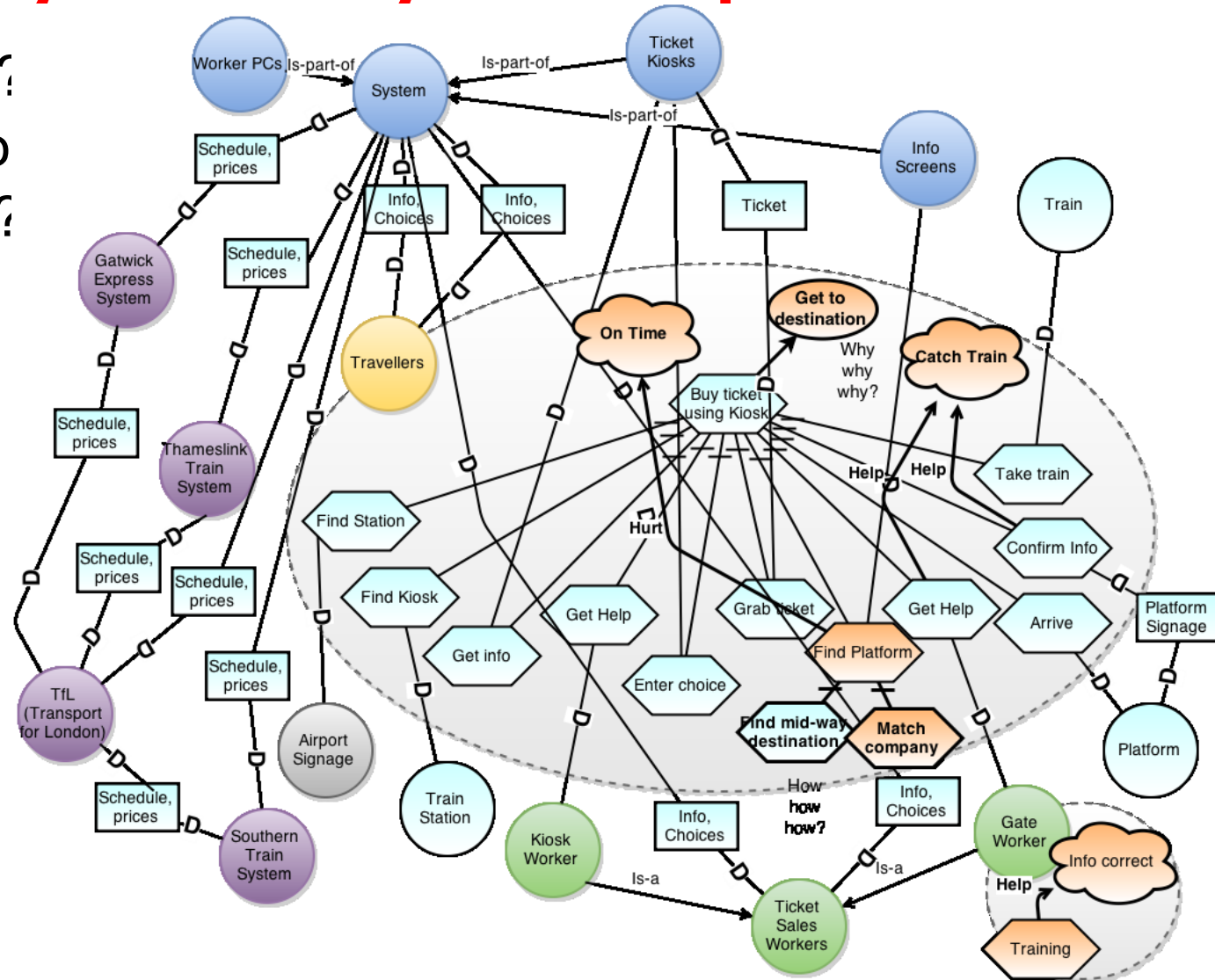
3. Bust Assumptions!



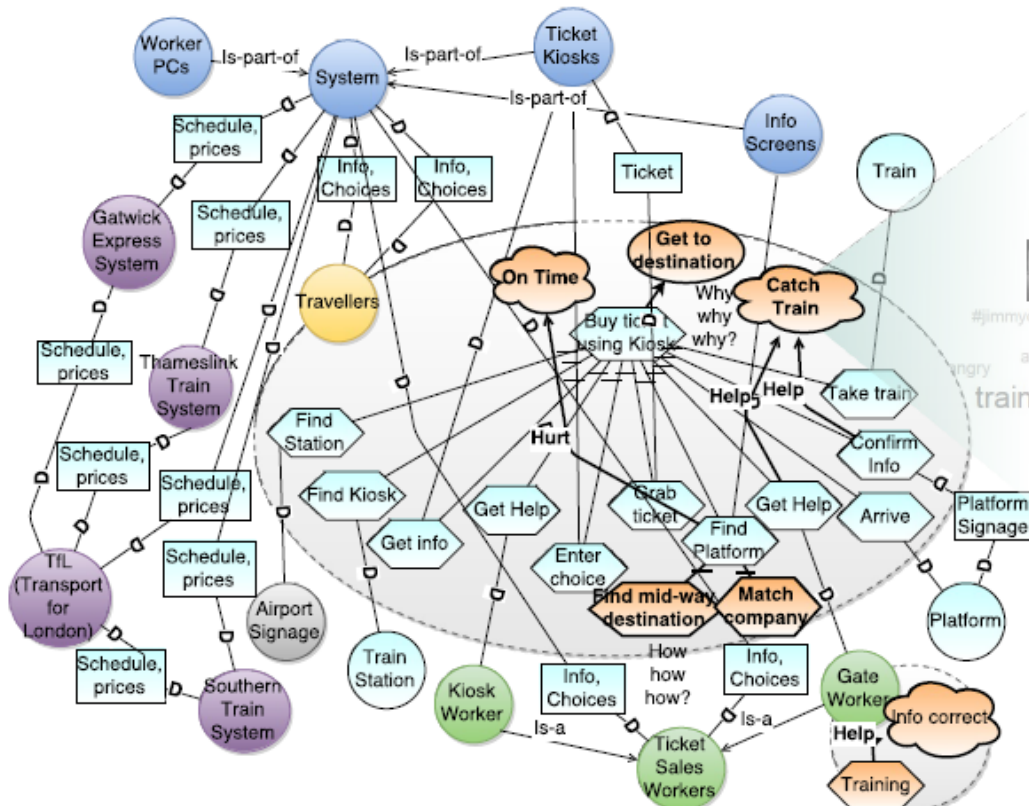


Exploratory Creativity Techniques

- Why why why?
(who who who
how how how?)
- Negative
(positive)
brainstorming
- And...
 - BrightSparks
 - Creativity Triggers



(Exploratory) Creative Search



CRreative User centric Inspirational Search (CRUISE)





Conclusions

- Goal modeling and creativity have the potential to work well together
- Create method/tool which supports:
 - The discovery of creative requirements
 - In a systematic, visual and structured way
 - Facilitating reasoning over creative ideas
- Studies studies studies
- On paper, digitally with small groups
- Prototype implementation
- In industrial settings



horkoff@city.ac.uk

THANK YOU!



Creativity Trigger Survey

- Please fill out our (very short!) survey

What makes Innovative solutions Innovative?



Take our survey to find out!

goo.gl/trLUZt