

# Strategic Business Modeling with *i*\*

Eric Yu  
University of Toronto

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**Requirements-Driven Business Process  
Modelling and Performance Management**  
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October 29, 2008

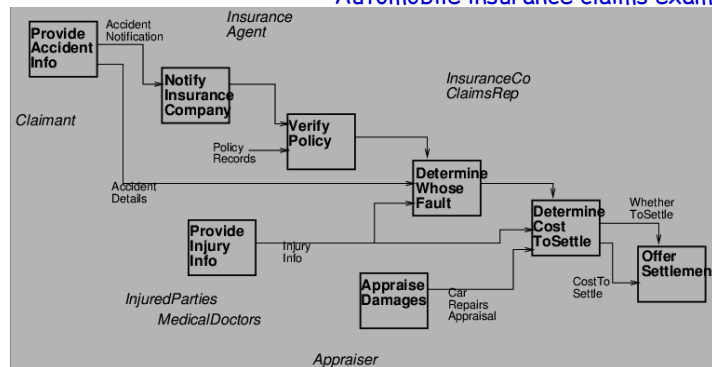


## Outline

1. Goal-Oriented and Agent-Oriented Requirements Engineering
2. *i*\* modelling
3. Business modelling for services
4. Strategic business modelling
5. References, *i*\* wiki

## We need deeper understanding than in traditional modelling

### Automobile insurance claims example

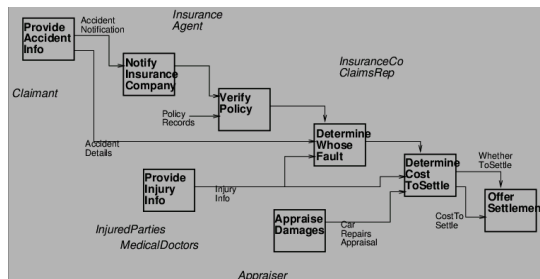


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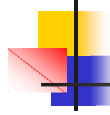
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## ... a deeper understanding about processes

- Car owner wants car to be repaired
- Insurance company wants to minimize claims payout
- Car owner wants fair appraisal of repairs
- Insurance agent wants to maintain good customer relations



4



## Why is Early RE important?

- Before defining the system to be built
- Complex relationships among stakeholders
  - what they want
    - E.g., security, privacy, trust, profitability, market positioning, strategic alliances, intellectual property, ...
  - How they can achieve what they want
- Need systematic method, bring into RE process
  - modelling and reasoning support, tools, traceability, ...
- Consider:
  - E-business; E-learning; E-health; E-government
  - Energy, environment, transportation

5

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## Modelling Strategic Actor Relationships and Rationales

- the *i\** modelling framework

### • Strategic Actors

- have goals, beliefs, abilities, commitments
- are semi-autonomous
  - freedom of action, constrained by relationships with others
  - not fully knowable or controllable
  - has knowledge to guide action, but only partially explicit
- **depend** on each other
  - for goals to be achieved, tasks to be performed, resources to be furnished

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6



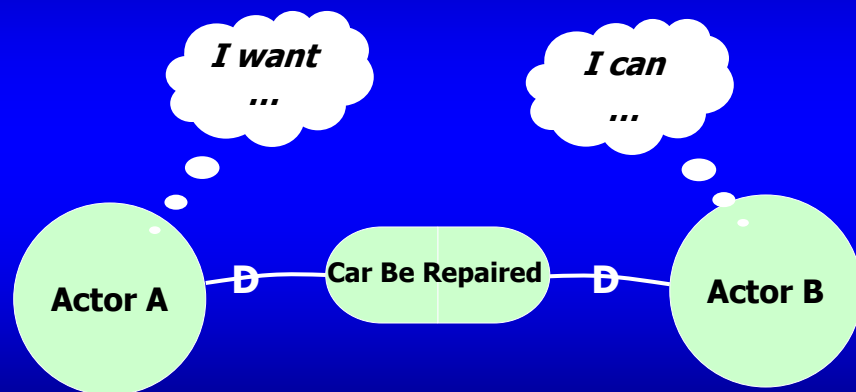
## Approach: model social relationships for analysis and design

- Strategic actors
  - What do I want?
  - How can I achieve what I want?
  - Who do I depend on to achieve what I want?

7

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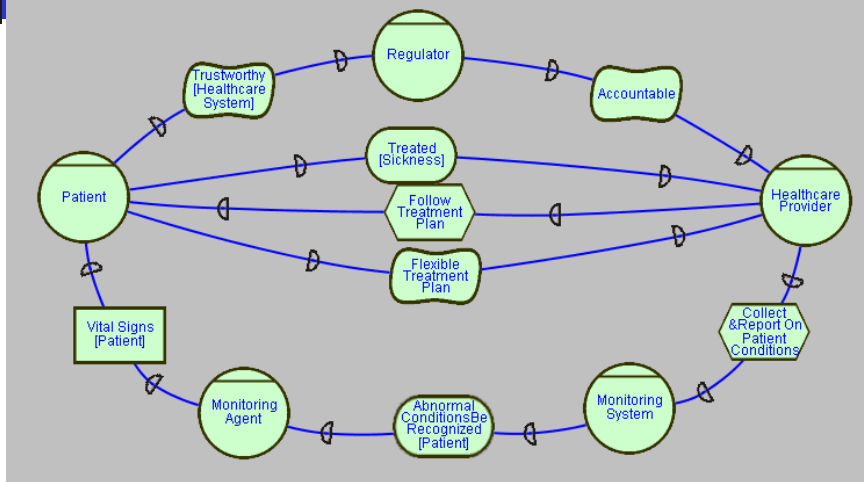
## Strategic Dependency Relationship



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let's model systems and organizations in terms of **Strategic Dependencies** among actors

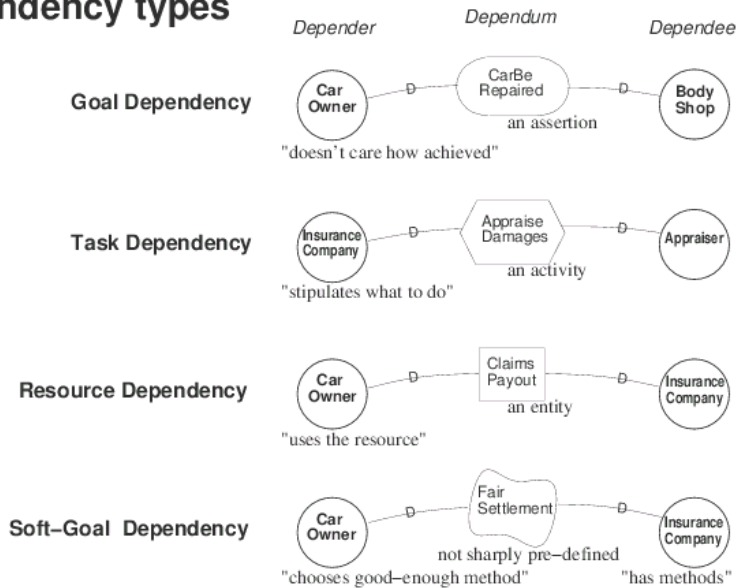


9

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## Strategic Dependency Model

### dependency types

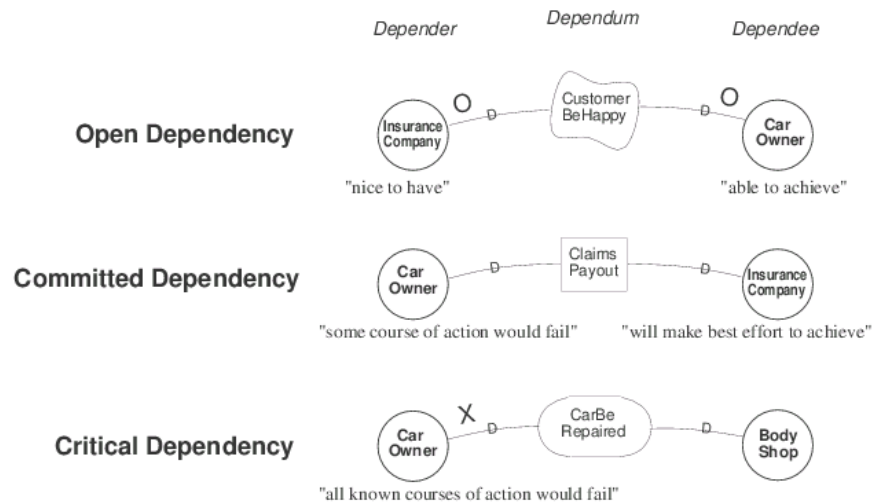


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## Strategic Dependency Model

### dependency strengths

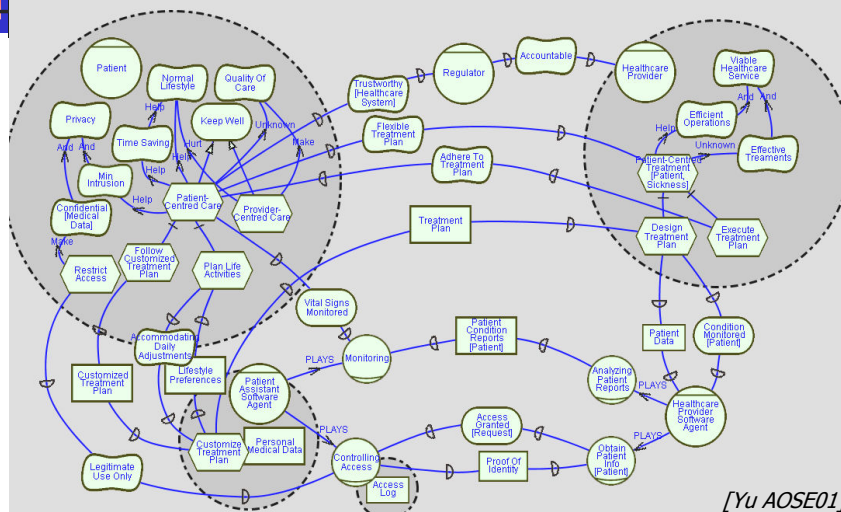


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11

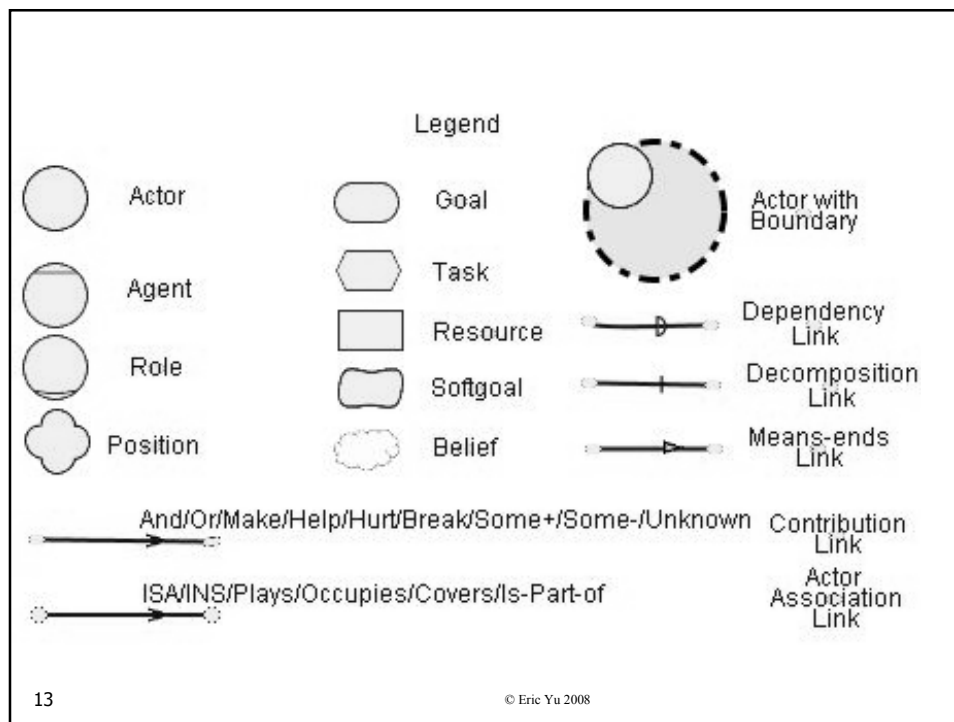
## Strategic Rationales about alternative configurations of relationships with other actors

### – Why? How? How else?



[Yu AOSE01]

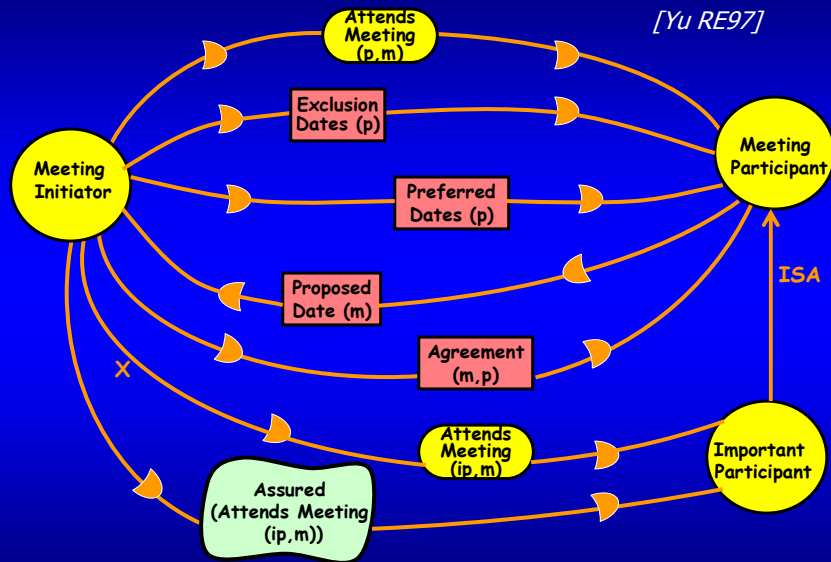
12



## An Example *Meeting Scheduler*

From: E. Yu. Towards Modelling and Reasoning Support for Early-Phase Requirements Engineering  
 3rd IEEE Int. Symp. on Requirements Engineering (RE'97) Jan. 6-8, 1997, Washington D.C., USA. pp. 226-235.

## Strategic Dependency (SD) model



Meeting Scheduling Example

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15

## Strategic Rationale (SR) model

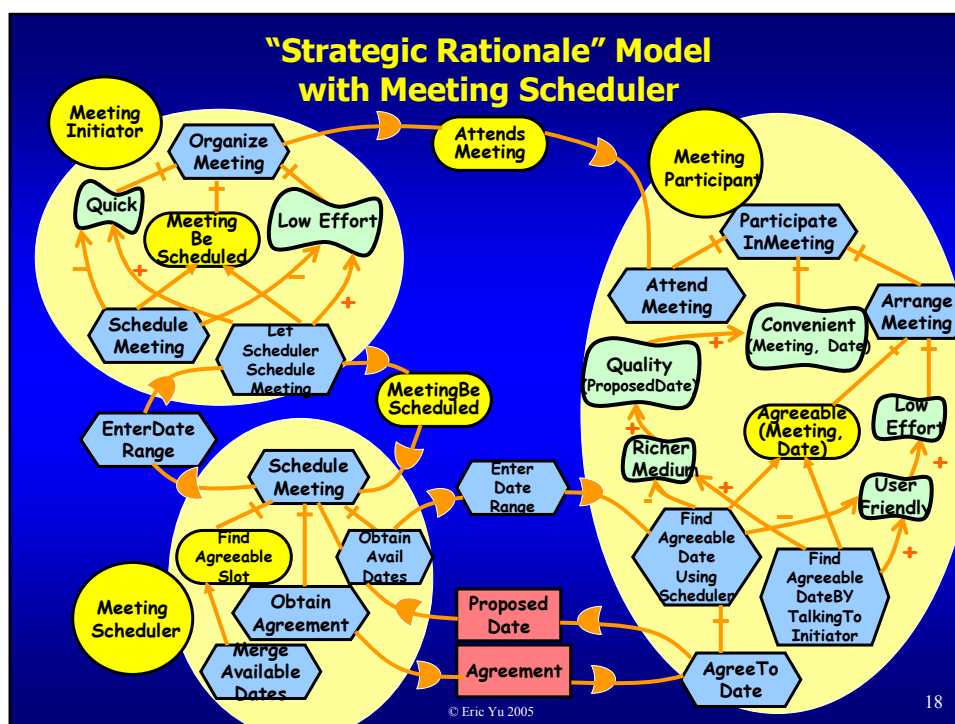
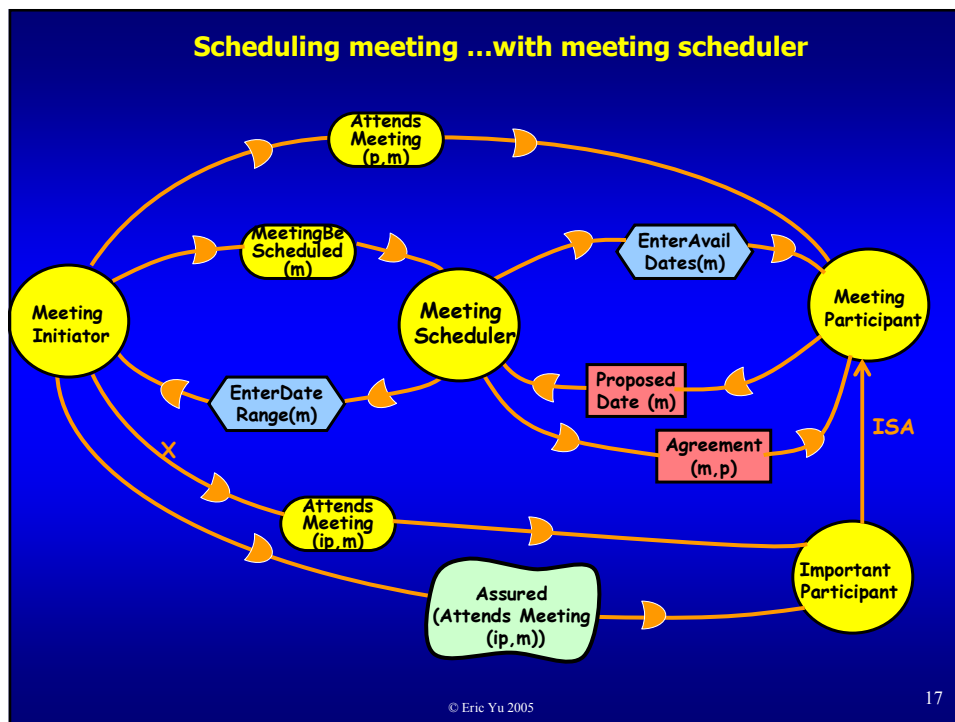
- Ask "Why", "How", "How else"

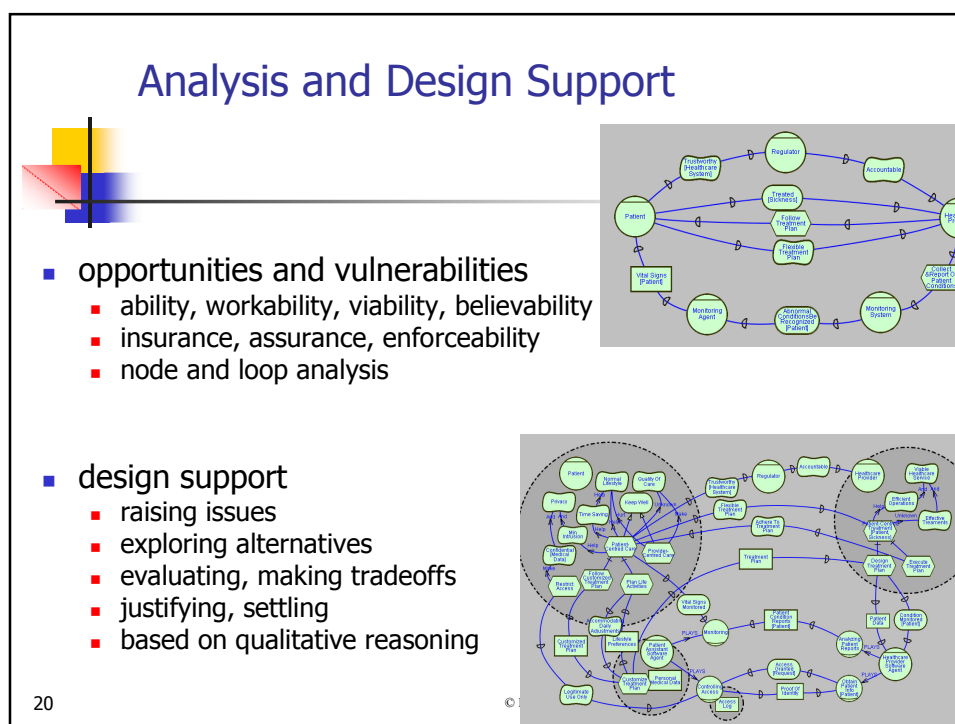
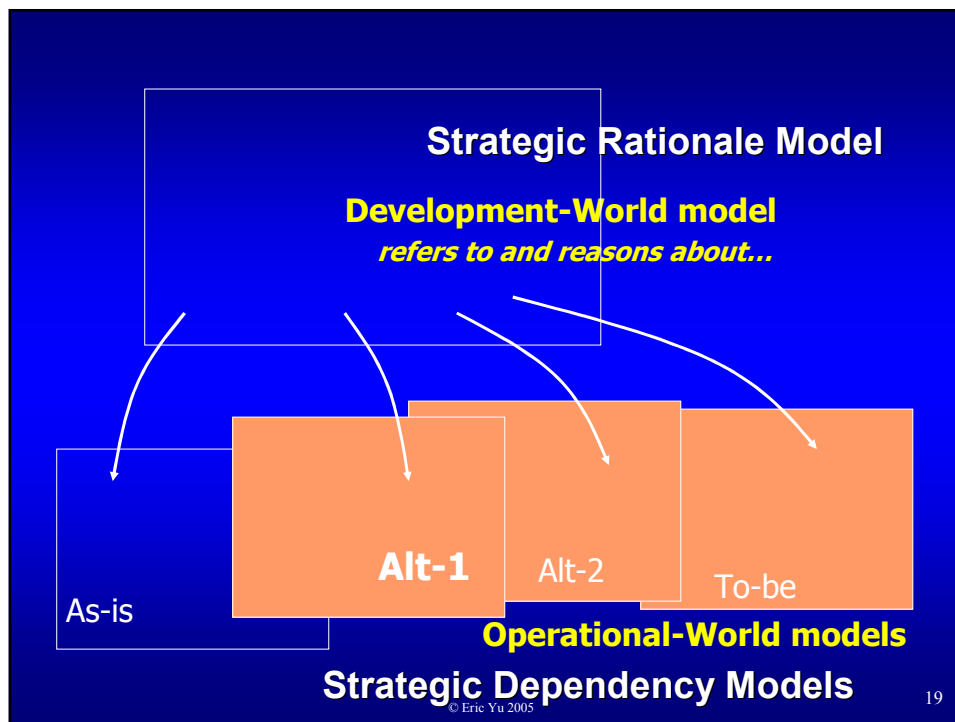


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16







## Analysis/Evaluation of $i^*$ Models [Jennifer Horkoff]

- To what extent are stakeholder goals satisfied or denied, given a particular situation or design option?

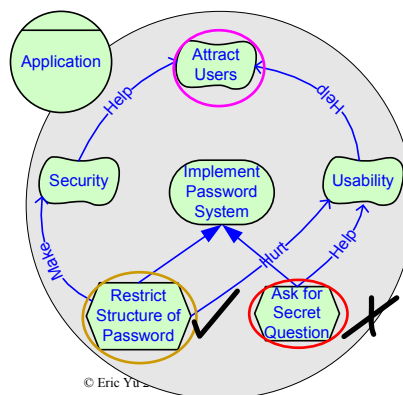


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### Example:

- Evaluation based on an analysis question:
  - If the Application implements Restrict Structure of Password, but not Ask for Secret Question, what effect will this have on Attract Users?
- Place Initial Labels reflecting Analysis Question



22

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### Example:



- Propagate labels
- Resolve labels
- Iterate on the above steps until all labels have been propagated

#### Human Intervention

Usability Receives the following Labels:

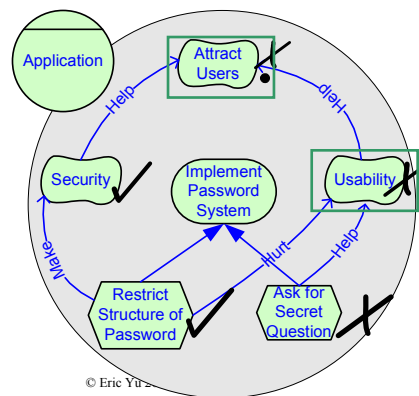
Partially denied from Restrict Structure of Password

Partially denied from Ask for Secret Question

Select Label...

Select denied

23



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## From Business Models to Service-Oriented Design: a Reference Catalog Approach

Amy Lo  
Department of Computer Science  
University of Toronto

Eric Yu  
Faculty of Information Studies  
University of Toronto

Lo, A. and Yu, E., "From Business Models to Service-Oriented Design: A Reference Catalog Approach", ER 2007: Int. Conf. on Conceptual Modeling, LNCS 4801, Springer, 87-101, 2008.  
Lo, A., "From Business Models to Service-Oriented Design: A Reference Catalog Approach", M.Sc. thesis, Dept. of Comp. Sci., Univ. of Toronto, 2006.

## Services at the Business level.....



25

## Motivations

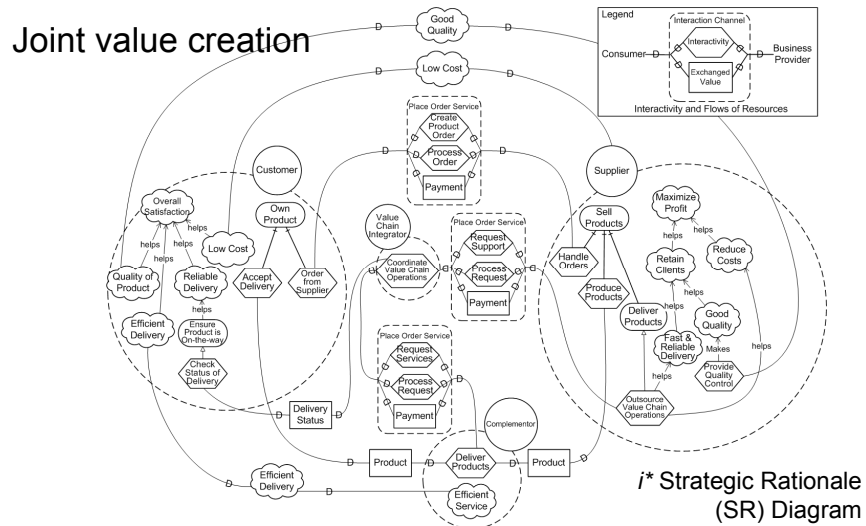
### Service-Oriented Architecture (SOA)

- Better business/IT alignment
  - Are business needs properly captured?
- Rapid increase of design options
  - How to choose among them?
- Open architecture
  - Why? What are the motivations and rationales behind the design?

26

## $i^*$ as a Business Modeling Technique

Joint value creation

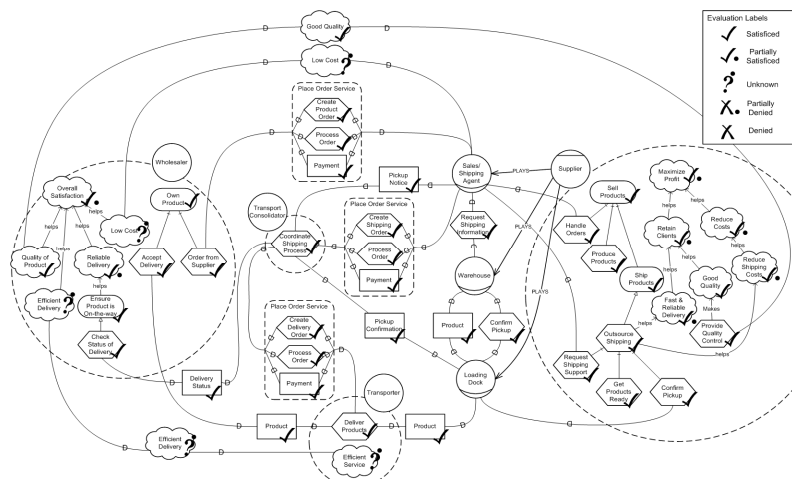


$i^*$  Strategic Rationale (SR) Diagram

27

## Are all stakeholders goals' achieved?

Evaluation of goal model [Horkoff06]



SR model refined from business model pattern

28

## *i\**'s Analytical and Reasoning Capabilities

- Goal analysis
- Task decomposition
- Means-ends reasoning
- Alternatives exploration and evaluation
- Feasibility analysis

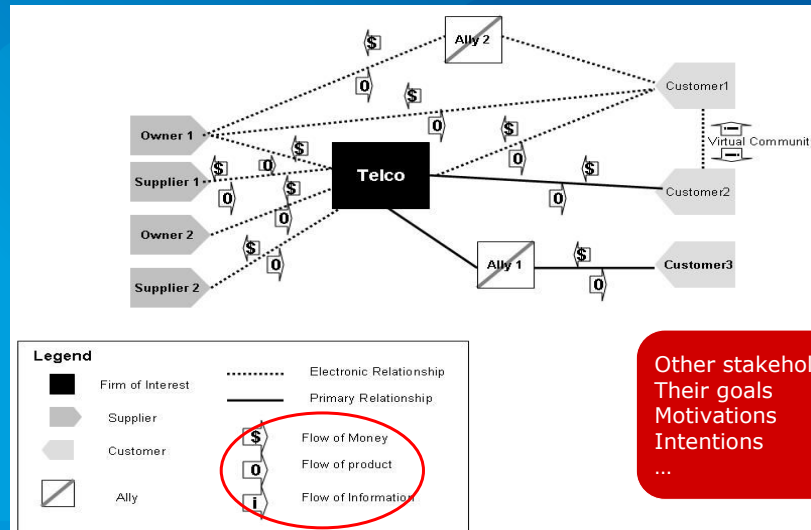
29

## Strategic Reasoning About Business Models: A Conceptual Modeling Approach

Reza Samavi  
Eric Yu  
Thodoros Topaloglou

Samavi, R., Yu, E., and Topaloglou, T., "Strategic reasoning about business models: a conceptual modeling approach", Information Systems and E-Business Management, Springer, 2008. DOI:10.1007/s10257-008-0079-z  
Samavi, R., Yu, E., and Topaloglou, T., "Applying Strategic Business Modeling to Understand Disruptive Innovation", Proc. Int. Conf. on E-Commerce, Innsbruck, Austria, August, 2008.  
Samavi, R., "Strategic reasoning about business models: a conceptual modeling approach", M.Eng. Project. Dept of Mech. & Ind. Eng., Univ. of Toronto, 2006.

## What is missing in this business model representation?

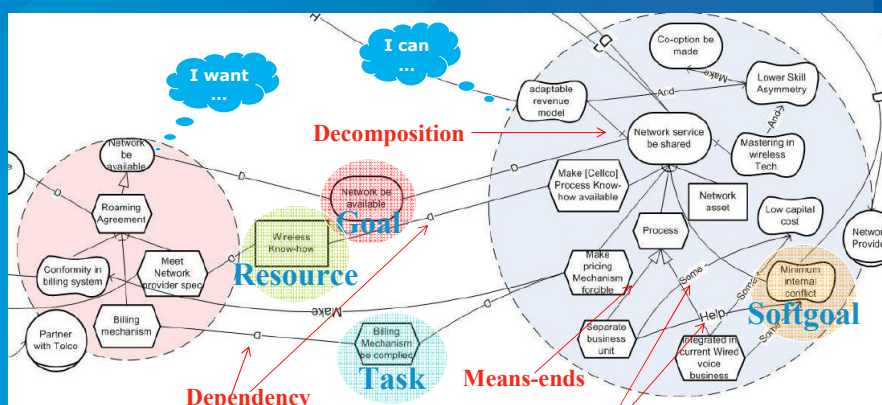


Other stakeholders  
Their goals  
Motivations  
Intentions  
...

31

Image taken from: Weill, P. and M. R. Vitale (2001), *Place to space: Migrating to eBusiness Models*. Boston: Harvard Business School Press

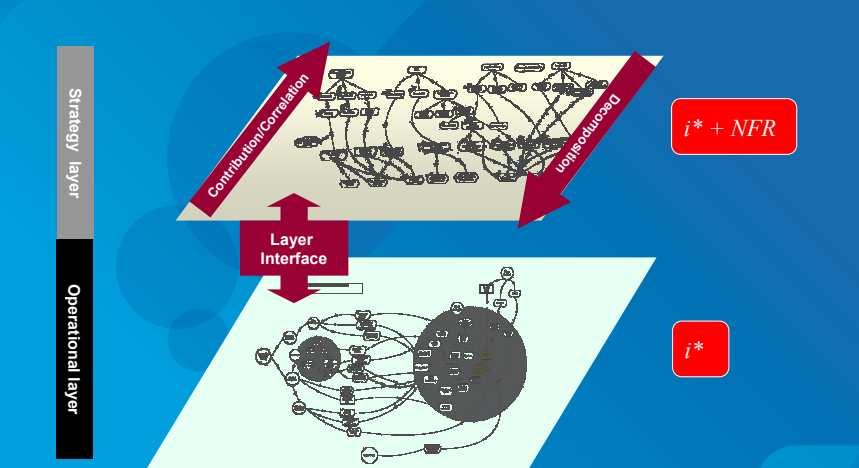
## Use $i^*$ to model strategic relationships



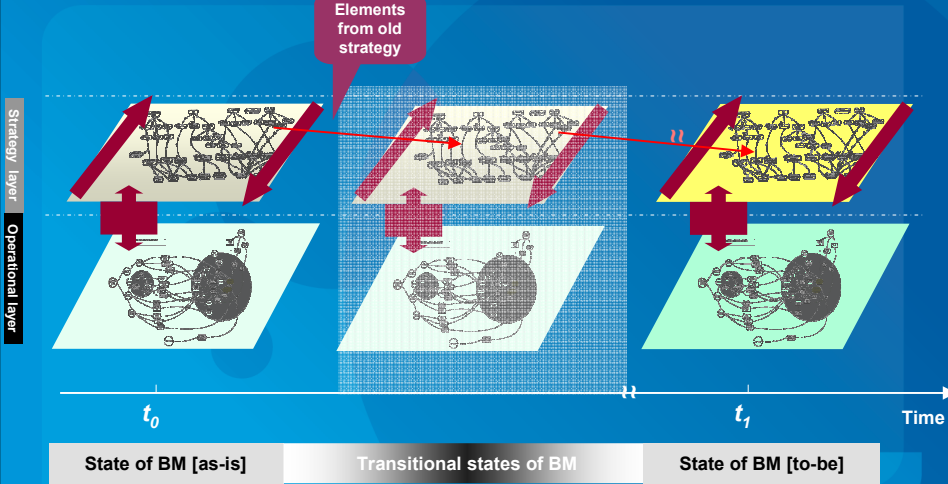
32



## Strategic Business Model Ontology



## An Integrated Framework



o-be]

34

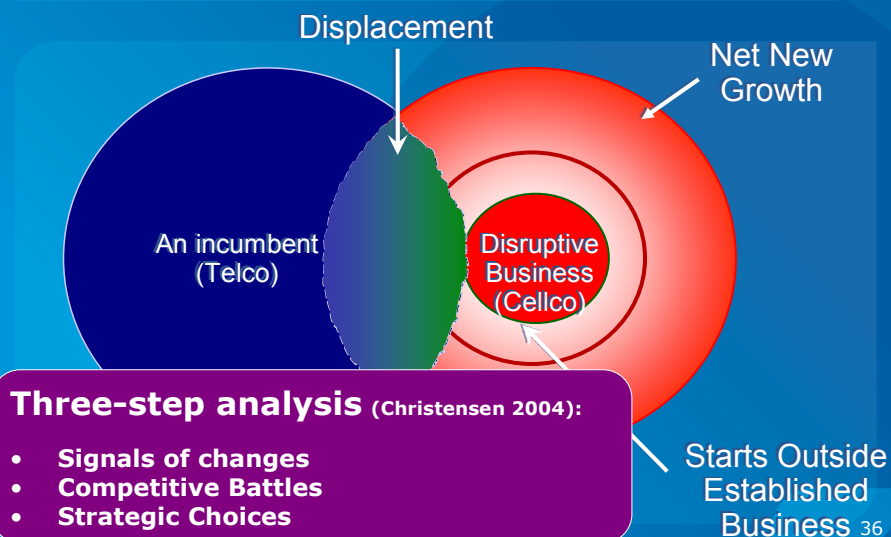
## Case Study

- Telco is a telecommunication company
- Arriving cellular voice services has been a technological disruptive innovation for wired voice provider
- Despite the mobility of cellular phones,
  - the quality of early wireless voice services was relatively poor,
  - battery life for cellular units was inadequate,
  - phones were relatively expensive
- what circumstances caused co-option in wireless and wired technology
- what other strategic moves either incumbents or new entrants could have been made in the wireless case.

35

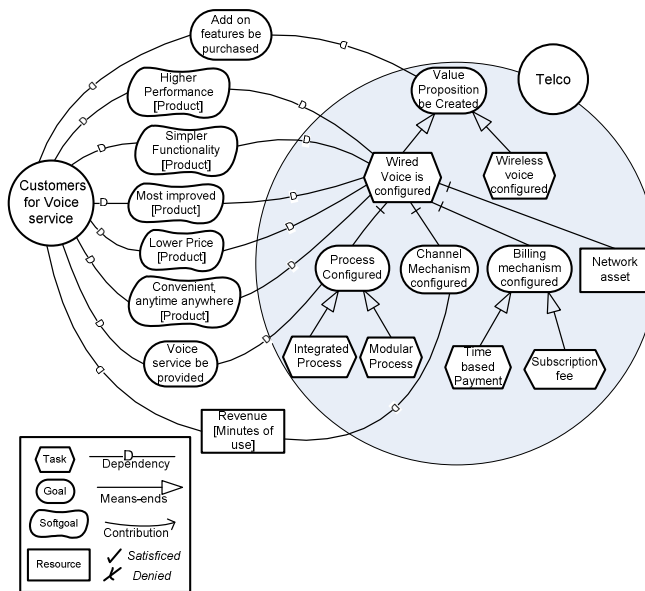
*Case study from: Christensen, C. (2004), Seeing What's Next: Using the theories of innovation to predict industry change. HBS Press Book.*

## Disruptive Innovation

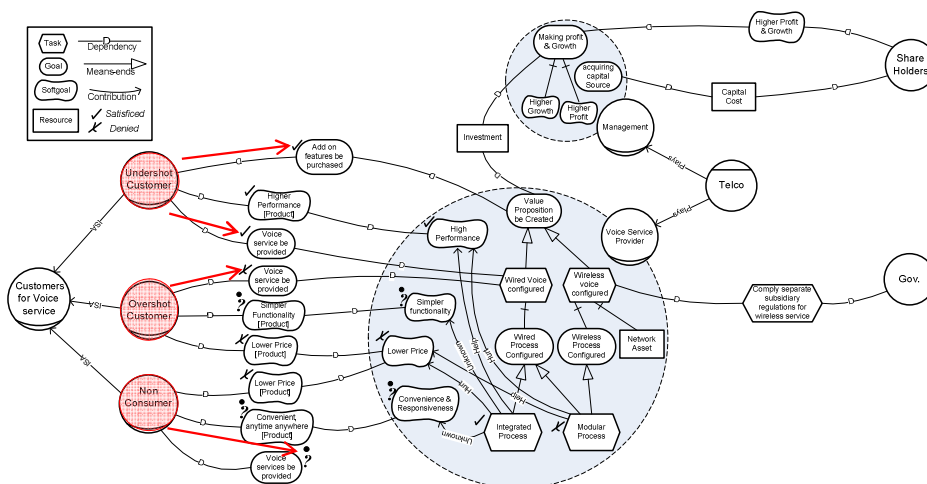


*This slide comes from Prof. Clark Gilbert presentation on DI, Harvard Business School, 2004*

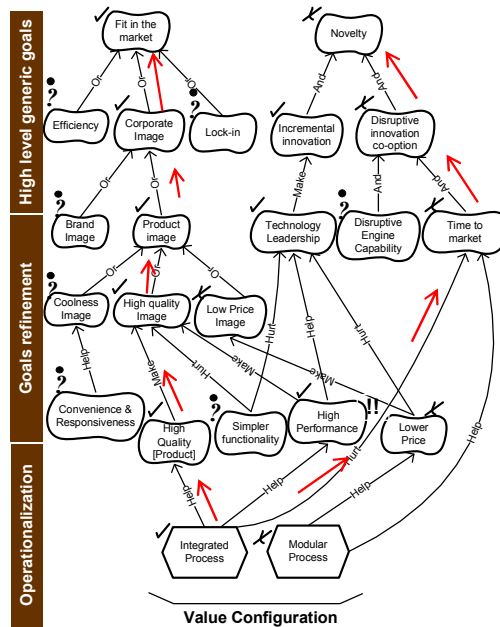
## Incumbent.as-is Business Model



## Incumbent.Signals of change



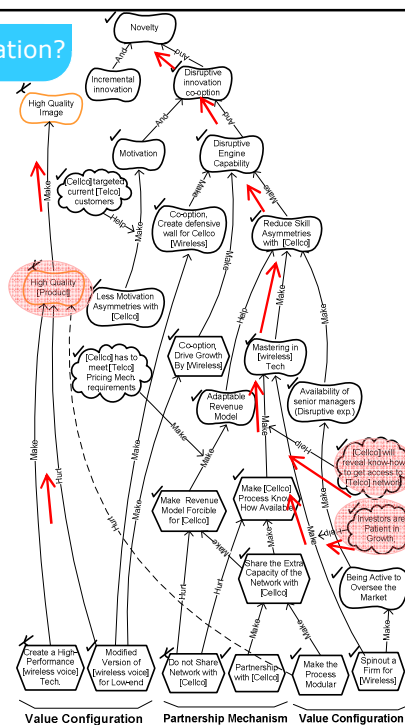
## Incumbent Strategy



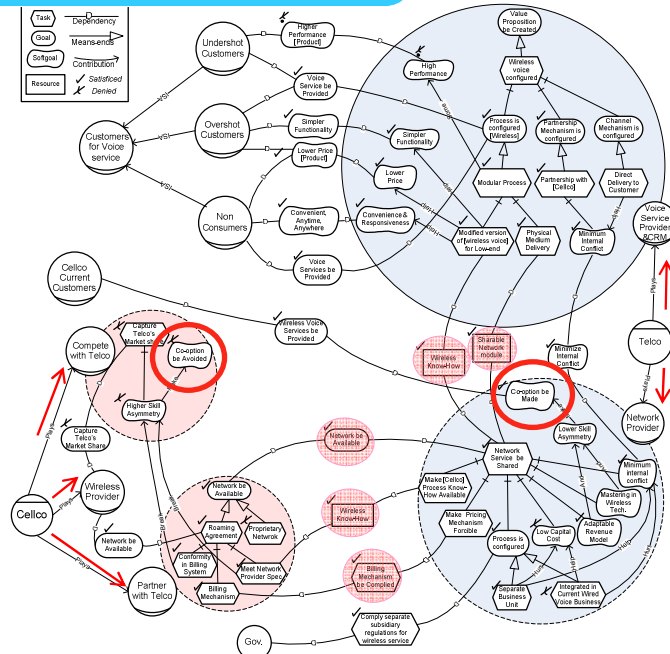
## Is Incumbent capable for Disruptive Innovation?

### Requirements to build Disruptive Innovation capacity:

- In its new strategy, Telco can convince its investors to be patient in growth;
- Despite that Cellco is Telco's rival, Telco cooperates with Cellco on sharing its network.
- A low quality image for Telco is assumed acceptable in its new strategy;



## Incumbent Strategic Choice



## How does *i\** modeling help?

- To systematically analyze the business model
- Investigate multi-stakeholders role in business model (e.g. *Rivals*, *Non-Market Players*, etc.)
- Bring into account intentional dimensions, motivations and goals of participants in a business model
- Make a firm's strategy explicit
- Demonstrate the implication of an strategy

# the *i*\* Wiki

Fostering Investigation, Collaboration, and Evaluation

<http://istar.rwth-aachen.de/>

- The *i*\* Quick Guide
- i*\* Usage Guidelines
- An Overview and a Comparison of *i*\* Tools
- Publications listings
- Who is Who
- Events

*i*\* Wiki Team

Gemma Grau,  
Jennifer Horkoff,  
Dominik Schmitz,  
Samer Abdulhadi,  
Eric Yu



## References

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See

<http://istar.rwth-aachen.de>

<http://www.ischool.utoronto.ca/~yu>