A Conceptual Modeling Method to Use Agents in Systems Analysis

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Outline

- Motivation / Background

- Proposed Research

- Conclusion and Current Status

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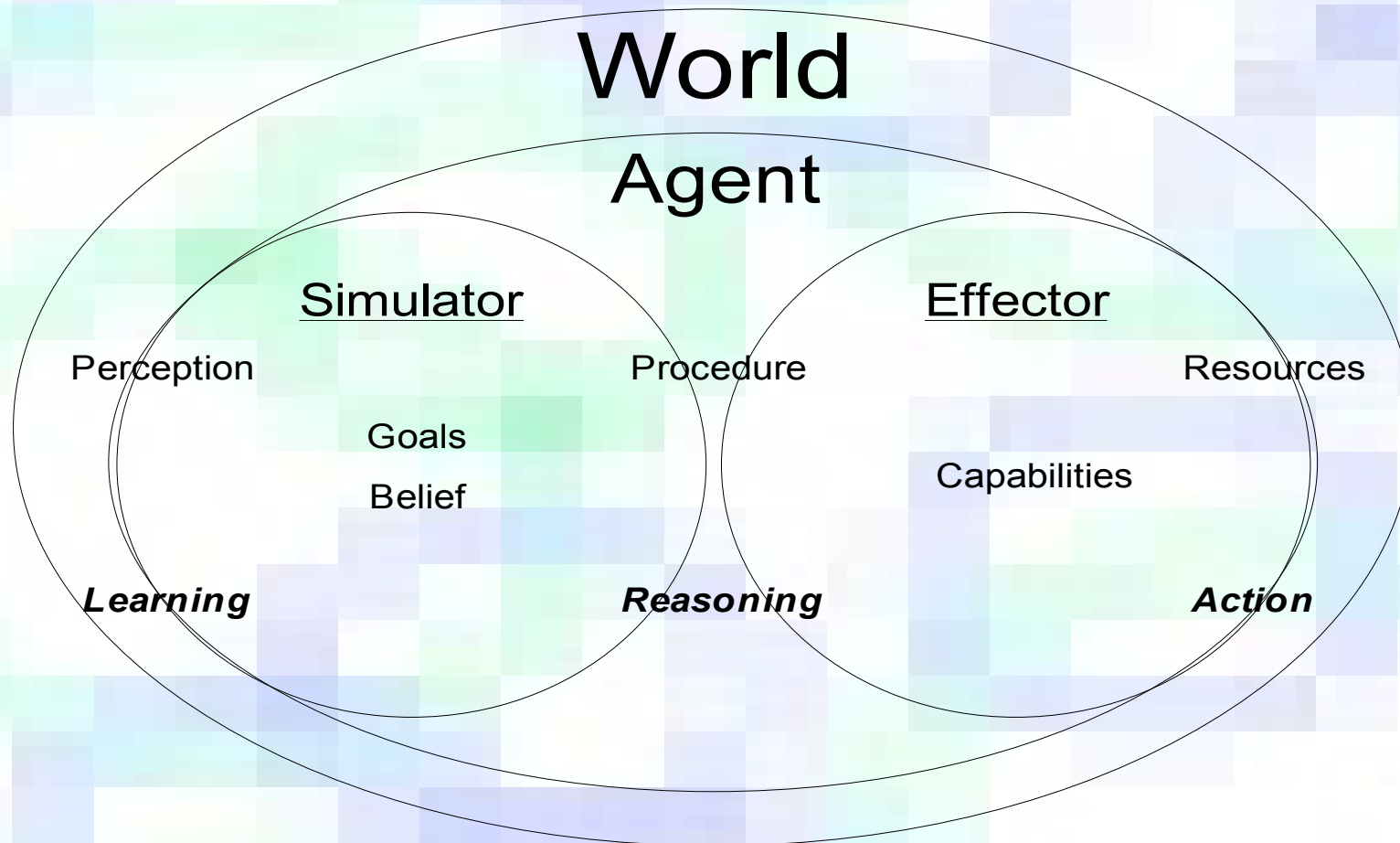School of Business
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Motivation

- Area of Interest: System Analysis

- Topic: Understanding the domain

- Traditional aspects of systems analysis

  - Data, processes, events

  - ER, DFD, BPM, UML

  - Problem with representing the business context

- Representing the actor

  - "Agent" proposed as a new conceptual construct in systems analysis (Yu 2001)

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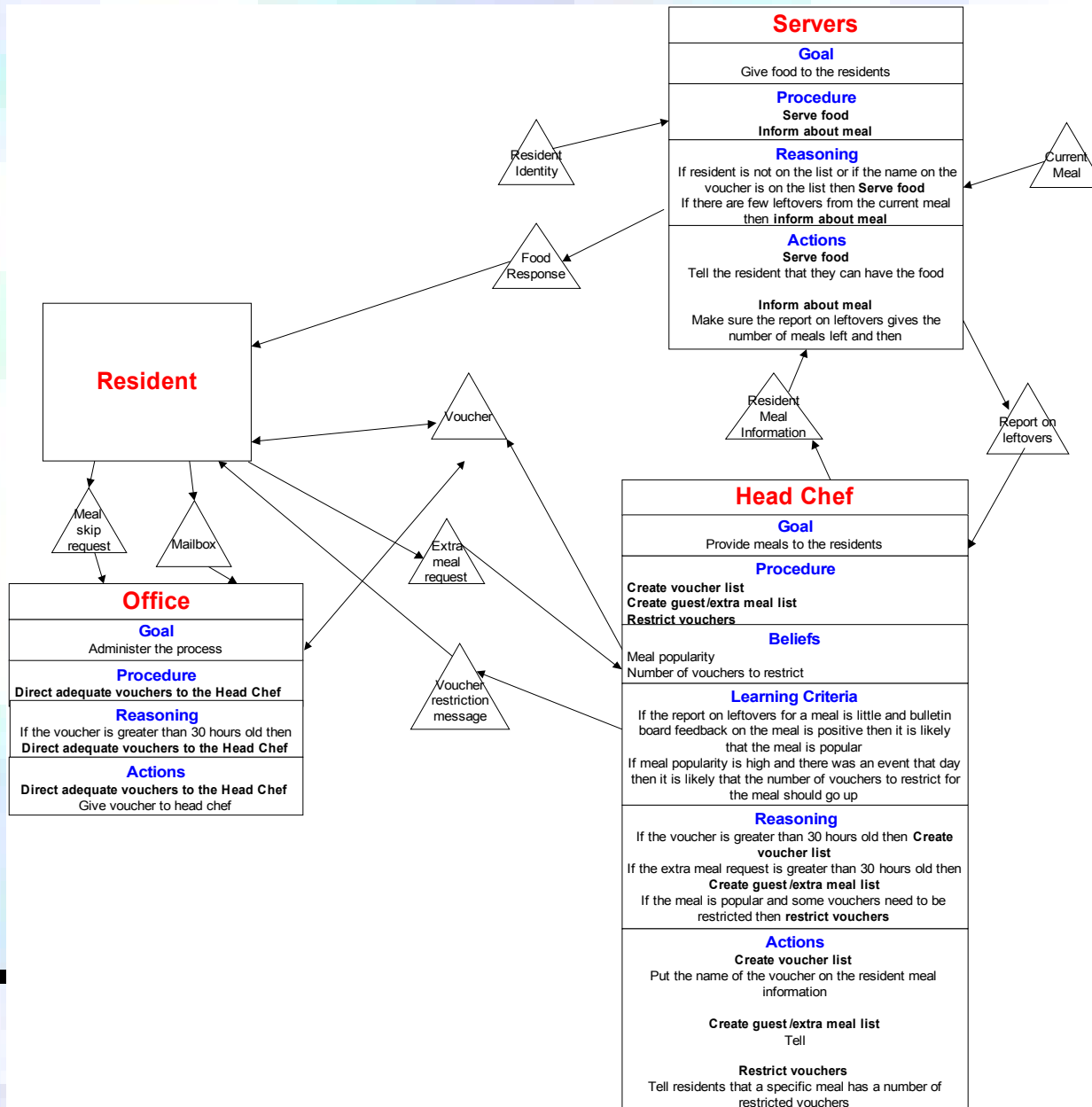University of British Columbia

Background

- Agents
  - Software intelligent agents from AI
  - Social, autonomous, and adaptive (Wooldridge 1999)
  - These conceptualizations be used in systems analysis!
- Agent concepts are not well defined (Drogoul et al. 2002)
- Intelligent agents as a modelling paradigm
  - Used systems theory and BWW ontology to understand the agent as a system (Monu et al. 2005)
  - Useful for undestanding agents but does not have sufficient detail to act as a modelling methodology

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The Conceptual Agent

World

Agent

Simulator

Effector

Perception

Procedure

Resources

Goals

Capabilities

Belief

Learning

Reasoning

Action

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Conceptual Agent Diagram

Servers

Goal
Give food to the residents

Procedure
Serve food
Inform about meal

Reasoning
If resident is not on the list or if the name on the voucher is on the list then **Serve food**
If there are few leftovers from the current meal then **inform about meal**

Actions
Serve food
Tell the resident that they can have the food

Inform about meal
Make sure the report on leftovers gives the number of meals left and then

Resident Identity

Current Meal

Food Response

Resident

Voucher

Resident Meal Information

Report on leftovers

Meal skip request

Mailbox

Extra meal request

Office

Goal
Administer the process

Procedure
Direct adequate vouchers to the Head Chef

Reasoning
If the voucher is greater than 30 hours old then **Direct adequate vouchers to the Head Chef**

Actions
Direct adequate vouchers to the Head Chef
Give voucher to head chef

Voucher restriction message

Head Chef

Goal
Provide meals to the residents

Procedure
Create voucher list
Create guest/extra meal list
Restrict vouchers

Beliefs
Meal popularity
Number of vouchers to restrict

Learning Criteria
If the report on leftovers for a meal is little and bulletin board feedback on the meal is positive then it is likely that the meal is popular
If meal popularity is high and there was an event that day then it is likely that the number of vouchers to restrict for the meal should go up

Reasoning
If the voucher is greater than 30 hours old then **Create voucher list**
If the extra meal request is greater than 30 hours old then **Create guest/extra meal list**
If the meal is popular and some vouchers need to be restricted then **restrict vouchers**

Actions
Create voucher list
Put the name of the voucher on the resident meal information

Create guest/extra meal list
Tell

Restrict vouchers
Tell residents that a specific meal has a number of restricted vouchers

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Research Inquiries

- What are the precise constructs of a conceptual agent needed to represent actors in systems analysis?

- How can these constructs be used in systems analysis?

- How useful is the methodology in gathering requirements and aiding the development and maintenance information systems?

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Research Tasks

- Develop grammar (constructs)

  - Agent constructs are needed to represent actors

- Develop method

  - Guidance needed to create agent models of consistent quality

- Case studies

  - Test the methodology in an environment

- Empirical tests

  - Test the quality of the methodology with different users

    - Usage – the experience modellers have using the methodology
    - Useful – the methodology can represent business domains

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Breakdown of tasks

Methodology component	Development and Proof of Concept	Usage Studies	Usefulness Studies
Grammar	Essay 1	Essay 1	Essay 3
Method	Essay 2	Essay 3	Essay 3

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Emperical Study Details

	Usage	*Usefulness*
Grammar	Observation of novice users modelling actors in a domain (Vitalari & Dickson 1983	Comparative read study with domain experts (Gemino & Wand 2004)
Method	Observation of modellers using the method (Vitalari & Dickson 1983)	Write Study with modellers with two groups. (Bera & Wand 2007)

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Essay 1: Conceptual Models

- Statements about agent concepts and their relationships

- Information system perspectives

  - Data, process, and behaviour oriented models

- Agent models

  - Structural, dynamic, interactive

- Validation

  - Proof of concept: Case Study

  - Usage: Observational study of actor modelling

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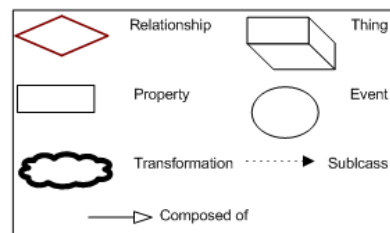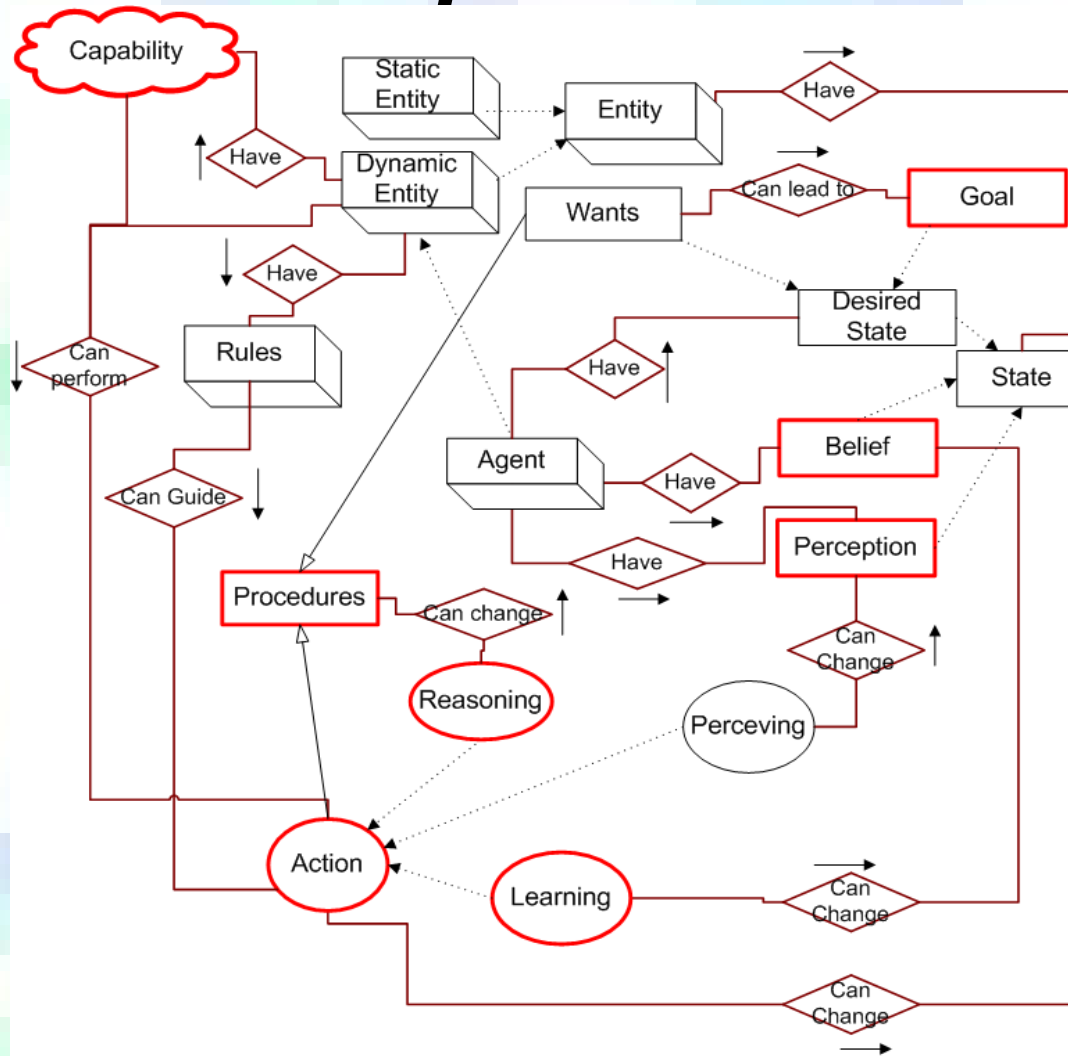
Conceptual Models

Essay 2: Conceptual Agent Modelling Methodology

- Development of modelling rules
  - Integrity rules – ensure that the models are correct
  - Mapping rules – aids in translating the domain to the constructs
- Development of method
  - Guide modellers to create agent models that conform to the rules
- Case studies
  - Post hoc analysis – investigation of previous diagrams
  - Domain understanding - knowledge acquisition study

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Essay 3: Empirical Work

- Usefulness of grammar
  - Read study
  - Comparison with i* diagram
- Usage and usefulness of method
  - Usage
    - Observation of users using the method
    - Measure breakdowns caused by method
  - Usefulness
    - Compare method and no method
    - Measure breakdowns mitigated by method

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Conclusion

- Agents can be used to understand business context

- Proposed research contributions

  - Definitions of agent constructs that can represent actors

  - Methodology to use agents to model actors

  - Validation of new methodology

- Current status

  - Conduct usage and usefulness studies of method

  - Conduct usefulness study for grammar

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Thank You

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