

Requirements Elicitation: *Part 2*

Goal-Directed Strategy 2:
Using more expressive power

Knowledge Acquisition:
A Relative of Requirements Elicitation

Data/Information Elicitation Techniques

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How to elicit?

✦ Goal-Directed Strategy 2: Using more expressive power

✦ Expressive Power *Revisited*

"Propositional and predicate logic provide all the basic concepts needed for a systematic engineering design methodology"
[C. A. Hoare, Mathematical Models for Computing Science, Oxford Univ. Rpt., Aug. 1994]

✦ modelling all the possible worlds

=> *what are they?*

=> *what are our conceptualization of them?*

these are philosophical questions!

✦ Ontology

on-tol-o-gy n. The branch of philosophy that deals with being
what exists in reality?
what are essential things in reality?
entities, activities, constraints
goals, agents, roles, rationales

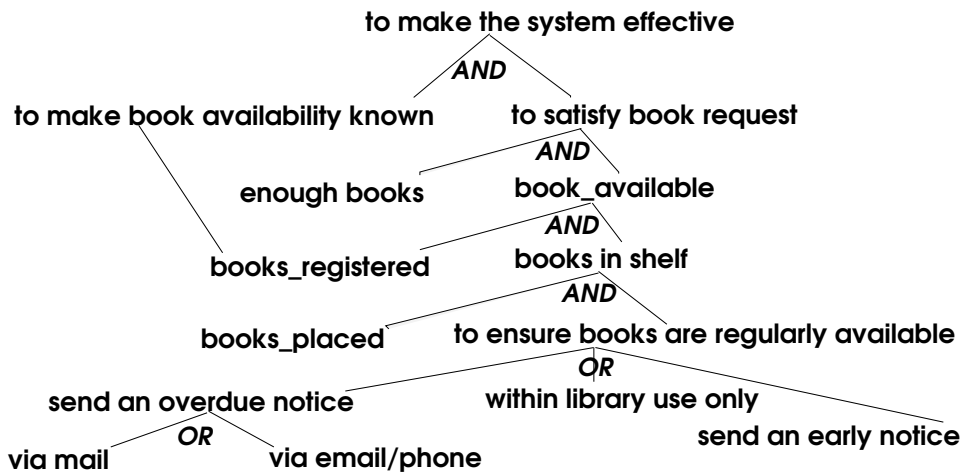
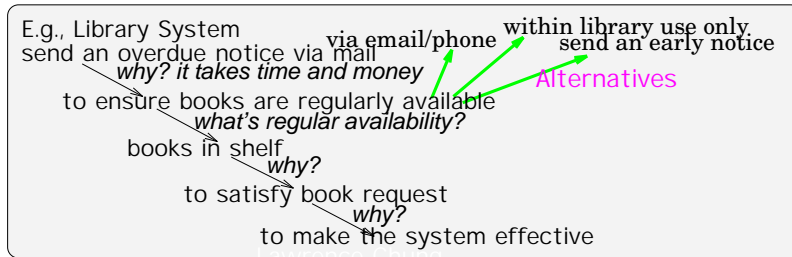
✦ Epistemology

e-pis-te-mol-o-gy n., pl. -gies. 1. The division of philosophy that investigates the nature and origin of knowledge.
2. A theory of the nature of knowledge.
how do we organize them? ✕

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How to elicit?

- E Goal-Directed Strategy 2: Using more expressive power
- F Example: A Library System



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- E Goal-Directed Strategy 2: Using more expressive power
- F Example: A Library System

[Dardenne, van Lamsweerde & Fickas, "Goal-directed Requirements Acquisition, Science of Computer Programming, 20, pp. 3-50]

Richer ontology -> during goal reduction, identity:

Concerned objects

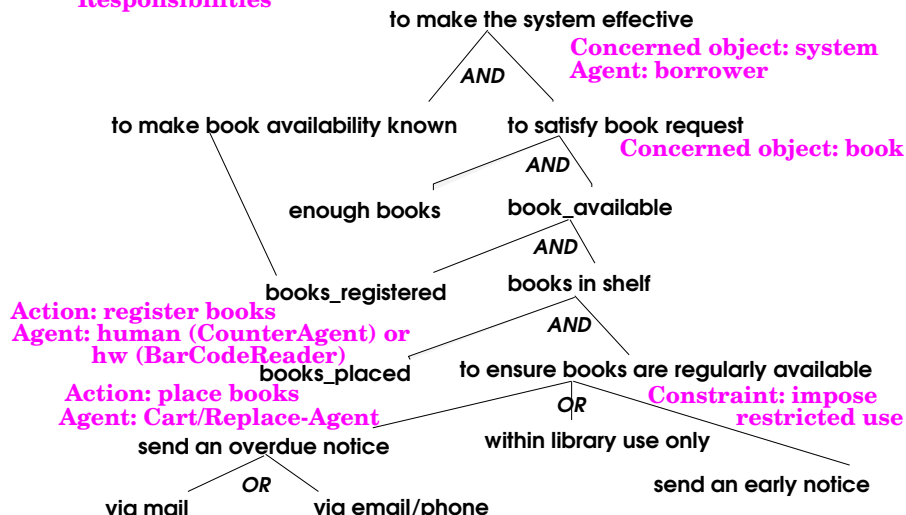
Constraints

Actions

Leaf goals are "operationalized" in terms of Agents/Constraints

Agents (human, hw, sw,...)

Responsibilities



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How to elicit?

E Domain Analysis

"support reuse of generic domain modelling patterns"

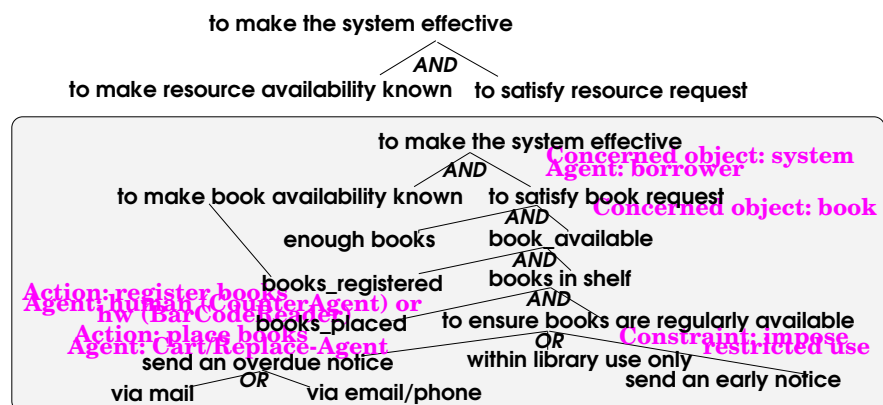
=> significant reduction in elicitation, specification & validation

F Identify commonalities between similar applications

F store requirements in a repository

F select one or more similar requirements and tailor

G E.g., "resource-allocation" meta-domain model



G resource-allocation has as instances:

airline reservation system, hotel reservation system, car rental, class registration, etc.

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How to elicit?

E Knowledge Acquisition: A Relative of Requirements Elicitation

F From AI, largely intended for acquiring expertise (e.g. of doctors, lawyers) practised by "knowledge engineer"

Recall: requirements elicitation -> capturing "knowledge" of domain

F Use of mediating representations:

help bridge the gap between the structure of expert' knowledge and formal, computer-based representations

(e.g., Text, Note, Diagram, Chart, Table, Frame, Rule, Semantic-Net)

F Automatic KA techniques

H infer new knowledge from past experience

worksFor(bill, john)

worksFor(maria, john)

worksFor(george, john)

forall x worksFor(x, john)

For whom does Susan work ?

H suggest refinement

forall x, y (x <> y) -> worksFor(x, y)

H detect inconsistencies

forall x worksFor(x, john)

worksFor(eve, maria)

F Issues recognized for KA

| novice K <> expert K ---> diff. types of customers

| experts may not want to tell ---> "say-do" problem

| expertise (experience) doesn't always translate into "rules"

---> reqs. analyst: informal -> formal (ethnomethodology)

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How to elicit?

E Data/Information Elicitation Techniques

- F Sampling
- F Questionnaires
- F Interviewing
- F Group Meetings
- F Ethnomethodology
- F Scenarios => 4

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How to elicit?

Data/Information Elicitation Techniques

F Sampling

H the process of systematically selecting representative elements of a population, often applied to documents ("hard" data, e.g., transaction log)

H useful as it can minimize costs/overhead during data gathering (only a portion, no direct involvement of customer)

H sampling tasks:

- I **data determination**

E.g., in building/improving an ATM system
how much time/transaction (-> #machines, response time improvement)
how many errors before completion (-> UI design, robustness, help fns)
correlation between amount and time spent (-> max amt, accuracy assurance)
peak period, interval between transactions (-> performance improvement)
success/failure ratios (-> bad transaction types, time of day/week)

- I **population**

E.g., transactions
transactions in 4 local branches for 1 week

- I **type determination**

J **purposive sampling** choose population elements the analyst considers important with no regard to statistical issues (e.g., only high amount/frequent transactions)

J **random sampling** every kth element

- I **sample size**

E.g., consider 1/10th of all transactions (in 4 local branches for 1 week)
the bigger the size, the higher the cost of sample collection, but higher confidence level

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How to elicit?

Data/Information Elicitation Techniques

F Questionnaires

- H kinds of information sought: attitudes, beliefs, behavior
 - not normally found through sampling (hard data) or interviews
 - But if not anonymous, customers may be reluctant to answer questions

Have you used any meeting scheduler system before? Y N

If yes, are you satisfied with it? 1 2 3 4 5

If no, would you try a meeting scheduler system when available? Y N

Would you encourage other people to use one? Y N

How much time are you willing to spend in each session?

5minutes< 5minutes< & <10 minutes 10 minutes< & <20 minutes

- H avoid open questions
(because answers to such questions are hard to correlate and interpret)

Do you think a new meeting scheduler will succeed?

Do you believe a mtg scheduler system should drastically change our daily lives?

- H questionnaires should be short
(otherwise, people may be reluctant to participate with busy schedule)

- H administer the questionnaire using simple rules

- J scoring scheme: e.g., a range of from 1 to 5

- J group inter-related questions

E.g., Q 1 2 3 represent customer satisfaction with current systems

Q 4 5 6 7 represent customer willingness to try a new one

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How to elicit?

Data/Information Elicitation Techniques

F Interviewing

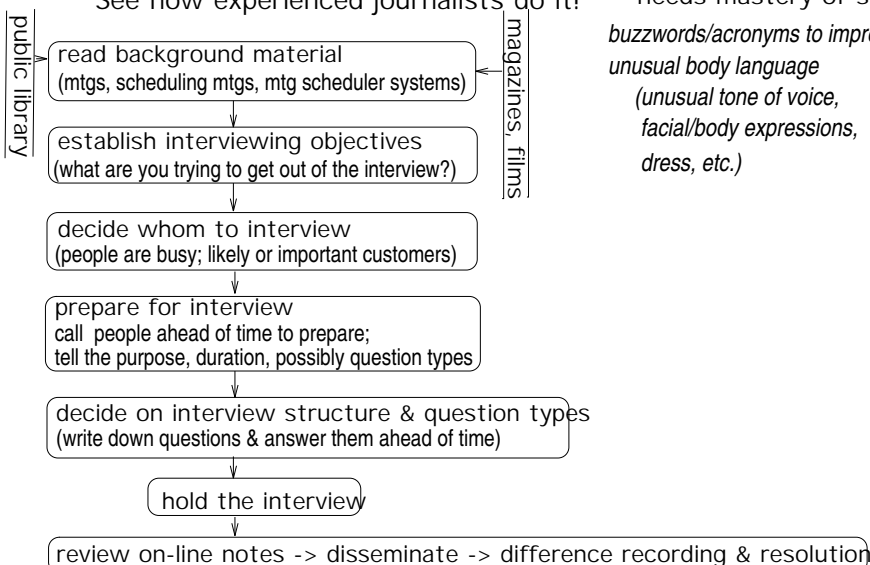
- H kinds of information sought:
 - tacit knowledge as well as hard facts, opinions, feelings, goals

J **dos:** planning ahead of time

See how experienced journalists do it!

J **don'ts:** needs mastery of skills

buzzwords/acronyms to impress
unusual body language
(unusual tone of voice,
facial/body expressions,
dress, etc.)



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How to elicit?

Data/Information Elicitation Techniques

F Group Meetings

H focus groups:

kind of group interview, often conducted in terms of "stimulus material" (videos, stories, ...)

Success depends on the kinds of participants and moderator

H E.g., Joint Application Development (JAD)

J Joint Requirements Planning (JRP)

usually for high-level managers;

identify and examine business goals, problems, critical success factors, strategic opportunities

J Joint Application Design (JAD)

identify and examine the end users' needs

J 4 tenets of JAD:

K group dynamics

participants (developers, users/customers)

leader/moderator/facilitator

recorder/scribe

K visual aids

E.g., calendars, participants, equipments, locations

K organized, rational process

periodic, democratic, conflict accommodating

K WYSIWIG documentation approach

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How to elicit?

Data/Information Elicitation Techniques

g the "say-do" problem: people know how to do things they normally don't describe (tacit knowledge); descriptions of such things may be highly inaccurate

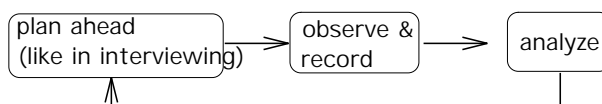
I experts may not want to tell ---> "say-do" problem

F Ethnomethodology (People's methods)

H Sometimes, observation is the best way to understand how things are done

H (esp. where) social order is accomplished on a moment-to-moment basis

H So, OBSERVE in a NATURAL setting



H e.g., stock brokerage (multiple phone calls, computer), HCI

H ethical, legal implications, if video-taping without notification

H observation not in a natural setting, if people are aware of being observed
needs maximal natural setting, minimal interruption

H can be too time-consuming to analyze the recording
gradual identification of critical tasks and focusing

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