数字媒体与网络技术

Human Computer Interaction

Identifying needs and establishing requirements

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Data gathering

—an important part of requirements activity and also of evolution

—Purpose: to collect sufficient, relevant, and appropriate data so that a set of stable requirements can be produced.

- expand, clarify, and confirm the initial requirements

—Needs to cover a wide spectrum of issues due to quite varied requirements

—Need to find out user tasks, goals, context…

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Data gathering techniques

Essentially a small number of basic techniques for data gathering

— questionnaires
— interviews
— focus groups and workshops
— naturalistic observation
— studying documentation

Data gathering techniques are flexible and can be combined and extended in many ways.

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Data gathering techniques (1)

Questionnaires:

—A series of questions designed to elicit specific information

—Questions may require different kinds of answers:
simple YES/NO; choice of pre-supplied answers; long response or comment

— Electronic form vs on paper

— administrated at a distance --(no help, no explanation)

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Data gathering techniques (1)

Questionnaires:

—Can give quantitative or qualitative data

—Good for answering specific questions from a large, dispersed group of people
--infeasible to visit them all

—Often used in conjunction with other techniques
--information obtained through interviews might be corroborated (确证) by sending a questionnaire to a wider group of stakeholders to confirm the conclusions.

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Data gathering techniques (2)

Interviews:

—Forum for talking to people --- face-to-face vs telephone

—Structured, unstructured or semi-structured
-- how rigorously the interviewer sticks to a prepared set of questions

—Context
-- home setting
-- Props, prototypes, can be used in interviews

—Good for exploring issues -- more encouraging

—But are time consuming and may be infeasible to visit everyone

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Data gathering techniques (3)

focus groups and workshops

— Group interviews

— Structured or unstructured, facilitator

— Good at gaining a consensus view and/or highlighting areas of conflict and disagreement.

—On a social level it also helps for stakeholders to meet designers and each other, and to express their views in public.

-- The sessions need to be structured carefully and the participants need to be chosen carefully.

-- It is easy for one or a few people to dominate discussions.

Data gathering techniques (4)

Naturalistic observation:

—Why?

-- It can be very difficult for humans to explain what they do or to even describe accurately how they achieve a task.

—Observation provides a richer view.

—Spend time with stakeholders in their day-to-day tasks, observing work as it happens, in a natural setting.

—A member of the design team shadows a stakeholder, making notes, asking questions, and observing what is being done in the natural context of the activity.

—Gain insights into stakeholders' tasks

Data gathering techniques (4)

Naturalistic observation:

—Level of involvement of the observer

-- variable from a spectrum with no involvement (outside observation) at one end and full involvement (participant observation) at the other.

—Good for understanding the nature and context of the tasks

—But, it requires time and commitment（许诺） from a member of the design team, and it can result in a huge amount of data

Data gathering techniques (5)

Studying documentation:

—Procedures and rules are often written down in manuals

—Other documentation: diaries or job logs that are written by the stakeholders during the course of their work

—Good source of data about the steps involved in an activity, and any regulations governing a task

—Not to be used in isolation

—Good for understanding legislation（立法）, and getting background information

—No stakeholder time, which is a limiting factor on the other techniques

Choosing between techniques

The kind of information your want will probably be determined by where you are in the cycle of iterations.

- at the beginning of the project -- interviews

The resources available will influence the choice.

- sending questionnaires nationwide -- time, money, good design, pilot it, issue it, collate（比较） the results and analyze them.
- has only 3 weeks? No one in the team has designed a survey before?

The location and accessibility of the stakeholders need to be considered.

- attractive to run a workshop
- spread across a wide geographical area?

Choosing between techniques

Choosing between data-gathering techniques rests on two issues:

1. The nature of the data gathering technique itself
2. The task to be studied

Choosing between techniques

Data gathering techniques differ in two ways:

1. Amount of time, level of detail and risk associated with the findings
   - naturalistic observation: 2 days effort and 3 months of training
   - interviews: 1 day effort and 1 month of training
2. Knowledge the analyst requires

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Choosing between techniques

The choice of technique is also affected by the kind of task to be studied:

—Sequential steps or overlapping series of subtasks?

—High or low information content→ complex or simple displays

—Task for a layman or a skilled practitioner?

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Problems with data gathering (1)

- Identifying and involving stakeholders: users, managers, developers, customer reps?, union reps?, shareholders?
- Involving stakeholders: workshops, interviews, workplace studies, co-opt（指派） stakeholders onto the development team
- 'Real' users, not managers: traditionally a problem in software engineering, but better now

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Problems with data gathering (2)

- Requirements management: version control, ownership
- Communication between parties:
  - —within development team
  - —with customer/user
  - —between users… different parts of an organisation use different terminology
- Domain knowledge distributed and implicit:
  - —difficult to dig up and understand
  - —knowledge articulation: how do you walk?
- Availability of key people

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Problems with data gathering (2)

- Knowledge articulation
- Kazuo Hiekata, Hiroyuki Yamato, Wataru Oishi, **Knowledge Articulation Method Using Design Data History,** Proceedings of the Fifth International Conference on Information Technology: New Generations
- This paper proposes a methodology to articulate design knowledge using a design trace. A software system is developed to support the proposed methodology. The system is a kind of design navigator and is also a design data storage. Design data are stored in RDF format which is a standard metadata description language. By incorporating with the software, design knowledge is articulated through the following processes: (1) define initial workflow, (2) record the design trace, (3) generation tree of the design history and (4) interview with the designer to revise workflow and to determine the design knowledge. This methodology and the software were applied to the marine propeller design. Since this is a typical parametric design, all the input and output data are recorded and the articulation was made in the proposed manner. The workflow and knowledge was extracted successfully.

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Problems with data gathering (3)

- Political problems within the organisation
- Dominance of certain stakeholders
- Economic and business environment changes
- Balancing functional and usability demands

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Some basic guidelines

- Focus on identifying the stakeholders' needs
- Involve all the stakeholder groups
- Involve more than one representative from each stakeholder group
- Use a combination of data gathering techniques

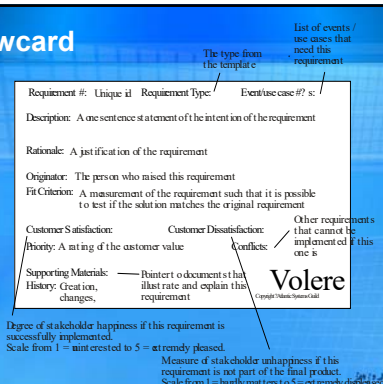
Some basic guidelines

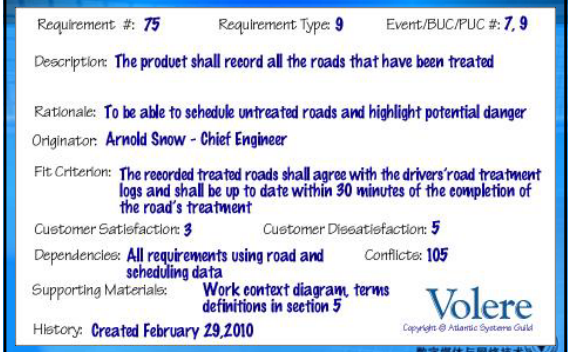
- Support the process with props such as prototypes and task descriptions
- Run a pilot session
- You will need to compromise on the data you collect and the analysis to be done, but before you can make sensible compromises, you need to know what you'd *really* like
- Consider carefully how to record the data

Data interpretation and analysis

- Aim: to begin structuring and recording descriptions of requirements. Start soon after data gathering session
  - The experience will be fresh in the minds of the participants and this can help overcome any bias caused by the recording approach.
- A good idea is to discuss the findings with others to get a variety of perspectives on the data.
- Using a template highlights the kinds of information you should be looking for and guides the data interpretation and analysis.

snowcard





Data interpretation and analysis

- Different approaches emphasize different elements
  - class diagrams for object-oriented systems,
  - entity-relationship diagrams for data intensive systems
- The requirements activity iterates a number of times before a set of stable requirements evolves.
  - As more interpretation and analysis techniques are applied, a deeper understanding of requirements will emerge and the requirements descriptions will expand and clarify.

Class Diagram

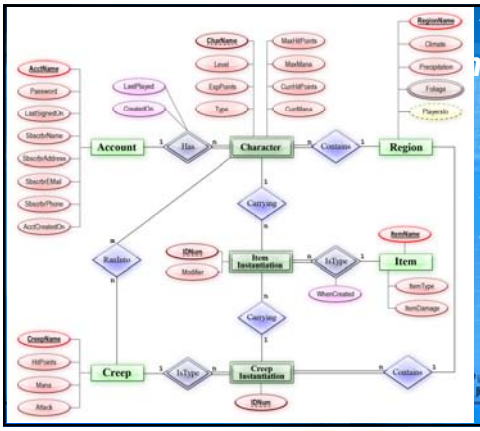
•In software engineering, a **class diagram** in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, and the relationships between the classes.

Class Diagram

Hierarchy of UML 2.0 Diagrams, shown as a class diagram. The individual classes are represented just with one section, but they often contain up to three sections.

Entity-relationship Diagram

•In software engineering, an **entity-relationship model** (**ERM**) is an abstract and conceptual representation of data. Entity-relationship modeling is a database modeling method, used to produce a type of conceptual schema or semantic data model of a system, often a relational database, and its requirements in a top-down fashion. Diagrams created by this process are called **entity-relationship diagrams**, **ER diagrams**, or **ERDs**.



A sample Entity-relationship diagram using Chen's notation

- from "The Entity Relationship Model: Toward a Unified View of Data"