G52SOF – Lecture 5

Contextual Methods for Requirements Analysis

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Contextual Approaches

- What are they?
  - Nuseibeh & Easterbrook (2000)
    - Contextual approaches “are based on the premise that local context is vital for understanding social and organisational behaviour”
    - The requirements engineer “must be immersed in this local context in order to experience how participants create their own social structures.”
    - Contextual approaches “include the use of ethnographic techniques such as participant observation. They also include ethnomethodology and conversation analysis, both of which apply fine grained analysis to identify patterns in conversation and interaction.”
  - In short, contextual approaches are about understanding how the participants of a setting create process and product in their interactions
    - So, essentially, contextual approaches are about looking at how human activities are done and how the doing creates process and product

Contextual Approaches

- Contextual approaches contrast with generic and cognitive approaches
  - “The two sides are incompatible: traditional and cognitive approaches are based on the use of abstracted models that are independent of context, whilst the contextualists insist that context is paramount, and completely resist any attempt to build generalisable models” (ibid.)
  - Contextual approaches are not concerned with generalisation but with the “situated” character of human activities
    - See Lucy Suchman (1987) *Plans and Situated Actions: The Problem of Human-Machine Communication*, Cambridge University Press.
  - They are concerned to understand how human activities are done in particular settings, by the particular people who do them, with the particular tools and resources to hand
    - They pay very careful attention to the local creation of process and product, because that is what systems will need to support

Attending to Local or Situated Action

- Fieldwork
  - In short, going and looking aka “observation”
    - Though this is misleading, you must also talk to people so that you understand the things you see them do
  - Requires immersion in the activities that people do
    - Seeing human activities first hand
  - Looking carefully at how human activities are assembled
    - How they are “put together” in the doing
  - Can’t do it from your office, you have to go out “into the field”
    - i.e., to the places where people do their activities and see them being done for yourself
  - Need to develop your competence in their activities so you understand how they are done
    - You will be doing this as part of your coursework and I will tell you more about doing in future lectures

Ethnography

- Analysing what you have seen
  - It is not sufficient to just go and look
    - You also need to provide an analysis of the “social organisation” of things you have seen so that you can elaborate human activity systems
  - Ethnography is an analytic perspective on the social organisation of human activities
    - Actually, ethnography provides lots of different analytic perspectives on social organisation
  - We are going to take inspiration from a perspective called “ethnomethodology”
    - It has had the greatest impact on systems design to date
    - First used by XeroxPARC in the 1970s, where the personal computer was invented

Fieldwork & Ethnography

- Now used by a broad range of IT research and systems development companies
  - Small and large, including
    - Microsoft
    - IBM
    - Intel
  - Part and parcel of the requirements engineers “toolkit”
  - Elaborates the local context of human activities in situated details of their interactional accomplishment
  - And enables designers to develop solutions that support the activities that go on in particular settings (offices, factories, homes, etc.)

The Origins of Ethnography

- Social science
  - Fieldwork and ethnography are spoken about interchangeably
    - One refers to the other
  - Ethnography is also used interchangeably with ethnomethodology
    - All a bit confusing and not strictly true
  - Fieldwork and ethnography derive from anthropology
    - Fieldwork originated in the late 1800s as a means of studying ‘faraway’ tribes
    - Ethnography developed accidentally *circa* 1920 by Bronislaw Malinowski
    - The contrast: fieldwork is essentially about ‘visiting’ the natives (scenic), ethnography about ‘living’ with them for a period of time
  - Ethnomethodology derives from sociology
    - An analytic perspective that uses fieldwork to study social organisation as an ‘incarnate’ or embodied and lived feature of everyday life (as something we all know and do in our capacity as members of the settings we inhabit)

Origins in Software Engineering

- The “turn to the social”
  - Crisis in software engineering as computers moved into the workplace
    - Mass failures of workplace systems as a result of cognitive models of work
  - Need to understand “real world, real time” character of work and its organisation
    - Designers recognised that work is essentially social (Goguen 1993)
  - Turned to the social sciences for help
    - Anthropology, sociology, business and management sciences, etc.
  - Ethnomethodologically-informed ethnography emerged as a viable candidate
    - Empirical means of understanding the social character of work and its organisation in situated detail
  - Need to develop a basic understanding of the approach so that you can complete your coursework

Work-practice

- If you pay very careful attention to interactional work you will find the “work-practices” organising human activity
  - Work-practice refers to the particular ways in which particular activities are ordered by members
    - See Button & Harper 1996
  - To the ways in which they are put together sequentially time and time again
  - To the recurrent ways in which the “putting together” of sequential order is done
  - Your task is to find the ways in which order is produced in the interactional work of doing an activity
  - Note that work-practice does not refer to a prescribed order, an abstract order, an ideal order (e.g., to plans, procedures, rules, etc.), but to real interactional order

Group work A Socio-Technical System

- You are all experts or “competent members” when it comes to dealing with the socio-technical system of mail
  - We will make some groups
  - As a group you will attempt to describe the activities which happen in mail handling in a typical home
  - Your notes should describe:
    - The activities involved in handling mail
    - Their sequential order
    - Work-practices for accomplishing each activity in the sequential order
  - I will ask questions of the groups about what they have described in their notes

A Study of Mail Handling

- The sequential order
  - 1) First things first: mail arrives somewhere
    - Letterbox, porch, front door, pigeon hole … … …
    - In other words a delivery / collection point
    - The particular place is contingent from home to home
    - But there is always one and it is known in common by household members

Known in common collection point

What Happens Next?

- 2) Collecting the mail
  - Someone collects it
  - Who?
    - Just about anyone, even the dog ☺
  - Can anybody open it?
  - No. It gets put some place where members can see that new mail has arrived
  - Another local and known in common place where members can sort through it to see if any mail has arrived for them
  - Again contingent but always present in home with multiple members

Known in common sorting point

Who Is The Mail For?

- 3) Members need to determine who is entitled to open particular mail items
  - How do they do that?
    - Name, yes
    - But also logos, handwriting, postmarks, senders' address, etc.
  - All these things articulate entitlement to open (not necessarily name)
  - Visible features of envelopes enable members to see at-a-glance who an item is for and what to do with it:
    - Junk it, leave it, open it

Sorting the mail:
members can see at-a-glance who it is for

What If The Mail Is For Someone Else?

- 4) Members who sort mail often place mail for others in places relevant to the intended recipient
  - e.g., places the recipient usually sits
    - At the kitchen table, on their favourite chair, on the arm of the sofa, or nest of tables next to it, etc.
  - Or places where the recipient cannot miss it
    - e.g., outside the bedroom door of a teenage son or daughter
  - Mail items that are not intended for but may be of interest to other members are also placed in this way
    - e.g., postcards, letters, leaflets, etc.

Relevant recipient point

What Do Members Do With Mail?

- 5) Mail occasions action
  - We don't just get it, we often have to do something in response to it
    - e.g., pay a bill
  - Members place mail to reflect its action status
  - Mail requiring immediate action is placed such that members can see that at-a-glance
    - e.g., by the mobile phone charger, or by the car keys, or in porch next to the front door, etc., if it's has to be taken out of the home and dealt with
    - Or by a computer if it has to be dealt with online

Immediate action point

What If Immediate Action Is Not Required?

- 6) Many mail items don't require action until a later date
  - e.g., appointments, invitations, promotional offers, etc.
  - They are placed to display their relevance to up and coming events
    - e.g., on notice boards next to calendars, shopping lists, takeaway menus, etc.

Pending event points

What If A Response Isn't Required?

- 7) Not all mail requires that we respond to it
  - e.g., bank statements, insurance certificates, mortgage payment records, etc.
  - We may still need to take action on it though
    - e.g., checking and archiving
  - Mail where no response is needed is placed to show that action is pending

Pending action point

What If It's A "Special" Kind of Item?

- 8) Not all of the mail we receive is utilitarian (bills, bank statements, appointments, etc.)
  - We also receive "special" mail items
    - e.g., birthday cards, thank you cards, congratulations, etc.
  - Special items are placed to display their "special" character
    - e.g., on window sills, mantelpieces, cupboards, dressers, etc.

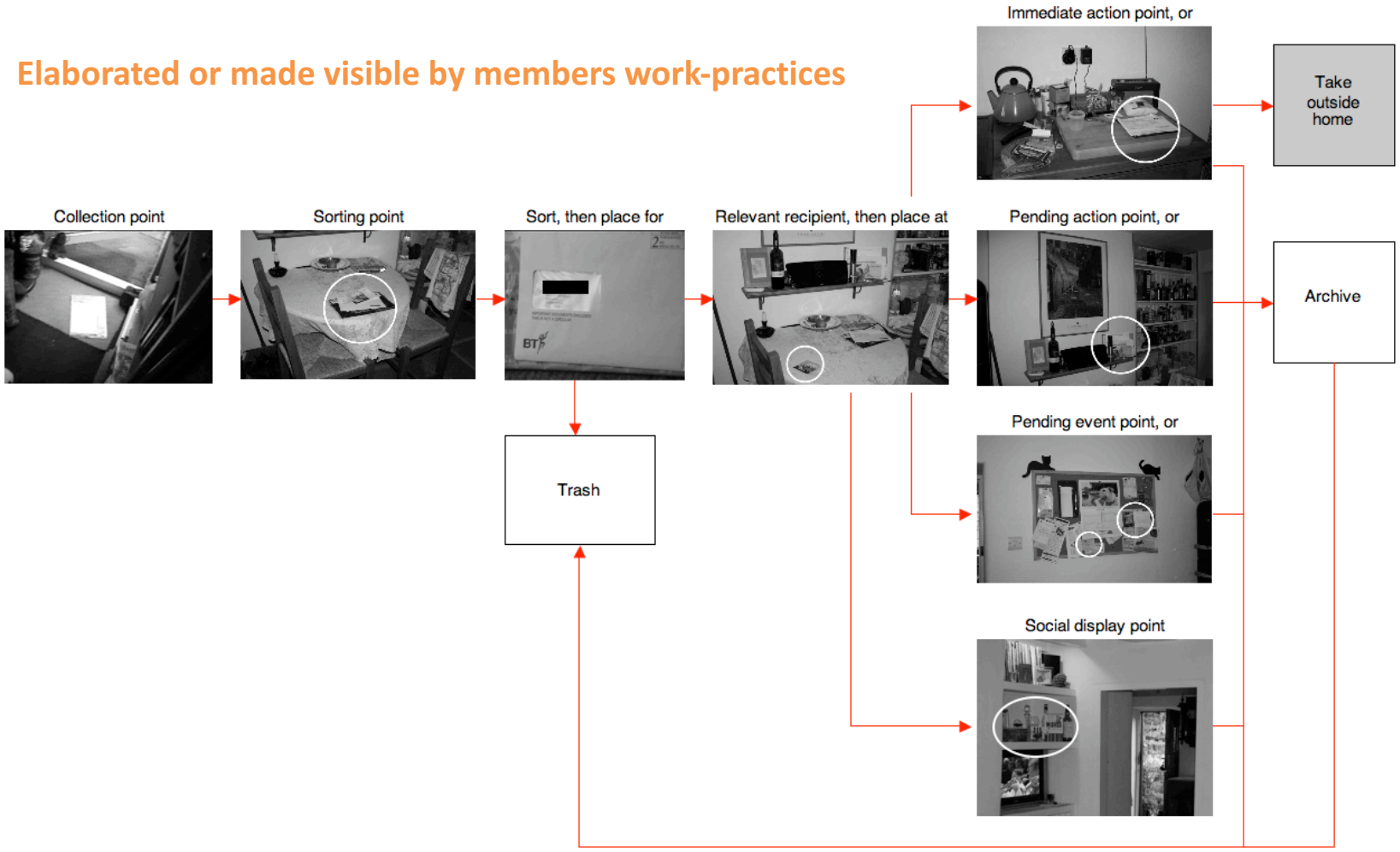
Special mail display points

Social Organisation of Mail Handling

- The sequential order of mail handling is socially organised
  - It is done collaboratively by multiple parties
    - Deliverers, collectors, sorters, recipients
  - The interactional work of mail handling reveals members work-practices for handling mail (distinct placement practices)
  - These work-practices elaborate a concrete human activity system
  - This elaborates the process and product of mail handling
    - Process: The ordered sequence of activities, entrance and exit criteria for each activity, which work product is produced in each activity, and what kind of people should do the work.
    - Products: The work products to be produced and, for each product, the resources needed to produce it, the information it contains, the expected audience, and the acceptance criteria the product must satisfy.
    - Faulk (1997) *Software Requirements: A Tutorial*
  - And thus enables us to specify the requirements problem
    - Let's briefly unpack these points

The Human Activity System

Elaborated or made visible by members work-practices



Product & Process

- The process is identical to the sequential order of mail handling activities
  - This is a real world, real time process not an abstract process
  - At each stage in its accomplishment distinct products are collaboratively produced
    - Product for sequential activity 1) Delivery of mail
    - Product for sequential activity 2) Collection and sorting of mail
    - Product for sequential activity 3) Placement of mail items for recipients
    - Product for sequential activity 4-8) Placement of mail to display different action statuses
  - Each product relies on the use of distinct resources
    - In this case, distinct physical sites or places that articulate what position in the process mail handling has reached (see Harper 2000)

The Requirements Problem

- Say we wanted to design a new email system for the smart home, what would our problem be?
  - Our studies tell us that mail handling relies on the distribution of mail at various sites around the home
    - " … a letter in the geography of the home is a marker of what point a job-to-do has reached. Email might support this if the screens are located in places that equate to locations within the domestic workflow." (Harper 2000)
  - Our problem, then, is one of supporting that distribution
  - Our studies show us how the distribution is done in practice and we can draw on our knowledge of the activity system's actual creation to develop requirements

User Requirements

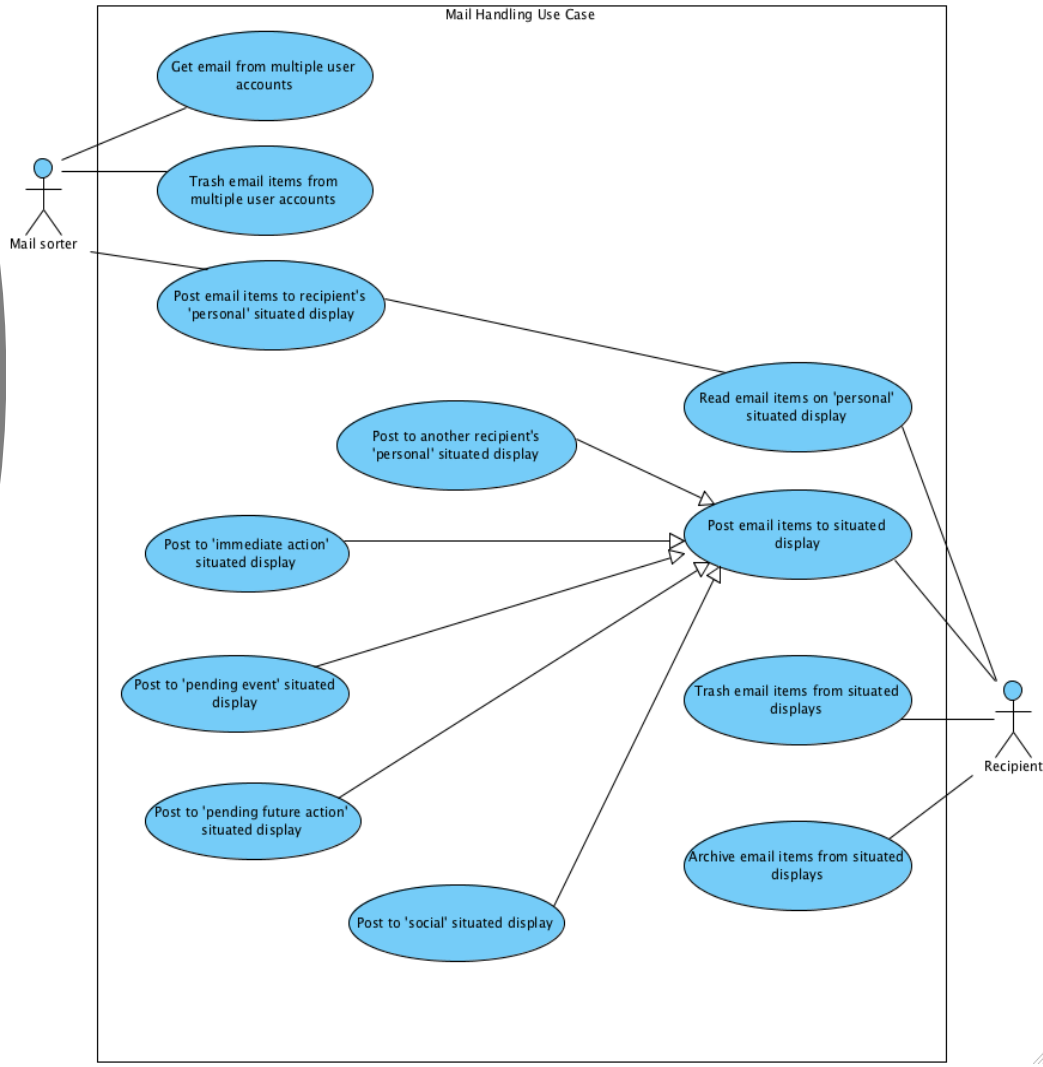
- System must enable users to distribute email around the home, including
  - Collect email
  - Sort and assign to a recipient
  - Place for a particular recipient
  - Place to display action status
    - Immediate action
    - Pending event
    - Pending action
    - Special status

System Requirements

- A *displays manager* enabling users to,
  - Find and name networked display panels in the local environment
  - Connect/disconnect networked display panels
  - Monitor connection status between display panels
- An *accounts manager* enabling users to,
  - Add/delete user email accounts
  - Assign add/move/archive /delete email rights to users
  - Set up and organise archive (add/delete folders)
- An *email client* enabling users to,
  - Retrieve email from user accounts
  - Move email to named display panels on the network
  - Move opened mail to archive
  - Move unopened or opened mail to trash
- A *database*
  - Store accounts data
  - Store emails from user accounts

Modeling Requirements

- With user and system requirements in hand it becomes possible to start modeling solutions
  - Much more on modelling in later lectures



Learning Outcomes

- If we are to develop appropriate solutions we first need to understand the problem
  - We can use ethnography to attend to the activities that are relevant to understanding the problem
  - This requires that we look carefully at the interactional work involved in their accomplishment
  - Examine interactional work to find the work-practices that members use to order that work
  - Use our understanding of work-practice to elaborate the sequential order of activities
  - The result is a real world, real time view on human activity systems
  - This allows you to see the process of work, the collaborations involved, the products produced at each stage, and the resources they rely on
  - In turn, this provides a precise specification of the problem
  - Which you can draw upon to define user and system requirements
  - And use to model potential solutions