PACT
People, Activity, Context and Technology

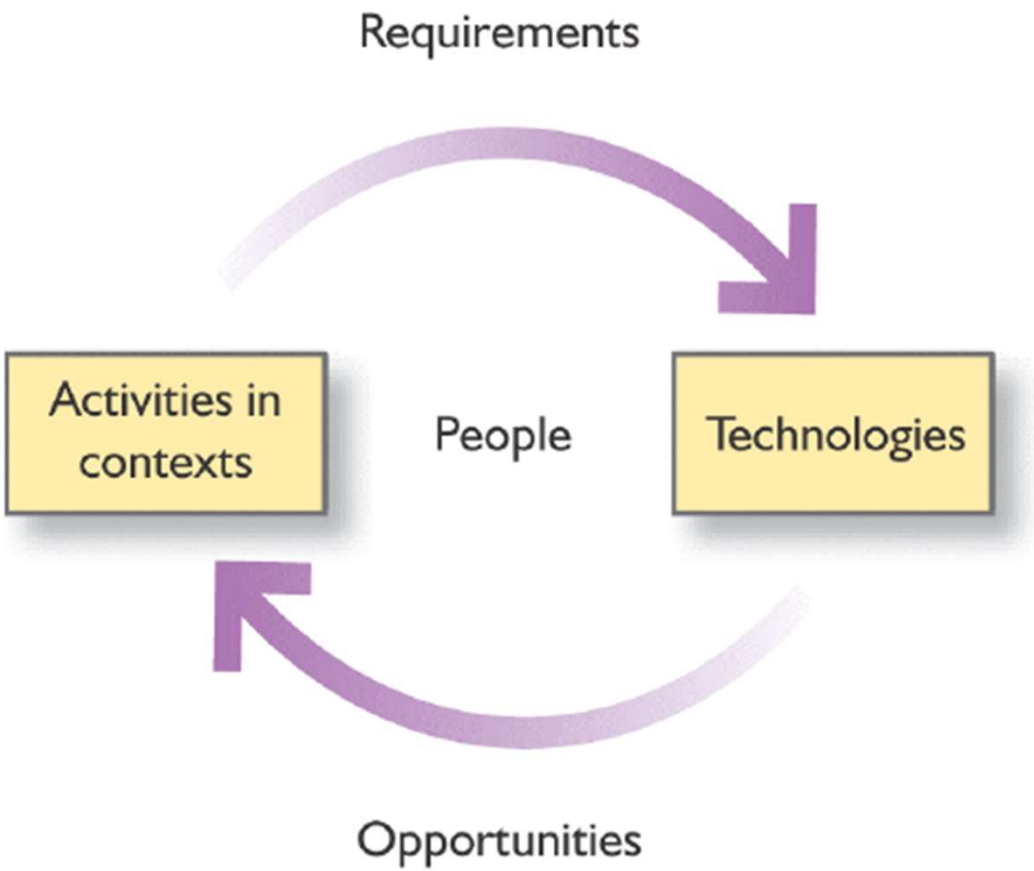
Dr. Ayman Ezzat

Spring 2024

PACT

- *People* undertake *activities*, in *contexts* using *technologies*.
- A student uses a phone to send a text message whilst sitting on a bus
- Air traffic controllers work together using computers and flight strips to ensure smooth running of an airport in the air traffic control center.
- • A 70-year-old woman presses various buttons to set the intruder alarm in her house.
- It is the variety in each of the PACT elements and their combination that makes interactive systems design so challenging and interesting.

Activities and Technology



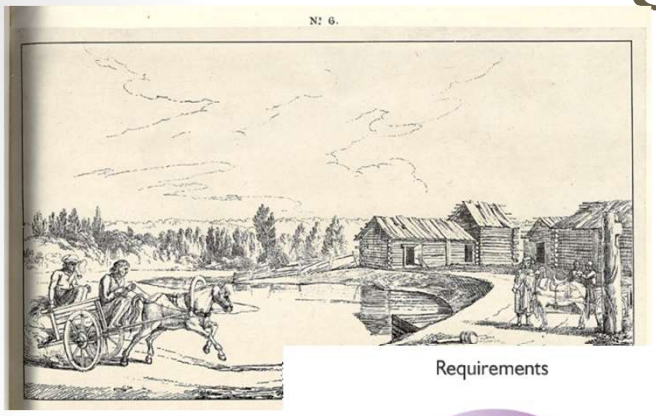
Activities and technologies.

Source: after Carroll (2002), Figure 3.1, p. 68.

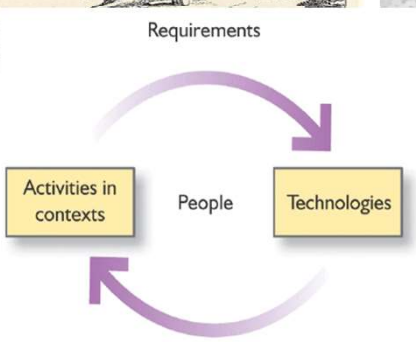
Activity technology loops

- **Activities** (and the **contexts** in which they occur) establish **requirements** for technologies
- **Technologies** offer **opportunities** to undertake activities in different ways
- Designers try to design technologies within some domain (a 'sphere of activity') to meet **people**'s requirements
- …. But in designing some technology (which may be hardware, or software, or both), they change people's activities.

Technology change activity



Source: courte



Source: courtesy of Motorola.

Source: Nokia 9500 Communicator. Courtesy of Nokia.

Film Technology change

- **Some changes in film technology**
- Silent films - people originally had a person explaining what was going on and a piano player for music
- Main stream cinema - popcorn, surround sound, huge screen, more immersive experience
- VCR - insert film and it plays! Simple, effective.
- DVD - more variety in selecting scenes, better quality (but sometimes jerky).
- YouTube (Video on Demand)
- NetFlix (Profiled recommended videos)

PACT

- People
- Activity
- Context
- Technology

People

- Physical differences
- – Height, weight, different capabilities in sight, hearing, touch,…
- Psychological differences
- – Different ways of working; different memory abilities, spatial ability; different amounts of attention at different times; ability to recognize things or remember things. Different ‘mental models’
- Usage differences
- – Experts versus novices, discretionary (Experts) users of technologies, differences in designing for a heterogeneous group or a homogeneous group

Physical Difference

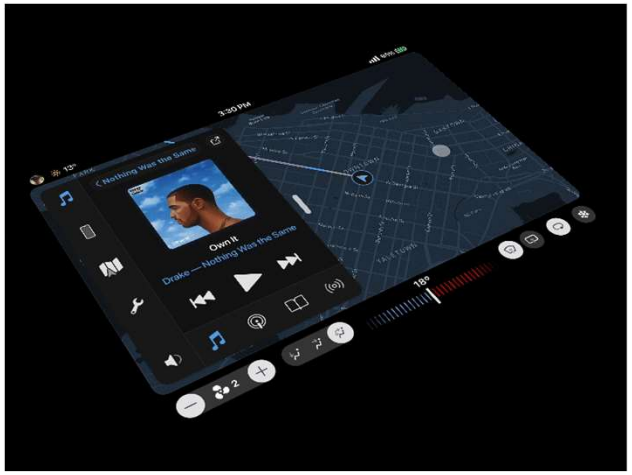
Blind Access your website

Weight issues

https://omi.uk/care/mobii-interactive-table-floor/

Psychological differences

- What is TUI ? Short Term memory
- What is Web usability standards ? Long term memory



- Attention times

- Mental models

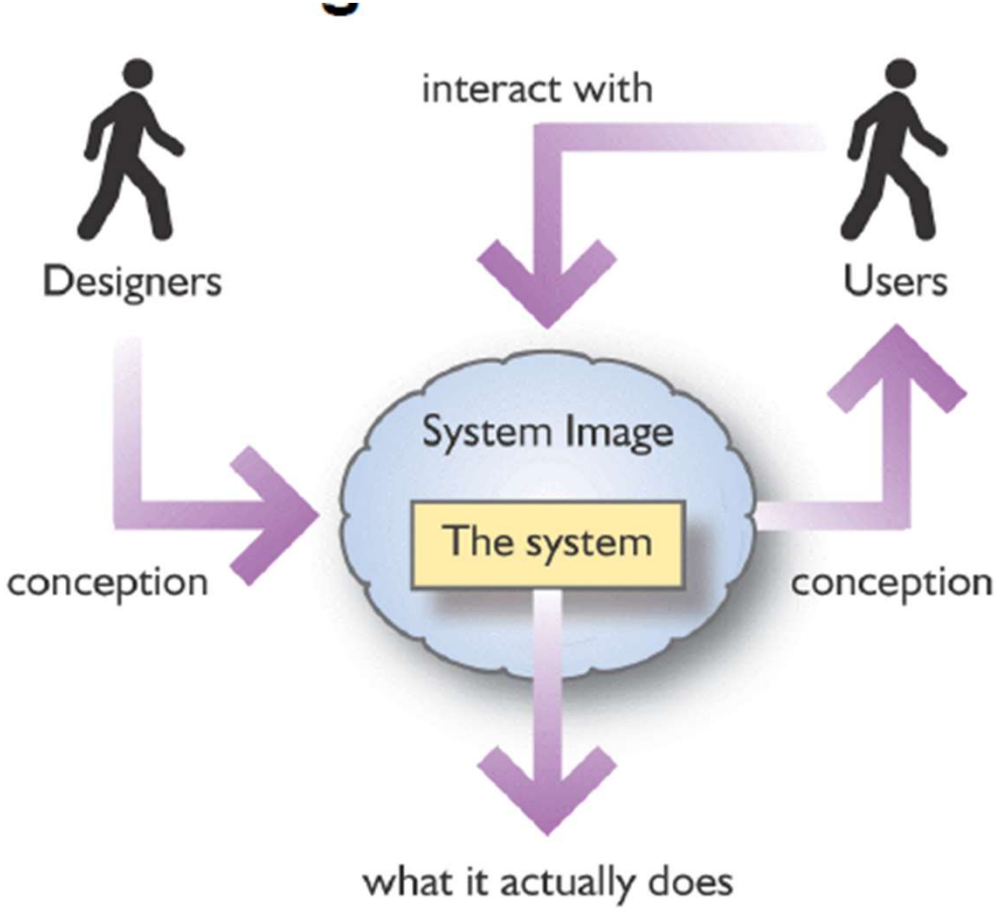
Psychological differences

- Differences in perception and attention
- Differences in memory - short term and long term
- Differences in mental models of things

Mental Model

- Also known as conceptual models…
- …mental models describe the ways in which we think about things - about how we conceptualize things.
- a key aspect of the design of technologies is to provide people with a clear model, … so that they will develop a clear mental model
- … but of course that depends on what they know already, their background, experiences, etc. etc.

Creating Mental Model

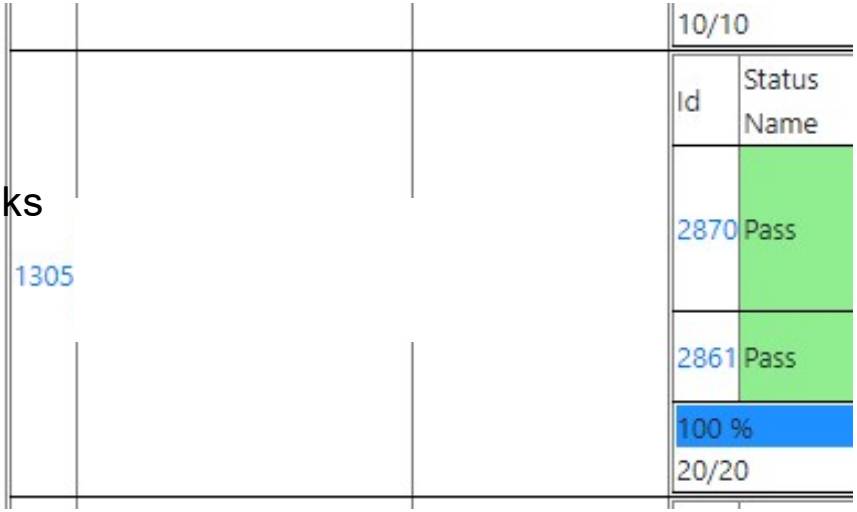


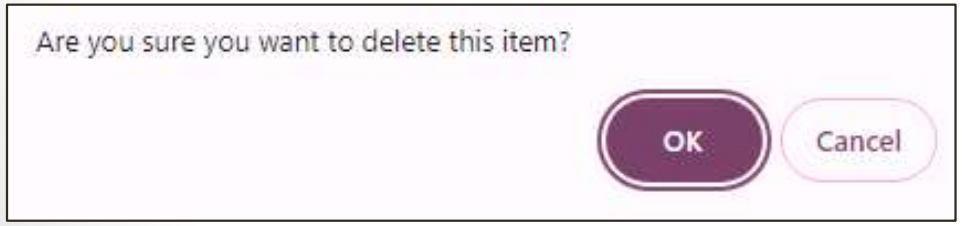
How this affect interface

- Given the following interface
- What this id means, BTW it is clickable !!!!

User Mental model
Clicking id will show some details probably
Mental model: comes from everyday use of hyper links

Designer understand what is this





Mental models

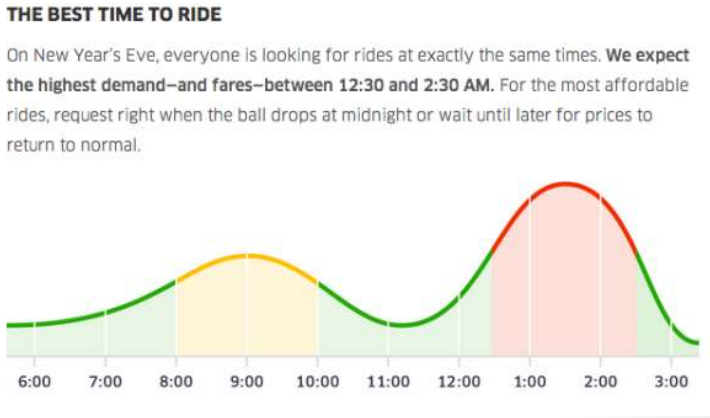
- Designers have a conceptual model.
- So does each user, based on interaction with the system.
- The system image results from the physical structure that has been built (including documentation, instructions and labels).
- The designer expects the user's model to be identical to his. However, the designer does not talk directly with the user.
- All communication takes place through the system image.
- if the system image does not make the designer's model clear and consistent then the user will end up with the wrong model.

Activities

- Temporal aspects
- – To do with timing, frequency etc.
- Co-operation and Complexity
- – Working with others or not
- Safety critical
- – What problems happen if something goes wrong?
- Content
- – What information and media are we dealing with?

Temporal aspects

- How regular or in**frequent** are the activities?
- – E.g. making a call on a phone vs. changing the battery
- – Searching the Web versus working on an Excel spreadsheet
- - Adding new **status/post on Facebook** versus **locking profile**.
- **Busy times** versus quiet times
- **Continuous** set of actions, or can be interrupted?
- – Designing so that people can ‘find their place’ again after an interruption

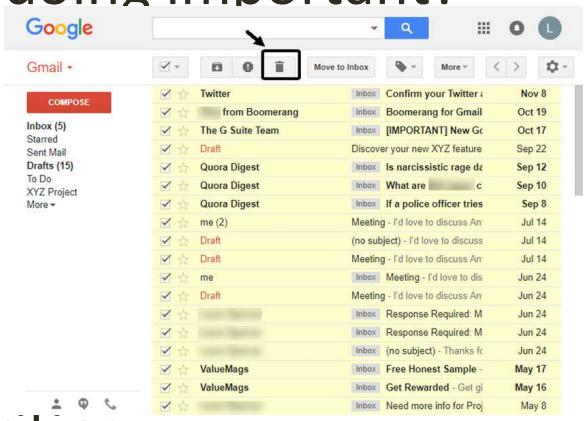


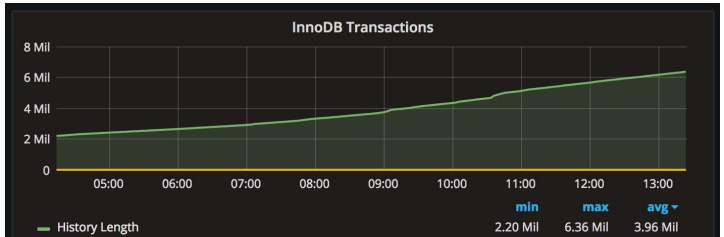
Temporal aspect and design

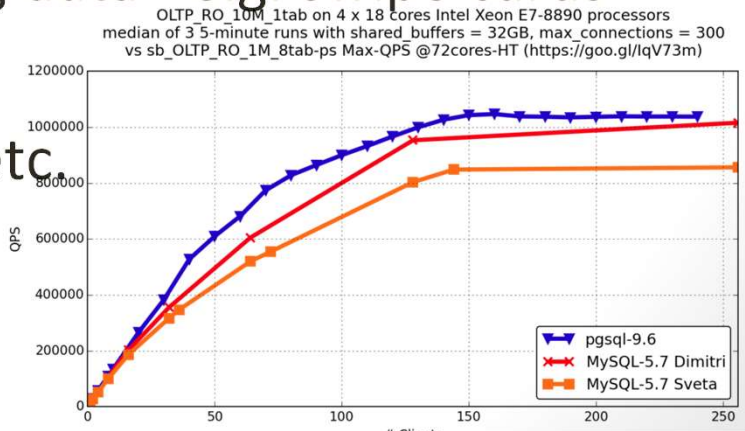
- Response time from the system
- – 100 ms for hand-eye coordination activity
- – 1 second for cause-effect activity
- – Over 5 seconds and people quickly get frustrated

More Characteristics of Activities

- **More characteristics of activities**
- **Co-operative** or not?
- – Is awareness of others and what they are doing important?
- **Are they well-defined or vague**?
- – Browsing versus doing something clear.
- **Safety-critical issues**
- **Data requirements**
- – Large amounts of alphabetic data - e.g. writing
- – Small amounts of static, unchanging data - e.g. swipe cards
- **Media requirements**
- – Need for video, text, color, sound, etc.







Context

- ‘Context’ sometimes means things that surround an activity and sometimes what glues an activity together
- Physical environment is one sort of context
- – ATM or ticket machine versus computer at home
- Social context is important
- – Help from others, acceptability of certain designs
- Organizational context
- – Power structure, changes in life style, de-skilling, etc.

Ubiquitous Computing and Context

Technology

- Hardware and software to consider
- • Input
- – How to enter data and commands into the system.
- Suitability of medium for different contexts/activities
- • Output
- – Characteristics of displays - ‘streamy’ media versus

‘chunky’ media. Characteristics of the content. Also feedback is important

Different Technology

- Communication
- – Between person and technology. Bandwidth, speed. communication between devices
- • Content
- – Functional systems versus systems more focused on content

PACT - Example 1

- **Example: designing a ticket machine**
- • South Kensington station is introducing a new system
- of automatic barriers and ticket machines. What are
- the characteristics of buying a ticket?
- – Regular/infrequent? Peaks and troughs; interruptible?
- Response time; co-operation? Vague/well-defined?
- Safety critical? Errors? Data requirements; media
- • What mental model would you want to engender in
- people. How would you design for this?

Example 1- Cont.

- Taking into consideration the contexts of use, the
- activities and the people. What technology will
- you design for the new ticket machines? Consider
- • Input
- • Output
- • Communication
- • Content

Ticket Machine ideas

- **Input** - need to specify destination, need to
- provide payment, need to specify ticket type
- – Press button (depending how many stations). Have touch screen (gets greasy). Pay by mobile phone?

- **Output** - need to specify options, need to
- provide a ticket, need to say when complete.
- – Ticket could be electronic or paper. Printing
- facility needed. Options as buttons, or menu items? Need to provide change
- **Communication** - must be simple. Could be Bluetooth. Probably button presses are easiest
- • Content - need to specify stations, but it could have lots of local information. Help with travel planning?

PACT Analysis

- Undertaking a PACT analysis is a useful starting point for design…
- • Useful for both analysis and design
- • Understanding the current situation
- • Seeing where possible improvements can be made
- • Envisioning future situations
- • To do a PACT analysis, scope the variety of the Ps, As, Cs and Ts in the particular domain

Steps for PACT

- **Doing a PACT analysis**
- • How to identify the range of PACT elements in a domain?
- • **Brainstorming**
- A group of you get together and talk through ideas and possibilities
- Do not dismiss ideas at first - anything goes! Do not put other people's ideas down
- After you have a set of possibilities go through and weed out the more ridiculous ones
- • **Envisioning** ideas (making ideas visible)
- – Draw pictures, sketches, cartoons, cut out pictures from
- magazines and stick them on a board, etc.
- • Work with **relevant** people
- – Workshops, interviews, observations
- • Write up as **scenarios**

Scenario

- Scenarios are stories about people undertaking activities using technologies in contexts
- • Develop conceptual scenarios that cover the main activities that the technology has to support
- • Develop concrete versions of these for specific designs of the technology
- • For example - a **conceptual** scenario might say ‘Pete logs onto the computer’
- • And a **concrete** version might be ‘Pete clicks on the “log on” icon’

Example of Conceptual Sc.

- Bart Simpson has grown up a bit, and he has found out from his Dad that there are good jobs in Nuclear Safety at the plant, but he will need a qualification. He is **going to study** partly at home and partly at the plant.
- Homer has been asked to run this course, and decided to produce some of the training material. He goes to the Nuclear Safety Inspectorates web site **and grabs a load of Learning** Objects that seem to be about Nuclear safety. He rejects those that seem irrelevant to the jobs that Bart is likely to do initially.
- Its important that the NSI Learning Objects repository has enough information to select the appropriate Learning Objects, and that Homer (with years of experience in Nuclear Safety)

Concrete Scenario

- Andy decides to ring a friend for whom he already
- has the number in his (paper) address book.
- 1. Andy looks up the phone number in his address book.
- 2. He dials the number into the phone.
- 3. The digits appear on the phone display.
- 3. He presses ‘YES’.
- 4. The phone display says ‘calling’.
- 5. A few seconds later it says ‘connected’.
- 6. Andy talks to his friend.
- 7. When they finish talking Andy presses ‘NO’ to finish the
- call.

Persona

- **Personas**
- • A Persona is a profile of an archetypical person in the domain
- • Personas are synthesized from knowledge of real people in the domain
- • Personas need to have goals - describe what they are trying to achieve
- • Like scenarios, conceptual personas are abstract types - students, lecturers, etc.
- • For design it is best to develop a few concrete personas who have hard characteristics such as age, interests, a name, etc.
- • Try to bring the character alive - perhaps include a picture or two

Persona Example

- **Persona: Rhonda Wilson, Nurse Unit Coordinator**
- Rhonda is a 36-year-old registered nurse who has worked at several skilled nursing facilities. She started out in acute care but moved to long-term care so she could have more autonomy. Rhonda was promoted to Unit Coordinator four years ago because she is very competent and generally well organized.
- Rhonda is entirely overwhelmed and is drowning in paper, even more so than the average nurse. She often misses eating dinner with her boyfriend because she has to work late, filling out forms and reports.

Goal

- Rhonda's goals are to:
- • Spend time on patient care and staff supervision, not paperwork.
- • Be proactive. Rhonda needs to understand trends in order to solve problems before they happen, instead of just reacting to crises.
- • Know that things are being done right. Rhonda supervises the unit because she's good at what she does. If nurses aren't following procedure or documenting things, she wants to know right away.

PACT Example 2 (Stop)

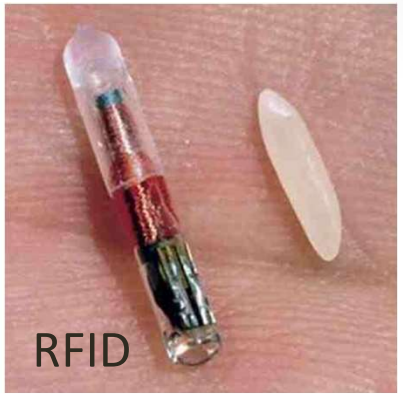
- Egyptian National Museum
- Waiting to reserve tickets
- Lost guidance
- Meeting Points
- Sufficient touristic information.
- Childs get board.
- Favorite interests

- Write scenarios for people who visited the Museum
- Conduct PACT analysis

PACT MUSUEM Ideas

Floor Projector

AR



RFID

QR Codes

Audio Guiding

PACT Analysis Museum

People	Activity	Context	Technology
Age: 20~25 and Elderly	Walking	Location change	Pocket Projectors
Professional: Expert, Novice	Reading Information	Time	Indoor BT locators
Affiliation: Professor, Doctor		Identity	
Persona: Reduce time, Reduce Cost			
Mental Model:			
Physical aspects: Long term memory, Blind, Deaf			

So Is my PACT correct

- There is no answer for any of the clues you choose unless you have some primitive user feedback.
- Any idea must have either direct reference or some related work. (Academic work Motivation)
- Or
- Some people need appears to request your idea. (Market need motivation)

For **academic** work search in http://portal.acm.org, UIST and CHI.

For **Market** need conduct **Surveys**.

Market need Surveys

- Survey can assist your clue about your problems in different aspects
  - You can highlight main domain your app target
  - You can focus on some groups of users
  - You can answer questions vague or has no clear references in your mind
  - It will solve a lot of issues and argues, debates between you and your team members.

PACT Project Example

- A group of students decided to make a system with Augmented reality.
- They are puzzled in which domain to select, they have some ideas like
- Child Education
- University Labs
- Chemistry
- Electronics
- Health care
- …etc

Survey bad Questions

- Q1 An augmented reality app to be developed which domain you prefer ?
- What is wrong here ?
  - What is AR ?
  - Why this domain I should choose !
- Q2 AR will be used in Chemistry LABS which age is suitable
  - 10
  - 15 ~20
- What is wrong here ?
  - Biased Question about Chemistry
  - Answers are not equivalent in range
- Q3 Do you like to have AR application on mobile
  - Yes / NO
- What is wrong here ?
  - You give no choice to group the answers of candidate

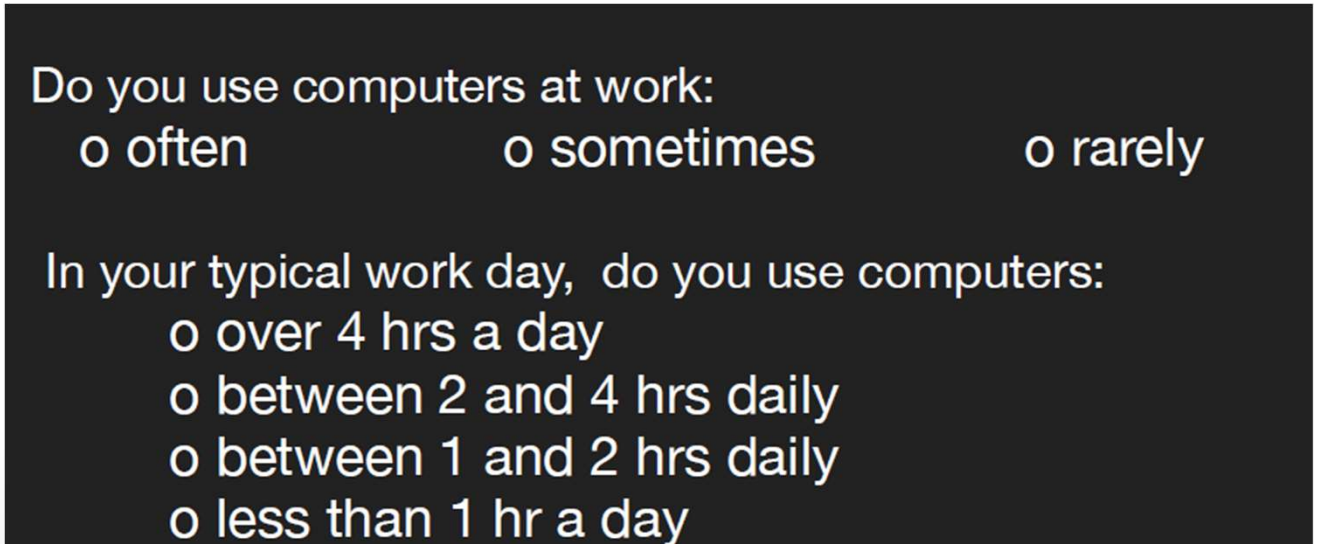
Some tips for Surveys

- In HCI we don't like the **open-ended** question like
- Source: http://groups.cs.umass.edu/nmahyar/

Can you suggest any improvements to the interface?

Good for general subjective information, But difficult to **analyse** rigorously

Closed questions easy to analyse but must be specific



Some tips for Surveys

- Gets specific response, but allows room for user's
- opinion

Rank the usefulness of these methods of issuing a command
(1 most useful, 2 next most useful..., 0 if not used)

__2__ command line
__1__ menu selection
__3__ control key accelerator

- Respondent offered a choice of *explicit responses*

How do you most often get help with the system? (tick one)

- ✓ on-line manual
- O paper manual
- O ask a colleague

Which types of software have you used? (tick all that apply)

- ✓ word processor
- O data base
- O spreadsheet
- ✓ compiler

Be considerate of your respondents
and the context you access them in

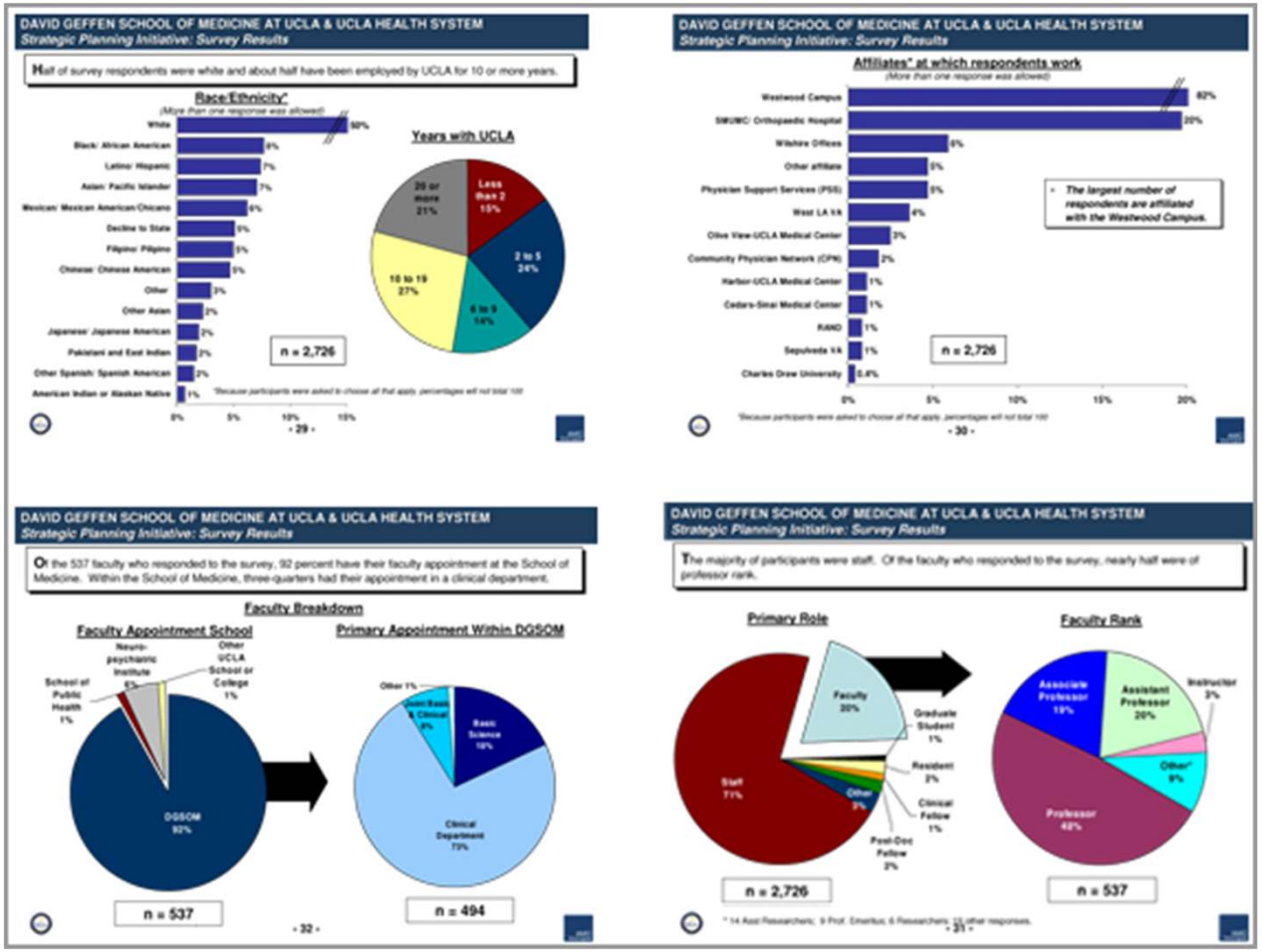
- Questionnaire length (short is good)
  - Think in terms of reasonable completion times
  - Do not ask questions whose answers you will not use!
- Privacy invasions/anonymity
  - Be careful how / what you ask
- Motivation
  - Why should the respondent bother?
  - Usually need to offer something in return
- Ability
  - Limitations like literacy and disability can come into play

Survey Questions

- You must ask about the demographics of the candidate (age, Gender, Specialty, Computer aware or not..etc.)
- Never ask direct questions
- Always rely on Multiple choices to your answer.
- Do not be biased towards some opinion
- Always illustrate the keywords and you idea in simple language
- Put some question to measure if the user is well understanding your technology or not.
- Example
- How do you rate the dangerous of doing chemical experiments in school
- Weak Strong
- ○○○○○○○○○○

Results

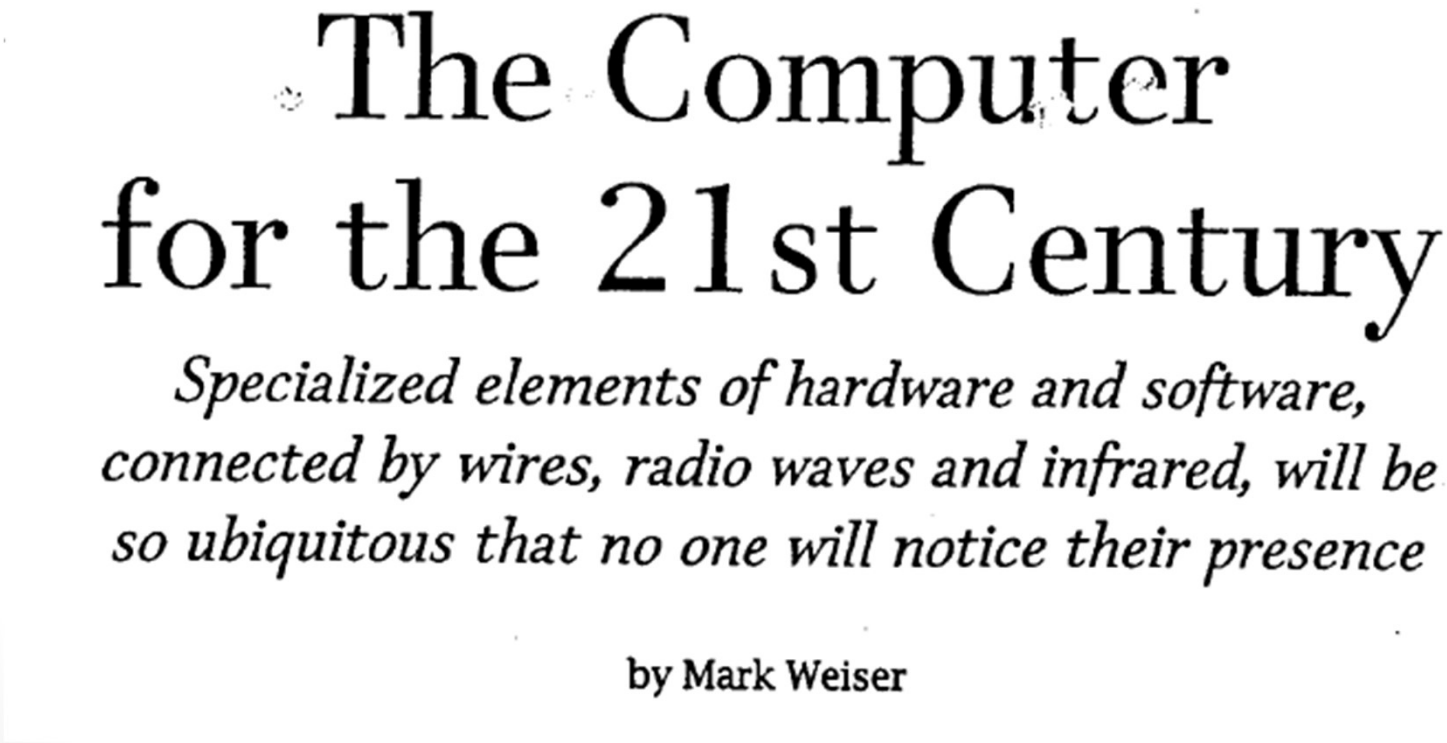
- Use graphs as much as possible



http://strategy.healthsciences.ucla.edu/images/surveyResults.jpg

Assignment

- Read Mark Weiser Paper and summarize it in 1 A4 page using IEEE LATEX template



The Computer for the 21st Century

Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence

by Mark Weiser