

**BIT 2<sup>nd</sup> Year**

**Semester 3**

**IT 3405**

**User Interface Design**  
**Chapter 5 - PACT Analysis**

# INTENDED LEARNING OUTCOMES

- Identify the importance of PACT framework
- Describe the relationships among people, activities, context and technologies

# Sub Topics

- 5.1. PACT Framework for design feasibility
- 5.2. PACT component
  - i. People
  - ii. Activities
  - iii. Context
  - iv. Technologies

# 5.1. PACT FRAMEWORK FOR DESIGN FEASIBILITY

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User Interface Design (UID)



# What Designers need to concern

An essential part of the design approach is to “**put people first**” (“be people-centered”)

Analyze the proposed product with respect to people and how they will use it

Designers need to understand/concern followings in advance

- people who will use their systems and products
- activities that people want to undertake
- contexts in which those activities take place
- features of interactive technologies
- Way to approach designing interactive systems

# PACT Framework

**PACT (People, Activities, Contexts, Technologies) is a useful framework for thinking about a design of a proposed product in different aspects**

People use technologies to undertake activities in contexts.

Example:

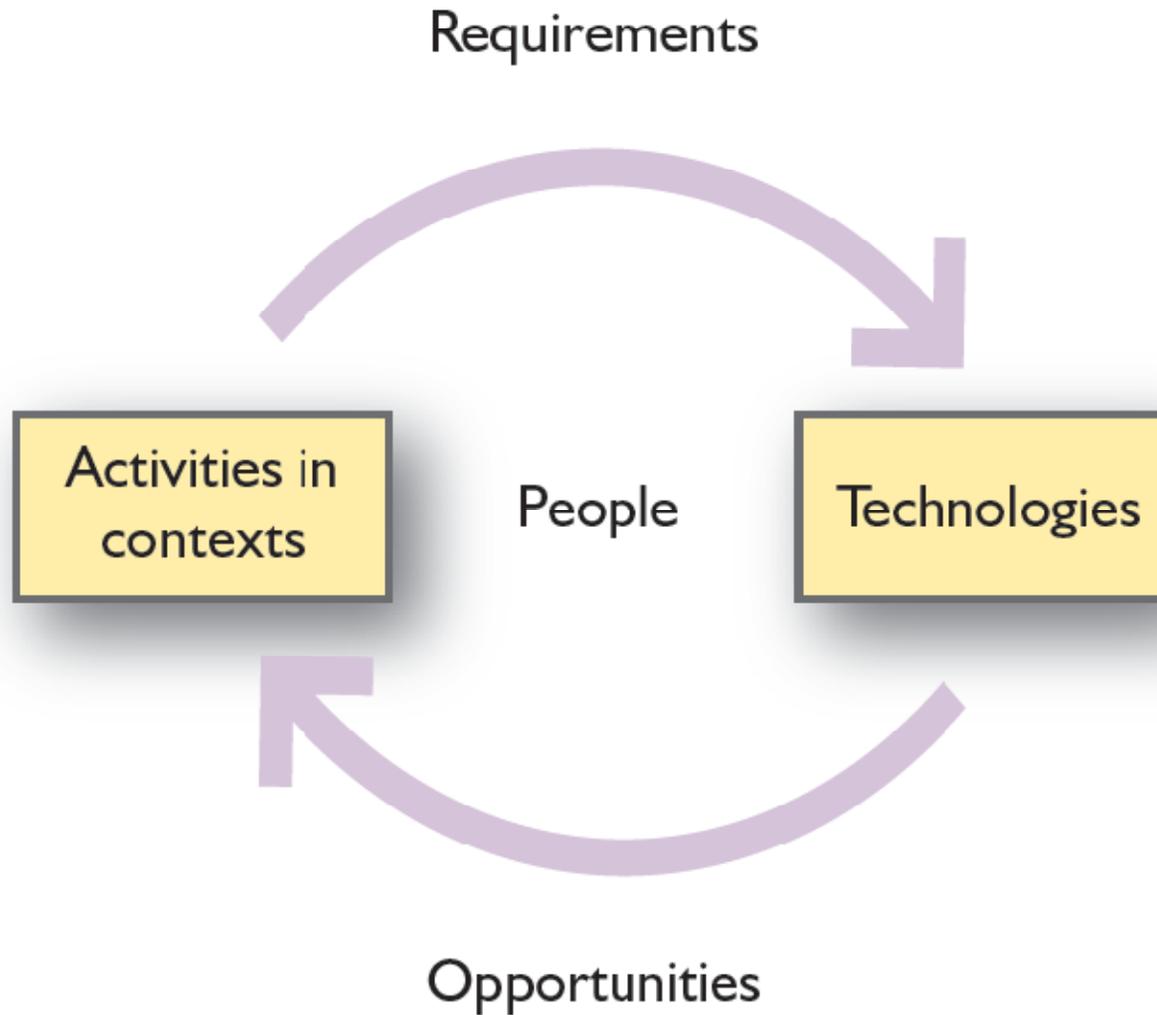
You may use a phone to talk to a friend to inform about something

- Consider Situation 1 - at Home (land phone, speak loudly, may take more time, ....)
- Consider Situation 2 - traveling in public transport (mobile phone, speak softly, if sensitive will excuse, ....)

# Activities and Technologies

- Technologies are there to support a wide range of people undertaking various activities in different contexts.
  - Same activity is provided in different technologies in different ways
- If the technology is changed then the nature of the activities will also change
  - Camera phone and mobile upload
- Activities (and the contexts within which they take place) establish requirements for technologies that in turn offer opportunities that change the nature of activities.
  - Taking photos from mobile

Cyclic Relationships between technology and activities  
People and context - force behind this relationship



# The Cycle continues

the cycle continues as the changed activity results in new requirements for technologies and so on.

Need to keep this cycle in mind as designers attempt to understand & design for some domain.

Eg: As personal computers have become more common, the domain of e-mail has changed.

- Originally e-mail was all in text only.
- Now it is in full colour with pictures and video embedded.
- Other items can be attached to e-mails easily.
- Emails could be tagged with respect to time, location, people, activities, ....

# PACT Analysis

PACT framework help to carry out the PACT analysis methodically

Facilitate the designers to understand many aspects before rushing to a particular design

Help to select the most suitable alternative design

Develop successful products

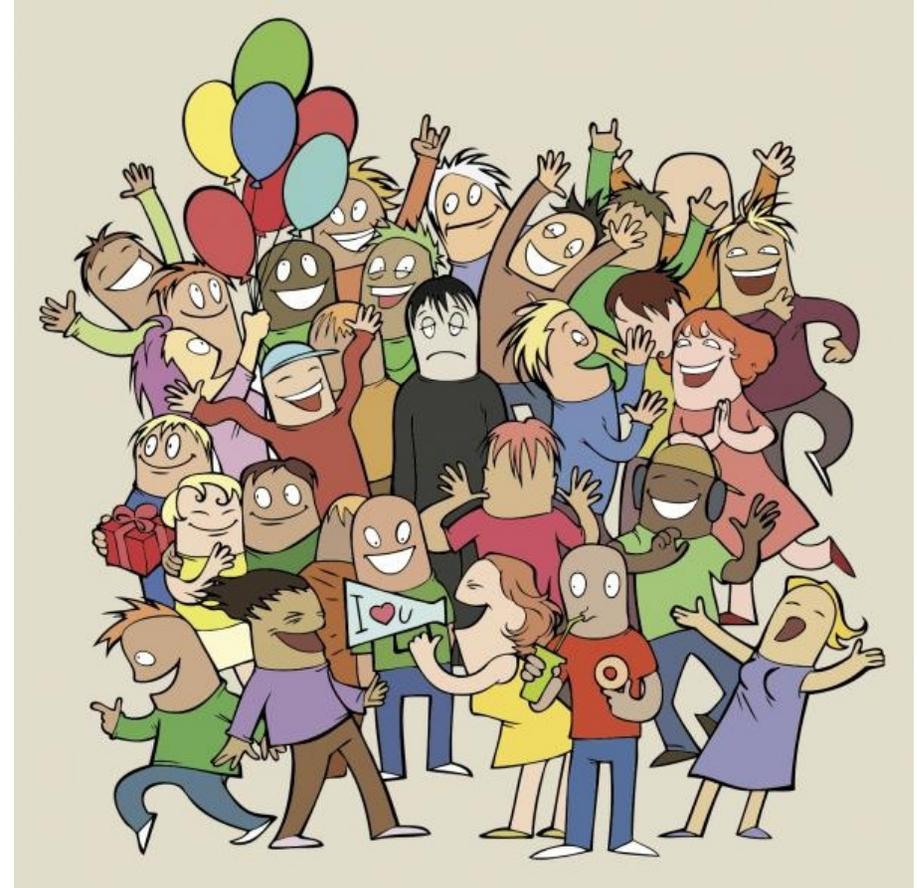
# 5.2.

## PACT COMPONENT: PEOPLE

# People

People differ from one another in a variety of ways.

- Physical differences
- Psychological differences
- Social Differences



# Physical differences

Physical differences have a huge effect on **how accessible, how usable and how enjoyable** using a technology will be for people in different contexts.

- Main Physical characteristics such as height and weight
- Variability in the five senses -
  - sight
  - hearing
  - touch
  - smell
  - taste



# Psychological differences

- Psychologically, people differ in a variety of ways.
- For example, people with good spatial ability will find it much easier to find their way around and remember than those with poor ability.
- Designers should design for people with poor ability by providing good signage and clear directions.



# Individual Differences

There are often large differences in the psychological abilities of people.

- Some people have a good memory, others less so.
- Some people can find their way around environments better than others, or mentally rotate objects more quickly and accurately.
- Some are good at words, others are good at numbers.
- There are differences in personality, emotional make-up and ability to work under stress.



## Psychological tests

- Many tests have been designed to measure these differences.
- For example the Myers-Brigg Type Indicator is a series of tests that results in people being classified as one of 16 personality types

<http://www.16personalities.com/free-personality-test>

- Designers need to consider the range of differences between people and the demands that their designs make on people's psychological abilities.

# Social differences

People make use of systems, products and services for very different reasons.

They have different goals in using systems.

They have different motivations for using systems.

Some people will be very interested in a particular system, others will just want to get a simple task completed.

These motivations change at different times.

e.g. Two people may use a smart phone in two different ways

# Novice and experts

- Novice and expert users of a technology will typically have very different levels of knowledge and hence requirements for design features.
- Experts use a system regularly and learn all sorts of details, whereas a beginner will need to be guided through an interaction.
- There are also people who do not have to use a system, but the designer would like to experiment the the system with them. These people are often quickly put off if things are difficult to do.
  - Designers need to entice these people to use their systems.

## Similarity between people

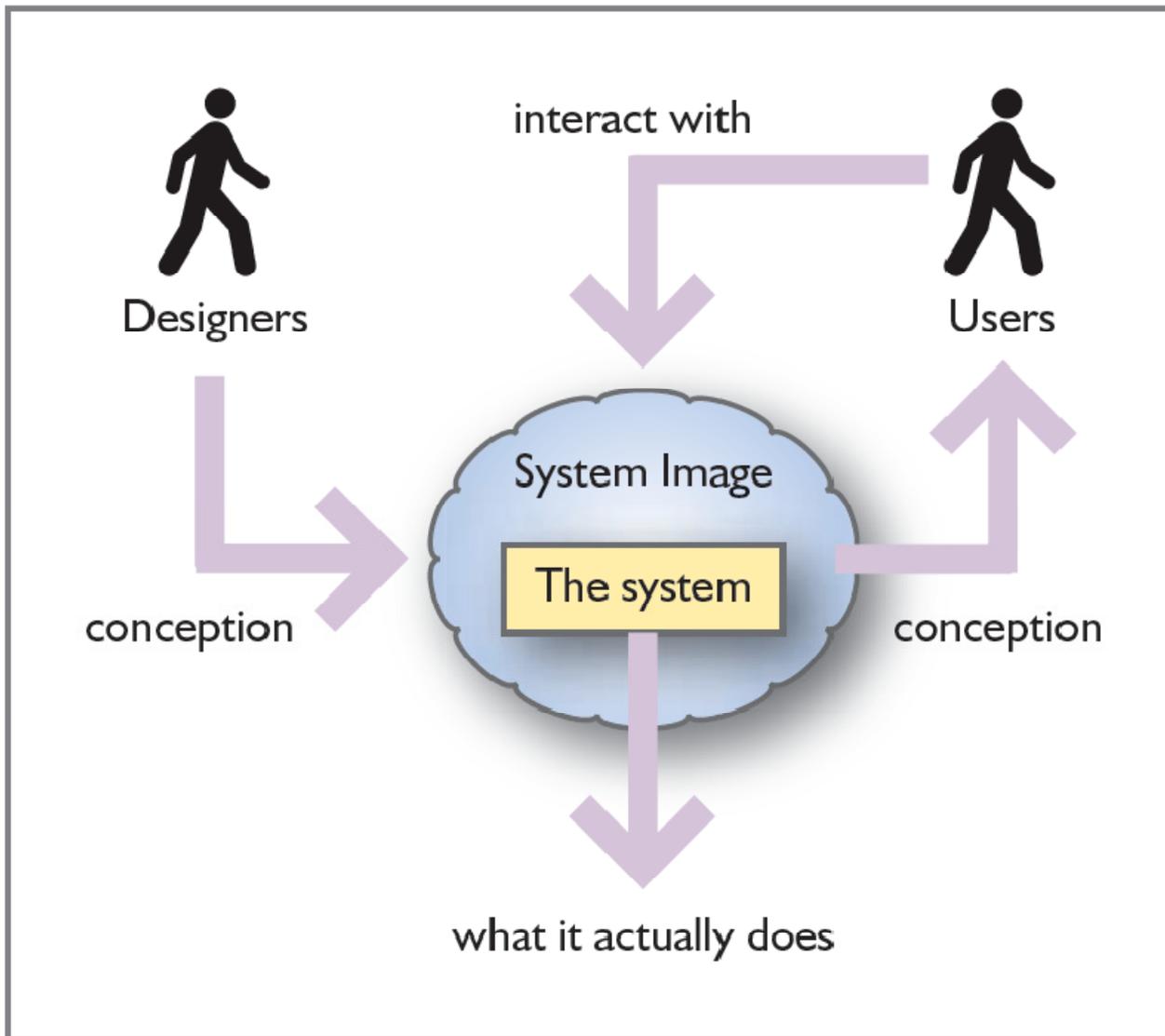
- Designing for homogeneous groups of people (groups who are broadly similar and want to do much the same things) is quite different from designing for heterogeneous groups.
- Websites have to cater for heterogeneous groups and have particular design concerns as a result.

# Mental models

- The understanding and knowledge that we possess of something is often referred to as a ‘mental model’.
- If people do not have a good mental model of something, they can only perform limited actions.
- If something goes wrong they will not know why and will not be able to recover.
- A key design principle is to design things so that people will form correct and useful mental models of how they work and what they do.

# Developing a mental model

- People develop mental models through
  - interacting with systems,
  - observing the relationship between their actions and the behaviours of the system
  - reading any manuals or other forms of explanation that come with a system.
- it is important that designers provide sufficient information in the interface (and any accompanying documentation) for people to form an accurate mental model.



# The mental model problem

- Designers have some conception of the system they have produced.
- This may or may not be the same as what the system actually does.
- In a system of any large size, no single designer will know everything that the system does.
- Designers design a system's image that they hope will reveal the designer's conception.
- People interact with the system image and from this have to derive their conception (their 'mental model') of what the system is and what it does.

# 5.2.

## PACT COMPONENT: ACTIVITIES

# Activities and their Characteristics

- An activity will be a series of actions the user may carry out in order to achieve a particular objective
- A task may consist of several activities. Some tasks will be simple, others will be complex.
- Design should assess these activities with respect to different characteristics to understand them
- The main features of activities are:
  - Temporal aspects
  - Cooperation
  - Complexity
  - Safety-critical
  - The nature of the content

# Temporal aspects of activities

- Temporal aspects covers how regular or infrequent activities are
- Something that is undertaken every day can have a very different design from something that happens only once a year.
- E.g. People will quickly learn how to make calls using a mobile phones, but may have great difficulties when it comes to changing the battery.
- Designers should ensure that frequent tasks are easy to do, but they also need to ensure that infrequent tasks are easy to learn (or remember) how to do

## More about temporal aspects

- If people are interrupted when undertaking some activity, the design needs to ensure that they can '*find their place*' again and pick up.
- It is important to ensure that people do not make mistakes or leave important steps out of some activity.
- The response time needed from the system must be considered.
- As a general rule people expect a response time of about
  - 100 milliseconds for hand-eye coordination activities and
  - one second for a cause-effect relationship such as clicking a button and something happening.
  - **Anything more than 5 seconds will make them feel frustrated and confused (Dix, 2003).**

# Cooperative or complex activities

- Another important feature of activities is whether they can be carried out alone or whether they are essentially concerned with working with others.
- Issues of awareness of others and communication and coordination then become important.
- Well-defined tasks need different designs from more vague tasks.
- If a task or activity is well defined it can be accomplished with a simple step-by-step design.
- A vague activity means that people have to be able to
  - browse around
  - see different types of information
  - move from one thing to another and so on.

# Safety-critical activities

- Some activities are ‘safety-critical’, in which any mistake could result in an injury or a serious accident. Others are less so.
- Clearly where safety is involved designers must pay every attention to ensuring mistakes do not have a serious effect.
- In general it is vital for designers to think about what happens when people make mistakes and errors and to design for such circumstances.

# Data and media requirements

- It is also important to consider the data requirements of the activity.
- If large amounts of alphabetic data have to be input as part of the activity (recording names and addresses, perhaps, or word processing documents) then a keyboard is almost certainly needed.
- In other activities there may be a need to display video or high quality colour graphic displays.
- Some activities, however, require very modest amounts of data, or data that does not change frequently and can make use of other technologies.
- A library, for example, just needs to scan in a bar code or two, so the technology can be designed to exploit this feature of the activity.

# 5.2.

## PACT COMPONENT: CONTEXT

# Contexts

- Activities always happen in a context, so there is a need to analyze the two together
- Three useful types of context are distinguishable:
  - the organizational context
  - the social context
  - the physical circumstances under which the activity takes place
- Context can be a difficult term
- Sometimes it is useful to see context as surrounding an activity
- At other times it can be seen as the features that glue some activities together into a coherent whole

## Example “Withdraw cash from an ATM”

- The physical analysis of context would include
  - the location of the device (often as a ‘hole-in-the-wall’),
  - the effect of sunshine on the readability of the display,
  - security considerations.
- Social considerations would include
  - the time spent on a transaction or the need to queue.
- The organizational context
  - the impact on the bank’s ways of working and its relationships with its customers.
- It is important to consider the range of contexts and environments in which activities could take place.

# 5.2. PACT COMPONENT: TECHNOLOGIES

# Technologies

- Interactive systems typically consist of hardware and software components that communicate with one another and transform some input data into some output data.
- Designers of interactive systems need to understand the materials they work with just as designers in other areas of design such as interior design, jewelry design, etc.

# Classifying Technologies

- Interactive technologies change with all new development. Therefore, it is very difficult to classify technologies as they are continually being packaged in new ways and different combinations facilitate quite different types of interactions.
- Designers need to be aware of various possibilities for
  - input
  - output
  - communication
  - Content
- E.g. The multi-touch screen on an iPod Touch allows for quite different ways of navigating through the music collection and selecting particular tracks than the track wheel on an iPod Nano.

# Scoping a problem with PACT

- The aim of human-centred interactive systems design is to arrive at the best combination of the PACT elements with respect to a particular domain.
- Designers want to get the right mix of technologies to support the activities being undertaken by people in different contexts.
- A PACT analysis is useful for both analysis and design activities:
  - understanding the current situation
  - seeing where possible improvements can be made or
  - envisioning future situations

## PACT Analysis - way to do it

- To do a PACT analysis the designer simply scopes out the variety of Ps, As, Cs and Ts that are possible, or likely, in a domain.
- This can be done using brainstorming and other envisionment techniques and by working with people through observations, interviews and workshops.
- The designer should look for trade-offs between combinations of PACT and think about how these might affect design.

# Designer consideration PACT

- It is most important that designers consider all the various stakeholders in a project.
- For people, designers need to think about the physical, psychological and social differences and how those differences change in different circumstances and over time.
- For activities, they need to think about the complexity of the activity (focused or vague, simple or difficult, few steps or many), the temporal features (frequency, peaks and troughs, continuous or interruptible), cooperative features and the nature of the data.
- For contexts they need to think about the physical, social and organizational setting
- For technologies they need to concentrate on input, output, communication and content.

# PACT example - People

We have been asked by a university department to consider developing a system controlling access to their laboratories. A PACT analysis might include the following.

- Students, lecturers and technicians are the main groups.
- They are all well educated and understand things such as swipe cards, passwords and so on.
- People in wheelchairs need to be considered as well as other design issues such as colour blindness.
- There may be language differences.
- Both visitors and frequent visitors need to be considered.
- However, there are other stakeholders who need access to rooms, such as cleaning staff and security personnel.
- What are the motivations of management for wanting to control access in the first place?

## PACT example - Activities

- The overall purpose of the activity is to enter some form of security clearance and to open the door.
- This is a very well-defined activity that takes place in one step.
- It happens very frequently with peaks at the start of each laboratory session.
- The data to be entered is a simple numeric or alpha-numeric code.
- It is an activity that does not require cooperation with others (though it may be done with others, of course).
- It is not safety-critical, though security is an important aspect.

## PACT example - Contexts

- Physically the activity takes place indoors, but people might be carrying books and other things that makes doing anything complicated quite difficult.
- Socially it may happen in a crowd, but also it may happen late at night when no-one else is about.
- Organizationally, the context is primarily about security and who has access to which rooms and when they can gain access.
- This is likely to be quite a politically charged setting.

## PACT example - Technologies

- A small amount of data has to be entered quickly.
- It must be obvious how to do this to accommodate visitors and people unfamiliar with the system.
- It needs to be accessible by people in wheelchairs.
- The output from the technology needs to be clear: that the security data has been accepted or not and the door has to be opened if the process was successful.
- Communication with a central database may be necessary to validate any data input, but there is little other content in the application.

# Summary

- The design of interactive systems is concerned with people, the activities they are undertaking, the contexts of those activities and the technologies that are used; the PACT elements.
- There is considerable variety in each of these and it is this variety - and all the different combinations that can occur - that makes the design of interactive systems so fascinating.
- People vary in terms of physical characteristics, psychological differences and in their usage of systems
- Activities vary in terms of temporal aspects, whether they involve cooperation, complexity, whether they are safety-critical and the nature of the content they require
- Contexts vary in terms of physical, social, organisational
- Technologies vary in terms of the input, output, communication and content that they support.
- Undertaking a PACT analysis of a situation is a useful way of scoping a design problem.