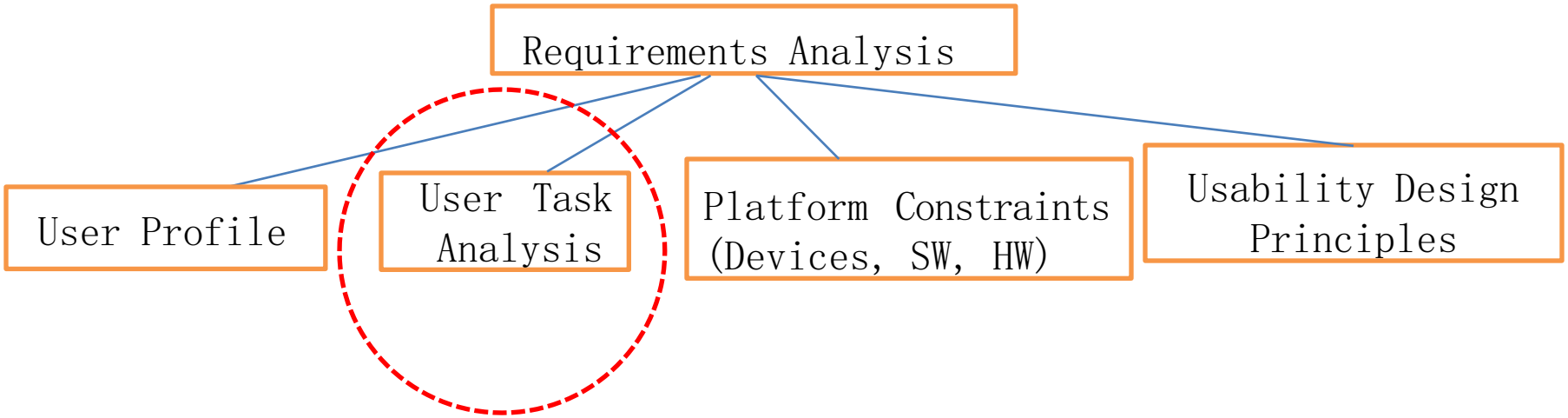
Task Modeling and Analysis:

Hierarchical Task Analysis (HTA)

Task Analysis forms an important part of User Requirements Analysis.



- Task analysis is a study of users, work flow patterns, conceptual frameworks, & sequential execution of interaction with the GUI.

- Task analysis results in an user's mental map of how he / she breaks down 'goals' into a series of smaller tasks & sequences them.

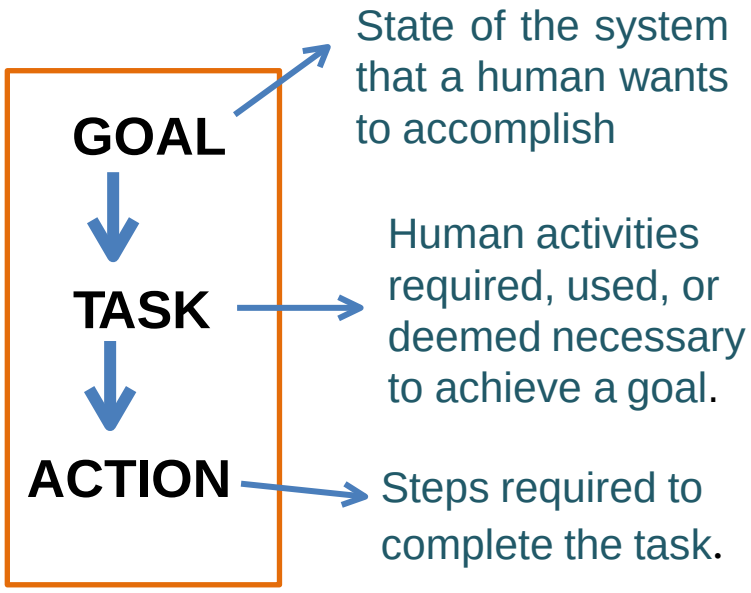
Task analysis focuses on understanding ‘User’

- Users’ goals and how they achieve them
- Personal, social, and cultural characteristics, users bring to their tasks
- Physical environment’s influence on users
- The influence of previous knowledge and experience on: How users think about their work
  The workflow users follow to perform their tasks

What is a ‘TASK’ ?

- A set of human actions that contributes to a functional objective and to the goal of the system.

- **Task analysis defines performance of humans & not computers.**



Task Analysis means understanding User's needs, sequencing them into a series of hierarchical acts (interactions) so as to facilitate the achieving of the goal.

Illustration: Making a phone call

User's need : To communicate with a particular individual
Goal is to inform & seek feedback from that individual in a particular context.
Actions: Putting 'ON' the Phone; dialing the number; communicating; ending the call.

There is a sequence and a hierarchy of actions to be followed.

One cannot go to the next step in making calls unless the previous one is complete.

Task Analysis includes :

- User's goal ; user's need ; user's intentions.
- Understanding user's environment – context of use.
- Planning for the 'actions'

Task analysis has direct implications in software design

Hierarchical Task Analysis is decomposing tasks into subtasks and analyzing the logic of sequence needed to execute the task to achieve the set goal (state) in an optimal way.

Techniques for Analysis

- Task decomposition
  (split tasks into subtasks in sequence)
- Knowledge-based techniques
  (what users need to know)

"A **hierarchy** is an organization of elements that, according to prerequisite relationships, describes the path of experiences a learner must take to achieve any single behavior that appears higher in the hierarchy . (Seels & Glasgow, 1990, p. 94)".

Involves description of tasks in terms of

- Goals(or states) they achieve after execution
- Steps involved
- Relevant contextual information

Task decomposition example
(split tasks into subtasks in sequence)

1. **Task 1**
2. **Task 2 etc.**
3. **Task characteristics (per task)**
4. **Task name**
5. **Task goal/output**
6. **Task steps (Sub Tasks)**
7. **Task frequency**
8. **Task flexibility**
9. **Task dependencies**
10. **Physical and mental demands**
11. **Task output**
12. **Risks resulting from error**
13. **Safety critical demands**

- **HTA provides a consistent logical description of the interdependencies of tasks and therefore forms a rational framework for description of possible user interface architecture based on which a GUI is visualised.**

Example of a decomposition

Task 1: Feed in Address information to order book

Locate the **Full Name** field.
Move the insertion point to the field.

Sub Task 1.1

Type the full name.
Action 1
Locate the **Address Line 1** field.
Action 2
Move the insertion point to the field.
Action 3
Type the address.
Optional: Locate the **Address Line 2** field.
Action 4
Move the insertion point to the field.
Action 5
Type the address.

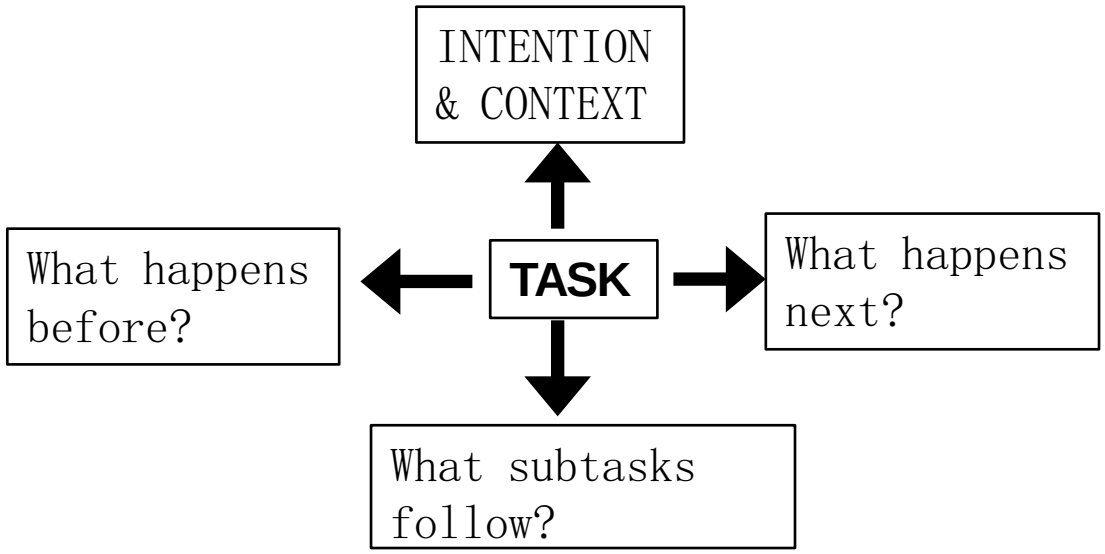
Sub Task 1.2
Locate the **Town/City** field.
Move the insertion point to the field.

Collecting user data for Task Analysis

Starting point for Task analysis is the ‘User’

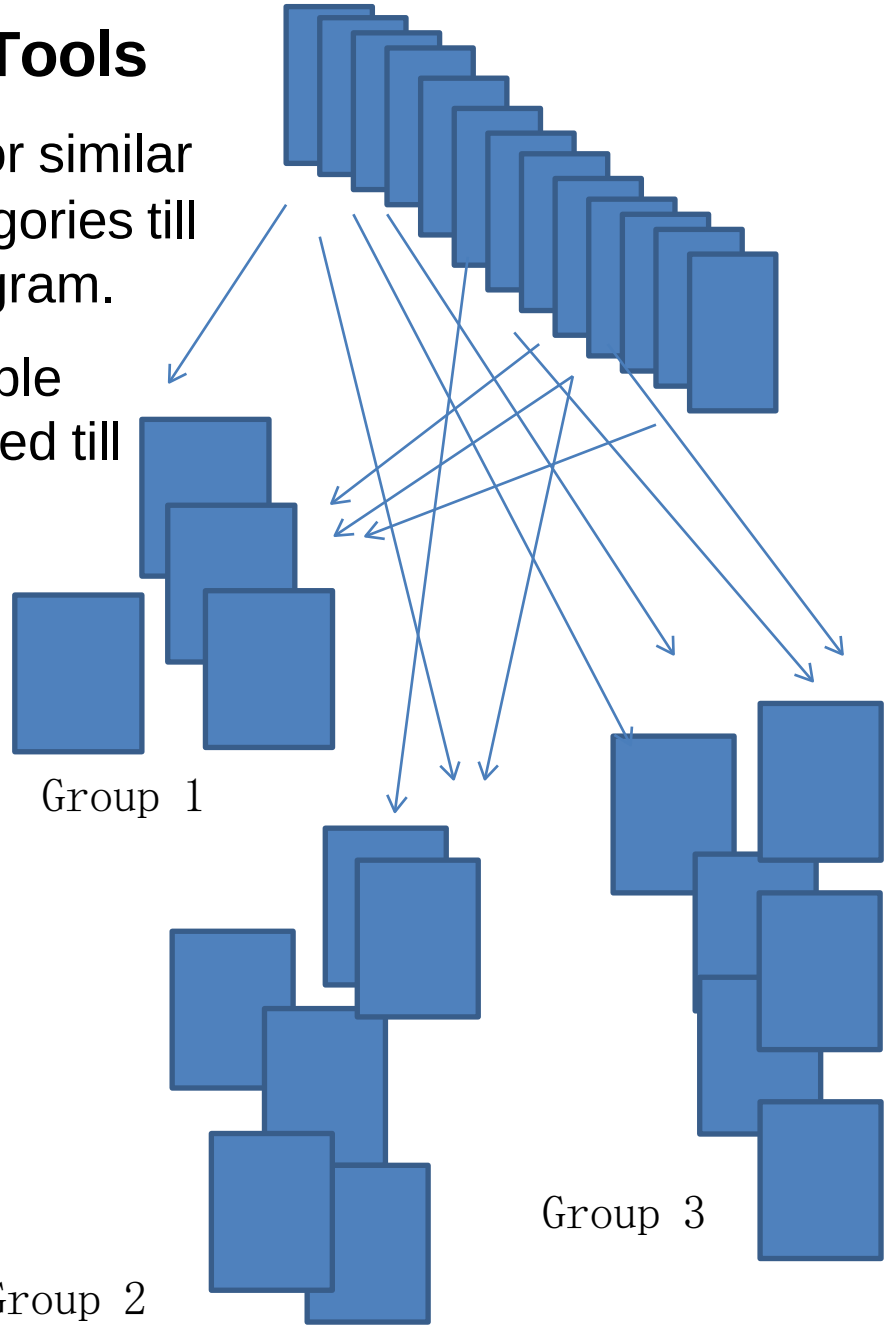
- **Ethnography:** Observing and noting users behavior in the use context
- **Protocol analysis**: Observing and documenting actions of the user by validating user’s mental thinking.
- Make the user *think* to understand the user’s mental model & logic.

- **Interviews**
- **Questionnaires**



Modeling user data for HTA: Tools

- **Affinity Diagrams:** Similar data or similar actions are together grouped into categories till a pattern emerges in the form of a diagram.
- **Stick notes or cards** are used to scribble labels. These are grouped and regrouped till a pattern that shows affinity of different groupings becomes evident.
- The degree of affinity is used while determining hierarchy of actions or hierarchy of information.



Modeling user data for HTA : Tools

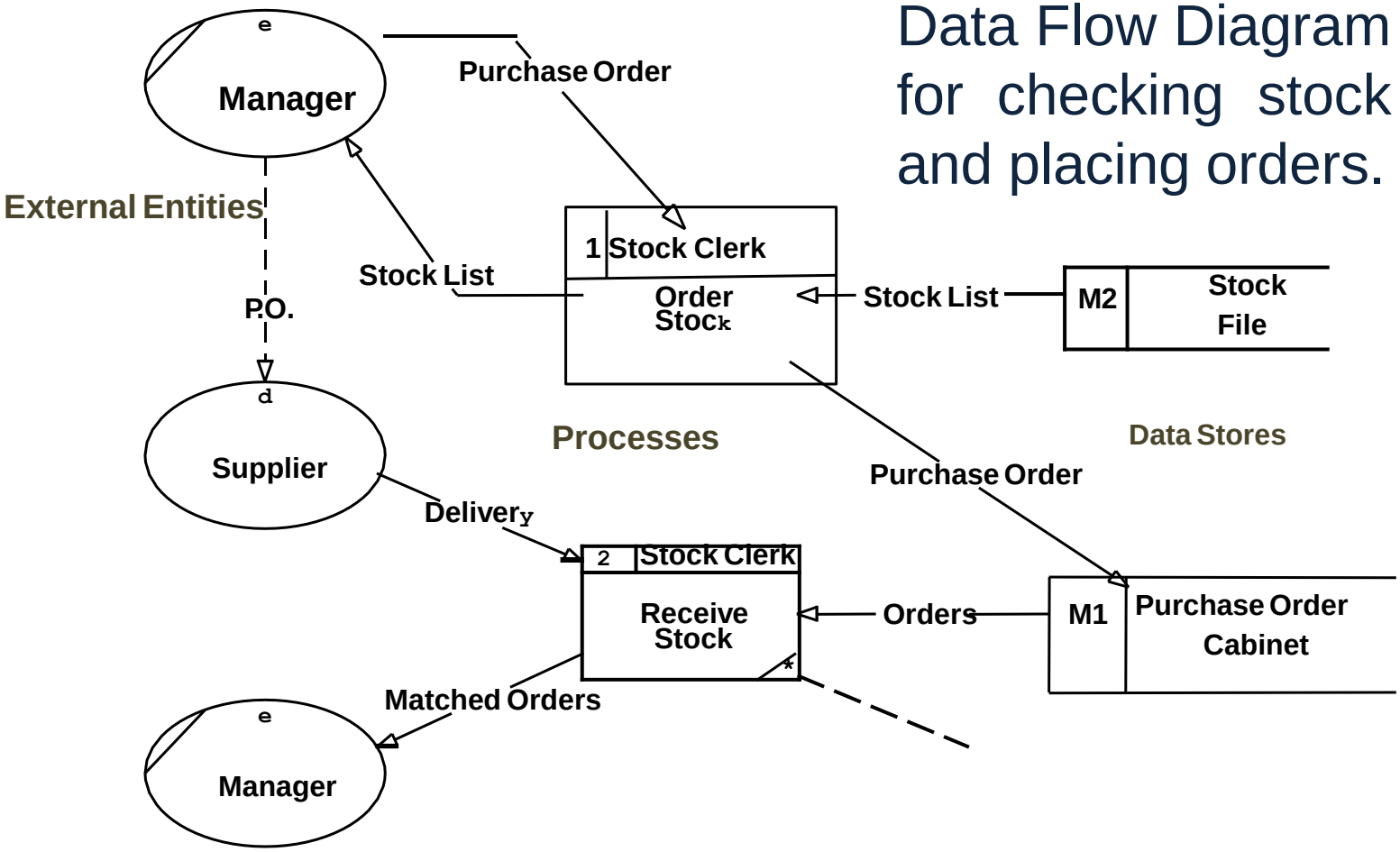
Flow Diagrams: Indicate flow of information through a system. They illustrate dependency of system elements (states) and how information moves - one from another.

They can also be indicative of roles that are assigned within an organisation and how data moves between these assigned roles as well as between organistaion as a whole & the out side world.

An example of a Flow Diagram showing flow of information in an organisation executing the task of checking stock and ordering supplies is shown in the next slide.

The diagram is called as Data Flow Diagram (DFD)and is a standard form of depiction used in Information Systems Design in Systems Engineering.

Data Flow Diagram for checking stock and placing orders.



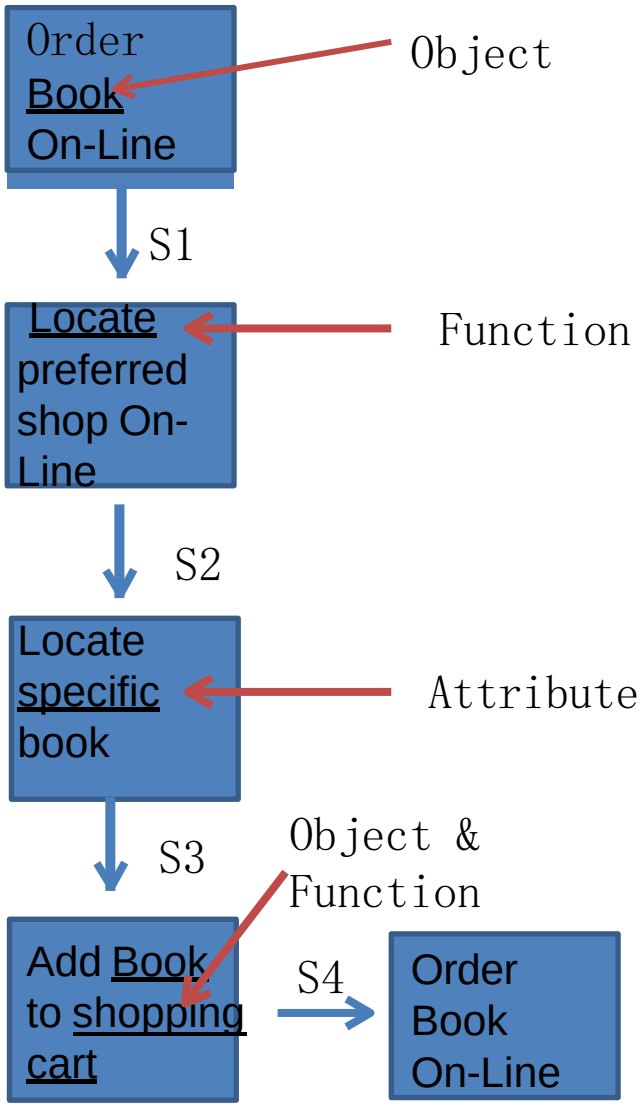
Data Flow in the above (part) diagram depicts a Manager calling for Stock list from the stock clerk who gets it from the database M2. Purchase order is placed and filed in Database M1. Clerk 2 receives stock from supplier and acts further (dotted line).

Modeling user data for HTA: Tools

Sequence Diagrams :

Sequence diagrams are procedural analysis diagrams. While flow diagrams track work through a system, a sequence diagram uses TIME to track actions & decisions.

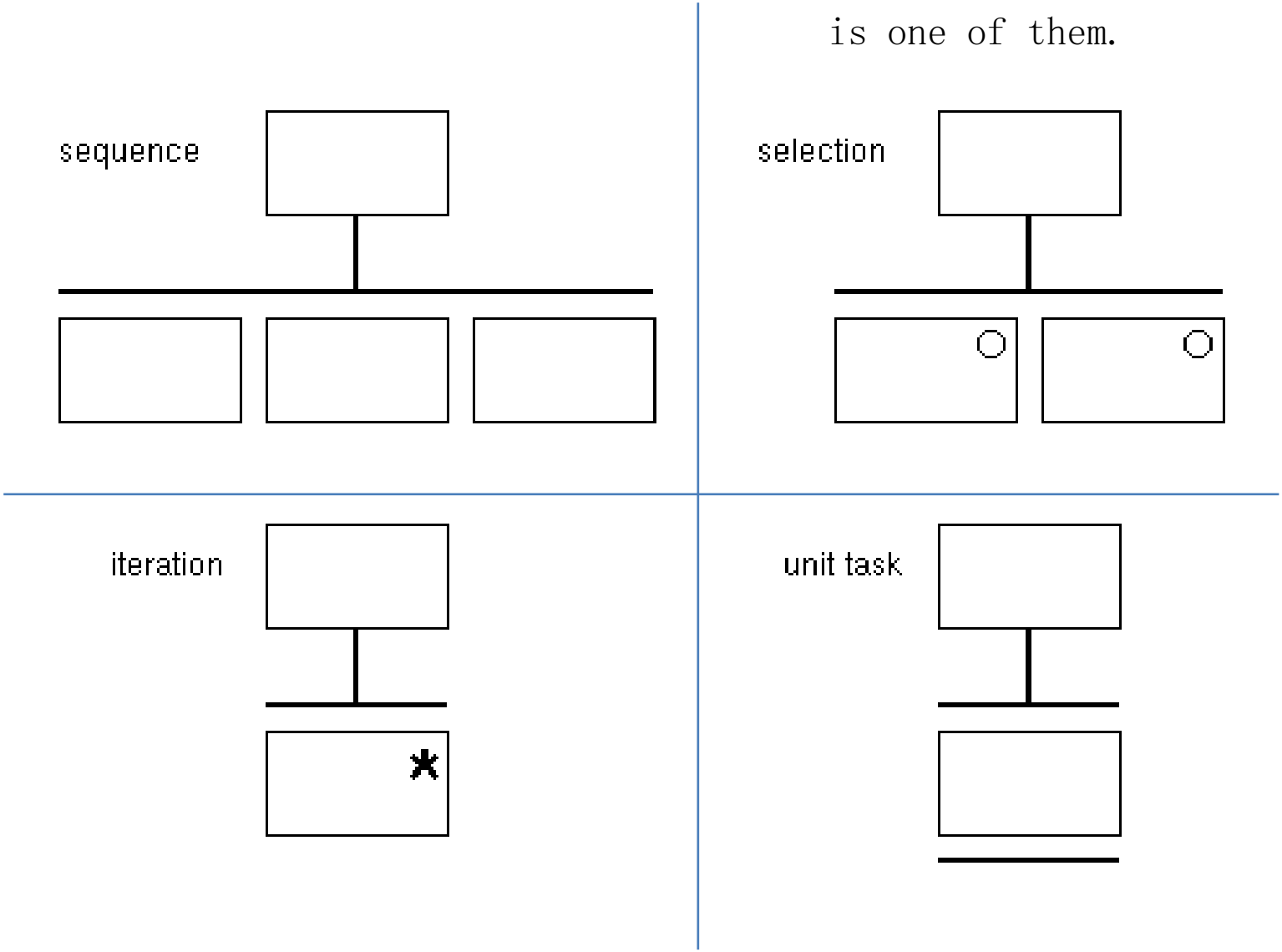
Sequence diagrams are critical because they give the OBJECTS, FUNCTIONS & ATTRIBUTES of a system which in turn are used to derive the UI information Architecture.



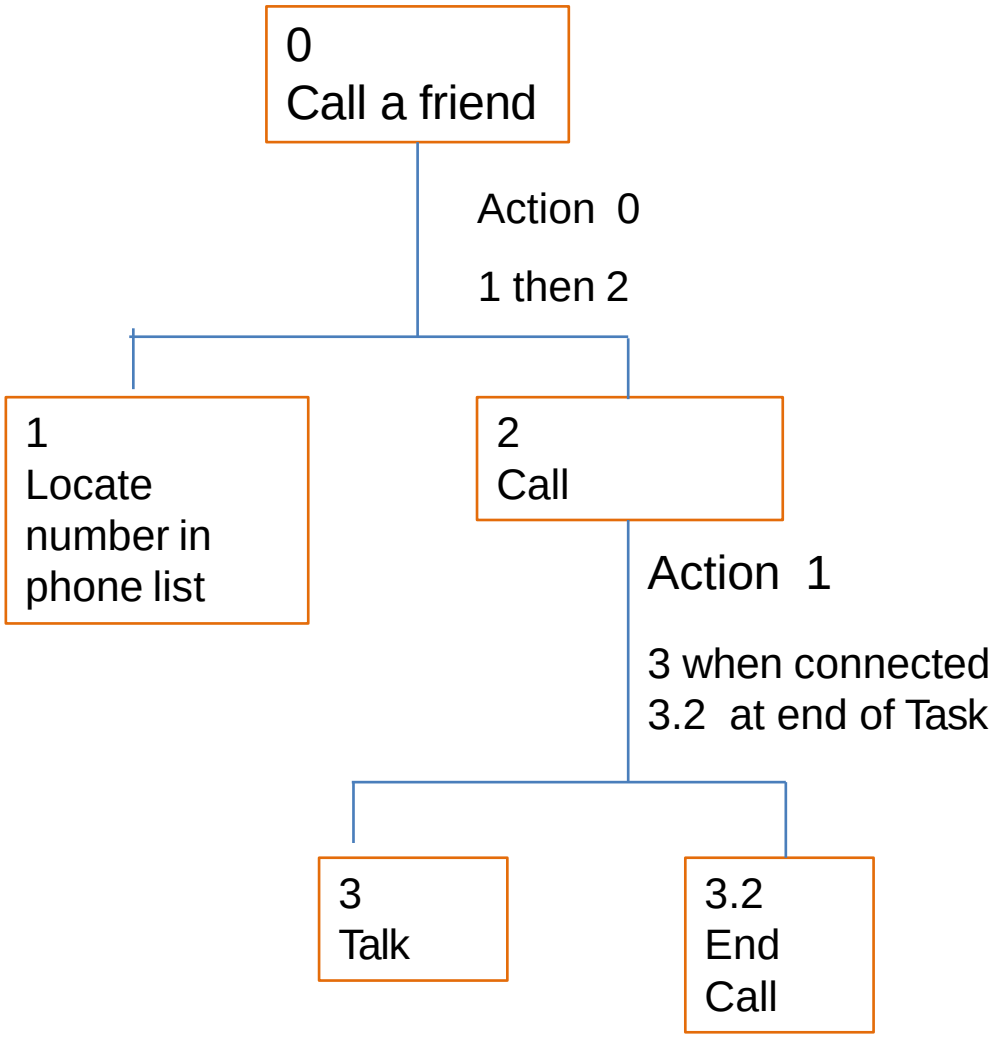
TABLES are also, sometimes, used to indicate sequences

HTA Structure Chart Notation

There are more than one notations found in literature. This is one of them.



HTA Diagram for making a Phone Call



Task name
Task goal/output
Task steps (Sub Tasks)
Task frequency
Task flexibility
Task dependencies
Physical and mental demands
Task output

Case Study of a Task Analysis for a **web based ticket booking system for a cultural festival on the NITK campus named 'INCIDENT'.**

Background

INCIDENT is the cultural festival of NITK Surathkal organized by the NITK Students' Council, inviting participation from colleges all over India. The festival is one of the biggest of its kind in Southern India. It is conducted over 3 to 4 days.

Issues leading up to a need for a Computer based seat reserving system for performances in INCIDENT

Renowned celebrities & Bands who are invited to perform have been attracting increasing number of crowds. This is causing, besides overcrowding, security problems, which have often led to suspension of events due to unmanageable crowds.

Passes get printed in thousands and are distributed all over town. There is no exact predicting mechanism as to the strength of the attending crowd given the fact that the festival is held over 3-4 days.

Problem Statement

To design the GUI for a web based ticket booking system for *INCIDENT's* main stage events.

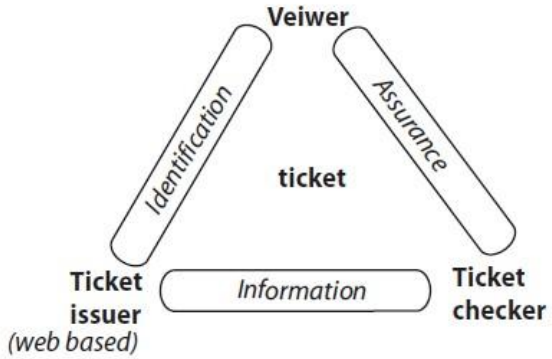
Proposed solution

A web based pre seat reservation system which can close entry to the festival once the Auditoriums & Grounds reach their holding capacity.

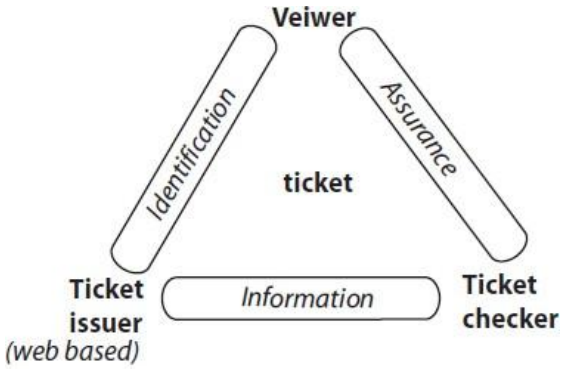
Based on initial data on the event following Interaction diagram is visualised which will form the basis of the web GUI.

Interacting Elements

1. Veiwer
2. Ticket Issuer
3. Ticket Checker



Interaction diagram



Understanding the users and their different classifications and needs. Ex: NITK Surathkal employees' family to get priority for seat reservation over general public.

Interaction diagram

Identification Interaction	Information Interaction	Assurance Interaction
—asking personal info —putting the veiwer in a category	— Id no. of veiwer and ticket's serial number	classification of information on ticket

User is assured of a seat of choice on first come first served basis for a particular event

The veiwers fall in 4 categories

1. NITK employee
2. NITK student
3. Other college students
4. VIP (people with passes)

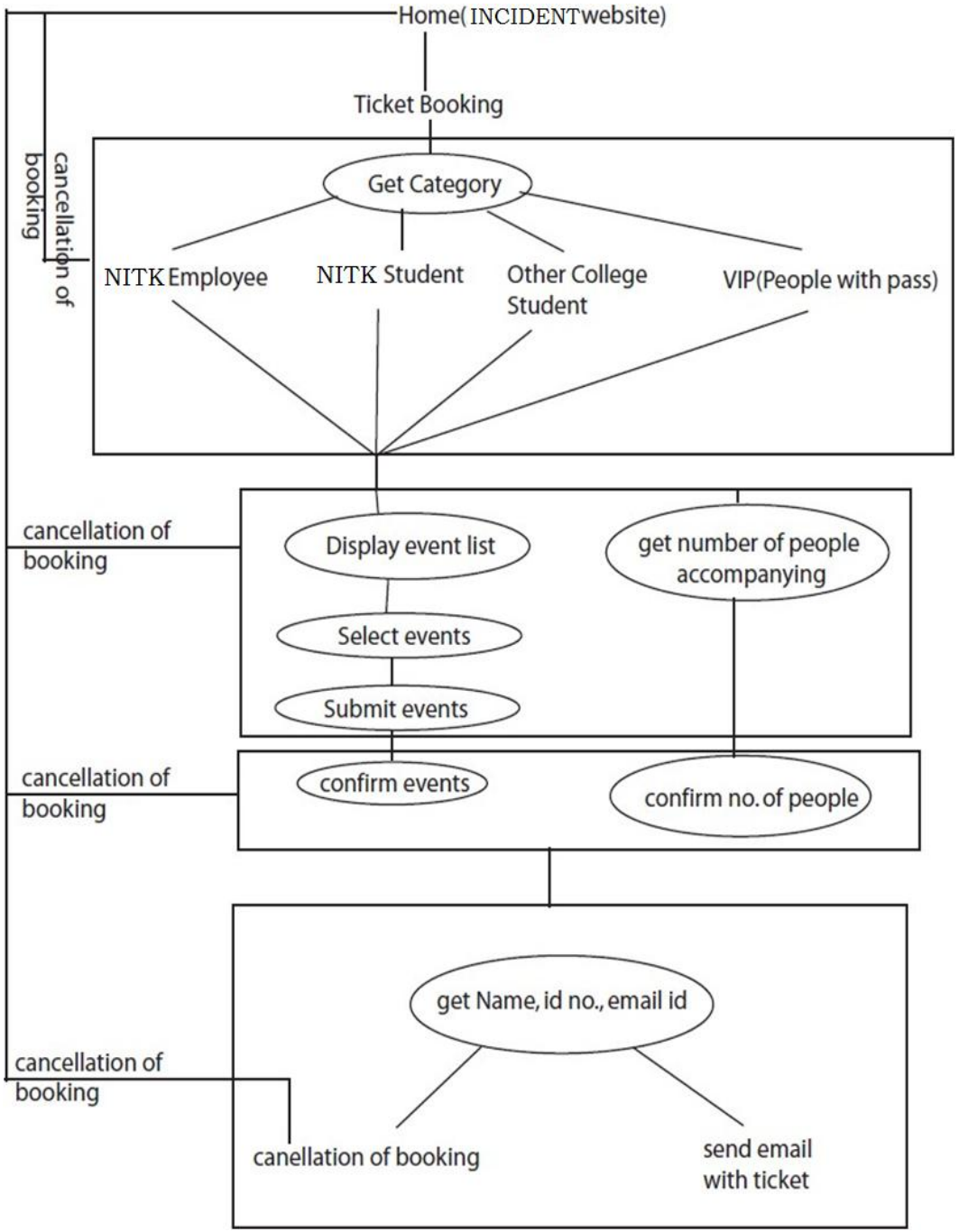
Conceptual Model of the GUI

Get Category
Display eventlist and allow user to tick it
Ask number of people accompanying(with a maximum of 5)
Get personal information
Assign serial number
Send ticket to user's email

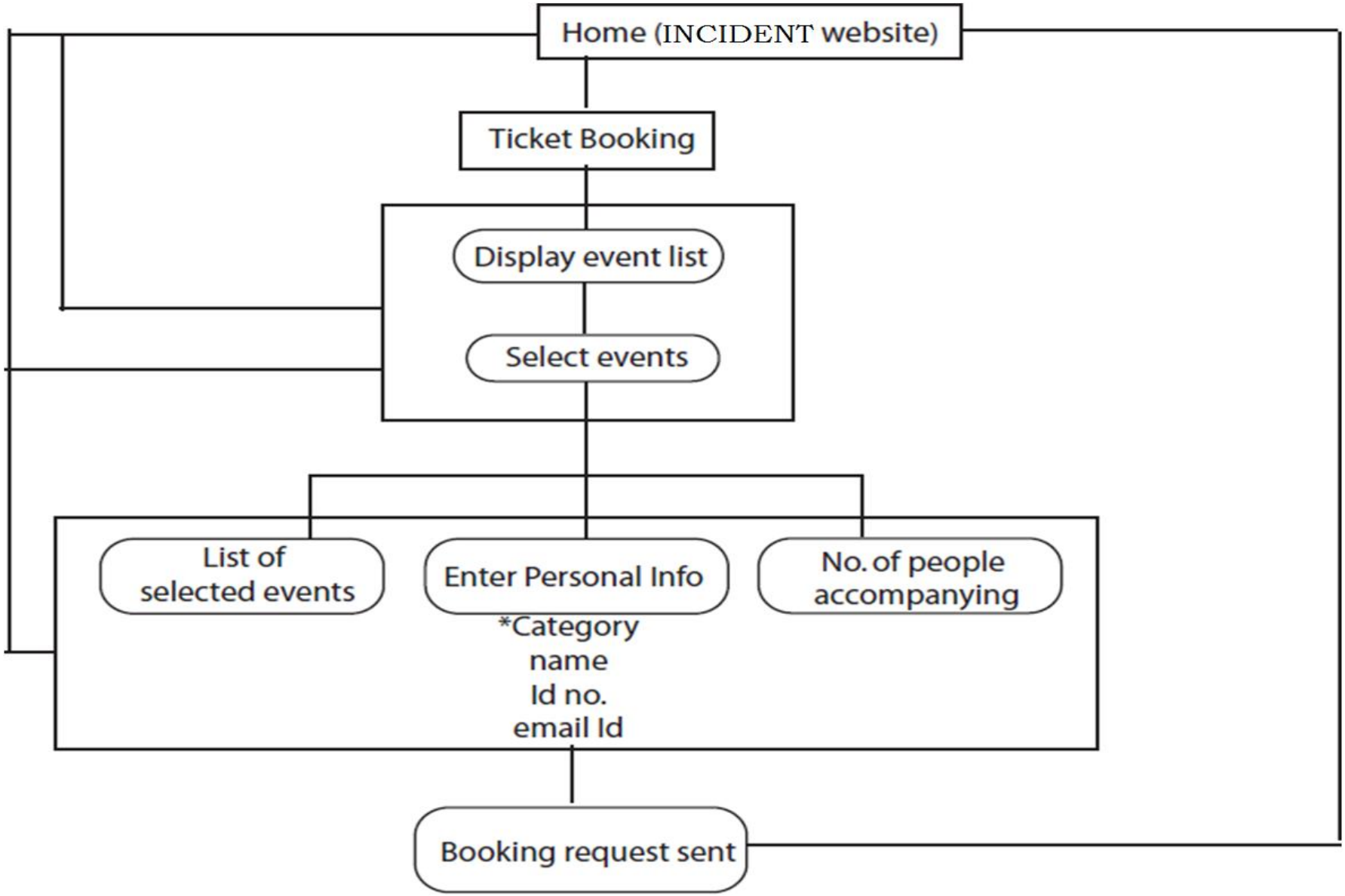
A first iteration of the HTA.

HTA diagrams need iterations.

The consolidated final HTA diagram is shown in the next slide.



THE TASK DIAGRAM for INCIDENT website to reserve a Seat.



References

1. Seels and Glasgow (1990). *Exercises in instructional design.* Columbus OH: Merrill Publishing Company.

2. A Sears & J A Jacko, (Editors) (2009). Human Computer Interaction – Development Process. CRC Press, Taylor & Francis. London.

Assignment

1. Draw a HTA for IRIS Portal of NITK website to announce Results. Take into the consideration that there are 9 UG & 14 PG Departments, Mid semester & End semester exams results to be declared and documented.