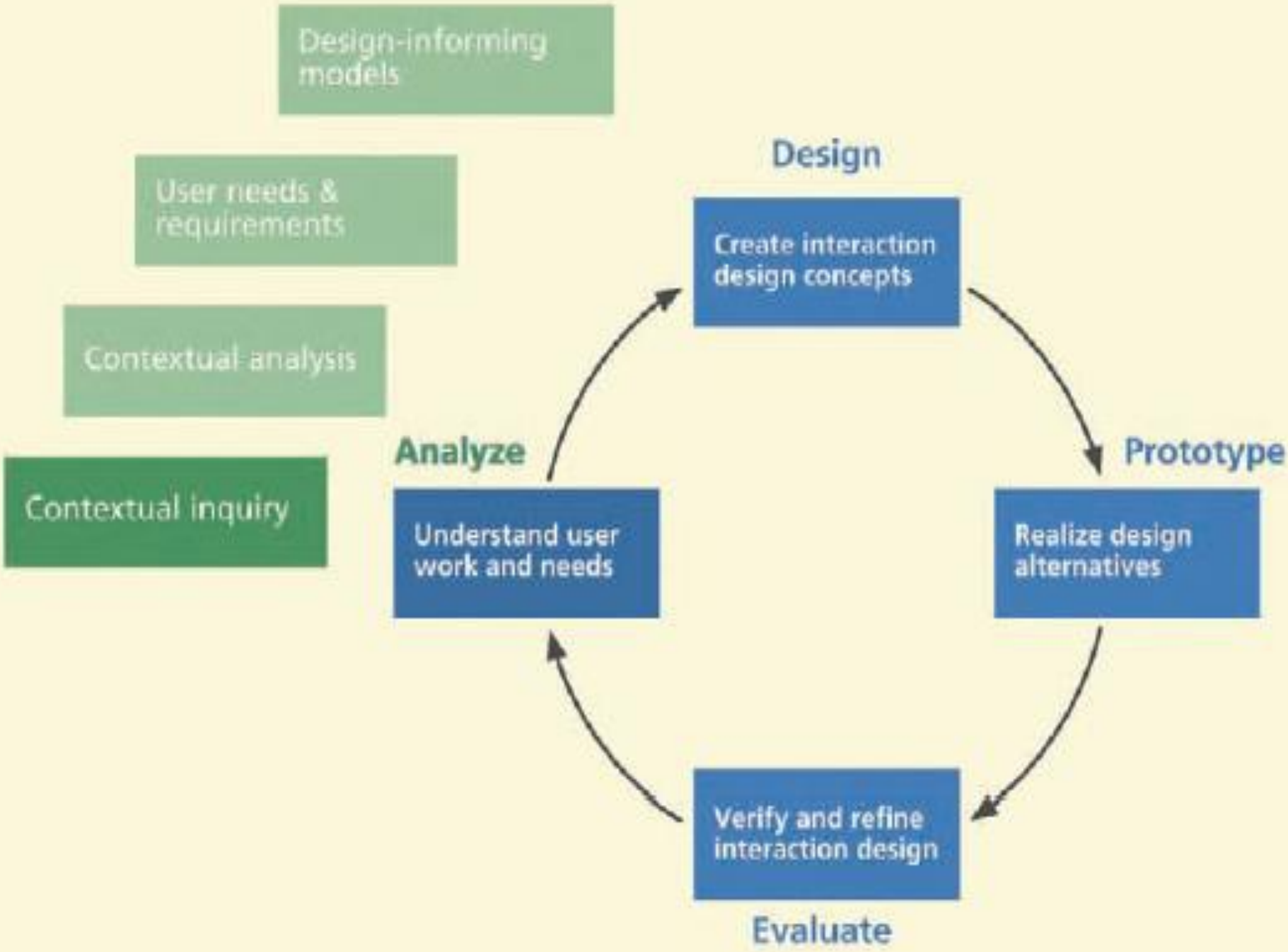
UNIT – 03
The UX Design Process-Understand Users

1. Introduction

1.1 You Are Here

- To understand the user's activities in the context of their current work practice using any currently existing system or product, we do contextual inquiry and contextual analysis.

- Sometimes contextual inquiry and contextual analysis are collectively called contextual studies or "user research."


Design-informing models
User needs & requirements
Contextual analysis
Contextual inquiry
Design
Create interaction design concepts
Prototype
Realize design alternatives
Evaluate
Verify and refine interaction design
Analyze
Understand user work and needs

Some Important Definitions

1) **Work**

Work is the set of activities that people undertake to accomplish goals. Some of these activities involve system or product usage.

2) **Work Domain**

The entire context of work and work practice in the target enterprise or other target usage environment.

The "work domain" is everything related to how work is done in a specific company or environment. It includes the tasks people do, the tools and technology they use, the work environment, rules, and more. Understanding the work domain helps improve work processes and make things better for the people doing the work.

3) **Work Practice**

Work practice is the pattern of established actions, approaches, routines, conventions, and procedures followed and observed in the customary performance of a particular job to carry out the operations of an enterprise.

usual or habitual way of doing something

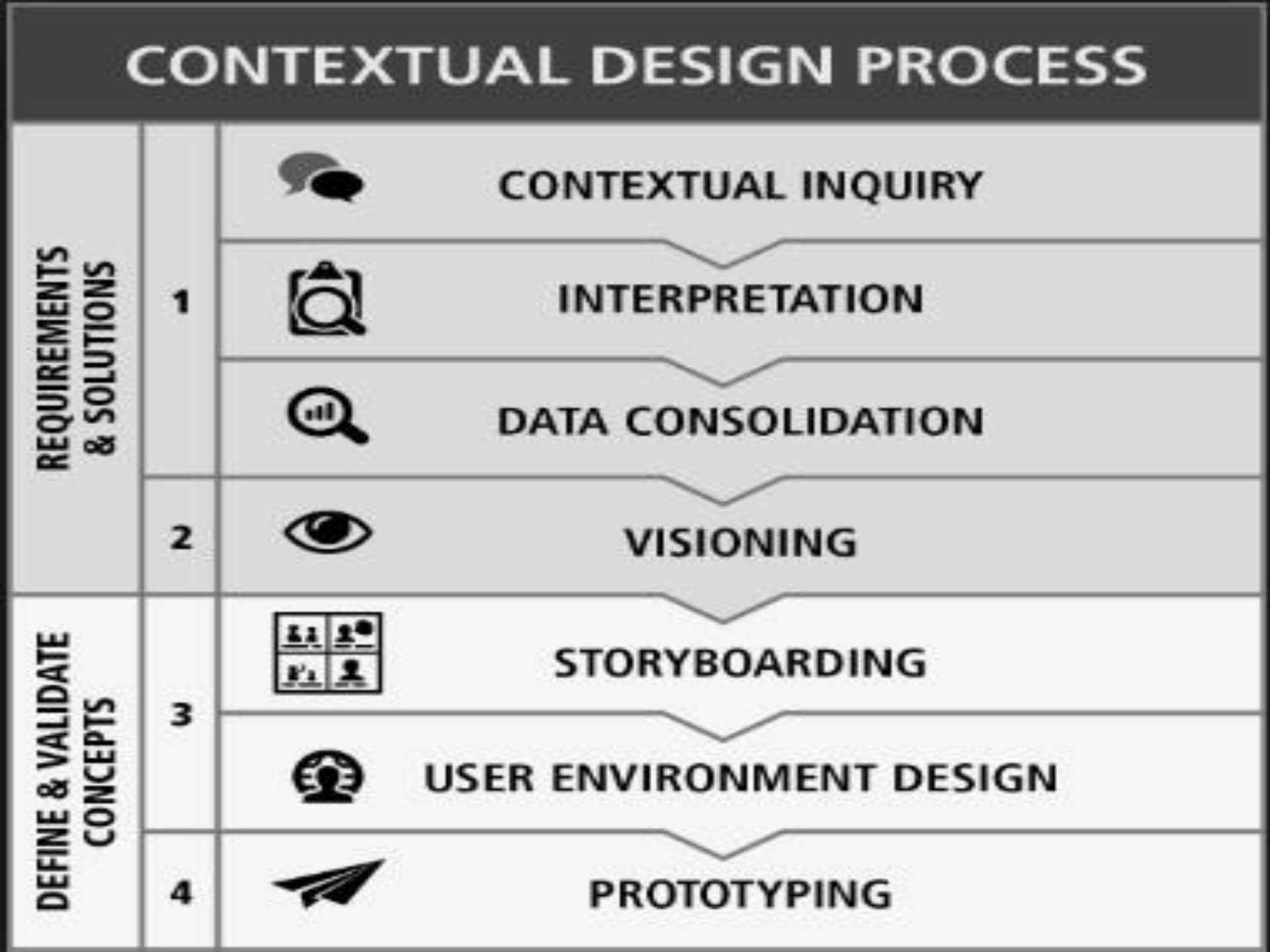
2) **Work Activity**

A work activity is comprised of sensory , cognitive, and physical actions made by users in the course of carrying out the work practice.

5) **Contextual Inquiry**

- Contextual inquiry is an early system or product UX lifecycle activity to gather detailed descriptions of customer or user work practice for the purpose of understanding work activities and underlying rationale. fundamental reason or basis that supports or justifies a particular decision, action, or choice
- The goal of contextual inquiry is to improve work practice and construct and/or improve system designs to support it.
- Contextual inquiry includes both interviews of customers and users and observations of work practice occurring in its real-world context.

CONTEXTUAL DESIGN PROCESS



1.2 A True Story

----Story----

So what does this have to do with contextual inquiry?

If you do contextual inquiry in a real environment like this, you might get lucky and find rich user data.

- It is certain however that, if you do not do contextual inquiry, you will never get this kind of information about situated usage.

1.3 Understanding Other People's Work Practice

- Contextual inquiry has taken on importance in the UX process.

  It takes real effort to learn about other people's work, which is usually unfamiliar, especially the details.

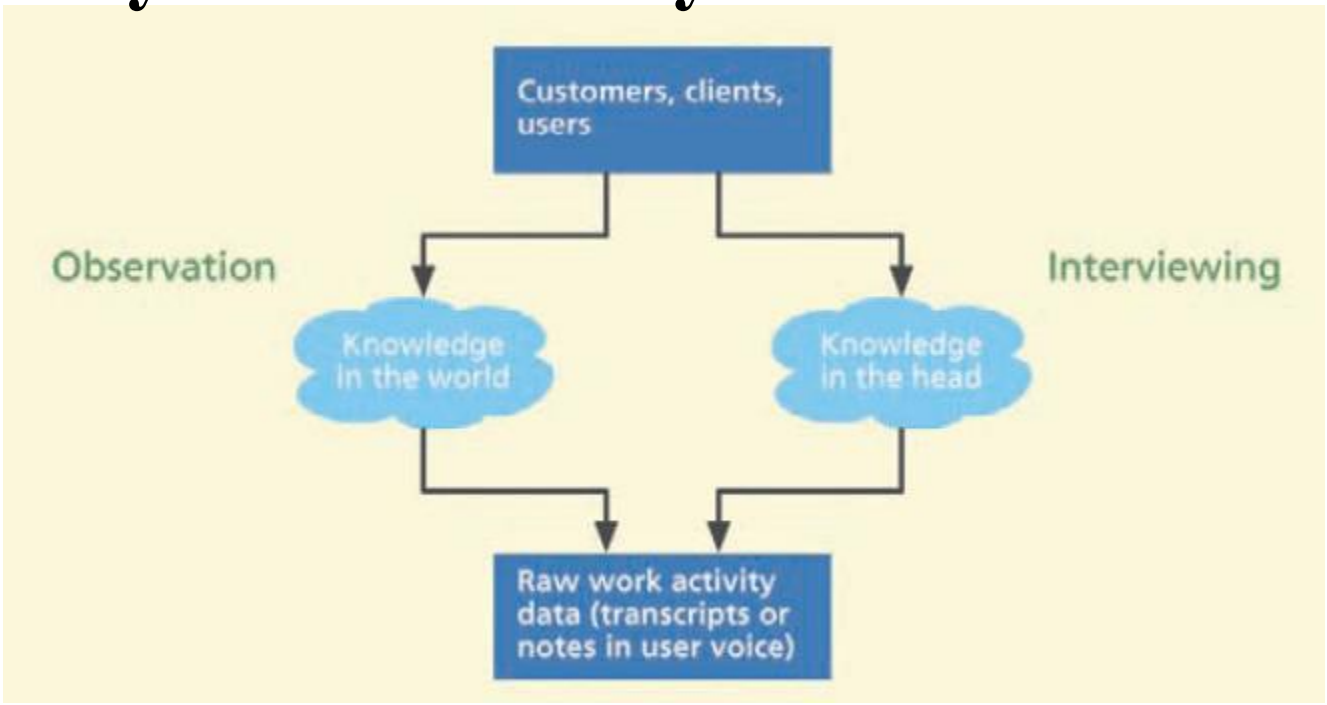
Task analysis is a method used to examine and break down the various components of a task or job. It involves studying the structure of these task units and detailing how they are executed, including their objectives, individual steps, and the actions involved. "Deconstruction" in this context means taking a complex task or job and breaking it down into its simpler and more manageable elements. By deconstructing a task through task analysis, you gain a deeper understanding of how it works, the specific steps involved, and the goals to be achieved in performing that task. This deconstruction helps in designing, optimizing, or training for the task more effectively, as it provides a clear picture of its intricacies.

6) **Task Analysis -** Task analysis is the investigation and deconstruction of units of work. It is the process of representing the structure of these units plus describing how they are performed, including goals, steps, and actions.

1.4 Not the Same as Task Analysis or a Marketing Survey

1.5 The Concepts of Work, Work Practice, and Work Domain

1.6 Observing and Interviewing in Situ: What They Say vs. What They Do



1.7 Are We Gathering Data on an Existing System or a New System?

1.8 Introducing an Application for Examples

The working title for the new system is Ticket Kiosk System, pending recommendations from our design team. The Ticket Kiosk System will have a completely new business model for the retail ticket operation.

The working title for the new system is "Ticket Kiosk System," although this title is subject to potential changes based on recommendations from our design team. The "Ticket Kiosk System" is anticipated to introduce a fresh and innovative business model for retail ticket operations.

2. The System Concept Statement

- A system concept statement is a concise descriptive summary of the envisioned system or product stating an initial system vision or mandate; in short, it is a mission statement for the project.

- A system (or product) concept statement is where it all starts, even before contextual inquiry.

- Before a UX team can conduct contextual inquiry, which will lead to requirements and design for the envisioned system, there has to be a system concept.

Points To Remember :

- A system concept statement is typically 100 to 150 words in length.
- It is a mission statement for a system to explain it to outsiders and to help set focus and scope for system development internally.
- Writing a good system concept statement is not easy.
- The amount of attention given per word is high. A system concept statement is not just written; it is iterated and refined to make it as clear and specific as possible.

An effective system concept statement answers at least the following questions:

The "Online Shopping System" is created to offer a user-friendly online platform for purchasing a wide variety of products. It includes features like product catalog, shopping cart, secure payment, and personalized recommendations. Its goal is to enhance customer convenience and satisfaction, leading to increased sales and revenue. The system relies on secure payment gateways, and its development is planned within a 12-month timeline.

- What is the system name?
- Who are the system users? What will the system do?
- What problem(s) will the system solve? (You need to be broad here to include business objectives.)
- What is the design vision and what are the emotional impact goals? In other words, what experience will the system provide to the user? This factor is especially important if the system is a commercial product.

Example: System Concept Statement for the Ticket Kiosk System

Here is an example of a system concept statement that we wrote for the Ticket Kiosk System.

> The Ticket Kiosk System will replace the old ticket retail system, the Middleburg University Ticket Transaction Service, by providing 24-hour-a-day distributed kiosk service to the general public. This service includes access to comprehensive event information and the capability to rapidly purchase tickets for local events such as concerts, movies, and the performing arts.
>
> The new system includes a significant expansion of scope to include ticket distribution for the entire MU athletic program. Transportation tickets will also be available, along with directions and parking information for specific venues. Compared to conventional ticket outlets, the Ticket Kiosk System will reduce waiting time and offer far more extensive information about events. A focus on innovative design will enhance the MU public profile while Fostering the spirit of being part of the MU community and offering the customer a Beaming interaction experience. (139 words)

Upon interacting with the customers and users, some of our objectives in this system concept statement will be adjusted and assumptions will be corrected.

3. User Work Activity Data Gathering

the process of collecting information and data related to the activities and tasks that users perform within a specific context or system

To do your user work activity data gathering you will:

- Prepare and conduct field visits to the customer/user work environment, where the system being designed will be used.
- Observe and interview users while they work.
- Inquire into the structure of the users' own work practice
- Learn about how people do the work your system is to be designed to support

  conducting research to understand how individuals currently perform their tasks and processes in order to design a system that aligns with their needs and work practices.
- Take copious, detailed notes, raw user work activity data, on the observations and interviews

3.1 Before the Visit: Preparation for the Domain-Complex System Perspective

- Learn about your customer organization before the visit
- Learn about the domain
- Issues about your team
- Lining up the right customer and user people
- Get access to “key” people
- What if you cannot find real users?
- Setting up the right conditions
- How many interviewees at a time?
- Preparing your initial questions
- Before the visit: Preparation for the product perspective
- Anticipating modeling needs in contextual inquiry: Create contextual data “bins”

7) Data Bin - a temporary repository—for example, a labeled pile of notes on a table—to hold data—raw contextual data at first and, later, synthesized work activity notes. Each bin corresponds to a different data category or contextual data topic.

"Synthesized work activity notes" refer to a summary or compilation of the observations, insights, and findings gathered from studying and analyzing how people perform their work activities

A "data bin" is a temporary storage or organization method used in data collection and analysis. It involves categorizing and storing raw contextual data, such as notes, in labeled piles or containers, with each bin representing a different data category or contextual data topic. Initially, it helps in sorting and organizing the collected information, and later, it facilitates the synthesis of work activity data within specific categories or topics for analysis and modeling.

A "data bin" is like a labeled box or pile of notes used to sort and keep track of different types of information. Each bin represents a specific category or topic of data. Initially, it helps in organizing the information, and later, it makes it easier to analyze and understand how people work in different areas.

3.2 During the Visit: Collecting User Work Data in their Domain-Complex System Perspective

Activity

- When you first arrive
- Remember the goal
- Establish trust and rapport
- Form partnerships with users
- Task data from observation and interview
- Recording video
- Note taking
- Use a numbering system to identify each point in data

How to proceed

- Be a listener; in most cases you should not offer your opinions about what users might need.
- Do not lead the user or introduce your own perspectives.
- Do not expect every user to have the same view of the work domain and the work; ask questions about the differences and find ways to combine to get the "truth."
- Capture the details as they occur; do not wait and try to remember it later.
- Be an effective data detective. Follow leads and discover, extract, "tease out" and collect "clues." Be ready to adapt, modify, explore, and branch out.

- Pay attention to information needs of users
- What about design ideas that crop up?
- What about analyst and designer ideas that crop up?
- Questions not to ask

- Do not ask about the future
- Do not ask for design advice, how they would design a given feature
- Do not ask a question by trying to state what you think is their rationale.

Other forms of data collection

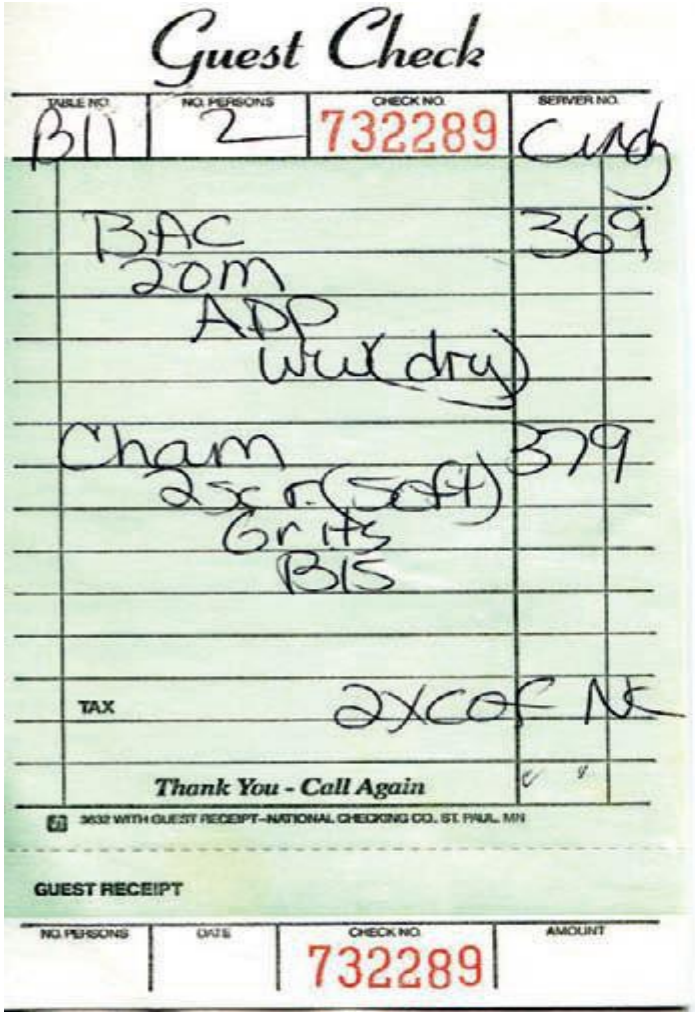
- Copious digital pictures of the physical environment, devices, people at work, and anything else to convey work activities and context visually

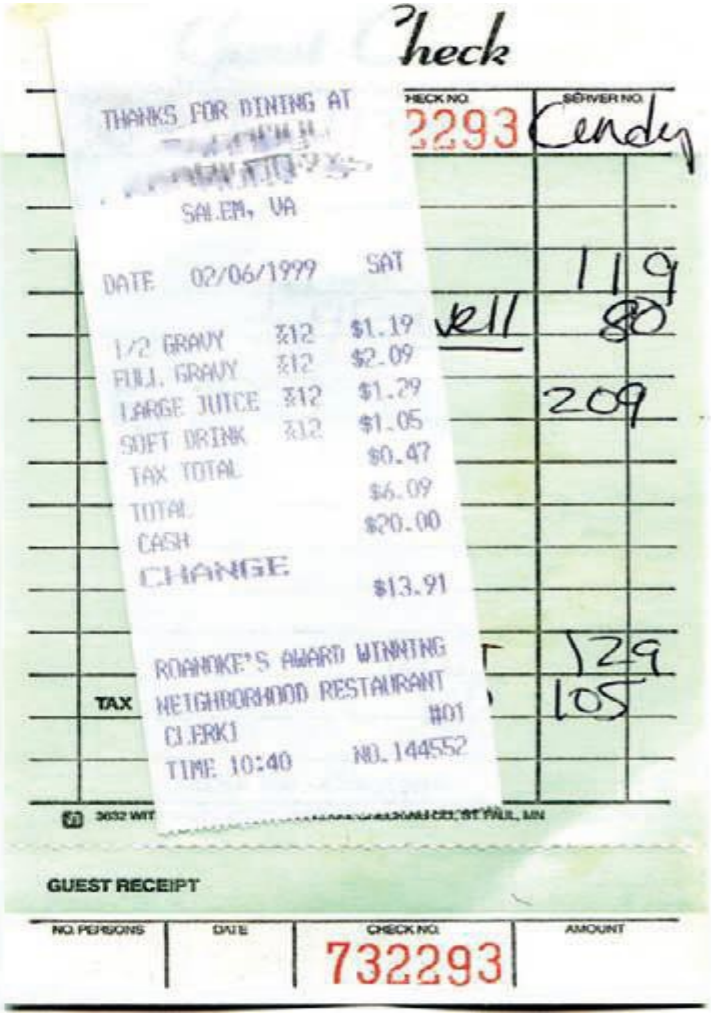
Creating diagrams in real-time to visually represent workflow

- On-the-fly diagrams of workflow, roles, and relationships
- On-the-fly sketches of the physical layout, floor plans (not necessary to be to scale), locations of people, furniture, equipment, communications connections, etc.
- Quantitative data—for example, how many people do this job, how long do they typically work before getting a break, or how many widgets per hour do they assemble on the average?

Collect work artifacts

- a set of paper work artifacts, including manually created order forms and "guest checks," from a local restaurant

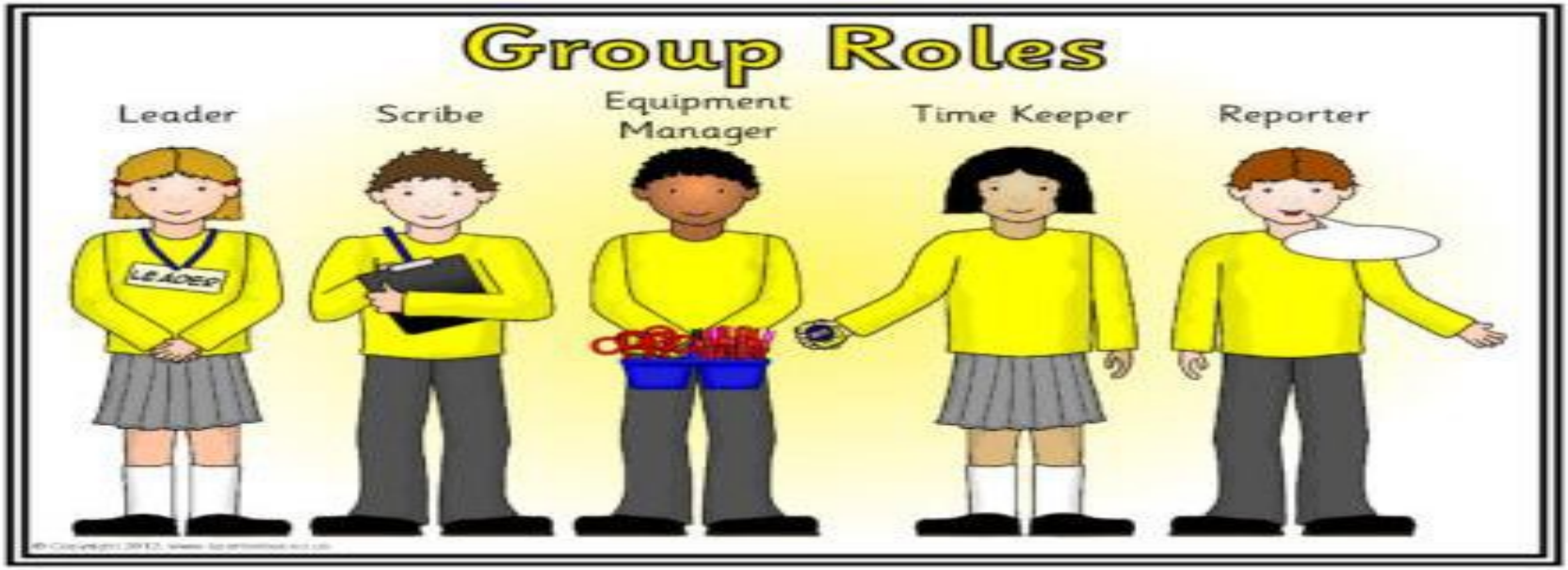




In most cases, work in a complex system context is carried out by individuals in various roles within the organization. These roles collectively form the structure of the organization and are responsible for different aspects of work and responsibilities. These roles are often referred to as "work roles," and each work role contributes to the overall functioning of the organization within the complex system context.

3.3 During the Visit: Collecting User Work Activity Data in the Product Perspective

- Roles of users will be different with commercial products.
- In most cases, work in a domain-complex system context is performed by people in roles that make up the organization, which we will be calling "**work roles**"



Example: User Data Gathering for MUTTS

- There is contextual inquiry sessions, interviewing MUTTS employees and customers.
- Where three analysts separately interviewing several groups of one or two users at a time and came up with a fairly rich set of raw data transcripts.

Q: We want to begin with some questions about your usage of the ticket service, MUTTS. What do you do for a living? Tell us about your typical day.

A: I have a 9 to 5 job as a lab technician in Smyth Hall. However, I often have to work later than 5PM to get the job done.

Q: So do you use MUTTS to buy tickets for entertainment?

A: I work long hours and, at the end of the day, I usually do not have the energy to go to MUTTS for entertainment tickets. Because this is the only MUTTS location, I cannot buy tickets during normal working hours, but the MUTTS window is not open after 7PM.

Q: How often and for what have you used the MUTTS service?

A: I use MUTTS about once a month for tickets, usually for events on the same weekend.

Q: What kinds of events do you buy tickets for?

A: Mostly concerts and movies.

Q: Describe the ticket buying experience you just had here at the MUTTS ticket office.

A: It went well except that I was a little bit frustrated because I could not do the search myself for the events I might like.

Q: Can you please elaborate about that?

A: My search for something for this weekend was slow and awkward because every step had to be a series of questions and answers through the ticket seller. If I could have used her computer to browse and search, I could have found what I wanted much sooner. Also, it works better if I can see the screens myself and read the event descriptions. And I also felt I need to answer quickly because I was holding up the line.

Q: Did you know you could search for some of these events on Tickets4ever.com?

A: No, I did not know they had local events.

Q: While you were looking at the seating chart, you seemed unsure about what the ticket seller was expecting you to do with it. Can you please walk us through what you were thinking and how that fit in with the way the seating chart was laid out.

A: Yeah, that was a problem. I could see it was a seating chart but I did not understand what seats were still available and could not quite put the layout of the seats in perspective. I had to ask her what the colors meant on the chart, and what the price difference was for each of those colored regions.

Q: Walk us through a couple of other experiences you have had at the ticket office and do not skip any details.

A: Last week I bought two movie tickets and that was very smooth because I knew what movie I wanted to see and they are usually the same price. Generally, buying movie tickets is very easy and quick. It is only with concerts and special events that things get somewhat complicated. For example, a couple of months ago, I wanted to get tickets to a concert and I could not get to this office for a couple of days because I was working late. When I eventually got here, the tickets were sold out. I had to fill a form over there to get added to a waitlist. I do not know how the waitlist works, and that form was very confusing. Here, let me show you. . .

Q: What do you like most about MUTTS?

A: Because I am an MU employee, I get a discount on tickets. I also like that they feature the most popular and most current local events.

Q: What do you like least about MUTTS and what concerns do you have about using MUTTS to buy tickets?

A: MUTTS seems to have a limited repertoire of tickets. Beyond the most popular events they do not seem to handle the smaller events outside the mainstream.

Q: What improvements, if any, would you like to see in MUTTS?

A: It would help me if they were open later at night. It would be great if I could get football tickets here, too!

Q: Do you buy football tickets regularly?

A: Yes, I go to about four to five games every season.

4. Look For Emotional Aspects Of Work Practice

Points To Remember:

- Look for the impact of aesthetics and fun in work practice, and look for opportunities for more of the same.
- You must try harder to uncover an understanding about emotional and social aspects of work practice.
- Look for ways to fight job boredom
  - What about the work is boring?
  - What are they doing when they have fun?
  - Where can job stress be relived with aesthetics & fun?
  - What parts of usage are learned over longer times?

in short

5. Abridged Contextual Inquiry Process

Points To Remember:

- Minimize overlap in raw data collection across interviews.
- Use your experience to focus on just the essentials.
- Another way to abridge your contextual inquiry is to limit your scope and rigor narrowing down the focus and depth of your research to make it more manageable and efficient.
- One of the most obvious and direct ways to abridge the full contextual inquiry process to save resources is to not make audio or video recordings of the user interview sessions.

rigor - the quality of being detailed, careful, and complete

6. Data-driven
Vs.
Model-driven Inquiry

Data-driven Inquiry :

To make sense of a large amount of diverse data, and to use this data to inform the design process, practitioners need to employ contextual analysis. This involves extracting key and relevant points and issues from the data and then organizing them into affinity diagrams. Contextual analysis helps distill the most important insights from the data, making it easier to understand and apply in the design process. Affinity diagrams are a visual tool that groups related insights, facilitating the identification of patterns and priorities for design decisions.

- Data-driven contextual inquiry results in voluminous raw data describing a wide variety of topics.
- To digest this mass of disparate data points, make sense of them, and put these data to work in informing design, practitioners must apply contextual analysis to extract the concise and meaningful points and issues and then sort and organize them into affinity diagrams.

Flow models depict the sequence of steps or interactions that a user goes through when using a system or performing a task

- Then the sorted categories must be converted into design informing models such as **flow models**, **user models**, and **task models**.

User models are representations of the characteristics, needs, behaviors, and preferences of the target user or user groups

Task models describe how specific tasks or activities are performed, highlighting the steps, decisions, and interactions involved

Data-based Inquiry and Decision Making

Model-driven Inquiry :

Model-driven inquiry" refers to an approach to research or problem-solving where models or representations play a central role in guiding the inquiry process. Instead of relying solely on raw data, this method uses pre-established models or frameworks to structure the research, analyze information, and draw conclusions.

- Model-driven inquiry is based in exploratory modeling development.

creating and refining models

through practical experience on different projects, the approach has been improved to make it a simpler, more flexible, and efficient alternative to the traditional, time-consuming methods of ethnographic research.

- The approach has evolved through practice on multiple projects into a streamlined and simplified agile alternative to conventional ethnographic approaches.
- In outline, model-driven inquiry is straight forward:
  - Build exploratory models
  - Compile emerging questions or issues
  - Select expeditious means for resolution
  - Conduct limited, highly focused inquiry
  - Refine and complete the initial models
  - Review and validate the models

Build Exploratory Models: Start by creating initial models that help in understanding the subject or problem.
Compile Emerging Questions or Issues: As you build these models, note down any questions or issues that arise during the process.
Select Expeditious Means for Resolution: Decide on efficient ways to address the questions or issues to keep the inquiry process moving swiftly.
Conduct Limited, Highly Focused Inquiry: Carry out focused research to resolve the questions or issues, avoiding unnecessary complexity.
Refine and Complete the Initial Models: Use the insights gained from the inquiry to refine and complete your initial models.
Review and Validate the Models: Ensure that the models accurately represent the subject or problem by reviewing and validating them based on the newly acquired knowledge.

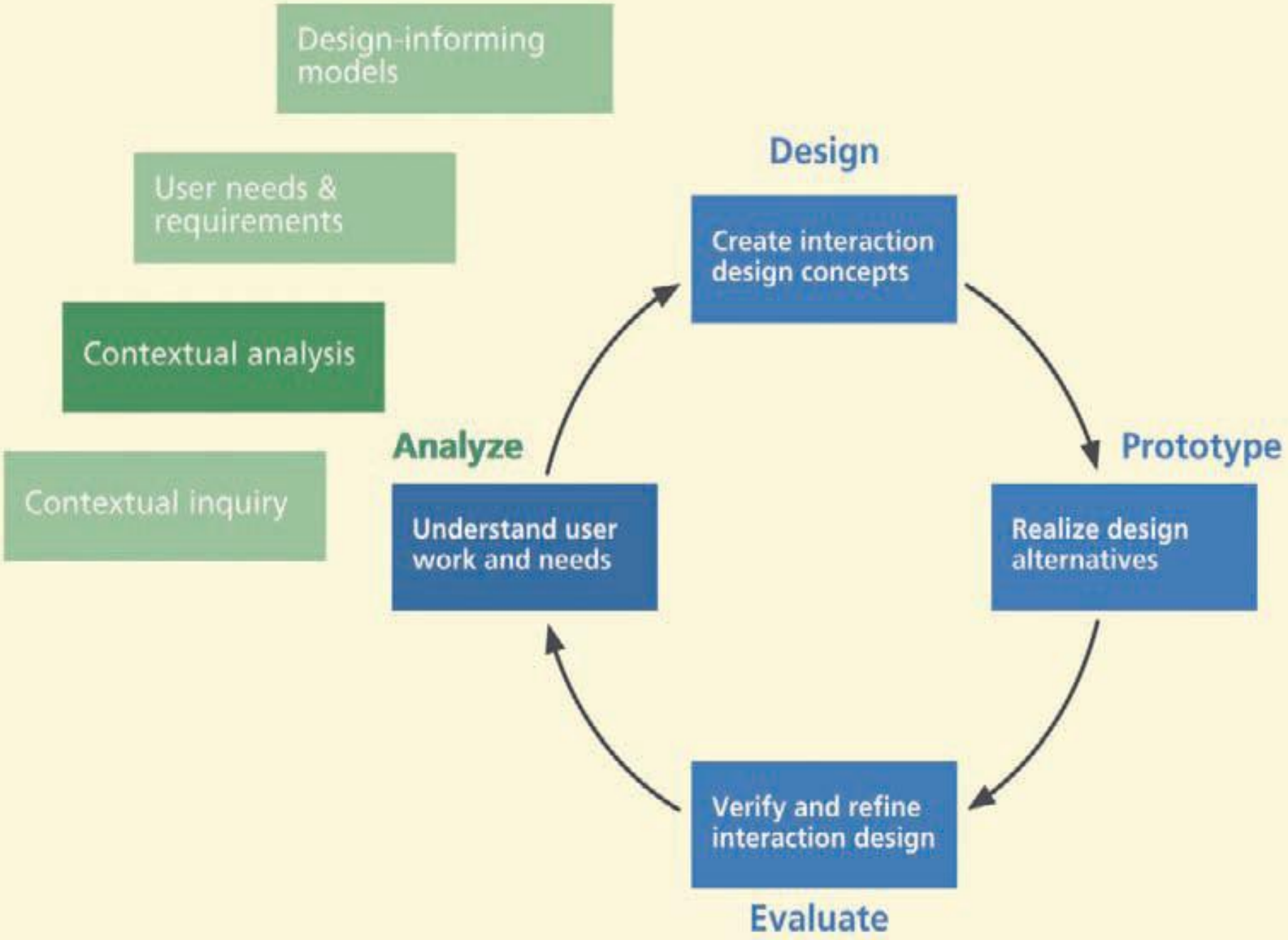
7. History

- 7.1 Roots in Activity Theory
- 7.2 Roots in Ethnography
- 7.3 Getting Contextual Studies into HCI
- 7.4 Connections to Participatory Design

8. Contextual Analysis

Contextual analysis is the systematic analysis—identification, sorting,organization,interpretation, consolidation, and communication—of the contextual user work activity data gathered in contextual inquiry, for the purpose of understanding the work context for a new system to be designed.

Contextual analysis is the methodical process of identifying, sorting, organizing, interpreting, consolidating, and communicating user work activity data collected during contextual inquiry. This process aims to gain a deep understanding of the work context, which is essential for designing a new system.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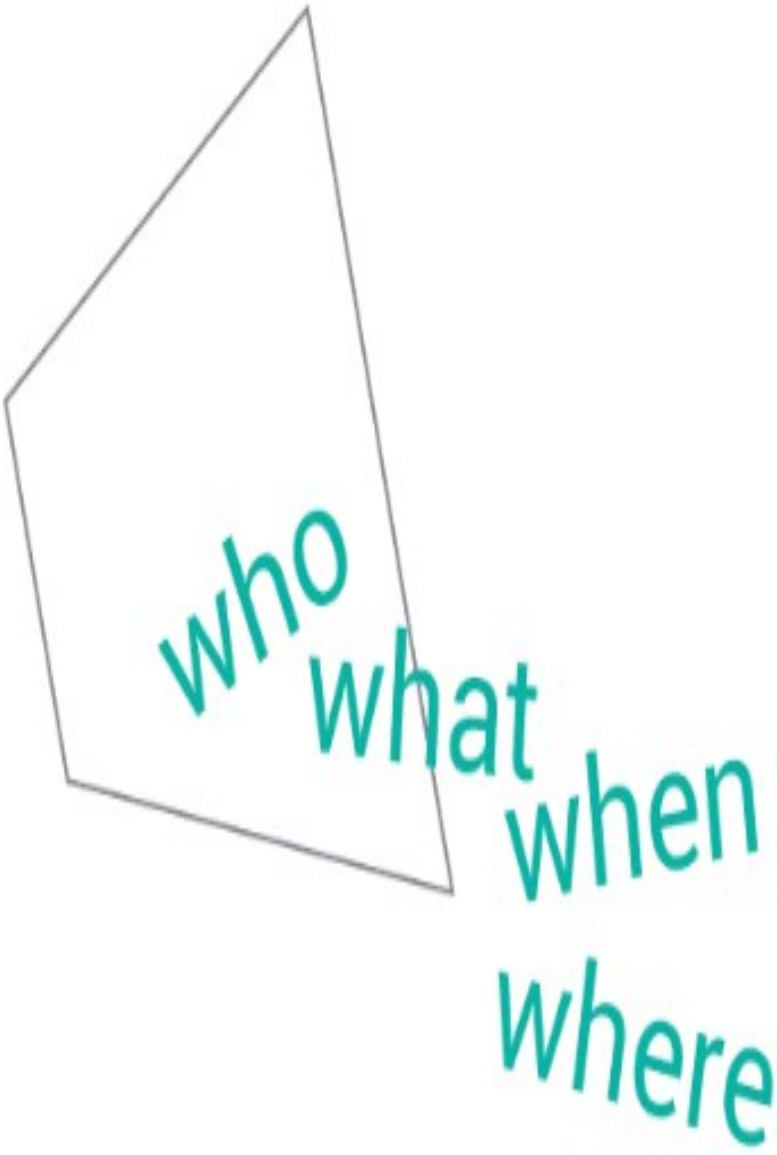
8.1 Contextual Analysis Is Data Interpretation

Since contextual analysis consists of user work activity data interpretation, consolidation, and communication.

- Interpretation of raw work activity data is accomplished through:
  - building a flow model
  - synthesizing work activity notes

Summarizing and distilling the observations and notes related to work activities. This process consolidates the data into meaningful insights and patterns.

- Data consolidation and communication are accomplished by, respectively:
  - building a work activity affinity diagram (WAAD) from the work activity notes
  - walkthroughs of all these work products



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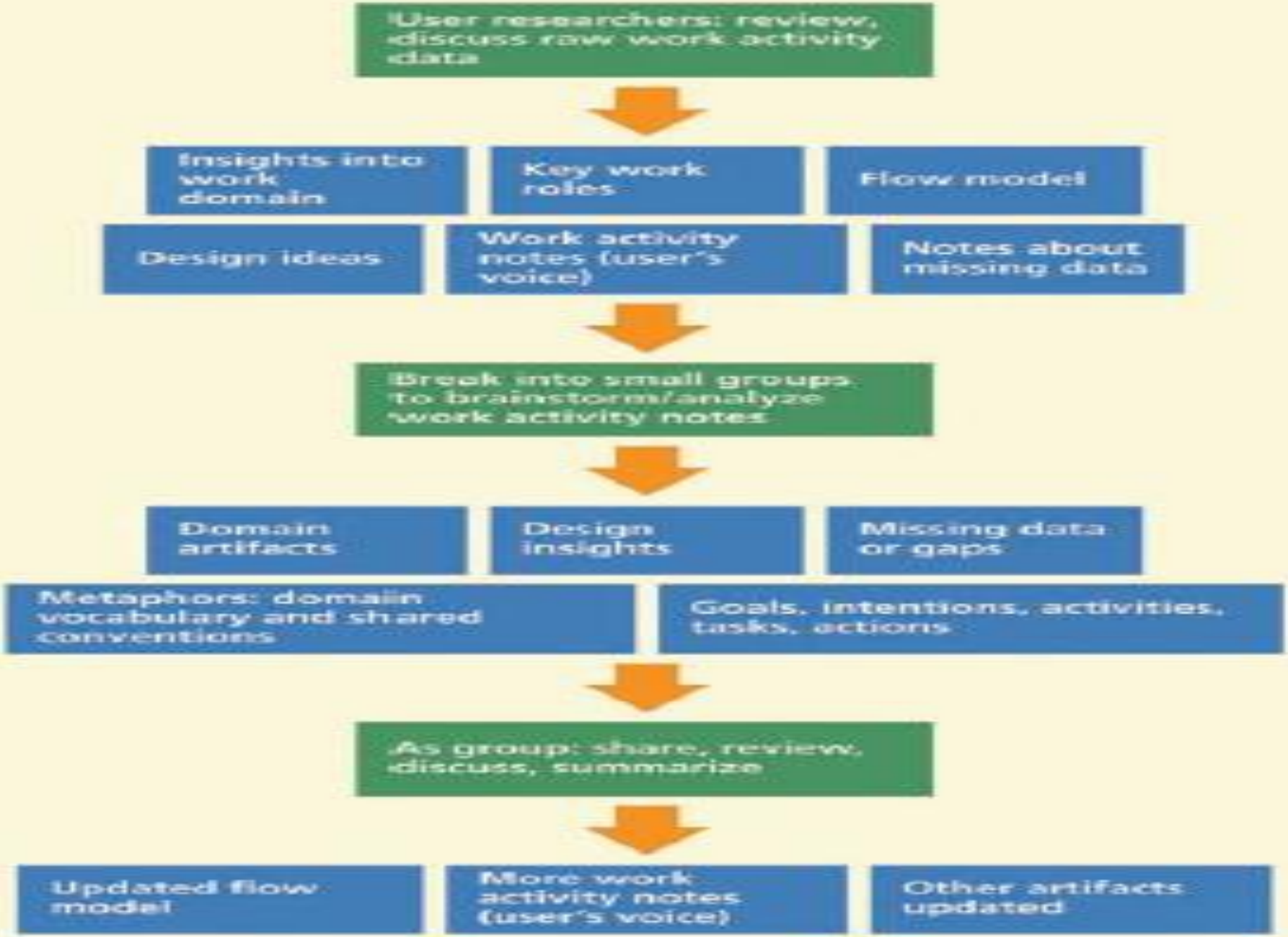
easier to measure,
visualize and analyze
data for a specific purpose

8.2 Overview of Data Interpretation



Two important things about contextual analysis:

- Contextual analysis does not directly yield either requirements or design.
- You probably have to do much of your data interpretation separately for each of the work roles.

Two important things to note about contextual analysis are:

No Direct Requirements or Design Output: Contextual analysis does not directly produce specific requirements or design solutions. Instead, it focuses on understanding the context, work practices, and user behaviors. The insights gained from contextual analysis serve as a foundation for informed decision-making during the later phases of the project, such as requirements definition and design.

Work Roles Interpretation: Interpretation of the data gathered during contextual analysis may need to be done separately for each of the work roles within the context. Different roles may have distinct needs, tasks, and behaviors, and understanding these variations is crucial for tailoring solutions that align with the specific requirements of each role.

In essence, contextual analysis provides the essential background information required for subsequent stages of a project, where requirements and design solutions are formulated based on a comprehensive understanding of the work context and the needs of different work roles.

8.3Organizing Concepts:Work Roles And Flow Model

8.3.1 Managing Complexity with Work Roles and Flow Models

- We need two things to help control the complexity and wrap our heads around the problem:
  - A big picture of the work domain, its components, and how information flows among them
  - A way to divide the big picture into manageable pieces
- Because these two things are somewhat in opposition and cannot be done by one single means, we need two complementary concepts to solve the two parts of the problem, respectively:
  - A flow model to provide the big picture
  - the concept of work roles as a basis to divide and

The approach of using a flow model to provide the big picture and the concept of work roles to divide the problem into manageable parts is a complementary strategy to address the two distinct aspects of a complex problem.

8.3.2 Identify Work Roles as Early as Possible

- As Beyer and Holtzblatt (1998, p. 163) put it, a work role is a “collection of responsibilities that accomplish a coherent part of the work.”

certain positions or responsibilities related to the organization's work or activities can be held or performed by individuals, entities, or parties that are not employees or members of the organization itself

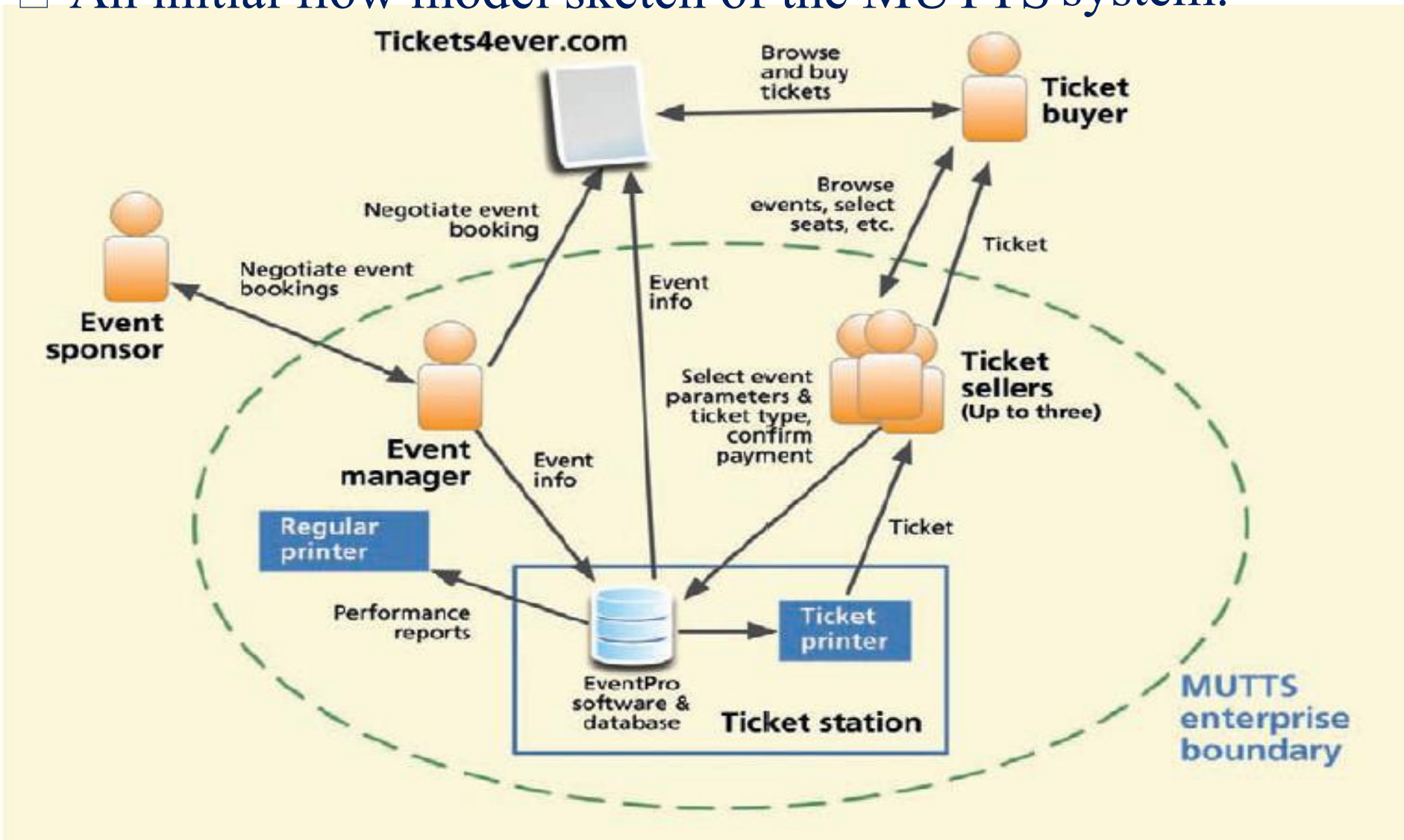
- A given work role may or may not involve system usage and some roles can be external to the organization, for example, a parts vendor, as long as they participate in the work practice of the organization.

A "collection of responsibilities that accomplish a coherent part of the work" refers to a group of specific tasks or duties that, when performed together, contribute to the completion of a well-defined and meaningful portion of a larger job or project. These responsibilities are typically organized in a way that ensures they are related, interdependent, and collectively achieve a specific goal or outcome within the work domain.

A work role can be defined in a way that includes or excludes system usage, and it can extend beyond the boundaries of the organization. For example, a work role may involve using a particular system as part of the job responsibilities, or it may not require any system usage at all. Additionally, some work roles can be external to the organization, such as a parts vendor, as long as they are actively engaged in and contribute to the work practices of the organization. The key is that a work role is determined by the specific set of responsibilities and tasks that an individual or entity performs within the context of the organization's work practices, which may or may not involve using a system, and it can extend beyond the organization itself when relevant.

8.3.3 Start Sketching an Initial Flow Model as Early as Possible

- An initial flow model sketch of the MUTTS system.



8.4 Creating And Managing Work Activity Notes

The main point of contextual analysis has two basic parts:

- Converting raw contextual data into work activity notes
- Converting work activity notes into a Work Activity

Affinity Diagram(WAAD)

Ticket buyers: Browse and buy tickets for events.
Event sponsors: Negotiate event bookings and provide funding for events.
Event managers: Organize and manage events.
Ticket sellers: Sell tickets for events, either online or in person.
Ticket station: A physical location where ticket buyers can purchase tickets.
Ticket printer: A device that prints tickets.
EventPro software & database: Software that manages the ticketing system and stores event information.
The flow model shows how these components interact with each other to facilitate the ticketing process. Here is a brief overview of the flow:
Ticket buyers browse and buy tickets for events on the Tickets4ever.com website.
Event sponsors negotiate event bookings with the MUTTS system.
Event managers organize and manage events using the EventPro software.
Ticket sellers sell tickets for events, either online or in person.

8.4.1 Transcribing Interview and Observation Recordings

8.4.2 Reviewing Raw User Work Activity Data

- Recounting one interview at a time, researchers:

- Review interview and observation notes and any recorded audio
- Retell the events
- In discussion with the group, capture key points and issues, design ideas, missing data, and questions arising in the course of the discussion

- User researchers talk about what users said and what they observed that users did:

- Start with one big session to help everyone get going in the same direction, then break into groups to work in parallel.
- Choose groupings to give an approximate balance of group size, background and skills, and distributing the user researchers across the groups.
- A moderator in each group keeps things on track, while user researchers give accounts of each interview. AND SO ON ….

- Finally the group engages in introspection about lessons learned.
- The group brainstorms to evaluate their process reflecting on what went well and what could be improved for next visit and how.
- The outputs of this process of review and interpretation are:

- Sets of work activity notes synthesized from raw data
- A work activity affinity diagram to organize the work activity notes

8.4.3 Synthesizing Work Activity Notes

- Because some application domains can be unfamiliar to some team members, the work activity note synthesis should be done by people who have already been immersed in the contextual data, probably the same people who did the interviews and observations.
- Guidelines for synthesizing work activity notes, starting here:

  - As you create each new work activity note, tag it with a source ID, a unique identifier of the person being observed and/or interviewed when the note was written.

- Paraphrase and synthesize instead of quoting raw data text verbatim.

For example:

Raw data: "I think of sports events as social events, so I like to go with my friends. The problem is that we often have to sit in different places, so it is not as much fun. It would be better if we could sit together."

In the user's perspective: "When I am looking to buy student tickets to MU basketball, I look for an option allowing several friends to sit together."

- Make each work activity note a simple declarative point instead of quoting an interviewer's question plus the user's answer.
- Filter out all noise and fluff; make each note compact and concise, easily read and understood at a glance.
- Be brief: Keep a note to one to three succinct sentences.

limit each note to one to three concise sentences

- Each note should contain just one concept, idea, or fact, with possibly one rationale statement for it. Break a long work activity note into shorter work activity notes.
- Make each note complete and self-standing.

- Never use an indefinite pronoun, such as “this,” “it,” “they,” or “them” unless its referent has already been identified in the same note.
- State the work role that a person represents rather than using “he” or “she.”
- Add words to disambiguate and explain references to pronouns or other context dependencies.
- Avoid repetition of the same information in multiple places.

Example: Work Activity Note Synthesis for MUTTS

- User comment (in response to thinking ahead about including athletic events):

When I am looking to buy student tickets to MU basketball, I like to look at different seating options vs. prices; I sometimes look for an option allowing several friends to sit together.

- Synthesized work activity notes:

When I am looking to buy student tickets to MU basketball, I like to look at different seating options vs. prices. When I am looking to buy student tickets to MU basketball, I sometimes look for an option allowing several friends to sit together.

8.4.4 Extending the Anticipated Data Bins to Accommodate Your Work Activity Note Categories

Examples of typical data categories you might encounter in your raw data are:

- User and user class information — details about the users or individuals being studied, including their demographic information, roles, and characteristics.
- Social aspects of work practice (how people interact with and influence each other) — how people within the work context interact with and influence each other. This may involve communication patterns, collaboration, and social dynamics.
- Emotional impact and long-term phenomenological aspects — emotional responses and long-term experiences of individuals within the work environment, such as job satisfaction, stress levels, and overall well-being.
- Task-specific information — details related to specific tasks or activities, including how they are performed, their goals, and any challenges encountered.
- Physical work environment — physical surroundings where work takes place, including factors like office layout, equipment, lighting, and ergonomics.
- Design inspiration ideas — any insights or concepts that could inspire the design or improvement of products, systems, or processes based on the gathered data.

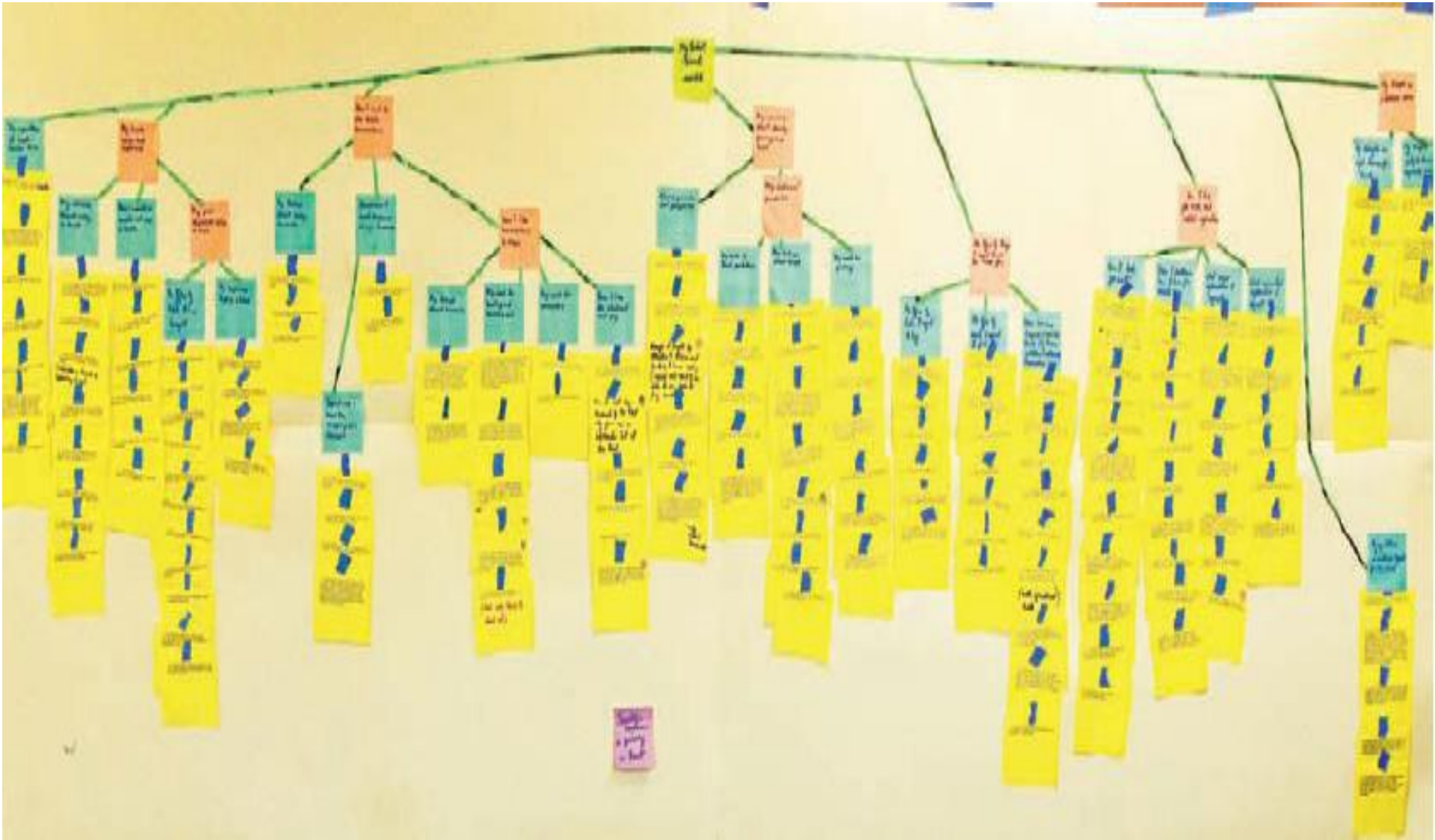
8.5 Constructing Your Work Activity Affinity Diagram (WAAD)

Introduction to WAAD Building

Affinity diagramming is a technique for organizing and grouping the issues and insights across all users in your contextual data and showing it in a visual display that can cover one or more walls of a room.

Example: WAAD Building for MUTTS

you can see a photo of a large part of the overall WAAD we built for MUTTS.



8.6 Abridged Contextual Analysis Process

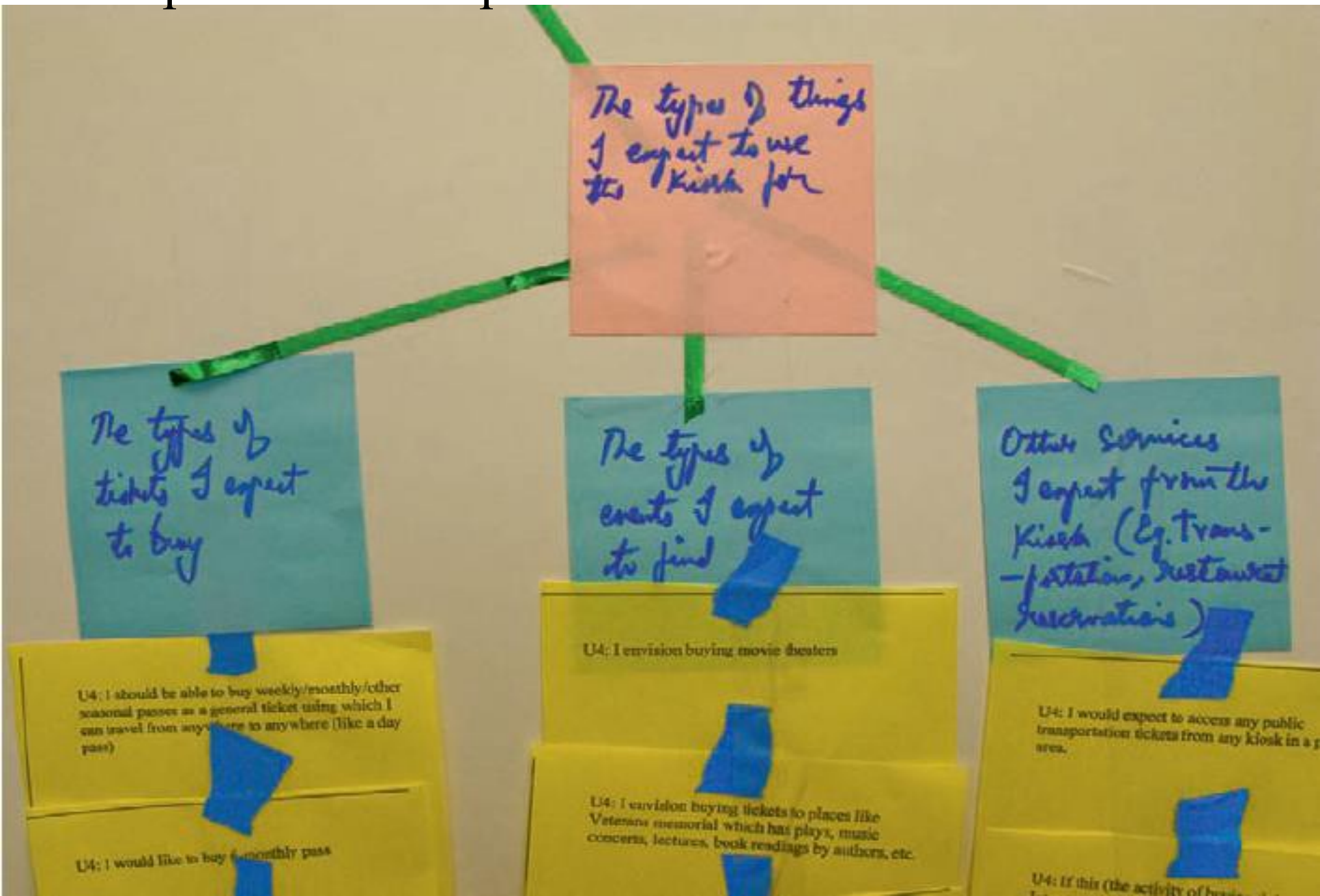
8.6.1 Plan Ahead during Contextual Inquiry by Capturing One Idea per Note

- The idea is to produce work activity notes without the laborious and voluminous intervening raw data transcripts.
- Experienced practitioners, skilled at note taking and abstracting the essence, can do some of this abstraction of detail from the real-time flow of raw data during the interviews themselves.

8.6.2 Focus on the Essence of WAAD Building

- The WAAD-building process itself can also be abridged by creating clusters of all the work activity data notes without building a hierarchical abstraction of the different categories.
- As you get through the part of the process where you put all the work activity notes on the wall to represent the affinities as clusters, you get a sense of the key themes and issues in the work domain.
- Using the temporary labels and walking through the clusters, you can immediately start creating a list of high-level requirements for the system.

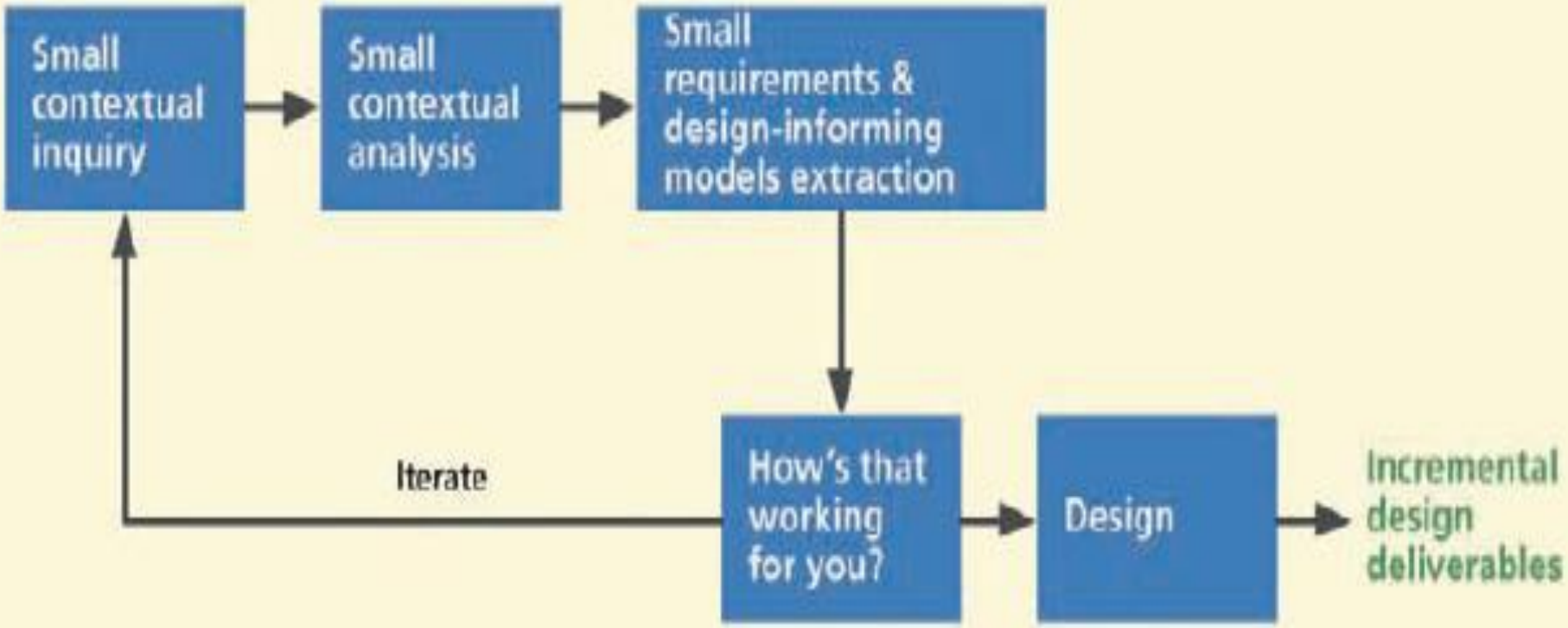
Example : A close-up of the MUTTS WAAD.



8.6.3 Use Finer-Grained Iteration to Address Pressure for Early Deliverables

- Doing a full contextual inquiry and requirements extraction process upfront means a large investment in each stage before proceeding to the next and delayed design deliverables, causing conflict with an anxious manager or customer.

- An incremental investment in smaller and more frequent iterations is well suited for this common situation, as shown in Figure below **Do a little contextual inquiry, a little contextual analysis, a little requirements extraction and a little design** and then get some feedback from users about whether you are on course.



8.6.4 History Of Affinity Diagrams

- Historically, affinity diagramming has been used as an effective method for generating hierarchical categories to organize large amounts of unstructured, far-ranging, and seemingly dissimilar qualitative data about almost anything.

vast

This process reveals and specifies shared problems, differences, work behaviors, and requirements while still acknowledging and retaining individual variations. This process doesn't overlook the fact that individuals may have variations in their experiences, behaviors, or requirements.

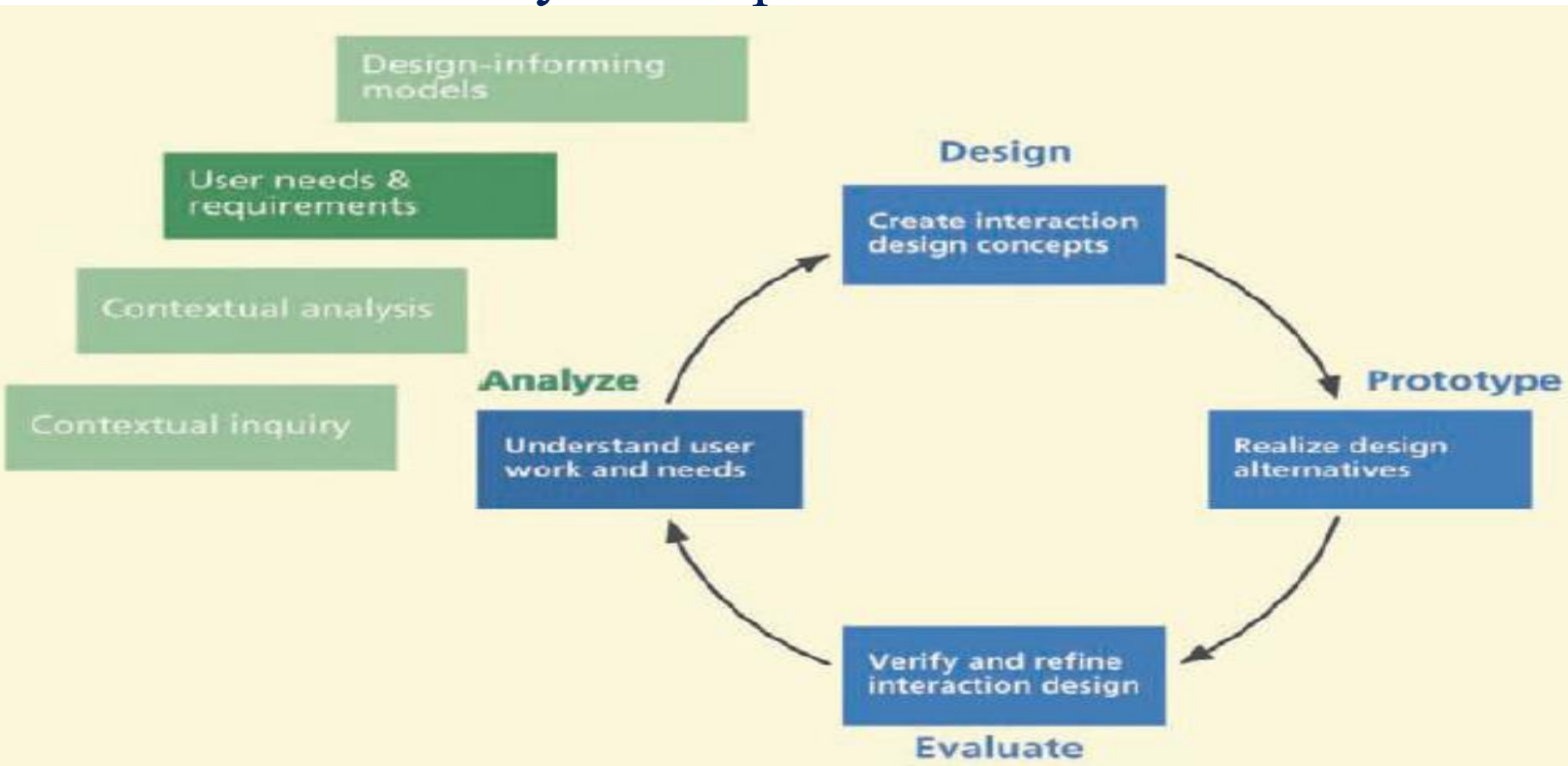
- As Wood (2007) says, “This process exposes and makes concrete common issues, distinctions, work patterns, and needs without losing individual variation.”
- The affinity diagram has been called one of the most significant management and planning tools in business and has been used to organize many different kinds of ideas in brainstorming and qualitative data in studies.

9. Extracting Interaction Design Requirements

9.1 Introduction

9.1.1 You are here

- the chapter on extracting interaction requirements, within understanding user work and needs in the context of the overall Wheel lifecycle template.



9.1.2 Now That We Have Done Contextual Analysis, We Have the Requirements, Right? Not

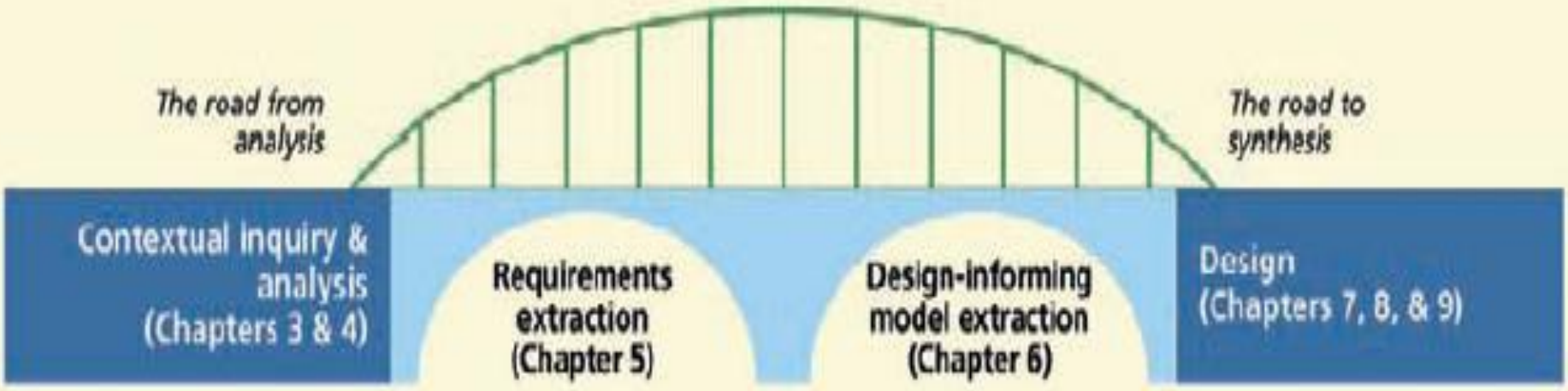
9.1.3 Gap between Analysis and Design

There is a gap:

- Information coming from contextual studies describes the work domain but does not directly meet the information needs in design.
- There is a cognitive shift between analysis-oriented thinking on one side of the gap and design-oriented thinking on the other.

- The gap is the demarcation between the old and the new—between studying existing work practice and existing systems and envisioning a new work space and new system design space.

separation



9.2 Needs And Requirements: First Span Of The Bridge

9.2.1 What Are “Requirements”?

9.2.2 Requirements “Specifications”

9.2.3 Software and Functional Implications of Interaction Design Requirements

result

structured and well-defined approach

9.3 Formal Requirements Extraction

- This process of extracting needs and requirements is similar to data interpretation and consolidation sessions of contextual analysis in that it involves a group sitting down together and going over a large amount of data, including the WAAD and evolving design-informing models.
- But here it is actually easier because much of the hard work is already done.

work activitiy affinity diagram

9.3.1 Walking the WAAD for Needs and Requirements

- It is now time for your team to get re-immersed in work activity data.
- this time with the focus of the walkthrough on extracting needs and requirements rather than iteratively improving the data.
- The general idea is to traverse the hierarchical WAAD structure and focus on extracting requirement statements from work activity notes.

review

the walkthrough process is centered on extracting the essential needs and requirements, as opposed to primarily refining or enhancing the data through iterations

Switching from inductive to deductive reasoning is like changing how you think. Inductive is when you look at specific things to make a general idea, like seeing many black crows and thinking all crows are black. Deductive is when you start with a general idea and use it to figure out specific things, like knowing all men are mortal and then concluding that Socrates, who is a man, is also mortal. It's about moving from looking at details to using a big idea or theory to figure things out.

9.3.2 Switching from Inductive to Deductive Reasoning

9.3.3 Preparation

9.3.4 Systematic Deduction of Needs as “Hinges” to Get at Requirements

structured way of figuring out the most important needs that act as key points for defining requirements.

9.3.5 Terminology Consistency

9.3.6 Requirement Statements

For example: how different elements or components within a system or between systems must interact with each other.

- Interaction requirement: “Ticket buyers shall be able to see a real-time preview of available seating for a venue.”
- Corresponding system requirement: “System shall have networked infrastructure to poll all kiosk transactions as they are happening and coordinate with the venue seating data to ‘lock and release’ selected seats.”

this requirement outlines that the system must be equipped with a networked infrastructure that continuously monitors all transactions occurring at the kiosks in real-time. It should also be capable of coordinating with the data to manage the process of "locking" and "releasing" specific seats within the venue. This means that the system can secure seats for customers when they are in the process of purchasing tickets and release those seats if the transactions are not completed, ensuring efficient seat management during ticket sales.

9.3.7 Requirement Statement Structure

- For systems where risk is high and traceability is important, each requirement is tagged with the WAAD source node ID, which serves as a link back to the source of this requirement statement within the WAAD.
- The WAAD in turn has a link back to its source in raw work activity data.
- Later, if a question arises about a particular need or requirement, the connection to original work activity data and the person who was its source can be traced to find the answers

- Generic structure of a requirement statement.

Name of major feature or category
Name of second-level feature or category
Requirement statement [WAAD source node ID]
Rationale (if useful): Rationale statement
Note (optional): Commentary about this requirement

- As an example, consider the work activity note that said "I am concerned about privacy and security of my transactions." In following figure we show how the resulting requirement statement fits into the requirement statement structure of above figure.

Security
Privacy of ticket–buyer transactions
Shall protect security and privacy of ticket-buyer transactions [C19]
Note: In design, consider timeout feature to clear screen between customers.

9.3.8 Requirements Document Structure

- We show two levels of headings, but you should use as many levels as necessary for your requirements.
- As an example of an extracted requirement for the Ticket Kiosk System,
- Suppose in our contextual inquiry a user mentioned the occasional convenience of shopping recommendations from Amazon.com. The resulting requirement might look like what is shown in following figure.

Transaction flow

Recommendations for buying

Ticket-buyer purchases shall be supported by recommendations for the purchase of related items. [DE2].

Implied system requirement: During a transaction session the Ticket Kiosk System shall keep track of the kinds of choices made by the ticket buyer along with the choices of other ticket buyers who bought this item. [DE2].
Note: Amazon.com is a model for this feature.

9.3.9 Continue the Process for the Whole WAAD

9.3.10 Keep an Eye out for Emotional Impact Requirements and Other Ways to Enhance the Overall User Experience

9.3.11 Extrapolation Requirements: Generalization of Contextual Data

9.3.12 Other Possible Outputs from the Requirements Extraction Process

- Questions about missing data
- System support needs
- Marketing inputs

9.3.13 Constraints as Requirements

Example: Constraints for MUTTS

- Special-purpose hardware for the kiosk
- Rugged, “hardened” vandal-proof outer shell
- All hardware to be durable, reliable
- Touchscreen interaction, no keyboard
- Network communications possibly specialized for efficiency and reliability
- If have a printer for tickets (likely), maintenance must be an extremely high priority; cannot have any customers pay and not get tickets (e.g., from paper or ink running out)
- Need a “hotline” communication feature as backup, a way for customers to contact company representatives in case this does happen

9.3.14 Prioritizing Requirements

9.3.15 Taking Requirements Back to Customers and Users for Validation

gather feedback and confirmation that the requirements align with what the users actually want

9.3.16 Resolve Organizational, Sociological, and Personal Issues with the Customer

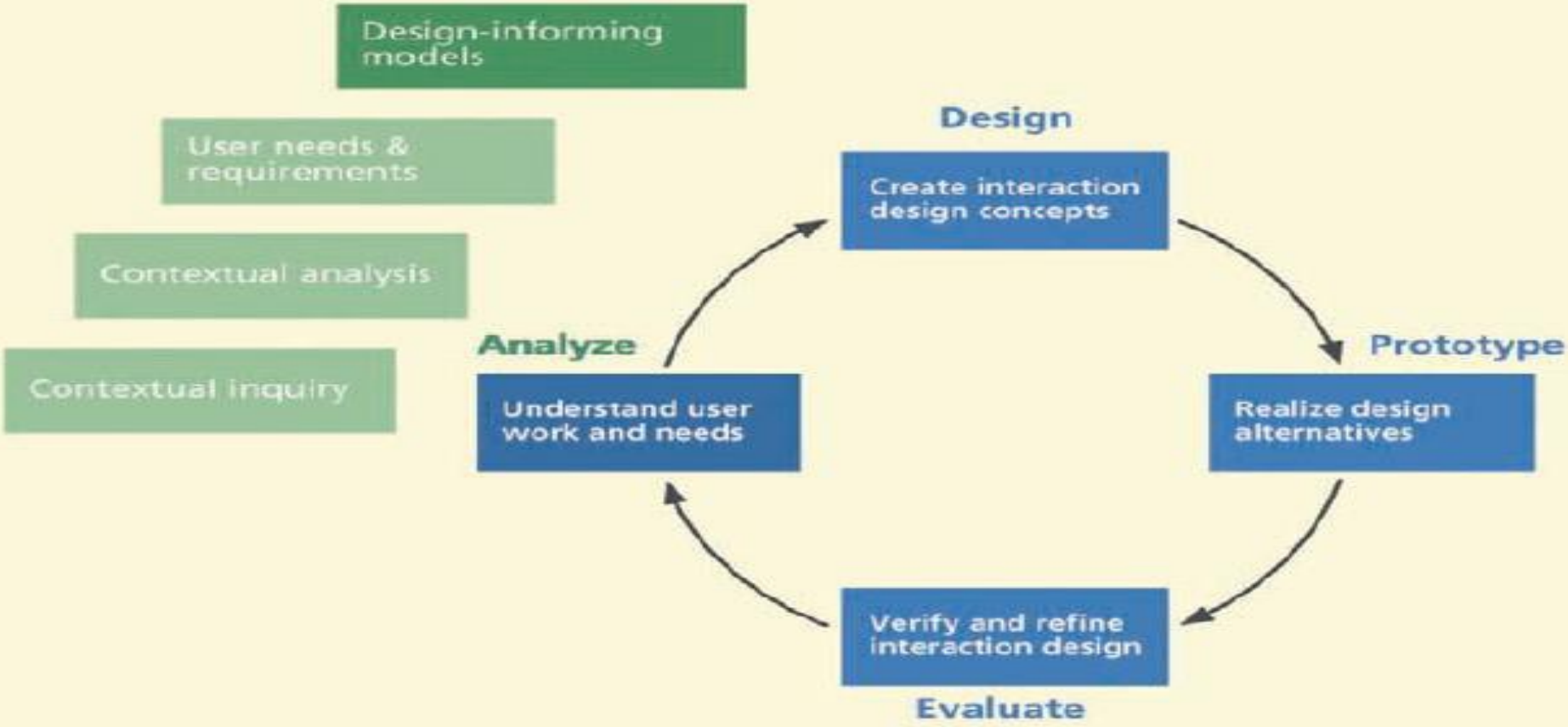
9.4 Abridged Methods For Requirements Extraction

9.4.1 Use the WAAD Directly as a Requirements Representation
9.4.2 Anticipating Needs and Requirements in Contextual Analysis
9.4.3 Use Work Activity Notes as Requirements (Eliminate the WAAD Completely)

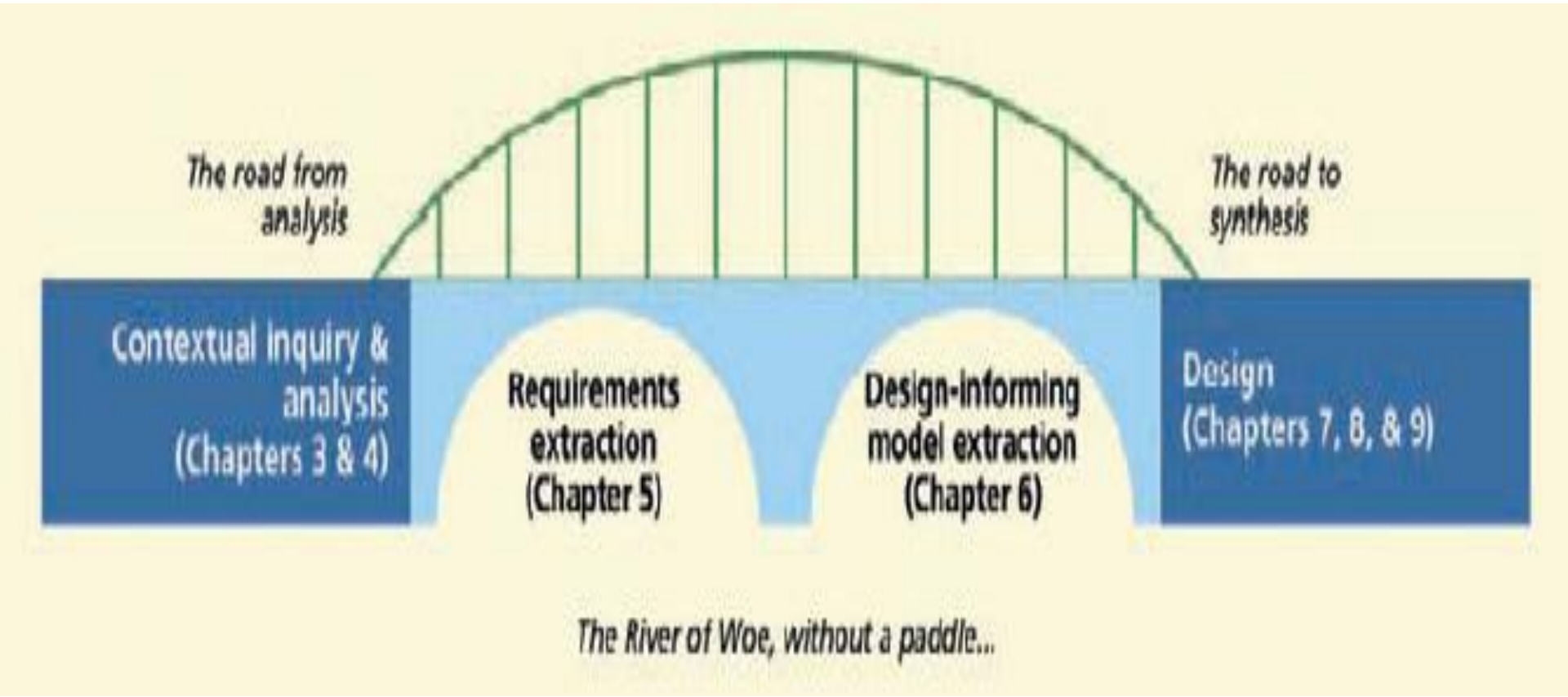
10. Constructing Design Informing models

10.1 Introduction

- We have now made it across the first of two spans of the bridge between contextual analysis and design.
- We have extracted requirements and are now on our way to constructing some design-informing models.



10.2 Design-informing Models: Second Span Of The Bridge



10.2.1 What Are Design-Informing Models and How Are They Used?

Design-informing models are visual or conceptual representations used in the design and development of a system, product, or process. These models serve as tools to inform and guide the design process, ensuring that the final solution meets the intended goals and requirements.

able to trace

- Helps to integrate and summarize the contextual data

systematic and documented way of ensuring that evidence or data can be trusted as accurate and untampered,

- Point back to the data, to maintain the "chain of custody" to ensure that the design is based on real contextual data
- Provide a shared focus for analysis now and, later design
- Provide intermediate deliverables, which can be important to your working relationship with the customer

contextual data refers to the specific information, observations, or insights gathered from the environment

establishing a common and agreed-upon point of reference that guides both the analysis phase and the subsequent design phase of a project. This shared focus ensures that

10.2.3 Envisioned Design-Informing Models

10.3 Some General “How To” Suggestions

10.3.1 Maintain Connections to Your Data

10.3.2 Extract Inputs to Design-Informing Models

10.3.3 Use Your “Bins” of Sorted Work Activity from Contextual Inquiry and Contextual Analysis

10.3.4 Represent Barriers to Work Practice

Identify and document any barriers or obstacles that users face in their work practices.
Use these representations to inform your design solutions and address these challenges.
Ensure that the design takes into account strategies for overcoming these barriers.

Persona

- A persona, as used in contextual data representation and interaction design, is a hypothetical but specific "character" in a specific work role, with specific user class characteristics.
- As a technique for making users real to designers, a persona is a story and description of a realistic individual who has a name, a life, and a personality, allowing designers to limit design focus to something very specific.

a persona is a fictional yet well-defined "character" created to represent a specific work role within a particular user class. Personas are based on real data and are used as a tool to help designers understand and empathize with the needs, behaviors, and characteristics of the target users. They provide a clear and relatable representation of the people who will be interacting with a product, system, or service, allowing designers to tailor their designs to meet the specific requirements and preferences of these personas.

10.4 User Models

- User models are a set of models that define who the users are, including everything about work roles, sub-roles, user class definitions, and personas.
- Perhaps the most important of the design-informing models are the **user models** and the **usage models**.

Usage models describe how users typically interact with a system or product. This includes their navigation patterns, common tasks, and behaviors during their interactions.

10.4.1 Work Roles

- Sub-roles

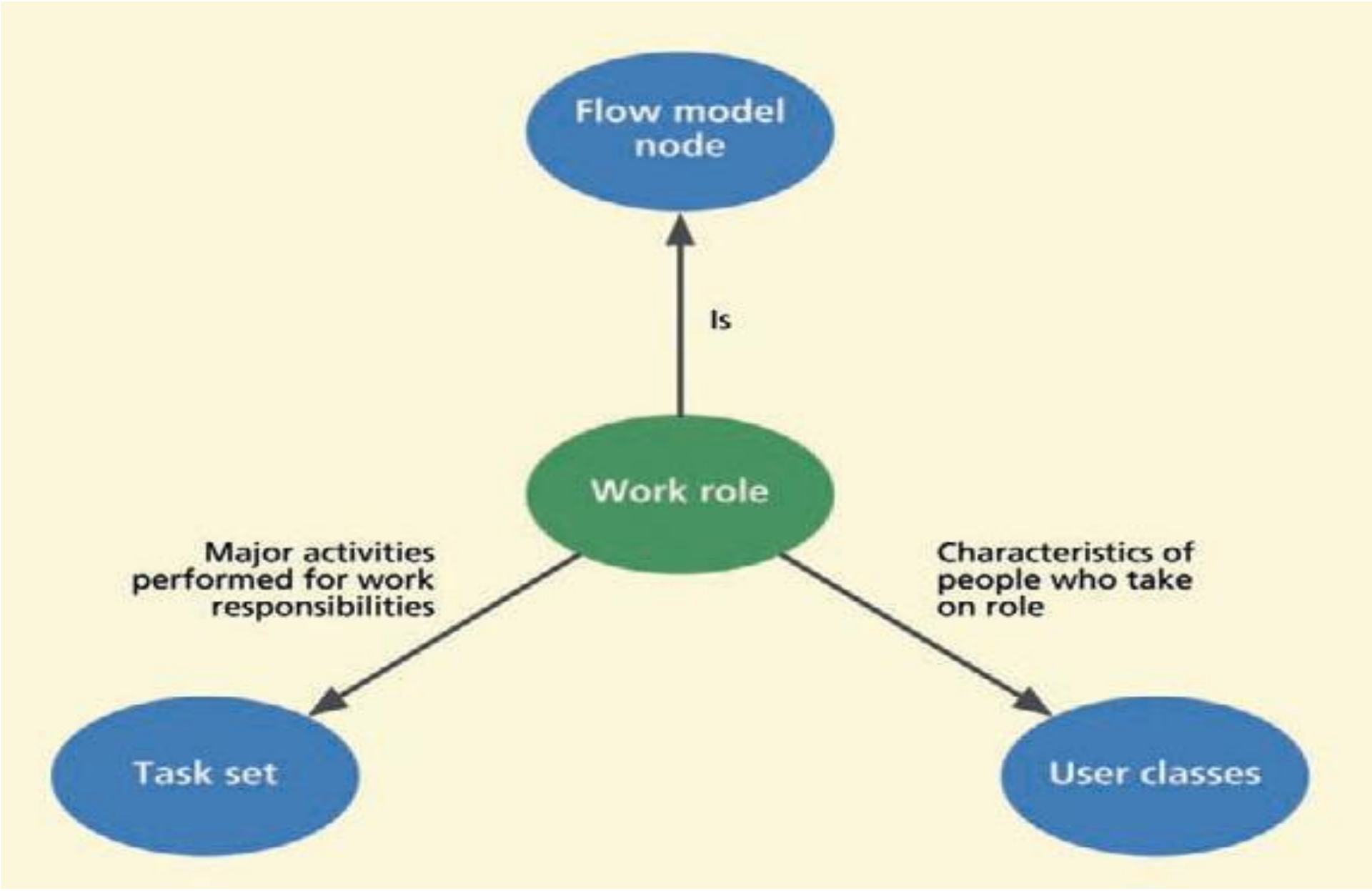
in a marketing department, the work role of a "Marketing Manager" may have sub-roles such as "Digital Marketing Specialist" and "Content Marketing Specialist." Each sub-role focuses on specific tasks and responsibilities within the broader field of marketing. The Digital Marketing Specialist may handle tasks related to online advertising and social media, while the Content Marketing Specialist concentrates on content creation and strategy.

For some work roles, there are obvious sub-roles distinguished by different subsets of the tasks the work role does.

- Mediated work roles

roles that involve using technology

- Envisioned work roles
- Relationship of work roles to other concepts



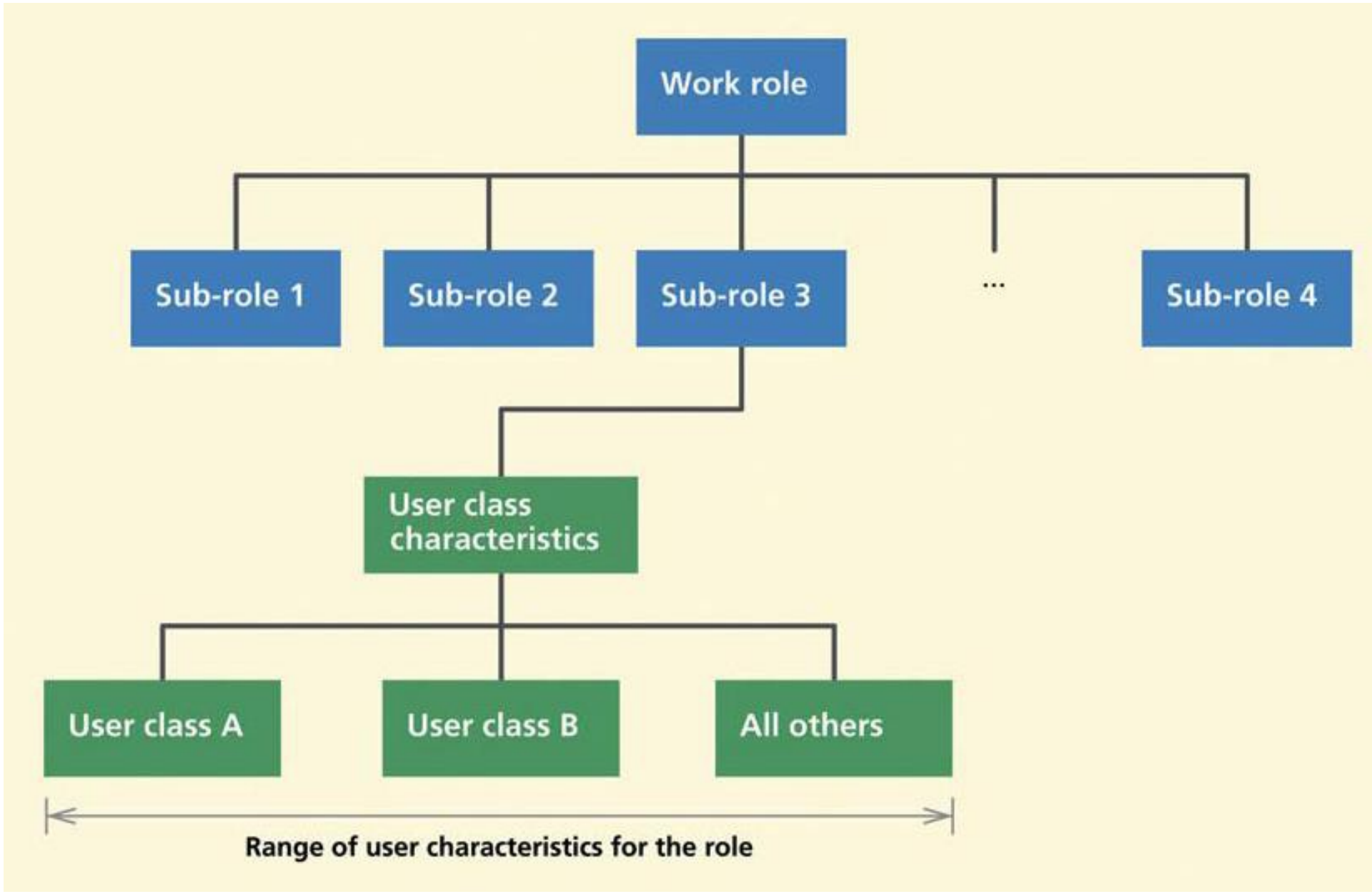
Concepts defining and related to work roles.

10.4.2 User Classes

User classes can be categorized based on various characteristics that impact how individuals interact with a system or product.

- Knowledge- and skills-based characteristics
- Physiological characteristics
- Experience-based characteristics
  - **novice or first-time user** : may know application domain but not specifics of the application
  - **intermittent user** : uses several systems from time to time; knows application domain but not details of different applications
  - **experienced user** : “power” user, uses application frequently and knows both application and task domain very well

Physiological characteristics pertain to users' physical attributes and capabilities. This includes factors such as age, physical abilities, sensory capabilities, and any unique physiological requirements or limitations.

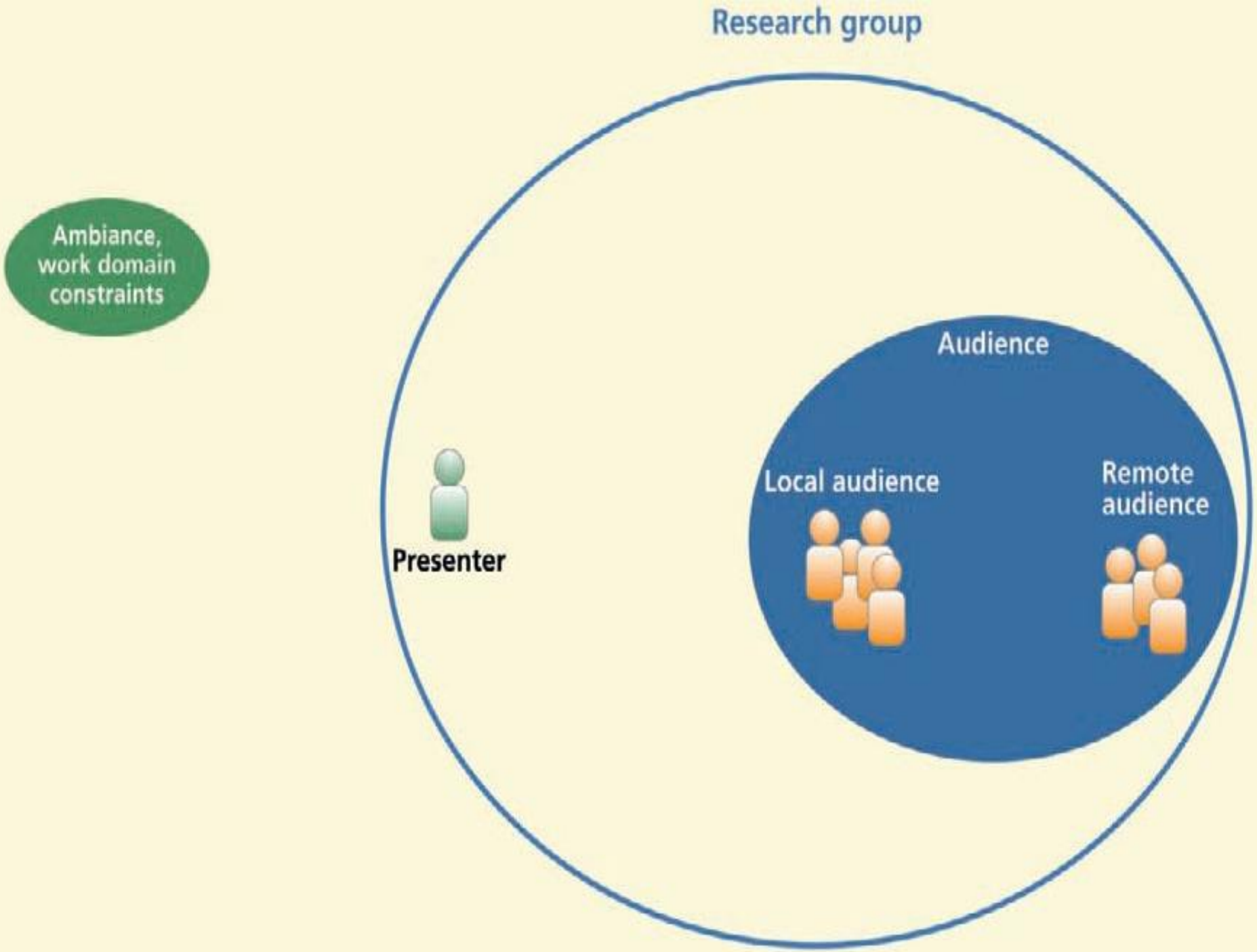


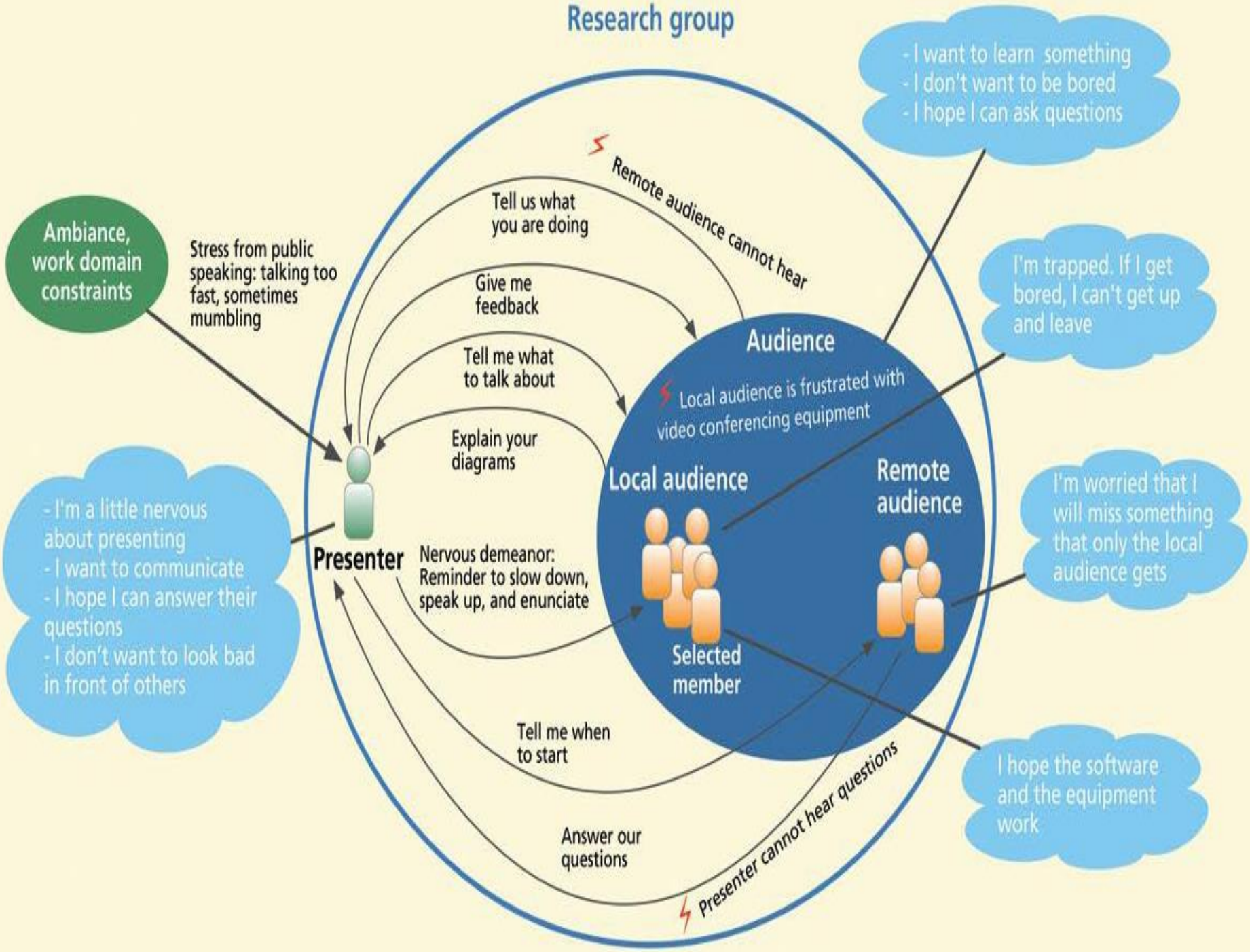
Relationships among work roles, sub-roles, and user

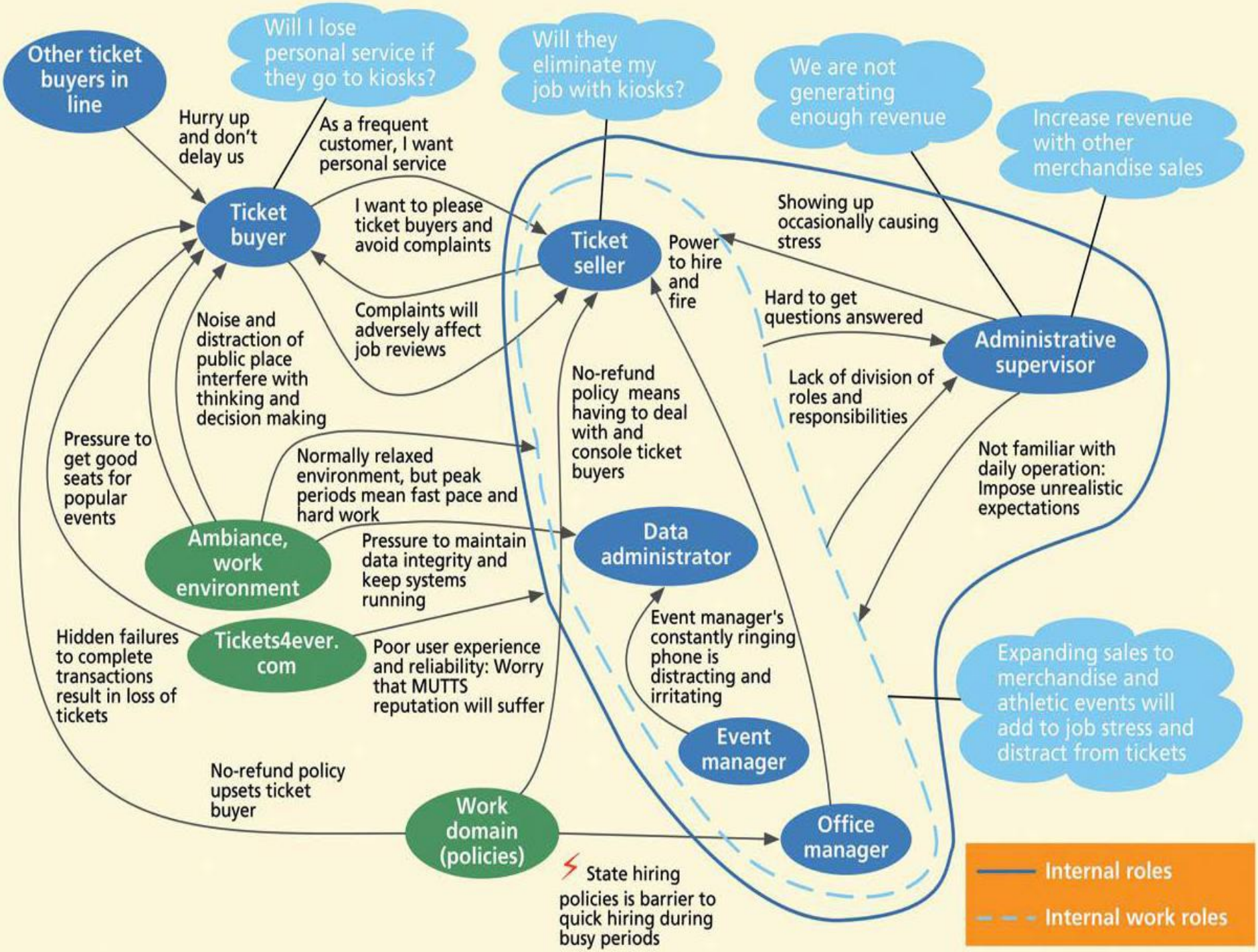
10.4.3 Social Models

Social models are particularly valuable in the design of social media platforms, online communities, collaborative software, and any technology or system that involves user-to-user interactions. By incorporating insights from social models, designers can create more effective and engaging experiences that align with users' social needs and behaviors.

- Identify active entities and represent as nodes
- Identify concerns and perspectives and represent as attributes of nodes
- Identify influences and represent as relationships among entities
- Social models in the commercial product perspective
- The envisioned social model


Research group
Ambiance, work domain constraints
Audience
Local audience
Remote audience
Presenter

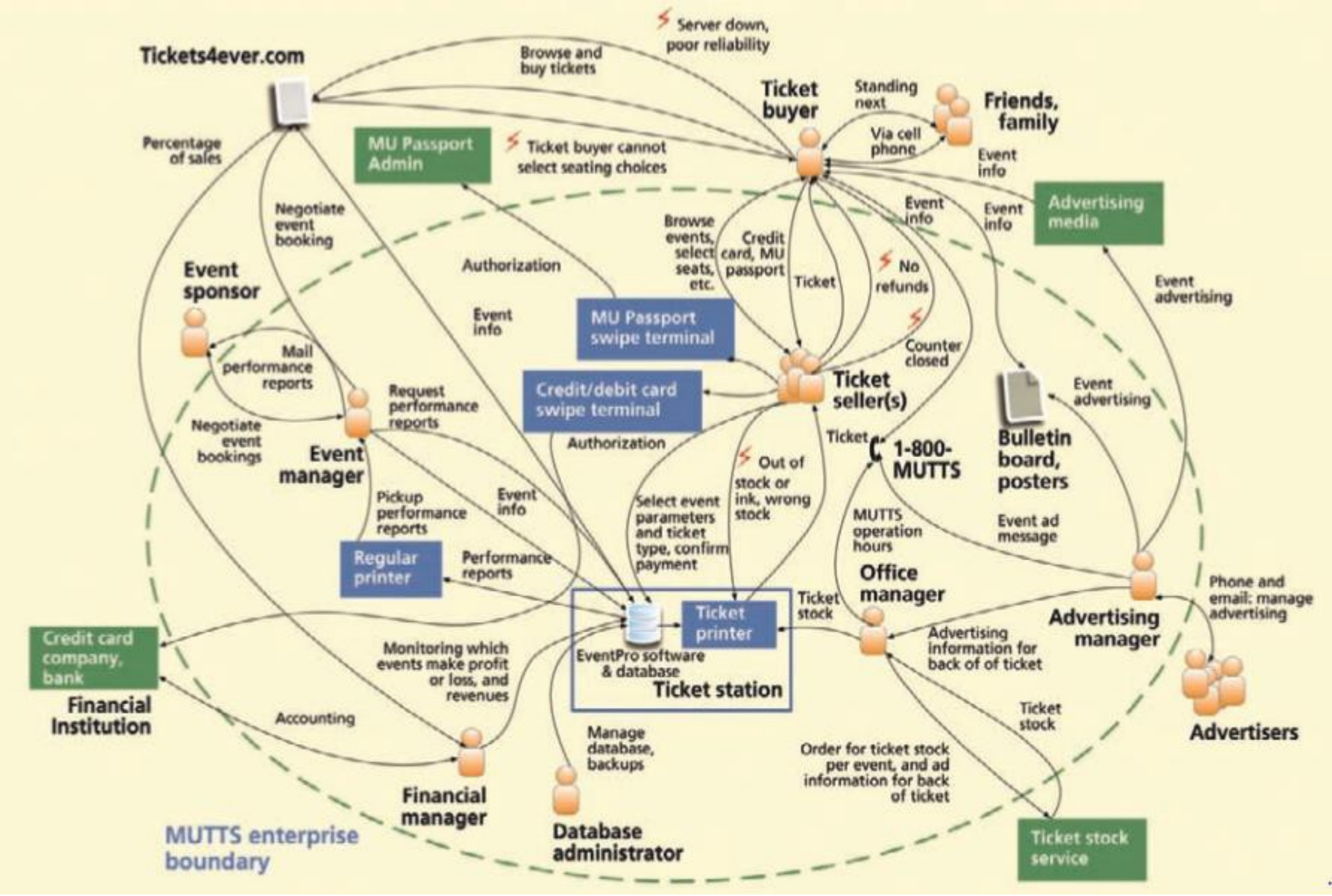

Research group
- I want to learn something
- I don't want to be bored
- I hope I can ask questions
Remote audience cannot hear
Tell us what you are doing
Give me feedback
Tell me what to talk about
Explain your diagrams
Ambiance, work domain constraints
Stress from public speaking: talking too fast, sometimes mumbling
Audience
Local audience is frustrated with video conferencing equipment
Local audience
Remote audience
I'm trapped. If I get bored, I can't get up and leave
- I'm a little nervous about presenting
- I want to communicate
- I hope I can answer their questions
- I don't want to look bad in front of others
Presenter
Nervous demeanor: Reminder to slow down, speak up, and enunciate
Selected member
I'm worried that I will miss something that only the local audience gets
Tell me when to start
I hope the software and the equipment work
Answer our questions
Presenter cannot hear questions


Other ticket buyers in line
Will I lose personal service if they go to kiosks?
Will they eliminate my job with kiosks?
We are not generating enough revenue
Increase revenue with other merchandise sales
Hurry up and don't delay us
As a frequent customer, I want personal service
Ticket buyer
I want to please ticket buyers and avoid complaints
Ticket seller
Power to hire and fire
Showing up occasionally causing stress
Hard to get questions answered
Administrative supervisor
Complaints will adversely affect job reviews
Noise and distraction of public place interfere with thinking and decision making
No-refund policy means having to deal with and console ticket buyers
Lack of division of roles and responsibilities
Not familiar with daily operation: Impose unrealistic expectations
Pressure to get good seats for popular events
Normally relaxed environment, but peak periods mean fast pace and hard work
Ambiance, work environment
Pressure to maintain data integrity and keep systems running
Data administrator
Hidden failures to complete transactions result in loss of tickets
Tickets4ever.com
Poor user experience and reliability: Worry that MUTTS reputation will suffer
Event manager's constantly ringing phone is distracting and irritating
Event manager
Expanding sales to merchandise and athletic events will add to job stress and distract from tickets
No-refund policy upsets ticket buyer
Work domain (policies)
Office manager
State hiring policies is barrier to quick hiring during busy periods
Internal roles
Internal work roles

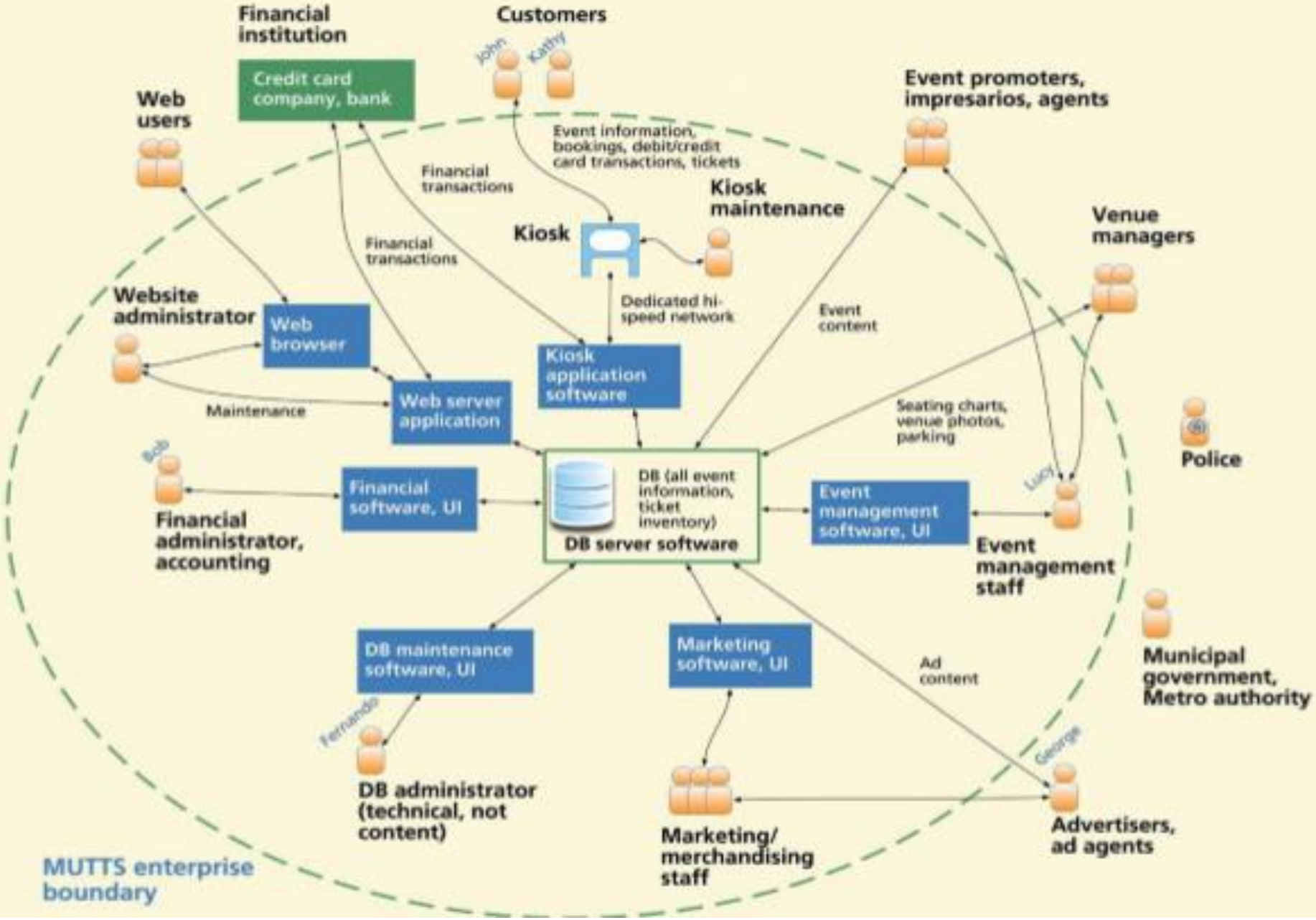
10.5 Usage Models

- Usage models are a set of models that define how work gets done, including
  - Flow models
  - Task structure models — relationships of tasks within a system or process
  - Task interaction models.

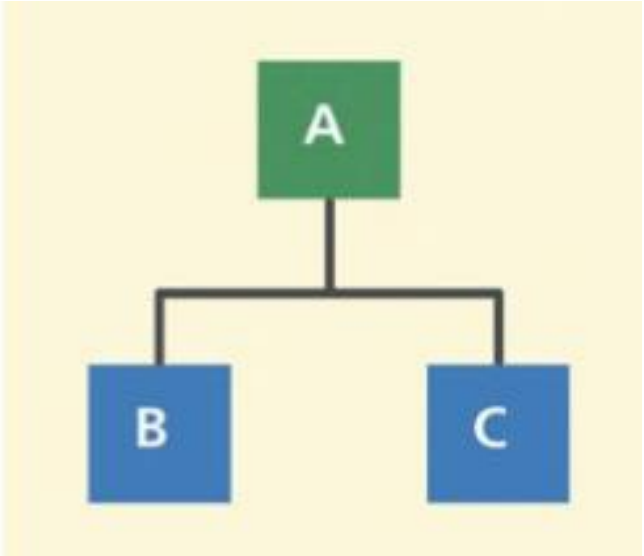
- Flow Model
  - Creating a flow model diagram
  - Flow models in the product perspective
  - The envisioned flow model
- Task Models
  - Tasks vs. functions
- Task Structure Models
  - Hierarchical Task Inventory
  - Task inventories lists of tasks or activities associated with a particular project, process, or domain
  - Task naming in hierarchical task inventories
  - Avoid temporal implications in hierarchical task inventories
  - Envisioned task structures



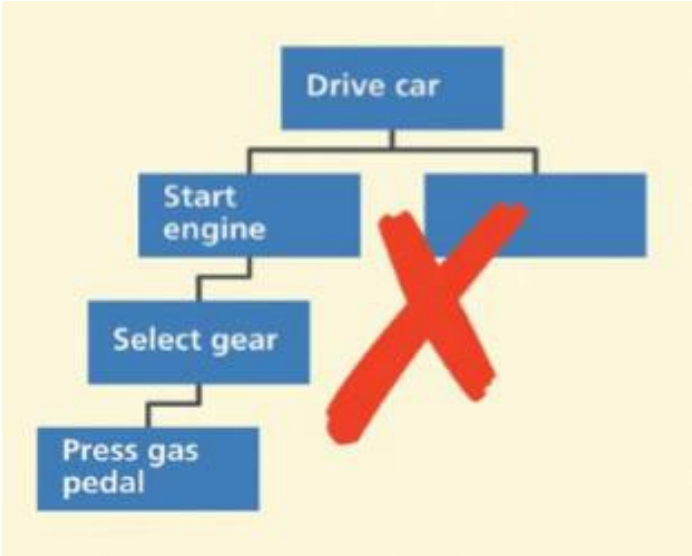
Flow model of our version Compiled By. U..Pro Tf.



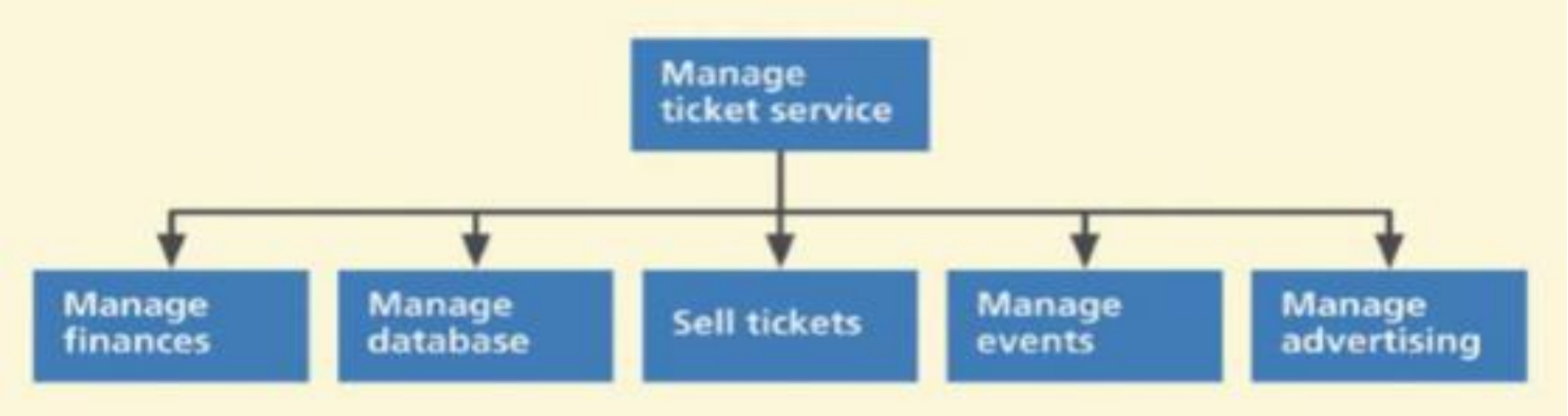
Envisioned flow model for the Ticketakeya



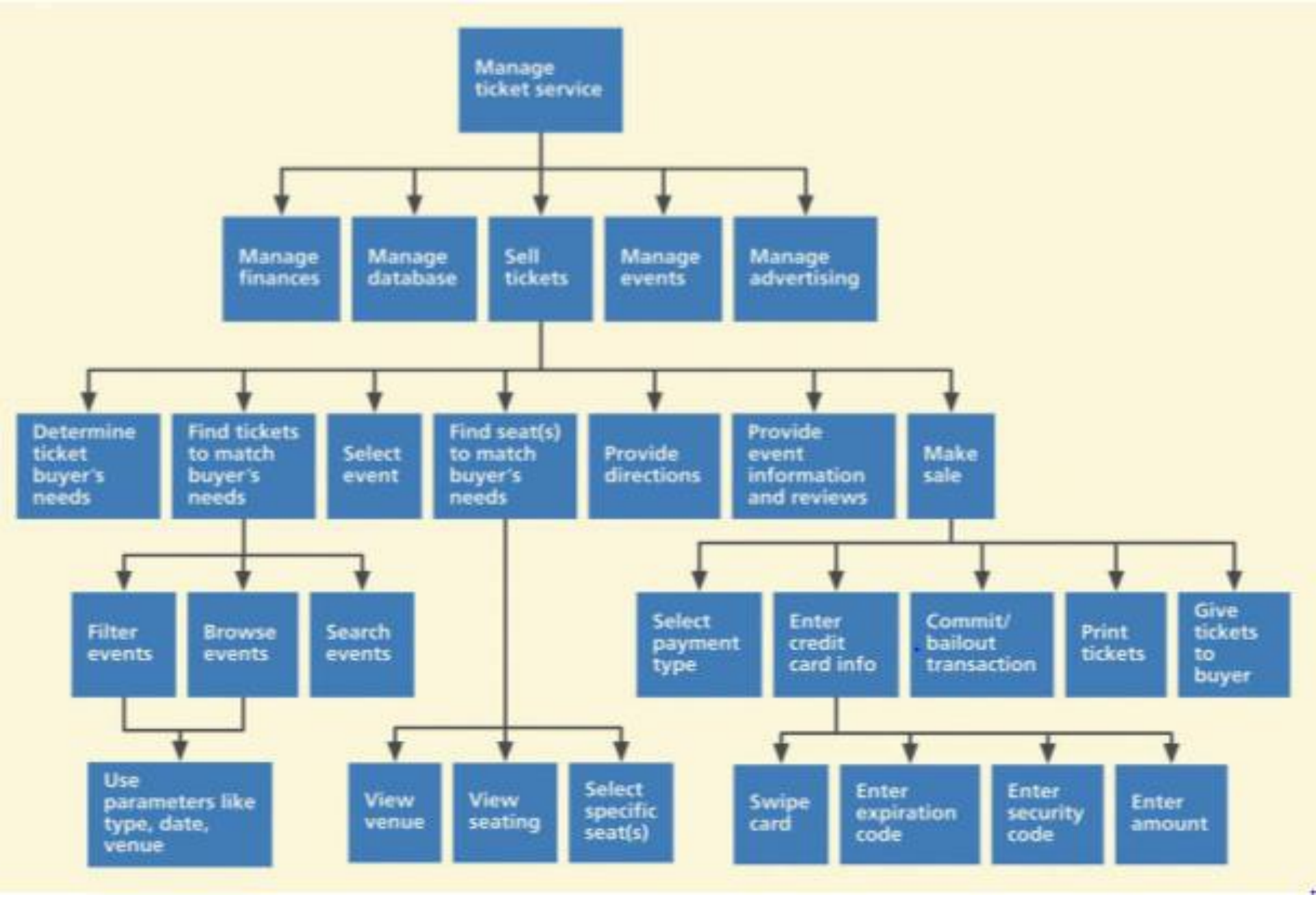
Hierarchical relationship of task A, the super-task, and tasks B and C, subtasks.



An incorrect hierarchical relationship attempting to show temporal sequencing.



Sketch of the top levels of a possible hierarchical task inventory diagram for MUTTS.



Partial HTI for MUTTS

- Task Interaction Models
  - Usage scenarios as narrative task interaction models
  - Elements of scenarios.

Task Interaction Models are used to understand and represent how tasks interact within a system. They can be depicted in various ways, including through usage scenarios. Usage scenarios are narratives that describe how users or agents interact with a system.

- Agents (users, people in work roles, often in personas, system, sensors)
- User goals and intentions
- User background, training, needs, etc.
- Reflections on work practice, including user planning, thoughts, feelings, and reactions to system

Scenarios often provide insights into how users plan and think about their tasks. They can include thoughts, feelings, and reactions to the system, providing a deeper understanding of the user's perspective.

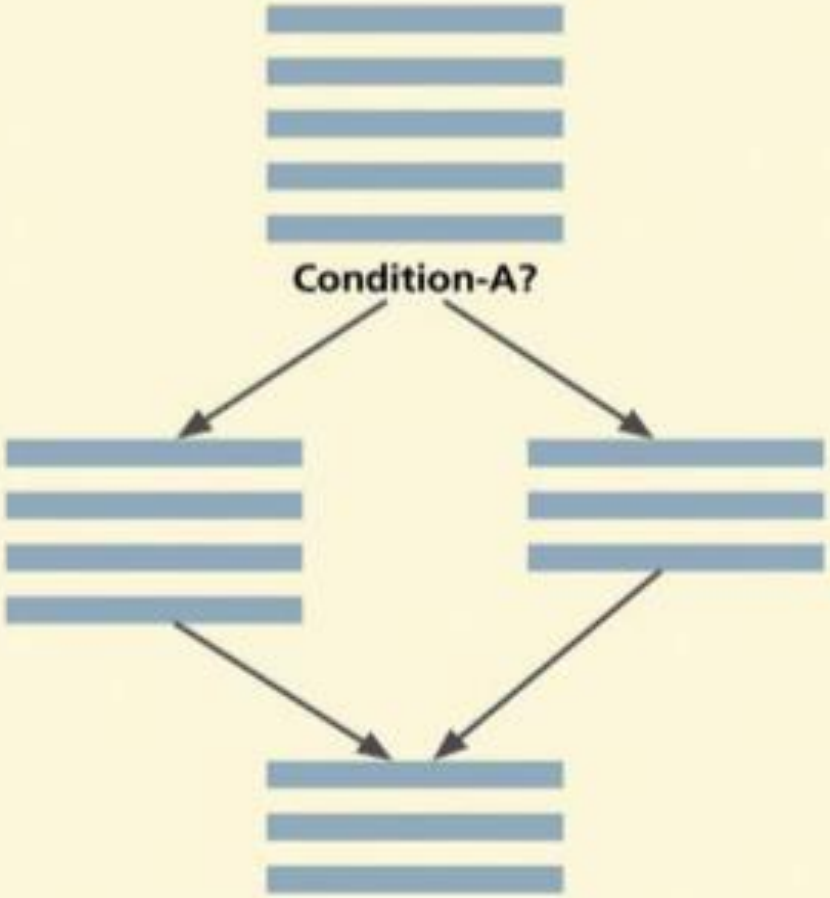
- User actions and user interface artifacts
- System responses, feedback
- User tasks, task threads, workflows, including common, representative, mission critical, and error and recovery situations
- Environmental and work context (e.g., phone ringing)
- Barriers, difficulties encountered in usage and, of course, a narrative, a story that plays out over time

– Envisioned usage scenarios or design scenarios

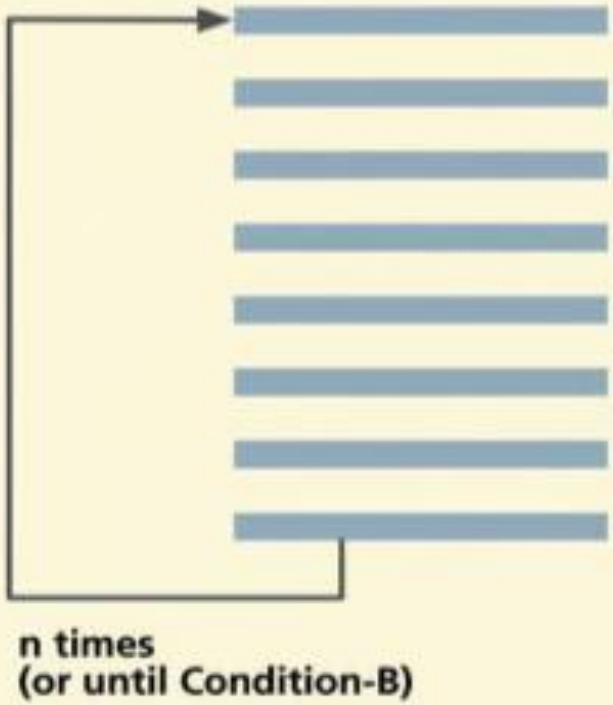
– Step-by-step task interaction models

– Essential use case task interaction models

– Envisioned task interaction models

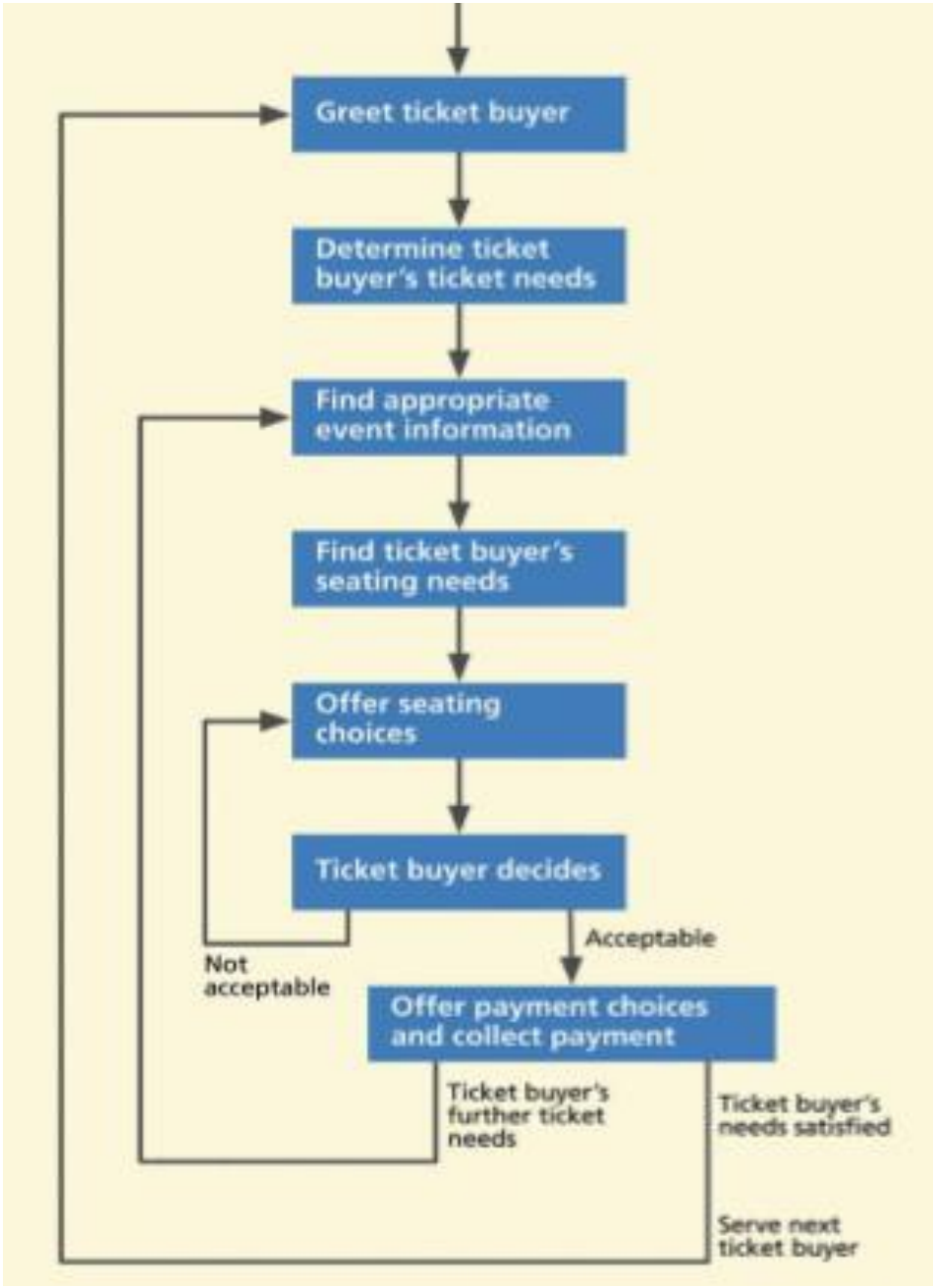


Branching in a step-by-step task description



Looping in a step-by-step task description

Branching and looping structures within step-by step task interaction models.



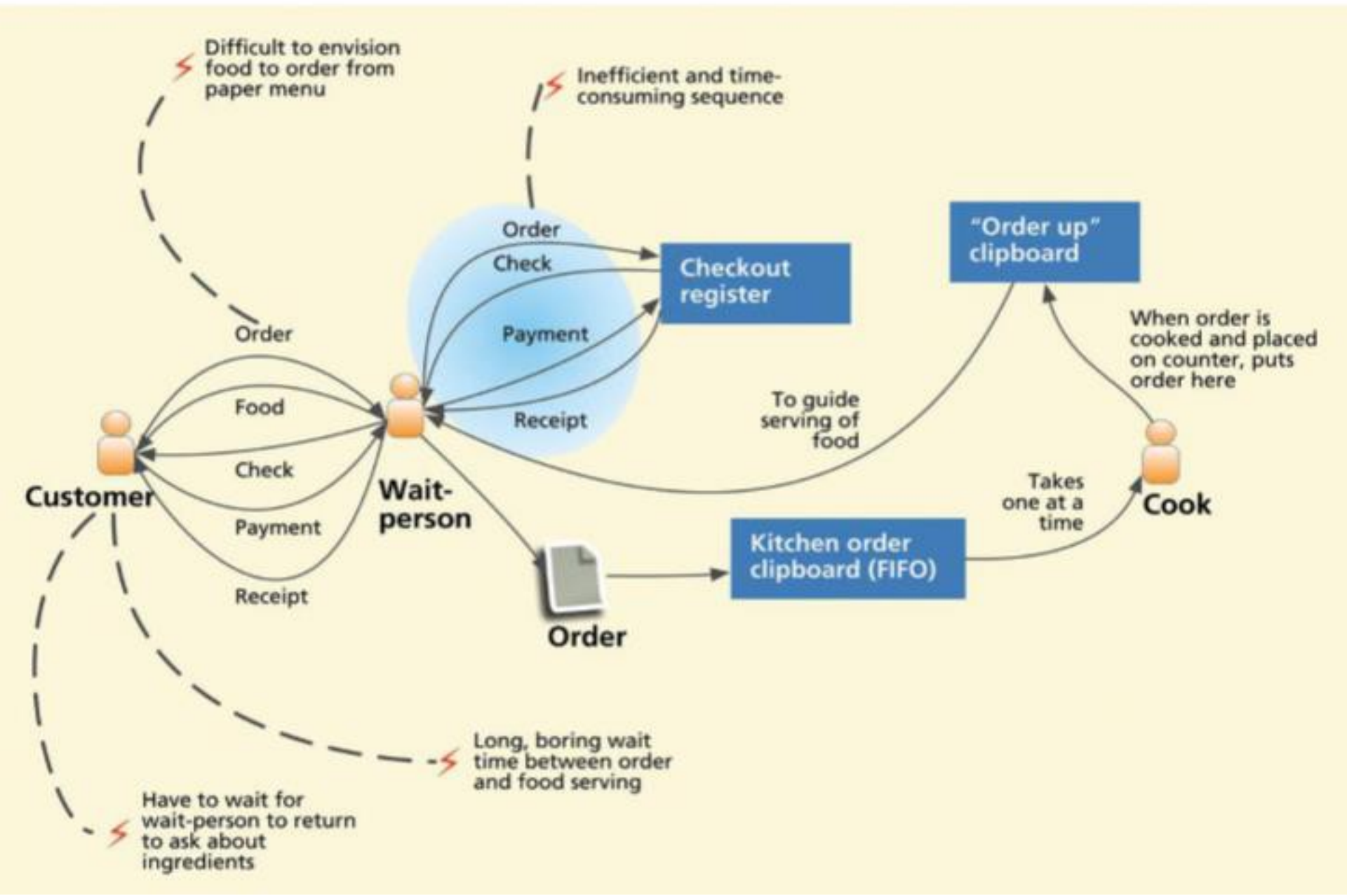
Task interaction branching and looping for MUTTS.

Example essential use case: Paying for a ticket purchase transaction (with a credit or debit card)

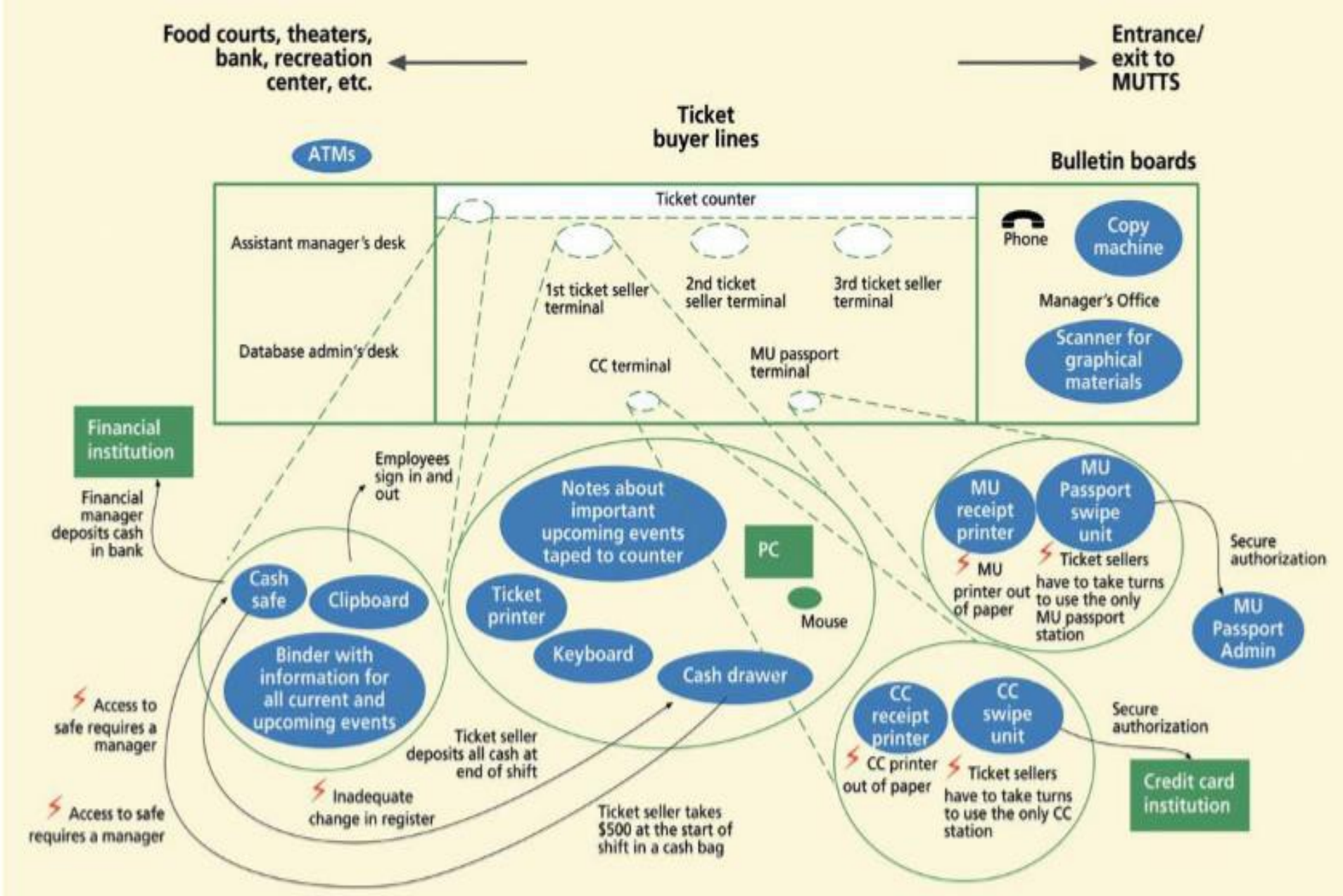
User Intention	System Responsibility
1. Ticket seller to computer: Express intention to pay	2. Request to insert card
3. Ticket seller or ticket buyer: Insert card	4. Request to remove card quickly
5. Withdraw card	6. Read card information
	7. Summarize transaction and cost
	8. Request signature (on touch pad)
9. Ticket buyer: Write signature	10. Conclude transaction
	11. Issue receipt
12. Take receipt	

10.6 Work Environment Models

- These models capture how the related work environment factors affect tasks in real usage.
- Of the work environment models, the physical model is probably the most important.
- Artifact Model
  - Constructing the artifact model
- Physical Model
  - Envisioned physical model



Part of a restaurant flow model with focus on work artifacts derived from the artifact model



A physical model for MUTTS.

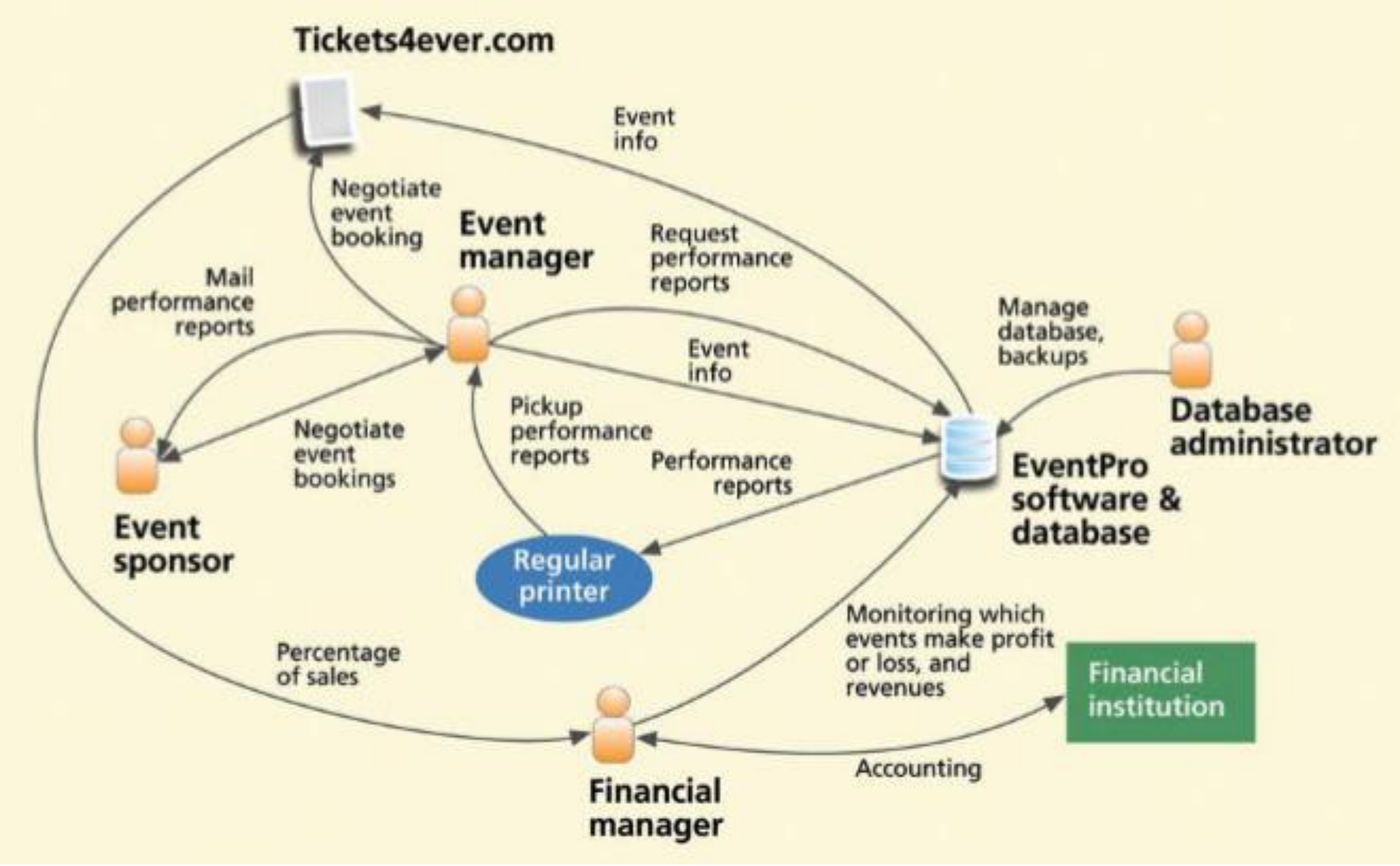
10.7 Barrier Summaries

Part of a restaurant flow model with focus on work artifacts derived from the artifact model.

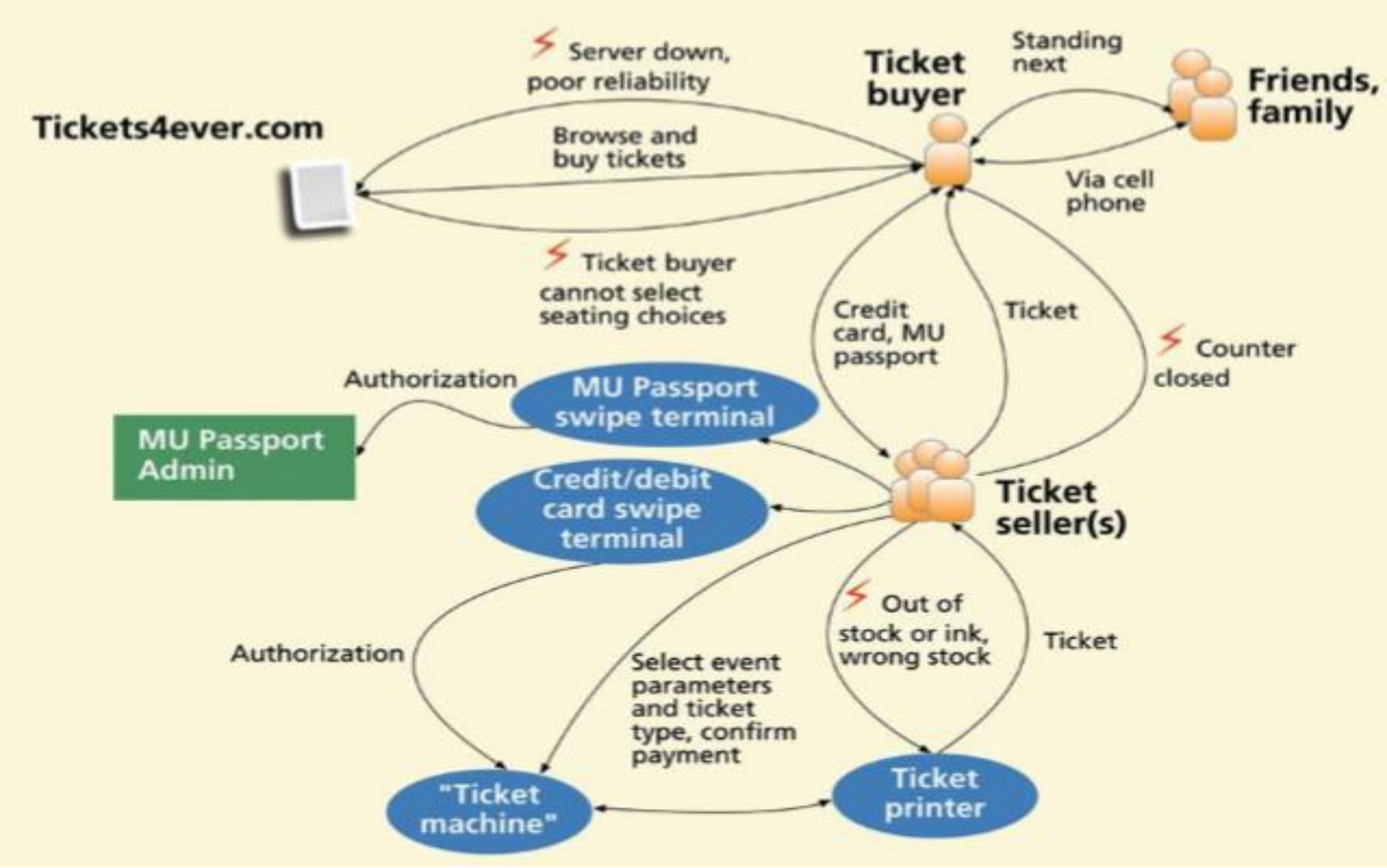
#	Trigger	Goal	Barrier
18	Question from remote audience member	Answer questions	Audio unintelligible. Local members instruct remote members to adjust audio setting.
19	Comment from remote member	Respond to comment	Audio unintelligible. Local members instruct remote members to reconnect.
20	Comments from local members	Respond to comments by referring to slide from earlier in presentation	Presenter tries to return to slide. Presenter searches through slides rapidly but cannot find it.
21	Question from local member	Answer question	Presenter tries again and eventually finds slide.
22	Local member asks presenter to bring up previous slide.	Go backward one slide	Presenter tries to go back one slide but goes forward one slide instead.
23	Remote audience reconnected	Continue discussion	
24	Question from remote member	Answer question	
25	Comment from local member	Respond to question	Presenter flips through slides searching for "system architecture" slide.

10.8 Model Consolidation

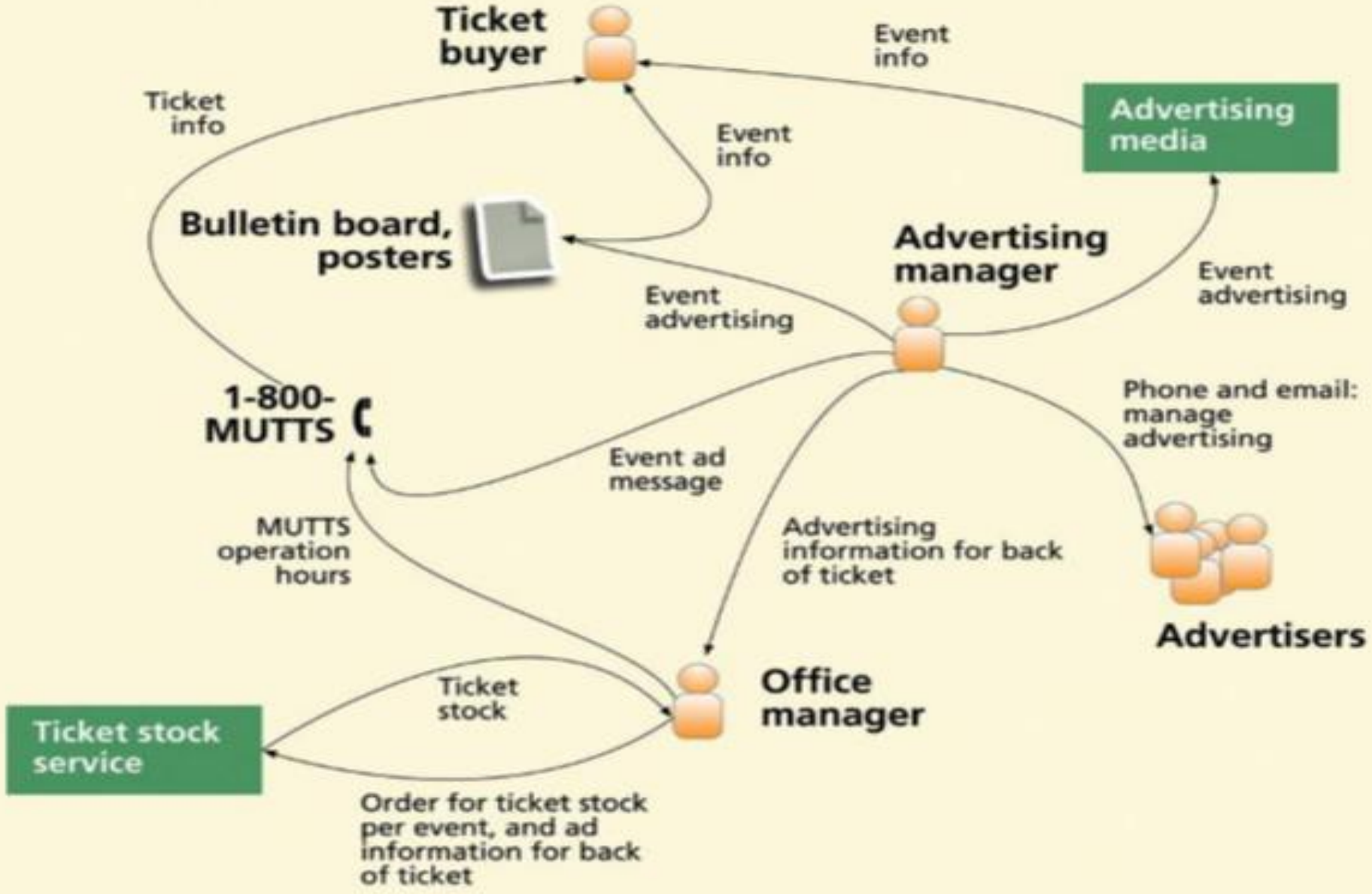
- It is a little like eliminating the unimportant details and taking the union of the important ones over all the versions of the model.



Flow model from a group who observed and interviewed the event manager, event sponsors, the financial manager, and the database administrator.



Flow model from a group who mainly observed and interviewed ticket buyers and ticket sellers.



Flow model from a group who observed and interviewed the office manager, the advertising manager, and external advertisers.

10.9 Abridged Methods For Design-informing Models Extraction

- Be Selective about the Modeling You Need to Do
- Designer-Ability-Driven Modeling
- Use a Hybrid of WAAD and Relevant Models
- Create Design-Informing Models on the Fly during Interviews