

# Chapter 3



Prof. Dr. Harald Störrle  
Danmarks Tekniske Universitet (DTU)

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## Chapter 3: Interaction Design and Validation

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DTU course 02264

# Agenda

## Abstract

- In this chapter we will learn how to elicit and validate requirements through Interaction Design (IxD). Clearly, we have to avoid to commit to any specific design at this stage to ensure we find the best solution rather than a random first candidate.
- The key method to do this is sketching, i.e., quick and dispensable designs such as paper prototypes, theatrical sketches, and mock-ups. A “sketch” is defined not by material or technique but by function.

## Contents

1. Explorative Design
2. Personas
3. Scenarios
4. The Wizard-of-Oz-Technique / Paper Prototyping
5. Theatrical Sketches
6. UI Prototyping Technologies
7. A Paper Prototype and WED of the LMS-App

*The best way to predict the future is to  
invent it.* *Allan Kay, 1971*

*The only way to engineer the future  
tomorrow is to have lived in it yesterday.*  
*Bill Buxton, 2012*



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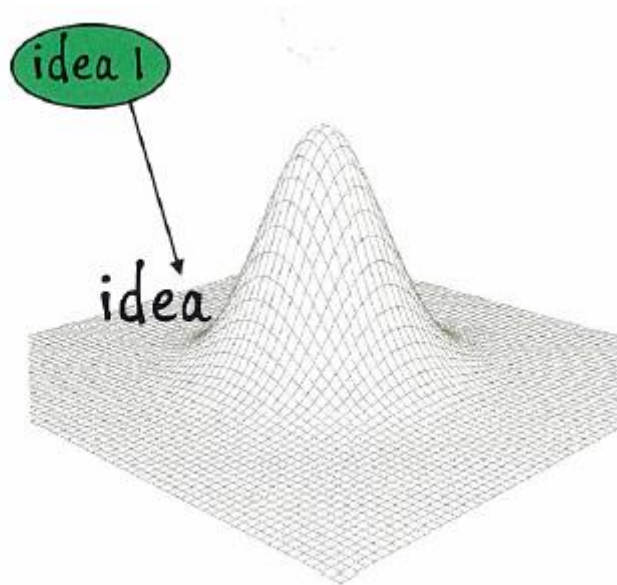
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## Chapter 3.1: Explorative Design

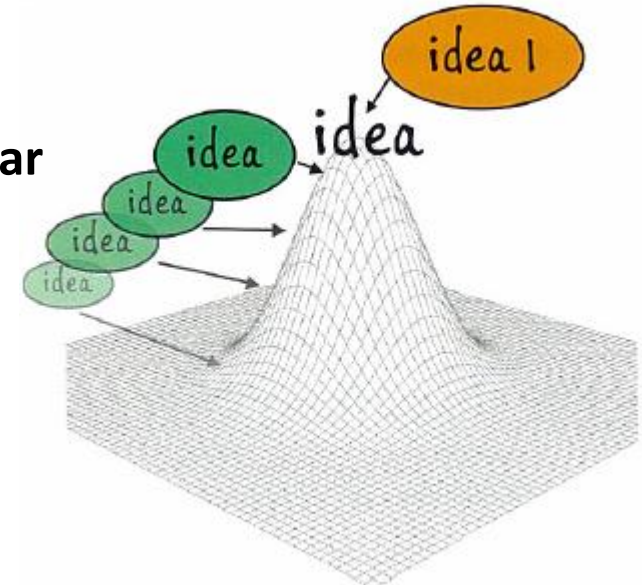
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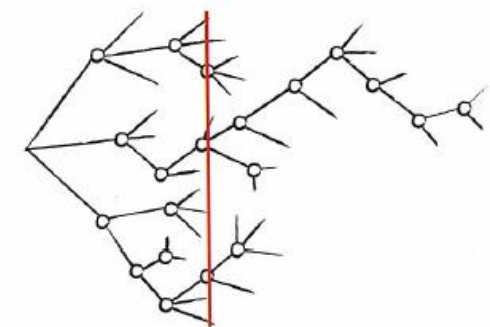
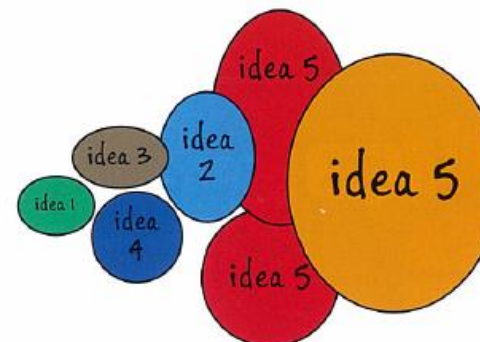
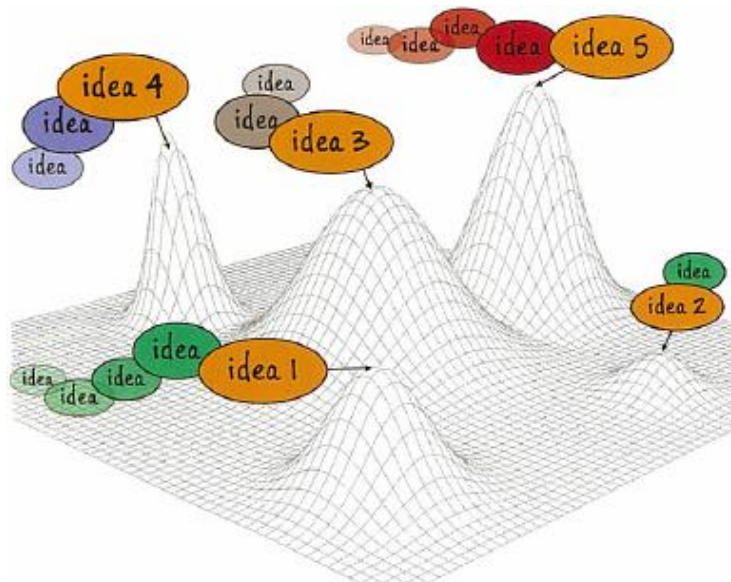
# Designing is great – but dangerous



Design may be considered an optimization task, similar to hill-climbing.



But what if there are many hills, and the first one we find is not the highest one?



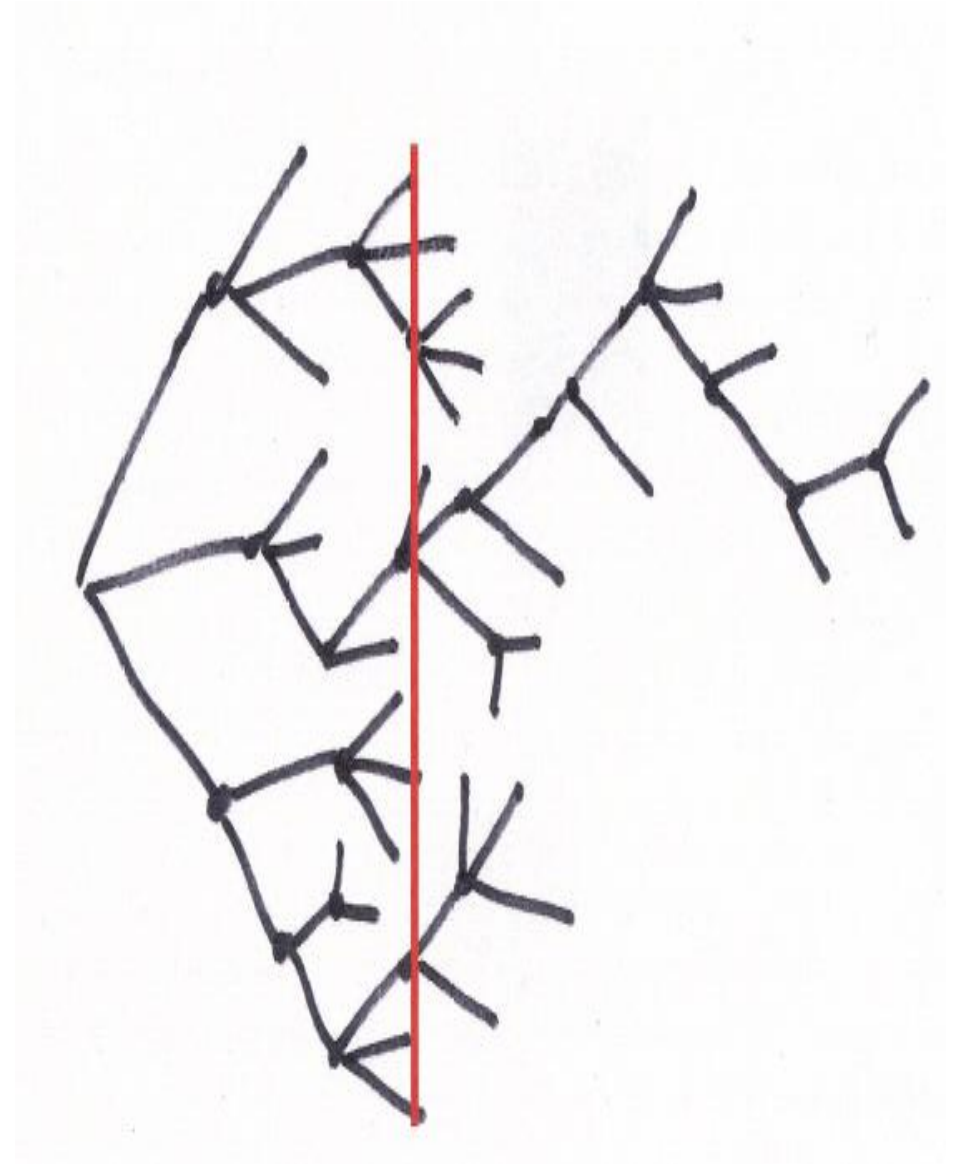
# Sketching vs. Development

- Traditional software development may not have perfect requirements, but theoretically we know what the problem is we are trying to solve (“I know it when I see it”).
- The problem is putting enough effort and commitment into a project, getting the right people and sponsors, and using appropriate tools and methods to do it.



# Sketching vs. Development

- In the conceptual age, the problem is to choose the right problem.
- We need to explore a great many questions and possible answers before committing to a single-tracked development process.
- This exploratory process is called Ideation, and it is done by Sketching.

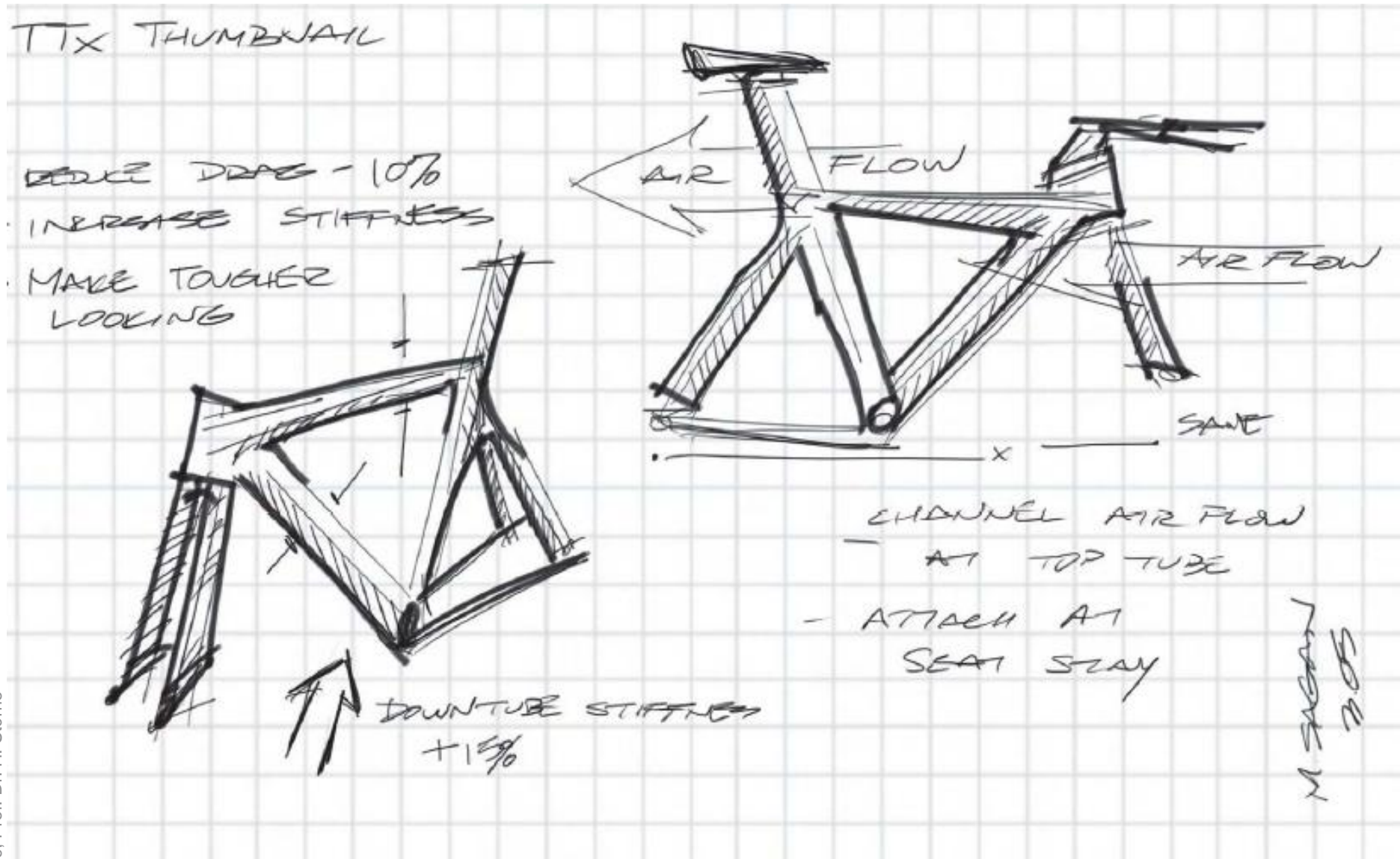


# Sketchiness

- **A sketch is a design tool.**
  - It is supposed to convey some idea and maybe stimulate some more.
  - It is a step in a process, not the final product.
  - It facilitates an equal and open-ended interaction.
  - It is not defined by involving specific materials, tools, or techniques but by its function and properties alone.
- **A good sketch is...**
  - vague, so that it invites and evokes alternative interpretations (“creative misunderstandings”, “conversational misalignment/breakdown”);
  - Unfinished, so that it invites changes and no interests are vested, no risks are taken in proposing something that might turn out stupid.
  - cheap and easy, so that nothing keeps us from throwing it away;
- **In one word, a sketch is open to improvement.**
  - It may be a good idea to defamiliarize your sketch on purpose if your raw material is too realistic (e.g. photos, real people).
- **A plan or model, on the other hand, require considerable effort making it, and thus resist change. They preview the result.**

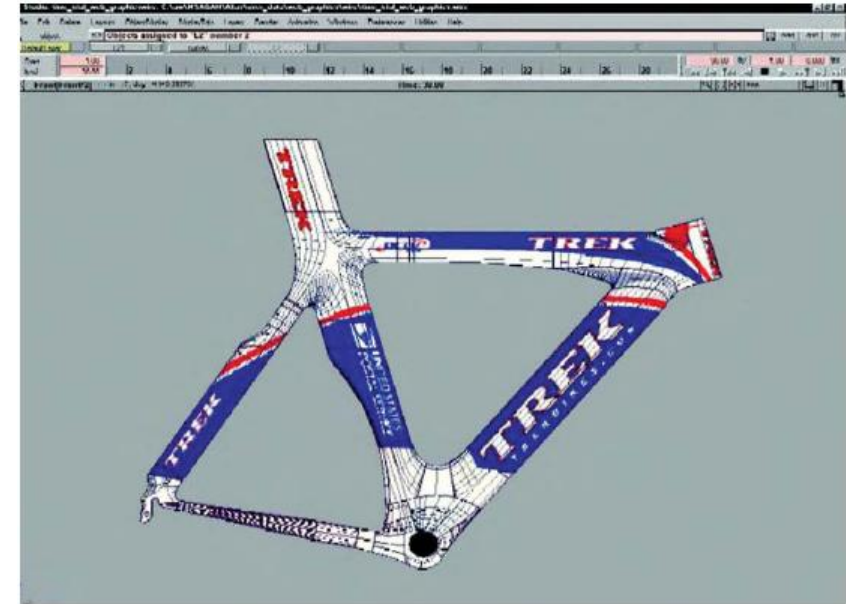
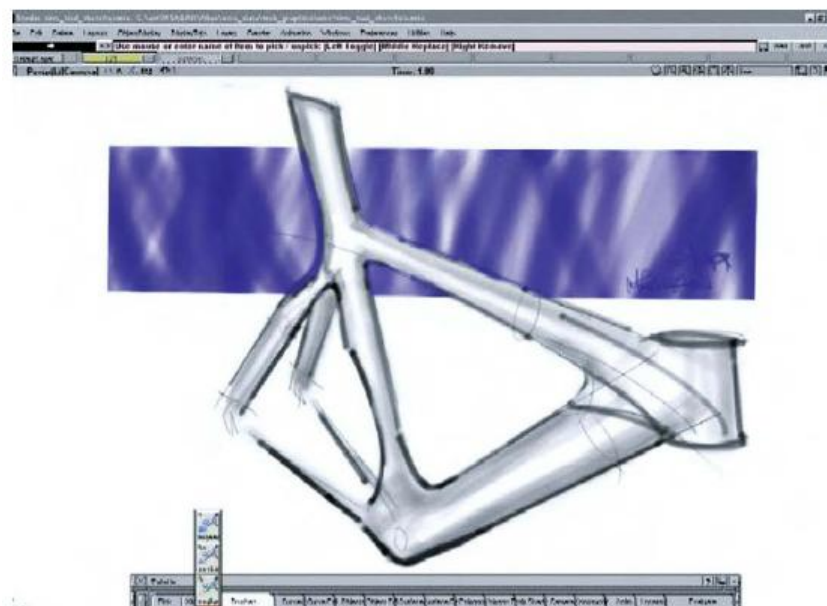
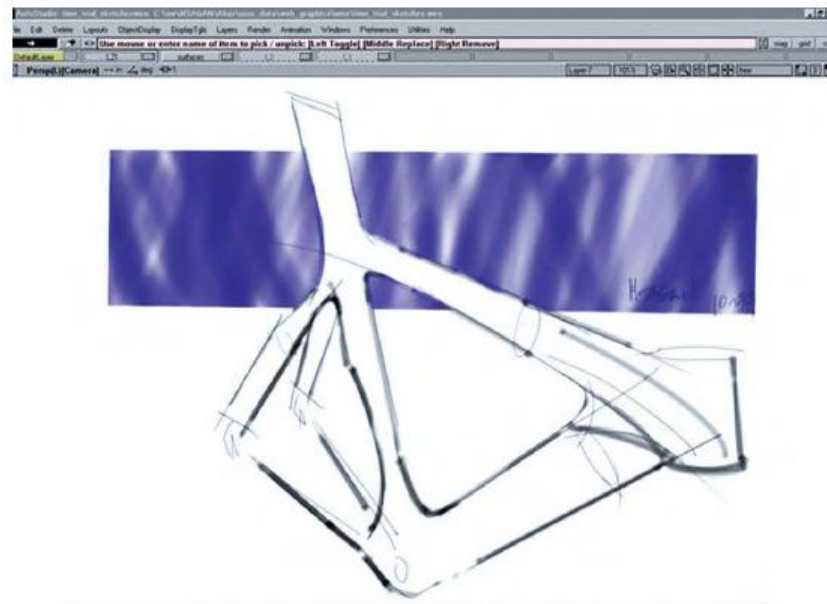


# A Sample Sketch





# From Sketch to Preview



# Inventing the future

- **Demonstrating a scenario or device in a theatrical play is fine, but sometimes it is better to shoot a little video of a demonstration.**
  - It can be repeated over and over again, and analyzed step by step.
  - It can be stored, copied, and sent to other people.
  - Nothing can go wrong during the presentation, no one can forget their lines.
  - If done professionally, it may have a more business-like appeal than a role play.
- **Consider the 3d matter replicator, a device to copy three dimensional physical objects like a conventional photo copier copies sheets of paper.**  
**??HYPER LINK Video (1:??)**



# A Real-Life 3d Printer



Home Gestures Case study (1:37)

*„A picture may be worth a thousand words,  
But a good story is worth a thousand pictures.“*

*Chinese Proverb*



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## **Chapter 3.2:**

### **Personas**

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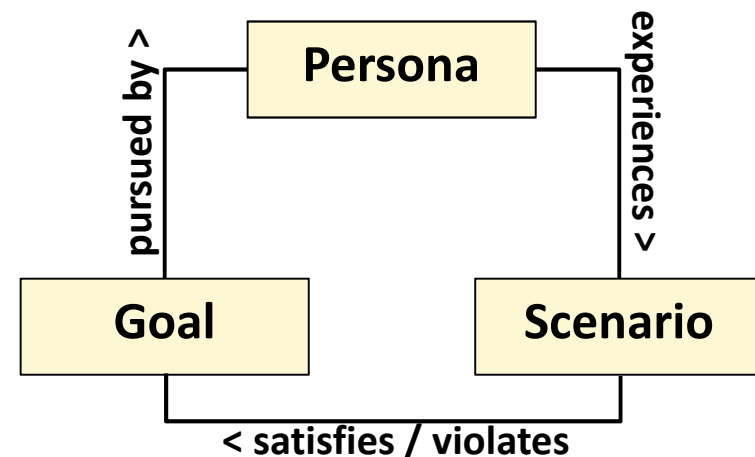
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# Personas

- **A Persona is a fictional but realistic human being using some device, application or service to be created (“the target”).**
  - The persona technique has been created in 1995 by Andrew Cooper as a tool to ensure usability of applications/devices by addressing the needs of concrete users rather than just offering unstructured sets of functionalities.
  - The persona is prototypical for a real group of users, their goals and desires, capabilities and limitations, and activities or usage profiles.
- ***„Narratives and telling stories are among the oldest human information technologies.“* serving three main purposes:**
  - ***Envisioning*** not just the technical aspects of an invention, but also the possible social political, and personal consequences [...]
  - [They] can be a tool for ***communicating*** innovations [...and] excels at arguing for or against a potential technological future [...]
  - [They allow] ***exploring*** possible design requirements.”

# Personas and Scenarios

- **The persona character is embedded in and expressed as a story (“narrative”) that combines**
  - a set of goals, capabilities, and restrictions that motivate the character,
  - a scenarios (“plot”) that shows the conflicts between the persona and other characters, the consequences of his/her actions, and/or
  - the implications of the goals/capabilities/restrictions of the character.
- **In order to connect to the audience, a Persona must have three elements:**
  - a likeable hero,
  - an immersive setting, and
  - a compelling scenario.
- **Example: DietMon**
  - Utopian (4:??)
  - Dystopian (4:??)





## Example: Stratus Air

- Alan Cooper's company created a beautiful case study that can be found online (see [www.cooper.com](http://www.cooper.com), look for Work>Stratus Air).
- It is about making air travel more enjoyable for travelers.
- In a 10 minute video, it first shows a concept introduction, then explains the experience of a persona called Gina M. Alvarez.



[Pictures taken from [www.cooper.com](http://www.cooper.com)]

# Varieties of Personas

- **A Primary Persona** represents a class of users whose needs and goals must be addressed.
  - It has its own interface to the system, created to exclusively address the needs and goals of this persona.
  - The interface of another persona cannot satisfy the needs of a primary persona.
  - The interfaces of primary personas are mutually disjoint.
  - Each cast has at least one and at most three primary personas.
- **A Secondary Persona** does not have a specific interface of its own.
  - It shares its interface with , other secondary personas, or might re-use the interface of a primary persona.
- **A Tertiary Persona** does not have an interface.
  - We mainly describe them as negative examples, i.e., making explicit the boundary of our system.

# Application conditions for Personas

- **Personas are useful at many stages.**
  - While exploring the solution space and eliciting requirements, using personas allows us to compare/contrast alternative usage scenarios to inform the ongoing design in terms of features, interactions, and the visual appearance of a target system.
  - After completing a design process, Personas may be used to communicate (intermediate) results of a design process to customers or sponsors.
  - During the implementation, Personas transport knowledge about future users to the developers.
- **Personas require relatively little initial effort, and is generally a powerful and generic communication tool.**
- **However, Personas are inherently subjective and it may be difficult to assess their quality (e.g. level of detail, when to stop).**

# How To Create Personas

- **Design a set of drafts first using creativity techniques**
  - only a few details, use e.g. Brainstorming, 6-3-5, or Mindmapping
- **Then do a first version for each of them.**
  - If used to communicate market analysis, personas are typically synthesized from interviews conducted with users.
  - If used as an explorative device, personas are mainly based on the imagination and creativity of the developers. Creative writing techniques are useful here.
- **Merge/split personas as appropriate, go back to start if necessary**
- **Improve and elaborate personas**
- **Quality assurance**
  - Do a peer review using the quality criteria in guideline QA3a.
  - Improvise a role play based on a persona, in particular if it involves interactions with other people and/or systems.

# Mistakes to avoid

- **Don't omit elements unless you have a good reason.**
- **Don't make fun of your personas.**
  - Don't choose weird pictures, places, or names.
  - Don't choose real people as your personas, or characters from literature.
- **Create high-quality personas.**
  - Release a persona only after a thorough quality check by somebody else.
  - Don't let somebody check your persona without removing trivial mistakes first (spelling, format, style, correctness).
- **Don't confuse process and product.**
  - The quality criteria in the guideline apply to the product, not the process.
  - If it helps you being creative, you may violate any of these criteria in the process of creating the persona.

# Cast

*No man is an island, entire of itself.*

*John Donne*

- Persona are not isolated – there is always a whole cast of personas who collectively cover the relevant part of the design space.
- This is very much like the cast in a play, and the analogy does not stop there:
  - there are main and support characters;
  - the characters need to be introduced;
  - the characters interact;
  - the characters have goals and motives.
- Most importantly, however, personas may be acted out, like in a play.

## DRAMATIS PERSONÆ.

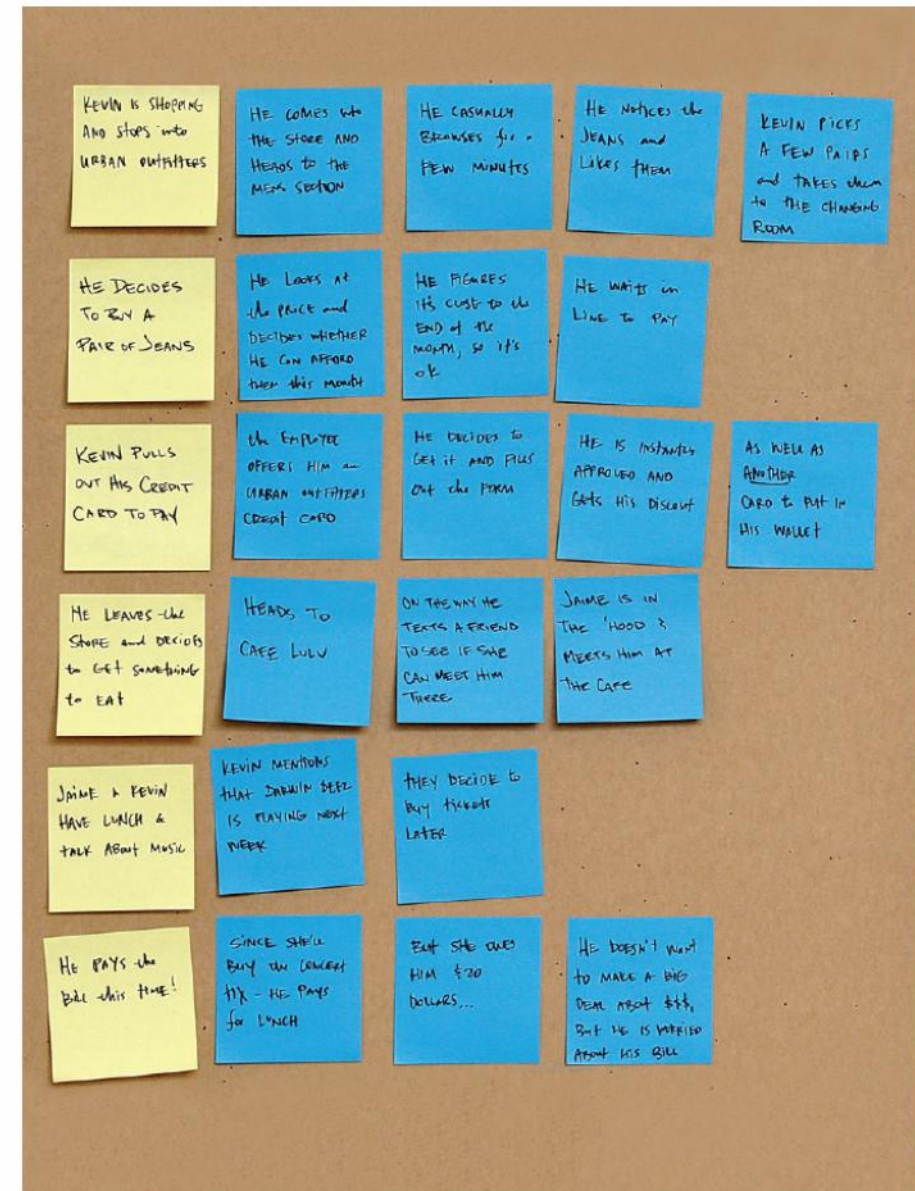
Count Almaviva,	Mr. LEWIS.
Don Guzman,	Mr. QUICK.
Doctor Bartholo,	Mr. WILSON.
Figaro,	Mr. BONNOR.
Antonio,	Mr. EDWIN.
Basil,	Mr. WEWITZER.
Doublefee,	Mr. THOMPSON.
Bounce,	Mr. STEVENS.
Courier,	Mr. JONES.
Crier of the Court,	Mr. BATES.
Servant,	Mr. NEWTON.
Page,	Mrs. MARTYR.

Countess,	Mrs. BATES.
Marcelina,	Mrs. WEBB.
Agnes,	Miss WEWITZER.
Sufan,	Miss YOUNGE.

Counsellors, Guards, Vassals.



# Persona Setting



# Persona First Steps

- **A cast contains 3-10 personas depending on the number of user groups, not necessarily on system size.**
- **Each persona should be described on approximately 1 printed page with the following items.**
  - **Heading**
    - The heading should set the context (case study, author, possibly a title)
    - Why is this persona relevant, what class of users does it represent
  - **Setting**
    - Name / Age / Gender / Occupation
    - Portrait picture / emblematic quote
  - **Means & Ends**
    - Goals / Motives
    - Capabilities / Handicaps
    - Skills / Attitudes (where relevant)
  - **Scenario**
    - A short story of this person interacting with the target system in a particular way.
    - If relevant, interactions with other people or systems may be included.
    - The story may contain a few additional fictional personal details to make the persona more realistic, and to make it easier for readers to identify with the persona.



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## **Chapter 3.3:**

### **Scenarios (Visual Plots)**

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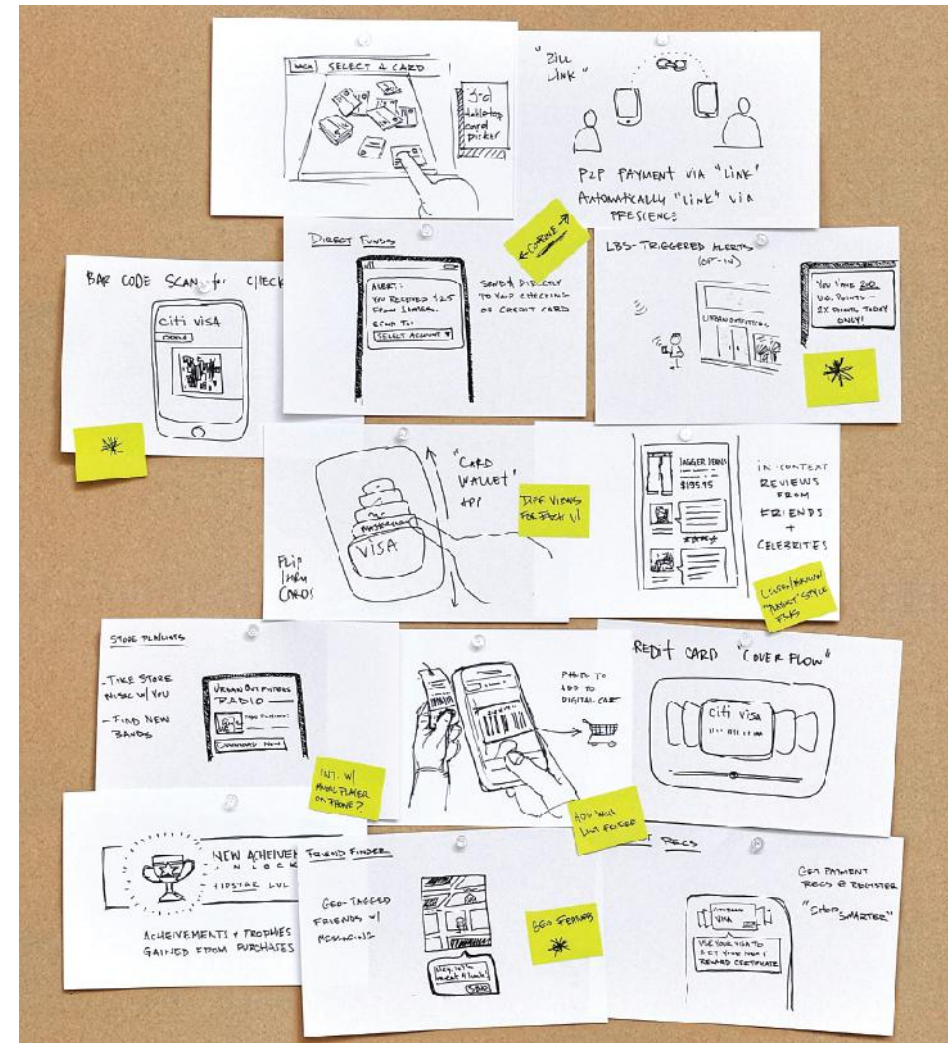
# Scenarios

- **A scenario is a description or documentation of the events happening in some interaction.**
  - Scenarios are used in many different places in software development, e.g. as part of personas, use cases, or user stories (Scrum, XP, ...).
- **There are many techniques that could be used for this purpose:**
  - UML Interactions or Activities as interaction / process models
  - Structured Text
  - Traditional play script
  - Visual Storyboard
  - Comic / Photo novel
  - Theatrical sketches
  - Videos
  - ...
- **A good script should follow the traditional structure of a play or a novel (the “plot”):**
  - Introduction → Ascent → Climax/Conflict → Resolution/Denouement → Closing



# Persona Interactions: a Brainstorm

- First of all, you should collect any interactions your persona will have in relation with the system.
- This includes interactions with other people or other systems, if they are somehow affected by the system under consideration.



# Persona Script as a Storyboard

- Then put the pieces together to form a coherent story, adding and modifying pieces as you go along.

## Observations

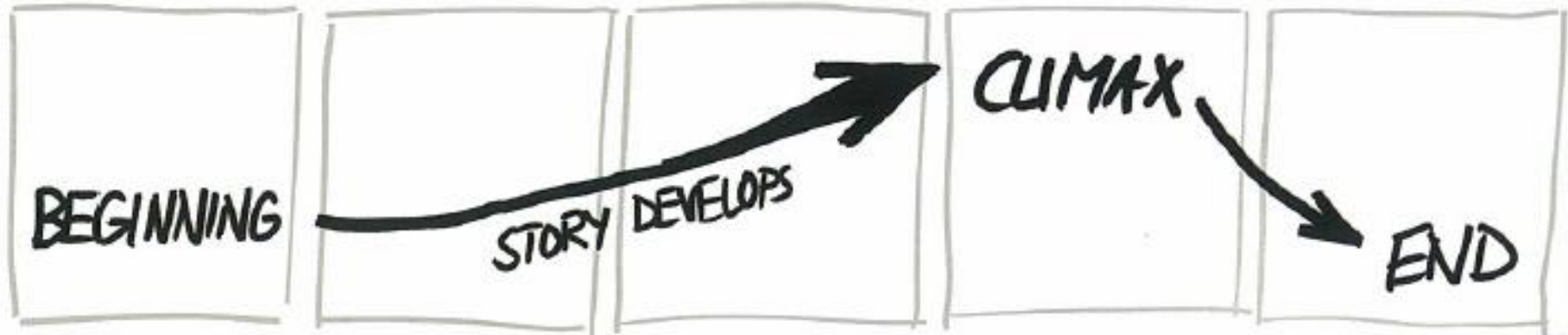
- Often, you will need more than one attempt to get it right, and interactivity is a great help.
- Observe the use of perspective in the example: it allows you to shift focus as needed in a very natural way.
- Such a scenario is a very compact way of combining several modes of interaction into a single simple narrative.



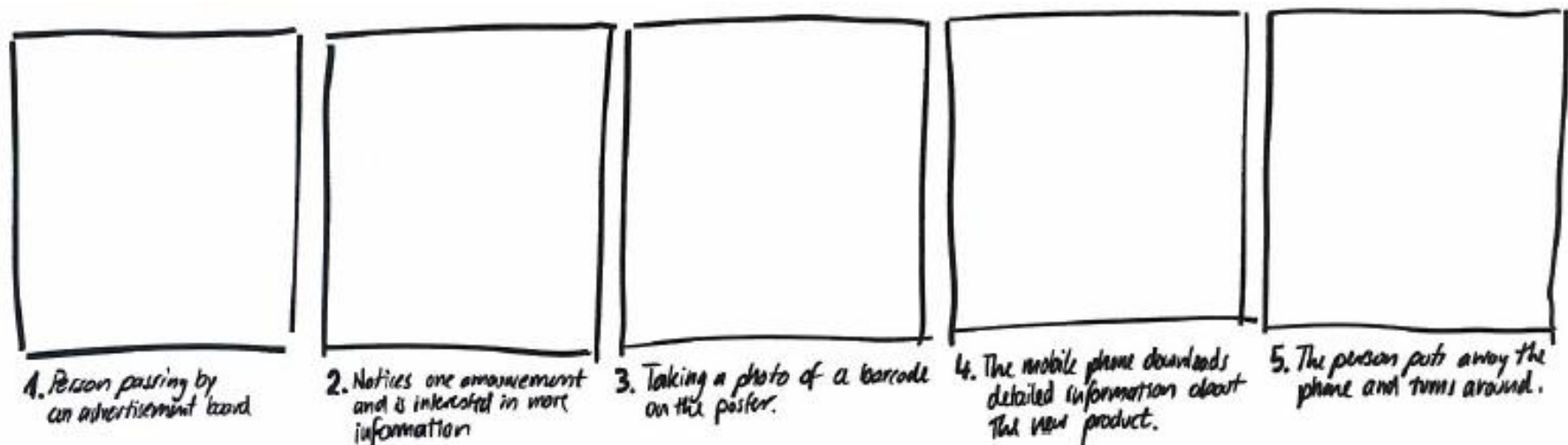


# Comic-Storyboard (1/3)

- 1) Create an outline – 5 panels is a good starting point to capture a classic story.

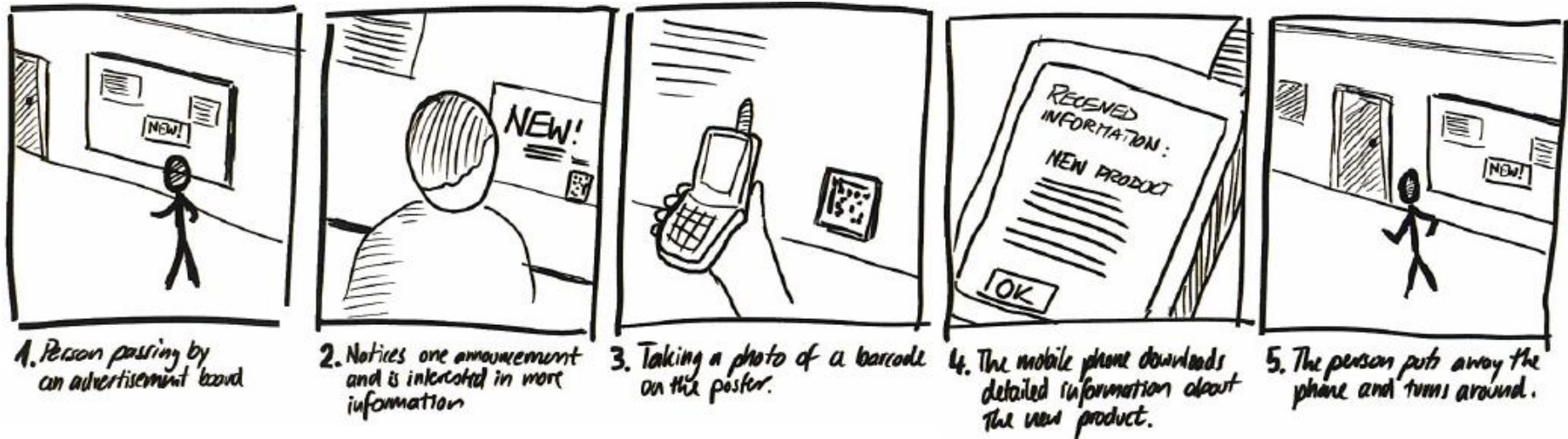


- 2) Describe what will be going into each panel by a sentence below the panel. This description will stay permanently, and will be complemented later.

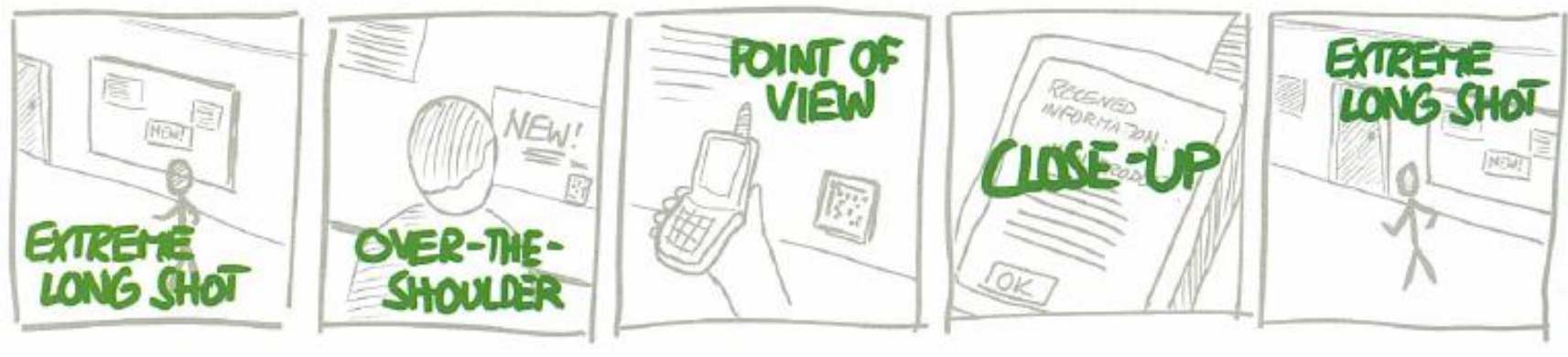


# Comic-Storyboard (2/3)

3) Fill the panel with a drawing matching the description.



4) Use the kinds of angles and shots a filmmaker would use.



# Comic-Storyboard (3/3)

- 5) Annotate the picture to emphasize the main activity.  
Use a bright and contrasting color.





# Photo Novel (1/3)

Instead of drawing pictures yourself, you can also use photographs.

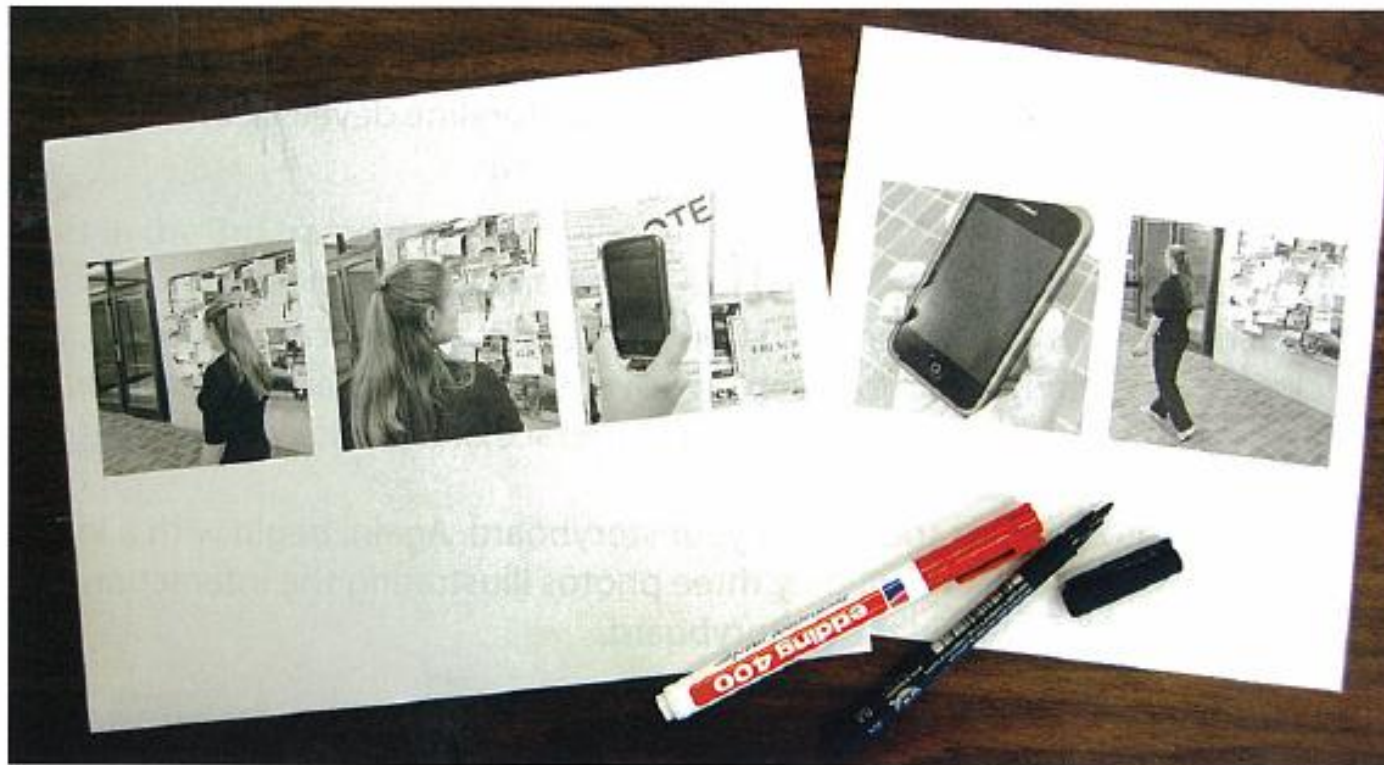


This is slightly more effort, but provides you also with a richer, more realistic scenario. For instance:

- Bulletin boards can be quite crowded
- The persona is a young female, possibly a student
- The setting could be a corridor in an educational institution
- The persons uses an iPhone (rather than a non-Smartphone)

## Photo Novel (2/3)

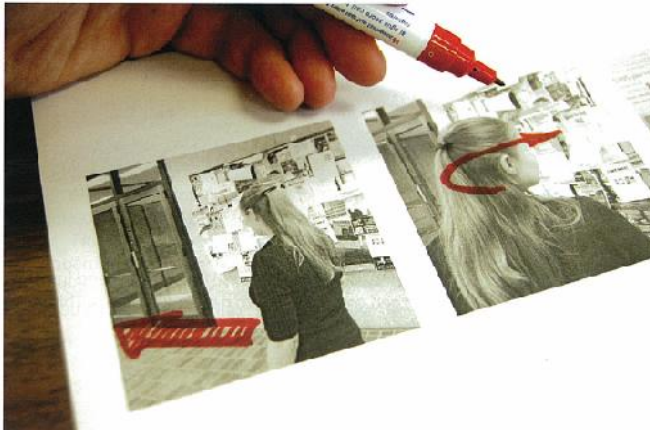
- Stage the scenario, take a few pictures, print/cut them,
- and glue them together.
  - It helps enormously, if you have done a comic-type storyboard before.
  - Otherwise you will waste a lot of time scouting the right location.





## Photo Novel (3/3)

- Just like a comic-storyboard, annotations should be used to emphasize movements, gazes, or details.



## Anders Nielsen



Anders Nielsen (51),  
Chief Librarian at the TCS  
since 7 years

Anders Nielsen walks into the office on Monday morning. The first thing he does is to start and log in into the Library Media System (LMS) his main tool for administrative work. First he deals with human resource issues. There will be a new member of staff at TCL later this week and so Anders creates a new user account with the LMS, adding all the personal details he knows about the new librarian, and adding him to the right group so that he will have the appropriate rights to perform his tasks. Any data Anders does not have available can later be filled in by the new member of staff. There is also some data that people may or may not want to be in the system, e.g. their photo, private phone number, or home address. Leaving the choice up to them avoids some data protection issues.

Next, Anders has to work on the corpus, i.e. the set of all media available and cataloged at TCL. First he picks up a list of media readers or staff members have proposed to purchase by TCL. All proposals are collected in the LMS which automatically checks whether the proposed media may be borrowed at another library, whether other people have proposed the same or similar media, and, using a new web service provided by the Danish Book Sellers' League, how much they will cost. As always, the proposals far exceed the funds available so that Anders will have to decide, but with the information readily displayed, it is easier for him to justify his decision. He marks some items to be ordered, and writes a few comments in other cases.

...

*Monday morning, Anders Nielsen walks into the office, sits at his desk, and opens the LMS application.*

**Anders**  
(*mumbling to himself*): Oh no, there's the new guy coming this week – I had totally forgotten about him...I guess I need to create an account for him first.

*He types and clicks frantically, repeatedly looking at his wristwatch and cursing silently.*

**Anders**  
(*still mumbling*): There, that should do it for now. He can fill in his own data later, and I'll make Stine take a picture of him for the record.

*He sighs and walks over to the coffee machine. While pouring a cup of steaming coffee, he glances over the wall-mounted display that shows the wishlist status, i.e. media proposed for purchase.*

Jesus, there are 14 new wishes again! How can we possibly buy all those books? What do people think I have as a budget?

*The door opens and Thuri Andersson enters. When she sees Anders, she smiles.*

**Thuri** (*cheerfully*): Hi Anders! So early in the office this morning? I thought you had the late shift this week?

**Anders:** Too much work...are you very busy today? I really could use some help here with the wishlist.

**Thuri** (*sighs*): Ok – I guess I first should cross check the wishlist with the catalog for you? I really wish this were automatic. People simply don't look.

**Anders:** Oh, they do, or at least they try, but the catalog interface is really too difficult for them to use.

# Structured Text

- **A structured text scenario consists of text fragments that are connected by operators inspired by UML Interactions and/or Use Cases.**
- **Structured text can be understood as a kind of pseudo-code.**
  - As such, it can be enacted by suitable applications like [RoleEnactor](#).
  - Also, it is easy to transfer into UML models, providing an important bridge to implementation.
  - However, significant effort and up-front training are required to use this technique effectively.
  - Thus, it is advisable to start with a prose or storyboard scenario before creating a structured text.

## Potential Operators

- Initiate / Begin
- Seq
- Par
- Alt
- Opt
- Loop
- While / Until
- Call / Return
- End
- Jump
- Break / Abort
- Extend by
- Include
- ...

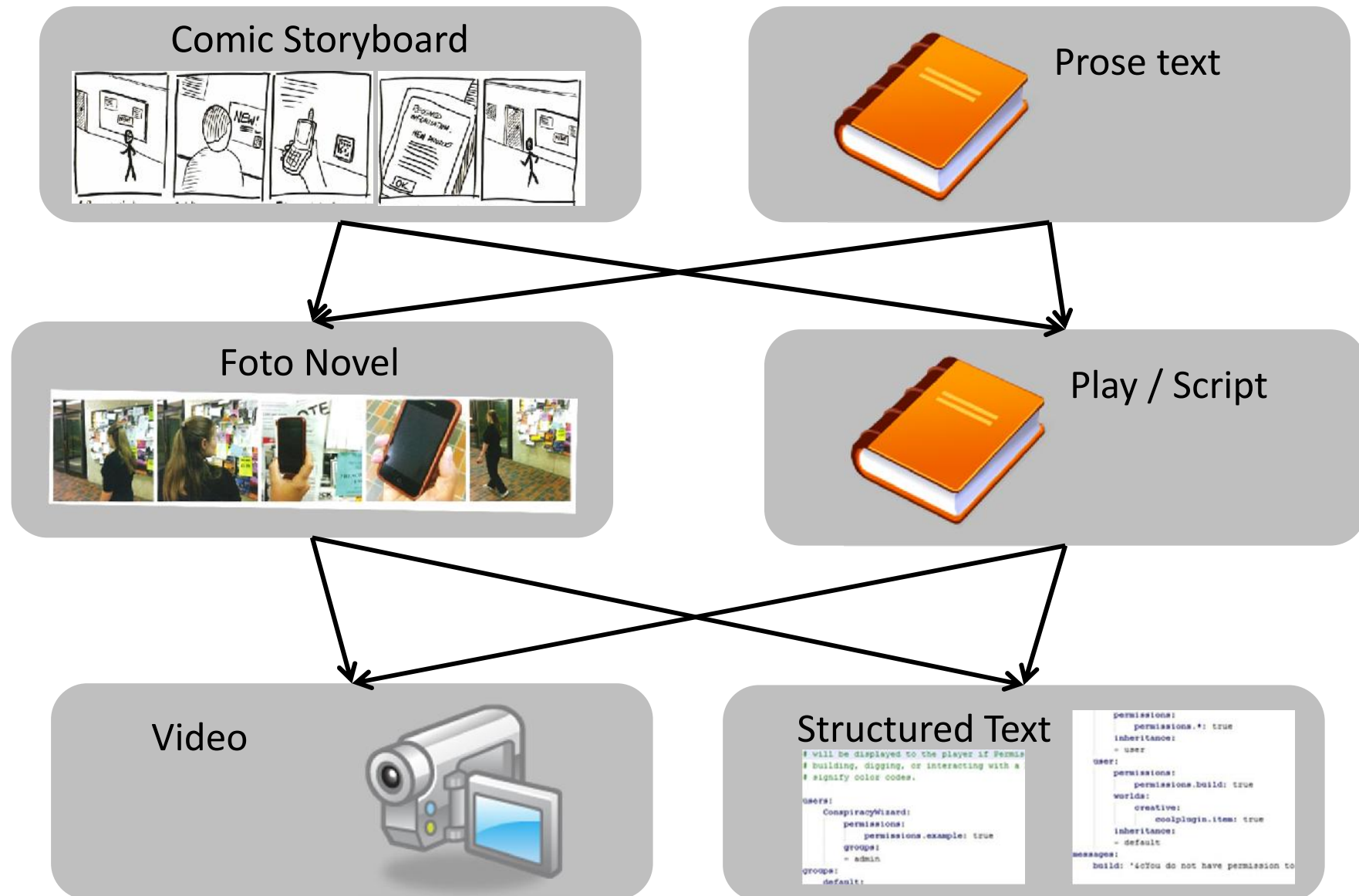
# Different Kinds of Scenario Descriptions

- **Different methods may be used to describe scenarios, each with their specific benefits and drawbacks.**
  - Often it helps to approach one scenarios from different angles, using different techniques.

Technique	Description	Strengths	Weaknesses
Prose	arbitrary text	easy to start with	little structure requires empathy
Script	like in a Shakespeare play	more structure easy to act out	difficult to handle alternatives requires empathy
Comic Strip / Photo Novel	story told in sequence of annotated pictures	easy to store easy to analyse	difficult to handle alternatives
Video	sequence of situations with voice-over narrative	very immersive	very large effort
Structured Text	text fragments joined by operators	affords formal methods	complex / difficult not very immersive



# Techniques for Plotting





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Danmarks Tekniske Universitet (DTU)

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## **Chapter 3.4:**

# **The Wizard-of-Oz Technique / Paper Prototypes**

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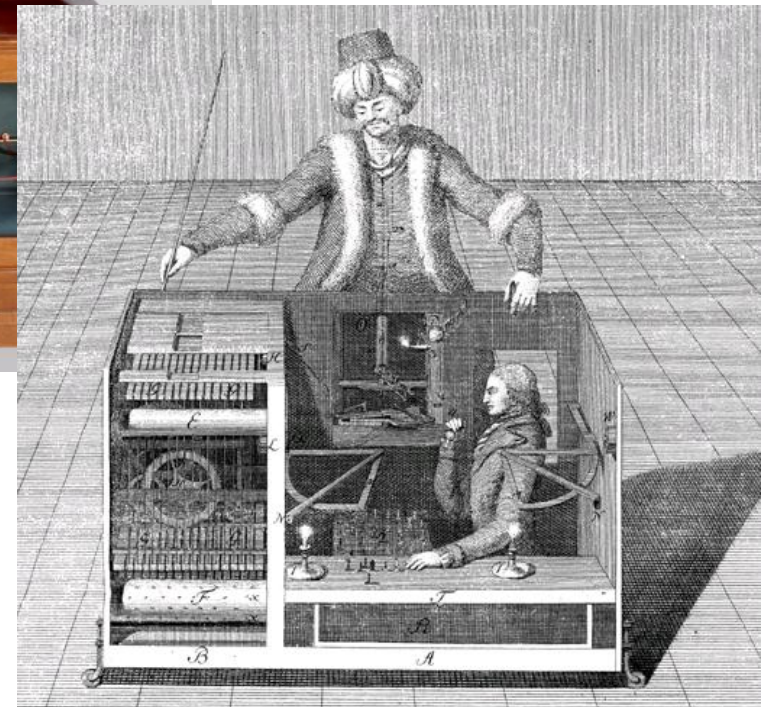
# Wizard-of-Of Technique

- **The “Wonderful Wizard of Oz” is a children’s book from 1900, and a film from 1939.**
  - The Wizard of Oz is extremely well known in the USA and the UK, it is a cornerstone of popular culture there.
  - The little girl Dorothy is swept away by a cyclone from the farm in Kansas where she lives. She is taken to the land of the Munchkins and on her way back home, she and some companions experience several adventures that center around “Oz, the great and terrible” a mighty Wizard who has the power of granting them their wishes, who only ever appears through his voice, not visually. Through a series of accidents, it is revealed that the mighty Wizard really is a tiny fearful man who just made himself appear big and mighty.
- **The Wizard-of-Oz (WoO) Technique consists of a physical mock-up driven by humans to simulate complex mechanical processes.**

# The Mechanical Turk



**Constructed 1769 by  
Wolfgang von Kempelen  
at the Austrian court.**



# Airline Ticket Kiosk

- In 1971, Erdman and Neal wanted to explore the real-life usability of kiosk solutions for selling airline tickets.
- While common-place today, back then there was not much experience in building such machines: the first ever ATM was deployed that year.
- So they created a mechanical Turk at Chicago O'Hare Airport: real customers could buy their tickets using real money at a kiosk system which seemed to run automatic, but was secretly run by people.



R.L. Erdmann, A.S.Neal: Laboratory vs. field experimentation in human factors – an evaluation of an experimental self-service airline ticket vendor. Hum Factors. 1971 Dec;13(6):521-31.

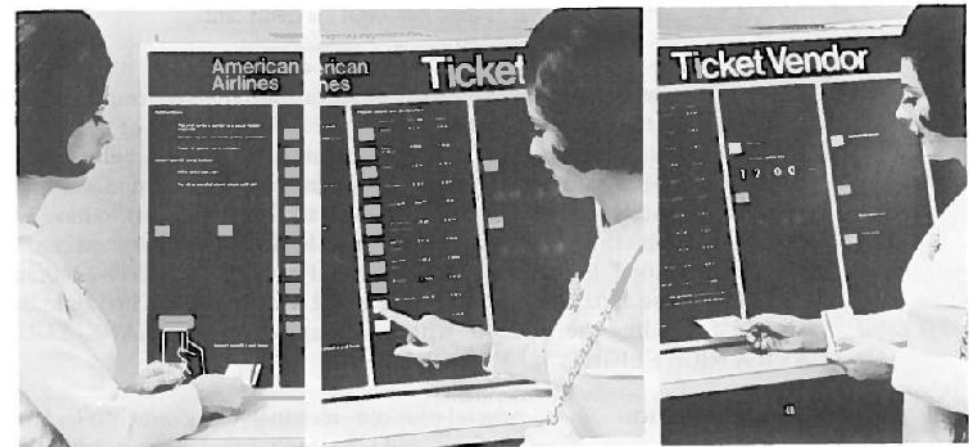


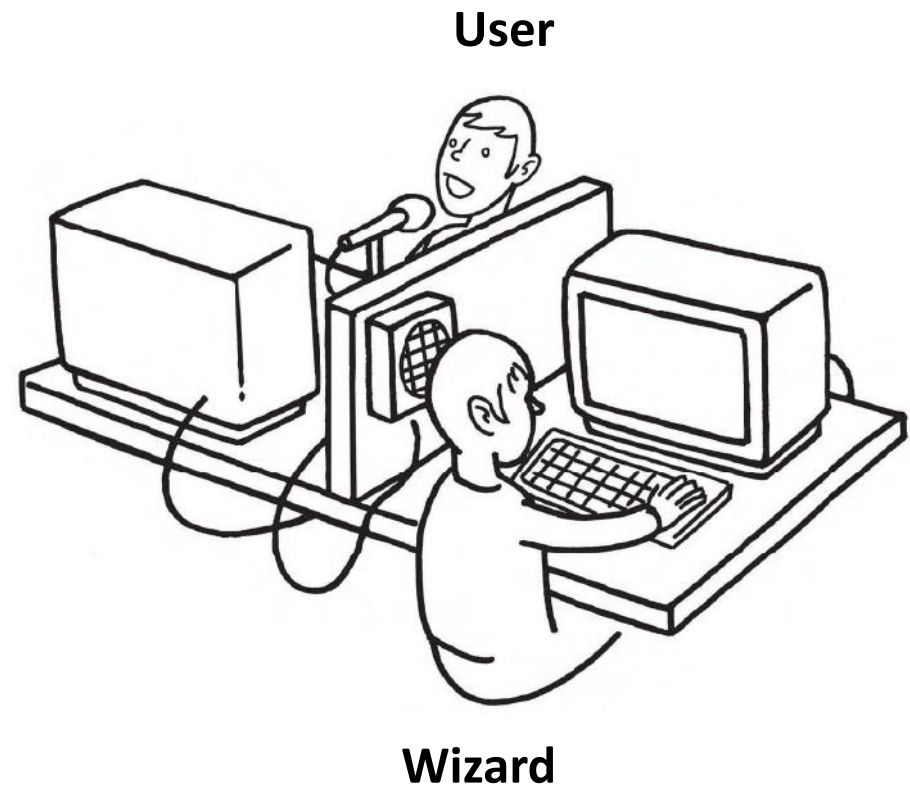
Figure 22.4. American Airlines ticket vending machine, on-line to an IBM computer – a simple computer dialogue for the general public.

J. Martin: Design of Man-Computer Dialogues. Prentice Hall, 1973, p. 497



# Listening Typewriter

- In the late 1970's, IBM thought about creating a voice controlled typewriter.
  - But would it be worth the effort to develop the technology?
- Using off-the-shelf components, a scenario was built where a human typist would convert spoken to written words.
- Unsurprisingly, the system worked extremely well.
- It generated real usage data
  - very fast,
  - very cheaply,
  - and decades before anything like that could be done technically.



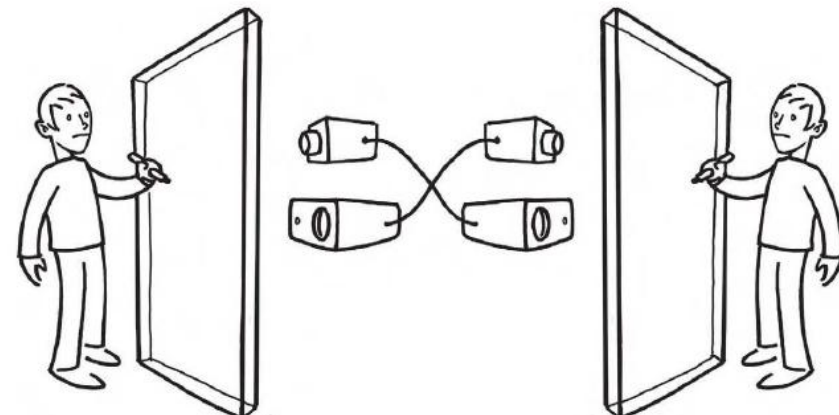
# The Tele-Cooperation Board

- **The Tele-Cooperation Board is a blackboard that allows the collaboration of several people across geographical distances.**
- **Stage 1: glass pane**  
**But: restricted to only 2 people in same place**
- **Stage 2: pair of glass panes with camera-projector-closed loop**

**Stage 1:** Two people drawing on opposing sides of a glass pane



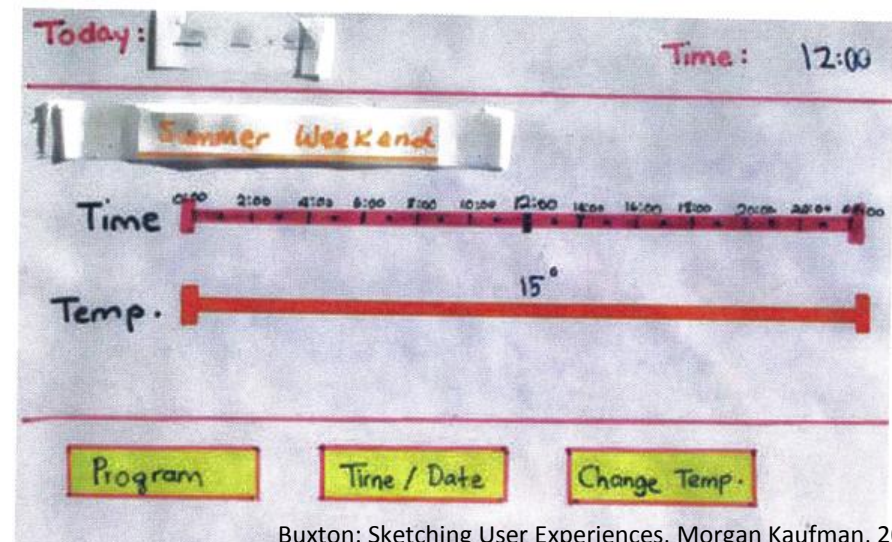
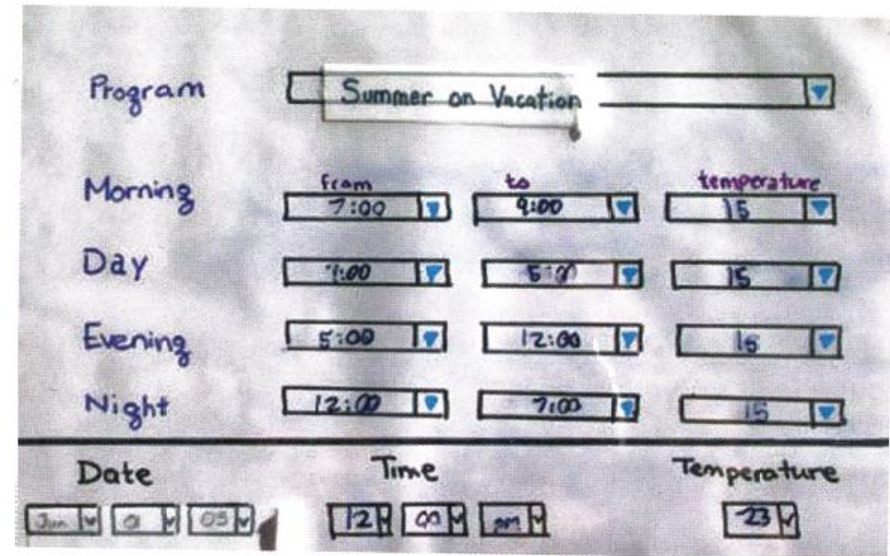
**Stage 2:** Two people on a pane each with the picture of the partner being projected



Buxton: Sketching User Experiences, Morgan Kaufman, 2007

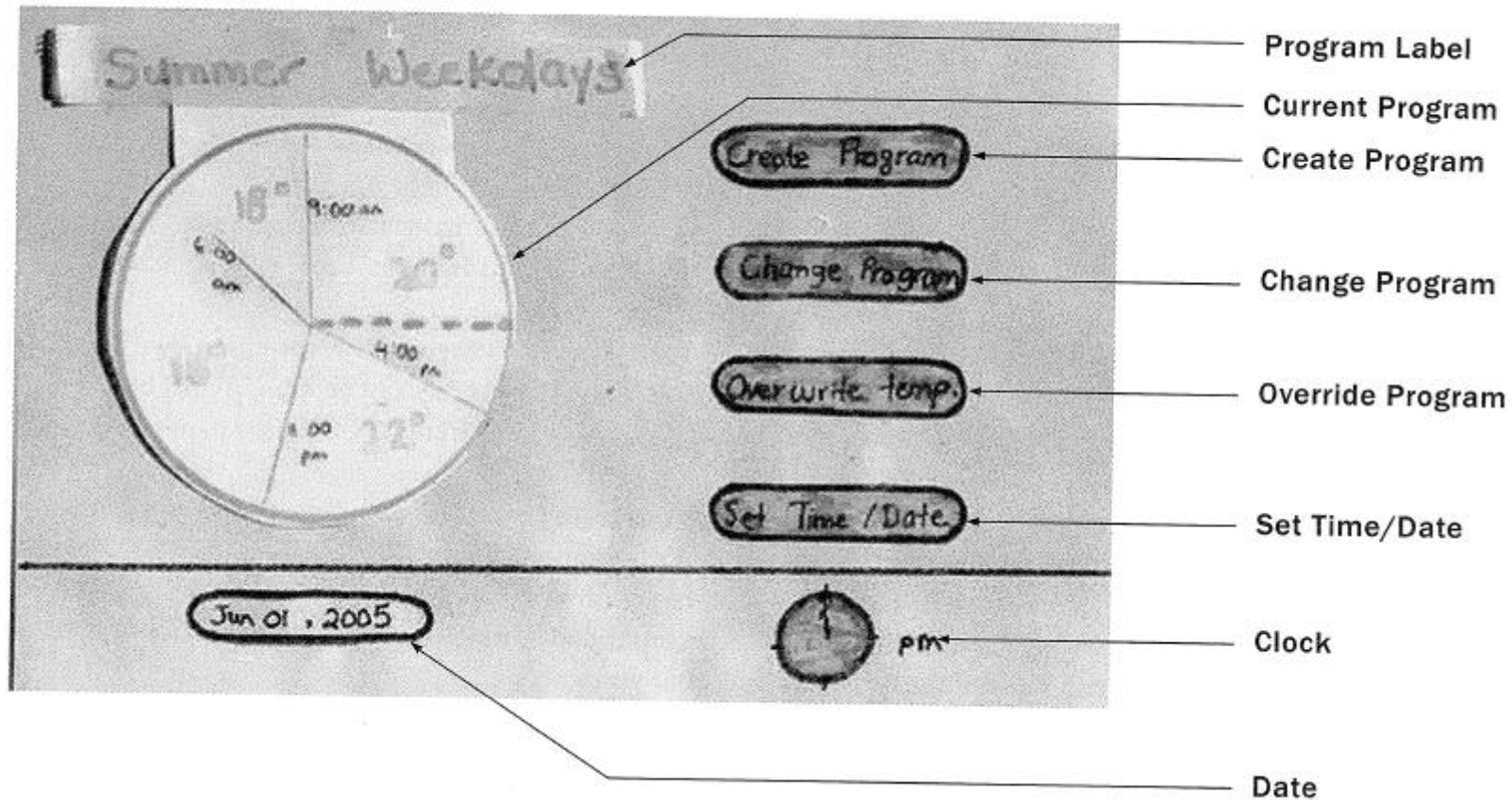
# Paper sketches invite change

- Probably the best thing about paper sketches is that they invite change.
- It is very easy, fast, and cheap to modify a paper sketch, or draw an alternative design to compare two variants.
- Here's an example for an interactive weather station.





# Adding Annotations to Sketches



# Paper Sketches can suggest behavior

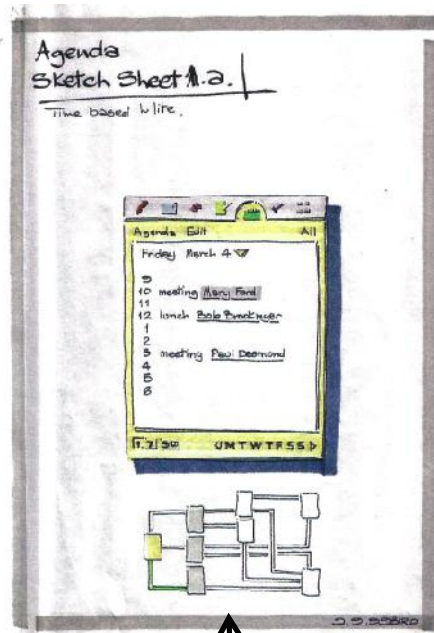
- Even simple paper sketches may be very suggestive and evoke realistic user behavior.
- People may want to use the device – not withstanding the obvious fact that the device does not exist.
- When people can not interact with the sketch, this is indeed indicating a problem with the design rather than the technique or the material.



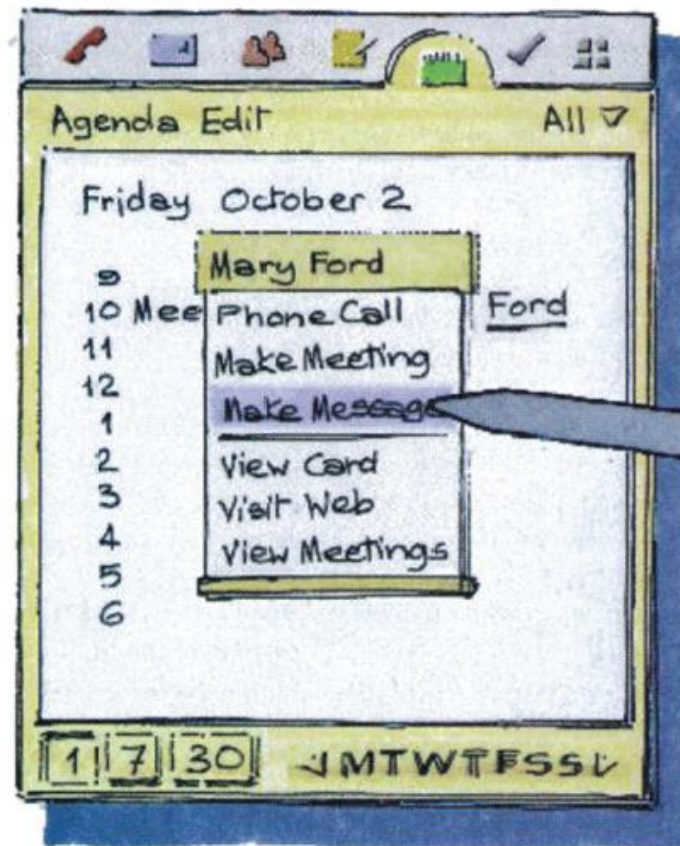
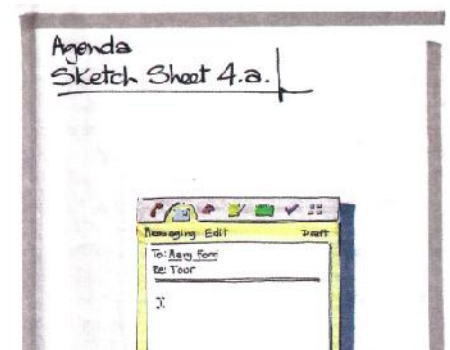
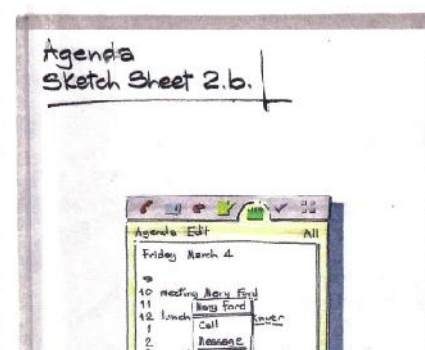
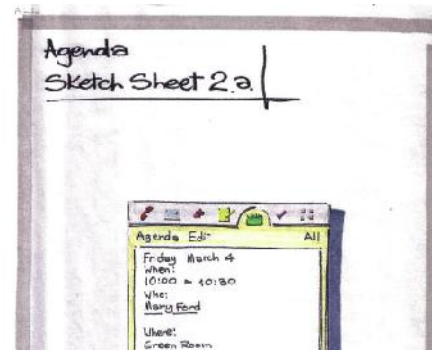
→ *Tektronix Video*



# Maintaining the Overview in Storyboards



Map view



Links are automatic

What a link can do




Links auto build

Links speed searches

Links make chains





Links maintain text too

# Capturing a Usage Scenario

	Facilitator	User
	(Start: Sketch 1.a in front of user.) The sketch in front of you shows the screen of your PDA. I want you to send a message to your 10:00 am appointment. For this exercise, to do anything, just touch what you think is appropriate on the screen, and tell me what you are doing or thinking as you go along.	
		Okay. I assume that you want me to send a message to Mary Ford, since she is my 10:00 am appointment. So I will touch her name.
	(Facilitator replaces sketch 1.a with 2.b)	Now I see a menu that lets me either call her or message her.

# Interacting with a Paper Sketch

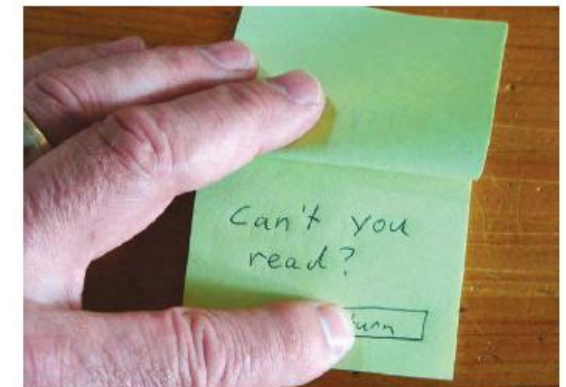
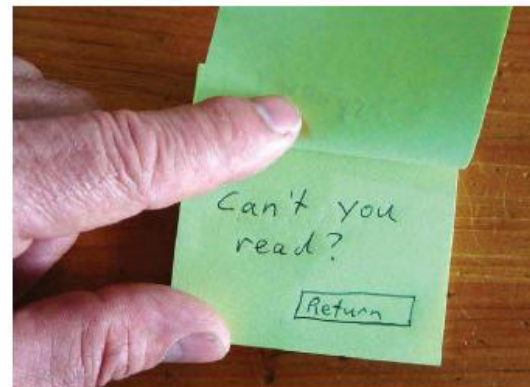
- A patient user and some manual skill provided, even an interactive storyboard may be modified dynamically, as you go along.
- This way, a potential user and a designer could explore options together, in real time.
- With a little effort, not just the end result but also intermediate steps are recorded.

	<p>If the user pushes the Create Program button, the main part of the display is replaced by two dials. The left one shows the four seasons, the right one four options: "Week Day", "Weekend", "On Vacation", and "Special". The user selects the season and type of day by touching the appropriate "slice" of the display, or dragging the red dial indicator.</p>
	<p>The indicator is actually a piece of transparent tape that is stuck to the dial. The glue is like that on a Post-It. That is, it can be easily lifted up and stuck down in a new position. That is what the facilitator is doing in this image: moving the indicator to reflect the season chosen by the user.</p>
	<p>When the new program is set, the facilitator returns to the original screen, shown in Figure 66, and updates the Program Label.</p>
	<p>The "face" of the dial is also replaced with one that reflects the new program.</p>



# Preparing Videos from Sketches

- It is very easy to create highly effective videos using paper storyboards.
- Here is probably the simplest possible example.



→ **PostIt Video**

Buxton  
Sketching User Experiences,  
Morgan Kaufman, 2007



Prof. Dr. Harald Störrle  
Danmarks Tekniske Universitet (DTU)

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## **Chapter 3.5:**

# **Theatrical Sketches**

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# Role Playing (Theatrical Sketches)

- **A role play is a preplanned or improvised scene where several people act out a scenario like a little theater play.**
  - People may represent users and customers, but also system parts.
  - Data exchange across interfaces can be expressed & recorded by using index cards or physical clipboards.
  - UI Events may be simulated and projected or shown as posters.
  - Personas can be the basis of role play scripts.
  - Props may be used to support the demonstration.
  
- **Role playing (also called Bodystorming or Informance) may be used for elicitation, quality assurance, and presentation alike**
  - While personas are more focused on individual users, role playing focuses on human interaction.
  - Role playing is little effort for a dense and captivating presentation.
  - It scales well and has many applications, including being recorded.

# Role Playing Variants

- **When preparing a theatrical sketch, there are several variables that may be adjusted for different results.**
- **Script**
  - Is there a fixed script? How detailed is it? How much improvisation?
- **Director**
  - Is there someone who directs (maybe a professional actor), or is it a democratic group process?
- **Actors**
  - Are the roles played by actual users, by designers, by actors?
- **Audience**
  - Designers, users, developers, clients,...?
- **Setting**
  - usage location, development location, presentation environment, ...
- **Performance/Rehearsal**
  - Are interruptions allowed? Who may interrupt? Are script changes allowed?
- **Props**
  - Any props at all? Which? How realistic?

# Using Props

- Using Props can drastically improve your performance.
- Use everyday items as props, or use cardboard to fabricate them.





# Reducing Inhibitions



# Effort vs. Benefit of Videos

- **Movies can be extremely immersive and convincing, not to mention professional-looking.**
  - On the other hand, it takes a lot of effort to make them as polished as we want to have them.
  - Cooper has created a number of great examples, including the Stratus Air case study, and the Economizer series.
- **But if we are happy with just a little less, we can do that, too!**
  - Always do a script and a storyboard before even thinking about shooting a video.



# Describing and Validating a Process

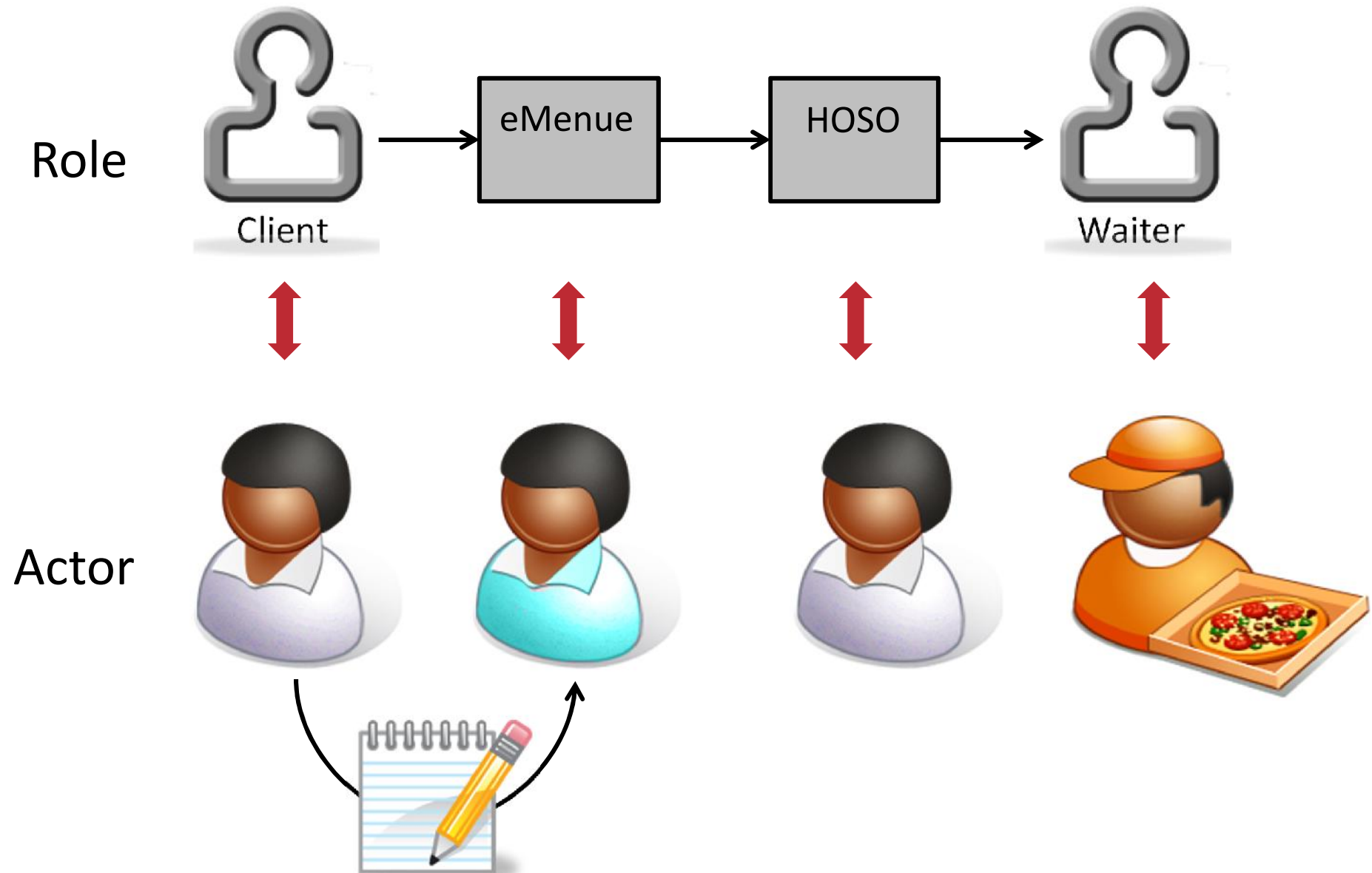
- **The same techniques we have used before can help us in describing and validating business processes.**
  - Look at the previously built models, in particular the domain architecture, and try to fill the gaps.
- **Whether or not the set is complete and consistent can be checked by role playing, where some group members try to “break” the design and some defend it.**
  - But make sure to switch roles regularly!

# Interaction Enactment (Instructions)

- 1. Pick a persona or set of interacting personas that you have already created for your system.**
- 2. Assign roles to all team members.**
  - There shall be one person for each persona, and each of the systems or subsystems in your design that are involved in the personas' interactions.
  - The same person may play different roles, as long as they do not interact.
- 3. Go through the persona scenario and act out the user level activities and the system level responses to them.**
- 4. Use a sheet of paper or similar as a token, and pass that through the hands of the players as they become involved into the play.**
- 5. Every passing of the token or activity taken while holding it is noted on the token.**



# Interaction Enactment (Example)





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Danmarks Tekniske Universitet (DTU)

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## **Chapter 3.6:**

# **UI Prototyping Technologies**

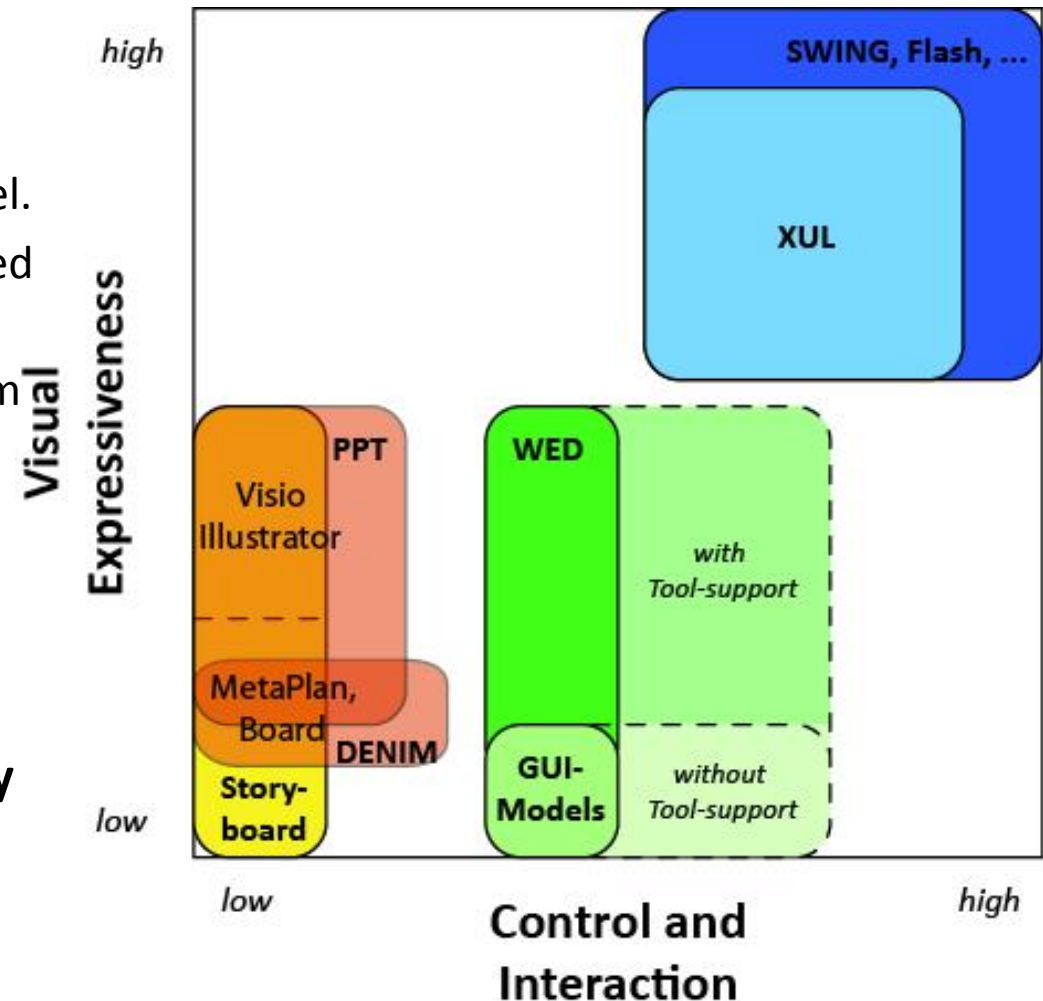
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# Fidelity

- GUI prototypes exhibit two independent aspects of an interface, its appearance and its behavior.
  - This is also known as look-and-feel.
  - Both aspects may be approximated independently in a prototype.
  - The proximity to the target system that a prototype exhibits is called Fidelity.
- Depending on the degree of fidelity, one would speak of low fidelity prototypes or high fidelity prototypes.



# GUI-Models

- **Storyboards are good as a starting point, but even though they are a low-fidelity technique they are rather concrete.**
  - Some elements of their appearance like layout and choice of widgets are already specified – and often the remaining design is subtly constraint by these (accidental) initial sketches.
  - Their behavior, on the other hand, can not be specified to a significant degree.
- **A more abstract technique to describe Interfaces are GUI-Models.**
  - GUI-Models focus on control and interaction and abstract from appearance.
  - They are rather closely related to workflows or business processes, but restricted to the immediate user interaction.
- **There are at least four approaches**
  - Dialog Design Diagrams (Martin, 1987)
  - Interaction diagrams (Denert, 1991)
  - Dialog-Graphs (Forbrig, since 1996)
  - Window-Event-Diagrams (Störrle, since 1999)

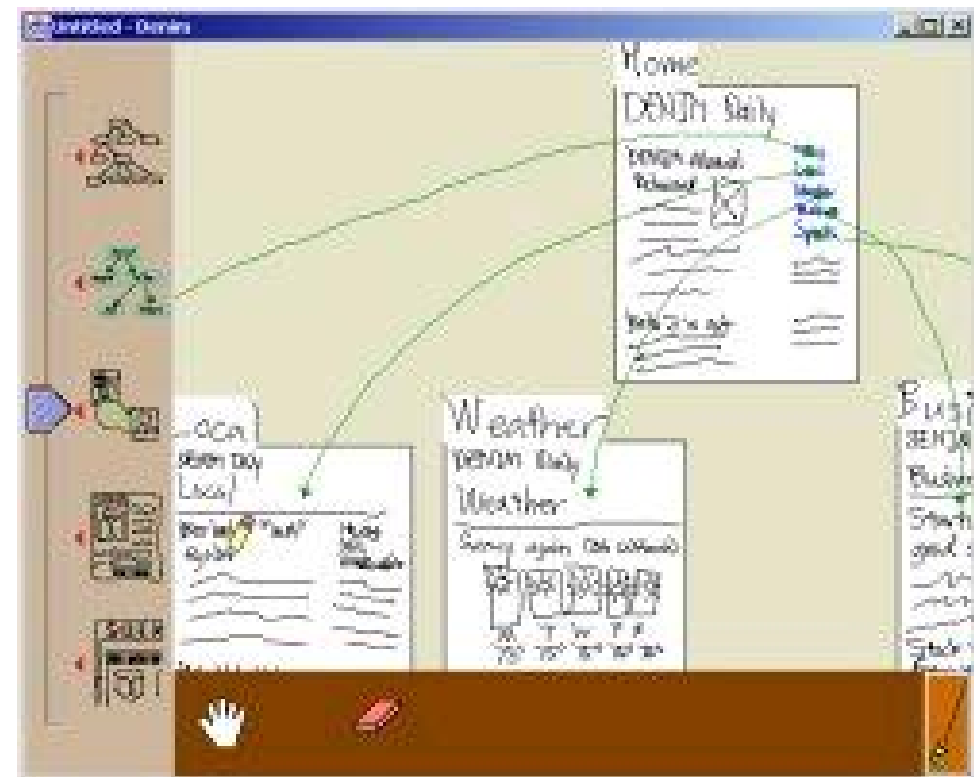
# The DENIM storyboarding tool

- The DENIM-tool (Landay et al., 1999) allows a user to hand-draw sketches of web pages using an early tablet/pen interface.

## Denim Demo Movie

- It supports designs of
  - individual pages,
  - navigation maps, and
  - site maps.
- Denim creates linked pages from the sketches.

## Resulting Web Pages





Prof. Dr. Harald Störrle  
Danmarks Tekniske Universitet (DTU)

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## **Chapter 3.7:**

# **A Paper Prototype and WED of the LMS-App**

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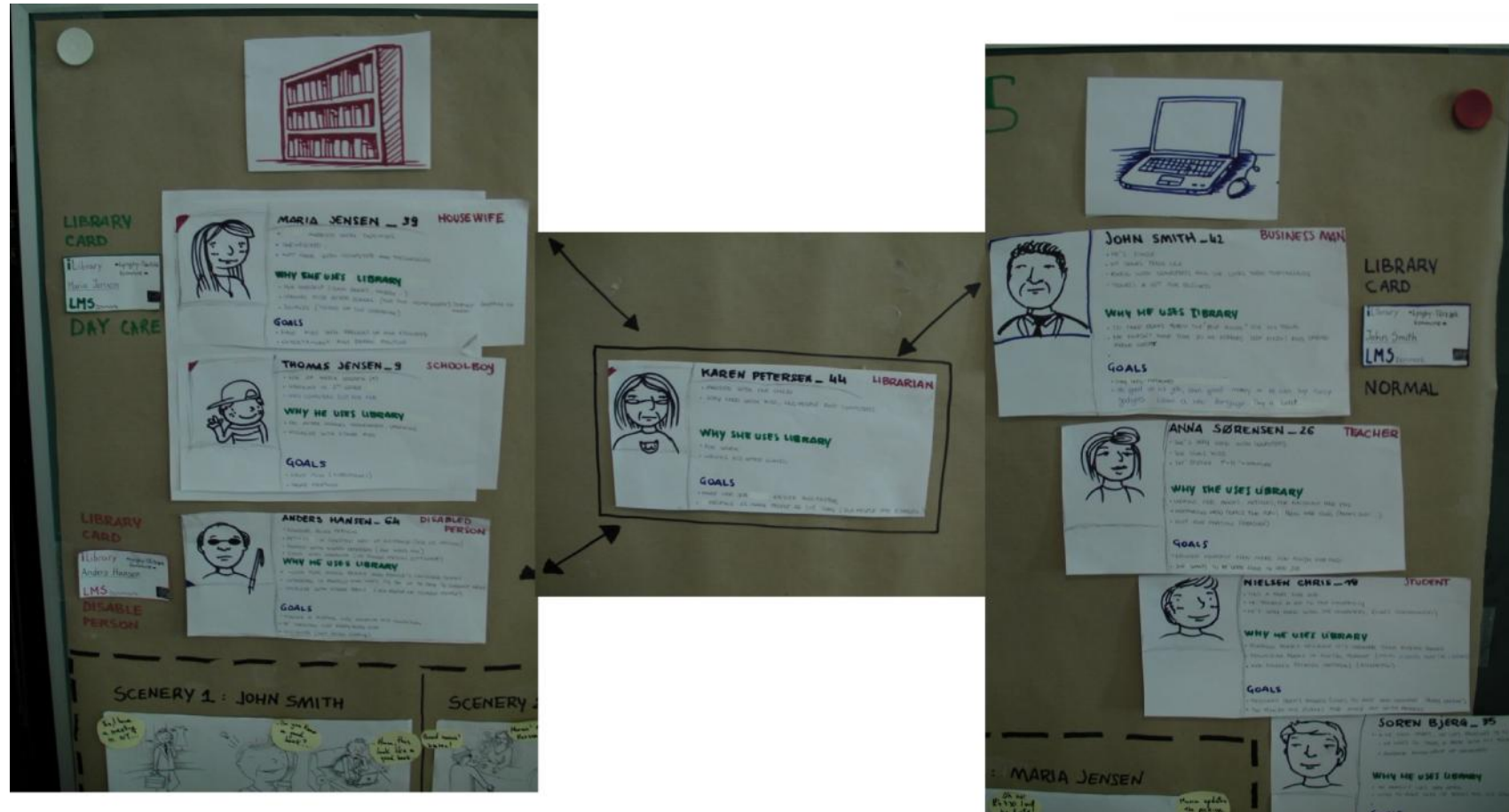
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# A Sample Cast for the LMS





# LMS-Cast: Personas and Relationships



# LMS Persona Scenarios

## SCENERY 1: JOHN SMITH

1. Yes, I have a meeting in NY...

2. Do you know a good book?

3. Hmm, this book looks like a good book.

4. (Moving to the Airport)

5. [Hello book!]

6.

**John Smith**

- He is for derived from his office tasks on the road and does it with a laptop & a mobile book.
- He has a business meeting in New York tomorrow and wants to read a book while he is traveling since his journey is a long ride.
- When he is reading a book from the LMS account he will pick up the book two hours before he leaves on the plane on the airport.

## SCENERY 2: ANDERS HANSEN

1. Mom! Mr. Hansen!

2. Let me just help you with the book!

3. Computer did it. Hansen, what would you like to read?

4. Computer: There are 2 users logged in the LMS library.

5. Computer: I don't know to the book!

6. Computer: Can you check if there are new visitors?

**Anders Hansen**

- After lunch Anders likes to go to the library because he uses the great computer & the internet (chat, photos and files) to read books.
- He goes there to socialize with other people like him.
- When the library has a small sale with books she helps him go the library room.
- He logs in with his library card and goes to his profile on a computer. Computer does search. He stops me and the book back with his profile in the library room.

## SCENERY 3: MARIA JENSEN

1. SUPERMARKET

2. Oh no! It's too late!

3. Hi Thomas! Your mom and me 30 min later.

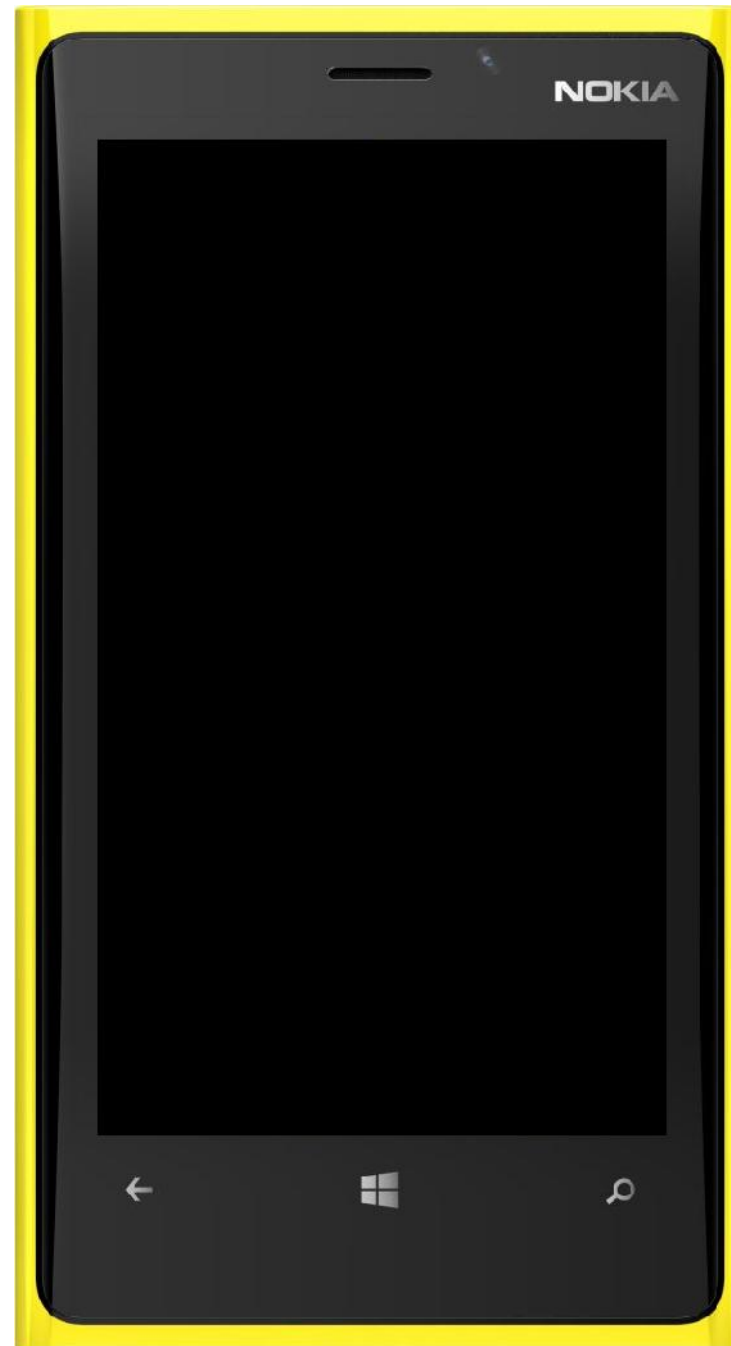
4. The librarian needs the update for Thomas.

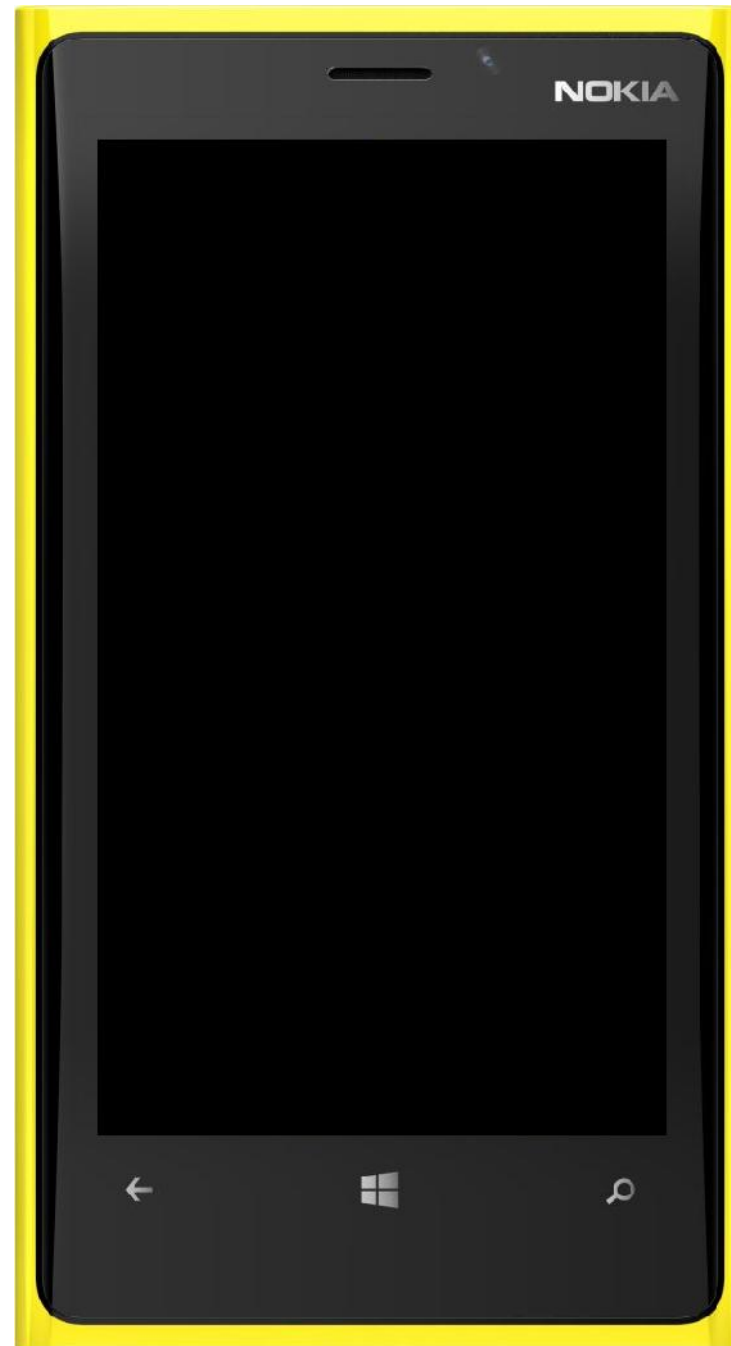
5. Thank you! Bye!

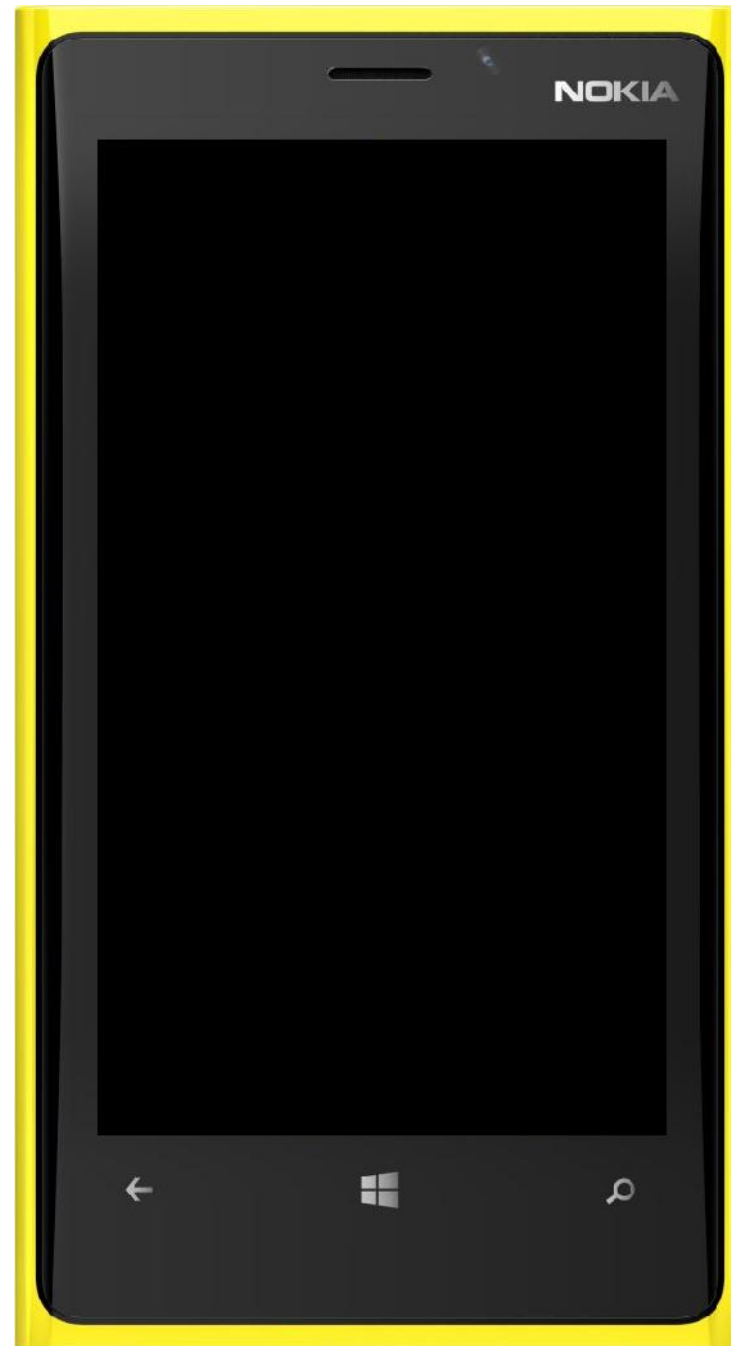
6. Mom update me pickup child time.

**Maria Jensen**

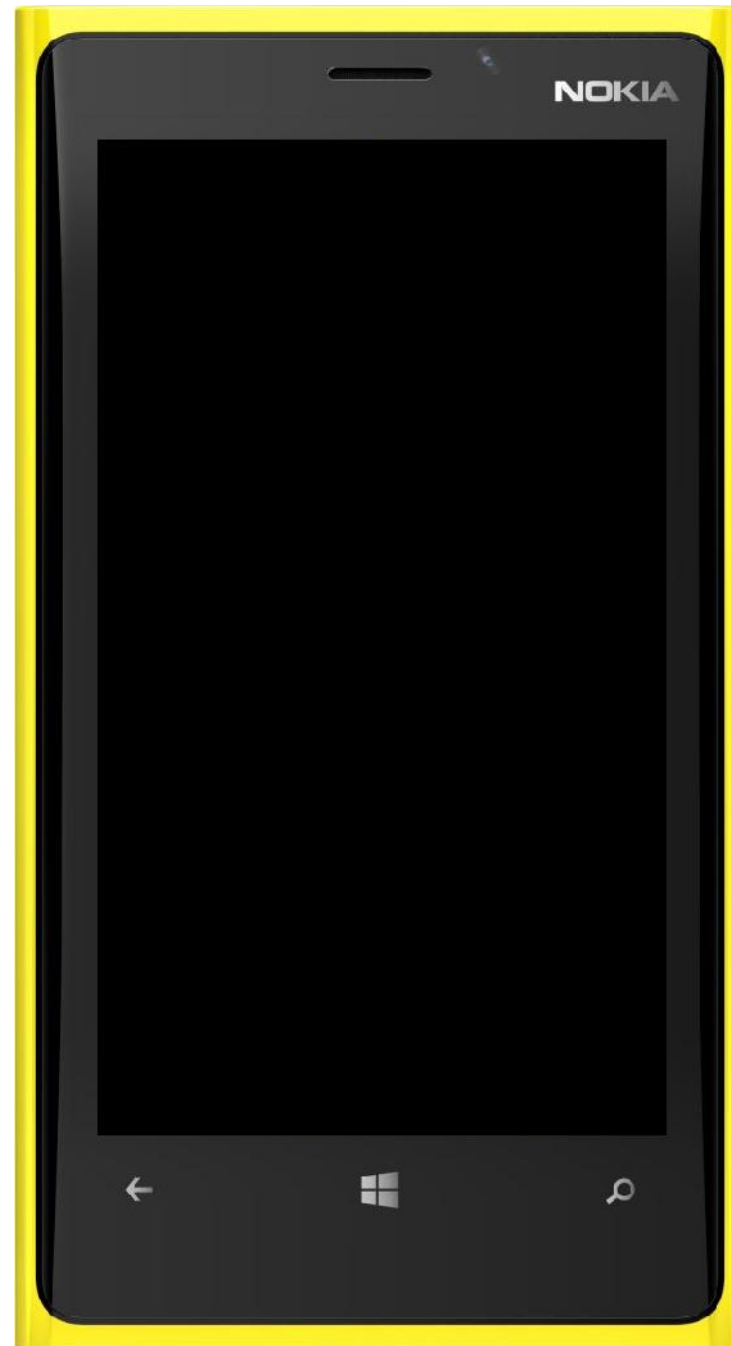
- She is doing shopping in a supermarket and looks at her watch and realizes that she is going to be late to pick up her son at the library.
- She takes out her "Smart" phone and checks the LMS library report application.
- She represents the (LMS) book she is picking up for her child from the library.
- The Librarian is informed about the change and how the LMS library's Thomas's book is changed and the LMS library is ready to book in a new book. It is included in the library.

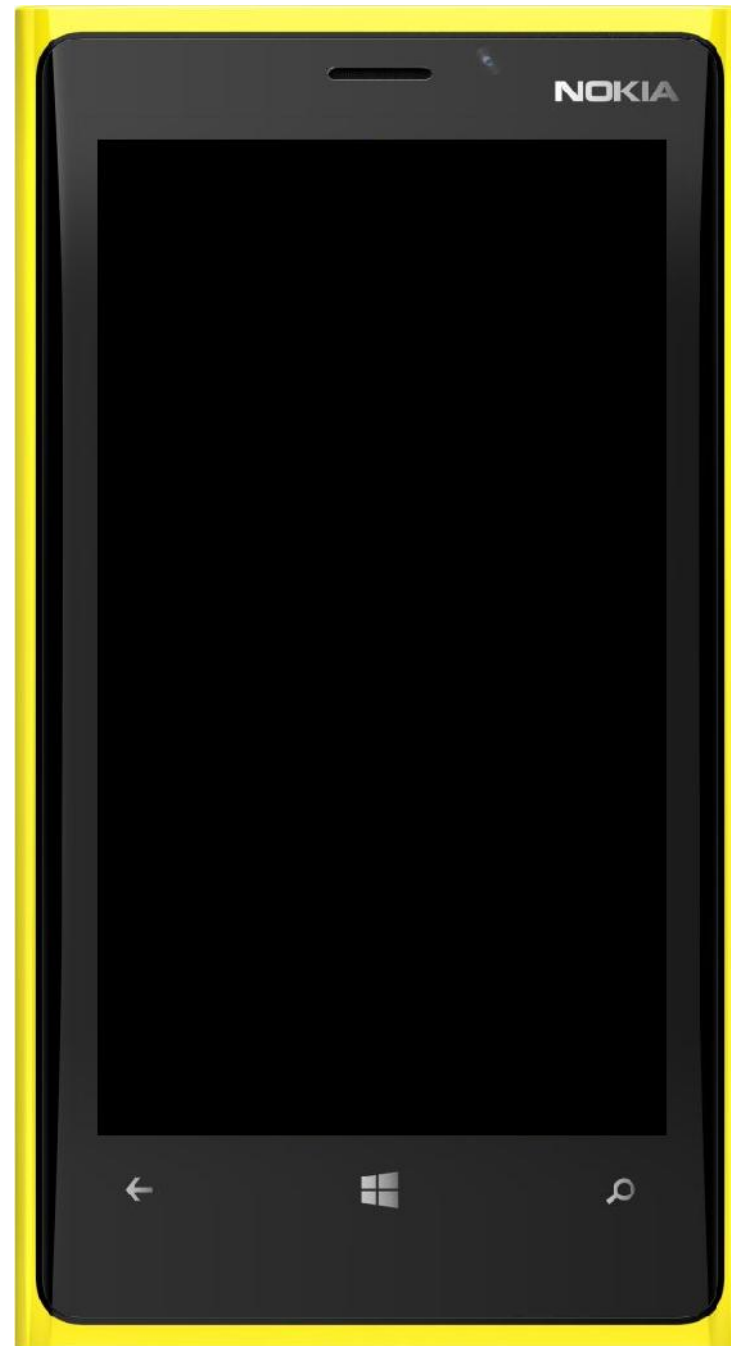


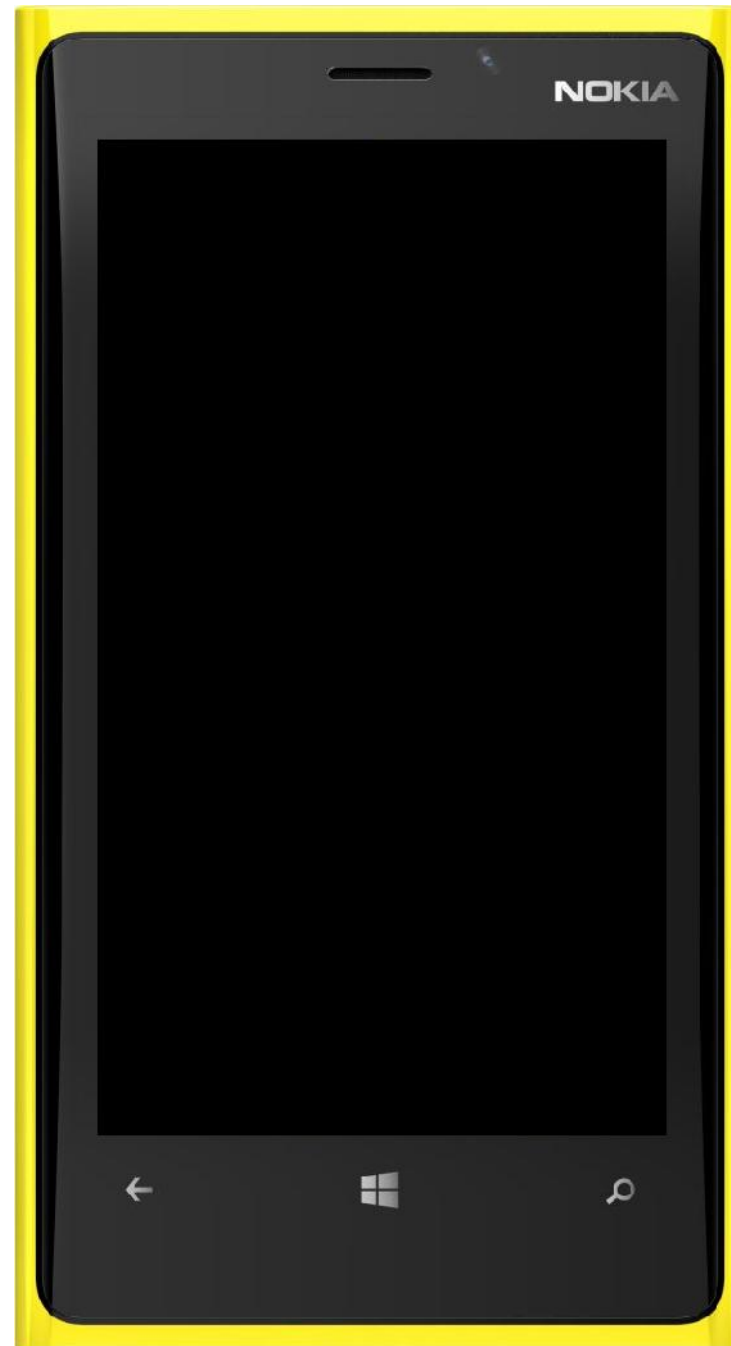


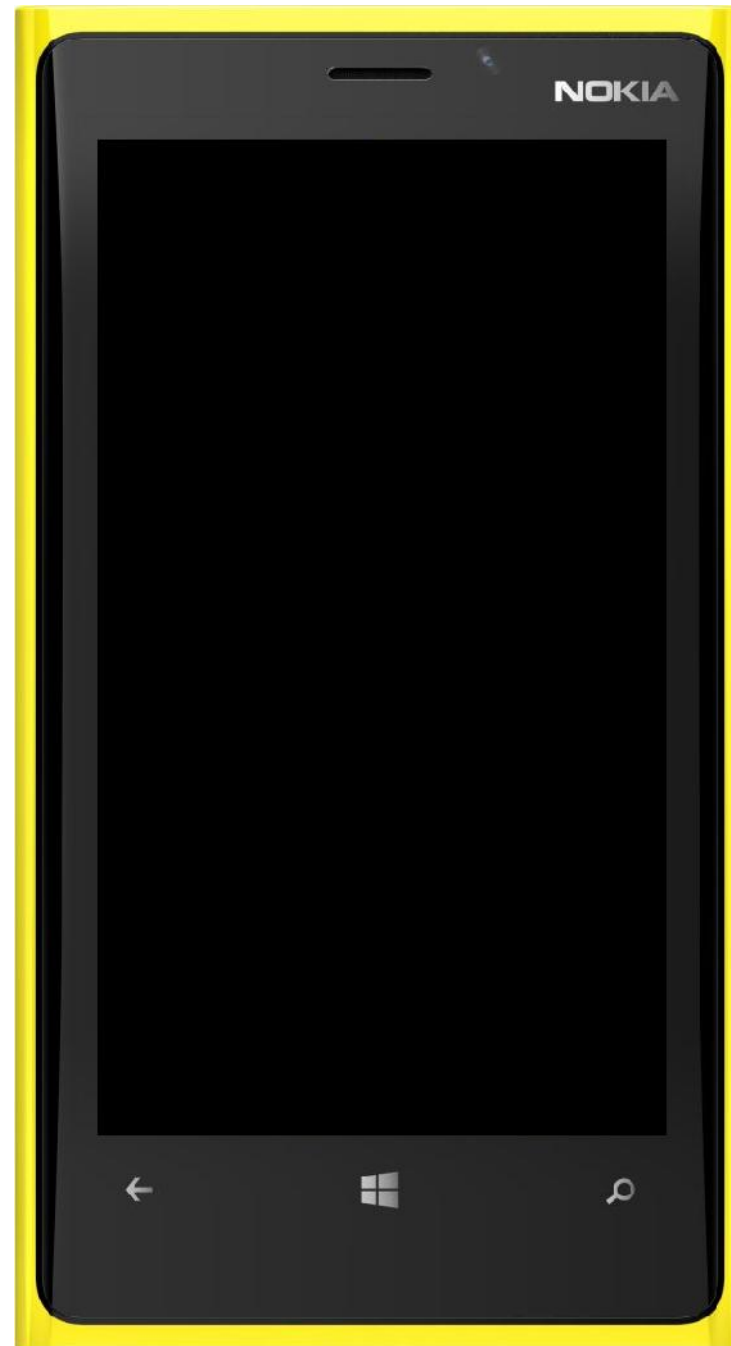


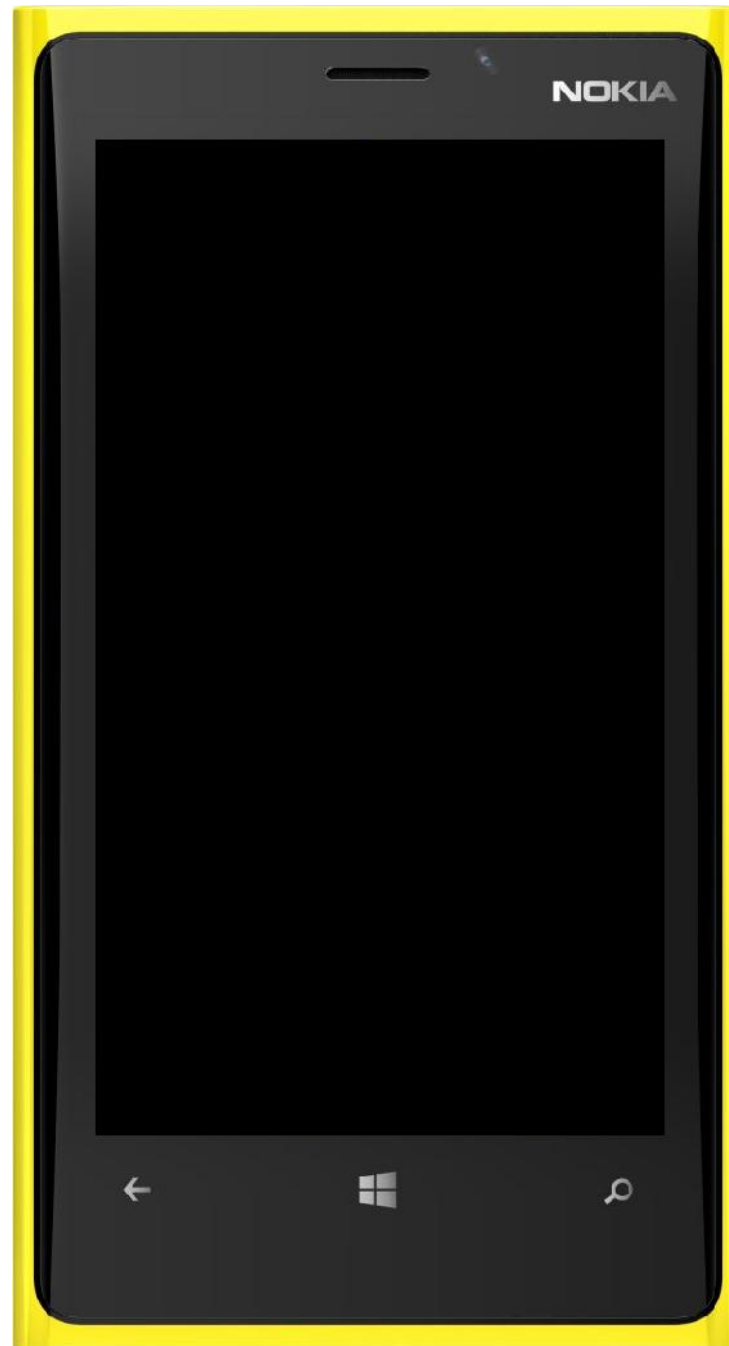




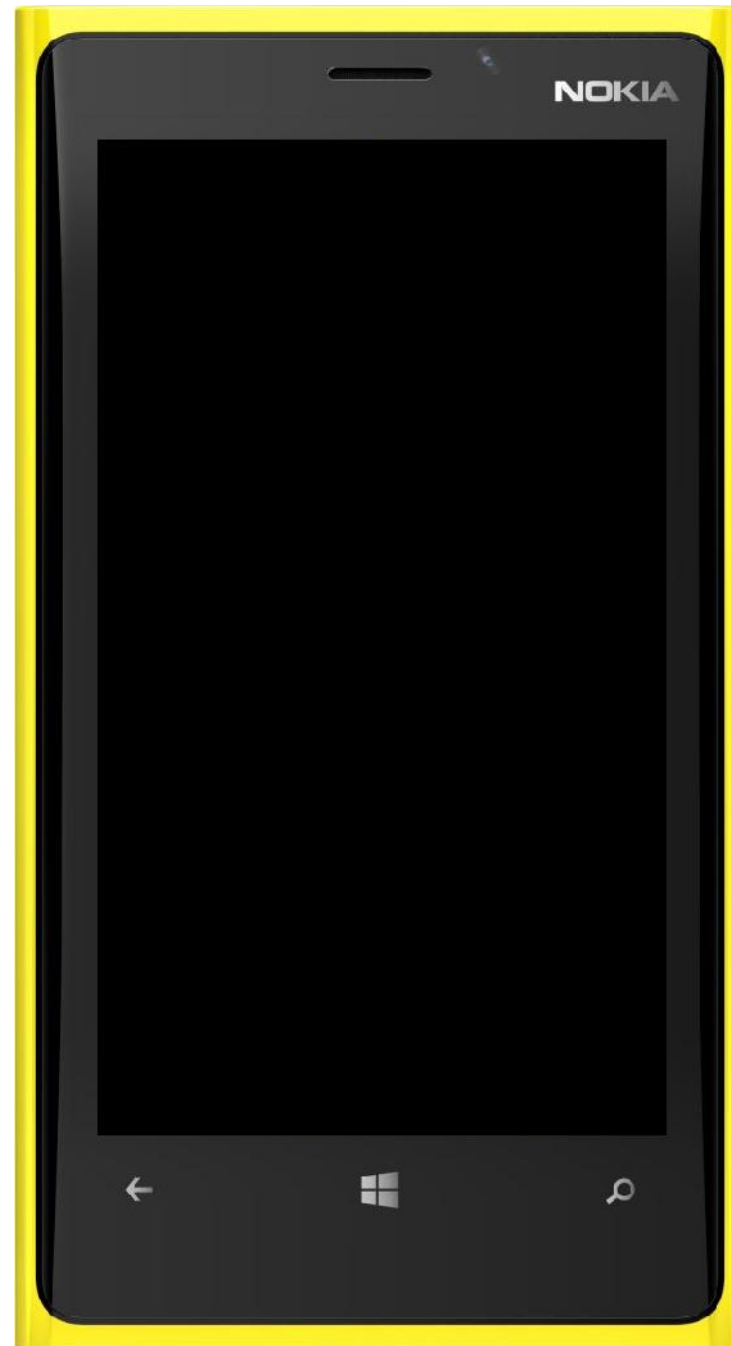


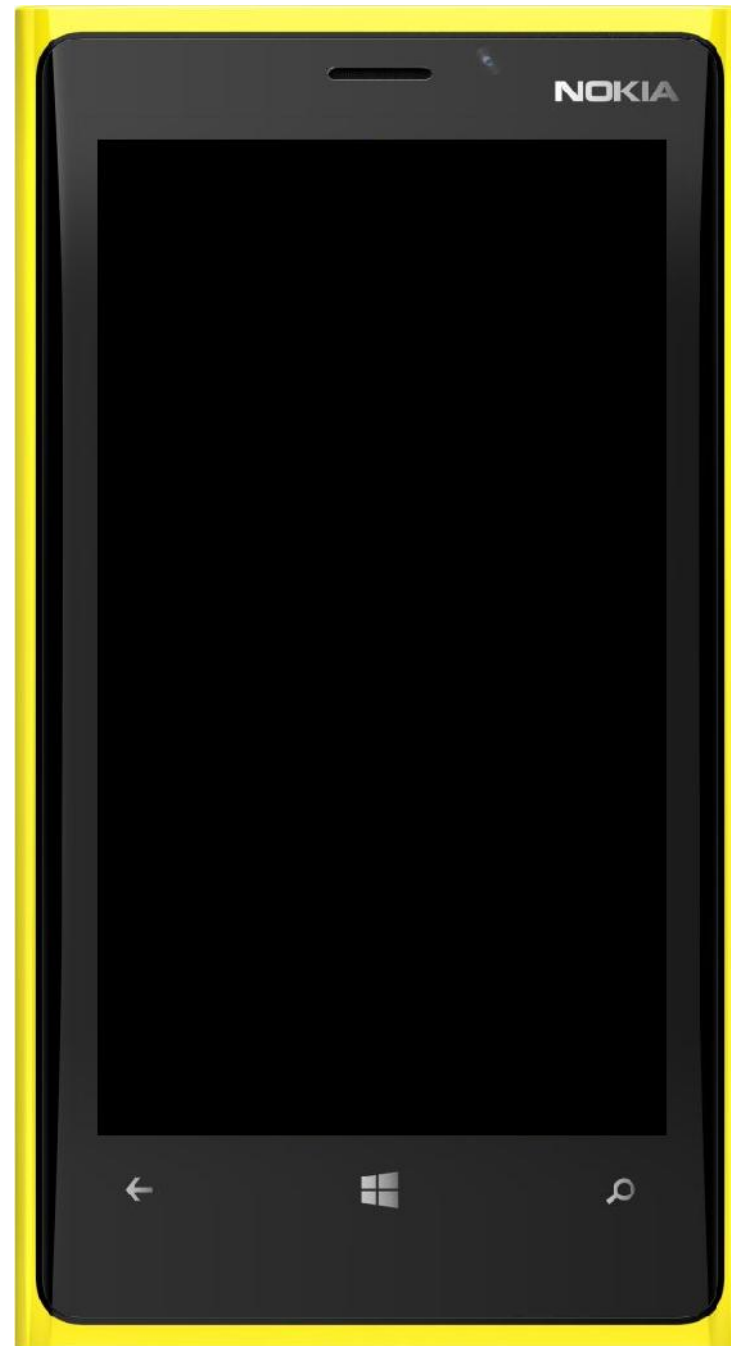


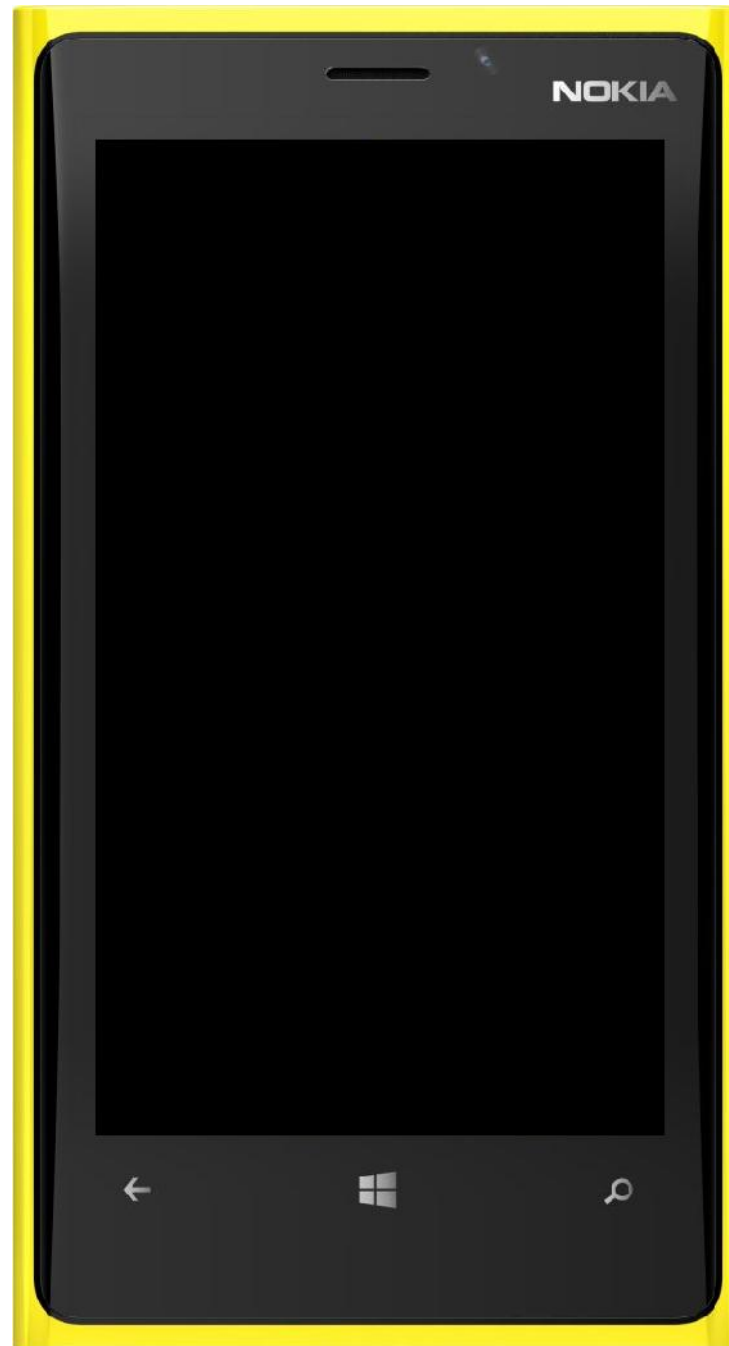


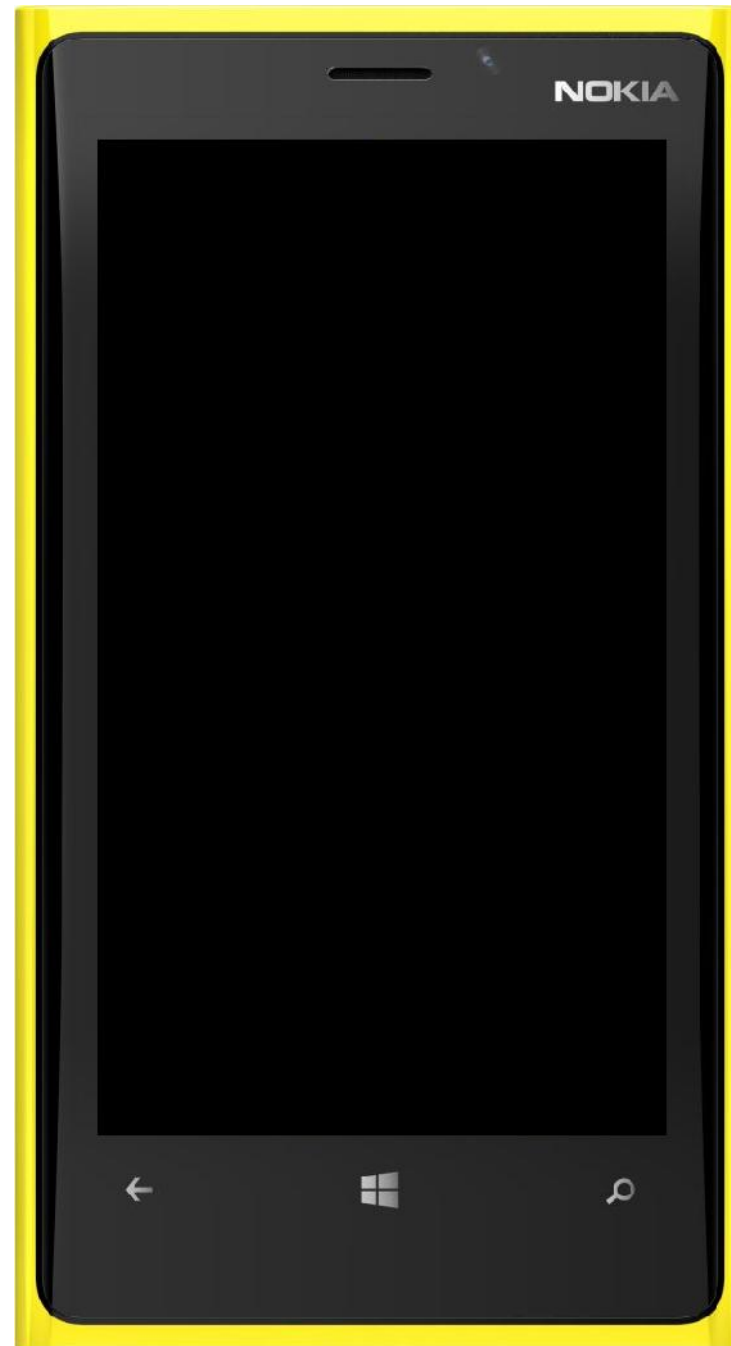


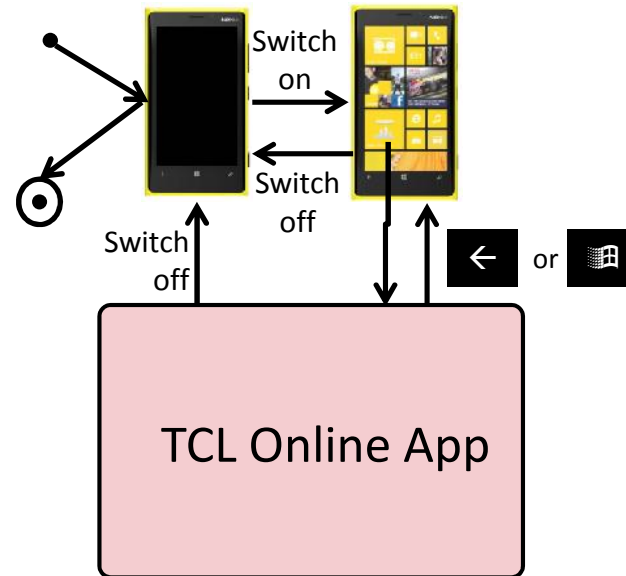












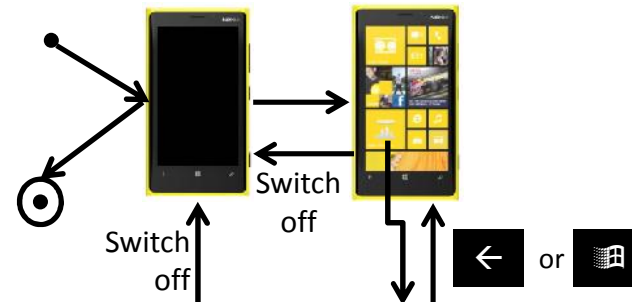
States  
Initial/Final States  
Transitions



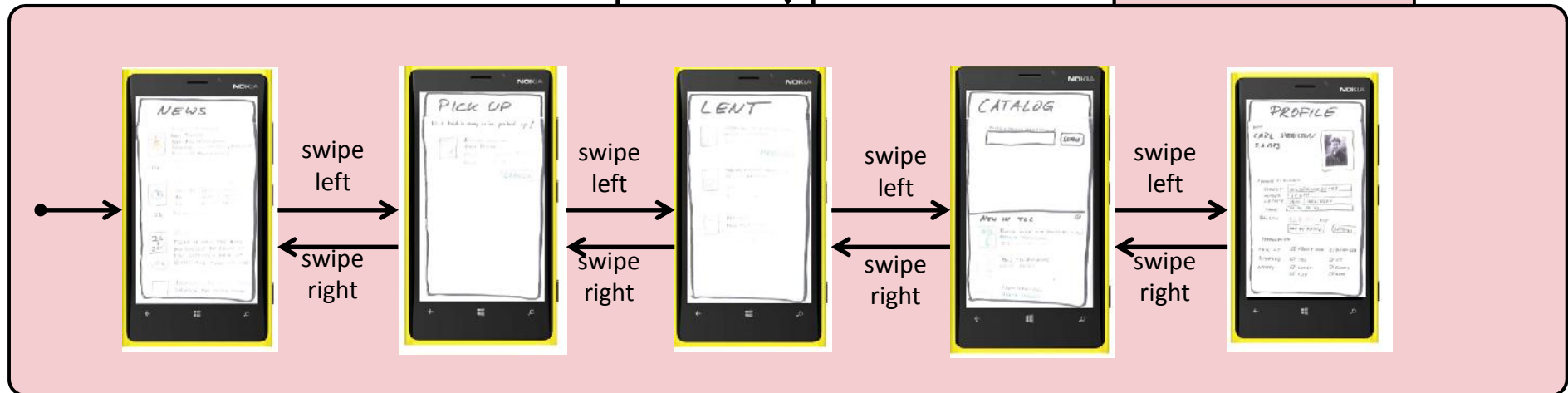
## Sequential Substate

### Explicit Actions

### High level entry/exit

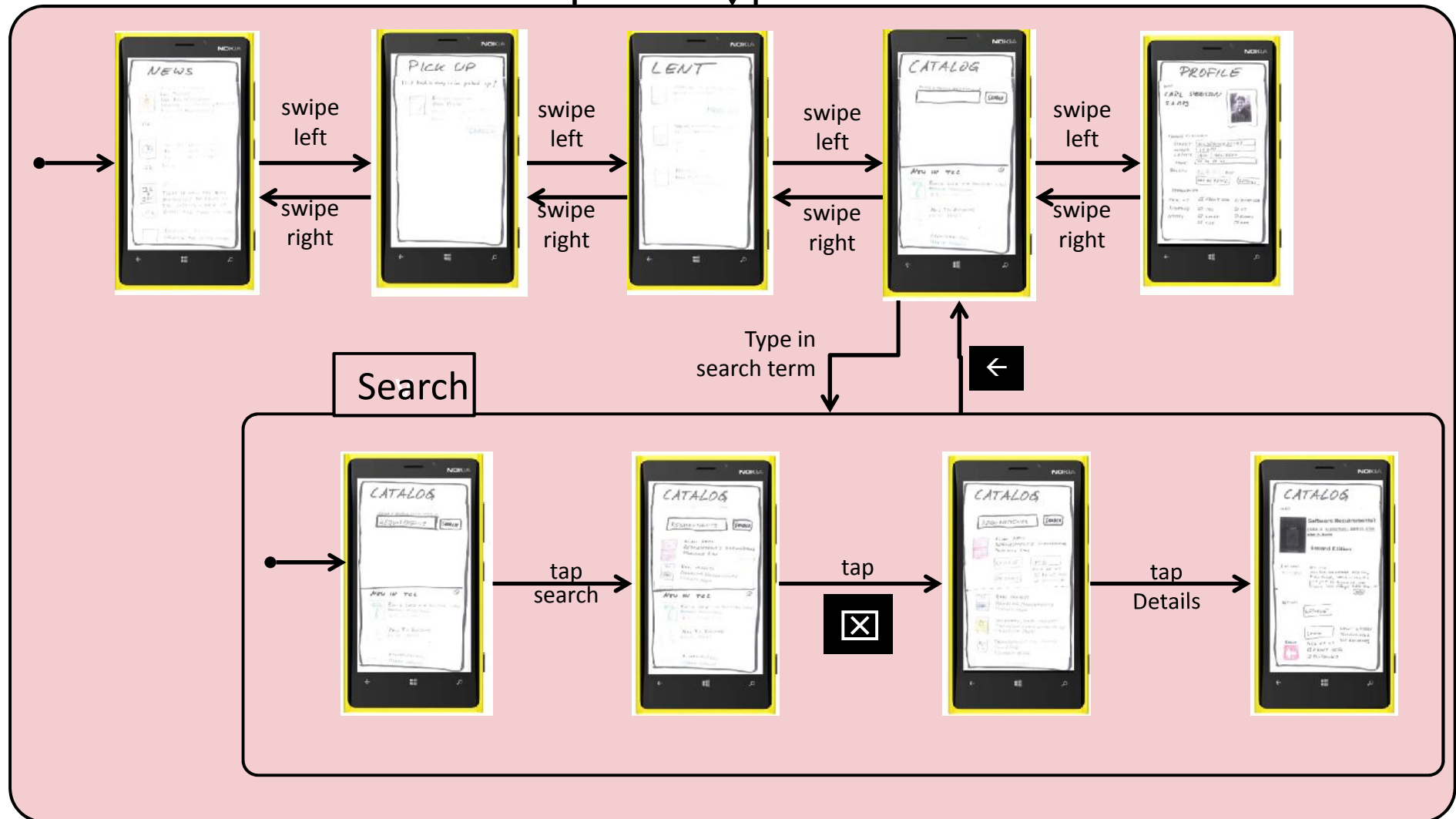
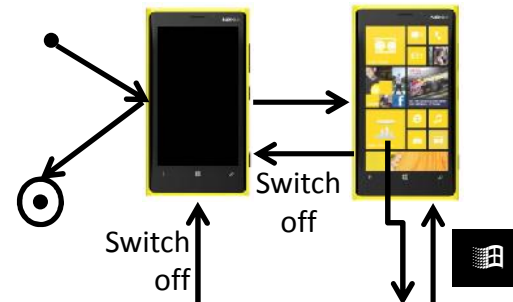


TCL Online App



# Nested Complex States

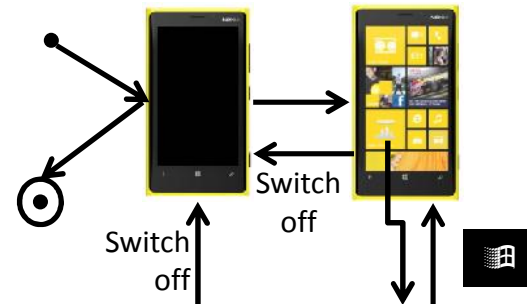
## Changed Meaning of ← Button



# Concurrent Substate

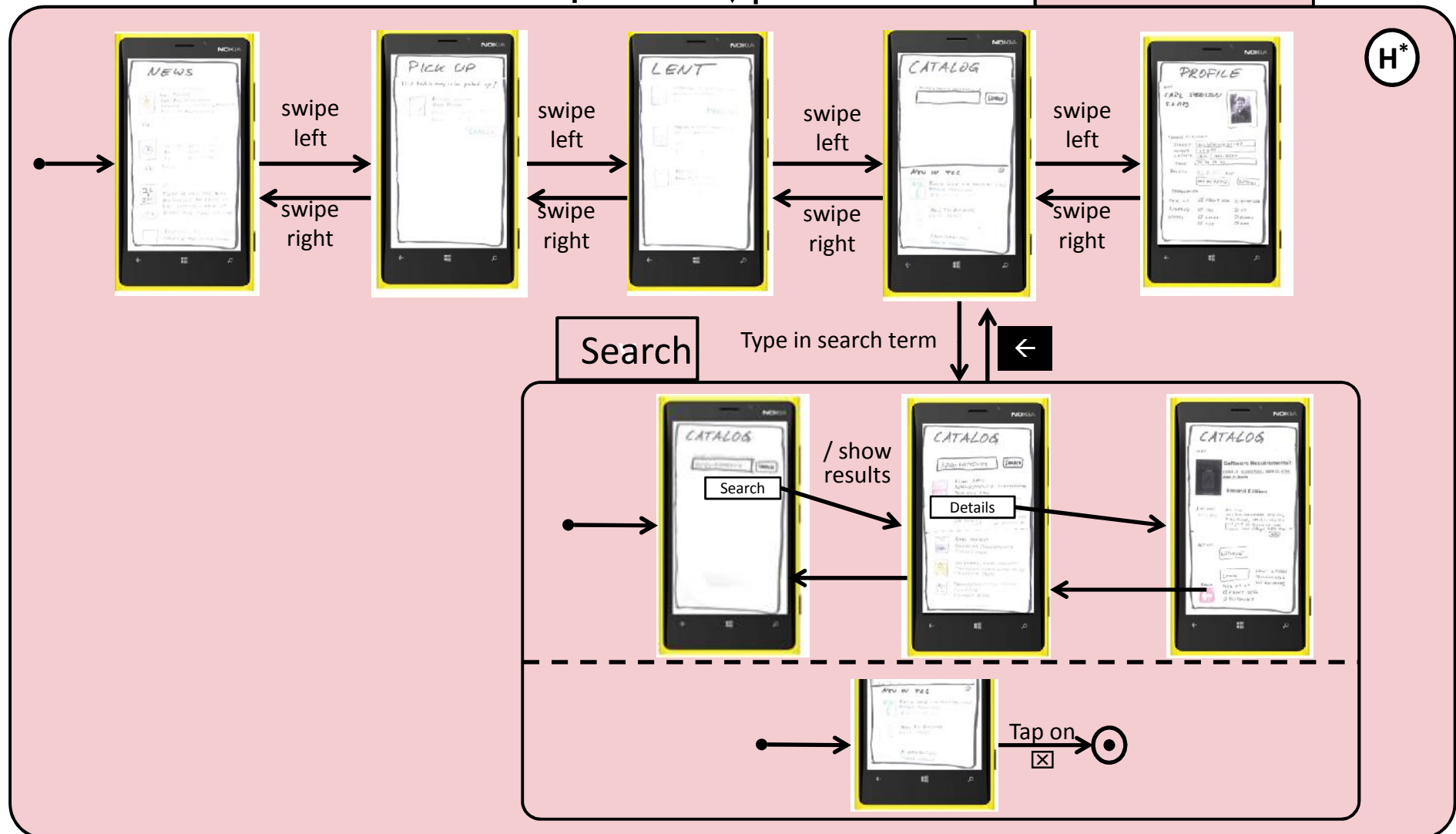
## Buttons

## History



TCL Online App

H\*





Prof. Dr. Harald Störrle

Software Engineering Section  
Department of Applied Mathematics and Computer Science  
Technical University of Denmark  
Matematiktorvet  
Building 303b, Room 056  
DK-2800 Kgs. Lyngby

[hsto@dtu.dk](mailto:hsto@dtu.dk)  
[www.compute.dtu.dk/~hsto](http://www.compute.dtu.dk/~hsto)

