

UX Expert Review

Based on Human Factors
Design Drivers Grounded in the
Levels-of-Cognition Model

Version 3, Jan 2023



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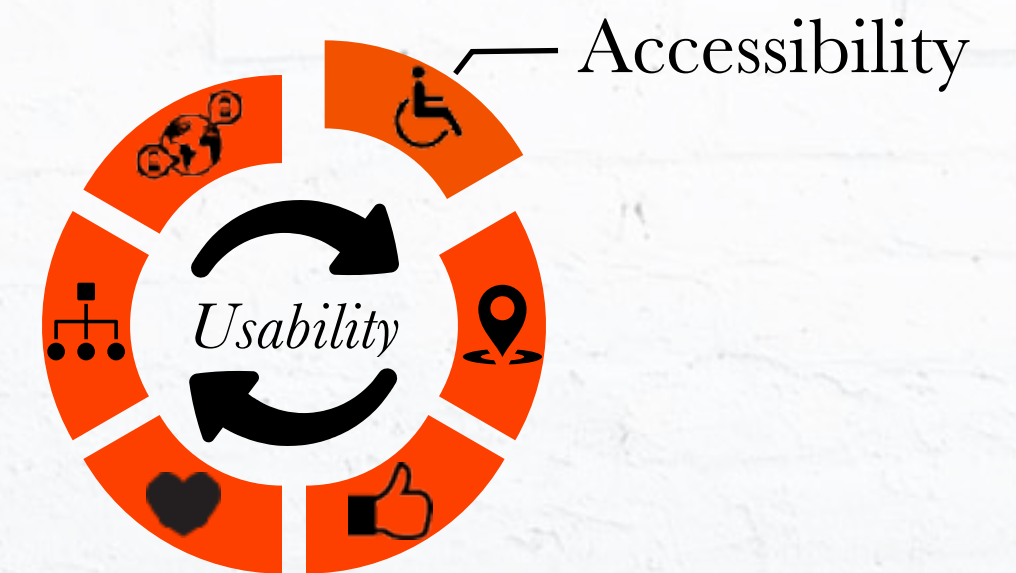
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1. Introduction to UX Expert Review

- Review background
- Levels of Cognition model
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- Relationship to accessibility



The UX Expert Review

- The UX Expert Review is a tool to ensure that your design delivers intuitive, easy-to-use and frictionless user experiences.
- A UX Expert Review secures that your design is compatible with the most effective and natural information processing capabilities of humans.
- It is also a building block for designing user interfaces that are robust in the face of stress.
- The UX Expert Review is carried out by plotting your design against a detailed set of drivers of how human beings function.
- In addition, when possible, you can use domain-specific best practice guidelines for standard design elements which are already widely used in the market.

Benefits of UX Expert Reviews:


- Review of design at all maturation levels - even pre-design conceptual ideas.
- Systematic review using evidence-based design drivers.
- You can supplement your reviews with examples based on the design drivers
- Very fast turn-around for agile projects: Down to same-day feedback possible.




UX Expert Review Focus

From the UX Expert Tools course you will be familiar with the UX Value Equation depicted below.

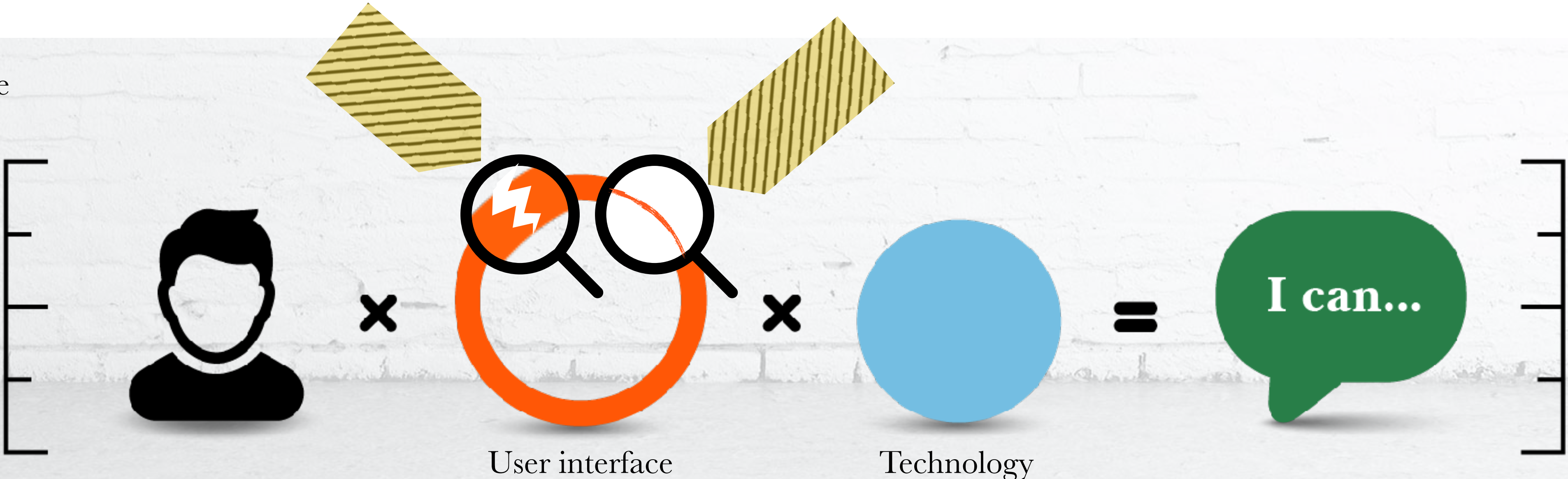
The user interface is coloured red in the model to denote that it should match the basic cognitive functions to the largest extent possible (which are coloured red and orange in the Levels-of-Cognition model).

User interface: You can think of the UX Expert Review as an exploration to find areas in the user interface  that have “cracks”. These cracks denote weak spots.

Technology: An alternative way to look at it is as an inspection to find the places where the user interface is too thin to fully cover the raw complex technical functionality (coloured blue  and referred to as the core technology).

It is purposefully coloured in blue to display that it requires the blue intellectual skills to figure out (the two top levels of the Levels-of-Cognition model)

The user experience value equation
UX-ValuEQ



The Levels of Cognition Model

The Levels of Cognition (LoC) model is the basic model, we use to explain how human beings function. It is a model that you should use to make design decisions based on a more detailed and correct understanding of human cognition.

LoC relates to other models you may already know like the **Skills-Rules-Knowledge** framework by Jens Rasmussen and the **System 1 and System 2** model made popular by Daniel Kahneman. However, you will learn that our use of the System 1 and 2 is different from Kahneman.

LoC is also referred to as the “pyramid model” for an obvious reason: It is a pyramid. In many ways it has the same logic as the classic Freudian ice-berg models with most of our brain activity being below a conscious threshold. However, the LoC has nothing to do with the psychoanalytical model by Freud as such.

The LoC model has four levels. Especially level 1 (the orange layers forming the basis of the pyramid) completely redefines how we should think about design.

The layer is evolutionary based and provides us with powerful skills to function super effectively in the world. These are the skills we should primarily design for to make intuitive user interfaces.

This is also the layer that **VERY FEW** people know about because it is a relatively new part of psychology.

Even if you already learned a lot about psychology and design, this will likely be new to you as well.

Designing for this layer 1 is very desirable for a lot of reasons. For instance, because people function in the same way at this layer, which means that the solutions will work for all user groups. Also, these skills are our super skills: a lot of resources, very fast and robust.



Levels of Cognition

Analytical IQ / knowledge

- Do **not** rely on in products!
- They make very poor UX
- Fragile and highly limited
- Break down under stress
- Require conscious focus
- Effortful

Rule based behaviour

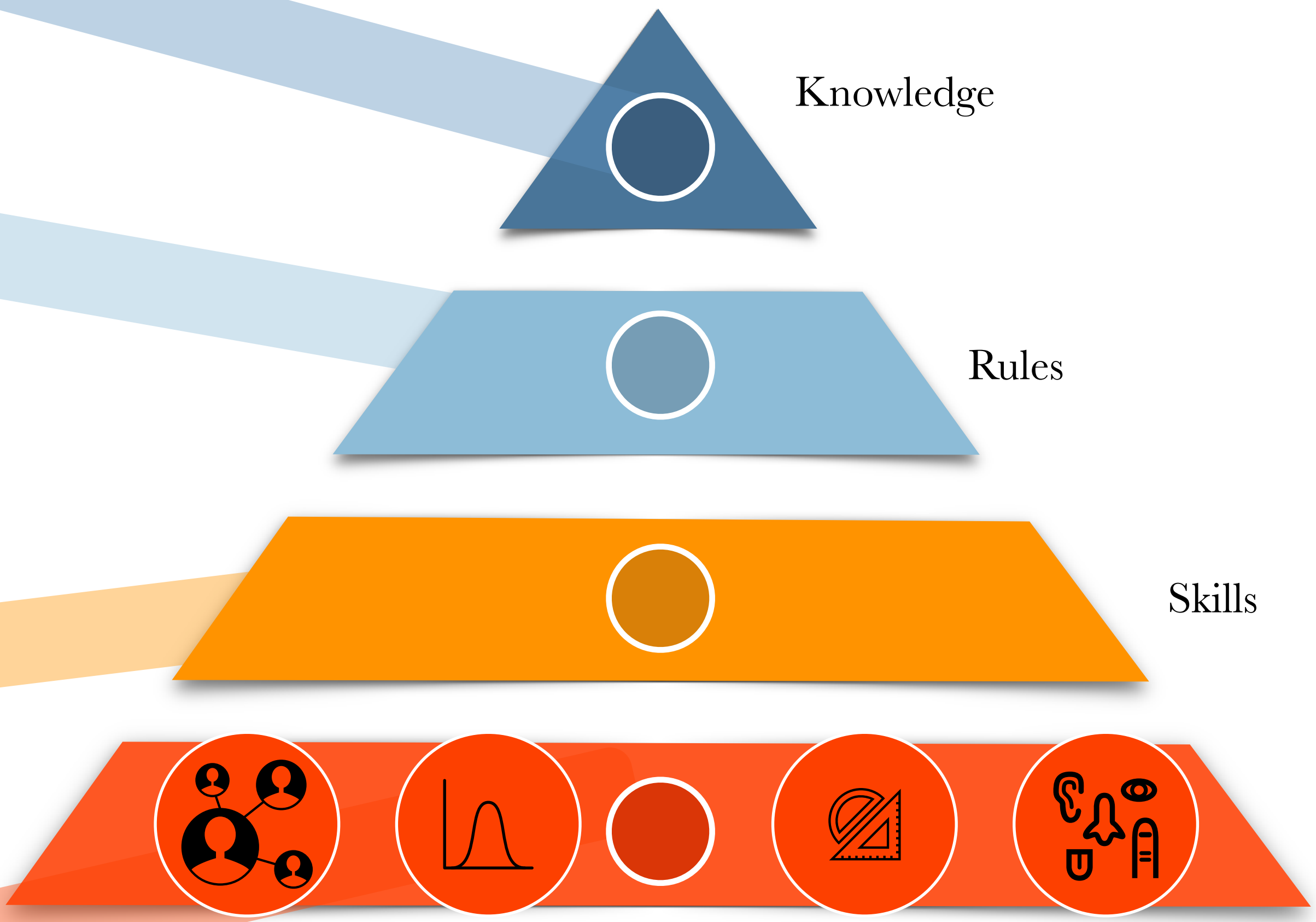
- Keep to a minimum in products
- Users may apply wrong rules
- Requires formal education
- Subject to learning curves
- Users apply rules if appropriate
- Based on formal experience

Learned skills

- Learn what users know
- Build on this knowledge base
- Cultural differences
- May limit innovation
- Standards
- Only applicable existing tech

Basic human skills

- Move basic interaction here
- Virtually limitless resources
- Robust, fast and effortless
- Truly intuitive
- Cross cultural



Knowledge

Rules

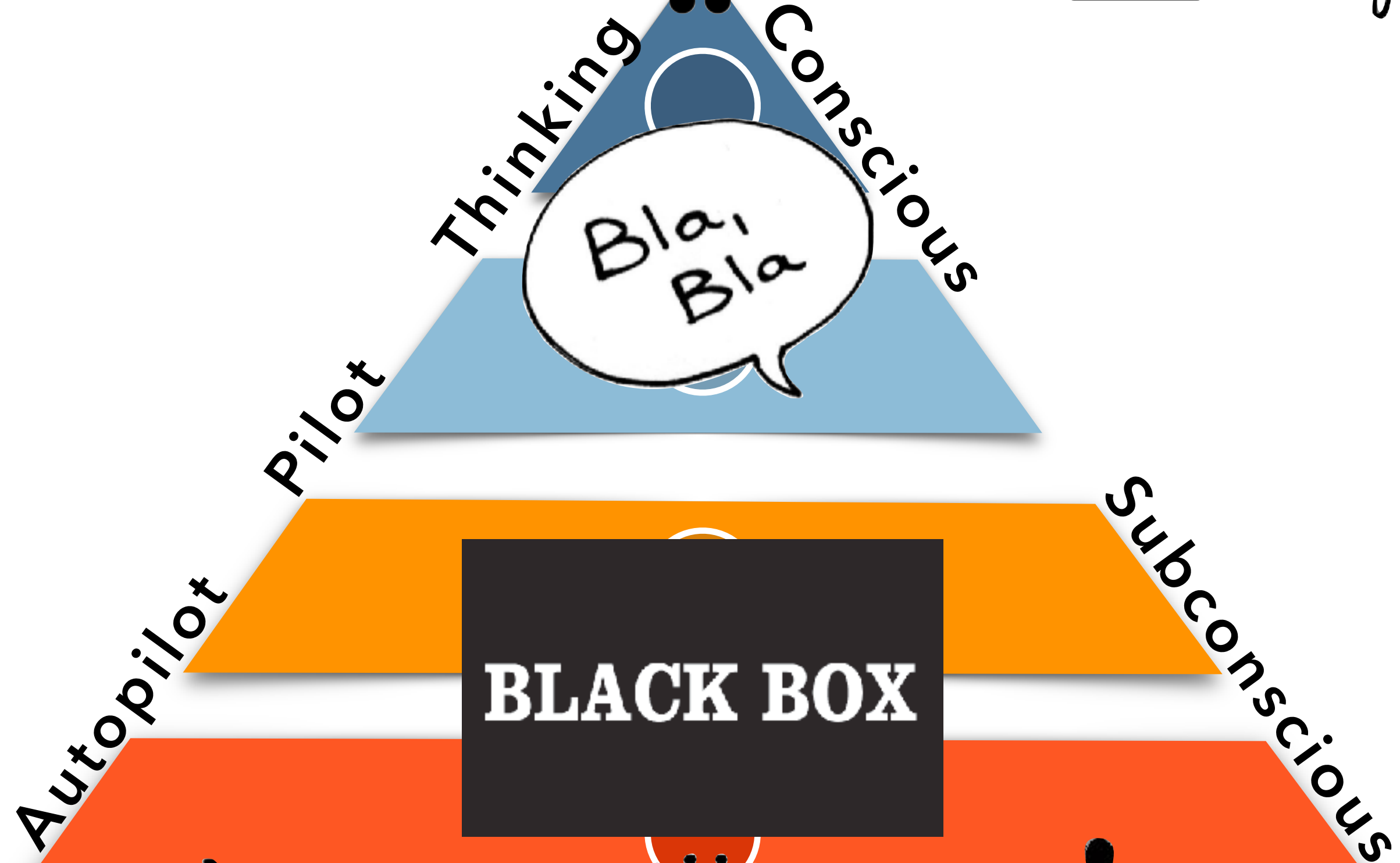
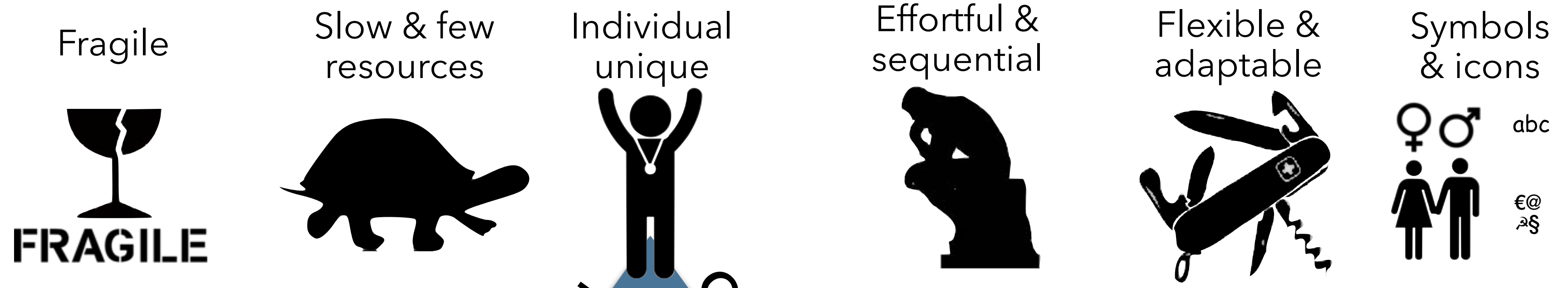
Skills

Basic cognitive functions

System 2

Cultural symbolical & linguistic

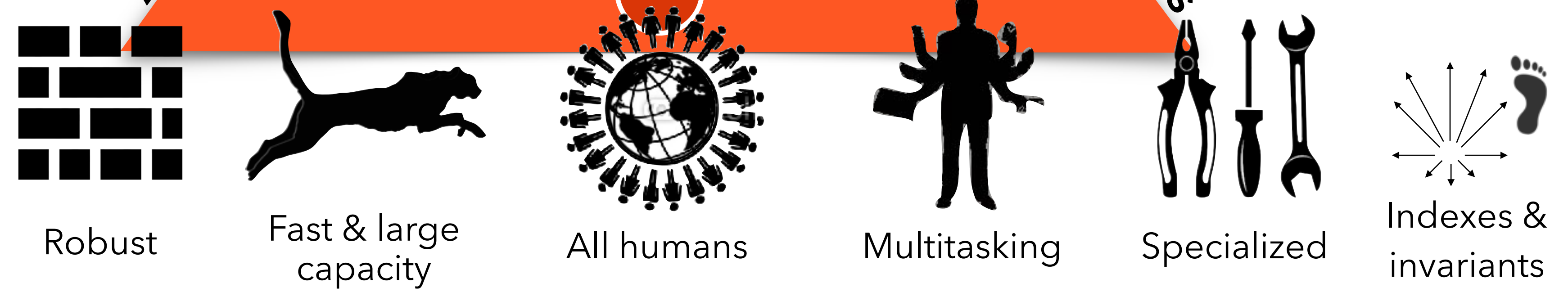
High level cognition



System 1

Biological eco niche (ecological psychology)

Low level cognition



2. Review Process Overview

- *Phase 1:* Use, exploration and documentation
- *Phase 2:* Review, root-causes and design hacks
- *Phase 3:* Reporting and design solutions

Phase 1.

Use, exploration and documentation

Phase 2.

Review, root-causes and design hacks

Phase 3.

Reporting and design solutions

Phase 1:

Use, Exploration and Documentation

The objective of Phase 1 is to identify and document potential problems for subsequent root-cause analysis.

The mindset is to stress-test the design by putting yourself in the role of a user that, at a glance, tries to make sense of your design. While this may appear as an artificial use case, it nevertheless provides valuable insights about the quality of the governing logic of your design.

This use and exploration can only be done once by a person, so it needs to be done right. It is also important to document: it should be video recorded (i.e. not only a screen recording of a graphical user interface) as we need to capture the user and the system together in action.

The use and exploration need to be done without interruptions, so place any other tasks you may have on hold.

Don't waste time writing down during your use exploration. Simply express your comments out loud to the recording camera.

If you consider using a “co-pilot” from your design team for the review, make sure not to engage in dialogue. It often happens that designers are inclined to assist in using the system.

The findings from this exploration phase will be subject to detailed root-cause analysis using the design drivers in phase 2.

Remember

- Try out the design without reflecting too much on it.
- Stress test it by casually browsing through the functions.
- Ensure you are not interrupted.
- You can only do it once as you will quickly learn and overcome problems.
- Video record everything for later analysis and documentation.

Intended User, Use and Context

Higher-order cognitive functions, such as analytical skills and problem solving, are influenced by differences related to user types, intended use and the context of use.

A UX Expert Review should therefore consider:

- (1) *who are the intended users,*
- (2) *what is the intended use and*
- (3) *what are the relevant use contexts*

Knowledge about these three points may provide valuable input to the review.

However, remember that a key tactic to create intuitive user interfaces is to actively try to unburden the higher-order cognitive functions. This is achieved by moving the interaction with the user interface towards the basic cognitive functions (bottom layer of the LoC model). In doing so, the UX Expert Review becomes less and less sensitive to differences in user type, use and context. Indeed, a value proposition related to use of the design drivers is that we can design for a global market.

For practical purposes, we recommend to first incorporate the contextual factors (user, user and context) in Phase 3 of the report out co-analysis of redesign solutions with the design team.



Phase 2:

Review, Root-Causes and Design Hacks

Review: The formal part of the review is like taking an X-Ray of the user interface design. Here you systematically work your way through all components of the user interface using the design drivers. Think of it as observing the user interface design with seven different lenses, where each one allows you to see different qualities.

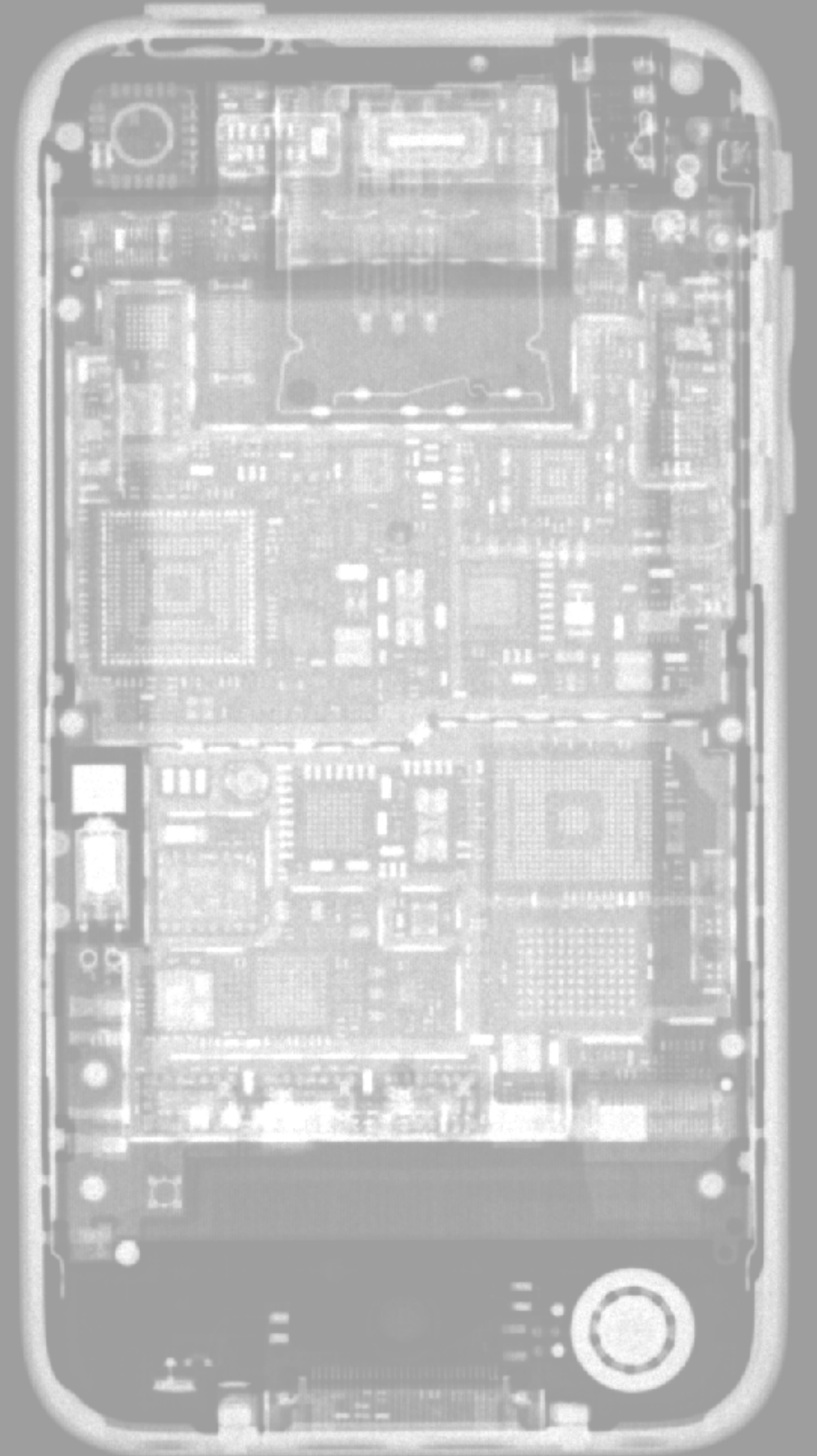
Remember that each design driver “lens” has many different facets with different implications for your design. With time, you and your team will develop a more detailed understanding of how to apply the lenses to your product.

Root causes: The findings from phase 1 should also be integrated with the more formal analysis. Try to understand

the friction and breakdowns you experienced by relating it to the design drivers lenses. In effect this is a root-cause analysis.

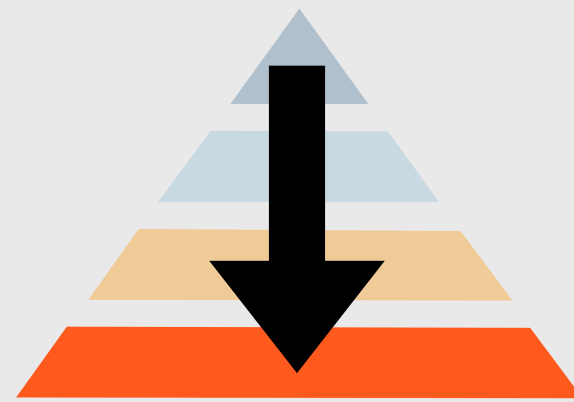
Design hacks: To clearly communicate problems identified with the the design driver lenses, we recommend design hacks. The analysis templates (see Phase 3) show what design hacks can look like. We also used them throughout the teaching videos to show problems with what is AND what a redesign could look like.

You do not need to be a graphical designer to make design hacks. Most design hacks can be done in Powerpoint. Their purpose is not to communicate the solution but what a solution could be using the design driver.



Three Tool Boxes for the UX Review

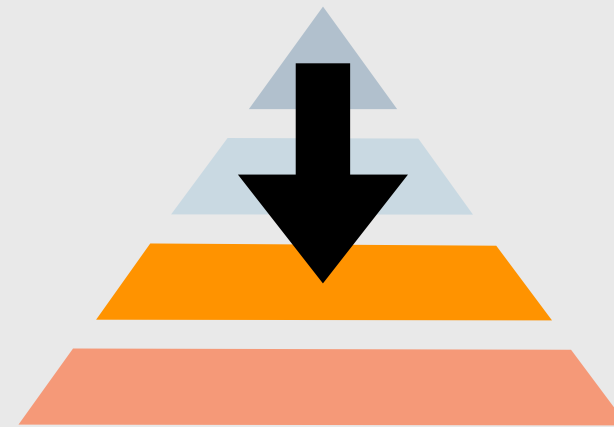
1



Move the interaction to the basic cognition level:

- What do the users **see**?
 - The blur filter
 - Space, orientation, movement, amount / size
- What do the users **hear**?
- What do the users **feel**?
- What does user **not** see, hear or feel? (Middleworld)

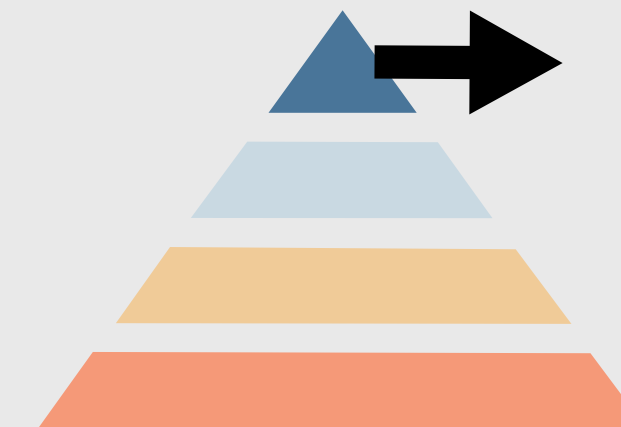
2



Move the interaction to the skills level:

- What does the user already know?
- Which **mental models** do the user have?
- Does the design match the users' mental models?
- Does the design adhere to formal and informal **standards**?

3



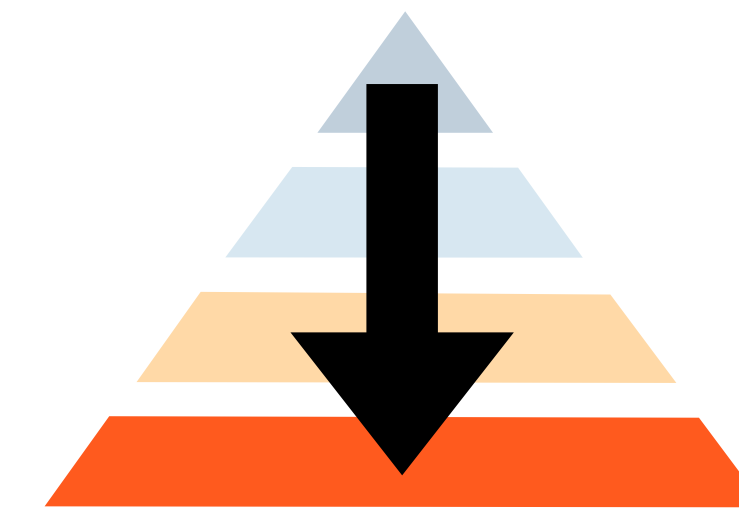
Remove it:

- How can we **optimise** and simplify?
- Are we **consistent** throughout the design?
- Is the communication **congruent** - does it communicate the same to all layers?
- Can we use **external cognition** to help the user?

1

From Knowledge to Basic Level

- Is the information available in a non-symbolic format? And does this non-symbolic information tell the right story? (Note both what the users sees, hears, and feels.)
- Are any basic properties of the physical reality being violated? For instance, gravity, balance, movement (up-down, front-back)
- Is the relevant information immediately available and understandable to the user, or do they have to know/understand something in advance? Is there something that the user cannot see, hear or feel?



Use the blur filter as an inspection tool (see next page)

Space:

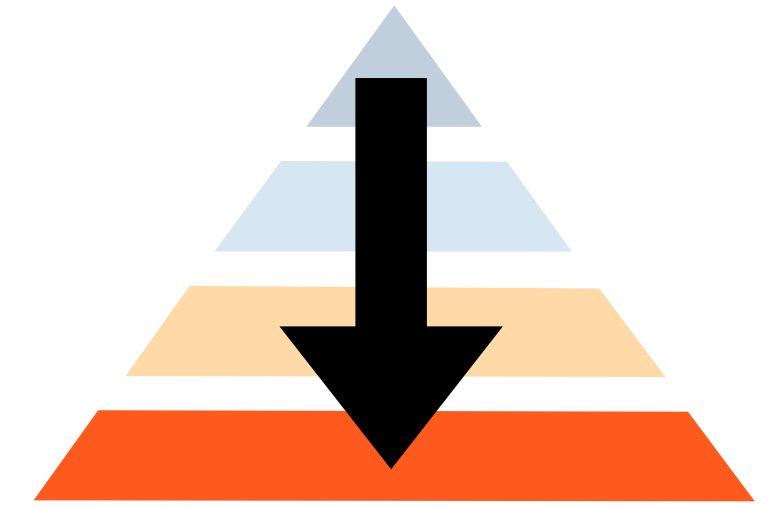
- ❑ Spatial layout and dynamics: Is the space we are creating communicated clearly and connected accurately? (For example during transitions between GUI screens?)
- ❑ Is there a visual hierarchy in the spatial layout (e.g. is the GUI organised into sections that have clear headlines), so the user can more easily identify the relevant information? (So they don't have to scan the entire page, but only the relevant section).
- ❑ Can we work with visual proximity or distance/white space to clearly show which things belong together and which do not?
- ❑ Are spatial relationships preserved throughout the GUI?
- ❑ Do the spatial layout, i.e. the position of different functions in the GUI, match the users understanding of the world?
- ❑ Can we work with natural mapping to make e.g. controls immediately understandable?

Objects:

- ❑ Do the user get a sense of agency and causality when interacting with the objects in your GUI? Meaning, do the user feel like they are the one in charge?
- ❑ Are there any natural constraints or dynamics related to the objects we are working with? Is the product adhering to these? E.g. sensation of orientation, movement, amount and size. How would be user expect to interact with the object?
- ❑ Are different things clearly different (visual differentiation)?
- ❑ Are connected things clearly similar/connected (visual consistency)?

1

From Knowledge to Basic Level: Continued



Visual design guidelines: Using the blur filter

- Visual hierarchy: Are information broken into distinct sections and subsections? Are these sections labelled clearly according to their content? Is the hierarchy of the sections clear?
 - Placement on the page – Western users follow an “F” or “Z” pattern on the page (starting from the top left).
 - Size – Larger elements are noticed before smaller ones.
 - Color – Brighter colours attract more attention.
 - Whitespace – More space around elements draws the eye toward them.
 - Alignment – Out-of-alignment elements attract attention.
- Visual proximity: Functionally related elements should be placed next to each other, as things that are close to each other are grouped together.
- Visual differentiation: Make different things look different.
- Visual similarity: Things that look similar are grouped together, and therefore should similar functional elements also should look similar (repetition and consistency).
- Visual continuity: We will fill in missing data to perceive objects as whole (this is another explanation for why the Jyske Bank app navigation works) We perceive whole shapes, figures, and objects rather than disconnected edges and lines.

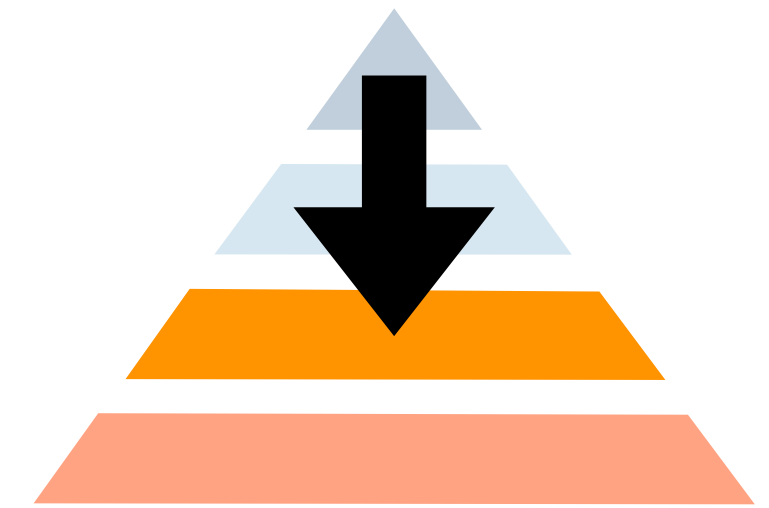
Read more about how to use the blur filter as an inspection tool here:

<https://www.designpsykologi.dk/blur-filter>

2

Move Cognitive Load From Knowledge to Skills

- Are things placed in a predictable place, meaning somewhere that matches the users' expectations based on either their mental model or known standards?



Mental models:

- Which mental models are likely for the user to have for this kind of product? How can they be factored in to the product design? Or, how can they be avoided, if they are incorrect?
- How can the desired mental model be activated? (e.g. through priming)
- Perception is biased by the current context. Is the context evoking the desired mental model?
- Are you priming your user to activate one clear mental model, and several different and conflicting mental models?
- What would be the natural way for the user to interact with the object? E.g. if the product contains liquids, the user may expect that the lid would be a screw-lid.
- **Primary embodied image schemas:** Does the design match the basic embodied intentionality of the user (e.g. power drill in and out)?
- **Metaphors:** Are you using metaphors consistently in your written communication (crime as a beast/virus)?
- **Scripts:** Can you utilise an existing familiar script to activate the correct mental model? (e.g. web-shop script for social services at KMD)

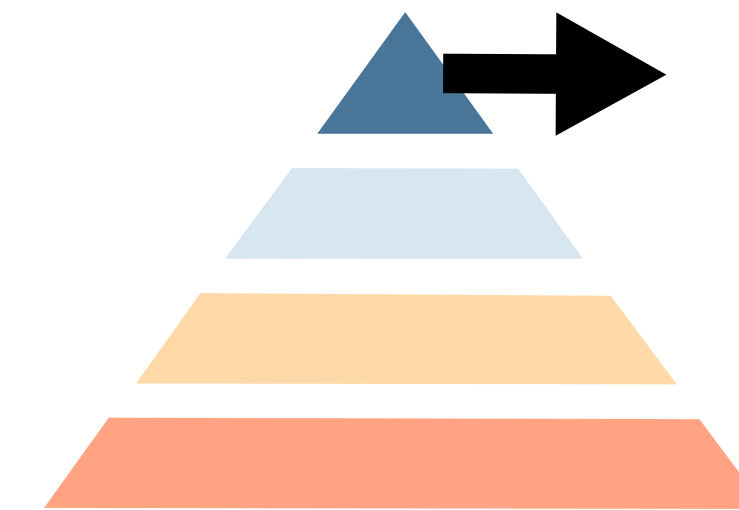
Standards:

- Which formal standards exists for your product domain? E.g.:
 - ◆ Human Factors Standards: AAMI/ANSI HE75:2009
 - ◆ SO/IEC 62366:2007- Medical devices – Application of usability engineering to medical devices
 - ◆ ANSI/AAMI/ISO 14971:2007 Medical devices – Application of risk management to medical devices.
 - ◆ <https://developer.apple.com/design/human-interface-guidelines/>
 - ◆ <https://material.io/design/>
 - ◆ <https://docs.microsoft.com/en-us/windows/win32/uxguide/controls>
- Which informal standards exist in your product domain and user/customer group, and can you benefit from them? E.g.:
 - ◆ “Mega” standards (e.g. Google, Facebook, LinkedIn, newspapers, IKEA assembly guides, LEGO building guides)
 - ◆ Pop-cultural standards in movies and TV-series
 - ◆ Daily product categories (bottles, boxes, make-up products, etc.)

3

Remove Cognitive Load

- Look for ways to unburden higher-order cognitive skills



Be consistent:

- Ensure consistency throughout the system and across all touchpoints (physical, digital, print, person).
- Button placement consistency throughout the system. We often perceive what we expect, and therefore don't read all labels of all buttons.
- Interaction design consistency: Ensure that learned interaction logics are used in the same way through the design (e.g., the many ways of deleting in the iPhone OS).
- Wording and labelling consistency: Communicate the same information using the same logics. Don't shift visual format and information structure (Three/3)

Use external cognition:

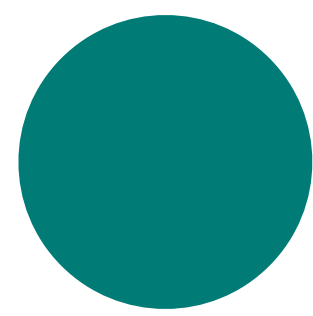
- Make the information needed to understand each part of the system and/or screen directly available. The user should not need to already know them or remember them (recognition rather than recall).
- Support the “why”, “what” and “how” level activity. Enrich information with contextual information relative to the user task at hand (e.g. diagnostic decision support).
- Avoid the need for fine motor control, and provide guiding information at the motor level (e.g. insert syringe/power plug).
- Make it easy to do it right. Build in protective features at the handling level (e.g. barcode case).

Optimise and simplify:

- The user interface is for the user, so get rid of information that the user does not need. And don't present everything at once. Stage information as a narrative that unfolds, or use progressive disclosure (minimise complexity: hide rarely used function in menus).
- Use lingo/wording that the user knows.
- Create classes of icons that visually relate to each other. Instead of 40 unique icons, use the icon family design approach.

Be congruent:

- Does the GUI tell the same story across all layers? E.g. do text/symbolic information and non-symbolic information images/sounds all communicate the same thing?
- Is there some non-symbolic information that conflicts with higher-order symbolic information? (Consider both visual, auditory and tactile signals from the product)
- Consider how directions are used (up, down, left, right, in, out, back, forth, etc.), and how these map to the visual components in the GUI/labels/industrial design? (e.g. placing the “left”-button on the left side of the screen).
- Do non-symbolic information support the message of the symbolic information? (e.g. the text field that should contain more text, should also be bigger)



Extra Guidelines: *Awaring*

- Is there a need for the users to shift their full conscious focus to a particular aspect of the design or contextual setting? For instance, has something changed in the design that violates what the user will likely have as an automated routine?

Awaring methods (from IQ to bodily):

- Create conceptual blends by mixing objects from two different contextual domains.
- Use visual illusions that have a “pop-out” quality.
- Attract attention with “objects out of place” (fly on urinal, coffee stain on invoice, deliberate misprints).
- Create physical barriers to activity.
- Full body “shake-up”.

Phase 3:

Reporting and Design Solutions

It can be tempting to just send a report with the findings from your UX Expert Review. However, reporting in Phase 3 should be considered as a guided co-creation process where the issues, found in the analysis, are taken as a departure point for discussing feasible solutions.

Even though you already provided design hacks as potential solutions, these should be considered more as a way to communicate the logic of the problem based on the design driver.

It may be that the example you provided is directly implemented - that is just great. Yet, usually we design entirely new solutions together with the team that participates in the presentation.

The presentation also provides an opportunity to anchor the design drivers with the design team. While you may have to spend some hours with the design during the analysis, the design will spend many weeks and months from here on with the team. They should therefore be empowered to see through and realise the value of the analysis.

The more ownership and understanding you are able to create at the presentation, the better.

God luck with your first review!

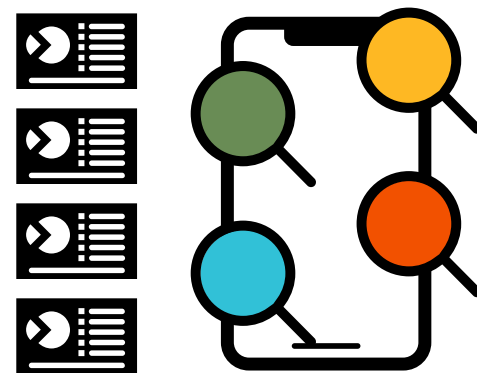


Report Structure

We recommend that you structure your report by grouping findings around individual parts of the design rather than the design drivers themselves.

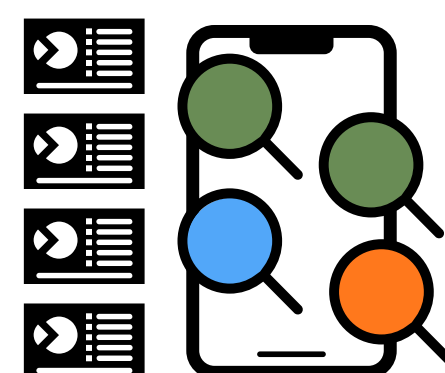
Screen A

Slide 1-4



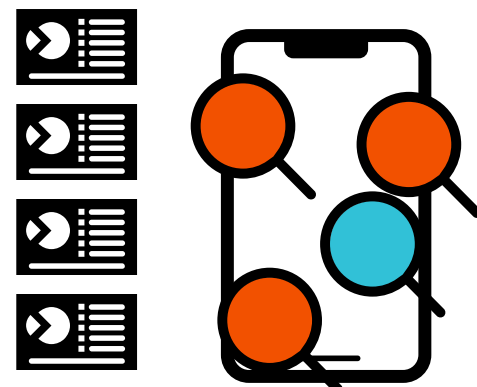
Screen B

Slide 1-4



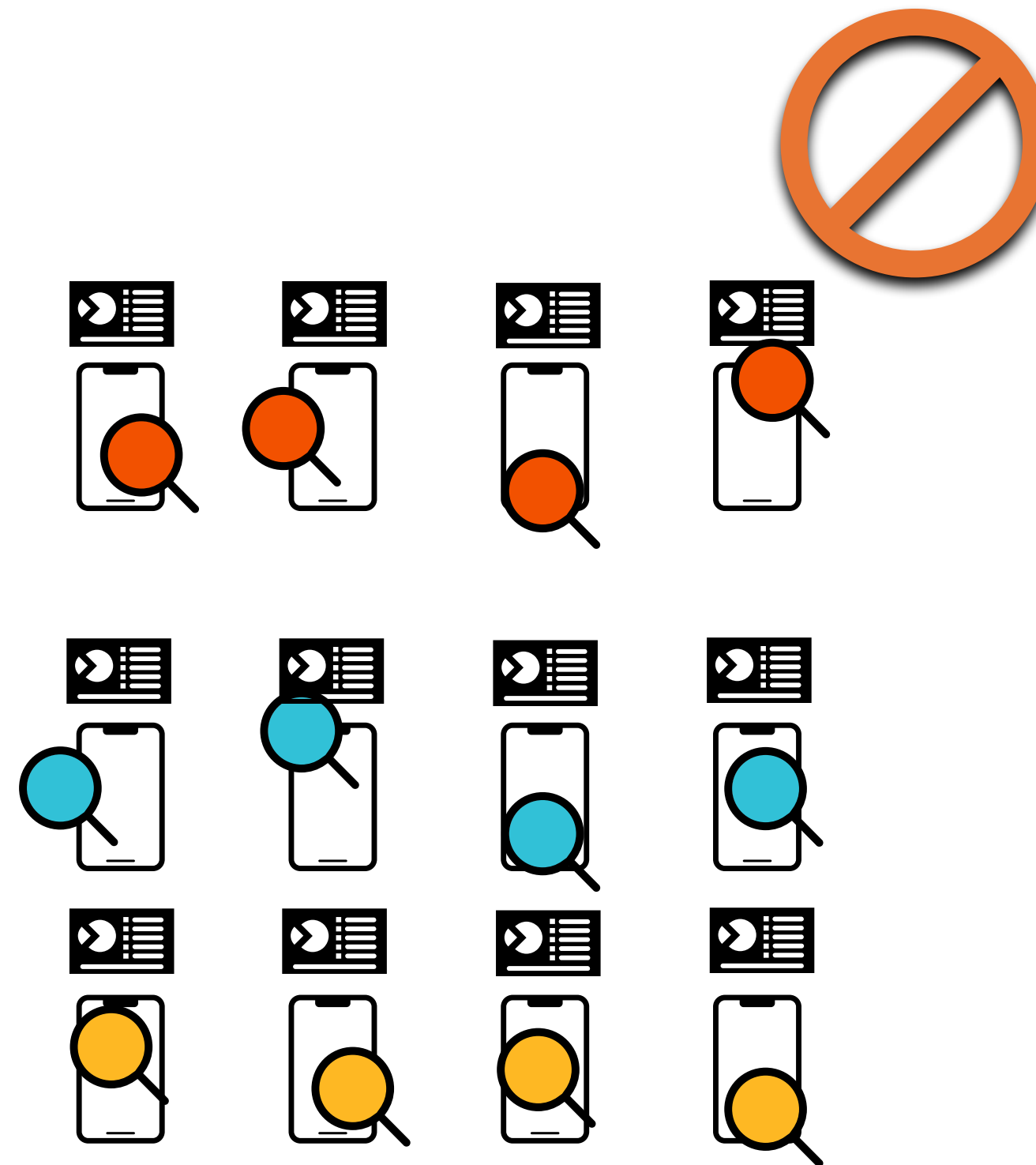
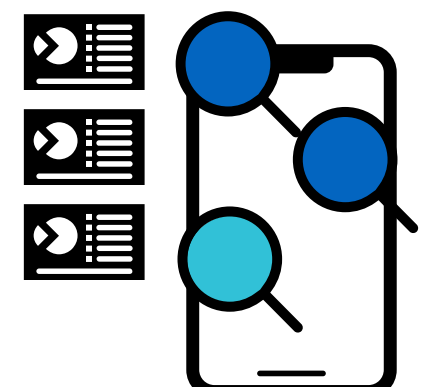
Screen C

Slide 1-4



Screen C

Slide 1-3



How To Present Findings and Recommendations

Problem Description

Here you include a small description of the design problem from the user's perspective.

Use the arrows to highlight the area of interest in the picture of the current design.

Root cause & design solutions

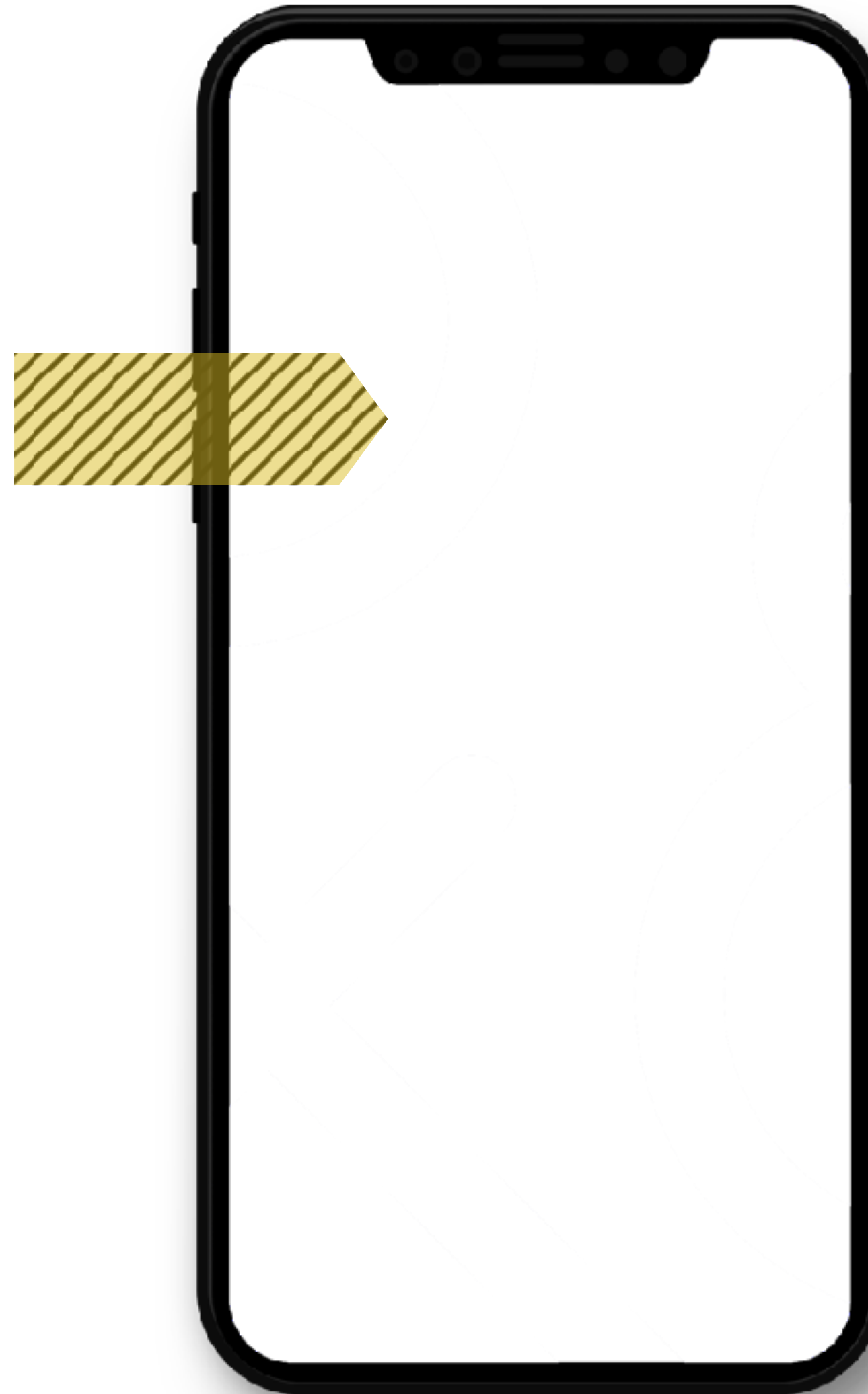
Here you provide an explanation and a root cause analysis of the design problem using the relevant design driver(s).

Also, describe the background for the design mitigation you suggest (the design hack).

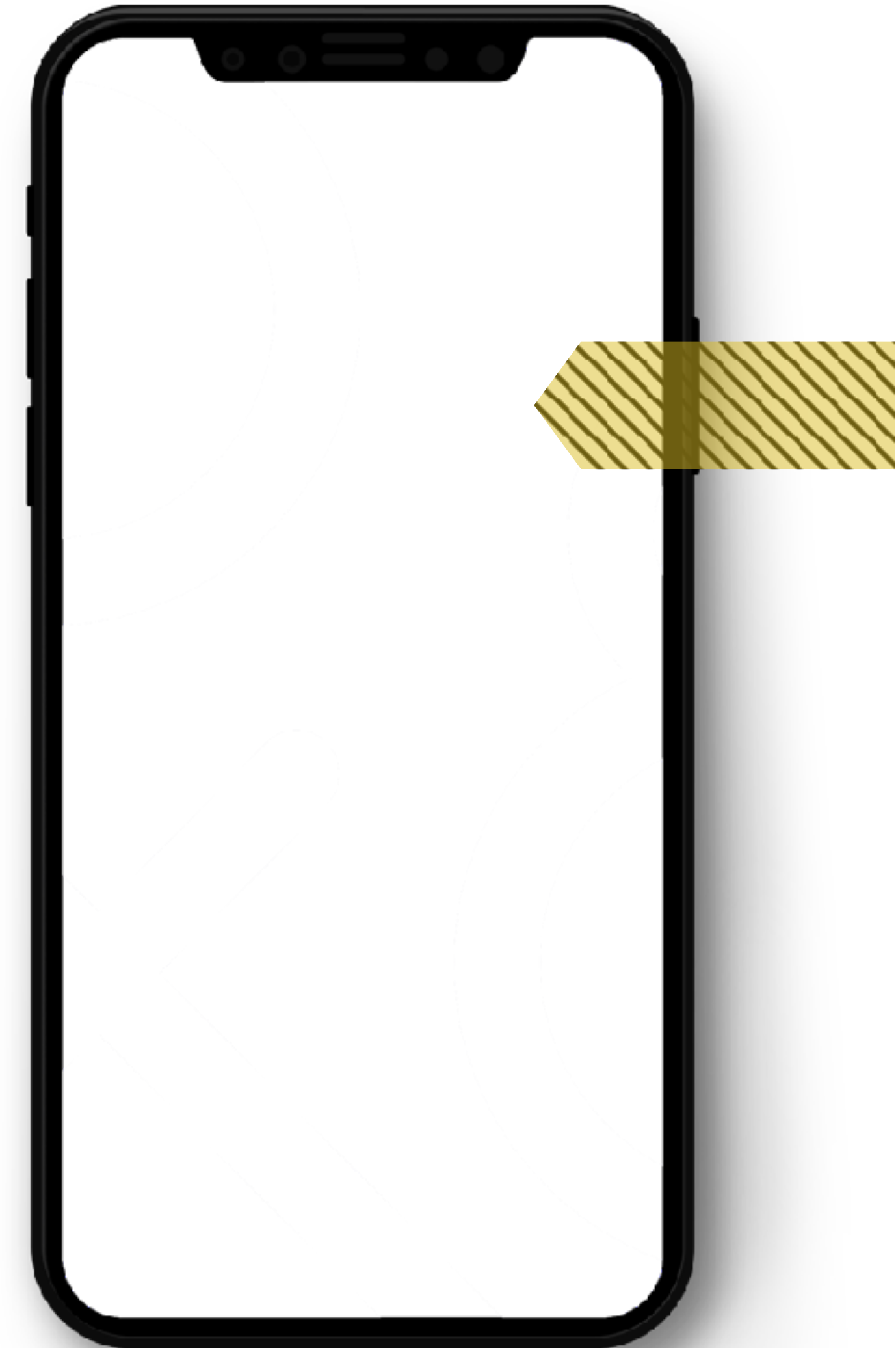
NOTE!

Only present one issue per slide

Current design



Re-Design



Example: Jyske Bank App

Problem Description

The current graphical design communicates to the user that everything you see is what there is.

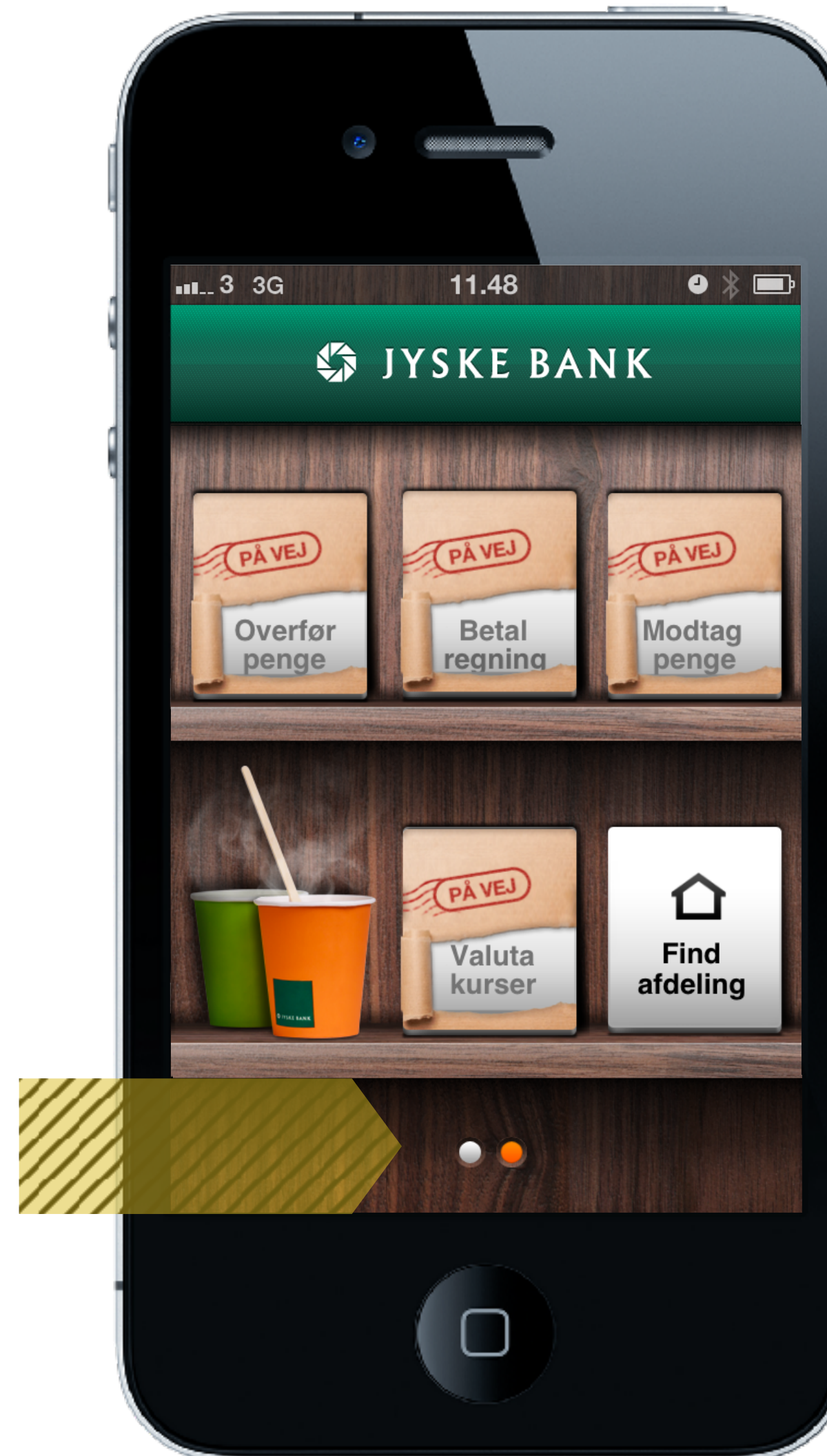
The page symbols at the bottom of the screen are easily overlooked. Also, they tap into linguistic intellectual resources, as you have to understand what the symbols mean.

Root cause & design solutions

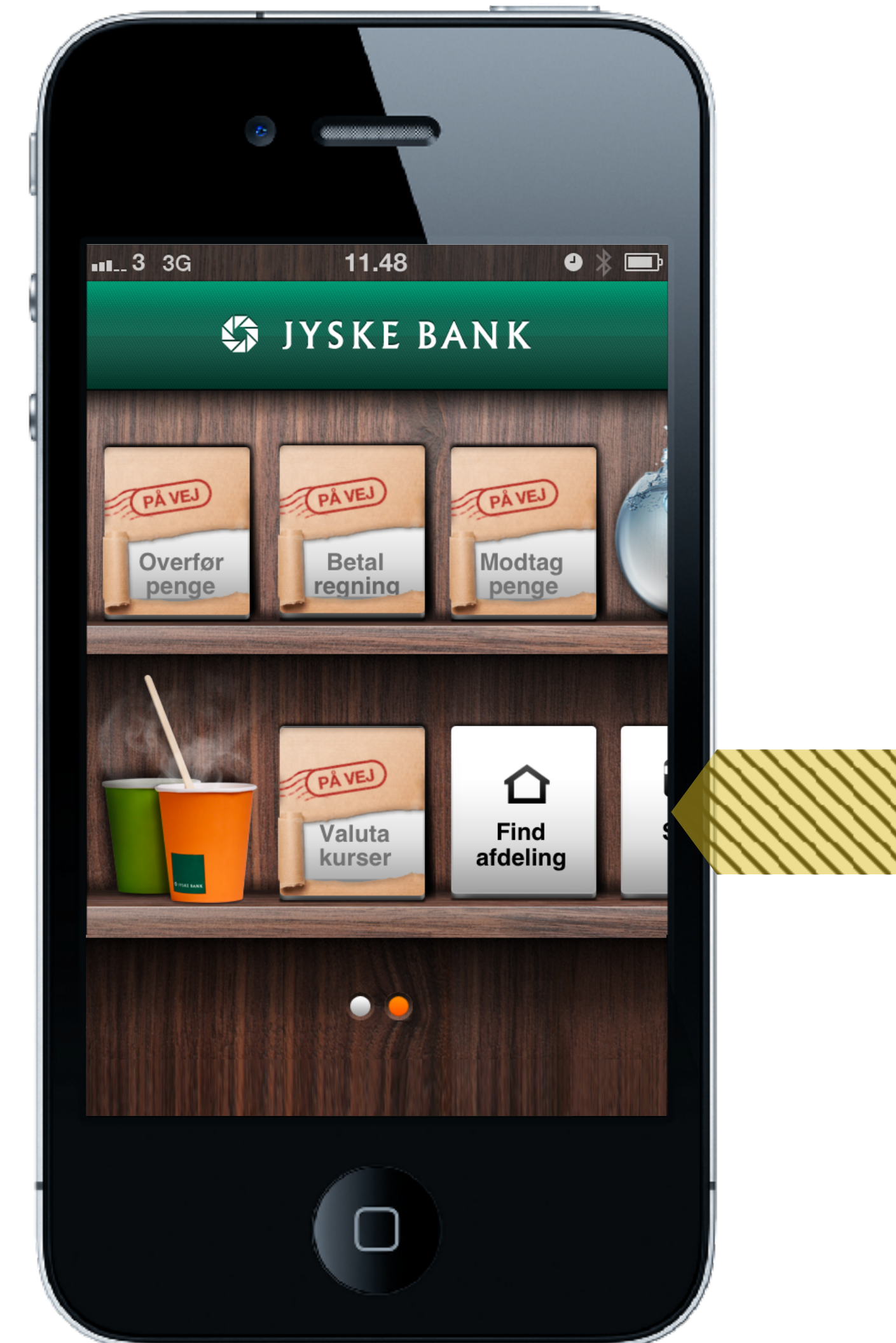
To support embodied cognition (Toolbox 1), an option could be to show objects and function on the bookshelf that are half occluded by the screen.

This would communicate to our basic object perception cognitive skills that “there is more to the right”.

Current design



Re-Design





UX CAMPUS

