

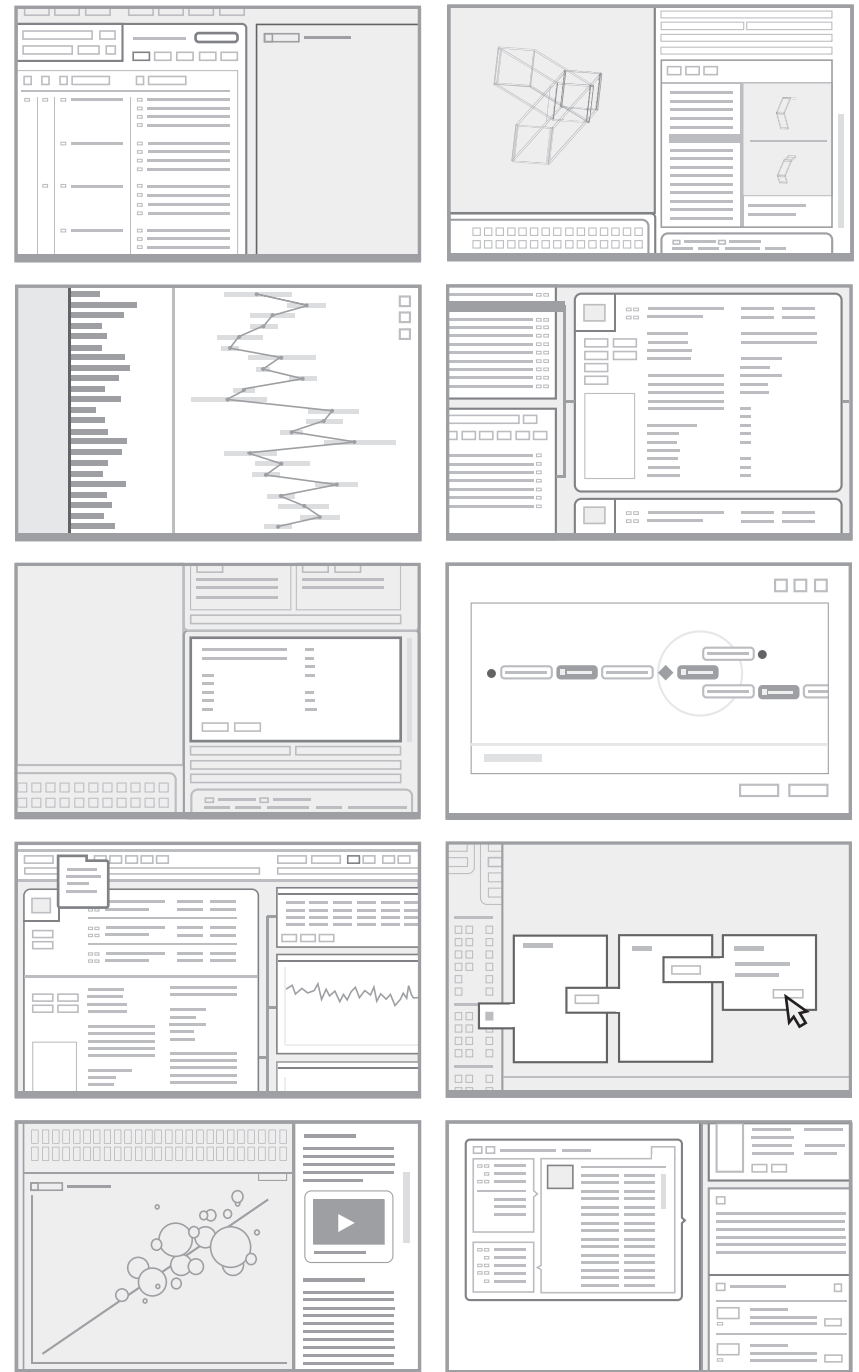
# WORKING THROUGH SCREENS

100 ideas for envisioning  
powerful, engaging, and productive  
user experiences  
in knowledge work

By Jacob Burghardt

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An extended, book length version of this work  
is available in print on demand, .html and .pdf  
formats at [www.FlashbulbInteraction.com](http://www.FlashbulbInteraction.com)



The category of human efforts sometimes called “knowledge work” is growing.

**In many contexts, the idea of knowledge work has become almost synonymous with using a computer, to both positive and negative effect.**

As a result of the design deficiencies in interactive products, people experience many frustrations in their working lives.

**Collectively, we have an infrastructural sense of what these technologies can be that tends to limit our ability to imagine better offerings.**

Targeted improvements in the design of these tools can have large impacts on workers’ experiences. Visionary design can advance entire fields and industries.

Product teams can make significant progress by changing how they get started on designing their products — by beginning with an emphasis on getting to the right design strategy and design concepts long before getting to the right design details.

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more on the case for *application envisioning*, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_intro.html](http://www.FlashbulbInteraction.com/WTS_intro.html)

**It is time to start holistically envisioning exemplary new tools for thought that target valuable intersections of work activity and technological possibility.**

A suggested overall approach for product teams envisioning new or improved interactive applications for knowledge work:

**Extensive concepting, based on intensive questioning, driving visionary, collaboratively defined strategies for exemplary tools for thought.**

In support of this suggested approach, this deck of “idea cards” contains 100 considerations — along with many examples and questions — to help product teams generate design strategies and design concepts that could become useful, meaningful, and valuable onscreen offerings.

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## IDEA CATEGORIES

- A. Exploring work mediation and determining scope (9)
- B. Defining interaction objects (10)
- C. Establishing an application framework (10)
- D. Considering workers' attentions (7)
- E. Providing opportunities to offload effort (6)
- F. Enhancing information representation (11)
- G. Clarifying central interactions (7)
- H. Supporting outcome exploration and cognitive tracing (4)
- I. Working with volumes of information (7)
- J. Facilitating communication (7)
- K. Promoting integration into work practice (13)
- L. Pursuing aesthetic refinement (5)
- M. Planning connection with use (4)

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For a complete listing of the 100 envisioning ideas, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_TOC.html](http://www.FlashbulbInteraction.com/WTS_TOC.html)

Needed

Mismatched Hard

Overly flexible **Typical**

Awkwardly dynamic

Inconsistent Distracting

Boring Circuitous

Replaceable



Wanted

Meaningful Engaging

Clearly targeted **Extraordinary**

Eye opening Dependable activity infrastructure

Domain grounded Mastery building

Irreplaceable Beautiful

## A. Exploring Work Mediation and Determining Scope

Valued computing tools can seemingly “fit” into certain parts of knowledge workers’ activities and thought processes, usefully meshing within the flows of their own goals.

Designing for such a harmonious pairing requires critical exploration of potential interventions into targeted activities.

During *application envisioning*, product teams can model and rationalize knowledge work from a variety of perspectives in order to understand how certain practices might be usefully mediated by their own onscreen applications.

Teams can use these models to sketch divergent functionality concepts, eventually drafting an appropriate and desirable scope for their computing tool.

This category contains 9 of the 100 *application envisioning* idea cards in this deck:

- A1. Influential physical and cultural environments
- A2. Workers’ interrelations and relationships
- A3. Work practices appropriate for computer mediation
- A4. Standardization of work practice through mediation
- A5. Interrelations of operation, task, and activity scenarios
- A6. Open and emergent work scenarios
- A7. Collaboration scenarios and variations
- A8. Local practices and scenario variations
- A9. High value ratio for targeted work practices



## A1. Influential Physical and Cultural Environments

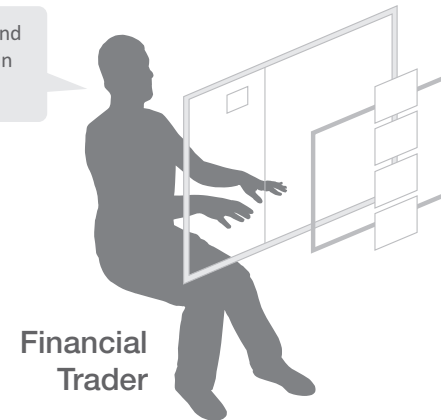
The environments that knowledge workers practice within — which includes both their multidisciplinary organizations and the larger cultural context of their professions — can pose key challenges and opportunities for product teams as they attempt to outline appropriate and compelling design strategies.

Questions for product teams to consider:

How could your team's insights into the realities and constraints of targeted knowledge workers' physical and cultural environments shape your application concepts?

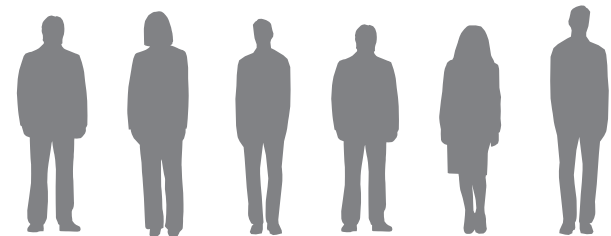
How might your computing tool meaningfully and valuably “fit” into these complex contexts?

Part of doing this kind of trading is sitting in this kind of room...



With a group of skilled people all sitting at the same big desk...

### SHARED ENVIRONMENT



Fellow Traders + Shared Ways of Working



Dependable Enabling Technologies



And all of these technologies and applications available for immediate use...

## A2. Workers' Interrelations and Relationships

Social interactions in knowledge work activities often involve multiple categories of organizational roles and outside stakeholders. The cultural characteristics of knowledge workers' social worlds can pose key challenges and opportunities for product teams as they attempt to outline appropriate and compelling design strategies.

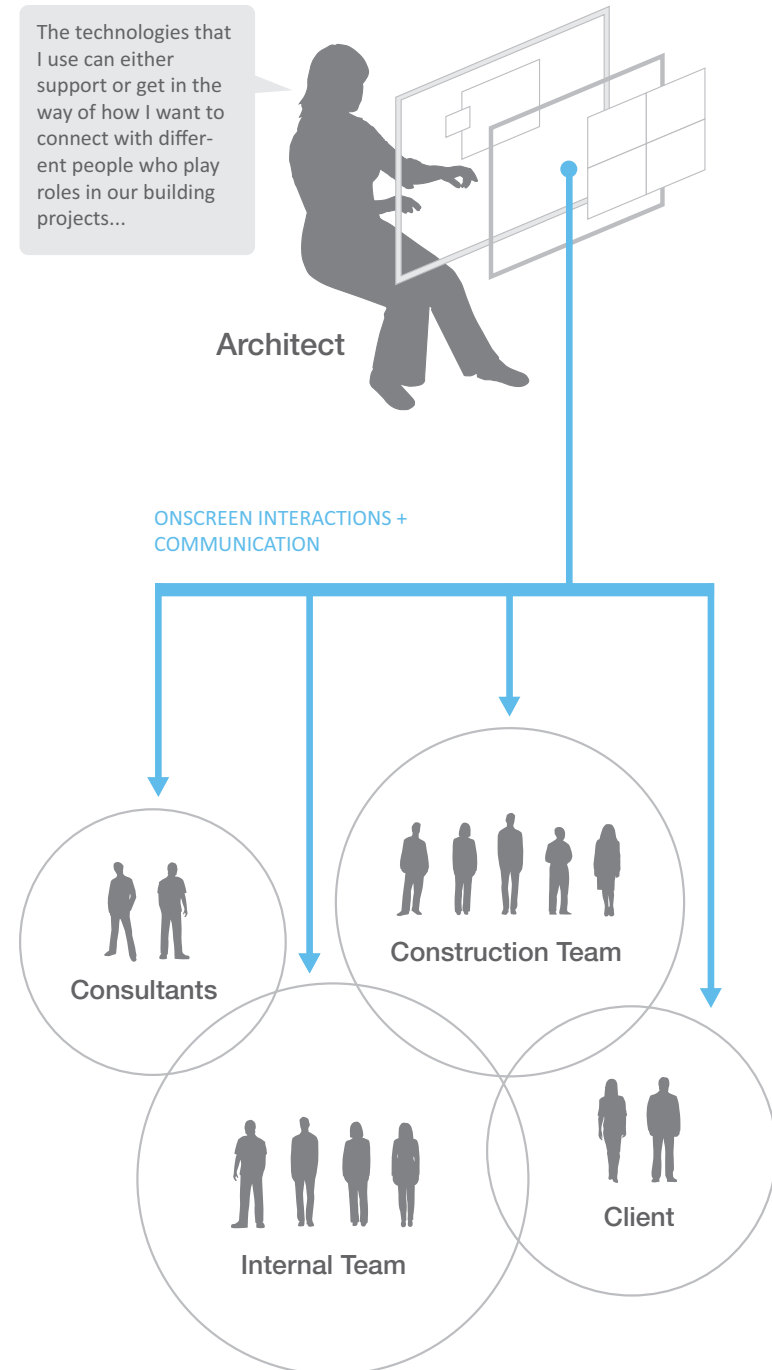
Questions for product teams to consider:

How could your team's insights into the connectivities and qualities of targeted knowledge workers' relationships shape your application concepts?

How might your computing tool usefully and meaningfully reflect these social realities?

The technologies that I use can either support or get in the way of how I want to connect with different people who play roles in our building projects...

Architect



## A3. Work Practices Appropriate for Computer Mediation

Interactive applications can provide knowledge workers and their organizations more value in some activity scenarios than in others. To drive an appropriate and compelling application scope, product teams can balance the desire to usefully facilitate targeted workers' goals and practices with contemporary limitations of the computing medium.

Questions for product teams to consider:

Where in your team's big picture characterizations of knowledge workers' activities do you see potential value and possibility for useful and meaningful mediation by a computing tool?

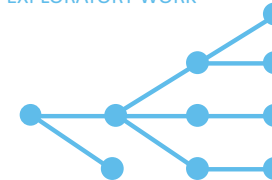
From a vantage point that emphasizes targeted workers' mental efforts, where is there less potential value and possibility?

Not every part of our lab's scientific workflow should be supported by software designed specifically for it...

Clinical Scientist

It's true that our lab's information management and analysis applications are always something we turn to when we are doing "production" work...

### EXPLORATORY WORK



How does this method work?  
How might we use it in a study?

### PRODUCTION WORK



How can we execute on this study plan? What findings are in its data?

Transition to use in a clinical study ▶

Activities understood as being too variable to be a functionality focus in primary software tools

Interactions that scientists expect to be a functionality focus in their primary software tools

But I don't expect those tools to support our leading edge, exploratory work.

When we are trying out new things, we often turn to more generalized tools, write our own rough code, or use scientific software in unintended ways...

## A4. Standardization of Work Practice through Mediation

When interactive applications introduce new possibilities in support of knowledge work practices, they often also introduce new levels of standardization. Product team can envision appropriate levels of freedom and constraint in their application concepts, which can range from a slight narrowing of available choices to the restrictive organization of entire activities.

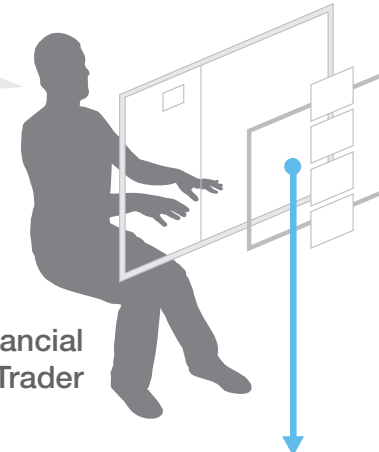
Questions for product teams to consider:

Where in your team's big picture characterizations of knowledge workers' activities could inherent standardization be valuable in a supporting computing tool?

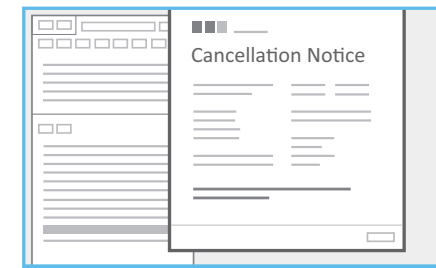
Where might targeted individuals and organizations view standardization as restrictive and problematic?

Communication is what trading is about, and our group tries to keep our interactions with the outside world as consistent as possible...

Financial  
Trader



For example, we use an automatic form to rapidly email clear and legible trade cancellations...



Which is very different from how we used to tell our trading partners about cancelled deals...

### CHANNELS USED PRIOR TO STANDARDIZATION OF WORK PRACTICE



Phone



Fax



Mail

Everyone in our group did it differently, which was confusing and eventually drove us to create a useful standard...

## A5. Interrelations of Operation, Task, and Activity Scenarios

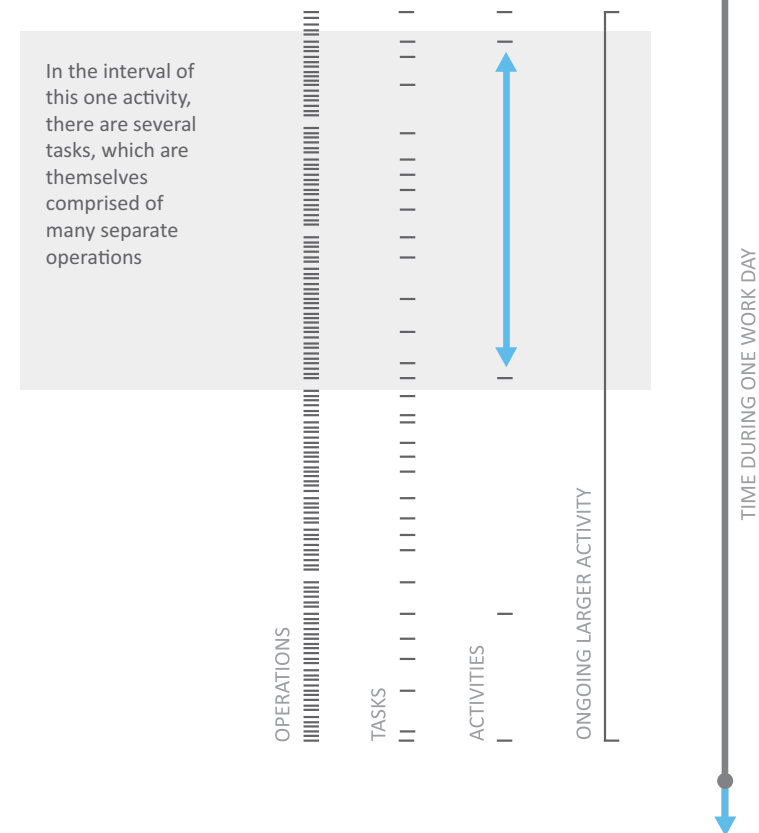
Knowledge workers' granular actions can be categorized as operations, which overlap and interrelate into larger tasks, which themselves overlap and interrelate into the larger unit of activities. Explicit models of these multi-tiered relationships can help product teams envision interactive applications that are much more than haphazard collections of unconnected, discrete functions.

Questions for product teams to consider:

From a vantage point that emphasizes knowledge workers' mental efforts, how might your team break down your big picture characterizations of targeted workers' practices into a useful and meaningful hierarchy of activity, task, and low level operation elements?

It's amazing to think of all of the different steps that I take in a day, many of which touch my building modeling software in one way or another...

Architect



## A6. Open and Emergent Work Scenarios

Some knowledge work tasks and larger activities involve solving complex, undefined problems where workers' goals and methods evolve within unfolding pathways of effort. These emergent scenarios can be supported by interactive applications that present useful flexibilities, which product teams can envision as largely unsequenced but interrelated patterns of mediated work.

Questions for product teams to consider:

What areas of your team's emerging models of work practice are accomplished through open and emergent pathways of knowledge work rather than strict, process oriented action?

From a vantage point that emphasizes targeted workers' mental efforts, how much functional flexibility could be required to valuably support these cases?

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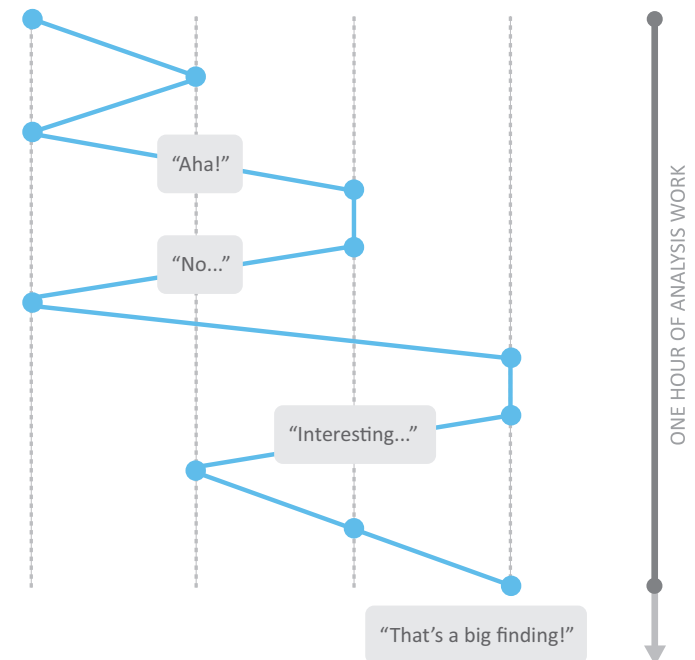
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_A6.html](http://www.FlashbulbInteraction.com/WTS_A6.html)

When I'm visualizing our data in my analysis tool, my goals can change at any time, depending on what I happen to discover...

Clinical Scientist

Though I'm generally switching between some fairly standard types of goals...

GOAL TYPE 1 GOAL TYPE 2 GOAL TYPE 3 GOAL TYPE 4



## A7. Collaboration Scenarios and Variations

Even apparently individualistic knowledge work practices can have key collaborative, or at least cooperative, scenarios and variations. By actively envisioning how these cases might be supported by an interactive application, product teams can avoid common and disruptive pitfalls in their approaches to mediating work.

Questions for product teams to consider:

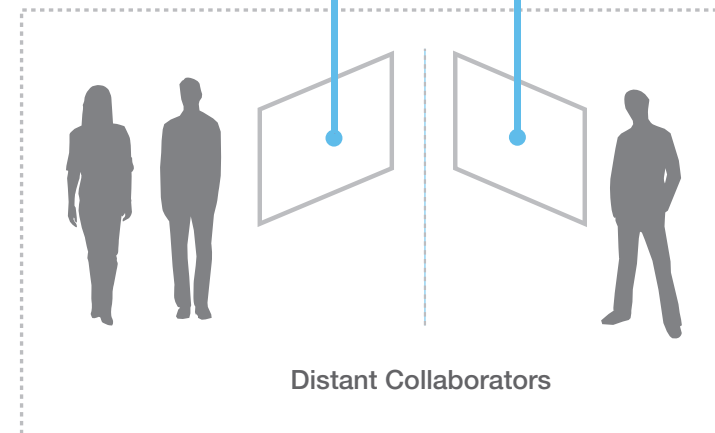
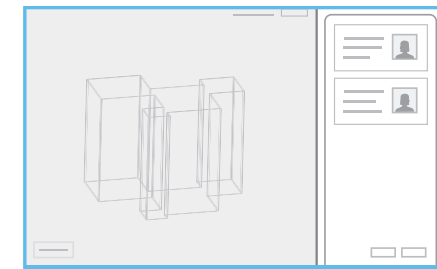
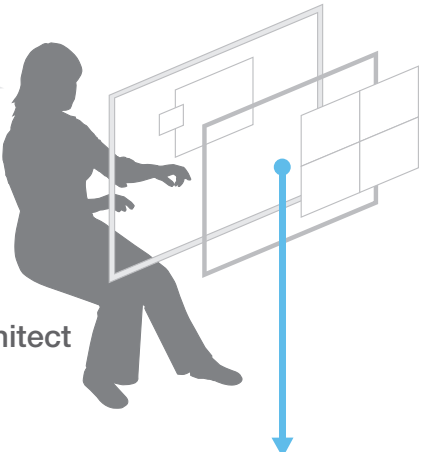
What areas in your team's emerging models of knowledge work practice can involve collaborative, or at least cooperative, action?

How might attempting to mediate these complex practices impact the functional forms and overarching strategic directions of your application concepts?

I've set up a meeting to review the current version of this building model...

Architect

And it looks like the people from our team that I invited have joined the online workspace, and they are looking at the building's details...



Distant Collaborators

It's not as good as meeting face to face in front of some big printouts or the same screen, but I look forward to gathering these experienced architects' feedback on our current choices...

## A8. Local Practices and Scenario Variations

Knowledge workers may continually refine their approaches to certain tasks and larger activities in order to meet their local needs, performing adaptive variations based on recognized contingencies. Product teams can envision how diverse yet essential variations in workers' practices might be supported by thoughtful flexibilities in their application concepts.

Questions for product teams to consider:

How might your team's emerging models of knowledge work practice call out key local variabilities between and within targeted organizations?

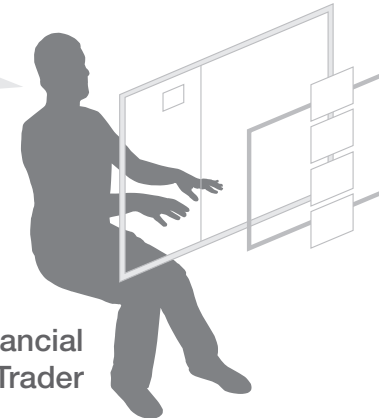
Where in your mapped understandings could different scenarios for accomplishing the same goal be important?

How might those differences impact the overarching functional forms and strategic directions of your application concepts?

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For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_A8.html](http://www.FlashbulbInteraction.com/WTS_A8.html)

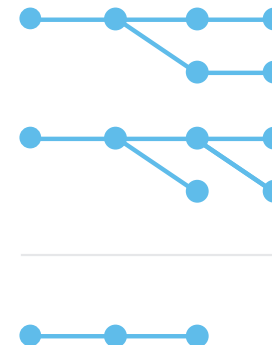
This trading tool is remarkably adaptable. I think that the people that designed it really know the small but important differences in how people trade...



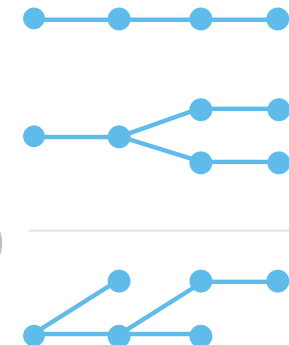
Financial Trader

All of the firms that I've worked at have been able to successfully work with the same software in their own slightly different ways...

### PREVIOUS FIRM



### CURRENT FIRM



VS

At my last job, there was a general emphasis on allowing us traders to do things our own way, which gave us just enough rope to hang ourselves...

But when it came to negotiating, they had specific processes that they wanted us to follow...

At my current firm, they have thought a lot about where standard processes could be valuable and provided good tools to help us get to those standards...

But in negotiation, they give us a lot of freedom...



## A9. High Value Ratio for Targeted Work Practices

Not all of a product team's sketched functionality concepts have the same potential to provide compelling utility in knowledge work. To promote usefulness and cohesive design strategies in their application concepts, teams can parsimoniously target certain work practices by including related, high value functionalities and downplaying or eliminating unrelated, lower priority options.

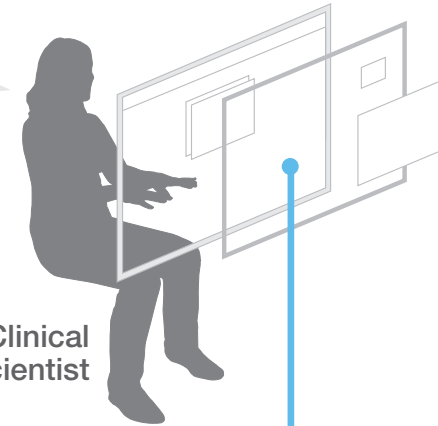
Questions for product teams to consider:

Which areas of knowledge work practice might your team want to target with your product?

From a vantage point that emphasizes workers' mental efforts, which selective assembly from among your sketched functionality concepts could provide compelling value in targeted work, while at the same time coalescing into a sensible application concept that embodies a well resolved design strategy?

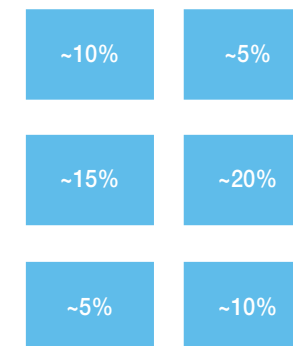
So many scientific applications are huge and generic, filled with bloat, or small and focused but missing so much of what our lab needs for our own research goals...

Clinical Scientist



### PREVIOUS USE OF SEVERAL ANALYSIS APPLICATIONS

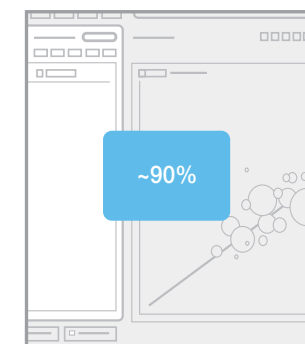
Most of the functionality in each of several applications was left unused by the laboratory team.



For example, it used to be that we would have to simultaneously use bits and pieces from different analysis applications in order to accomplish what we wanted...

### CURRENT USE OF SINGLE ANALYSIS APPLICATION

Main analysis application contains few options that the laboratory team does not use.



And then we found our new analysis tool, which is designed for our type of research, and meets I'd say 90 percent of our needs...

## B. Defining Interaction Objects

Valued computing tools can present clearly articulated and understandable collections of onscreen objects that knowledge workers can act upon, with, and through.

Designing such clarity requires deliberate mapping and careful simplification.

During *application envisioning*, product teams can sketch and explore the interaction objects that users might encounter in different scenarios of mediated work.

By taking time to generate diverse ideas about users' potential experiences of onscreen entities, teams can codify essential characteristics, behaviors, and relationships.

This category contains 10 of the 100 *application envisioning* idea cards in this deck:

- B1. Named objects and information structures
- B2. Flexible identification of object instances
- B3. Coupling of application and real world objects
- B4. Object associations and user defined objects
- B5. Object states and activity flow visibility
- B6. Flagged variability within or between objects
- B7. Object ownership and availability rules
- B8. Explicit mapping of objects to work mediation
- B9. Common management actions for objects
- B10. Object templates

## DEFINING INTERACTION OBJECTS

# B1. Named Objects and Information Structures

Knowledge work applications can support specific work practices with named interaction objects that are equivalents of familiar workplace artifacts. In addition to incorporating existing domain ideas and entities, product teams may need to introduce new objects into workers' vocabularies and practices in order to meaningfully enable certain functionality concepts.

Questions for product teams to consider:

What artifacts do targeted knowledge workers currently focus on in the work practices that your team is striving to mediate, and how might these objects be embodied in your application concepts?

What new interaction objects are implied in your sketches of functional possibilities?

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For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_B1.html](http://www.FlashbulbInteraction.com/WTS_B1.html)

Setting up a new clinical study in my lab's information management application means creating a set of expected and familiar items for my plans...

Clinical Scientist

These are the things that we talk about in our lab, that "live" in our lab's shared database...



## OBJECTS CREATED FOR A SMALL CLINICAL STUDY

Study File



Automation Procedure



Clinical Samples



Test Tubes



## DEFINING INTERACTION OBJECTS

# B2. Flexible Identification of Object Instances

In order to effectively support knowledge work practice, certain types of interaction objects typically need to have multiple instances. Especially for those object types that are higher volume and a main focus of ongoing effort, product teams can envision flexible, complimentary options that could allow workers to apply meaningful identification schemes.

Questions for product teams to consider:

What flexible, complimentary methods might your team envision to allow targeted knowledge workers to identify and easily recognize certain instances of interaction objects within your application concepts?

How might different identification options drive different approaches to information structuring and seeking behaviors?

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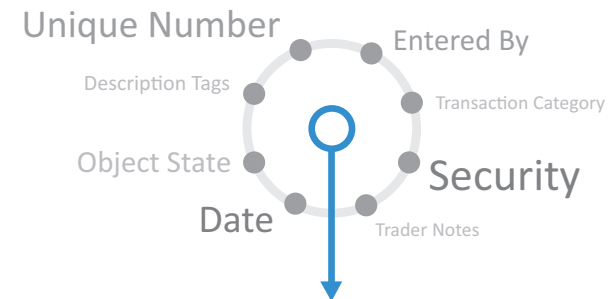
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There are so many trades made even in an hour, it's hard to remember very much information about any one given deal...

Financial Trader

One thing that is very helpful is that I can search by entering any combination of different identifying aspects for a trade...

## IDENTIFYING ATTRIBUTES



And eventually, I'll figure out a way to navigate the information in order to find a certain deal or whatever I'm looking for...



## DEFINING INTERACTION OBJECTS

### B3. Coupling of Application and Real World Objects

Some knowledge work applications contain interaction objects that are extensions of, rather than replacements for, offline artifacts. In these cases, product teams can envision interactions that tightly couple onscreen and off screen equivalents in order to promote a more efficient, direct, and unified experience.

Questions for product teams to consider:

What interaction objects in your team's application concepts could benefit from a preserved connection to related off screen artifacts?

What functionality concepts might your team envision to allow targeted knowledge workers to usefully recognize and meaningfully act through these connections?

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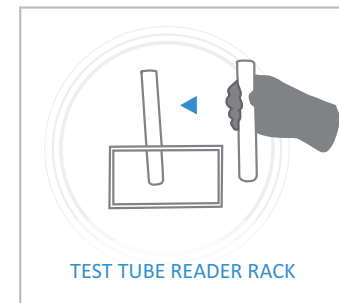
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Our lab's information management software is set up to "know," in a limited way, where things are in the lab...

Clinical Scientist

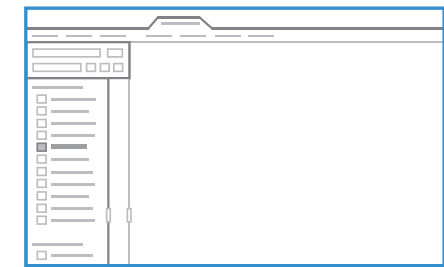
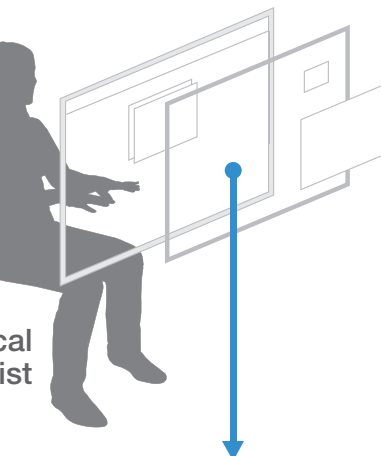
So, for example, right now the application has no data displayed...

I'm going to put a test tube into the reader rack, and it will pull up related data from the system...



And now the reader has found the test tube and brought the sample up onto the screen...

It shows related sample data because I'm in the samples view of the tool...



## DEFINING INTERACTION OBJECTS

# B4. Object Associations and User Defined Objects

Interaction objects can carry default and worker defined linkages to other objects within a computing application. Product teams can envision how clear and actionable presentations of these object associations could allow workers to offload effort while acting in informed and confident ways.

Questions for product teams to consider:

What connections and interrelations could be present in the inventories of interaction objects that your team has identified?

How might your sketched functionality concepts allow targeted knowledge workers to define, recognize, make senses of, navigate, use, or even defend against these associations?

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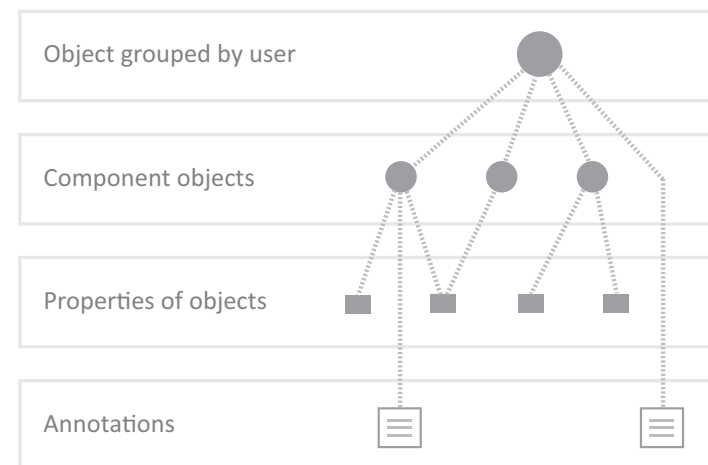
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_B4.html](http://www.FlashbulbInteraction.com/WTS_B4.html)

I've modeled a window assembly for our latest building design out of a few different parts...

Architect

So I'm grouping it together into a single object in the building modeling tool, which will preserve the details of the individual pieces that it's made from and all the related info...

## ASSOCIATIONS WITHIN SELECTION



## DEFINING INTERACTION OBJECTS

# B5. Object States and Activity Flow Visibility

Understanding the current state of interaction objects can be crucial for the effective planning and execution of knowledge work. Especially for those object types that are higher volume and a main focus of workers' ongoing efforts, product teams can envision appropriate states that could communicate potent meaning and directive pathways of action.

Questions for product teams to consider:

What useful or necessary states can your team envision for key interaction objects in your application concepts?

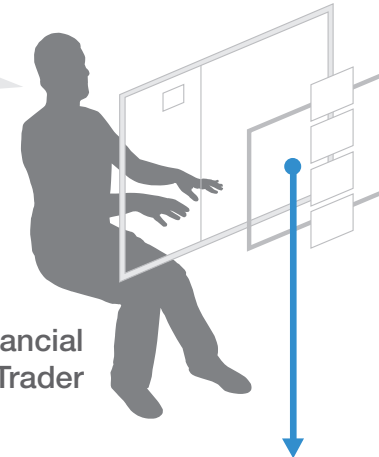
How might these object states play meaningful and directive roles in your functional responses for targeted knowledge work practices?

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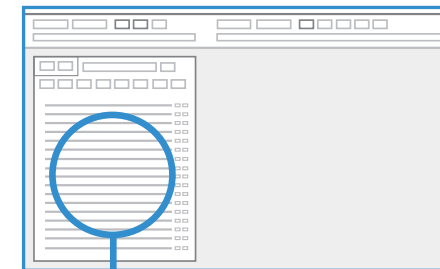
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I'm negotiating a bunch of tougher deals at the same time, so I'm constantly going back to my messages to see what I need to respond to...

Financial Trader



All of the messages have easy to understand codes that tell me the state of each negotiation...



### MESSAGES BY STATE CATEGORIES

Negotiation with Minor Changes

1 Message



Negotiation with Major Changes

2 Messages



Cancelled Negotiation

4 Messages



It looks like things aren't going so well with most of these, but I'll wrap up the one with minor changes before moving on to making new deals...

## DEFINING INTERACTION OBJECTS

### B6. Flagged Variability within or between Objects

There are often aspects of interaction objects, outside of any explicit states, that are important to call to knowledge workers' attentions in certain contexts. Product teams can envision how adaptive flagging of central variabilities could reduce the effort needed to examine key characteristics of individual objects.

Questions for product teams to consider:

Beyond defined states, what specific pieces of information about interaction objects might be especially interesting or useful to targeted knowledge workers during the course of their practices?

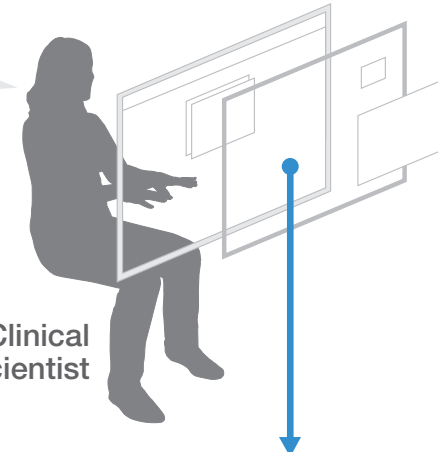
How might your team informatively communicate these key variabilities through perceptually salient cues?

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I'm using our lab's main data management application to find all of the samples that are involved with our current clinical study...

Clinical Scientist



And I've got a set of search results back that I'm scrolling through...



And the tool is saying that there is something wrong with one of the samples...



It looks like a treatment is being applied that is not found anywhere else in this study...

That's a simple data entry error from earlier that I can fix right now...





## DEFINING INTERACTION OBJECTS

# B7. Object Ownership and Availability Rules

Similar to offline, real world artifacts in a knowledge workplace, onscreen interaction objects can benefit from clear and consistent rules governing who can perform actions on or with them at a given time. Product teams can envision and communicate rules that are culturally appropriate, logically feasible, and understandably clear.

Questions for product teams to consider:

Based on your team's understanding of targeted cultural environments and knowledge work practices, what rules can you envision for key interaction objects to ensure that they are "owned" and accessed by workers in appropriate and useful ways?

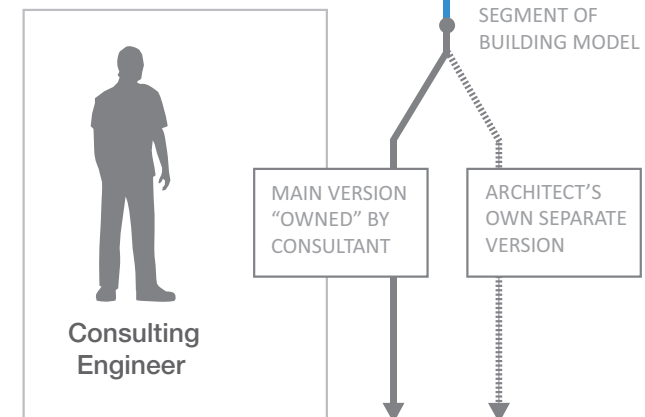
## WORKING THROUGH SCREENS | 100 IDEA CARDS

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So next, I am going to work on that northern section of the building model, where I need to make some changes...

Architect

But it looks like one of our consultants is currently working there too. So that means that I can't make any changes in the main model. That's just the rules of the system, to help prevent conflicts...



So I can check out my own version of that segment. If there are any conflicts when I check my version back in, the software will help us sort them out later...

## DEFINING INTERACTION OBJECTS

# B8. Explicit Mapping of Objects to Work Mediation

Even though a general understanding of an interaction object can carry with it expectations of certain related actions in a knowledge work application, product teams can prevent oversights and drive interaction clarity by explicitly mapping how important objects could fit into targeted operations, tasks, and larger activities.

Questions for product teams to consider:

How, specifically, could the interaction objects that your team has envisioned fit into the knowledge work operations, tasks, and larger activities that you are striving to mediate with your application concepts?

What important relationships between objects and actions might you be overlooking?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_B8.html](http://www.FlashbulbInteraction.com/WTS_B8.html)

Things in this trading tool have concise, intelligent action lists that help me make faster decisions...

Financial Trader

For example, depending on the state of a trade form, I only get options to act that make sense given that state...

## AVAILABLE OPTIONS BY STATE CATEGORIES

Blank Trade Form



4 Action Options

Negotiation with Major Changes



3 Action Options

Cancelled Negotiation



1 Action Option

I don't want to see any buttons for options that I can't click...

The people that made this tool understand how we trade, and so I don't have to think about those little things...

## DEFINING INTERACTION OBJECTS

# B9. Common Management Actions for Objects

Some types of interaction objects in computing applications will typically require a conventional set of management actions, such as create, copy, edit, and delete. Product teams can map available management actions for different types of interaction objects, envisioning what common functionalities might look like in different object contexts.

Questions for product teams to consider:

What common management actions, such as create, copy, edit, and delete, could the interaction objects in your team's application concepts require or benefit from?

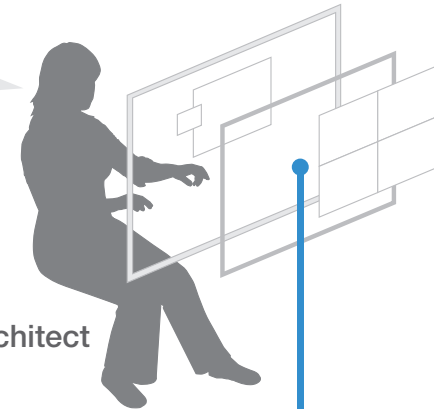
What important management actions might you be overlooking?

WORKING THROUGH SCREENS | 100 IDEA CARDS

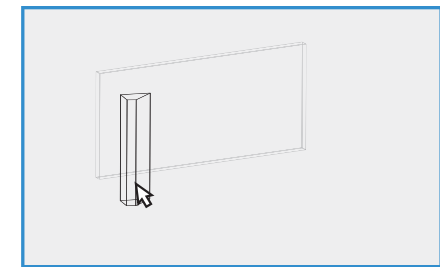
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_B9.html](http://www.FlashbulbInteraction.com/WTS_B9.html)

I've just finished this shape that I want to try out as a repeating element in the exterior of this new building that our team is currently generating ideas for...

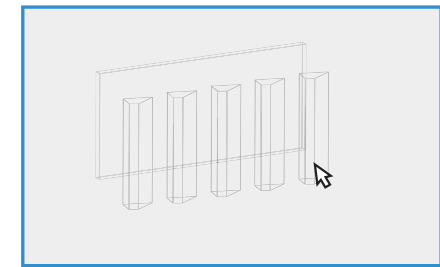
Architect



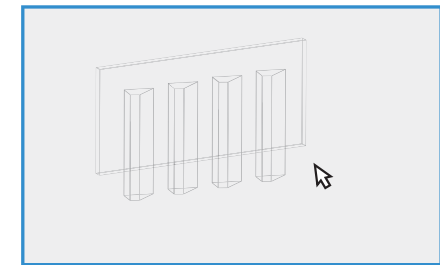
So I select the element in my modeling tool...



And then I repeat it...



And maybe that feels like one too many for what I want, so I've deleted one of them...



## B10. Object Templates

When knowledge workers repeatedly generate instances of interaction objects with similar attributes, they may value the ability to create new objects from standard “molds.” Product teams can envision functionality concepts that could allow workers to offload tedious data entry effort by tailoring and making use of object templates.

Questions for product teams to consider:

Where might object templates valuably decrease the effort needed to create common classes of complex information structures in your team’s application concepts?

What functional options could allow targeted knowledge workers to define, share, modify, and use these templates?

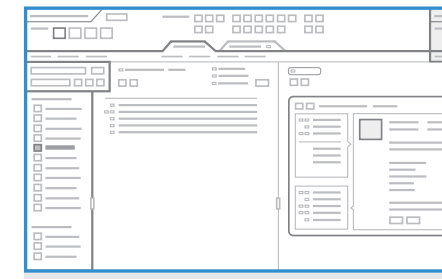
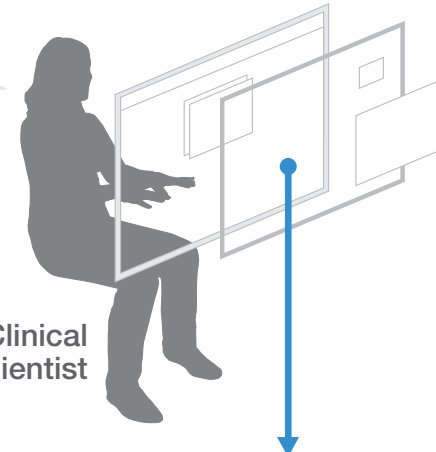
Consistency and information quality is incredibly important in research work, especially as volumes of data increase exponentially...

Clinical Scientist

So when I’ve got a plan for a study and I’m creating an extended series of samples in the system...

I can create one sample template...

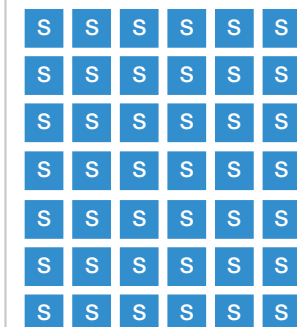
And then generate many individual, consistent samples in the software that are slight variations on that template...



Sample Template



Individual Samples



## C. Establishing an Application Framework

Valued computing tools can tame complexity by structuring workers' interactions within comprehensible, consistent, and cohesive overall frames.

Designing such a clear organization requires deliberate and critical exploration of an on-screen tool's potential "shape" and "routes."

During *application envisioning*, product teams can synthesize common structural needs with their own resonating design ideas in order to sketch guiding models and larger interaction approaches for their products.

Early ideation about these application structures can "set the stage" for teams' evolving functionality concepts by both shaping and reflecting divergent ideas about potential user experiences.

This category contains 10 of the 100 *application envisioning* idea cards in this deck:

- C1. Intentional and articulated conceptual models
- C2. Application interaction model
- C3. Levels of interaction patterns
- C4. Pathways for task and activity based wayfinding
- C5. Permissions and views tailored to workers' identities
- C6. Standardized application workflows
- C7. Structural support of workspace awareness
- C8. Defaults, customization, and automated tailoring
- C9. Error prevention and handling conventions
- C10. Predictable application states

## C1. Intentional and Articulated Conceptual Models

Knowledge workers develop particular understandings of which work practices an interactive application is designed to support, how it essentially “works,” and how it might fit into their own activities. Product teams can communicate their computing tool’s intended conceptual models through application design and other channels.

Questions for product teams to consider:

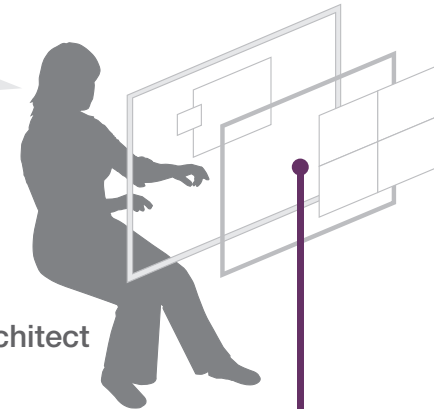
What overall models could encapsulate the “what and how” of your interactive application’s proposed roles in targeted knowledge work?

How might those overall “functional stories” be communicated to users?

Similarly, how could your team promote clear “sub-stories” for each of your central functionality ideas?

By adopting building information modeling, we are considering some unprecedented changes in how our team works...

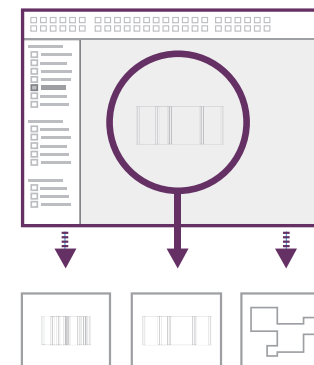
Architect



### OLD: CREATE ISOLATED DRAWING

The entirety of a building design is thought of as the sum of a set of separate architectural drawings.

Use of computing applications focuses on creating individual representations of a building, which must be kept in coordination.

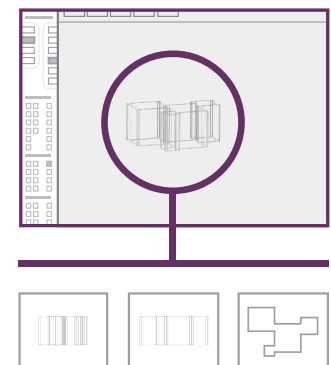


By comparison, the introduction of CAD had little impact on traditional practice. CAD changed who was doing some things, but the structure of work was mostly the same...

### NEW: MODEL CREATES OUTPUTS

Use of computing applications aims to collaboratively create and evolve a unified virtual model of a building project.

The information in this unified 3D model can then be used to automatically create all traditional architectural plans.



Luckily, everything about this tool seems like it is designed to clarify this new mindset and to help us to build it into the way that we work...

## C2. Application Interaction Model

Knowledge work applications can benefit from a consistent and overriding interaction model that defines a computing tool's "shell" of navigation and overall approach to interactivity. Product teams can envision interaction models that are complementary to targeted work practices, appropriate for their sketched design strategies, and framed by workers' experiences with other tools.

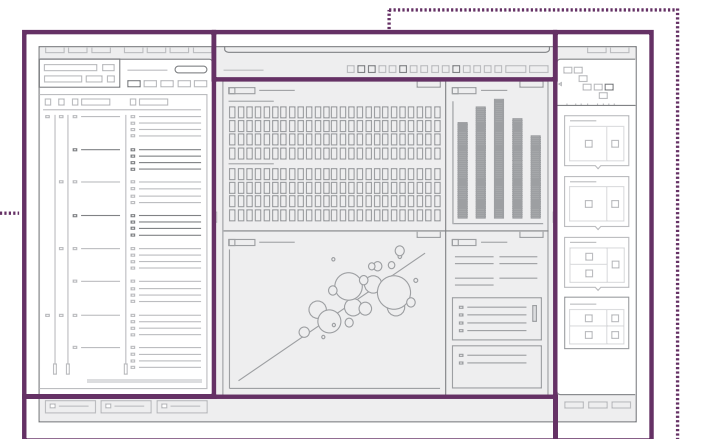
Questions for product teams to consider:

What directions can your team generate for the deliberate "shells" of your application concepts, including their approach to containing, enabling, and shaping your sketched functionality ideas?

What types of interaction models could effectively support targeted knowledge work in a way that embodies your strategic focus?

Each edge of my analysis application has a clearly defined purpose, and it's clear where I should turn to do different things...

Clinical Scientist



**BOTTOM TICKER:** Presents collaborator status and time sensitive messaging around the central data-base being visualized

**TOP PANEL:** Contains all of the controls that determine how data is visualized in the screen's central area

**LEFT PANEL:** Contains flexible tables that can be transformed to show several different types of relationships in clinical data

**RIGHT PANEL:** Presents saved snapshots of users' actions, allowing them to retrace and alter their navigation pathways

## C3. Levels of Interaction Patterns

Looking across the sketched functional offerings in a product team's application concepts, there are often opportunities to categorize and standardize certain repeating patterns. Teams can capture and expand upon internal consistencies at different levels of granularity, promoting eventual learnability, usability, and implementation efficiencies within their computing tools.

Questions for product teams to consider:

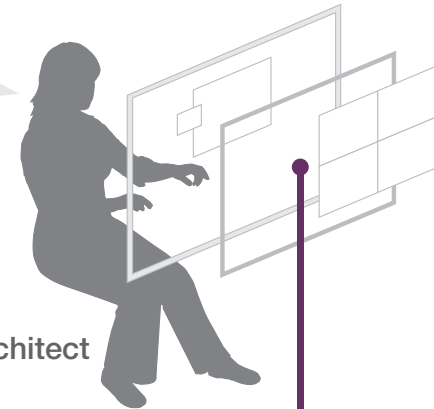
Scanning the breadth of your team's promising functionality concepts, what typical or novel interaction patterns might you identify and meaningfully reuse?

How might your team organize these valuable regularities into different tiers of patterns within your application proposals, ranging from large to more granular?

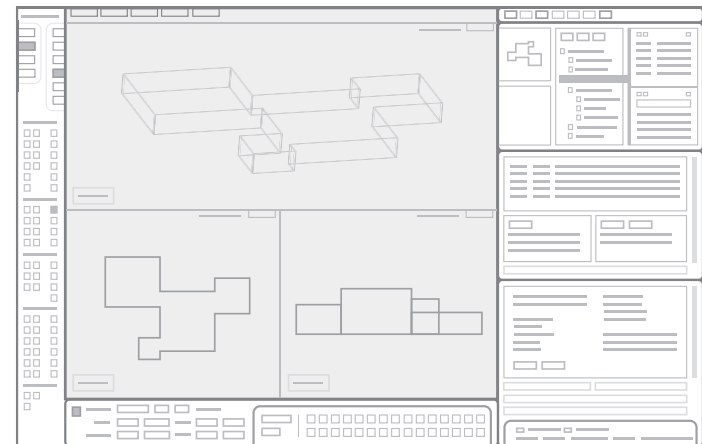
Everywhere I go in this software, there is this overall feeling of high quality consistency...

I imagine this tool being created by a single person, even though I know it took a whole team...

Architect



### LEVELS OF INTERACTION PATTERNS WITHIN APPLICATION



Application Views



Dialogs and Panes



Smaller Components





## C4. Pathways for Task and Activity Based Wayfinding

Effective pathways through interactive applications can be structured to allow knowledge workers to navigate based on the emergent flow of their own efforts. Product teams can derive these pathways from the interrelations between different operations, tasks, and larger activities in targeted work practices.

Questions for product teams to consider:

How might your team organize the structuring flow of functional options in your application concepts around understood pathways of meaningful action?

How could navigation “naturally” and desirably unfold through the course of targeted knowledge workers’ own decisions and efforts within your computing tool?

Even as I make what feel like very different choices, this tool is always somehow stepping me through what I want to do...

Financial Trader

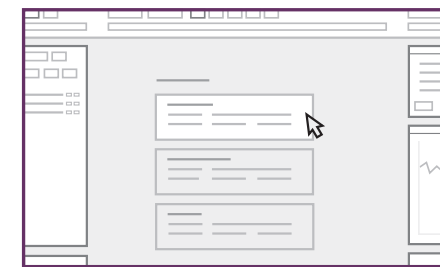
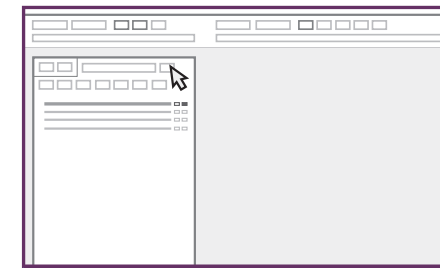
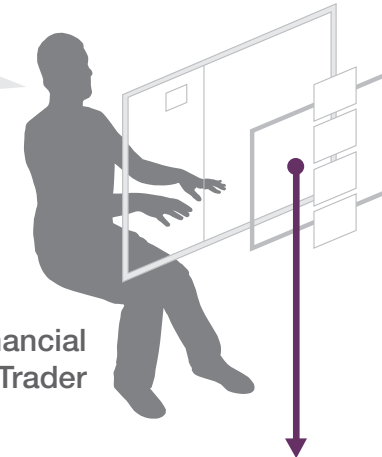
For example, I search for messages from a certain trader at another firm...

And the software highlights the messages from him that it recommends...

It gives me the option to transform the incoming message into a trade ticket...

And then I go through the highlighted steps to complete the deal...

Next, once that deal is finished, the tool gives me messages right here about what I might want to do next, based on rules that we set up in our group...



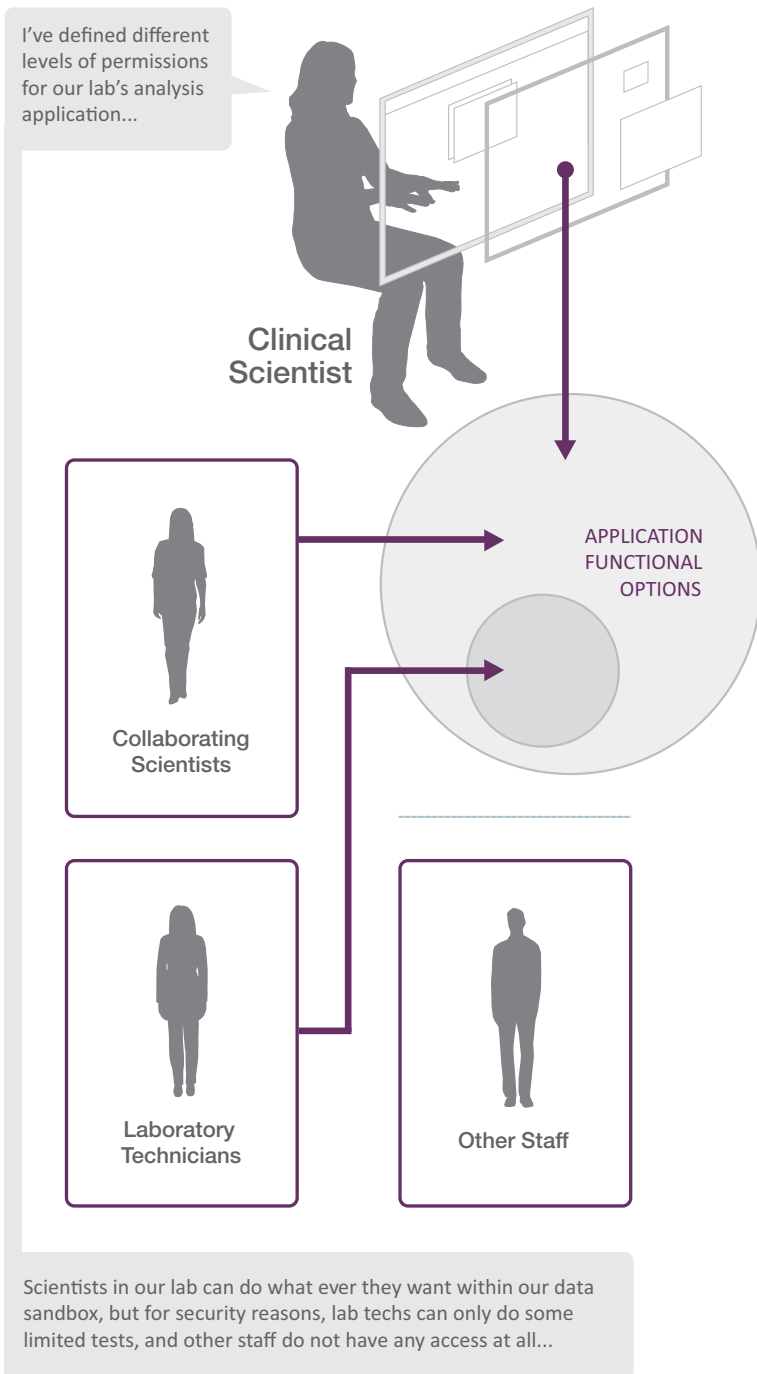
## C5. Permissions and Views Tailored to Workers' Identities

Application displays that are tailored to knowledge workers' identities can support both organizational goals and workers' own preferred ranges of practice. Product teams can envision how the content and functionalities within their computing tools could be segmented into areas and views that are intended for certain audiences within the same working culture.

Questions for product teams to consider:

Based on observed role segmentations and security needs in the organizations that your team is targeting, what approaches can you envision for meaningfully categorizing knowledge workers' identities in your application concepts?

How might these categories drive differing access and interactions with certain functionalities and content?



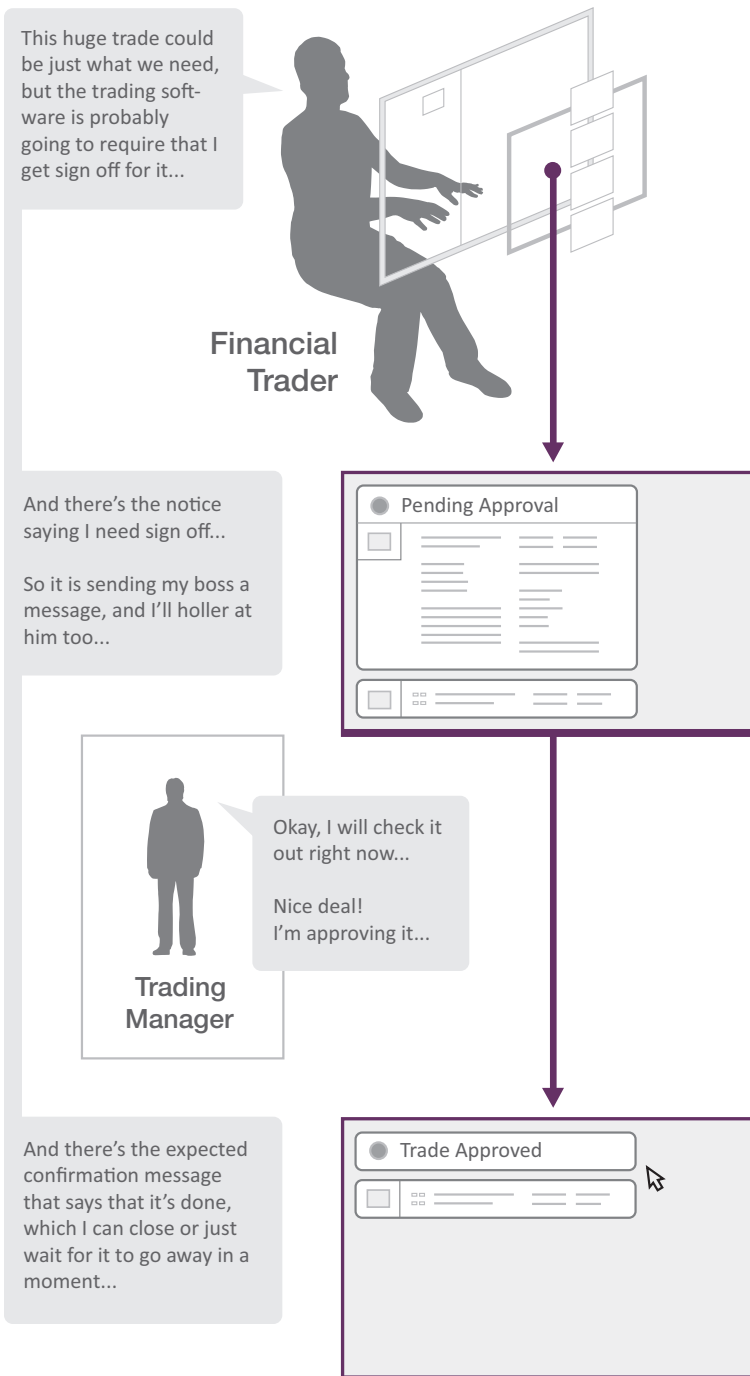
## C6. Standardized Application Workflows

Some cooperative processes in knowledge work can be supported by computing functionalities that facilitate entire sequences of standardized effort. Product teams can envision functionality concepts that could valuably distribute segments of larger work processes among multiple users; however, restrictive workflows may not always be an appropriate design response.

Questions for product teams to consider:

What portions of the knowledge work that your team is targeting truly follow standardized and routine processes — but still require human judgment and action?

How might your application concepts meaningfully structure and usefully reduce burdens in these procedural flows for all involved?



## C7. Structural Support of Workspace Awareness

Valuable functional support for cooperative or collaborative knowledge work activities may impact the larger structure of a computing tool. Product teams can envision pervasive cues within their application concepts that could highlight significant actions of other users acting in the same “workspace.”

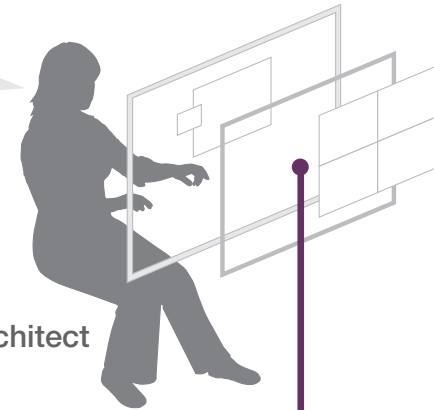
Questions for product teams to consider:

What structural, application level approaches might your team envision to allow targeted knowledge workers to stay usefully and meaningfully aware of others’ actions within the same data locale?

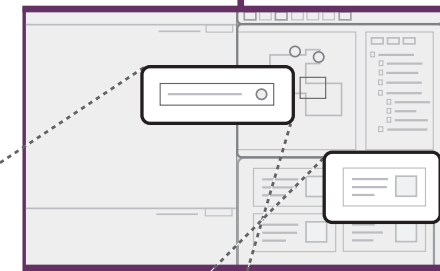
What might these awarenesses feel like in practice?

My building modeling application always lets me see at a glance what my colleagues are working on, without going out of my way to look...

Architect



For example, I generally know what’s going on with Jane, who is another architect on our team...



“Hallway” checked out by Jane Yu

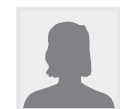


A SELECTION OF  
AWARENESS CUES  
AND INFORMATION

Jane Yu

Online - Editing

“Hallway” - Main Version



The accumulation of these little clues really changes the amount we have to communicate, as well as the topics that our team talks about when we do chat face to face...

## C8. Defaults, Customization, and Automated Tailoring

Knowledge workers may want to make persistent changes to default settings in order to tailor how they interact with a computing tool. Product teams can endeavor to create useful defaults; provide clear, consistent, and direct means of changing them; and consider scenarios for useful automation around some setting changes.

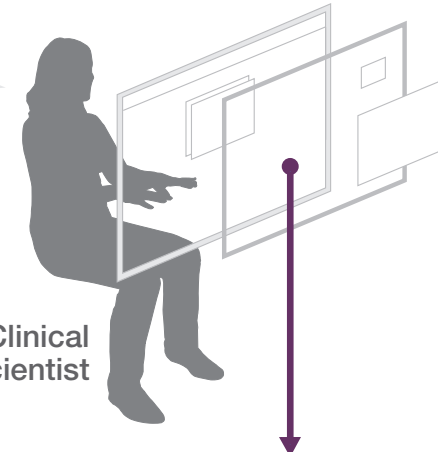
Questions for product teams to consider:

How might your team clarify and reduce the effort needed to understand and set important parameters in your application concepts?

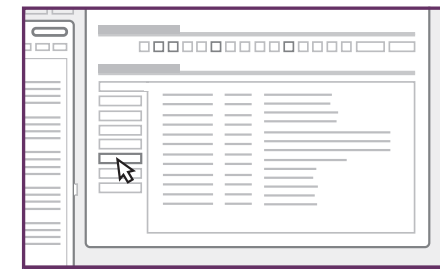
How could the interplay of appropriate default values, manual customization, and automated tailoring enhance your product's effectiveness across a breadth of targeted contexts?

Our analysis application has certain defaults in the way it computes clinical result values...

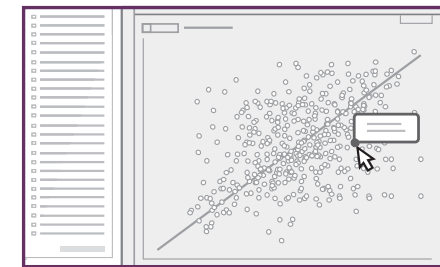
Clinical Scientist



I'm changing one of those defaults, because our lab is finding that the software is consistently computing a certain variable too low when compared to our instrument readings...



And I'm having a look at what that change does...



Since it looks like the new setting is working the way I want it to, I'll save that new setting as the default for any and all analyses that we create in the future...



## C9. Error Prevention and Handling Conventions

To ensure that potential errors in mediated knowledge work are preempted and managed in a consistent and appropriate manner, product teams can develop internal conventions for their application concepts. These standards can promote learnability, usability, and implementation efficiencies.

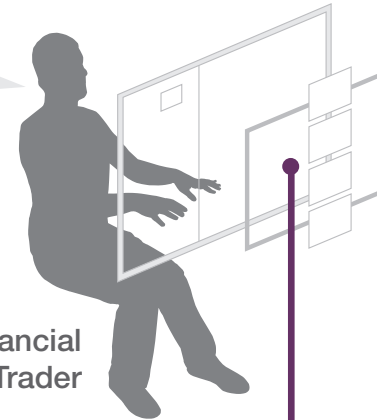
Questions for product teams to consider:

Looking across the functionality concepts in your team's sketched application possibilities, what common classes of error situations might you identify?

What interaction patterns could consistently and appropriately prevent or handle each of these error classes?

Traders have fat fingers like everyone else using a computer, and this trading software steps in to help prevent all sorts of problems in a predictable way...

Financial Trader



Like if I'm typing a price wrong, this tool doesn't let me get too far before telling me about it...



Which looks similar to the very useful message that comes up if I'm entering a quantity for a security that exceeds our holdings...



Which is similar to the error stopper that appears when a trade ticket's contents happen to go against the complex mesh of no-trade rules that our group is always updating...



## C10. Predictable Application States

High level state information can allow knowledge workers to assess whether an application is functioning properly, decide what avenues of action are currently available to them, and plan the ongoing flow of their efforts. Product teams can envision clearly defined, appropriately simple, and well communicated overall states for their computing tools.

Questions for product teams to consider:

What useful or necessary overall states might your team envision for your application concepts (e.g. starting, loading, normal, critical error)?

How might these states consistently communicate how your tool is currently operating, what it can currently be used to accomplish, and when, if applicable, its state will likely change again?

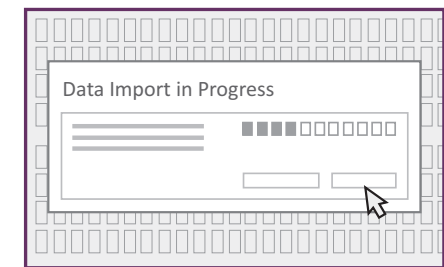
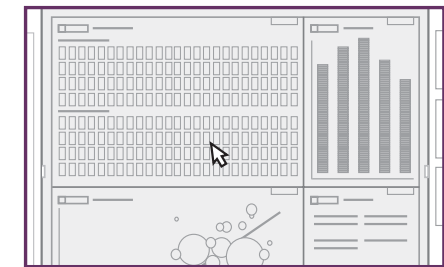
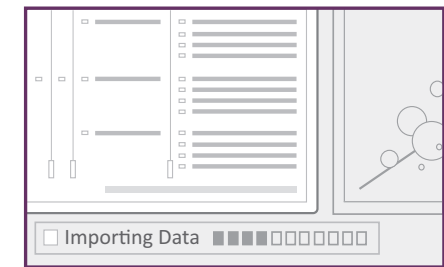
I've received a large amount of data from another lab, and I'm going to use my analysis application to import it into one of our lab's databases...

Clinical Scientist

And while I'm importing that data, the software has a message open at the bottom, which tells me that I can't make changes to any other data that I already have open...

I can still visualize it and zoom around to look at all that currently open data...

But if I find anything, I can't really save it as interesting or reanalyze it with a different rule set, because that involves changing the information in the database that's already being updated...



## D. Considering Workers' Attentions

Valued computing tools can desirably “fit” into the flow of thinking work: easing burdens, removing distractions, and allowing people to focus on challenging problems.

Designing for such a compelling pairing requires a careful examination of current and potential demands on peoples' attention.

During *application envisioning*, product teams can evaluate and explore how their sketched offerings might impact the allocation and sequence of knowledge workers' efforts.

By taking time to explore the topic of attention related needs and goals, teams can highlight opportunities to tailor and extend their products in truly useful and humane ways.

This category contains 7 of the 100 *application envisioning* idea cards in this deck:

D1. Respected tempos of work

D2. Expected effort

D3. Current workload, priority of work, and opportunity costs

D4. Minimizing distraction and fostering concentration

D5. Resuming work

D6. Alerting and reminding cues

D7. Eventual habit and automaticity



## D1. Respected Tempos of Work

Knowledge work can have implicit paces and timings, based in part on workers' inherent mental and physical limitations as human beings. By exploring potential changes to the pacing of individual tasks and extended activities, product teams can meaningfully envision how their interactive applications might impact important tempos in workers' practices.

Questions for product teams to consider:

How could the interactive flow of your team's application concepts desirably reflect the inherent pacing of targeted knowledge work practices, rather than force unwanted slowing or acceleration in users' experiences?

Where might positive shifts be possible?

My work has a definite rhythm to it that actually helps me to think more clearly...

During the really busy times, I won't use any part of my software that slows me down...

Financial  
Trader

In the morning, trading volume can be high as everyone comes in and trades on new information from after the closing bell of the previous day...

Toward the end of the day, when the market is moving fast before closing time, I really need my tools to respond rapidly and to understand what I want to do...



## D2. Expected Effort

Knowledge workers develop useful expectations about how much time and attention is required to successfully accomplish different operations, tasks and larger activities. Product teams can envision functionality concepts that could either meet or exceed these expectations, providing justifications of sufficient value whenever onscreen tools happen to require more work instead of less.

Questions for product teams to consider:

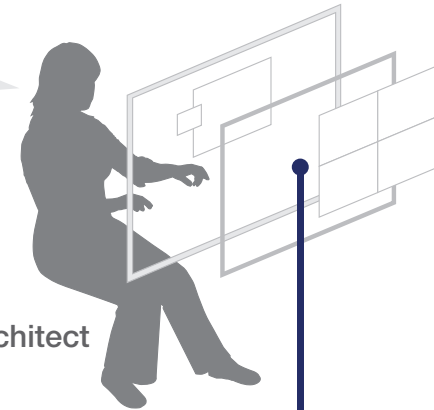
What expectations of effort do targeted knowledge workers have in the specific areas of work practice that your team is targeting?

Which of your team's functionality concepts will likely "beat" those expectations?

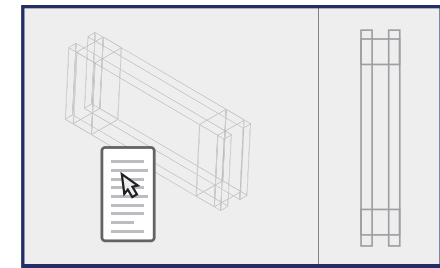
Which might be perceived as problematically effortful to use?

I'm going to group some separate parts together into a single part, because I want them to always appear as one thing...

Architect



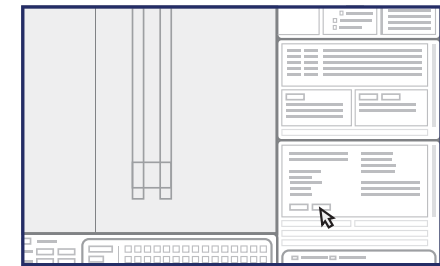
So I've got the pieces selected, and I'm opting to group them into a collective object in the building model...



And the application wants me to fill out all this info about different properties, which really doesn't seem necessary to me...



I guess that the info could be useful later, when I have these things all over the building model, but I'm not sure that it's worth doing those steps every time I want to create a new a grouped object...



## CONSIDERING WORKERS' ATTENTIONS

### D3. Current Workload, Priority of Work, and Opportunity Costs

Knowledge work often involves pools of collected work items that can be generated by workers for themselves or can arrive via structured handoffs and other communications. Product teams can envision features that could support workers as they strive to understand their current workload, assign priorities, and then focus their efforts on certain items.

Questions for product teams to consider:

How might your team's functionality concepts allow targeted knowledge workers to assess the workload that is currently "on their plate," prioritize what they want to accomplish, hide or remove what they do not want to address, and work on selected items until their "plate is clean"?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_D3.html](http://www.FlashbulbInteraction.com/WTS_D3.html)

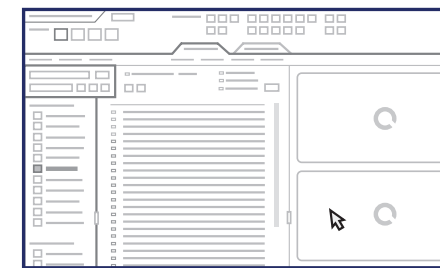
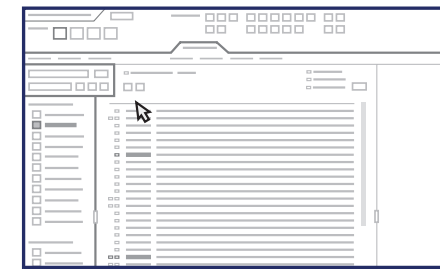
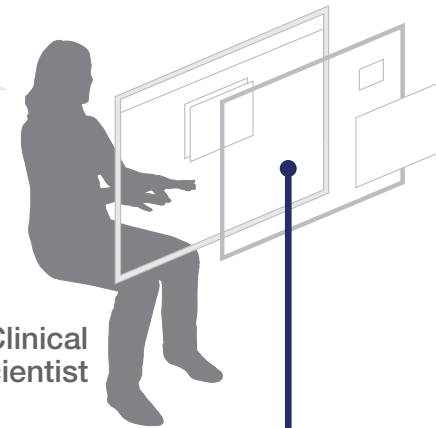
I need to check on the "fresh" data coming from our lab to see what my upcoming analysis workload is looking like...

Clinical Scientist

So I'm choosing to view all of this data by whether it's been approved yet...

And there's a few new items here that the tool is calling out as needing my approval before they can go on to our vetted, high quality analysis database...

I'm excited to get a first look at data from this one experimental group, so I'm digging into that one first...



## D4. Minimizing Distraction and Fostering Concentration

Knowledge workers are often interrupted from the immersive flows of their own practices, and some of these interruptions may undesirably pull them away from valued actions and outcomes. Product teams can envision their functionality concepts with the intention of minimizing unnecessary distractions and other obstacles to workers' concentrated engagement in their present goals.

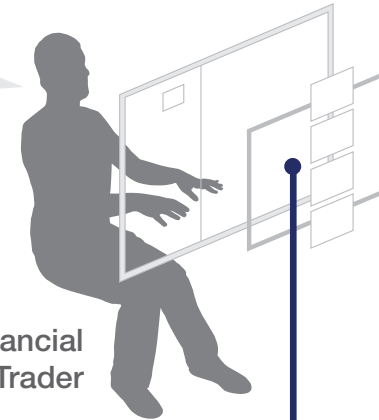
Questions for product teams to consider:

Where might your team's application concepts introduce unwanted distractions into targeted workers' practices?

How could your sketched functionalities reduce unwanted interference while allowing for useful interruptions that may enhance productivity and quality in knowledge work?

It has been extremely busy, and I want to reduce any big interruptions...

Financial Trader



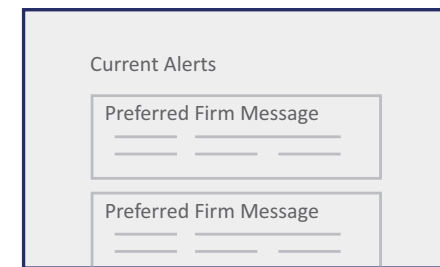
I am just about finished booking the deals that I have been focusing on for the last few minutes...



And now that I haven't got any trade tickets open, the software is giving me some alerts that were not top priority while I was completing other deals...



It looks like there are a couple of items from our preferred firms that I should take care of next...



## D5. Resuming Work

Knowledge workers' activities often span more than one work day. Within a given day, individuals may shift their attentions back and forth among several different threads of work. To reduce the effort needed to effectively resume previous threads, product teams can envision useful cues that could prompt workers' recollections and outline current conditions within a shared workspace.

Questions for product teams to consider:

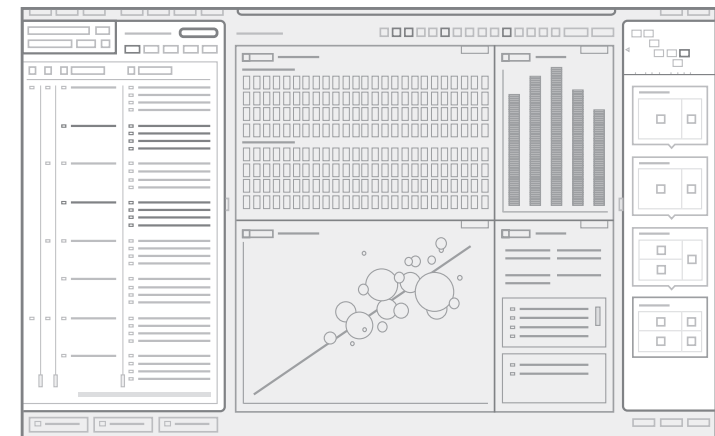
What could the experience be like when “stepping away” from, and then returning to, your team’s computing tool?

How might your application concepts support targeted knowledge workers as they seek to invoke and reconstruct their previous mindsets in order to “pick up” where they had left off in their evolving activity contexts?

After I've first sat down at the lab in the morning, I always look at our current data with fresh eyes to see if anything jumps out that I hadn't seen the day before...

Clinical Scientist

So I'm logging into our lab's analysis application...



And the software opens as if I had never left it, waiting for me to hopefully have some big insight into these results...

## D6. Alerting and Reminding Cues

Knowledge work often involves event driven signals and actions, which the boundaries of computing displays may hide from an application's users. Product teams can envision timely and salient messaging that could reduce or eliminate the need for workers to continuously monitor for certain events that might impact the sequence or outcomes of their efforts.

Questions for product teams to consider:

What events in your team's application concepts will targeted knowledge workers likely want to know about and monitor for, either as insight into mediated work process or as event driven support for their own memories over time?

How might the automated presentation of relevant messaging allow users to stay attuned to these events without maintaining vigilant attention for them?

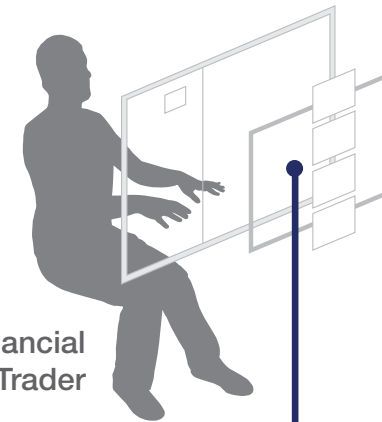
I need to jump over to my market info application to see whether a deal is worth making...

Financial Trader

Just examining the data...

And now there's a message from my trading tool letting me know that certain offers are about to expire...

So I'm jumping over to my trading tool to take a look at this other deal while I still can...



## D7. Eventual Habit and Automaticity

Over time, knowledge workers learn to attend to certain areas of their interactive applications, while deemphasizing other pathways and content. Product teams can sketch their functionality concepts with this sort of habitual learning in mind, creating conditions where workers may develop adaptive, nearly automatic approaches to accomplishing routine interactions.

Questions for product teams to consider:

Assuming that targeted knowledge workers will eventually adopt and frequently use your team's computing tool, how might you examine your application concepts through the lens of users' eventual habituation and mastery?

What unpredictabilities could lead to errors by "getting in the way" of valuable automaticity?

Where might negative habits develop?

I want to change a setting on the shaping tool that I'm going to use next in my modeling application...

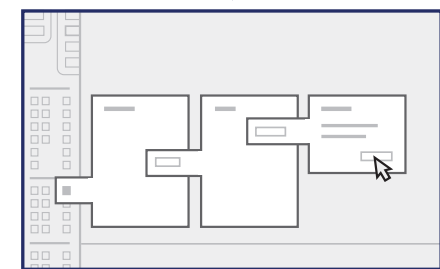
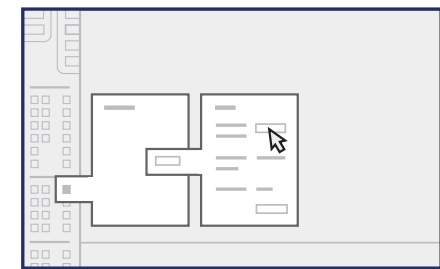
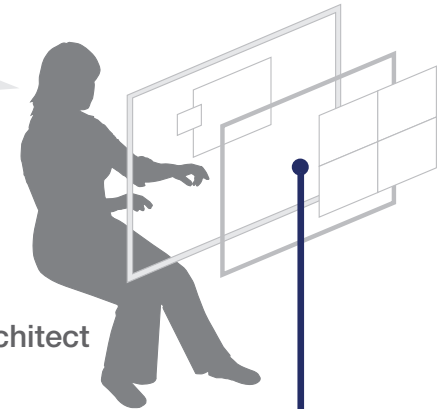
Architect

First, I click over here...

And then I go here...

And then this will make the change...

I'm not sure why it doesn't save that setting in the building model, but it's no big deal to change it when I need to...



## E. Providing Opportunities to Offload Effort

Valued computing tools can desirably reduce burdens in knowledge work while at the same time promoting a sense of engagement and agency.

Designing for such useful reductions requires a deliberate and critical understanding of current and potential efforts in work practice.

During *application envisioning*, product teams can map workers' consistent and routine burdens in order to locate potential opportunities for supporting technologies.

By focusing on how effort might be offloaded to an onscreen tool, teams can highlight cases where higher order tasks and user experiences might transformatively replace unwanted actions and cognitive load.

This category contains 6 of the 100 *application envisioning* idea cards in this deck:

- E1. Offloading long term memory effort
- E2. Offloading short term memory effort
- E3. Automation of low level operations
- E4. Automation of task or activity scenarios
- E5. Visibility into automation
- E6. Internal locus of control



PROVIDING OPPORTUNITIES TO OFFLOAD EFFORT

## E1. Offloading Long Term Memory Effort

Certain information often needs to be “remembered” for some time by knowledge workers and their organizations. Product teams can envision functionality concepts that could record and store this valued content, allowing workers to refer to their computing tools instead of having to concentrate on keeping certain items mentally available.

Questions for product teams to consider:

What information do targeted knowledge workers struggle to remember over extended periods of time in the work practices that your team is striving to mediate?

How might your application concepts structure, collect, preserve, and present valued long term information in accessible and meaningful ways?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_E1.html](http://www.FlashbulbInteraction.com/WTS_E1.html)

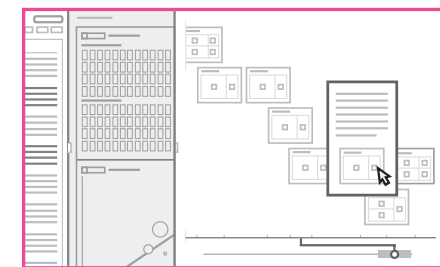
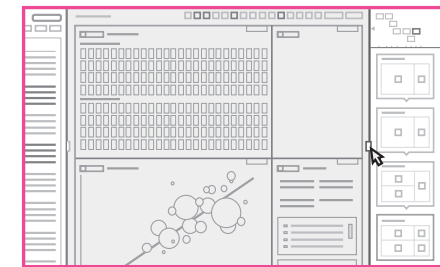
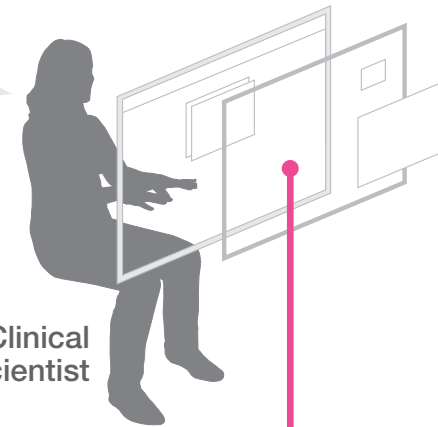
As I'm looking at the data from our latest study, I'm vaguely reminded of how we analyzed the data from a big study last year...

Clinical Scientist

So I'm just going to open up that older study in our analysis application...

And look at the analysis history to see what settings and processes we used back then on this massive pile of results...

Oh, that's right, I had forgotten that we did it that way. Great. That same approach should be useful in our current round of work...



PROVIDING OPPORTUNITIES TO OFFLOAD EFFORT

## E2. Offloading Short Term Memory Effort

Knowledge workers' short term memories have inherent limits, even in the context of familiar work practices. To support key short term memory challenges in computer mediated work, product teams can envision concepts for persistently presenting workers with recent cues and information that is pertinent to their goals.

Questions for product teams to consider:

What information do targeted knowledge workers struggle to remember for short intervals while accomplishing the operations and larger tasks that your team is striving to mediate?

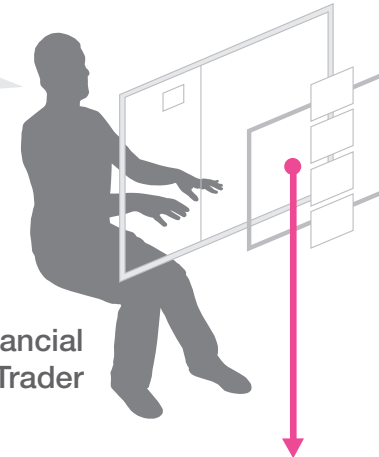
How might your application concepts store and display relevant short term information in accessible and meaningful ways?

WORKING THROUGH SCREENS | 100 IDEA CARDS

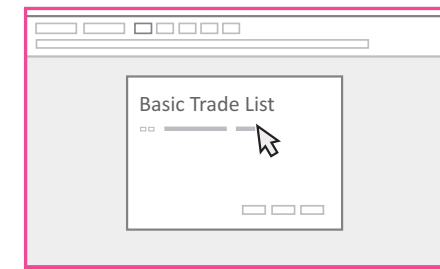
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_E2.html](http://www.FlashbulbInteraction.com/WTS_E2.html)

Often, there are too many deals made in a single phone call to remember them all without somehow getting them down on paper or my screen...

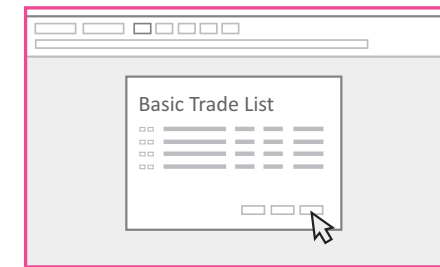
Financial Trader



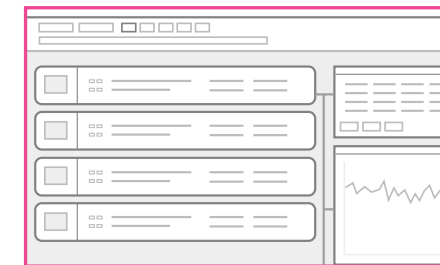
So I try to type them into this shorthand function, designed specifically to help with big lists of potential deals...



Then I can select an option to turn them all into full fledged trade tickets, which automatically makes some assumptions and fills in a lot of the information...



Once they are turned into individual tickets, I can review the information on each one, make any changes that I want to make, and then complete each deal separately, like normal trades...



PROVIDING OPPORTUNITIES TO OFFLOAD EFFORT

## E3. Automation of Low Level Operations

Knowledge workers may experience certain frequent, highly granular work operations as redundant or excessively rigorous. To reduce or eliminate efforts around certain tedious or exacting operations, product teams can envision small, highly targeted automations within their sketched functionality concepts.

Questions for product teams to consider:

How might your team's functional offerings remove or scaffold certain consistent, granular knowledge work operations with highly specific automations?

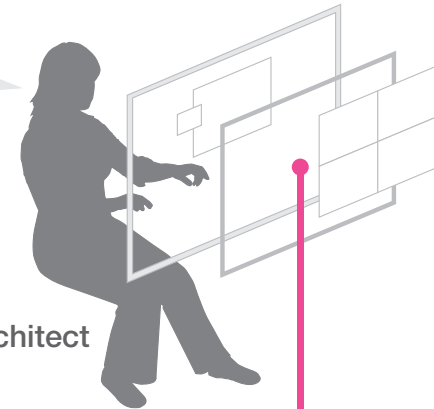
How could these small automations advance targeted workers' larger, goal directed tasks in useful ways that they may not even recognize?

WORKING THROUGH SCREENS | 100 IDEA CARDS

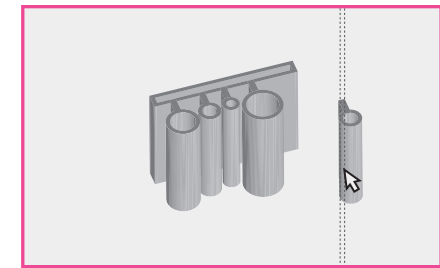
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_E3.html](http://www.FlashbulbInteraction.com/WTS_E3.html)

I'm finishing this shape, which I want to try out as a repeating motif on the facade of our latest building model...

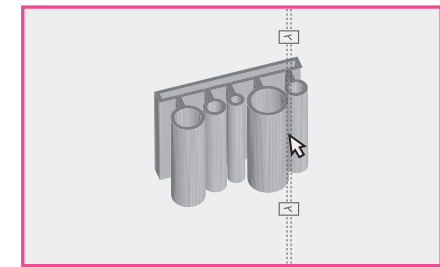
Architect



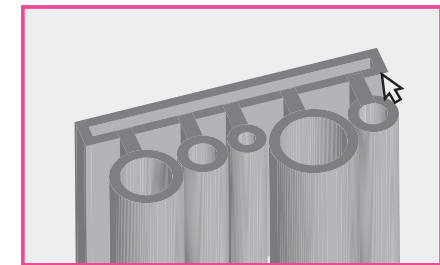
I'm selecting the unconnected form and dragging it toward the edge of the rest of the component...



And when I get close, it jumps to the surface in order to connect them...



I can override that small snap, but in this case it makes things a bit easier, and I know that they are truly connected...



PROVIDING OPPORTUNITIES TO OFFLOAD EFFORT

## E4. Automation of Task or Activity Scenarios

In certain situations, entire tasks or larger activities in knowledge work can become extremely routine, describable, and tedious. In response to these cases, product teams can envision concepts for targeted automation functionality, which can change the nature of work by allowing individuals to focus more of their efforts on less routine and higher value efforts.

Questions for product teams to consider:

Is your team targeting any tasks or larger activities that have highly predictable and standard series of operations?

What functionality concepts might you envision to automate these sequences?

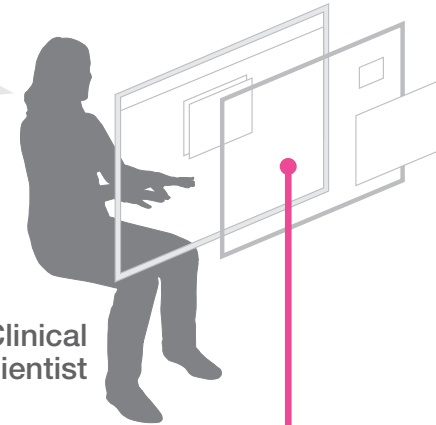
What could be gained or lost, from the perspectives of targeted knowledge workers and their organizations, in the adoption of such expansive automations?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_E4.html](http://www.FlashbulbInteraction.com/WTS_E4.html)

After my lab technicians prepare samples and put them in certain instruments, our lab's automation can do a remarkable amount on its own, with human eyes only on errors and exceptions...

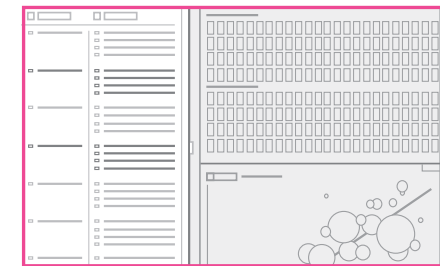
Clinical Scientist



### LAB AUTOMATION CONTROLLED BY COMPUTING APPLICATIONS

- Automated data collection
- Automated data filtering
- Automated movement of data in study repository
- Automated calculation of resultant values in study
- Automated testing against previously coded hypotheses
- Automated messaging about data availability

And at the end of the automation pipeline, if all goes well, I receive accurate new data from the experiments I defined long before any of the lab work was even started...



PROVIDING OPPORTUNITIES TO OFFLOAD EFFORT

## E5. Visibility into Automation

To help ensure that knowledge workers are not deskilled when they adopt new or revised computing tools, product teams can envision functionality concepts that could provide users with meaningful and useful visibilities into the underlying aspects of certain automated processes.

Questions for product teams to consider:

How much visibility might targeted knowledge workers value when encountering or actively using each of the automated offerings in your team's sketched application concepts?

When could such visibility be useful; what might it look like; what meaning could it provide; and how present might it be in workers' experiences?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_E5.html](http://www.FlashbulbInteraction.com/WTS_E5.html)

My trading tool makes great suggestions based on what I've told it that I want...

Financial Trader

Right now, my message list has some items in it that the tool is pointing out...

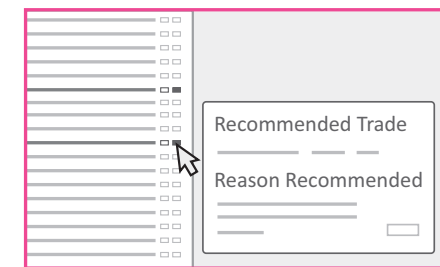
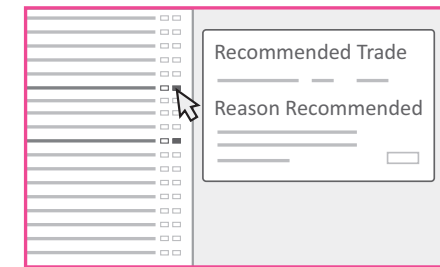
I always want to know why something is flagged as a recommendation...

This one says it's a request for a security that our desk wants to unload as soon as possible...

So I'll definitely look at that one more closely...

This one is a proposed deal with someone that I told the software that I want to do more business with...

So, I'm going to act on both of those...



PROVIDING OPPORTUNITIES TO OFFLOAD EFFORT

## E6. Internal Locus of Control

Knowledge workers may sometimes feel that interactive applications “hijack” their work practices in undesirable and stress inducing ways. Product teams can envision their functionality concepts with the intention of promoting a sense of control and mastery in workers’ experiences, even as computing tools usefully perform complex actions on their behalf.

Questions for product teams to consider:

What aspects of your team’s automation concepts might detract from targeted knowledge workers’ sense of agency and skilled accomplishment?

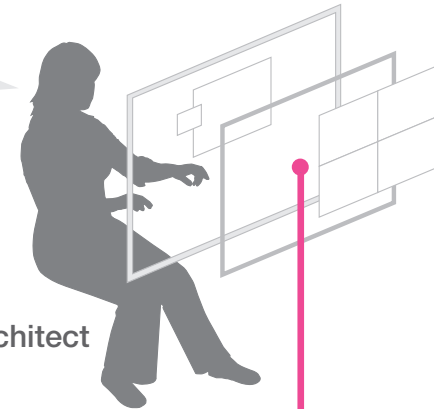
How might your computing tool allow workers to have desirable levels of control over the initiation, steering, and completion of automated processes?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_E6.html](http://www.FlashbulbInteraction.com/WTS_E6.html)

I’m getting ready to submit this building model for review, so I’m going to run some tests to make sure that the main floor is basically up to code...

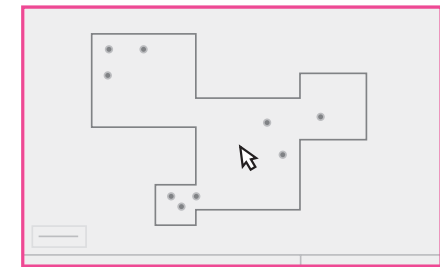
Architect



I’m having a look at the settings before I get the test started...



And, as to be expected, there are potential violations to check out...



A few of these things we should probably fix, but some of them, like this one, I’m going to try to get an exception on, because the building codes are really vague in this case...



## F. Enhancing Information Representation

Valued computing tools can represent information in concise and tailored ways that are well suited to knowledge workers' goals and mental models.

Designing such useful representations requires a deliberate understanding of how people might understand and act upon content.

During *application envisioning*, product teams can critically examine how information is currently represented, looking for opportunities to display important content in enhanced or even transformative ways.

By taking time to generate diverse ideas for their product's information displays, teams can situate new and existing content in comprehensible views that ease navigation burdens and make complex conclusions perceptually clear.

This category contains 11 of the 100 *application envisioning* idea cards in this deck:

- F1. Coordinated representational elements
- F2. Established genres of information representation
- F3. Novel information representations
- F4. Support for visualization at different levels
- F5. Comparative representations
- F6. Instrumental results representations
- F7. Highly functional tables
- F8. Representational transformations
- F9. Simultaneous or sequential use of representations
- F10. Symbolic visual languages
- F11. Representational codes and context

## F1. Coordinated Representational Elements

Elements within and between information representations can have coordinated facets, reducing efforts that would otherwise be needed to usefully bring them into alignment as part of certain operations or larger tasks. Product teams can envision coordinations that could transform effortful mental work into visual judgments and direct manipulations of interrelated external artifacts.

Questions for product teams to consider:

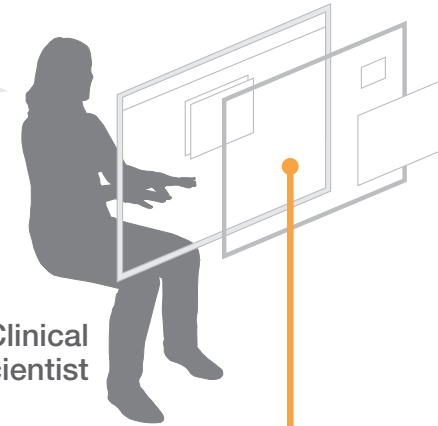
What mental transformations and artifactual alignments do knowledge workers frequently employ in order to manipulate information in goal directed ways?

What concepts might your team generate to implicitly coordinate certain meaningfully related elements in your sketched information representations?

How might individuals create their own coordinations in the context of your computing tool while performing targeted work practices?

I was just sent a big set of data by a colleague, and I've imported it into my analysis application to look for interesting findings...

Clinical Scientist



Now I'm setting up some connected visualizations before diving in to see what I can find...



And each visualization stays in synch with the others as I make different selections, showing the same highlighted info in each of these views...



And the different views visually line up with each other automatically so I don't even have to think about connecting them together...





## F2. Established Genres of Information Representation

Knowledge workers reuse established representational formats to create new meaning in a shared interpretive context and to valuably define boundaries for their efforts. Product teams can envision concepts for how these existing genres could be recreated, reinterpreted, and usefully extended in their interactive applications.

Questions for product teams to consider:

What central and long standing representational genres do knowledge workers commonly recreate, derive meaning from, and collaborate around as part of targeted work practices?

How might your team incorporate and advance these valued formats within your application concepts?

Everywhere I work, the basics of this business are the same...

You get to know certain screens very well when you look at them over and over every day...

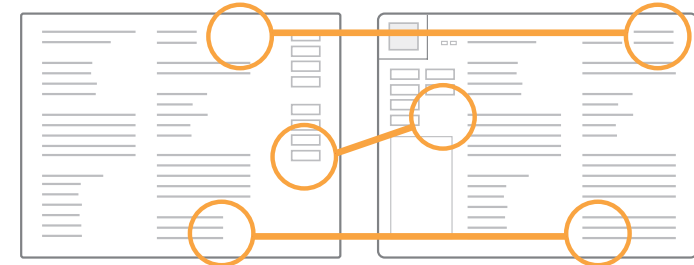
Financial  
Trader

Trade tickets are a good example...

### MINOR DIFFERENCES IN REPRESENTATION

Previous Trade Ticket

Current Trade Ticket



These are the standard ticket forms from my current firm and from the last place where I worked. As you can see, there are only small differences...

And neither of them is really so different from back when these kinds of tickets were paper slips, before the average trader on this desk even used computers...

## F3. Novel Information Representations

Interactive applications can aggregate and display stored data in new ways that are highly useful and meaningful in knowledge work. Within their broader ideas about the advancement of targeted work practices, product teams can identify and explore potential opportunities for new representations of information.

Questions for product teams to consider:

How might any deficiencies in current information representations suggest opportunities for representing application content in new ways?

What compelling opportunities for representational redesign can be found in your team's sketched functionality concepts?

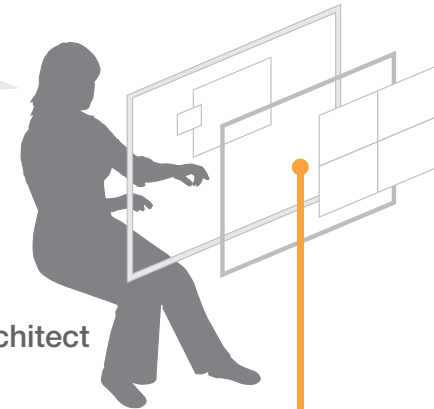
What might these new displays look like, and how could they provide sufficient value to justify knowledge workers learning to use them?

WORKING THROUGH SCREENS | 100 IDEA CARDS

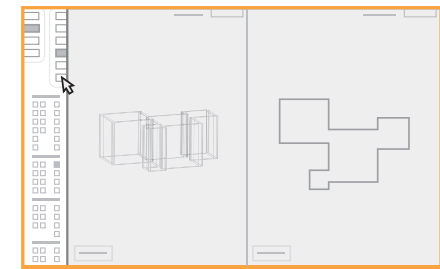
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_F3.html](http://www.FlashbulbInteraction.com/WTS_F3.html)

So I am concerned that some areas in this building model are more contentious than they need to be...

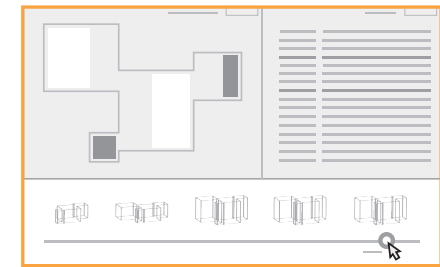
Architect



So I'm opening a view that allows me to see what has changed over time and to look back at quick snapshots of old versions of the model...



I can immediately see that there have been a lot of changes to the foyer area of the design, which the client has been driving with their requests...



And that we have maybe been fussing too much about some other details when our time could be better spent on more important factors in the design, which is always a tough balance...



## F4. Support for Visualization at Different Levels

Computing tools can aggregate volumes of content that may be unprecedented within a knowledge work domain. Product teams can envision functionality concepts that could allow workers to visualize aggregated information at different levels of granularity from valuable, goal oriented perspectives.

Questions for product teams to consider:

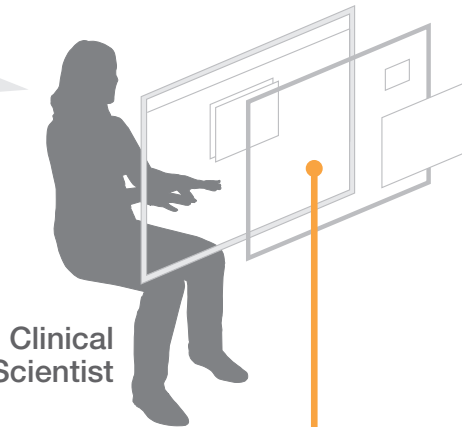
How might the storage of large volumes of information in your team's application concepts provide opportunities for innovative interactions and insights in targeted knowledge work?

What types of information representation could make sense at different levels of content aggregation?

How might these scaling perspectives be usefully interlinked in support of certain analytical goals?

In our lab's analysis application, visualizing a study's results often means starting at 50,000 feet and then heading down...

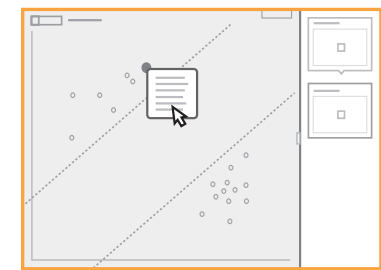
Clinical Scientist



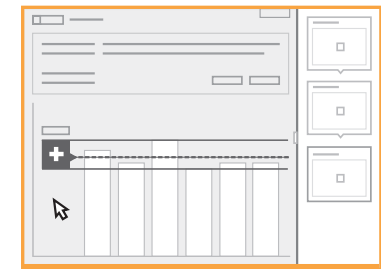
I have one experimental group that generally has a higher level of gene expression than other groups that we tested...



And now, within that one group, I'm looking for outlier genes with especially high or low readings...



Next, I'm zooming into the data just for those outlier genes to look at how consistent the readings were...



## F5. Comparative Representations

Knowledge work can involve standard comparisons, based on known and meaningful criteria, between work artifacts. Product teams can envision functionality concepts that automate certain comparisons between interaction objects and display resulting outcomes in representations that highlight any distinctions that are pertinent to workers' goals.

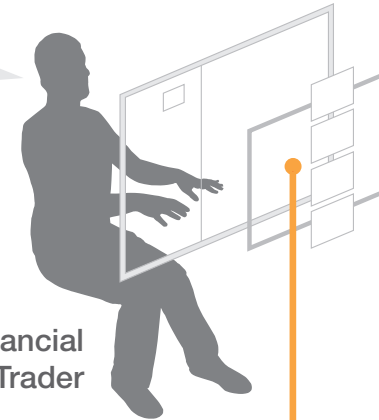
Questions for product teams to consider:

What comparisons do targeted knowledge workers frequently make in the work practices that your team is striving to mediate?

What specialized information representations could allow workers to accomplish valuable comparisons by quickly interpreting emphasized distinctions between selected interaction objects?

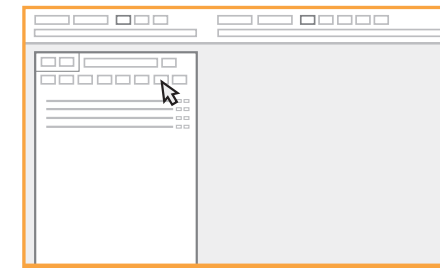
I have to quickly fill this order...

Financial  
Trader



The search results show that we have four different sources for the security that I need...

All four seem relatively similar, so I'm going to use the comparison view...



I love the way this screen calls out differences in the info that I care about, including some more complex analytics...

And I'm removing sources that don't look right...



So, it looks like it's a toss up between the first two...

And the tool has put them first because its rules generally know what I look for when making these decisions...



## F6. Instrumental Results Representations

For knowledge work processes where the desired user experience is highly automated, “push button” simplicity, product teams can envision distilled representations of resulting information outputs that could facilitate rapid judgments within targeted work practices.

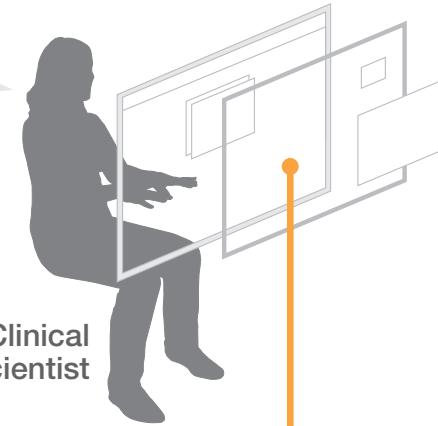
Questions for product teams to consider:

Which of the knowledge work tasks or larger activities that your team is striving to mediate could be valuably supported by automations that result in easy to interpret, “instrumental” outputs?

How might these results be distilled into meaningful representations of clearly actionable information?

I have a large set of clinical data, and I want to run some basic tests on it to see if there are any known, major genetic abnormalities in the subjects...

Clinical Scientist



So I've selected the data from the new subjects in my analysis application, and I'm choosing the range of testable abnormalities that I want the tool to look for...



And a few seconds later, when the results have come back, it gives me a quick summary of how many abnormalities were found...



I can then scroll down through the results to see the genetic conditions for each subject, organized by statistical confidence and the severity of potential health impacts...



## F7. Highly Functional Tables

Tabular representations are pervasive in knowledge work. Based on an understanding of how various tables in an application concept might be used, product teams can envision functionalities to powerfully transform and extend gridded content to meet certain goals and analytical conditions.

Questions for product teams to consider:

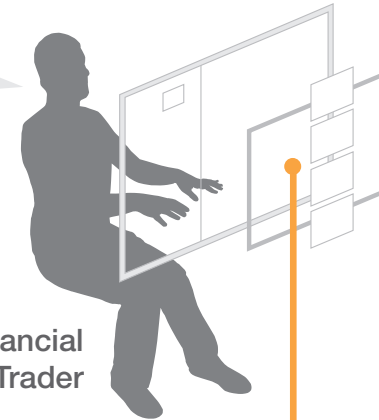
How might your team categorize tables across your sketched functionality concepts based on the volume of their potential contents and their associated goals in targeted knowledge work?

What types of interactive offerings could be usefully and consistently applied to different categories of tables?

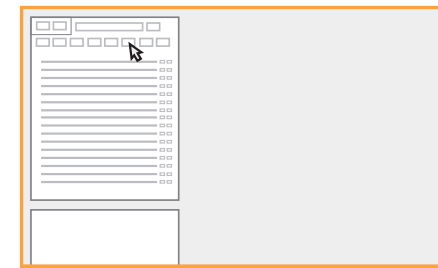
How might other representations coordinate with gridded views as part of certain operations and larger tasks?

I nearly always have a list of trading messages that I need to go through...

Financial  
Trader



When it's busy and my message list gets really long, I am constantly changing the ordering to see what's going on...



As I look at each message, I'm checking the related tables below to make sure that I know the bigger situation around it...



And as I think of questions about a potential deal, I can add on to or change these tables to quickly find the answers that I need...



## F8. Representational Transformations

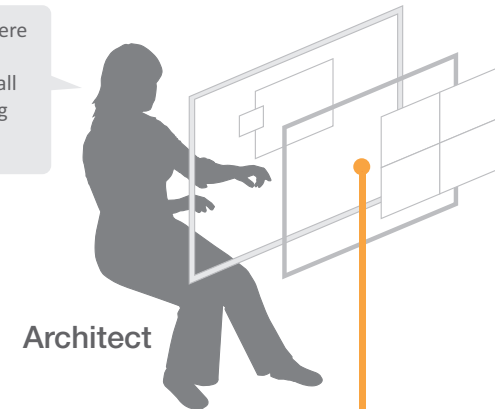
Knowledge workers may use a single information representation as part of accomplishing very different work practices. To support differing needs from a single information display, product teams can envision functionality concepts that could allow workers to meaningfully tailor how a representation classifies and presents selected content.

Questions for product teams to consider:

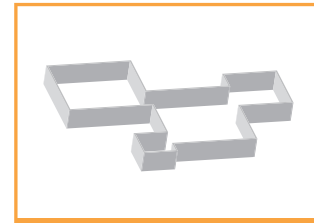
Which of your team's sketched information representations could be used in multiple work practices — especially in distinct information seeking and sense making efforts?

What functional options might allow targeted knowledge workers to visually transform these representations in support of certain characteristic or emergent needs?

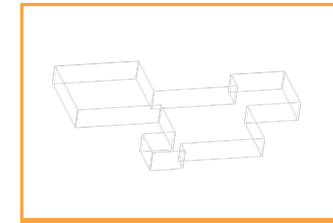
In this software, there are so many useful ways of looking at all or part of a building model...



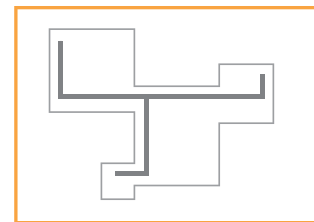
Architect



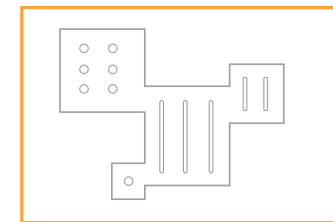
Rendered building of one floor



Wireframe geometry of one floor



Ventilation systems within one floor



Lighting elements within one floor

Any one view can be transformed to show or hide all sorts of different data...

So I turn on what I need based on what I'm trying to do...

Also, the application is surprisingly smart about suggesting different visual transformations based on what it gathers about my current needs...

## F9. Simultaneous or Sequential Use of Representations

Knowledge workers may use more than one information representation, of the same or different content, to accomplish certain operations or larger tasks. To support workers' abilities to meaningfully act from the context of different data perspectives, product teams can envision concepts that present certain displays in parallel or allow for rapid switching between related views.

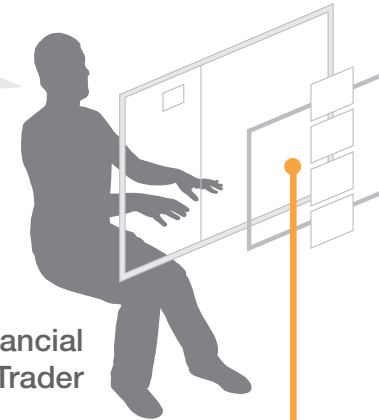
Questions for product teams to consider:

How might close onscreen relationships between coordinated displays of information provide value in the knowledge work practices that your team is striving to mediate?

What sequential or simultaneous arrangements of content in your application concepts could allow targeted workers to more easily see key relationships or interact through them more directly?

People talk about getting overloaded with too much information, but I like to have the option of seeing a lot of different kinds of data at the same time...

Financial Trader



I'm turning on some graphs here to see what's going on with this potential deal...

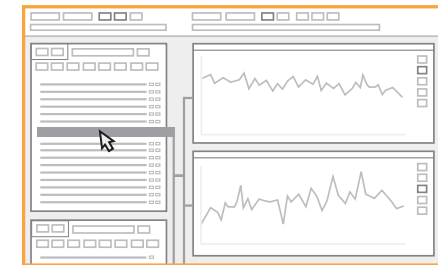
No dice here...



And I've got a lot of other messages to go through, so I'm going to close down this middle column of details for the time being...



So now I can just look at specific messages and their graphed data, which feels faster sometimes...





## F10. Symbolic Visual Languages

Symbology can be a central component of interactive applications, adding clarity and emotive style to representations of onscreen objects, interactive options, information categories, or messaging content. Product teams can envision symbolic approaches for their application concepts that meaningfully advance and extend known visual languages.

Questions for product teams to consider:

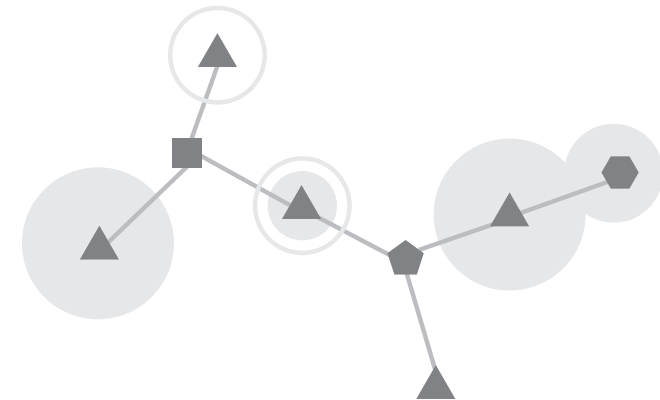
What symbolic conventions are currently used in the knowledge work practices that your team is striving to mediate?

While referencing these existing languages and the conventional iconographies of interactive applications, what new concepts might your team envision to symbolically communicate information and affordances in your application concepts?

In my field, certain standard symbols are used to represent abstract concepts...

Clinical Scientist

For example, if I want to know what a set of highly expressed genes might mean in the context of what we currently know about related biological pathways, I can view that symbolically....



My analysis application superimposes the complex data from our lab's experiments onto standard biological pathway symbols that I can "read" based on my experiences...

Allowing me to see new relationships and effects that are important for our research work...

## F11. Representational Codes and Context

Information representations may require supporting content in order to be interpreted correctly by knowledge workers. Product teams can envision how different representational forms in their sketched application concepts could be clarified with useful labels and keys, as well as descriptions of current data scope.

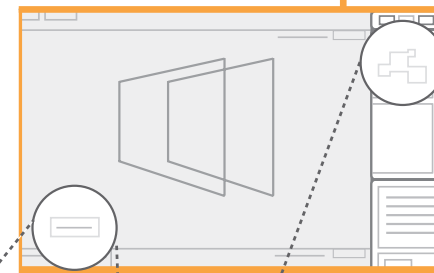
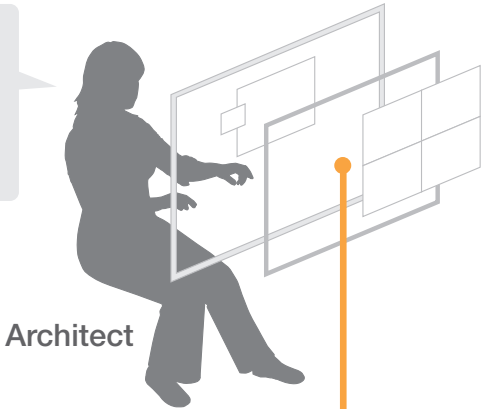
Questions for product teams to consider:

What explanatory content about abstract codes and data contexts could help targeted knowledge workers to more effectively learn and actively use certain representations?

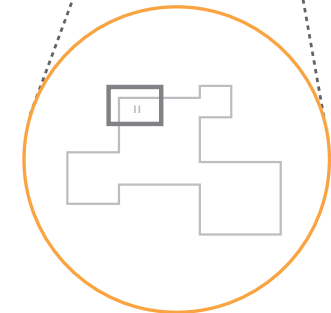
How might supporting cues and information be contextually presented or made interactively available in order to clarify workers' interpretive acts?

It is so easy to lose track on the screen of where I am in this huge building structure that my team is working on...

Architect



This scale indicator helps me to realize that I am intently focusing on something at a much smaller scale than I think I am...



And this overview map helps me to know what part of the building I'm zoomed in on, without having to zoom out and then zoom back in...

## G. Clarifying Central Interactions

Valued computing tools can support knowledge workers' primary goals with truly compelling arcs of interaction.

The design of these central interactions can make or brake users' perceptions of an onscreen product.

During *application envisioning*, product teams can simultaneously consider potential design strategies at both the macro, framework level, and at the lower level of important individual scenarios.

By taking time to explore divergent directions for a product's central experiences, teams can discover important new design factors, while at the same time addressing common needs in the design of onscreen pathways.

This category contains 7 of the 100 *application envisioning* idea cards in this deck:

- G1. Narrative experiences
- G2. Levels of selection and action scope
- G3. Error prevention and handling in individual interactions
- G4. Workspace awareness embedded in interactions
- G5. Impromptu tangents and juxtapositions
- G6. Contextual push of related information
- G7. Transitioning work from private to public view

## CLARIFYING CENTRAL INTERACTIONS

# G1. Narrative Experiences

Knowledge workers can develop strong and useful expectations regarding how their work is initiated, progressed through, and concluded. To enhance users' experiences of their computing tools, product teams can reference workers' existing narratives or seek to establish new ones within their application concepts.

Questions for product teams to consider:

How do targeted knowledge workers describe the narratives of their current work practices?

How might your team's individual functionality concepts fit within these existing narratives?

How might they communicate new narratives that are grounded in your sketched application's conceptual models?

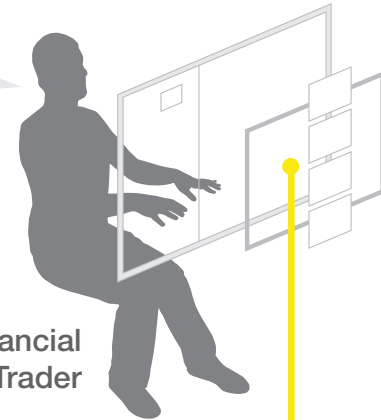
WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G1.html](http://www.FlashbulbInteraction.com/WTS_G1.html)

Yeah, I suppose my work has a story that I repeat over and over...

It's really several different stories, but there's one basic one that I go through again and again...

Financial  
Trader



I start by choosing what needs to be tackled next. As traders, we are constantly having to rethink our priorities...



Then I analyze the potential deal that I am considering, and I think about whether to make a move and what move would be best...



And then, if I've decided to make a move, I have to quickly do the details to get it done and move on...



And that's the moment I really like. It's a very good feeling to move onward...

## CLARIFYING CENTRAL INTERACTIONS

# G2. Levels of Selection and Action Scope

A single interaction within a computing application can have minute or expansive consequences on stored information. To promote knowledge workers understanding the potential impacts of their action choices, product teams can envision clear levels of selection and other informative scope cues within their functionality concepts.

Questions for product teams to consider:

How might the complex interrelations of interaction objects in your team's application concepts be clarified into different levels of selectability?

How might the potential impacts of available interaction choices be clearly communicated in different selection cases?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G2.html](http://www.FlashbulbInteraction.com/WTS_G2.html)

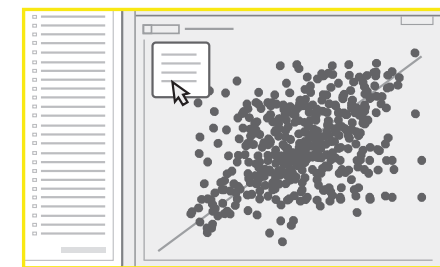
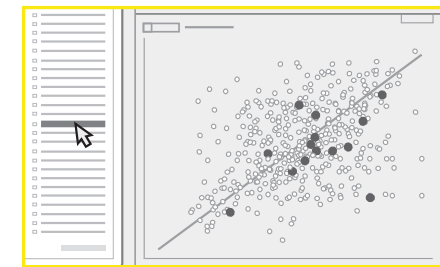
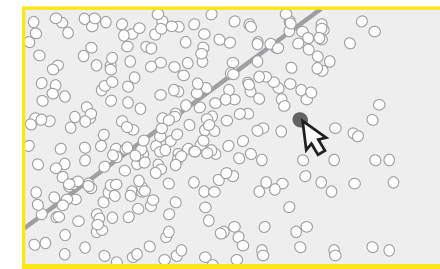
With so much data in this analysis tool, it's very important that I know what I am selecting and what I am changing...

Clinical Scientist

Right now, I'm going to change the color of this single point so that its position stands out in the overall view of this data...

Or I have other useful selection options. For example, I could also change the color of this whole group of experimental results, to make it different from the many other results groupings...

Or I could change the general color of all the data points being currently displayed, which covers several different levels of data hierarchy...



## CLARIFYING CENTRAL INTERACTIONS

### G3. Error Prevention and Handling in Individual Interactions

Computing tools can prevent certain harmful effects of human error in specific knowledge work operations and larger tasks. Product teams can attempt to adhere to their own, internally consistent conventions across their sketched functionality concepts in order to eliminate the ability to commit certain errors, confirm workers' intentions, and handle problems when they occur.

Questions for product teams to consider:

Looking within the central functionalities that your team has envisioned, what error cases could present key problems in targeted work practices?

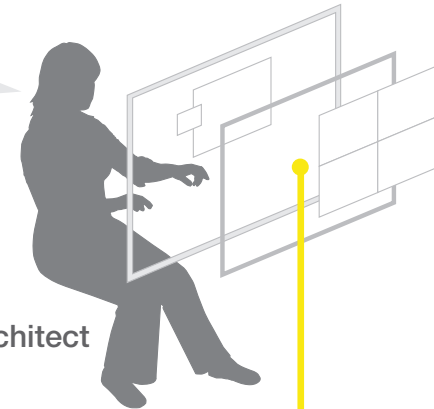
How might your team use constraints in interactive behaviors, consistent patterns and conventions, or tailored design solutions to prevent and handle these concrete situations?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G3.html](http://www.FlashbulbInteraction.com/WTS_G3.html)

Our team has decided to change a material that is used all over this building. We are hoping that the new surface will give the design a more luxurious feel...

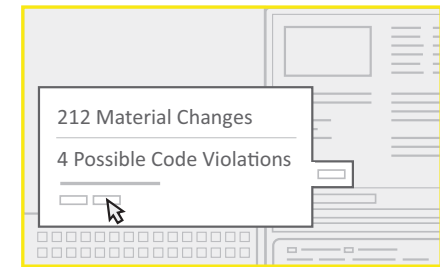
Architect



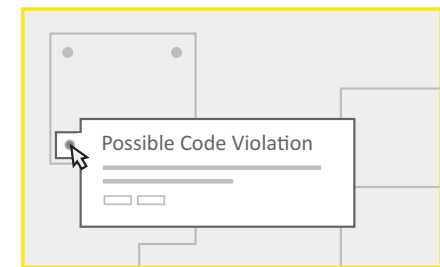
So I'm changing the material description in this area of the tool, which will make the change everywhere the current material is used...



And I get a message that lets me know that the change may cause some code violations...



And there they are. I'm going to agree that fixes should be made in these locations, then move on for now and come back to those later...



## CLARIFYING CENTRAL INTERACTIONS

# G4. Workspace Awareness Embedded in Interactions

To promote valuable awarenesses among colleagues acting in shared application “workspaces,” product teams can envision targeted cues in their functionality concepts that could signal the performance of specific operations and larger tasks.

Questions for product teams to consider:

Looking within your team’s individual functionality concepts, where might tailored cues about the actions of others provide meaning and value in certain cooperative work practices?

What might these awarenesses feel like in practice?

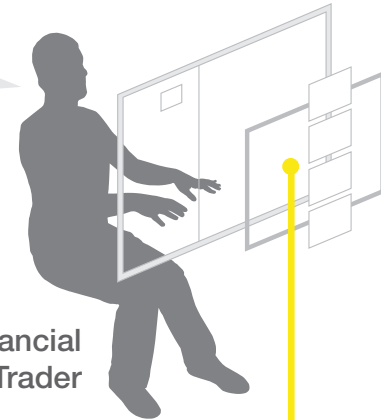
How might these cues reference or fit within your sketched larger approaches for workspace awareness across your computing tool’s various areas?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G4.html](http://www.FlashbulbInteraction.com/WTS_G4.html)

My trading tool has a lot of new features that keep me in the loop with other traders on my desk, all while I’m just focusing on my typical trading work...

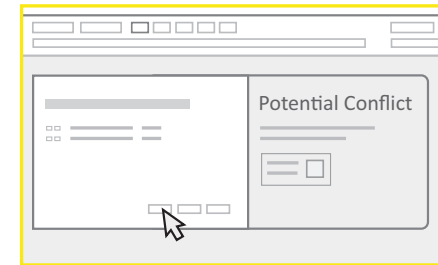
Financial  
Trader



If I’m on the phone and I start typing in a security name, it filters our recent deals to show me what other traders have done for that particular name and at what terms...



If I enter a security name that someone else on my desk is currently working, I get a message right there in the screen that keeps us from conflicting...



It’s like that for a lot of different areas...

Like if I’m looking at how much business we’ve done with another firm, it will let me know if anyone else is doing that too...



## CLARIFYING CENTRAL INTERACTIONS

# G5. Impromptu Tangents and Juxtapositions

The flow of knowledge work practice can take unexpected turns, requiring sudden departures and visual referencing. Product teams can envision how their sketched application concepts could allow workers to transition between and spontaneously overlap various threads of work practice and onscreen content.

Questions for product teams to consider:

How might your team's application concepts allow targeted knowledge workers to freely practice the circuitous flows of their work, without unwanted structure that prevents them from valuably jumping between tasks or investigating the threads of information that they want to see?

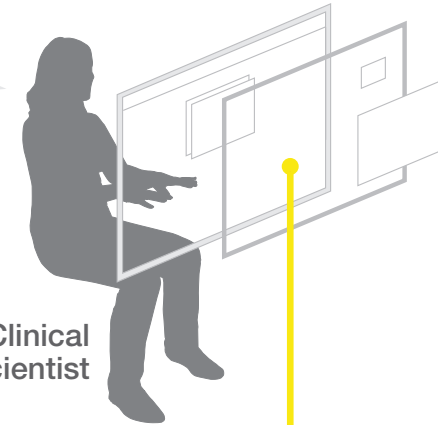
Conversely, when and where might guiding — yet limiting — interactive structure become a useful “necessity”?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G5.html](http://www.FlashbulbInteraction.com/WTS_G5.html)

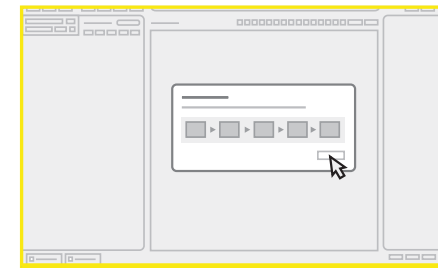
So I'm just starting an analysis of a massive data set, which will take a while...

Clinical Scientist

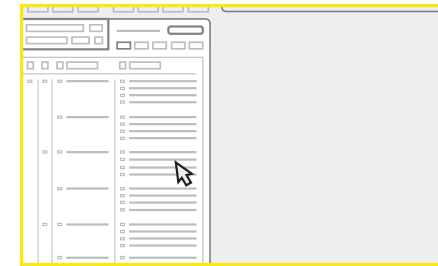


Oh, wait...

I'm not sure if I have all of the data I want in there, so I'm going to pause it...



And I'm looking at the items that are currently marked to be processed by the analysis routine...



I can't remember what I had planned, so I'm opening my electronic lab notebook and comparing its spreadsheet with what is currently listed in the analysis software...





## CLARIFYING CENTRAL INTERACTIONS

# G6. Contextual Push of Related Information

In some cases, it can be useful for knowledge work applications to adaptively incorporate “outside” feeling, potentially unexpected content into specific interactions. Product teams can envision how “pushed” domain information, presented as an optional resource, might expand workers’ understanding of a subject and inform their decision making.

Questions for product teams to consider:

How might your team’s functionality concepts automatically incorporate useful, supplementing content into the flow of certain interactions?

How might the adaptive appearance of contextually related information positively influence knowledge workers’ choices and outcomes?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G6.html](http://www.FlashbulbInteraction.com/WTS_G6.html)

I’m just scanning my list of incoming trading messages...

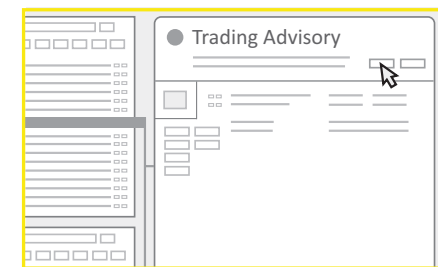
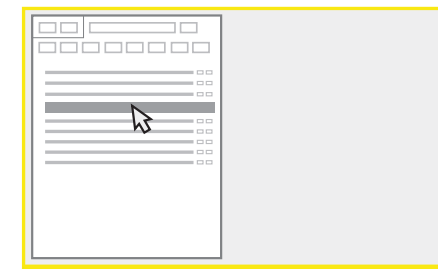
Financial Trader

This one looks promising...

But now that I’m trying to complete a trade ticket for it and seal the deal, I see that it has an advisory message on it...

According to a friend of mine, who’s an analyst at our firm, I shouldn’t move on this. I had forgotten all about that...

So I am cancelling this deal and moving on...



## CLARIFYING CENTRAL INTERACTIONS

# G7. Transitioning Work from Private to Public View

Knowledge workers may want to work privately before moving their outputs to a place where certain audiences can access them. Product teams can envision functionality concepts that could provide users with clear methods of transitioning from private modes of working into defined “public” views and back again.

Questions for product teams to consider:

What interaction objects in your application concepts might targeted knowledge workers want to act on in private before “publishing” their efforts?

What could that desirable sense of privacy mean in the context of your computing tool?

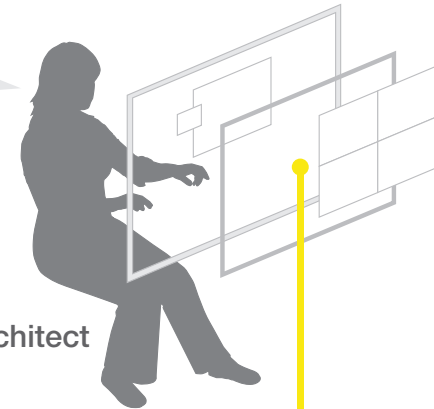
How might workers recognize and change an object’s current visibility — whether public or private?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_G7.html](http://www.FlashbulbInteraction.com/WTS_G7.html)

I’m still experimenting with how this facade might work, and I want some time to explore ideas before sharing with my team what I think is the best one...

Architect



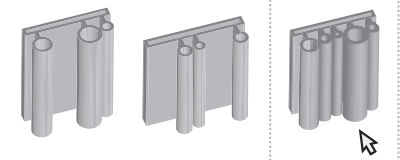
So before I get started, I’m going to select an option to work on my own private version for now...



And now I’m merging my own version with the main building model so that the team can see the direction that I’m proposing...



Facade motif explorations:



## H. Supporting Outcome Exploration and Cognitive Tracing

Valued computing tools can play a supporting role in divergent and malleable pathways of thought and action.

Designing this kind of support requires an understanding of peoples' burdens in scenario oriented activities.

During application envisioning, product teams can map and explore areas of targeted work practices where people productively consider multiple options or “look back” through previous possibilities and choices.

By taking time to explore how users might test different scenarios or retrace their earlier cognitive paths, teams can highlight opportunities to tailor and extend their products in novel and highly useful ways.

This category contains 4 of the 100 *application envisioning* idea cards in this deck:

H1. Active versioning

H2. Extensive and reconstructive undo

H3. Automated historical records and versions

H4. Working annotations

## H1. Active Versioning

Actively versioning application content can free knowledge workers from concerns of damaging previous efforts while they explore alternate scenarios or otherwise advance their goals. Product teams can envision how the ability to create multiple, separate versions of interaction objects could allow workers to intentionally differentiate threads of effort and preserve milestones of progress over time.

Questions for product teams to consider:

Could the opportunity to actively “branch” or “preserve” key versions of interaction objects provide value in the knowledge work practices that your team is striving to mediate?

How might the lineages of related versions be usefully displayed, allowing targeted workers to meaningfully trace sequential arcs and branching relationships?

At different points in my long and circuitous data explorations, I like to create separate, safely saved versions of whatever analysis that I'm working on...

Clinical Scientist



So at the end of a single session of using my analysis software, I may have chosen to create multiple versions of the overall analysis file for any of a number of different reasons...

- Version to save important milestone
- Version before trying new approach
- Version to save important milestone
- Version prior to adding new data

## H2. Extensive and Reconstructive Undo

Undo functionality can offload effort from knowledge workers to their computing tools by storing step-by-step trails of their onscreen actions, effectively freeing them from concerns of damaging previous efforts. Product teams can envision functionality concepts that could allow workers to sequentially reconstruct earlier states in their interactive applications.

Questions for product teams to consider:

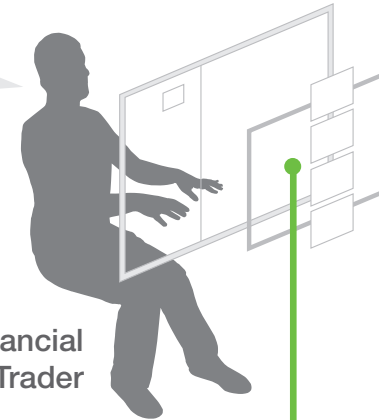
How might undo functionality play a role in the knowledge work practices that your team is striving to mediate?

Does the nature of targeted work allow for such uncommitted action?

How might undo options “save” targeted workers from erroneous outcomes and allow them to valuably explore a breadth of scenarios?

I've got to be extra careful entering the details for this huge, very high value deal...

Financial Trader



Now I'm just double checking whether I've put in the right things before I press the final button here...



Damn. I'm glad I double checked. I was thinking about this all wrong...

I have to undo a lot this info, because I put this deal in the wrong category up front...



Okay, now I am back at the point where I made the wrong choice, and I can make this right...



## H3. Automated Historical Records and Versions

Knowledge work applications can automatically store information about the actions that have been performed on specific interaction objects or enacted within a given functional area. Product teams can envision concepts for usefully presenting captured historical events in ways that could allow workers to meaningfully trace, and potentially restore, system elements to earlier states and versions.

Questions for product teams to consider:

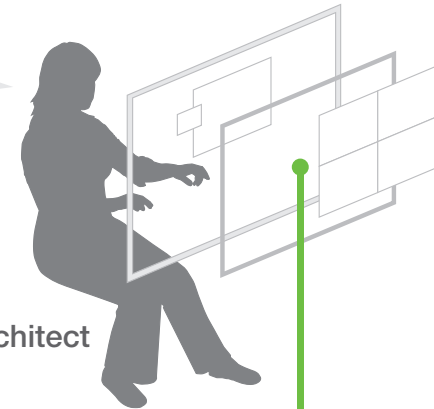
When might the individuals and organizations that your team is targeting find value in looking back at what has occurred to certain onscreen objects or within particular functionalities?

Why might they want to look at these histories?

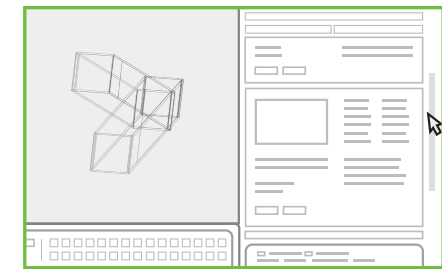
What related information and options — such as the ability to restore to earlier, automatically captured versions — might support their motivations?

I know a lot of changes have been made in this area of the building model, and I want to remind myself about what's been in flux...

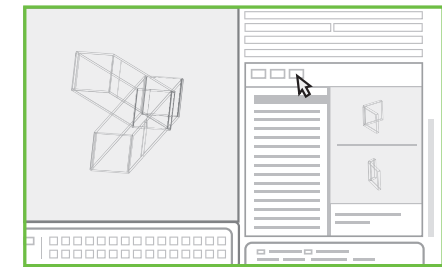
Architect



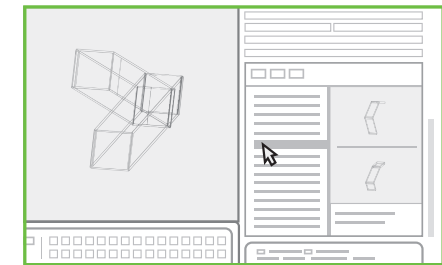
So I've selected the area in question, and I'm scrolling to show the history panel...



Where I can explore, from different perspectives, every change made within these coordinates of the building model...



And as I go through the change list for the last week, it shows useful "before and after" snapshots for each change. Alternately, I could choose to watch all the sequential changes as a video...



## H4. Working Annotations

Knowledge workers' shorthand, contextual annotations can support their own recollections and other cognitive processes. Product teams can envision functionality concepts that could allow workers to record these lightweight, often private annotations in the context of specific interaction objects or functional areas.

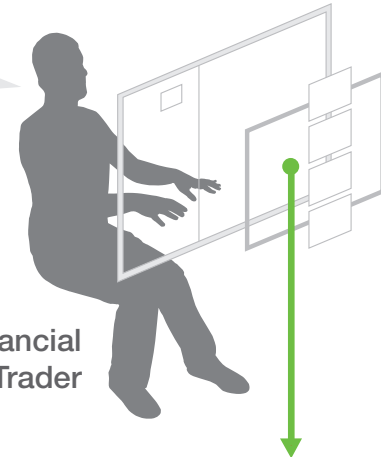
Questions for product teams to consider:

When and where are informal, working annotations currently used in the knowledge work practices that your team is striving to mediate?

How might your application concepts allow targeted workers to similarly “draw in the margins” while they work within certain onscreen displays?

This large deal could play out in a few different ways, and I want to make sure that I go down the right road...

Financial  
Trader



So I'm testing out different possibilities...



And as I try them out, I'm writing some notes to myself. It's good to have them in the form in case I get called away to make some other deal...



These notes will help me remember in the end which approach is best...

I can get rid of them whenever I want, so other people in our firm don't have to look at them...



## I. Working with Volumes of Information

Valued computing tools can contain massive amounts of content while somehow retaining clarity and manageability in practice.

Designing such clarity requires a critical understanding of how people think about and use certain types of information.

During *application envisioning*, product teams can map and explore their applications' potential roles in aggregating and linking to knowledge work content.

By taking time to explore potential scenarios around growing collections of stored data, teams can envision powerful, flexible, and comprehensive user experiences for information organization, discovery, retrieval, use, and sharing.

This category contains 7 of the 100 *application envisioning* idea cards in this deck:

- I1. Flexible information organization
- I2. Comprehensive and relevant search
- I3. Powerful filtering and sorting
- I4. Uncertain or missing content
- I5. Integration of information sources
- I6. Explicit messaging for information updates
- I7. Archived information



## I1. Flexible Information Organization

Individuals and groups of knowledge workers can develop useful methods of organizing the content that informs and stems from their efforts. Product teams can envision functionality concepts that could allow workers to flexibly apply classification schemes to key interaction objects and categorize information in data repositories.

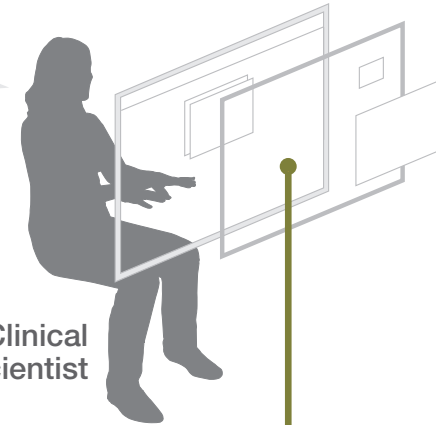
Questions for product teams to consider:

How do targeted knowledge workers and organizations currently organize information in its physical form, in interactive applications, and in shared repositories?

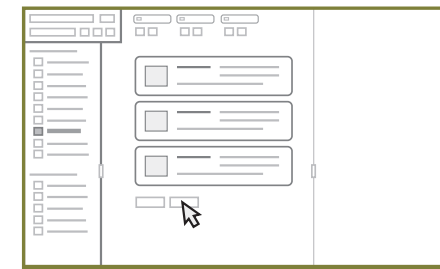
How might your team's application concepts support these existing practices while at the same time providing relevant new opportunities to classify and categorize valued content?

The organization work, planning a large clinical study, can have as much to do with its success as all of the hours of lab work that follow...

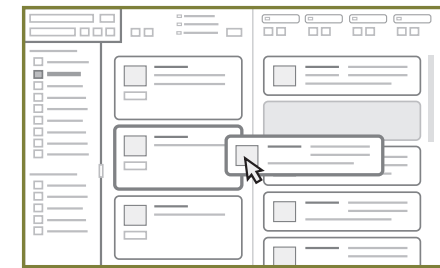
Clinical Scientist



Right now I'm creating a new set of samples in our information management tool in order to increase the volume of data collected for our lab's current project...



Next, I'm organizing the samples by dragging them into groups. These defined groupings will help later, when I'm making sense of the resulting data...



And everyone in the lab knows that each of these groupings represents a different tissue sampling time in a series of readings taken during the duration of a long clinical trial...



## I2. Comprehensive and Relevant Search

Knowledge workers frequently need to locate stored interaction objects and onscreen information based on a variety of parameters. Product teams can envision tailored functionality concepts for specific types of goal oriented searches, as well as flexible query assembly and results representation options for unexpected and variable search needs.

Questions for product teams to consider:

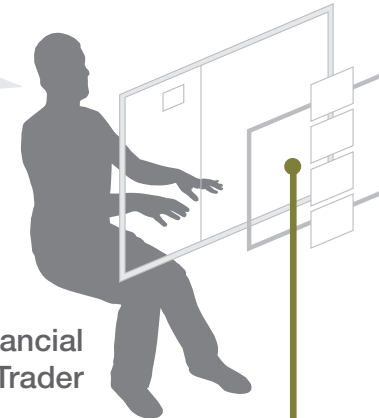
Given the ubiquitous value of search functionality in many computing experiences, how might search play a useful role in your team's application concepts?

What interaction objects and stored information might targeted knowledge workers be looking for as part of their work practices, and what search tools and results representations could effectively help them to find it?

I've got a long list of requested security names that has been passed my way...

I need to check on our holdings for all of these ASAP...

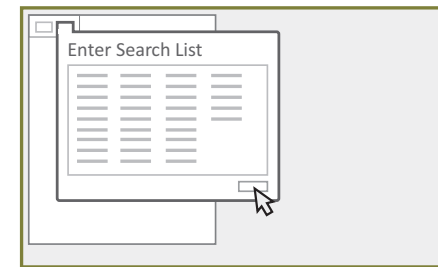
Financial  
Trader



So I'm going to list search...



And I'm pasting the whole list into this search tool...



Results. Good. It looks like we have most of them...

Going a bit further, I'm searching within these to see which holdings we've had at our firm for longer than a week...



## I3. Powerful Filtering and Sorting

When confronted with large sets of information, knowledge workers frequently benefit from the ability to reorder, highlight, or exclude specific categories of stored content. Product teams can envision functionality concepts that could allow workers to perform valuable data manipulations based on goal oriented criteria.

Questions for product teams to consider:

Beyond, or in addition to, search options, what manipulations of application data might targeted knowledge workers value in the context of their information seeking and sense making goals?

What functionality concepts might your team envision to allow workers to usefully rearrange and meaningfully sift through larger sets of content?

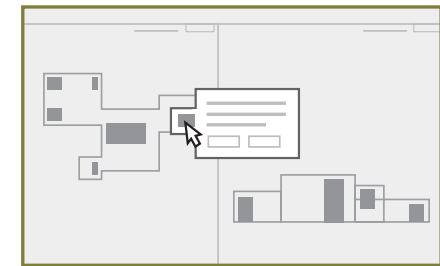
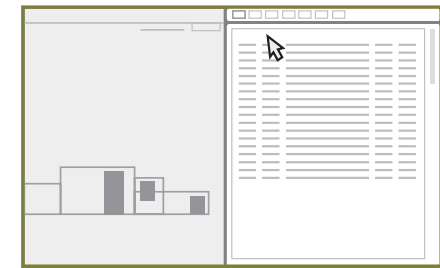
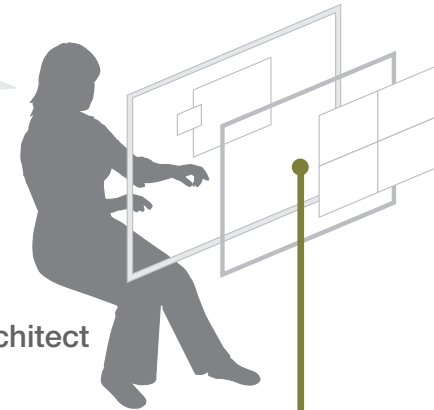
I'm curious how much of this building model is up for approval in our next internal design review...

Architect

So I'm changing this view...

And I'm filtering the building elements list to show only those items that are pending approval by the team, and then sorting that list by building location...

The views of the model that are open in the left side of the screen also filter to show only this subset of work, which allows me to get a feel for what we will be talking about in our meeting...



## I4. Uncertain or Missing Content

Adopting computing tools into knowledge work practice can create new ambiguities around stored data, as well as aggravate any ambiguities that were already inherent in information collections. Product teams can envision functionality concepts that could support workers as they identify, evaluate, and act on uncertain and missing content.

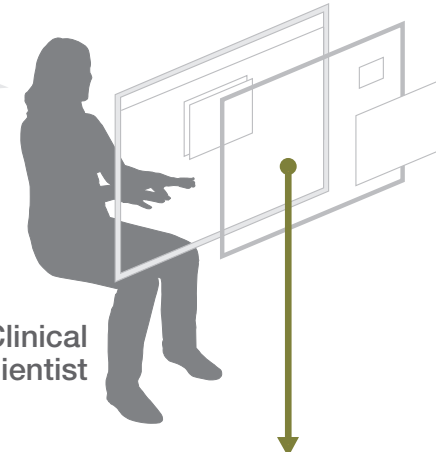
Questions for product teams to consider:

Where might holes, conflicts, and unknowns appear in the data sets that your team's application concepts have been envisioned to import, reference, or generate?

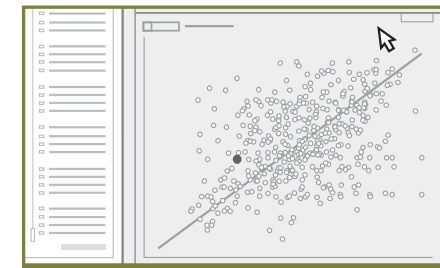
What specialized symbologies and interactive options could help targeted knowledge workers to recognize and then valuably correct — or appropriately act around — these unstable information situations?

I'm excited to get into this new data in my analysis application...

Clinical Scientist



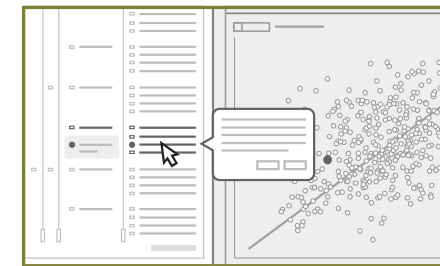
But it looks like there is something going awry with one of our data points, even though the lab has done some manual QC processes to ensure that all of these results are "clean" readings...



So to investigate this problem point, I'm going to highlight its sample in the data table to the left...



It looks like maybe the sample was mislabeled at some point, because one of the readings is very different from the others in an unexpected way...



## 15. Integration of Information Sources

Some knowledge work practices involve referencing or integrating “outside” content from a variety of sources. Product teams can envision application concepts that could bring together disparate information in meaningful ways, potentially offloading effort that would otherwise be needed to navigate to multiple sources.

Questions for product teams to consider:

What information sources do targeted knowledge workers refer to during the specific tasks and larger activities that your team is striving to mediate?

How might this content be valuably “brought inside” the bounds of your computing tool, either in its current format or in new, distilled views that are tailored to certain work goals?

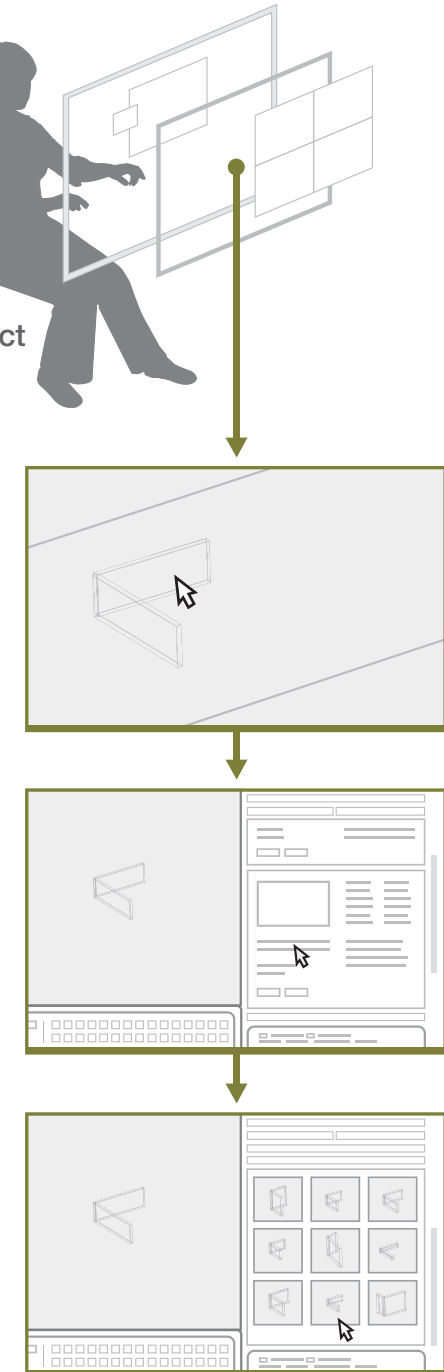
I want some inspiration around how I should change a certain part of this building model...

Architect

So I select it...

And this panel in the tool tells me what has currently been defined for the selection...

While this panel, which is much more inspiring, lists all sorts of similarities that the application finds. For example, it searches an open source Web database for building elements with similar forms...



## 16. Explicit Messaging for Information Updates

Content within or associated with interactive applications can change as a result of automated updates and knowledge workers' own efforts. To prevent misconceptions and build confidence in information "freshness" and integrity, product teams can envision clear instruction and messaging around content updates.

Questions for product teams to consider:

What important information used within your team's application concepts could change in ways that may be difficult to assess and understand?

How might your computing tool communicate useful conceptual models and timely alerts in order to support workers' understandings of information currency?

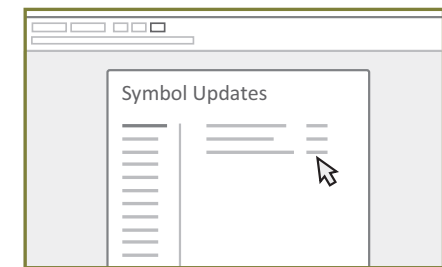
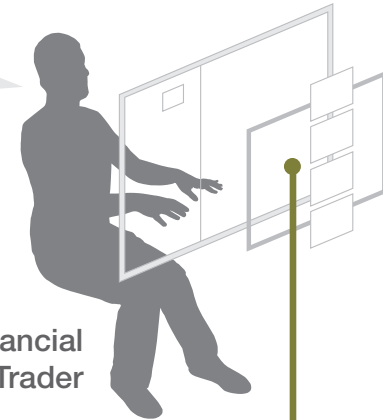
I absolutely need the most current info available in order to do my job. It's as simple as that...

Financial Trader

If I'm at all concerned, I can check on the real time feeds to see that they are always updating...

I can also see price updates automatically happen as I fill out trade tickets...

And if I want, I can keep current by looking at the new names that are added to the system once daily and will trade in the market the following day...



## 17. Archived Information

As activities progress over time, knowledge workers often generate information that, while valuable to their long term and organizational memories, may not need to be “present” or easily accessible. In order to improve workers’ ability to focus on their current efforts, product teams can envision functionality concepts that support archiving of completed work.

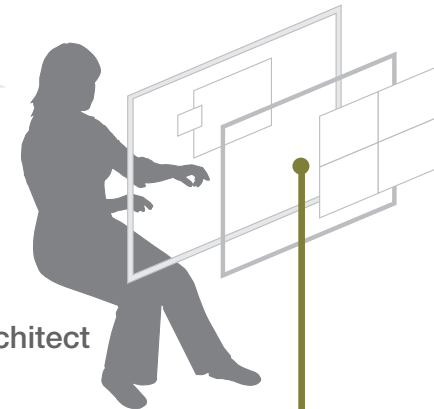
Questions for product teams to consider:

What information do targeted knowledge workers implicitly or actively “leave behind” as they move forward in the work practices that your team is striving to mediate?

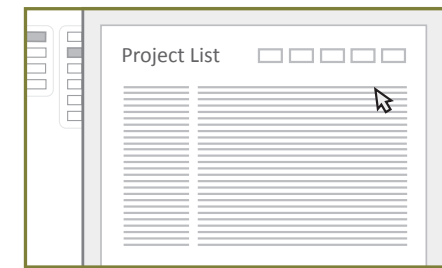
How might your application concepts allow targeted individuals and their organizations to archive this content so that it is still available but not actively seen as part of their current efforts?

The whole studio is complaining that old projects are cluttering our building modeling database, so I’m going to archive some of our completed work...

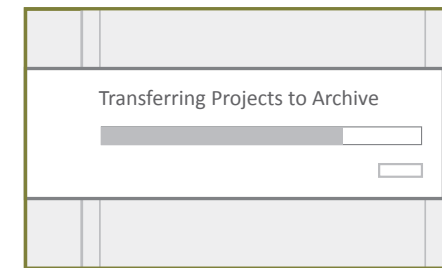
Architect



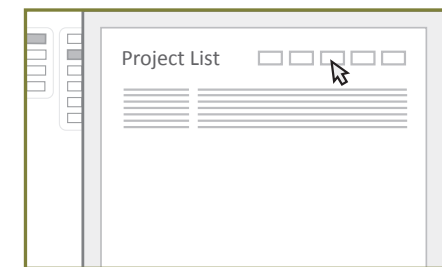
I’m going through the projects list in our modeling tool and sorting it by “last accessed” to see things that no one has touched for a while...



Next, I’m going to archive everything that has not been accessed within the last two years, but leave all the unbuilt projects and proposals...



And now, looking at the list the way that most of our staff looks at it, it’s a lot easier to work with...



## J. Facilitating Communication

Valued computing tools can enhance certain types of direct communication while opening up opportunities for more ambient and tangential signs and messages.

Designing for such meaningful interchange requires a critical understanding of where and how people deem communication to be important.

During *application envisioning*, product teams can map and explore their onscreen applications' potential roles in current and desired communication scenarios.

By taking time to think through different possibilities for interpersonal connectivity and mediated interchange, teams can uncover opportunities to tailor their functionality concepts to the conversational flows of knowledge work practice.

This category contains 7 of the 100 *application envisioning* idea cards in this deck:

- J1. Integral communication pathways
- J2. Representational common ground
- J3. Explicit work handoffs
- J4. Authorship awareness, presence, and contact facilitation
- J5. Public annotation
- J6. Streamlined standard communications
- J7. Pervasive printing



## FACILITATING COMMUNICATION

# J1. Integral Communication Pathways

Computer mediated communication can become integral to knowledge work practices, even in cases where collaborating workers and stakeholders are in close proximity. Product teams can envision functionality concepts that could provide workers with clear, relevant, direct, and contextually appropriate options for actively communicating about important application content.

Questions for product teams to consider:

Why might targeted knowledge workers want to communicate about the various types of information that your team has envisioned as being part of your application concepts?

With whom might they want to actively communicate?

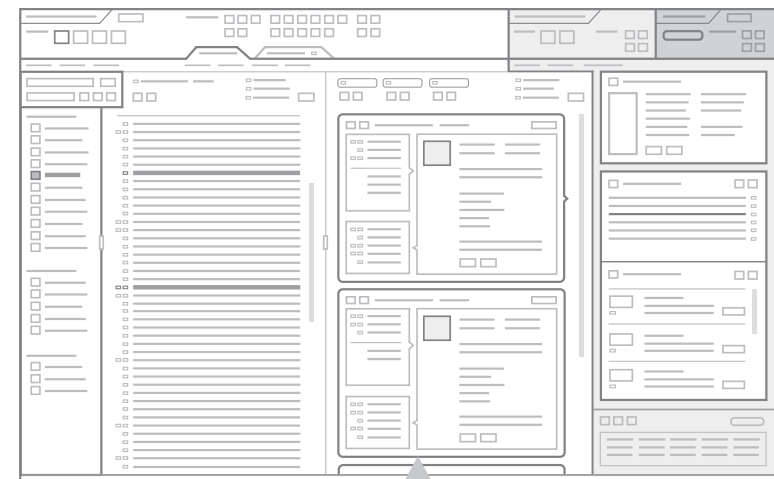
How could specific communication tasks be usefully supported through direct and integral functionality?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_J1.html](http://www.FlashbulbInteraction.com/WTS_J1.html)

Our lab's communication is often about our data, so it's great that our information management tool has some of our existing ways of communicating built right into it...

Clinical Scientist



COMMUNICATION CHANNELS INTEGRATED INTO FUNCTIONALITY



Instant Messenger



Fax



Email

## J2. Representational Common Ground

When knowledge workers collaborate around the same representations of information, their communication can require less effort and feel more direct. To support the creation of shared meaning, product teams can envision functionality concepts that could allow workers to generate and share common visual ground.

Questions for product teams to consider:

What information do targeted knowledge workers currently share in order to make their exchanges clearer?

How might your team's application concepts support existing approaches for creating common ground?

What novel functionalities might you envision to valuably support the sharing of information views within mediated communication?

It's hard to talk about these details over the phone, so let me share my view of the building model with you...

Architect

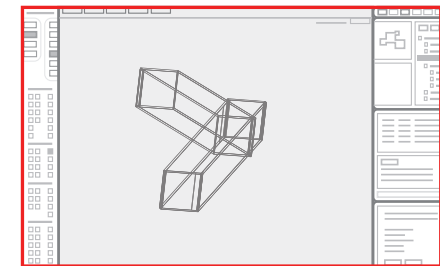
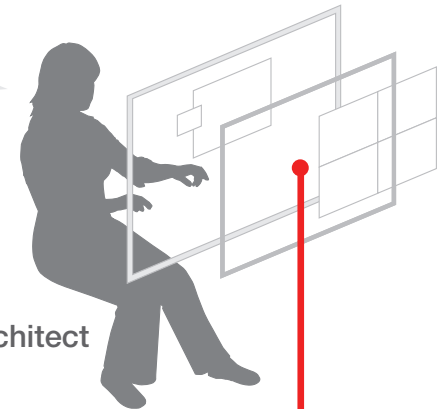
I'm selecting the option...  
And you should be able to open my view now...

OK...

Remote Collaborator

I see your message, and now I can see your view...

Oh, now I see what you're talking about, and I have an idea about how we might go even further with that change...



## J3. Explicit Work Handoffs

As part of contributing to larger activities, knowledge workers often need to formally or informally handoff their efforts to certain colleagues and stakeholders. Product teams can envision communication functionalities that could allow workers to clearly and directly deliver certain tasks or interaction objects.

Questions for product teams to consider:

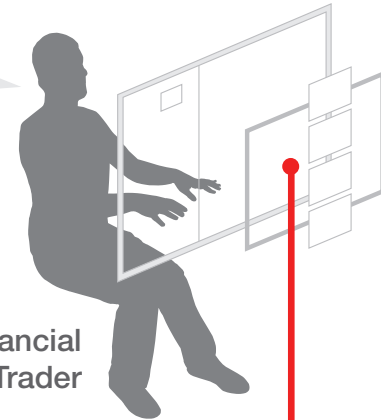
Where and when do handoffs occur in the knowledge work practices that your team is striving to mediate?

What functionality concepts might your team envision to usefully support certain “special deliveries” of application content, closely tying them to sketched features for permissions and collaboration?

I am getting too many trading messages at the moment...

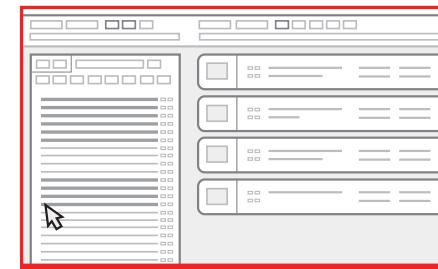
I've got to delegate some of them in order to make sure that the work gets done fast enough...

Financial Trader



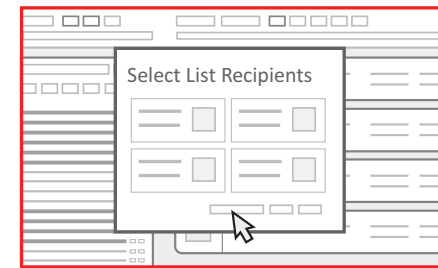
So I'm selecting some parts of my list...

The ones that I don't need to handle personally...

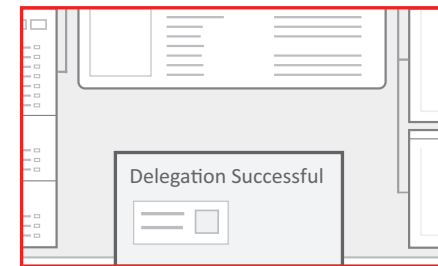


And now I'm sending those to the entire desk to see if anyone has the time to help me out...

I will holler in a minute if no one picks this up...



And, almost right away, I'm getting a message that Jon has just taken the list, so I don't have to think about it now...



## FACILITATING COMMUNICATION

### J4. Authorship Awareness, Presence, and Contact Facilitation

Product teams can envision concepts for informative cues that could indicate who has worked, or is working, within a given functional area or on specific interaction objects. These cues can facilitate spontaneous communication between colleagues, both near and remote, and promote the traceability of distributed efforts.

Questions for product teams to consider:

With the goal of enhancing useful communication among users, how might your team's application concepts contextually present historical and real time cues about the "who" of others' actions and presence?

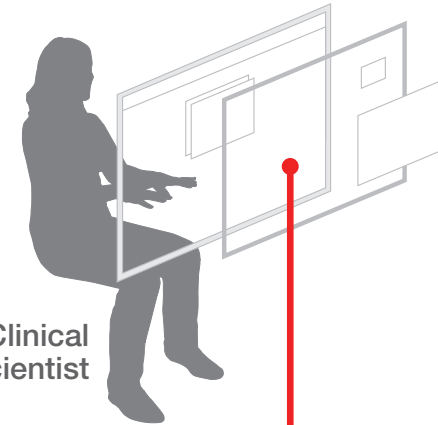
How might targeted knowledge workers use these cues to initiate situated conversations?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_J4.html](http://www.FlashbulbInteraction.com/WTS_J4.html)

During the course of checking our lab's latest data, I found a sample presenting very interesting results...

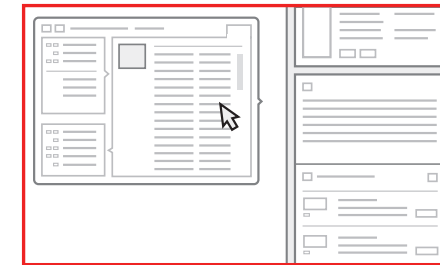
Clinical Scientist



And now I'm looking in our information management application to see who ran the experiment and what equipment they ran it on...



It says here it was mostly run by Brian and partially run by Anne. Since Brian took the final readings, I'm going to look to see if he's currently online...



And since he's logged into a workstation, I'm starting up a chat session to talk to him about this potentially breakthrough data...



## J5. Public Annotation

When workers make annotations in a specific context, they can direct their commentary to an intended audience, potentially reducing the difficulty of composing their communications. Product teams can envision concepts that could allow workers to annotate selected functional areas or interaction objects in ways that are visible and meaningful to desired recipients.

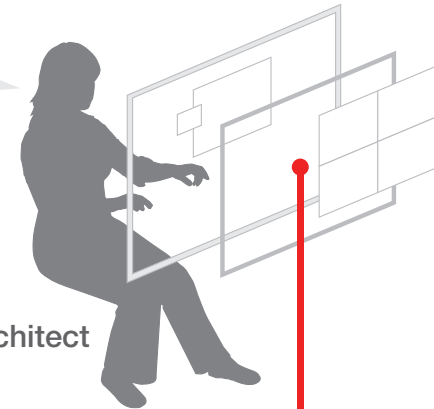
Questions for product teams to consider:

Where, when, and how do knowledge workers currently annotate shared artifacts and environments in the work practices that your team is striving to mediate?

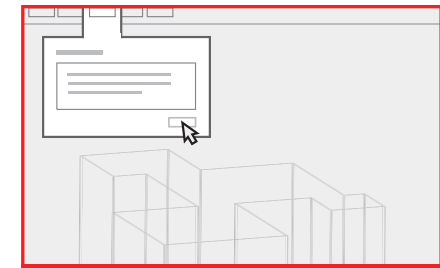
How might targeted workers valuably communicate by annotating your product's functional areas and interaction objects with intended recipients in mind?

I'm trying out different rough forms for a new building that our firm is putting together a proposal for...

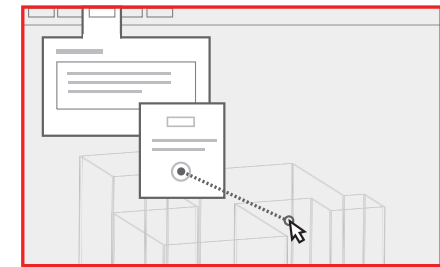
Architect



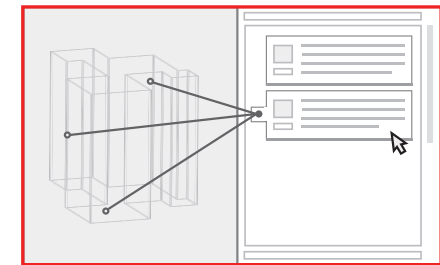
We don't have many requirements from the client, so as I create different model forms, I am typing up some comments that outline my rationale...



And I'm connecting the comment text to related areas within the draft building model...



And that way, when we are comparing different options, anyone on the team can use this view to read my ideas and justifications...



## J6. Streamlined Standard Communications

Knowledge work often involves established, commonly shared genres of communication that play important roles in work activities and organizational memory. Product teams can envision functionality concepts that could provide workers with opportunities to offload some or all of the effort of creating, distributing, and interpreting these standard forms.

Questions for product teams to consider:

What standard communication formats are currently used in the knowledge work practices that your team is striving to mediate?

What functionality concepts might your team envision to valuably automate and enhance the standardized portions of these communication tasks while still providing desirable levels of expressiveness and control?

Damn. I can't believe that I just booked that deal...

Financial Trader

Okay. I'm finding the messed up deal in the list of completed trades...

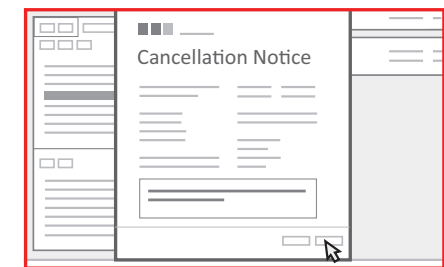
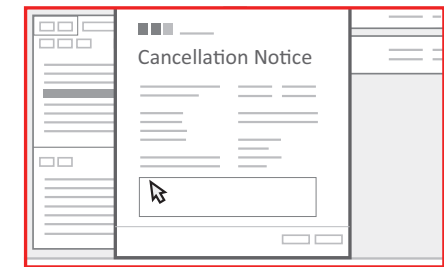
And choosing an option to send a cancellation notice...

The tool automatically creates a message with all of the info filled in, which saves me a lot of work...

These cancel forms have been around forever, but they used to be faxed...

And now I'm just typing a little apology and then sending this off into their email...

I'll give them a call as well to discuss the problem...



## J7. Pervasive Printing

Many knowledge work tasks, including communication acts, can revolve around or be facilitated by paper documents. Product teams can envision functionality concepts that could allow workers to create various types of printouts while maintaining traceability back to their onscreen sources.

Questions for product teams to consider:

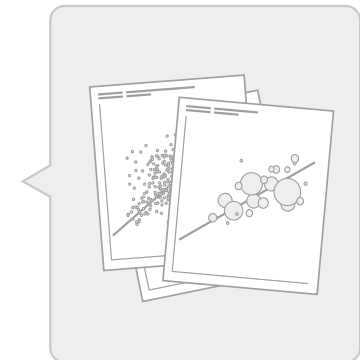
How do targeted knowledge workers currently use paper documents in the work practices that your team is striving to mediate?

How might your team's application concepts allow workers to easily create valuable paper outputs of onscreen representations and content?

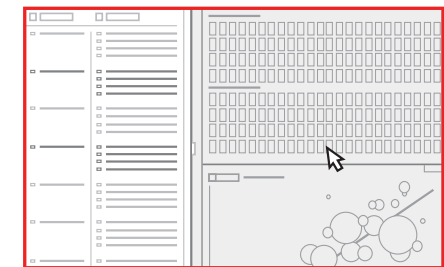
I sometimes print out analysis work to share it in a lab meeting or to mark it up with hand written notes...

Clinical Scientist

PRINTOUTS SHARED  
IN FACE TO FACE MEETING



And the notes that I take during our lab meeting discussions then feed back into my work in the analysis software...



## K. Promoting Integration into Work Practice

Valued computing tools can be designed to make “getting up to speed” as painless as possible.

Designing for such easy integration requires a clear understanding of the gaps that people will need to bridge in order to make use of a tool.

During *application envisioning*, product teams can map and explore how targeted knowledge workers and their organizations might integrate new onscreen offerings into their working cultures and technological systems.

By taking time to explore potential product adoption experiences — in an expansive sense — teams can identify opportunities to set the stage for direct, trusted, extensive, and meaningful use.

This category contains 13 of the 100 *application envisioning* idea cards in this deck:

- K1. Application localization
- K2. Introductory user experience
- K3. Recognizable applicability to targeted work
- K4. Verification of operation
- K5. Understanding and reframing alternate interpretations
- K6. Design for frequency of access and skill acquisition
- K7. Clear and comprehensive instructional assistance
- K8. Seamless inter-application interactivity
- K9. Directed application interoperation
- K10. Openness to application integration and extension
- K11. End user programming
- K12. Trusted and credible processes and content
- K13. Reliable and direct activity infrastructure



PROMOTING INTEGRATION INTO WORK PRACTICE

## K1. Application Localization

Product teams can envision support in their application concepts for individuals from different cultural backgrounds. Targeted knowledge worker populations can have different wants and needs for the linguistic, symbolic, layout, and procedural aspects of their computing tools.

Questions for product teams to consider:

In what localization intensive markets might your team be striving to provide a viable and desirable computing tool for knowledge work?

What aspects of your application concepts could benefit from early envisioning around targeted local wants, needs, and opportunities?

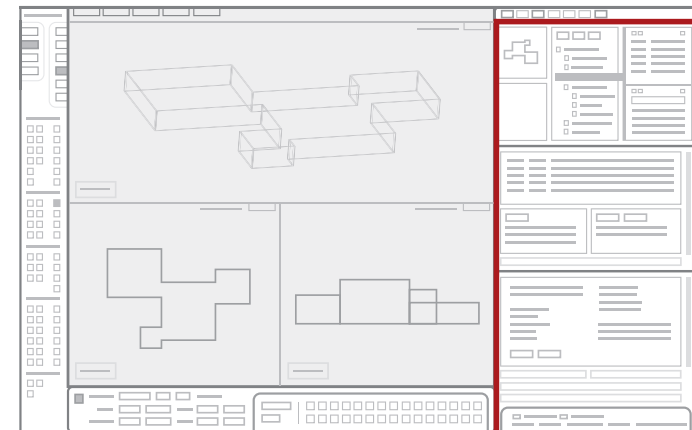
WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K1.html](http://www.FlashbulbInteraction.com/WTS_K1.html)

Sitting here in the Beijing office, the user interface of our firm's building modeling tool is in Mandarin...

Architect

So my colleague here told me how to change my language setting...



And now the application itself is in English...

But I will still need someone to translate all of the comments and info in this building model, because it was all typed in by this project team in the local language...

All user generated content in this panel remains untranslated from Mandarin

PROMOTING INTEGRATION INTO WORK PRACTICE

## K2. Introductory User Experience

Product teams can envision how their application concepts could promote initial experiences that generate interest, instill confidence, clearly communicate essential information, and offer a direct foundation for committed adoption.

Questions for product teams to consider:

Based on your team's understanding of targeted workers' current practices and background knowledge, what might they need to know in order to "get started" using your computing tool?

What functionality concepts might your team envision to provide appropriate and dynamic instruction during these early user experiences?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K2.html](http://www.FlashbulbInteraction.com/WTS_K2.html)

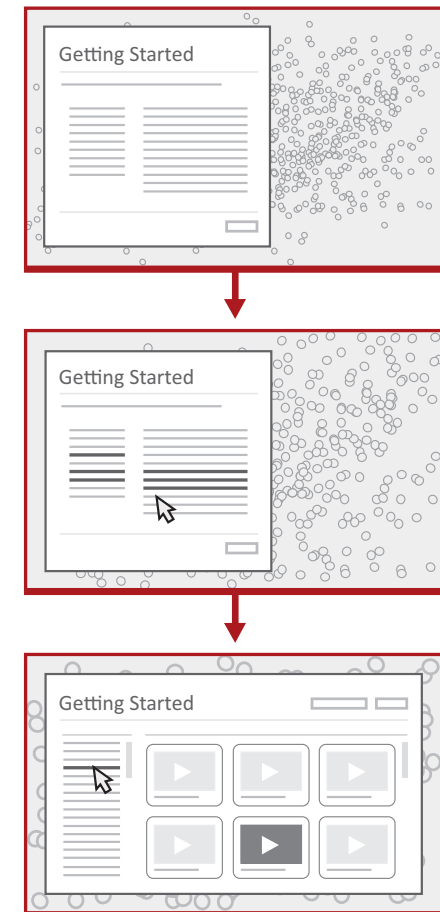
It's always daunting to open a new application for the first time, especially when it's as complicated as new analysis software...

Clinical Scientist

So it's giving me a list of questions about how I want to use the tool in order to give me some sort of customized tour...

It feels pretty slick, so I'm going to go ahead and enter what analysis tools I have used and what my research goals are...

And it's suggesting a list of video tutorials that I might be interested in, or I can skip all this and then check them out later...



PROMOTING INTEGRATION INTO WORK PRACTICE

## K3. Recognizable Applicability to Targeted Work

In order to communicate to potential users that the particulars of their work practices have been thoroughly considered, product teams can envision legible domain cues within their application concepts. When these cues are easily recognizable, knowledge workers may be more inclined to consider how they might use a new technology in their own activities.

Questions for product teams to consider:

Beyond expected marketing messaging, how might the form, appearance, and behaviors of your team's computing tool rapidly communicate relevance for targeted knowledge workers' own goals and practices?

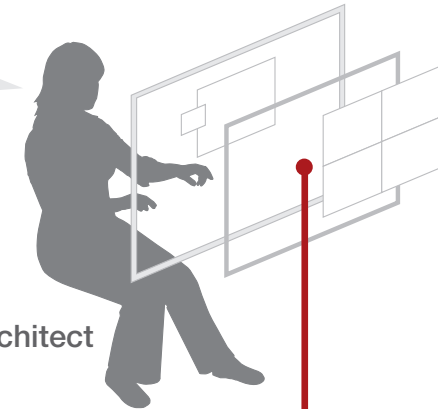
What domain signs and emotive cues might workers feel a compelling affinity for while interacting with your application concepts?

WORKING THROUGH SCREENS | 100 IDEA CARDS

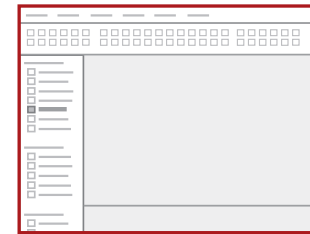
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K3.html](http://www.FlashbulbInteraction.com/WTS_K3.html)

It's interesting to compare our firm's old building modeling tool to our new one...

Architect



### PREVIOUS APPLICATION



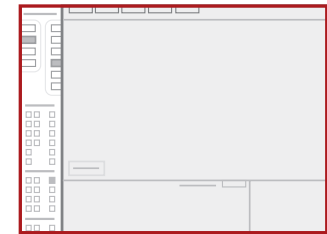
"Side view"

"Rectangle tool"

"Surface Type"

"Engineering macro"

### CURRENT APPLICATION



"Elevation view"

"Define wall"

"Material: Exterior"

"Energy model"

VS

Looking back at the software that we used to use, I honestly can't imagine using it again. It looks powerful, but it's very generic to 3d modeling, and my team had to work really hard to make it work for what we do...

Our current building modeling tool is completely built around the way we work. Just reading the labels and looking at the organization, it's all there...

## K4. Verification of Operation

Knowledge workers have specific understandings, within their organizations and communities of practice, of what it means to successfully accomplish their work. In order to support workers' ability to test whether their computing tools are operating as expected, product teams can envision functionality concepts around key verification scenarios.

Questions for product teams to consider:

What mandatory or discretionary verification scenarios could be valuable for your team's application concepts?

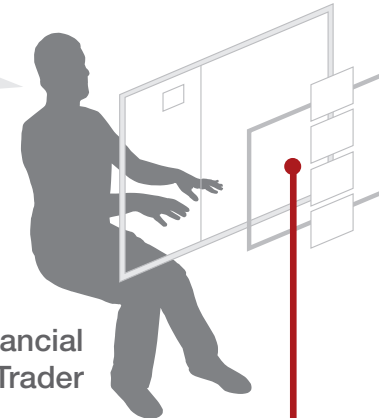
What aspects of your computing tool might targeted knowledge workers need or want to test in their local environments?

What functionalities might you envision to directly enable certain well characterized checks?

Looks like we have a new version of our trading tool...

So, I want to double check to make sure that my own trading rules are still working like they should be...

Financial  
Trader



So I'm filling out a trade ticket using some test settings that will keep it from becoming a real, on the books, deal...



Looks like the new version of the tool is defaulting my data according to the rules that I've set up previously, which is good...



And now that I've seen these test trades go through and appear in this list of completed deals, I can delete them from the books and get started on making real money...



## K5. Understanding and Reframing Alternate Interpretations

When product teams foresee potential “misinterpretations” of their functionality concepts — and these possibilities cannot be effectively “designed out” — they can envision cues that may help knowledge workers to reframe their own interpretations to be more closely aligned with their products’ intended conceptual models.

Questions for product teams to consider:

Where might targeted knowledge workers’ domain background promote interpretations of your team’s sketched computing tool that are different than those that you intended, potentially leading to errors and inefficiencies in use?

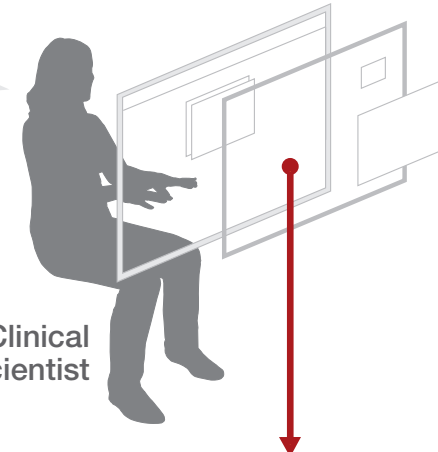
What corrective cues and instruction might your functionality concepts include in order to reduce the likelihood of such conflicts?

WORKING THROUGH SCREENS | 100 IDEA CARDS

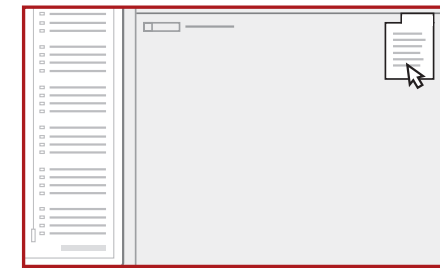
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K5.html](http://www.FlashbulbInteraction.com/WTS_K5.html)

We are trying out some new chemistry in our lab’s process, and I am about to look at the first batch of experiments in our analysis software...

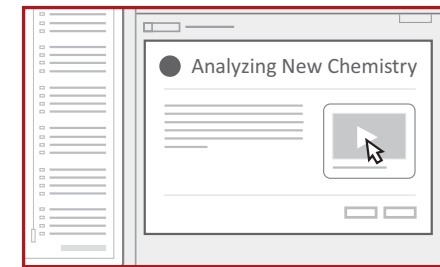
Clinical Scientist



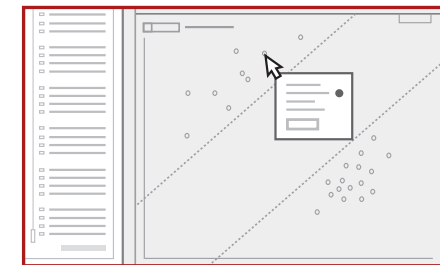
So I’m choosing a visualization that I normally start with to get a sense for data quality...



And apparently the tool sees that we have switched chemistry for collecting this data, and it wants to tell me how to interpret the same old visualization a little bit differently...



And then, after reading that information and diving into our data, the software is still pointing out what is different than usual as I inspect this interesting data point...



PROMOTING INTEGRATION INTO WORK PRACTICE

## K6. Design for Frequency of Access and Skill Acquisition

Knowledge workers become highly familiar with some parts of their interactive applications and remain “perpetual intermediates” or even novices in others. Product teams can envision appropriate levels of interaction constraint and instruction for different functionality concepts, matching design responses to expected frequency of use.

Questions for product teams to consider:

How might your team characterize predicted frequency of use for each of your sketched functionality concepts?

How might these differential levels of access, along with other relevant learnability factors, impact the amount of direction and scaffolding that you incorporate into each interaction pathway?

WORKING THROUGH SCREENS | 100 IDEA CARDS

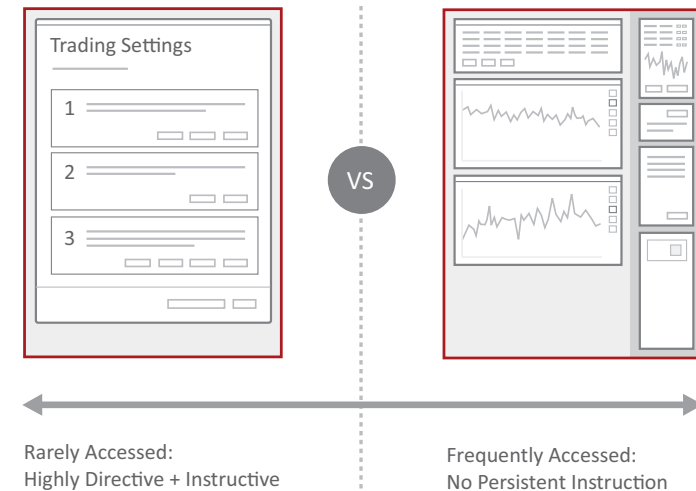
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K6.html](http://www.FlashbulbInteraction.com/WTS_K6.html)

This trading tool is very streamlined, with only the information I need to make deals...

Financial Trader

And looking across the whole product, I guess that streamlined means different things in different places...

### DIFFERENCES IN SCREEN APPROACHES



In a screen that I use all the time, it means being extremely concise and getting rid of extra labelling. But in places in the tool where I don't go to very often, it means having some information to guide me through to a good conclusion...

PROMOTING INTEGRATION INTO WORK PRACTICE

## K7. Clear and Comprehensive Instructional Assistance

The balancing act between initial learnability and long term usability often results in some functionalities that are not self explanatory to all knowledge workers in a targeted population. To ensure that workers have just-in-time access to needed answers, product teams can envision useful, findable, and directive "help," delivered via channels that are well suited to characterized learning needs.

Questions for product teams to consider:

What functionality concepts might your team envision to provide targeted knowledge workers with comprehensive and appropriate support for their learning needs and critical issues?

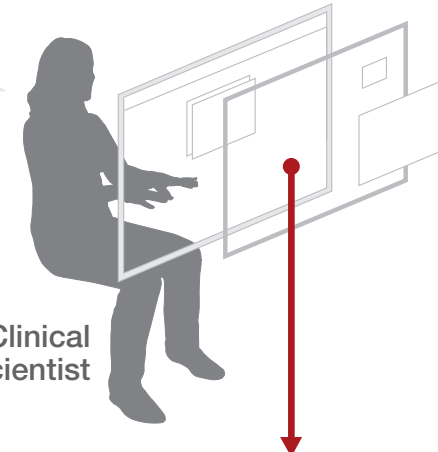
What contextual, goal directed interaction pathways could your computing tool present in order to connect users with stored user assistance content, online repositories, relevant social networks, or specialized support staff?

WORKING THROUGH SCREENS | 100 IDEA CARDS

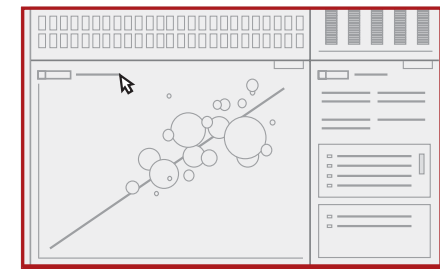
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K7.html](http://www.FlashbulbInteraction.com/WTS_K7.html)

I've spotted something interesting in this data, but I'm having a hard time getting to the next transformation that I want to make...

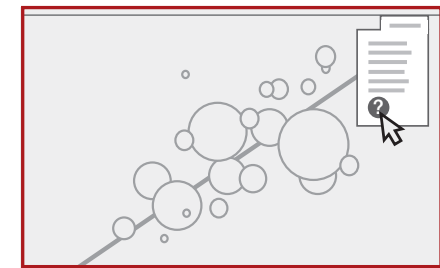
Clinical Scientist



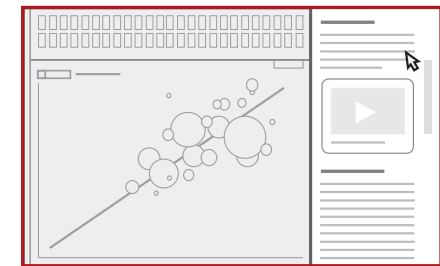
So I'm clicking around my analysis application to see if I can find anything that looks related to what I want to do...



And I'm clicking on a question mark icon to see what it says...



Good. It looks like this program includes a fairly comprehensive manual in it. My problems are often so specific, and in many programs, I can't find the detailed info that I need...



PROMOTING INTEGRATION INTO WORK PRACTICE

## K8. Seamless Inter-application Interactivity

Knowledge workers may need to interact with several computing tools in order to accomplish their activities, effectively treating their adopted suite of applications as one overall system. Product teams can envision functionality concepts that could facilitate desirable and fluid onscreen interactions across related products.

Questions for product teams to consider:

Which of the work practices that your team is striving to mediate could span multiple computing tools in knowledge workers' technology environments?

What useful interactions might your team envision to allow targeted workers to dynamically use multiple onscreen applications as if they were a single seamless system?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K8.html](http://www.FlashbulbInteraction.com/WTS_K8.html)

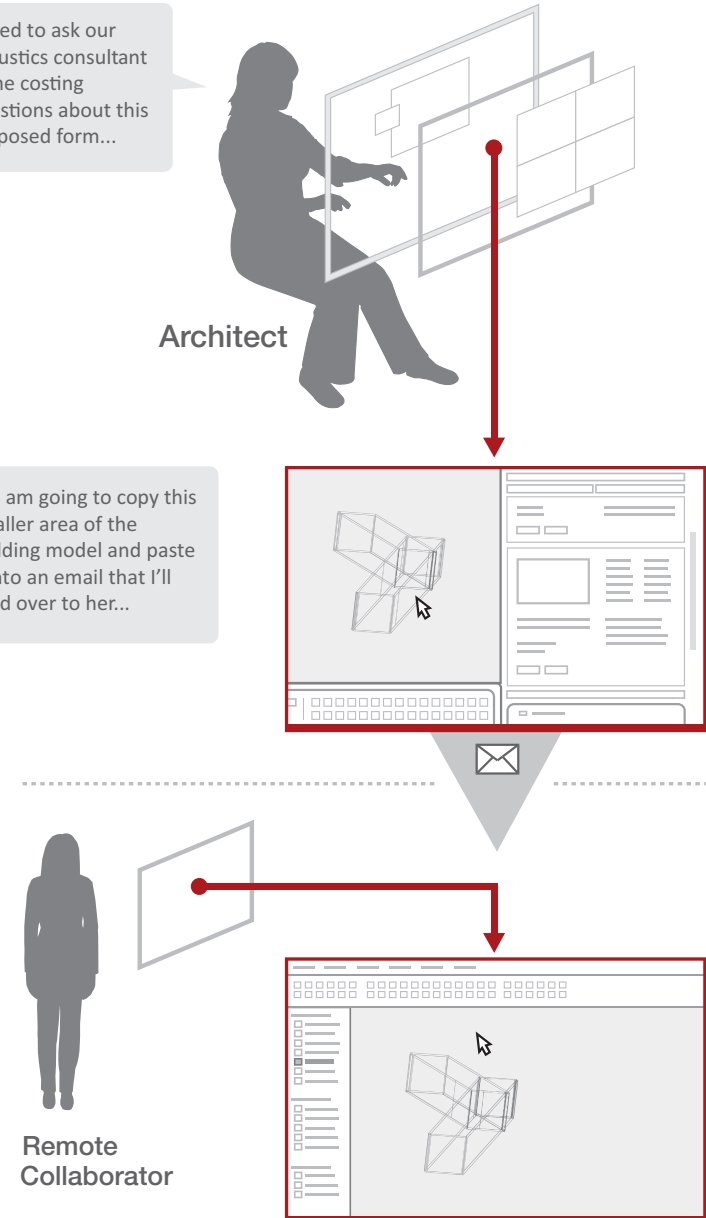
I need to ask our acoustics consultant some costing questions about this proposed form...

Architect

So I am going to copy this smaller area of the building model and paste it into an email that I'll send over to her...

Remote Collaborator

And then she can open it up in the software that she uses, without having to do anything special...





PROMOTING INTEGRATION INTO WORK PRACTICE

## K9. Directed Application Interoperation

Knowledge workers may want to accomplish their activities by using a series of functionalities that sequentially span more than one computing application. To allow for the movement of large volumes of data in relevant formats, product teams can envision functionality concepts that could facilitate cross boundary interoperations with distinct import and export options.

Questions for product teams to consider:

Which of the work practices that your team is striving to mediate could bridge multiple computing tools in knowledge workers' technology environments?

What separate, named functionality concepts might your team envision to allow targeted workers to valuably move selected collections of application content across otherwise isolating product boundaries?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K9.html](http://www.FlashbulbInteraction.com/WTS_K9.html)

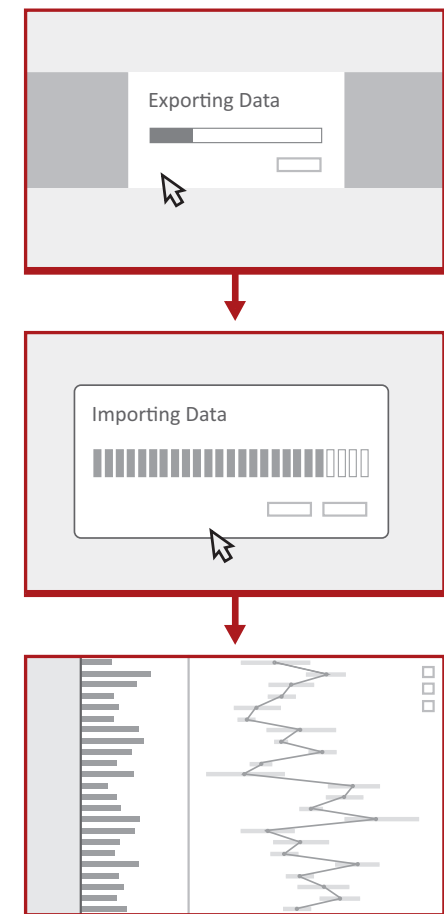
Our new analysis application doesn't have this one visualization that I often find useful...

Clinical Scientist

So I'm exporting the data I want to look at...

And importing it into the analysis tool that our lab used to always use...

And if I find something interesting, I can import it back into our current software, which is our main tool, to continue digging into it...



PROMOTING INTEGRATION INTO WORK PRACTICE

## K10. Openness to Application Integration and Extension

In order to better support their local processes, knowledge workers and their organizations may want to effectively combine different applications or add to a computing tool's functionalities. Product teams can envision technical features and support that could facilitate integration, or customized functional extension, of their application concepts.

Questions for product teams to consider:

Which of the work practices that your team is striving to mediate could bridge multiple computing tools in knowledge workers' technology environments?

Where might custom functional extensions address unsupported needs?

What specific, publicized points of technical openness could allow target organizations to locally recombine and add on to your application concepts?

WORKING THROUGH SCREENS | 100 IDEA CARDS

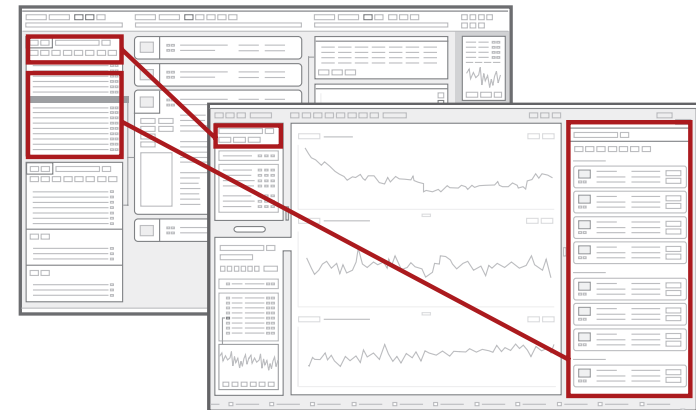
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_10.html](http://www.FlashbulbInteraction.com/WTS_10.html)

A certain amount of trading is just like George Jetson work, doing routine things over and over again...

Financial  
Trader

And our group is always trying to figure out how to remove that work so that we can spend more time making deals...

FULLY INTEGRATED APPLICATION AREAS



For example, we had our IT group integrate some key parts of our two main tools, even though they are made by different companies.

That integration saves us traders a lot of copy and paste work — and that's exactly the kind of work that computers should do for us, not the other way around, right?

PROMOTING INTEGRATION INTO WORK PRACTICE

## K11. End User Programming

Product teams can envision functionality concepts that could allow knowledge workers to program different sorts of coded routines within their computing tools, such as the steps followed by an automated process. Interactive, task specific methods can make programming straightforward in the context of workers' own goals and technical skills.

Questions for product teams to consider:

What functionality concepts might your team envision to allow targeted knowledge workers to create their own algorithmic rules in order to meet local and emergent needs?

What inherent constraints, representations, and interaction idioms might you draw upon to promote clearly bounded and intuitive “coding” experiences?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K11.html](http://www.FlashbulbInteraction.com/WTS_K11.html)

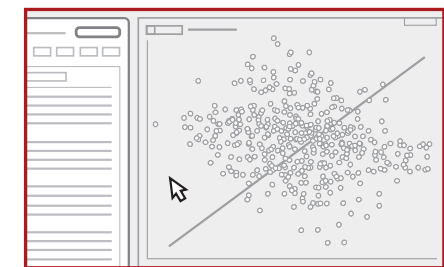
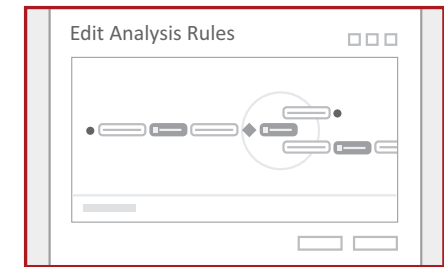
This analysis program has standard routines to transform data, but there's always some other transformation that I want to do...

Clinical Scientist

So I'm going to start with one of the rule sets that the product came with, and I will see if I can't change it to analyze how I want it to...

The existing rules are written in a sort of plain language of symbols and text that I can change or add on to...

And now I'm using my new routine with this scatterplot, and the data looks very different. This could be very good...



PROMOTING INTEGRATION INTO WORK PRACTICE

## K12. Trusted and Credible Processes and Content

When knowledge workers are confident that an interactive application follows known professional standards or was contributed to by credible sources, they may be more likely to trust the computing tool's processes and content. Product teams can envision honest and direct ways to engender these cues in their application concepts.

Questions for product teams to consider:

Which domain standards and thought leaders are viewed as credible by targeted knowledge workers and their organizations?

How might your team meaningfully involve certain trusted sources in your ideation efforts, incorporating their input and insights in order to enhance the usefulness, usability, and desirability of your offerings?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_K12.html](http://www.FlashbulbInteraction.com/WTS_K12.html)

Some key people at our firm were involved in the creation of the latest version of our trading tool...

Financial Trader

Leading Traders



I can see some of their favorite ideas embedded into how this thing works, and it makes me feel good about using it...

## K13. Reliable and Direct Activity Infrastructure

Interactive applications that perform reliably and give knowledge workers a sense of uninterrupted, direct action have the potential to become “at hand” infrastructure in work activities. To prevent situations where individuals and organizations limit their adoption of unreliable computing tools — or jettison them entirely — product teams can envision early requirements for experienced performance.

Questions for product teams to consider:

How might the experienced reliability of your team’s computing tool instill a sense of confidence in targeted individuals and organizations that could lead them to adopt its options into the structure of their work?

How might your functionality concepts provide a sense of direct, low latency action on the objects of workers’ goals?

Even after only two weeks, I cannot imagine doing my daily work without this building modeling tool...

Architect

When I first opened it on my screen I thought, “Wow, there is a lot to learn here,” but everything I tried seemed to work really well...

And then over time, while I was realizing how to use more and more of the tool, the important parts that I had already learned somehow felt very dependable...

Today, a lot of this interface feels like second nature. And since it works so consistently, I know how long it will take me to do different things...

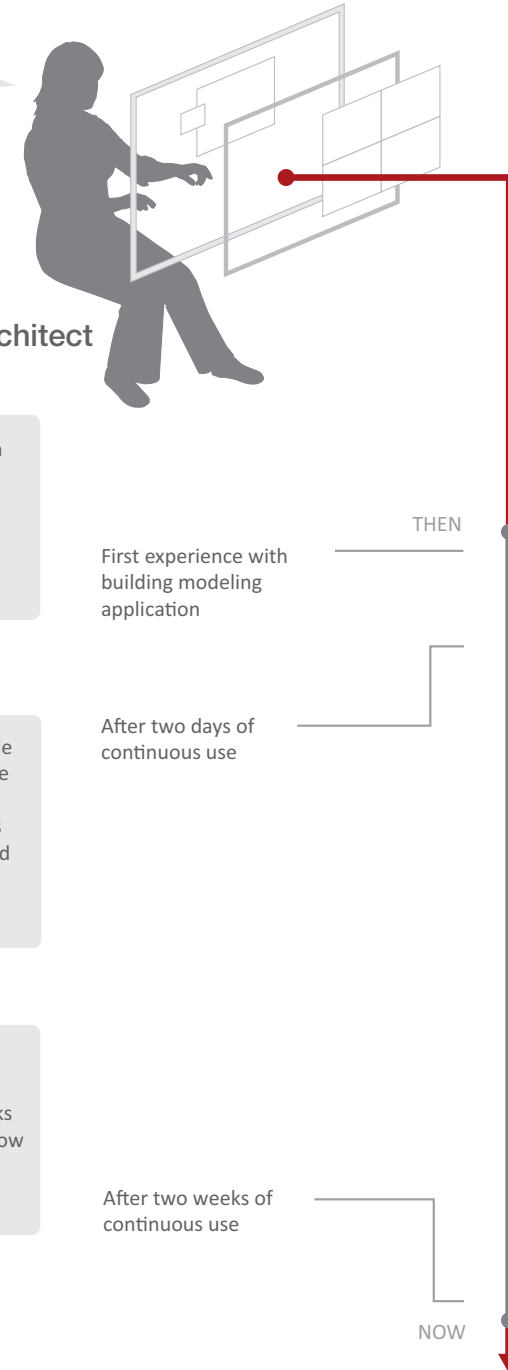
First experience with building modeling application

After two days of continuous use

After two weeks of continuous use

THEN

NOW



## L. Pursuing Aesthetic Refinement

Valued computing tools can desirably communicate with knowledge workers on an emotional level, delighting users and creating a sensory environment that is conducive to focused thinking.

Designing such compelling aesthetics requires the critical examination of a product's formal qualities, behaviors, and larger positioning.

During *application envisioning*, product teams can map and explore potential aesthetic meanings and refined aesthetic directions.

By taking time to locate and generate relevant emotive qualities for their onscreen tools, teams can uncover opportunities for more appealing, recognizable, comprehensible, and brand differentiated experiences.

This category contains 5 of the 100 *application envisioning* idea cards in this deck:

- L1. High quality and appealing work products
- L2. Contemporary application aesthetics
- L3. Iconic design resemblances within applications
- L4. Appropriate use of imagery and direct branding
- L5. Iconoclastic product design

PURSuing Aesthetic Refinement

## L1. High Quality and Appealing Work Products

Knowledge work typically results in artifactual outputs that are communicated to others, which recipients may then use to understand work progress and evaluate its outcomes. Product teams can envision functionality concepts that could make it easier for users to generate desirable work products with refined aesthetics.

Questions for product teams to consider:

What types of artifacts are created in the knowledge work practices that your team is striving to mediate?

How might your computing tool offload some of the effort of generating certain outputs while at the same time enhancing the effectiveness and appeal of their design?

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_L1.html](http://www.FlashbulbInteraction.com/WTS_L1.html)

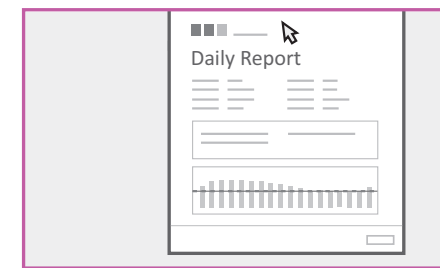
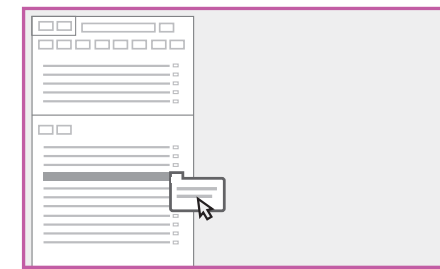
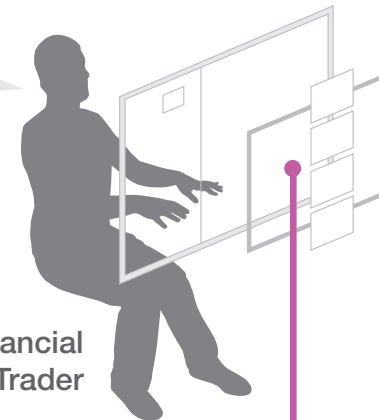
It's very important for our firm to maintain a certain reputation and image...

Financial Trader

If you open any message that I've sent and view it as the receiver will see it...

You'll see that it has the high quality look that people expect from us...

That's our logo, as if it was written on letterhead...



PURSUING AESTHETIC REFINEMENT

## L2. Contemporary Application Aesthetics

The stylistic aspects of conventional onscreen interaction and visual design have changed over time and will continue to do so. Product teams can promote learnability, as well as attributions of product quality and utility, by envisioning usages of contemporary user interface aesthetics in their application concepts.

Questions for product teams to consider:

What current and emerging trends in user interface aesthetics could be relevant for your team's targeted markets and the work practices that you are striving to mediate?

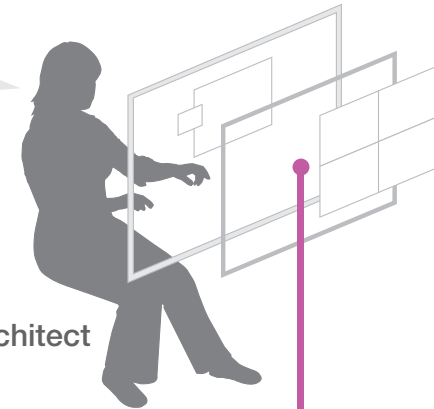
How might your team distill selected contemporary interaction and visual design directions into stylistic conventions that could be applied across your application concepts?

WORKING THROUGH SCREENS | 100 IDEA CARDS

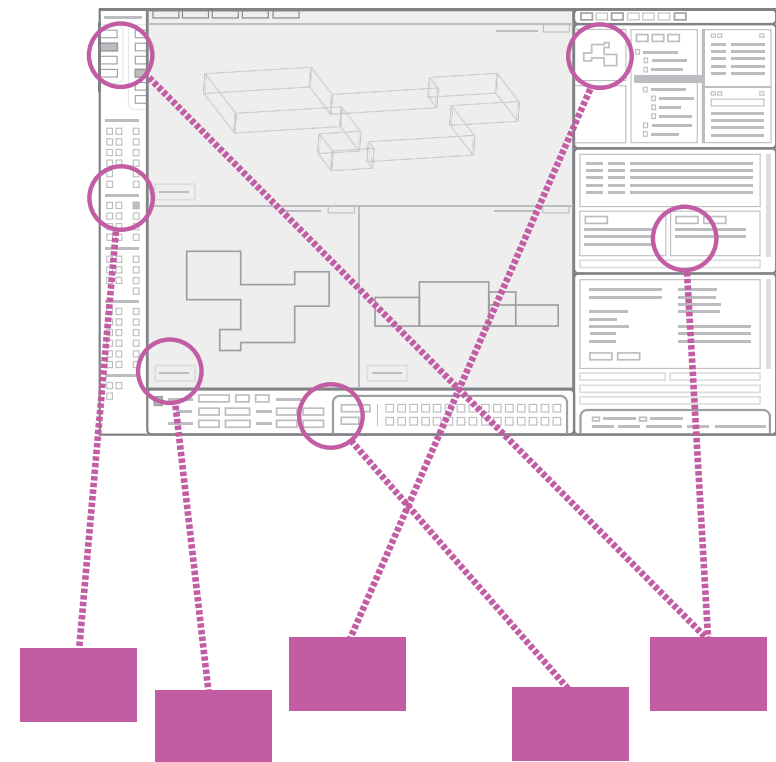
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_L2.html](http://www.FlashbulbInteraction.com/WTS_L2.html)

In our building modeling application, I see visual similarities with the best architectural tools. It's like I can somehow read the appearance of the product based on what I already know...

Architect



RECOGNIZED SIMILARITIES



CONTEMPORARY ARCHITECTURAL SOFTWARE

OTHER ONSCREEN PRODUCTS



## L3. Iconic Design Resemblances within Applications

Knowledge work domains have visual cultures of iconic designs and related products that have evolved over time. Product teams can leverage those familiar cultural understandings to give their onscreen elements intangible, or outright meaningful, family resemblances with known artifacts.

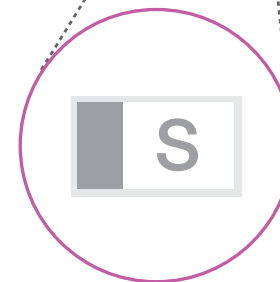
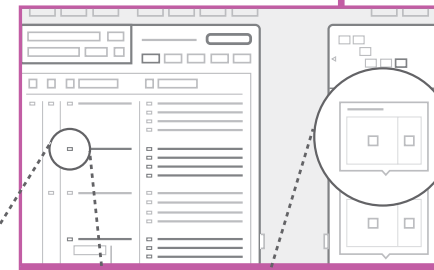
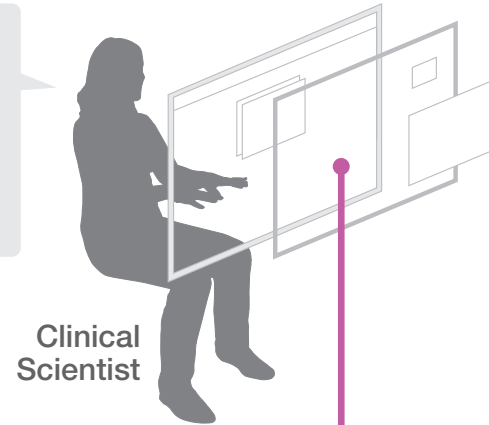
Questions for product teams to consider:

What iconic artifacts are part of the visual and material culture of targeted knowledge workers' day to day professional environments?

How might your sketched functionality concepts and interaction objects subtly or directly reference these artifacts in ways that are both compelling and evocative?

The design of this analysis application just fits into our lab. I don't think it would look right if it appeared outside of a lab or a pharmacy...

Clinical Scientist



The simple icons are easy to learn and very similar to the types of visual information that I see when I look away from my screen to the shelves of our lab...



And if you look at this history area of this screen, you can see that each of these little event boxes looks something like the label on a reagent vial...

## L4. Appropriate Use of Imagery and Direct Branding

Thoughtfully applied branding and non-interactive imagery are often noticeably absent in computing tools for knowledge work. Product teams can envision how aesthetic treatments and added graphic elements could help build emotional connections with users, promoting brand recognition and appeal while at the same time improving individuals' understandings of product functionality.

Questions for product teams to consider:

How might your team's application concepts be extensively and recognizably branded, while enhancing — not distracting from — onscreen clarity and utility?

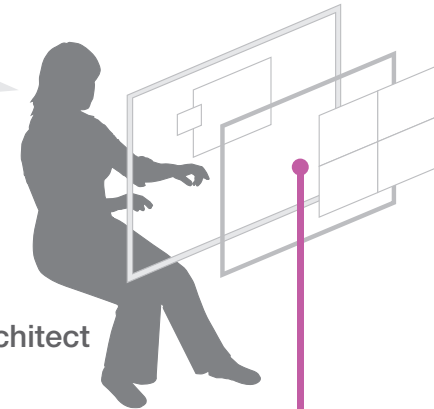
Where in your sketched functionality ideas could there be opportunities for useful, stimulating, and memorable supplementary graphic elements?

WORKING THROUGH SCREENS | 100 IDEA CARDS

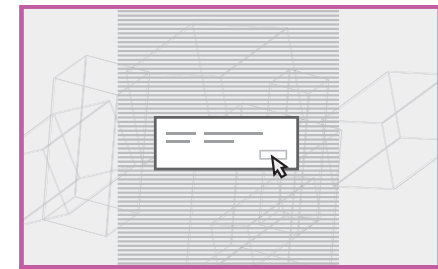
For more description, examples, and questions related to this idea, see the full version of this book: [www.FlashbulbInteraction.com/WTS\\_L4.html](http://www.FlashbulbInteraction.com/WTS_L4.html)

Starting up my building modeling application has this great, slightly cinematic feel...

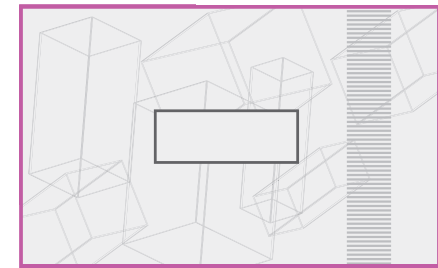
Architect



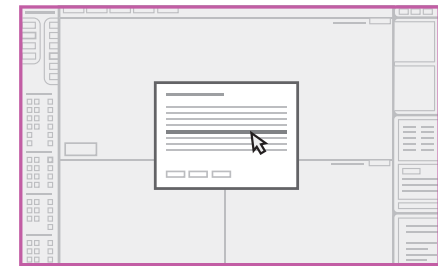
The log in screen comes up fast, and I enter my information...



And while it's loading, there's this great animation going on in the background that sort of gives you an indirect feel for what the product does. It feels like all of this slick, integrated building data...



But it's just a quick thing, and it's important that it fades as soon as it can to leave me with the details of my tool and my work...



## L5. Iconoclastic Product Design

Many knowledge work applications do not stray very far from the aesthetic mold of “standard” user interface design. Products teams can envision how their application concepts could fully preserve their proposed utility while at the same time gaining uniquely stimulating and emotionally compelling differentiation through novel interaction and visual design approaches.

Questions for product teams to consider:

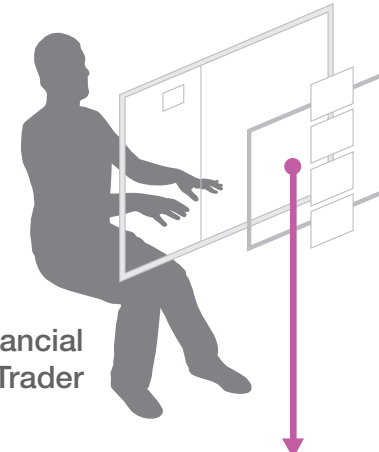
How might your team use your insights into targeted knowledge work practices to sketch truly different, surprisingly engaging, and highly relevant user interface design breakthroughs?

What impact could these ideas have on the larger design strategies of your application concepts?

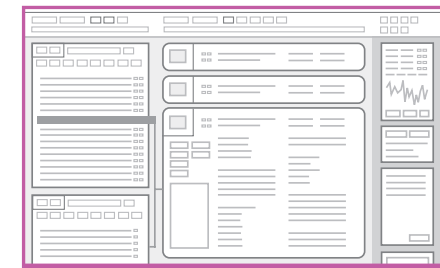
I love the way this new trading tool looks and moves.

It's very different from software as usual. It feels much more designed somehow...

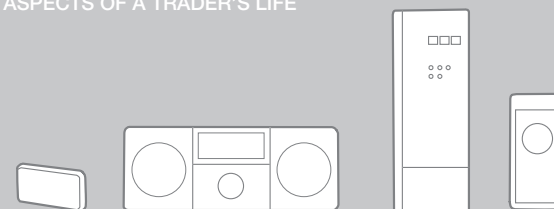
Financial  
Trader



I think that the designers must have thought about the kind of gadgets that I like to own and play with and walk around with...



INNOVATIVELY REFERENCING  
TECHNOLOGIES FROM OTHER  
ASPECTS OF A TRADER'S LIFE



I see a lot of small things in this tool that remind me of the types tech that I like to personally buy and use...

It has this quality look that I really want, and I don't feel like I'm sacrificing anything as far as my work goes in order to get this better experience...

IDEA CATEGORY

## M. Planning Connection with Use

Valued computing tools are born from intensive conversations, and those conversations may then continue to evolve throughout a product's dispersion and adoption.

Designing for such meaningful connection requires critical thinking about potential real world scenarios of use — both desirable and negative — as well as potential interventions that might help steer usage toward intended outcomes.

During *application envisioning*, product teams can actively talk about potential downstream effects of their design concepts. Teams can also generate ideas about future connections with their applications' eventual users, envisioning integral touch points that can allow them to remain systemically responsive and strategically relevant over time.

WORKING THROUGH SCREENS | 100 IDEA CARDS

For more description of this idea category, see the full version of this book:  
[www.FlashbulbInteraction.com/WTS\\_M.html](http://www.FlashbulbInteraction.com/WTS_M.html)

This category contains 4 of the 100 *application envisioning* idea cards in this deck:

M1. Iterative conversations with knowledge workers

M2. System champions

M3. Application user communities

M4. Unanticipated uses of technology

## M1. Iterative Conversations with Knowledge Workers

Product teams can iteratively co-envision valuable interactive applications with selected knowledge workers, grounding resulting technologies in current and emerging needs within targeted organizations and communities of practice. This dialog can commence in early, strategic design conceiving and then continue throughout development and across product versions.

Questions for product teams to consider:

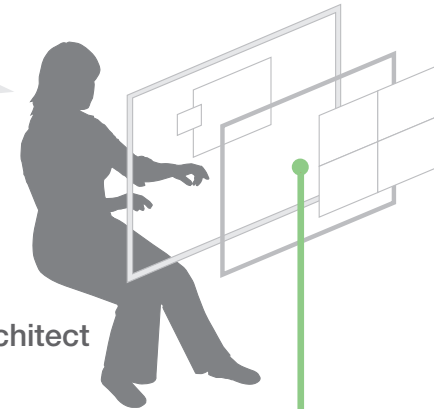
How might your team gather and use input from targeted knowledge workers as part of your *application envisioning* process?

What functional channels within your product might allow you to gather such input over time?

How could representative workers' insights, ideas, and feedback inform your decision making processes as you evolve your product?

The vendor that created our building modeling application has been very interested to hear my thoughts on their new designs for the tool...

Architect



I'm often on the phone providing feedback to people from their team about simple prototypes that they put together to express their new ideas...



Vendor Product Team

Iterative research, conceiving, design, and implementation based on ongoing conversation with carefully selected knowledge workers

And it's great to see those ideas come to life in new releases of their products, knowing that our firm's input made a difference in how they work...



## M2. System Champions

Product teams can envision valuable support for individuals who champion the adoption and effective use of their interactive applications within certain communities of practice. These champions can be identified both within targeted customer organizations and within knowledge work fields at large.

Questions for product teams to consider:

How might your team eventually identify and engage with system champions?

What functionality concepts and interaction pathways could reach out to these targeted knowledge workers?

What types of support could help them to effectively promote your computing tool in their own local environments and cultures of practice?

I'm the one that learns about our tools and teaches everyone in our trading group about how to get the most out of new functions and such...

Financial  
Trader

Our software vendors are very supportive and seem to care about ongoing relationships with their customers like us traders do...

Vendor

CURATED FEATURES, ADAPTED FOR CONTEXT



They just had a training session, and now I'm explaining the important changes to everyone around our office who needs to be up to speed...

Other Traders

## M3. Application User Communities

The social networks and collective focus of user communities can provide valuable support to knowledge workers who are trying to make the most of computing tools in their own organizations and personal practices. Product teams can envision concepts for fostering and reaching out to these communities, opening up channels to discuss issues and gather feedback.

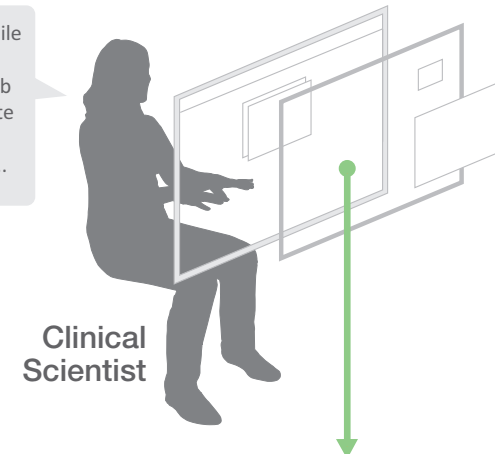
Questions for product teams to consider:

How could your firm be more than a “distant provider” to the larger communities that will eventually discuss and converge around your computing tool?

What inputs might related communities contribute to your *application envisioning* efforts?

How might interactive touchpoints and human support for certain communities eventually lead to positive impacts on product adoption, workers’ outcomes, brand reputation, and other factors?

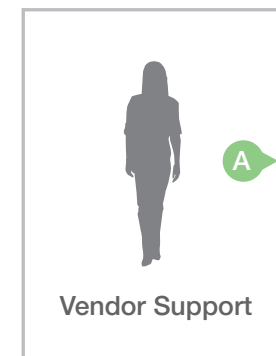
Every once and a while I post a detailed question from our lab to the community site that is linked to our analysis application...



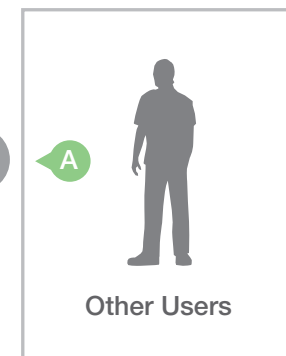
Clinical Scientist



DISTANT COMMUNITY



Vendor Support



Other Users

And eventually I get answers from all sorts of knowledgeable people...

## M4. Unanticipated Uses of Technology

History contains many examples of unanticipated uses that come to life once technologies are released into the world. Product teams can explicitly envision the design of their interactive applications to steer clear of support for certain usage scenarios. Teams can also inform the evolution of their offerings by investigating the unexpected ways that knowledge workers think about appropriating them.

Questions for product teams to consider:

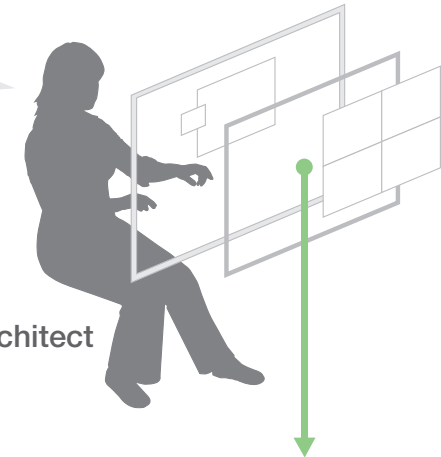
What early predictions might your team make about surprising and novel uses of your computing tool, simply by taking time to consider them?

What inventive usages would you like to prevent or discourage due to ethical, legal, or strategic concerns?

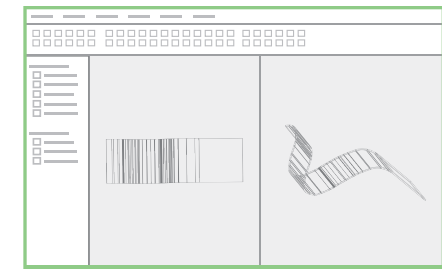
What processes might your team follow to identify emergent and unexpected uses of your product in a timely way?

We heard that this leading architecture studio was using a different software package to come up with some of its more dramatic, organic forms...

Architect



And so now we're also using this aviation software tool to do certain shapes. It generates them with much more info about the "how" of the structure, not just dumb 3D form data...



EXPORTED INFORMATION



We then import it into our main building modeling application, where it becomes part of our normal workflow...

