In design and development we create and share stories about the future of operational settings. These stories concern the impact of objects-to-be-created as a source of change in a field of practice. The objects in the story embody solutions that would occur if others support investments in R&D that enable creation of such objects. The beneficial changes envisioned provide grounds for recruiting investments and support for prospective organizational change. In effect the envisioned impact justifies the efforts needed to create and adopt the objects in questions.

Often development takes a more indirect form where the stories are told about the potential benefits that will come from advancing some aspect the technological substrate. The more general capability in these stories seems to address a theme that could be part of many settings. Quite often the themes raised are cognitive or collaborative in nature (e.g., it seems obvious that increasing capability X would enable better [diagnoses, plans, communication, etc.] wherever that generic activity goes on). Others could use these capabilities to create specific objects for specific settings to get the same envisioned benefits.

In either case the stories about the future propose solutions that would occur if others support building the objects that embody the solution or the new capabilities that would enable such objects. The stories told are envisioned operations concepts including both new objects-to-be-realized and a set of scenarios about practice.
design tells (shares) stories about the future

Those engaged in development usually see the push toward new forms and levels of computerization as a solution to previous limits on performance or to specific performance problems.

As stories of the future focus on anticipated benefits, attention shifts to building the object that embodies the solution – create-this-object-within-these-parameters. The framework of expectations is that the benefits envisioned in the conception will come to pass (and only those effects will come to pass). Hence, development will naturally run toward technology centered paths (overcoming obstacles and impasses in the process of realizing the object) as all assume that if the object level expectations are met the practice expectations will be met automatically. However, the development efforts still rest on a base of hypotheses cloaked as stories told about the future.

To design one must speculate about the impact of the object-to-be-realized as a source of change in a field of practice. To design is to participate in the process of change with other stakeholders. Thus, in design we engage in a process of building and sharing stories that envision future operations – what it will be like to practice after the objects-to-be-realized have been deployed.

New tools alter the tasks for which they were designed, indeed alter the situations in which the tasks occur and even the conditions that cause people to want to engage in the tasks.

Carroll, Campbell 1988
moving target for design

There is a gap between the envisioned impact of a new development and the actual impact and reverberations of that change. In part this occurs because fields of practice are not static; rather demands, pressures and resources are changing. The introduction of new systems transforms the nature of practice in the form of new roles, new judgments, new forms of coordination, and new paths toward and forms of breakdown. Practitioners adapt to the changes working around complexities and re-shaping objects to function as tools in their hands in ways rarely foreseen by developers and their advocates.

New technology is a source of change as performance demands and resource pressures change. New technology becomes wrapped up in organizational change as well. The question then is – can design anticipate the full range of effects of the change. Usually, technology change produces unintended and sometimes negative side effects in addition to new capabilities. Thus we are part of a dynamic process which we also wish to understand and influence – a dynamic process of technology change generating a new set of capabilities and complexities, leading to adaptations by stakeholders, producing a changing mix of successes and vulnerabilities to failure.

The design of new technology is always an intervention into an ongoing world of activity. It alters what is already going on - the everyday practices and concerns of a community of people - and leads to a resettling into new practices.

Flores, Winograd 1988

How to support design when the introduction of new technology will transform the nature of practice?

Predict the Reverberations of Change from objects-to-be-realized

Woods, Dekker 2001
There are several basic dimensions to envisioned operation concepts. Each of these have negative and positive poles with respect to the envisioning process:

- plurality
- underspecification
- groundedness
- calibration

The following 4 figures use the metaphor of a crystal ball as developers and stakeholders look ahead to envision future operations. Considering how each dimension has an upside and downside leads to new ideas about how to aid design as envisioning future operations.
design tells (shares) stories about the future characteristics of envisioned worlds

plurality: multiple views, but each parochial.

Plurality - There are always multiple versions of how the proposed changes will effect the character of the field of practice in the future. Different stakeholders have different perspectives on the impact of new objects on the nature of practice. The downside of plurality is a kind of parochialism where we mistake a partial, narrow view as if it were the only or dominant view of the future of practice, unaware of the plurality of views across stakeholders. The upside of plurality is the triangulation that is possible when the multiple views are brought together. In examining the relationships, overlaps, and gaps across multiple perspectives we are better able to cope with the inherent uncertainty built into looking into the future.
Underspecification - as a hypothesis and prediction about the impact of new objects on the nature of practice, each envision concept must be vague on many aspects of what it would mean to function in that field of practice in the future. The upside of underspecification is the freedom to explore new possibilities and new ways to relax and recombine the multiple constraints to innovate and improve. This requires a search for leverage points and a sensitivity to the fact that new envisioned objects only become tools through use. The downside of underspecification is remaining trapped in a disconnected, shallow, unrealistic view of what it means to practice then and now. When the view of practice is disconnected from the pressures, challenges, and constraints operating in that world, the view of practice is inherently distorted from the beginning, missing how the strategies of practice are adapted to these constraints and pressures. Starting from a distorted view of practice guarantees predictions that will prove wildly wrong as objects-to-be-designed come into contact with the pressures of actual practice. The difficulty is that in envisioning we are pursuing a moving target so that it is difficult to say how the current vectors of practice play into a changing future.
Envisioned modes of operation are predictions about the effects of change on people, technology and work. As predictions, envisioned concepts can vary on a dimension of *groundedness* - are the predictions grounded on patterns derived from the empirical research base on how technology change effects the interplay of people, technology and work. The research base acts like binoculars helping design anticipate likely reverberations of change based on patterns abstracted from previous studies. The downside is when envisioned concepts remain ungrounded from the research base on the actual consequences of the changes on people, technology and work. This is often the case as advocates recruit continued resource investment needed to develop objects-to-be-designed. Their claims about future impact are often at odds with or even contradict the empirical base.
design tells (shares) stories about the future characteristics of envisioned worlds

**calibration**: overconfidence that the predicted consequences, and only the predicted consequence, will occur.

Finally, as predictions, envisioned concepts can vary on a dimension of *calibration* or confidence (calibration refers to how well we know how much we know). Envisioning a co-evolving, dynamic process of change and adaptation is highly uncertain. Advocates can easily become miscalibrated and overconfident that, if the systems envisioned can be realized, the predicted consequences and only the predicted consequence will occur. Our views of the future are tentative hypotheses. As such we need to remain open to revision and subject our hypotheses to empirical jeopardy in the face of feedback about actual patterns of change and adaptation.
Table 1: Properties of Stories about Future Operations

<table>
<thead>
<tr>
<th>Property</th>
<th>Downside/Upside</th>
<th>Re-balancing constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plurality</strong></td>
<td>Parochialism</td>
<td>Triangulation</td>
</tr>
<tr>
<td><strong>Underspecification</strong></td>
<td>Disconnected from practice</td>
<td>Re-balancing constraints</td>
</tr>
<tr>
<td><strong>Groundedness</strong></td>
<td>Ungrounded</td>
<td>Grounded</td>
</tr>
<tr>
<td><strong>Calibration</strong></td>
<td>Overconfident</td>
<td>Tentative hypotheses</td>
</tr>
</tbody>
</table>
The envisioned world problem demands that we develop means to ground predictions on relevant empirical results abstracted from observations in context. Understanding the dynamic process of change and adaptation will lead to better control of the innovation process at the intersection of people, technology and work. Armed with knowledge about the dynamics of change and adaptation, we can address potential side effects at a time when intervention is less difficult and less expensive (because the field of practice is already in a period of change and systems development is in the process of creating tangible objects).

All who would design are susceptible to the fragility of envisioned world stories. To design one must speculate about the impact of the object-to-be-created as a source of change in a field of practice. The question is what standards should be applied to that envisioning process? What are envisioned world judgments based on? What should envisioned world judgments be based on?

This project explores design as a process of creating and sharing stories about the future. In this project we seek ways to enhance envisioned operations concepts so that they

- are better grounded on empirical patterns of change and adaptation,
- serve as tentative hypotheses subject to empirical jeopardy,
- synchronize with the dynamics of change and adaptation,
- support anticipation of the reverberations and side effects of change
- enhance participation of diverse stakeholders in exploring and creating the future of practice.
Design is telling (sharing) stories
A framework for supporting envisioning

The framework we are developing and testing in different design projects consists of three parts. The center is the (1) envisioning cycle which is supported by a new role and type of prototype – (2) animocks which reflect current views of future operations to various stakeholders for sharing, exploring, elaboration and critiques. Envisioning is supported through the development of (3) a storytelling engine where aspects of narrative – how to tell stories – guide the creation, sharing and revision of stories about the future. Patterns and models of cognitive work are critical as storylines and story archetypes for developing narratives.
design tells (shares) stories about the future
story telling engine

Design Stories

supported by: animock as reflector
envisioning cycle

envisioning cycle
animock
as reflector

patterns in cognitive work
structures of narrative
operations concepts

storytelling engine

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**telling:** stories of how situations and operations play out

**sketching:** how objects-to-be-realized would prove useful

**design tells (shares) stories about the future envisioning cycle**

- **PAST** operations concepts
- **FUTURE** animock as reflector
  - envisioning cycle
  - story telling
  - concept sketching

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Design is not about shaping the future through artifacts,
design initiates new types of human/technology interactions through the introduction of new artifacts and operations frameworks.

The new artifacts and their organizational integration are responses to unsatisfactory cognitive work situations that were observed in the current field of practice.

The intent behind a new design is to improve aspects that were identified as unsatisfactory through the introduction of innovative change.

*Designers want to know:*  

**How could a human/technology interaction situation be improved?**

**What does not work in the current work setting?**

**Will the predicted changes come about as predicted?**

If not, in how far is the designers’ model of the observed field of practice wrong and could be improved?
In the course of design, designers involve project leaders and practitioners to

• present the designers’ direction

• verify domain knowledge and assumptions

• get feedback from practitioners and stakeholders

To formulate design states that can be discussed, designers communicate their design using design stage representations.

A series of these design work meetings leads to refined design formulations of the problem space and further design commitment.

Design stage representations are:

• **Problem statements** as reviewed and re-written by the designers, based on observation

• **Observation materials** that back up the designers’ functional model of the design situation

• **Design scenarios** that lead to

• **First design concepts**

• **Mock ups** of selected design concepts

• **Further defined, partially working design models**

• **Prototypes**

• **Final design definition**

**design tells (shares) stories about the future presentations of design intent**
A clear representation of design stages is essential to avoid misinterpretations and resulting design error – likely caused by misguided resource allocation and the inability to successfully represent design potential.

The format of the design representation matters.

The different types of common design representations have upsides and downsides:

**Problem statements, observation materials and use scenarios:**

+ low investment cost since text based
+ basically found material as illustrations

- inability to show design approaches in plausible form - much is left to the viewers’ imagination

**Design mock ups and models**

+ show the shape of things to come in tangible form

- are static representations and need story support - their future performance is up to imagination
In the face of design challenges posted by dynamic and collaborative cognitive systems, the isolated and static representation of design directions as mock ups and written reports do not pay justice to the demands posted by the design environment.

On the other hand, storys as use scenarios alone do not provide the participatory design team with common ground concerning the look and feel of the envisioned artifacts and interaction activities.

Miscommunication is likely, because different stakeholders have different imaginative representations in mind that can’t be easily interchanged. (Designers use to sketch and tell stories while they explain the functions of a design concept)

*Design representations need to be integrated*

mock-up + animation = animock

A mock up as premature design representation is animated by a story that integrates the appearance of envisioned artifacts with the dynamic nature of a use scenario.

Since a mock up is animated, the animock is open for revision.

Both, design mock up and story can be refined or modified to represent authentic artifacts in authentic interaction scenarios - both can be observed in action.
design tells (shares) stories about the future

Animock -- or Animated mock up -- links the scenarios told to that point with the design concepts sketched to that point.

The animock makes future operation concepts:
- Dynamic
- Explicit
- Sharable
- Critique-able
- Co-evolving

all of which help to avoid errors of premature commitment.

When we start with animating our design concepts we must consider the scenarios or stories of future operations. Animating an early design concept requires a storyboard, since how the concept behaves over time has to be specified. A story without such planning is a series of fortuitous coincidences, that only justify, rather than stress, the concept.

This focuses design-for-usefulness as a process of telling, sharing, and revising stories about the future across the different stakeholders in that future. This process does play out early in any design process, but typically it plays out in ways that are implicit, not open to revision, ungrounded, parochial, disconnected, and overconfident. The Animock is a critical tool to shift this exploration of possible futures into more positive channels. It focuses the process on the usually implicit story that accompanies sketches of design concepts. Sharing these stories invites richer exploration of future consequences and reverberations of the change envisioned, if we can support the process telling these stories.
A design mock up is a rough-enough-representation of an envisioned design that looks authentic enough while it invites for revision. The physical appearance of the mock up understates commitments made and reveals the small scale investment in the model production.

It signals that design participants are invited to play with it, to modify it, even with the possibility that they may destroy it.

Three levels of design mock ups:

- **very abstract** conceptual mock-up
- **appearance mock-up**
- **partially working mock-up**, illustrating functions and dynamic behavior

Mock-ups pre-sample the future design

A mock-up of an office space - notice the degree of abstraction in the scene.

A real office space

design tells (shares) stories about the future properties of the classic design mock up
design tells (shares) stories about the future
link scenarios and design concepts

• dynamic
• explicit
• sharable
• critiques
• co-evolve

animock as reflector

• avoid premature commitment
design tells (shares) stories about the future

story telling engine

The story telling engine is a set of concepts and tools to help design teams tell stories of the future in ways that can support effective envisioning of future operations. It supports the designer as a story writer. In this process the research base on patterns in cognitive work functions as a generator of storylines.

Similar to the authentic enough look of the mock-up that invites for revision,

design stories that animate the animock need to be good design stories - they have to

- **be realistic enough** to allow practitioners imagining themselves in the scene

- **avoid being predictable** stories that take away from truly exploring the scenarios

- **be open and constrained** to surprise designers and practitioners likewise

- **tell believable stories** about the future of practice.

To telling better stories of the future, story creators need to consider a variety of aspects of narrative structure, such as,

- **Tension to be resolved**
- **Perspective/points of view**
- **Temporal relations**
- **Stakeholders**.
When formulating a concept for a future design, an Animock—or Animated mock up—links the scenarios told to that point with the design concepts sketched to that point in the design process in a public envisioning cycle. Animating mock ups of objects-to-be-realized shifts the focus from the development of the object itself to the role of the object in future operations. An animock reflects current views of future operations to various stakeholders for sharing, exploring, elaboration and critiques.

The issue is how the animock helps designers prepare to be surprised as they explore the reverberations of the technology change in question. Surprises are events, behaviors, or side effects that were not anticipated in the design to that point. Surprises indicate places where what is anticipated about the character of future operations breaks down. This could occur from:

• exploring how people will adapt to work around complexities or exploit new capabilities,
• exploring how situations will place new complexities for practitioners to adapt to,
• exploring how developers’ model of practice is incomplete or off target.

As the design evolves, an animock evolves and becomes a tangible representation of what would be useful—a shared hypothesis that guides development, but a hypothesis open to revision as new evidence comes in to revise the model of success in future operational situations. As such, animocks have the potential to cope with the moving requirements problem in development.

A good story about the future of operations is open but constrained. Open in that the story can be elaborated or re-told depending on the perspectives gathered around the animock representing different knowledge sources about the nature of operations, about people in such settings and about the artifacts that people can manage as resources to accomplish goals.

Constrained in that the story is based on principles of narrative structure such as multiple perspectives and temporal pacing and on patterns in cognitive work and coordinated activity. These patterns from the research base, such as human-automation coordination (Billings, 1996), escalation of cognitive demands (Woods and Patterson, 2000), or oversimplification fallacies (Feltovich et al., 1997) serve as story archetypes to guide the creation and exploration of stories embodied in a series of animocks.

As the design evolves, an animock reflects current views of future operations to various stakeholders for sharing, exploring, elaboration and critiques.

Narrative:
- pacing
- blocking
- point of view

Research base as story archetypes:
- oversimplification biases
- escalation and cascading effects

Patterns in cognitive work:
- as storylines and archetypes
An animock designed to represent a scenario consists of three components:

- **a stage** that mocks up the physical design environment

- **actors** in *roles* that engage in goal directed action to cope with tasks in the environment

- **events** that reshape tasks in the physical environment and initiate responses by the actors that experience and produce states in their environment on the animock stage

Between the three components of an animock exist relationships that represent the three dimensions of animocks as dynamic worlds. All three dimensions are characterized by their continuous change over time:

- **blocking** describes the locations and paths of actors on the stage

- **pacing** describes the varying timing conditions on the stage as actors engage with tasks in the environment, triggered by events

- **point of view** illustrate the scene access as in-scene views of actors that perform tasks in the animock environment
design is telling (sharing) stories
the three dimensions of animocks - part 1

In this early animock case study we investigated the implications of point of view for storytelling. Our findings indicate that POV impacts both, the spatial and the narrative aspects of animocking. Using the example of climbing up a slope we illustrate how individual view points control a person’s understanding of spatial characteristics of the scene one is in and how this understanding guides plans for actions and reflections of actions that were taken.
design tells (shares) stories about the future
example: points of view in stories of the future

One example we have begun to explore is the role of multiple points of view in creating effective stories. Two different storyboards in the next section illustrate the role of point of view in design stories. An animation of this example is viewable at the end of this media paper.

The storyline is: people are following a routine which is represented as a path through a terrain. Disruptions arise; conceptualized as obstacles or false paths – variations on storylines where practitioners get sidetracked or thrown off track.

Typically, designers as authors, with a God’s eye view of the scenario, tell this type of story in a very utopian manner where the idealized actor on the path sees around obstacles to find the path forward too easily (side tracks are too easy to recognize as such and avoid). Such an idealized actor always has a way forward when confronting in-principle obstacles and side tracks. In other words, the story writer only puts ‘un-obstacles’ in the path of their protagonists – obstacles that already have their solution embedded in the situation.

Better stories place tensions in the story line whose solution is not obvious to the actors or to the audience. Actors-in-the-real must recognize when they have shifted off track and carry out significant cognitive work to recover when side-tracked.

Novice story writers have great difficulty creating these tensions because they come to the story with a God’s eye view of the situation, paths and storyline. The author knows of all upcoming events and sees the big picture of how all these events are interconnected with each other. In other words, the novice author, knowing the resolution, has a difficult time developing tensions and surprise as obstacles are encountered and the storyline develops. As a result they create a very linear, literal, uninteresting and flat story.
Experienced story writers focus their efforts on creating tensions through mismatches between what people with different perspectives know about the developing story. They use various techniques to reveal what the unfolding events look like from the perspective of the participants – a ground eye view. They juxtapose different perspectives to help the audience explore or create meaning about the themes built into the story.

We want to direct this exploration into channels that explore the story lines as patterns in cognitive work and the role of objects-to-be-realized in a participatory design process.

Tempo
Another dimension of narrative and of cognitive work is tempo. An Animock forces designers to consider how events flow, grow and subside. Dynamic media are needed to mock-up factors such as time pressure, tempo shifts, cascades of effects, synchronization of actions, or time delays. Temporal relationships in a story are not a series of linear, quantified, external time steps. Different time scales and paces play out for different participants in the story and audiences who listen in.

Capturing the changing tempo focuses our attention on properties of the media for representing concepts and stories that are dynamic. Qualities of movement, threads over time, time scales and other dynamic characteristics supersede level of detail in appearance that usually dominates in static mock ups.

**The following storyboards juxtapose three different points of view, as if a camera was following the actor on the ground; as if a camera was in a drone, following the actor from above, or as if the camera was outside the situation and outside time revealing all from an omniscient, god’s eye point of view.**
scenarios designers create have been generalized around the metaphor of *climbing a slope*. The path forward represents being on plan, but alternative plans can appear, actors can be sidetracked.

This scenario illustrates a story typically told by designers. Since they know their answers to their designed problems, everything works perfectly.

An actor climbs a mountain for the first time. Being faced with an unanticipated fork, he makes the decision to take a right, which *(surprise!)* turns out to be the correct track.
version A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

**064 camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

live representation, reacting

EYE WITNESS

in-situ model

“I am about to start and have my goal within sight.”

**design is telling (sharing) stories**
version A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

"which one should I take, which one suggests to be the better one - and how can I get information of what lies ahead?"

"I have to make a decision."

design is telling (sharing) stories
on the right track

version A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

195 camera following the actor in scene

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view
live representation
EYE WITNESS
in-situ model

“Let’s face the decision I made for this track”

design is telling (sharing) stories

“Is this really the right alternative to go for?”

“I should look for indicators that assure me that this was the right choice.”
**animock storyboard:**

**on the right track**

**version A:** an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

**239 camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

**live representation**

**EYE WITNESS, reacting**

**in-situ model**

“Over there is the alternative track to my goal”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. no foreshortening, but obscured areas.

**plan/replan representation**

**REPORTER, interpreting**

**decision model**

“does it look more promising than this one?”

“If I have serious doubts about my choice I should go back to the fork.”

**axonometric long shot of the complete environment. no foreshortening or obscuring.**

**documentation representation**

**NARRATOR, summarizing**

**omniscient model**

actor is about to begin

alternative plan is considered

decision is faced

past alternative is checked

goal is obscured / complication

impasse

workaround

goal reappears, situation is resolved

**design is telling (sharing) stories**

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versions A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

on the right track

camera following the actor in scene

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

live representation

EYE WITNESS, reacting

in-situ model

“I can’t see my goal anymore”

drone camera: local overview

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. no foreshortening, but obscured areas.

plan/replan representation

REPORTER, interpreting decision model

“where am I relative to my goal?”

“I should make sure to stay on the track which should lead me to the now obscured goal.”

god’s eye view: perfect overview

axonometric long shot of the complete environment. no foreshortening or obscuring.

documentation representation

NARRATOR, summarizing omniscient model

actor is about to begin

alternative plan is considered

decision is faced

past alternative is checked

goal is obscured / complication

impasse

workaround

goal reappears, situation is resolved

design is telling (sharing) stories
on the right track

version A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

camera following the actor in scene

drone camera: local overview

god’s eye view: perfect overview

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. no foreshortening, but obscured areas.

axonometric long shot of the complete environment. no foreshortening or obscuring.

documentation representation

NARRATOR, summarizing

actor is about to begin
alternative plan is considered
decision is faced

past alternative is checked
goal is obscured / complication

impasse

workaround

goal reappears, situation is resolved

design is telling (sharing) stories

“I am facing a barrier that stands between me and my goal.”

“was the alternative track the one to go?”

“I should figure out how serious my problem really is.”
version A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

animock storyboard: **on the right track**

**camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

*live representation*

*EYE WITNESS, reacting*

*in-situ model*

“This appears to block me from my goal”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. no foreshortening, but obscured areas.

*plan/replan representation*

*REPORTER, interpreting*

“should I stay on this track and will it lead me back to my original intent?”

“going on a little further might resolve my situation. the way back to the fork seems farther.”

**god’s eye view: perfect overview**

axonometric long shot of the complete environment. no foreshortening or obscuring.

*documentation representation*

*NARRATOR, summarizing*

*omniscient model*

actor is about to begin
alternative plan is considered
decision is faced
past alternative is checked
goal is obscured / complication

*impasse*

*workaround*

goal reappears, situation is resolved

design is telling (sharing) stories
version A: an actor climbs a mountain. being faced with a fork, he makes the decision to go right, which turns out to be the correct track.

**camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

**live representation**

EYE WITNESS, reacting

**in-situ model**

"I can see my original goal again. the detour was due to the characteristics of the environment that i was unable to predict then."

**design is telling (sharing) stories**
scenarios designers create have been generalized around the metaphor of *climbing a slope*. The path forward represents being on plan, but alternative plans can appear, actors can be side tracked.

Other than intended by the designer, the autonomous actor makes his own decision when he faces the fork.

*storyboard*, version B

An actor climbs a mountain for the first time. Following a side track takes him away from the goal and into a dead end.
version B: an actor climbs a mountain. being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

**w159** camera following the actor in scene

animock storyboard:

**on the wrong track**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

*live representation*

*EYE WITNESS, reacting*

*in-situ model*

“I am going to take this track...”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happenend and what might happen next. no foreshortening, but obscured areas.

*plan/replan representation*

*REPORTER, interpreting decision model*

“What tells me that I should go this way?”

“I know that there should only be one option, but obviously I have a choice.”

**god’s eye view: perfect overview**

axonometric long shot of the complete environment. no foreshortening or obscuring.

*documentation representation*

*NARRATOR, summarizing omniscient model*

recognize alternatives?

decision faced?

actor questions path?

unanticipated difficulties?

increasing difficulty threatens dilemma - recover soon?

dead end

**design is telling (sharing) stories**
animock storyboard:

**on the wrong track**

**version B:** an actor climbs a mountain. being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

**w234 camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

*live representation*

*EYE WITNESS, reacting*

*in-situ model*

“This provides a way forward”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happenend and what might happen next. no foreshortening, but obscured areas.

*plan/replan representation*

*REPORTER, interpreting*

decision model

“Is this track what I expected?”

“I should look for indications that assure me that this is the right track.”

**god’s eye view: perfect overview**

axonometric long shot of the complete environment. no foreshortening or obscuring.

*documentation representation*

*NARRATOR, summarizing*

*omniscient model*

recognize alternatives?

decision faced?

actor questions path?

unanticipated difficulties?

increasing difficulty threatens dilemma - recover soon?

dead end

*design is telling (sharing) stories*
version B: an actor climbs a mountain. being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.


Perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view.

Live representation

EYE WITNESS, reacting

In-situ model

"Seems I am a little off from where I was going."

Design is telling (sharing) stories
version B: an actor climbs a mountain. being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

**animock storyboard:**

**on the wrong track**

**camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

**live representation**

EYE WITNESS, reacting

in-situ model

“This looks more difficult than I thought.”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. no foreshortening, but obscured areas.

**plan/replan representation**

REPORTER, interpreting decision model

“If I am sidetracked - how do I recover?”

“maybe this is the right track, and it is more difficult than I was told.”

**god’s eye view: perfect overview**

axonometric long shot of the complete environment. no foreshortening or obscuring.

**documentation representation**

NARRATOR, summarizing omniscient model

recognize alternatives?

decision faced?

actor questions path?

unanticipated difficulties?

increasing difficulty threatens dilemma - recover soon?

dead end

**version B**

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design is telling (sharing) stories
version B: an actor climbs a mountain. Being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

**animock storyboard:**

**on the wrong track**

**camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. This includes foreshortening and obscuring according to point of view.

live representation

EYE WITNESS, reacting

*in-situ model*

“I doubt that I will be able to manage this.”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. No foreshortening, but obscured areas.

plan/replan representation

REPORTER, interpreting decision model

“does it get more difficult?”

“I can’t see what’s ahead. Should I move on?”

“How can I recover?”

**god’s eye view: perfect overview**

axonometric long shot of the complete environment. No foreshortening or obscuring.

documentation representation

NARRATOR, summarizing omniscient model

recognize alternatives?

decision faced?

actor questions path?

unanticipated difficulties?

increasing difficulty threatens dilemma - recover soon?

dead end

**design is telling (sharing) stories**
**version B**: an actor climbs a mountain. Being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

**on the wrong track**

<table>
<thead>
<tr>
<th>Camera following the actor in scene</th>
<th>Drone camera: local overview</th>
<th>God's eye view: perfect overview</th>
</tr>
</thead>
<tbody>
<tr>
<td>[Image 0x0 to 720x540]</td>
<td>[Image 0x0 to 720x540]</td>
<td>[Image 0x0 to 720x540]</td>
</tr>
</tbody>
</table>

**perspective view of the real world condition as the actor would actually perceive it, being in the scene. This includes foreshortening and obscuring according to point of view.**

**live representation**

**EYE WITNESS, reacting in-situ model**

“this looks too difficult.”

**Partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happened and what might happen next. No foreshortening, but obscured areas.**

**plan/replan representation**

**REPORTER, interpreting decision model**

“*is this the only tricky situation?*”

“If I manage this, the remaining track should turn out easier.”

**axonometric long shot of the complete environment. No foreshortening or obscuring.**

**documentation representation**

**NARRATOR, summarizing omniscient model**

recognize alternatives?

decision faced?

actor questions path?

unanticipated difficulties?

increasing difficulty threatens dilemma - recover soon?

dead end

**design is telling (sharing) stories**
version B: an actor climbs a mountain. being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

animock storyboard:

**on the wrong track**

**w509 camera following the actor in scene**

perspective view of the real world condition as the actor would actually perceive it, being in the scene. this includes foreshortening and obscuring according to point of view

**live representation**

**EYE WITNESS, reacting**

**in-situ model**

“the track continues behind the barrier.”

**drone camera: local overview**

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happenend and what might happen next. no foreshortening, but obscured areas.

**plan/replan representation**

**REPORTER, interpreting**

decision model

“should I attempt to master the obstacle or go back to the fork?”

**god’s eye view: perfect overview**

axonometric long shot of the complete environment. no foreshortening or obscuring.

**documentation representation**

**NARRATOR, summarizing**

omniscient model

recognize alternatives?

decision faced?

actor questions path?

unanticipated difficulties?

increasing difficulty threatens dilemma - recover soon?

how to recover?

dead end

**design is telling (sharing) stories**

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on the wrong track

version B: an actor climbs a mountain. being faced with a fork, he turns to the left, which sidetracks him/her and turns out to be a dead end.

w579 camera following the actor in scene

partial axonometric excerpt of the environment, as the actor can imagine it, based on what just happenend and what might happen next. no foreshortening, but obscured areas.

drone camera: local overview

axonometric long shot of the complete environment. no foreshortening or obscuring.

documentation representation

NARRATOR, summarizing omniscient model

recognize alternatives?
decision faced?
actor questions path?
unanticipated difficulties?
increasing difficulty threatens dilemma - recover soon?
how to recover?
dead end

design is telling (sharing) stories
design tells (shares) stories about the future climbing up a slope, seen from multiple points of view.
This animock example takes a real design scenario as a starting point and illustrates the three dimensions of animocks (blocking, pacing, point of view) and their implications on the representation fidelity/authenticity of the envisioned design. The design scenario that was chosen is a proximity agent architecture for a semi-autonomous monitoring system for a water recovery facility. In the case of operations incidents, the DCI system would notify human agents that would assist the system in trouble shooting the hardware units. The notification procedures involve task interruptions, the replanning of the operators’ task schedules, and the communication among the human operators. Starting with a video of the staged scenario and its transcript, we started to review the original scenario under the criteria of what qualifies it as a good design story and then went on to represent a revised scenario as a full fidelity virtual animock.
Designing an animock as a case study for NASA’s development of a proxy-agent based automation software system, the DCI, we identified a set of story patterns in writing a good design story that creates a space of observation when reviewing a current design stage. The scenario describes a failure response request of an automated system. Human operators that are occupied with routine tasks are interrupted and coordinate their response in roles. The prime engineer gets to the problem site and resolves the problem in remote collaboration with a backup engineer.

- Actors are occupied with routine or first order task. They engage in different such routine tasks while being at different locations.
- An event occurs that interrupts the prime engineer who is, by organizational proceedings, assigned to respond.
- The prime engineer can’t be contacted.
- A coordinating engineer monitors the notification steps followed by the software agent.
- Finally the prime engineer responds and drives to the problem site.
- Resolving the problem, he is assisted by the backup engineer who was previously the prime and had observed symptoms of possible failure the night before.

Storytelling patterns form the structure of the narrative that animates states in the design mock-up.
design tells (shares) stories about the future
blocking in animocks

Blocking - A blocking map charts the spatial properties of the stage.

It shows the geographical relationships of story settings and maps the locations and movements of actors in the course of the unfolding story. It indicates start- and end-points of actor positions throughout the narrative and allows for cross-connection with the pacing diagram as it provides options for a spatial allocation of story key frames.

The blocking map is a spatial long shot and a god’s eye plan view of the animock site.
Pacing - The pacing diagram is a set of timelines that shows each actor's activity over time in relationship to other actors.

The timelines are synchronized by keyframes that indicate events - or major scene changes, initiated by top-down or bottom-up interventions.

These events are marked in addition with communication strings that show who is contacting whom at what point of time.

Lighter shades in the timelines indicate location changes.

The pacing diagram is a temporal longshot of the story progress.

Animock Dimension: Pacing

Animock Notation: View this pacing diagram in parallel with the blocking map on the left. Notice the connections between the two diagrams: Events in an animock take place in time and space.

Key frames (Synchronize with the video DVD), total duration 23min53sec.

* prime is in his office walks over to prime's office
  * prime is at WRS unit
  * prime walks into b2 towards his office
    * prime is in his office
  * prime drives from building 1 to b3

* coordinator is in his office walks into b1 towards his office
  * coordinator is at the WRS unit

* backup is in his office drives from outside to b1
  * backup is in his office

* DCI is in his office walks into b1 towards his office
  * DCI checks the PBBWP

* pete checks on state of response
  * pete assists carroll with WRS repair

* carroll confirms action
  * carroll checks WRS independently

* prime coordinator backup

* WRS incident
design tells (shares) stories about the future
point of view in animocks
design tells (shares) stories about the future
synchronizing the three dimensions of animocks

Animock III / The built virtual narrative in time and space: Scenario notation
Axel Roesler, Josh Schoenwald, Roger Chapman, and Dave Woods. The Ohio State University.

Animock Dimensions: **Blocking and Point of View**

Animock Dimension: Pacing

Animock Notation: View this pacing diagram in parallel with the blocking map on the left. Notice the connections between the two diagrams: Events in an animock take place in time and space.

Key frames (Synchronize with the video DVD), total duration 23min53sec.
Patterns in blocking:

Blocking describes the relationships between actors, stage and events. It is driven by the location of actors

- Being at the work site
- Transfer from one location to another
- Being sidetracked in a different location
- Navigating in a building
- Unnoticed encounter with another actor while driving, navigating on the road: parallel re-location

Patterns in pacing:

Pacing describes the relationship between events and actors, driven by the temporal distance or frequency of events.

- At times boring situation, with little or no change
- Immediate alarm initiates shift to time pressure - addressee can’t be contacted
- Cooperation over a distance under time pressure
- Time available to help, but contact can’t be established

Patterns in point of view:

Point of view describes the relationship between individual actor and event-environment as a goal driven activity.

- Finding the right location
- Finding interfaces to engage in the situation
- Miss the other person while driving by
- God’s eye view not available
- Wrong god’s eye view assumed
design tells (shares) stories about the future

Conclusion

Animocks and Storytelling Engine are intended to support design as a process of building and sharing stories that envision future operations. These labels start our exploration of how to help stakeholders explore what it would be like to practice if potential objects-to-be-realized have been deployed in their field of activity.

But the concept of Animocks and Storytelling Engine are themselves hypotheses about the future of design. This media paper and future explorations of the concepts in the context of design projects function as second order animocks. As a tool for envisioning, the role and characteristics of Animocks and Storytelling Engine will change and evolve as we participate with other design stakeholders in tangible development projects at the intersections of people, technology and work.

Acknowledgements

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Animocks, envisioning and storytelling engines is part of line of work about how to link research — understanding/discovery of patterns in cognitive work, to one layer of design — discovering what would be useful.
design tells (shares) stories about the future

Bibliography: Visual Narrative


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