

## **Visual Storyboarding: Anthropometrics, Innovation, and Designing the Process**

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### Introduction

The movie industry heavily relies on storyboards as an effective way to visually describe the process of a movie. And for a good reason—the storyboard visually describes how the movie flows from beginning to end, how the characters are interacting and where transitions and/or gaps exist in the storyline.

The storyboard is an effective tool in industrial design as well. A storyboard visually describes how users will interact with the product from start to finish and depicts the individual steps in that process that need further examination and analysis. This detail examination, leads to innovative product solutions that successfully address a greater amount of anthropometric/ergonomic issues. In the classroom, when students employ visual storyboards, they are better able to focus beyond function and appearance and resolve a broader range of design objectives.

This paper/presentation will discuss visual storyboarding in terms of its value in communicating what the designed product will do and how people will interact with it. It will discuss visual storyboarding as a tool for identifying opportunities for innovation, examining anthropometric and ergonomic issues, and communicating project concerns to diverse product development groups. The paper/presentation will use examples from industry and student course work to support its premise.

### Visual Storyboards

Industrial designers commonly use task analysis and product scenario techniques to delineate a complicated task or process as a series of controlled steps for analysis and resolution. A visual storyboard supplies the same results, but like a movie storyboard, depicts the steps visually. In this way, a visual storyboard depicts each step in the process in a broader format for analysis and conceptualization without losing sight of the bigger picture.

Through research activities, industrial designers understand how people interact with existing and analogous products. Storyboarding these activities allows the designer to visualize the user's needs and interactions throughout the process of using a product. In this way, designers can focus on and resolve difficult steps in completing a task while designing for the whole process. For instance, students at Georgia Tech recently designed a medical delivery cart for a hospital in Atlanta. Through research and storyboarding, the students were able to visualize and juggle the design issues of storing medication, charging power sources, moving through crowded spaces, and dispensing medication. Solutions offered bases with a wider sections, swiveling, retractable surfaces, and latch-on shelves while still presenting an appropriate image, and a solid structure within a manufacturing budget. Through this project the student's were better able to manipulate the myriad of design issues that needed to be addressed in order to design a superior medical delivery cart.



Fig. 1. Storyboard example from cart project.

Visual storyboards can also be used to help designers identify opportunities for innovation. The operational process for a common electrical kitchen product may be:

1. Remove the product from storage
2. Plug the power cord into the outlet
3. Turn it on
4. Complete the task
5. Turn it off
6. Remove the power cord from the outlet
7. Clean the product
8. Replace the product to storage

The process may be prioritized to step number 4. “Complete the task.” By storyboarding this process the designer can visualize and develop solutions for a step in the process that is not prioritized and perhaps not addressed by competitive products. In this manner, the new product surpasses market expectations by offering more than “complete the task” to the consumer. As an academic exercise, students can visually understand how the priority of the design objectives may change through the process of using the product. For example, in step 1 of the process described above storing the power cord may be an important issue while in step 4, cord storage, has no importance.

An example of employing visual storyboarding as a means to achieve innovation is shown in figure 2.

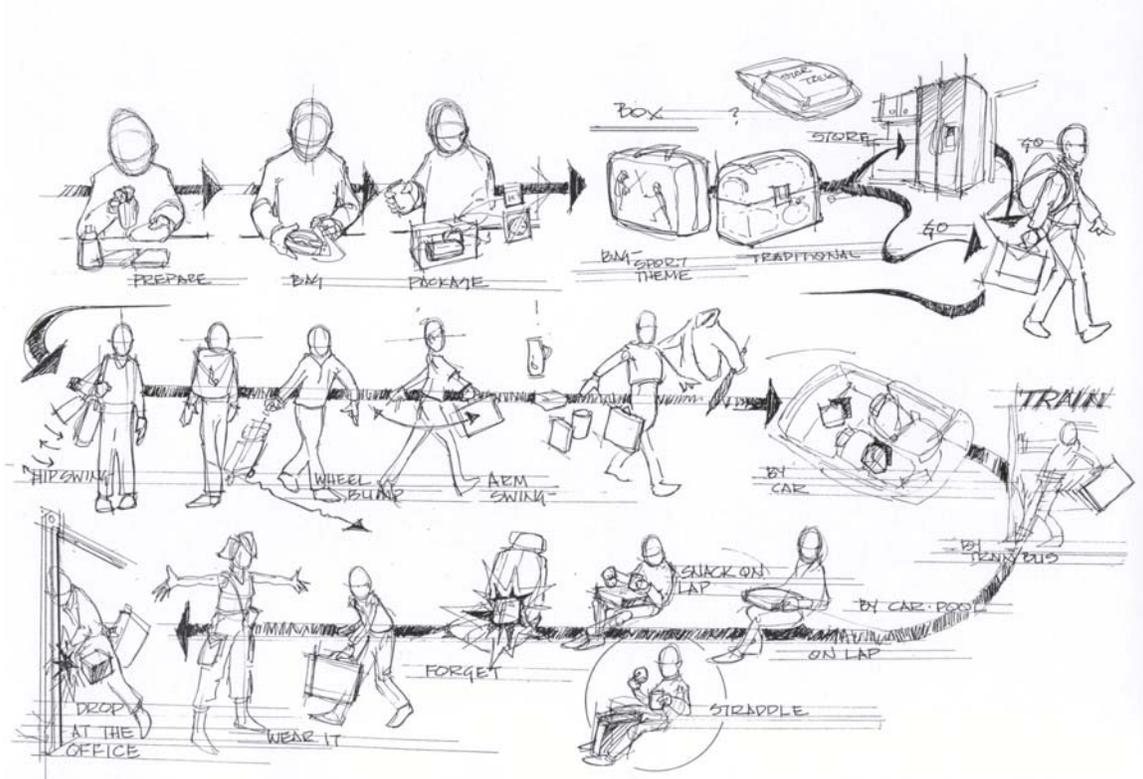


Fig. 2. Storyboard from lunch box project.

In this example, the designer addressed the stable market of lunch boxes where change and innovation is limited to product graphics or surface materials. In this case the designer storyboarded the process of commuting to the office with a lunchbox and briefcase. By addressing this issue in general and in particular, the designer was able to generate several product solutions that address potentially new market segments in professional lunch boxes.

Addressing anthropometric and ergonomic issues is complicated by the range of users' physical and cognitive needs. Visually comparing the anthropometric range of the users early in the project schedule, allows designers to make comparisons and develop solutions while the product concept is still fluid. For example; in the medical cart project, through storyboarding the process, students identified the issue of the nurses' height verses their stride length verses the footprint of the cart. In this way they were able to examine the issue in the concept development phase and test specific solutions in the refinement phase. Storyboarding can not replace physical testing of prototypes but it does allow the designer to examine and address issues early in the project that may require additional examination than was originally perceived. Again, through visual storyboarding designers are able to visualize potential trouble spots or opportunities for innovation by examining the steps in the process of using the product (Figure 3).

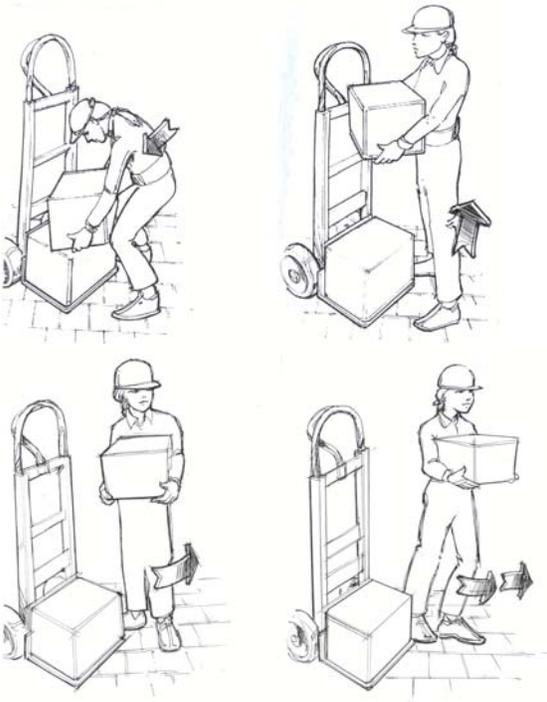


Fig. 3. Storyboard from hand truck project.

### Constructing Visual Storyboards

Visual storyboards are exploration, analysis, conceptualization, and communication tools and as such can be constructed in several ways. Movie storyboards are often hand-drawn for speed and visualization of the story and action. For industrial designers, both photographic and hand-drawn methods are acceptable. Photographic recording (film, digital camera/video) of the research activities provides detailed images that can be examined and presented digitally or as a printed hardcopy (fig. 4). In cases where photo documentation is not appropriate, recording role-playing exercises can help the design team to formulate questions for further examination (fig. 1). Hand-drawn methods are most appropriate when quick examination and conceptualization is the goal (fig. 2). It is important to note that hand-drawn storyboards are not limited by the skill of the designer and, as such, a stick figure is as valid a communication image as a Syd Mead rendering. Regardless of the media, the storyboard allows the designer to examine the individual steps while remaining aware of the over-all process (fig. 3).



Fig. 4. Storyboard from circular saw project.

### Collaborative Projects

A product-development team often includes people representing different disciplines such as industrial design, design and marketing research, product development engineering, electrical engineering, marketing/sales, business/finance, manufacturing engineering, and the user's advocate. All these people have different responsibilities for the new product's success and as such, their point of view on the project will be influenced accordingly. A visual storyboard is an effective technique to help people of different disciplines to visualize the common goal. The storyboard can communicate the logistics of manufacturing and shipping, the advantages of packaging and merchandizing, the user's needs and expectations, as well as, the steps required to disassemble, remanufacture, and/or recycle the product. Given the different languages of the different disciplines, the picture is worth a thousand words and each person on the team can visualize how their inputs are recognized and valued by team. In addition, it allows team members to understand the overlap of the different disciplines and the usefulness of cooperation. All of these attributes will lead to greater market success for the new product and the visual storyboard is the communication tool to that end.

### Conclusion

Visual storyboarding is a valuable tool to industrial designers and even more valuable to industrial design students. The technique encourages designers to examine, analyze, conceptualize, and communicate the different steps that constitute the interaction of a product to the person using it. Storyboarding can help the designer identify areas for innovative product solutions as well as anthropometric and/or ergonomic problems. Furthermore, it can help to communicate different concerns to a diverse product development group. Visual storyboarding can help student designers to better understand the broad scope of product development as well as the value of designing the details while still considering the overall objective for the product.

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