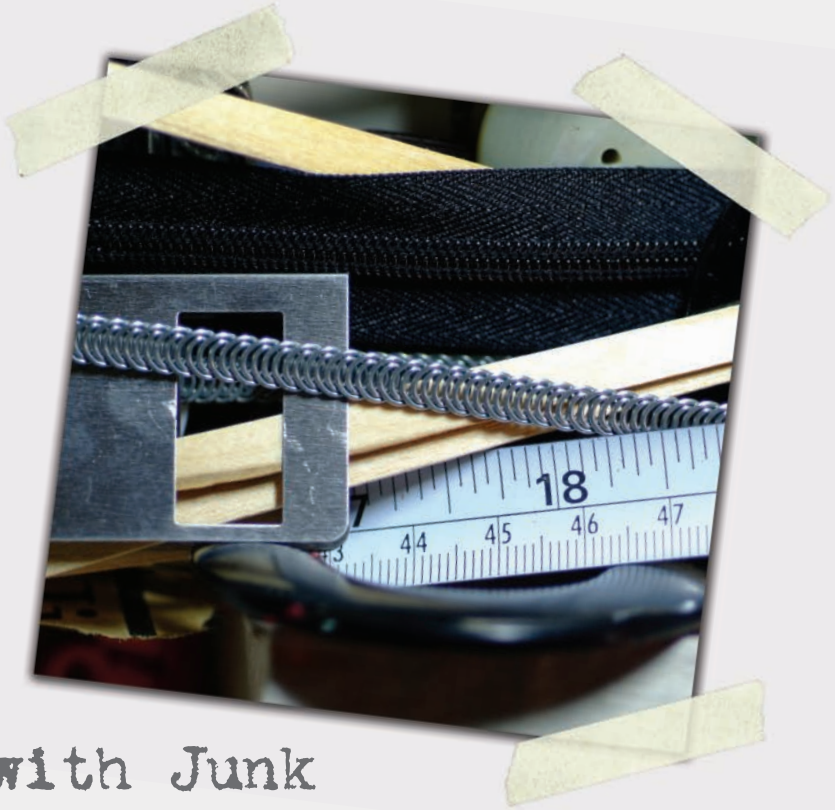


Prototyping with Junk

Nancy Frishberg, PhD > nancyf@acm.org

Interaction designers typically work with digital prototyping tools that have 2D (or at best 2.5D) visualization capability, e.g. Photoshop, Illustrator, Visio and even Powerpoint. Carolyn Synder's book *Paper Prototyping* encourages interaction designers, irrespective of artistic training or confidence in sketching, to use paper and markers to mock up screens [1]. She promotes these artifacts for their speed, low cost, ability to make ideas tangible, and lets users respond to them.

Industrial designers often make rough 3D models simply to play out ideas in low-cost but physically tangible form. Likewise, three-dimensional modeling is employed by architects, structural engineers, and industrial designers both in training and in practice.

Why Junk?

We take paper prototyping one step further. We bring the materials of kindergarten to the world of design to achieve at least four goals. Prototyping with junk...

- makes you talk: encourages communication both within a team, and between the team and other stakeholders
- makes design tangible: gives a product concept or workflow a physical instantiation
- costs little: quickly visualizes proposed solutions with little investment of time or money
- promotes fun at work: The playful attitudes that are associated with these materials allow creativity to blossom.

Where Have We Used Junk?

This technique has been successfully used for team-building and at design workshops. The challenge for planners is determining how much (or how little) structure to give in the design problem. The amount of abstraction can also be adjusted to focus on product, service delivery, or workflow, as just three examples.

Management Team Building

With a corporate reorganization, 60 senior engineering staff and managers had recently become a single divisional unit. As a team-building exercise, we divided the group into eight teams, matching the number of workgroups in the division.

Each team had at least (and often at most) one person from each featured workgroup, while the other team members were from the other departments. All teams had a time limit and a table full of starting materials (with additional extras in a common area). Their task was to "describe the workgroup's mission and function in our division and the company."

Results: We ended up with eight highly distinctive models, made of paper plates, pipecleaners, cornstarch "peanuts," and a variety of playful materials that represented the organizational chart, the workflow, the relationships between departments, or a key process used by that department. The exercise revealed the department functions by overtly showing intangible relations or activities. It also paved the way for continuing communication among new colleagues.

CHI2004|ICSID FORUM

This two-day session aimed to familiarize interaction designers (IxD) and industrial (or product) designers (ID) with one another's work practices by posing a design challenge, offering a genuine encounter with target users and providing time for revision of initial designs (http://www.chi2004icsid-forum.org). Most of the 40-plus people who attended this meeting were strongly identified with one design practice or the other. The 3D prototyping activity constituted two hours (or less) of the first day (before visits to target users), and a segment of the second day (when designs were refined based on what had been learned from user contact). Each of the six teams showed their junk prototypes in the final judging event, recapping product concepts and processes used.

Results: Participants gave the exercise positive reviews, appreciated the chance to use Presumptive Design (see the prior article by Leo Frishberg) including rapid, iterative prototyping (and customer feedback) in the exercise, and expected to incorporate it into their work practices at home.

SEC05

Fashioned on the CHI2004|ICSID Forum, this workshop was organized as a two-day hands-on exercise in design. Participants ranged in background and professional identity from engineering, marketing, research, only a few of whom call themselves designers. Like the prior event, the four teams had two hours to prepare for their encounter with the target user population and a wealth of "junk" materials. Unlike the prior event, we explicitly encouraged each team to prepare an artifact to discuss with users.

Results: Again, participants were impressed by how Presumptive Design allowed competing solutions to be iterated rapidly with customer feedback.

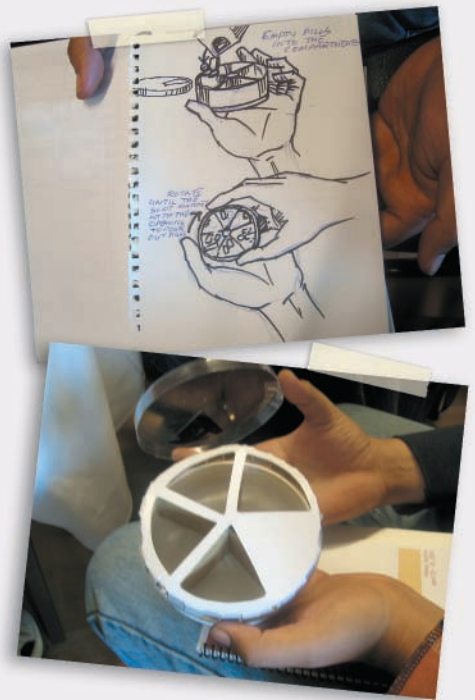
Usability Sprint II

"Prototyping with junk" was one segment of a multiday experiment in extreme usability (http://www.flossusability.org/wiki.pl?Sprint200508Agenda). Working with one of the three focused projects, we invited three teams of two to three users and developers to spend just over an hour and portray their understanding of a workflow for a proposed Web site. The participants functioned as designers for these few days. We left open to each team which workflow they would depict; prior discussion had hinted at several possible choices. In fact, each team chose to model the same workflow — a "find" task, rather than the "contribute," "collect," or "compare" tasks.

Results: The three prototypes revealed different details of the user's path, decision points, risks, and successes. The fact that all three teams focused on the same workflow scenario may have indicated a shared belief that the chosen task is easier to describe, though none would claim this task is more important nor frequent. The discussions during prototyping accomplished two goals: i) deepening everyone's understanding of the specific problem (workflow for "find"); and ii) causing strangers to become collaborators. The discussion following prototyping focused quickly on the other scenarios, and referred back to the models in extending solutions.

What Is Junk?

Materials collected from the recycling bin are great additions to those found at school supply shops, the dollar store, and sale tables of your favorite craft counter. Picnic supplies, such as paper plates, as well as cafeteria (or fast food) cardboard trays work well as a base or frame for other structures. Pipecleaners, packing materials, coffee stirrers, toothpicks, wooden ice cream sticks, wire hangers, egg cartons, and the usual selection of old magazines or gently used gift-wrapping paper and ribbons also make great prototyping materials. We supply inexpensive plastic toys, party supplies, twist-ties, modeling clay, candy past its expiration date, and beads, as well as various sorts of cutting implements, glue, and tape. Paper,



A clear plastic lid is recycled as the dial of a prototyped pill dispenser.

pens, and crayons are invited as well.

Observations

Most work activities favor the person who excels in spoken or written communication. In most business environments, visualization is appreciated, but not cultivated. Prototyping with junk goes one step further by stretching and elevating tactile and spatial modes of expression.

As we observe industrial designers in these modeling activities, we notice that figure and ground are willingly turned upside down: Containers and the wrappers often become the primary prototyping materials in these exercises.

Creative design employs nonliteral thinking in the physical dimension to induce thinking outside boundaries in more abstract functional dimensions.

The exercise values novelty, approximation, and humor [2]. People of all backgrounds portray the intended object, simulating rough shape or relative size or weight, while distorting or ignoring many other dimensions. Attitudes toward abstractions such as processes are revealed in juxtaposition, metaphor, and narrative.

One downside of prototyping with junk is that its benefits accrue to physically present participants. We've attempted to include people remotely by audio or even video conference, but so far have found it difficult to integrate the local and remote.

The overt, externalized results appear as these representations made of otherwise useless materials. The covert, intangible results include lasting communication within an ephemeral or stable work group.

REFERENCES **1.** Snyder, Carolyn, *Paper Prototyping: The Fast and Easy Way to Design and Refine User Interfaces*, New York: Morgan Kaufmann, 2003. **2.** Weinstein, Matt, *Managing to Have Fun*, New York: Simon & Schuster, 1996.

ABOUT THE AUTHOR *Nancy Frishberg consults with organizations to design products and services by employing qualitative and quantitative data-gathering methods in their strategic decisions. Her professional career spans industry, academia, and nonprofit organizations. At Sun Microsystems, her team conducted the first laboratory usability study (2001) of the GNOME desktop, a large scale Open Source Software project. At New Media Centers, Apple, and IBM, Nancy advanced academic computing for teaching and learning, and created award-winning multimedia applications with tools designed for nonprogrammers. Frishberg holds a PhD in linguistics from University of California, San Diego. Leo is her brother.*