From Tangibles to Toolkits and Chaos to Convection – Management and Innovation at Leading Design Organizations and Idea Labs

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One of the first things one notices at leading design firms is the way in which they have many artifacts scattered about, from which designers can evolve new ideas and design concepts. Not only their own products, but also interesting designs from competitors are displayed and made available to pick up and examine. IDEO, for example, has a full-time staff member in charge of acquiring and curating this gizmo collection; new devices are continually collected, announced through publications and online lists, and made available at a central location (purposefully located in an area of heavy traffic flow) for their designers to examine and even checkout as one would a library book. I've found stockrooms to serve a similar purpose; when in search of an idea or solution to a problem, wandering through aisles stocked with different kinds of items and materials (the more categories the better) often provokes several ideas, frequently unrelated to the original purpose of the items on display. One unfortunate side effect to the rise of Internet retail is the shrinking and eradication of corporate and university stockrooms; the hidden cost in lost ideas isn't easily calculable.

Perhaps there is an analog to this "artifact" concept in the world of management via case studies. The tangible nature of the designer's artifacts, however, provides a major difference. Being able to pick up and manipulate these items with your hands and to physically feel and observe the way they work engages something very primal. We learn with our hands – although one can study and understand a concept through literature and diagrams, physically engaging with an actual object produces a deeper understanding – it stimulates the kind of intuition that is often critical to a designer.

A major trend in human-computer interaction research is termed "Tangible Interfaces"[1]. This movement has the goal of changing the dominant means of interacting with information; moving away from today's graphical user interface (GUI), where we manipulate visual abstractions projected onto a flat screen. Proponents at the Tangible frontier are trying to move the computer interface into physical objects that can be more naturally manipulated. Information is then represented through some kind of physical abstraction; the data or concepts connected to the object are then explored through physical manipulation, much as the way the designer handles artifacts to obtain a deeper understanding of principle and aesthetic. It comes as no surprise that some of the best practioniters in this field are also designers, or have strong empathy with design principles. One can perhaps conceive of tangible toolkits for management processes, enabling physical exploration of organizational dynamics, a company's fiscal or logistical status, etc. As tangible interfaces provide a means through which information can become physical, this paradigm could offer managers a means of tactilely exploring possibilities, much as in the way a designer engages with artifacts.

Many varieties of tangible interfaces have been developed Hiroshi Ishii and his Tangible Media Group [2] at the MIT Media Lab. Some of these projects explore information manipulation relevant to management applications. One example is the SenseTable [3], a desk-sized surface that is able to identify and track a set of pucks horizontally, vertically, and rotationally. Each puck also hosts a local control of some sort (e.g., a knob). The pucks can be dynamically bound to information that can be explored by moving them about the table and manipulating their local control. An overhead projection onto the table defines a dynamic, visual input-output space, immersing the user in the presentation of the data and its manipulation options. Other relevant examples are the Tangible Query Interfaces [4], designed by Brygg Ullmer. These are a set of compact electronic "widgets", each of which have a set of local controls and co-located display, that allow people to physically express and manipulate queries into databases and large information aggregates. These devices can be used independently or docked in any combination to a graphical base station, allowing finer exploration of their associated information.

Toolkits, in general, have another purpose that is especially appropriate for innovative organizations such as design labs. They coherently encompass a set of capabilities, enabling people unfamiliar with the underlying technology or set of concepts upon which the toolkit is based to rapidly assimilate the necessary principles and basic experience needed to begin applying them in their work. Toolkits can include anything that's relevant; they range from physical objects through electronics hardware to software. Toolkits go beyond the collections of artifacts that design labs curate; they enable designers to engage with the principles driving the devices and rapidly assimilate them. Studies of corporate innovation [5] have recognized the importance of toolkits for stimulating the creative process. Oftentimes, the breakthroughs come when the tools are used in ways they weren't intended. One of the main challenges in technology innovation is to determine what the "killer app" will be for a particular development; history abounds with quotes from inventors expounding on what their invention will enable, only to be dead wrong when their brainchild succeeds for an entirely different reason.

Much as in the way that design houses tend to encompass talent spanning many different specialties, the MIT Media Lab is home to an extremely diverse set of people who hail from very different backgrounds, ranging from art and design to physics and engineering. Much as how the scattered artifacts in the designers' collection or the diverse items on the shelf of a stockroom can stimulate innovation, the mix of backgrounds, expertise, and goals deriving from such a hyperdiverse group can produce frequent jolts that keep the participants on an edge – people who survive in such an environment naturally move to the boundaries between disciplines where new fields of inquiry can sprout.

Several components are important to keep such environments together. At the Media Lab, toolkits play part of this role. A group can encapsulate a sliver of its expertise into a toolkit, which can then be used by others for entirely different (and quite unanticipated) applications. Thinking of the Media Lab as a pot on the stove, the toolkits

are the transportation mechanism for a convective process of learning and communication. Devices produced by the engineering groups propagate up to the content groups, where they are pushed into unanticipated niches. These applications filter back, inspiring the inventors and stimulating them to innovate further, and the process begins anew. Of course the flow doesn't need to begin with engineering – just as artists can be inspired by a piece of technology, the technologists can be inspired by content. The important thing is that a process exists by which knowledge and innovation can be transported across intellectual boundaries.

Other factors, such as the emphasis on "demos," play important roles in breaking disciplinary barriers at the Media Lab, which is very much a "show me" environment. It is mandatory that students produce some kind of encapsulated "demonstration" of their research. This need not be anything like a final product (and is generally far from this), but it must somehow embody the core principles of their research. The goal is to enable them to powerfully and simply convey their directions, concepts, and results to a general audience, including our industrial sponsors and other visitors. Demos, however, also serve an important internal function in enabling groups arising from different disciplines to easily show their work to one another and spread concepts about – they are very much a common language in conveying concepts to different groups and crossing the art/technology boundary.

Perhaps the most important factor in keeping an organization like the Media Lab mixed is our students. Although I've used the term "artist" and "technologist" as separate quantities in this text, each individual is a weighted vector sum of both, some more one way than the other. We tend to bring in students at the middle, able to understand something of each perspective. Even in the cases where they are firmly at one end or the other, their colleagues in the middle serve as conduits, infecting them with artistic outlook or technical concepts. Although students belong to particular research groups, their social structures respect no group boundary. They freely associate with one another, and, of course, talk about their work. Keeping open minds, they'll take what they've seen in one group (again, often by catching the demo), establish an impromptu collaboration with a colleague elsewhere, and produce a cross-genre hybrid that's quite unanticipated. Many of our best projects get started that way.

Interdisciplinary organizations, in particular, are by nature unstable. They can dissolve along several pathways as they grow and evolve. One is a drift towards specialization. Even though the physicists that you first hire into a nascent interdisciplinary team can talk with the musicians and graphics artists (after all, that's why they came in the first place), the physicists that they hire may be less inclined to cross boundaries, and the physicists that they hire get even more specialized. In the best of cases, this is due to a success; a part of the interdisciplinary group has indeed invented a new discipline, and splits off to explore it full-tilt. In a less positive scenario, the split is due to a communication breakdown resulting from organizational drift.

It has been said [6] that the maximum size of a functional organization is roughly 150 people; if it gets much larger, they lose familiarity with one another and no longer function as a group. Interdisciplinary organizations may have even stricter quotas – in

order to relate, they need to understand each other across wide conceptual gulfs. Providing effective management mechanisms to dynamically tune and adjust these organizations such that they optimally innovate is a challenge that becomes ever more important as these "idea factories" propagate and grow.

References

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[2] See: http://www.media.mit.edu/tangible

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[6] Gladwell, M., The Tipping Point, Little Brown & Company, 2000.