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Reading Responses

**Prototyping for Physical and Digital Products Response:**
Prototyping for Physical and Digital Products is a piece advocating for the practice of prototyping. Putting one's idea into the real world instead of keeping it in their head can be very relieving and allow one to more easily recognize the best path forward in creating their product. Firstly, prototyping helps to understand the problem at stake. Making many different variations of a single idea helps one (and one's team) to understand what exactly that idea means and how the different options for its physical manifestation effects its purpose. Iterative prototyping to test and improve is possibly the most important use of prototyping. It allows one to refine their idea: remove aspects that are unimportant, add aspects that are more influential, and get to the core of what the product really needs to be. Prototyping is also useful to get people interested in your idea and prevent miscommunication. It is much easier to sell an object then an idea because in the form of an idea, the imagined object may be different in different people's heads. For possible investors, it is important to see exactly what it is they might invest in, or else they might expect something in the final product that was never meant to be there. Lastly, prototyping is important as a means for advocacy of a design or direction. The feedback that is received from user testing helps to influence what aspects of a product should be modified, enhanced, or removed. Different prototype fidelity levels help to address different levels of idea-refinement.

Low fidelity prototypes do not look or feel like the finished product. Instead they resemble it on a technical or conceptual level. At this stage, prototyping helps to decide what technology is best to use and generally how to realize an idea in the form of an object. Mid fidelity prototypes resemble the final product on an operational level. They exist within the final medium and they are partially designed. With this increased level of prototype refinement comes an increased level of specificity in testing assumptions. They take more time to make, but the problems they address are more nuanced. High fidelity prototypes are attempts at making the final product. Every single aspect of this prototype is chosen for a reason and no feature is a test feature.

**Designing for Emerging Technologies: Intelligent Materials Response:**
In a world where intelligent materials are fully realized and implemented, all of our interactions that currently take place between us and a screen would be replaced with interactions between us and the material objects that exist around us. Ideas such as Adaptive Materials and Programmable Matter illustrate what it means for atoms to be controlled by bits. That is, our physical, material environment to be dynamic and affected by sensory and computational operations. Now, the word material is almost opposite to the word digital. But this does not

have to be the case.  There are many scientific advancements in the creation of materials whose state can be changed according to a computer's control.  Similarly, materials whose physical structure can be fine tuned at a microscopic level can be optimized for a specific purpose.  This approach to intelligent materials is very interesting because it shows how intelligence can exist without computers.  These materials are not controlled by bits, instead, their complex structure becomes the mechanism they use to address a complex problem.

Materials existing in nature that have been refined through the process of evolution exhibit this idea of embodied intelligence.  Through the process of natural selection, our skin has become profoundly intelligent in the way it secretes moisture, grows hair, or senses the world around it to an extremely high level of fidelity.  We take our skin for granted, but in reality we can only hope to recreate a material with a fraction of its intelligence.   As Dr. Markus Buehler states, these natural materials have been developed under extreme evolutionary pressure.  Given as much time as they have had, this evolutionary pressure doesn't even come close to the pressures that comes from the competitivity that drives our technology industry forward now.  The best we can do is learn from everything that nature has already shown us.

Naturally, the one thing that is preventing us from attaining intelligent materials is our (in)ability to manufacture them.  Most 3D printers on the market are only able to print with one material, usually certain types of plastic.  But what if they could print with multiples materials all at once like silicon or other semiconductors, plastics, and metals, or even living cells?  Dr. Jennifer Lewis is developing revolutionary additive manufacturing processes that allow just this.  Her advancements in this field are propelled by the sentiment that, "Integrating form and function is the next big thing that needs to happen in 3D printing."

**Designing for Emerging Technologies Response:**

A disruptive technology is recognized as such when it alters the way people live in a significant way.  Disruptive technologies have the ability to unsettle billion, or even trillion dollar industries by introducing an item or process that is fundamentally new.  Past examples are the car, printing press, industrial manufacturing, and the internet.  There are many technologies now that have the capacity to be just as, if not more disruptive than these examples, but the maturation of these emerging technologies into disruptive ones hinges on their ability to be implemented into the fabric of society—and this implementation relies on designers.  A technology has been fully adopted by society when its existence is taken for granted.

One way to spot a disruptive technology is to observe popular culture.  Technologies such as robotics and artificial intelligence have sparked numerous Hollywood productions that capitalize on and facilitate society's obsession with computers that resemble humans in some way.  Often times, however, the way that Hollywood depicts emerging technologies is faulted and only helps to condition society to fear the future rather then embrace it.  In reality, truly disruptive technologies come about in ways we could never predict.

Similarly, in the cell phone industry, the curved edges on the Iphone Six are not new in comparison to the sharp edges on the “old” iphone five, yet companies are able to reliably convince consumers that new as defined as current is equal to new as defined as newly different, or not similar to past newness. This is fake newness, newness that is constructed for a specific goal which is not really new. Something really new, new beyond difference, is only identified through the paradigm shifts it triggers in areas that are seemingly untouchable.

Naturally, the most important thing to consider when implementing a technology into society is its ethical implications. In the past, disruptive technologies such as industrial manufacturing have come at the cost of destroying our environment, encouraging the proliferation of horrible living conditions, and creating massive gaps in socio-economic class hierarchies that take centuries to mend. Here, it is arguable that a disruptive technology has done more harm than good and it is where the “Eight Design Tenets for Emerging Technology” must come into play if we are to not repeat the same mistakes.

Works Cited

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