

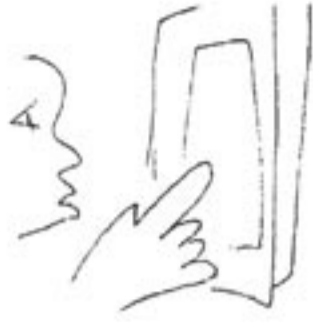
DESIGNING INTERACTIONS

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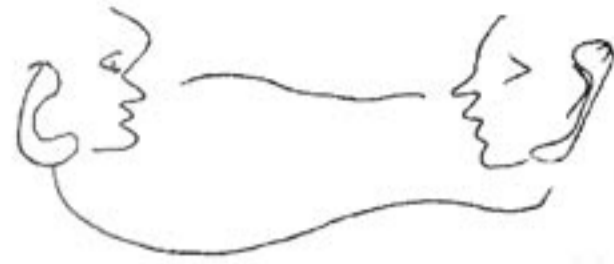
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BILL MOGGRIDGE, JUNE 2004





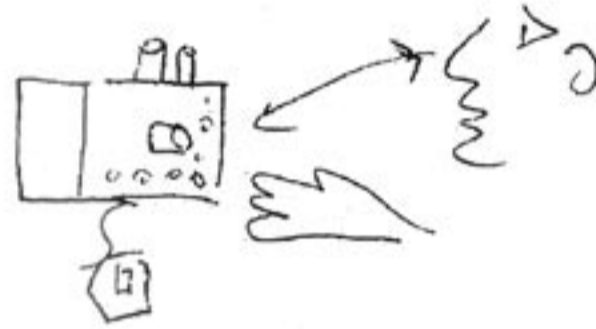
Ⓐ HCI / HUMAN FACTORS



Ⓑ (TELE) COMM



Ⓑ MASS MEDIA



Ⓐ INTERFACE / PRODUCT DESIGN



Ⓑ SOCIAL STUDIES



Ⓒ INFO & DOC MANAGEMENT

Any aspects of product design where:

- └ objects are quasi-subjects
- └ interaction is heavier
- └ information exchange is high

1. WHAT IS INTERACTION DESIGN?

“BROADLY, INTERACTION DESIGN IS THE DESIGN OF EVERYTHING THAT IS BOTH DIGITAL AND INTERACTIVE”

Design has always been concerned with interactivity. When you design a simple object like a wine glass, the interaction between the person who uses the glass and the object itself is at the forefront of your mind. You think about creating a beautiful shape for the glass, but you also think about what it looks like as you pour the wine into it, what it is like to feel the shape of the stem in your finger tips, to lift it to your lips, to smell the bouquet, and to feel the rim of the glass as you take a sip. You think about all the interactions with the object, from the point of view of everyone who will interact with it, from manufacture, through purchase, the cycle of use, and finally recycling or disposal. The designer aims to make those interactions as enjoyable and satisfying as possible. →

The new discipline called “Interaction Design” has emerged to design interactions enabled by digital technology. The traditional approach to designing interactions, like that for the wine glass, does not help the designer to navigate in the artificial context of bits, pixels, input devices, users’ conceptual models and organizing metaphors. A new discipline is necessary to equip designers with the knowledge and tools that allow them to “create or contrive for a particular purpose or effect”¹ in this digital context. →

Here is Nicholas Negroponte’s 1998 description of the emerging digital age: “The decades ahead will be a period of comprehending biotech, mastering nature, and realizing extraterrestrial travel, with DNA computers, microrobots, and nano-technologies the main characters on the technological stage. Computers as we know them today will a) be boring, and b) disappear into things that are first and foremost something else: smart nails, self-cleaning shirts, driverless cars, therapeutic Barbie dolls, intelligent doorknobs that let the Federal Express man in and Fido out, but not 10 other dogs back in. Computers will be a sweeping yet invisible part of our everyday lives: We’ll live in them, wear them, even eat them... Yes, we are now in a digital age, to whatever degree our culture, infrastructure, and economy (in that order) allow us”. (Nicholas Negroponte, a founder of MIT’s Media Lab, 1998)² →

We seem to be well on the way towards fulfilling these predictions, although the “dot com madness” has faded and the invasion of technology was temporarily slowed by the economic downturn. Even if you doubt that we are already in a digital age, it is clear that we are marching relentlessly

towards a condition where everything that can be digital will be digital.³ →

It is also true, even if not always recognized, that everything is designed, whether it is digital or physical. Don Norman makes an eloquent case that we are all designers⁴, in that we manipulate our environment, selecting, building, buying and arranging everything around us for our own purposes, and to our own satisfaction. Before we get to do that as individuals, professionals have already designed most of the items that we can choose and manipulate. →

There is a long tradition of design of the physical artefacts that we surround ourselves with, from architecture and civil engineering for spatial structures, through mechanical engineering and industrial design for everyday products, to haute couture for fashion. The infrastructure of education and disciplines for these skills is well established and understood. The challenge for Interaction Design is to develop similar skills and education for the design of everything that is both interactive and digital. →

“EVERYTHING THAT IS BOTH INTERACTIVE AND DIGITAL INCLUDES OBJECTS, SERVICES AND EXPERIENCES”

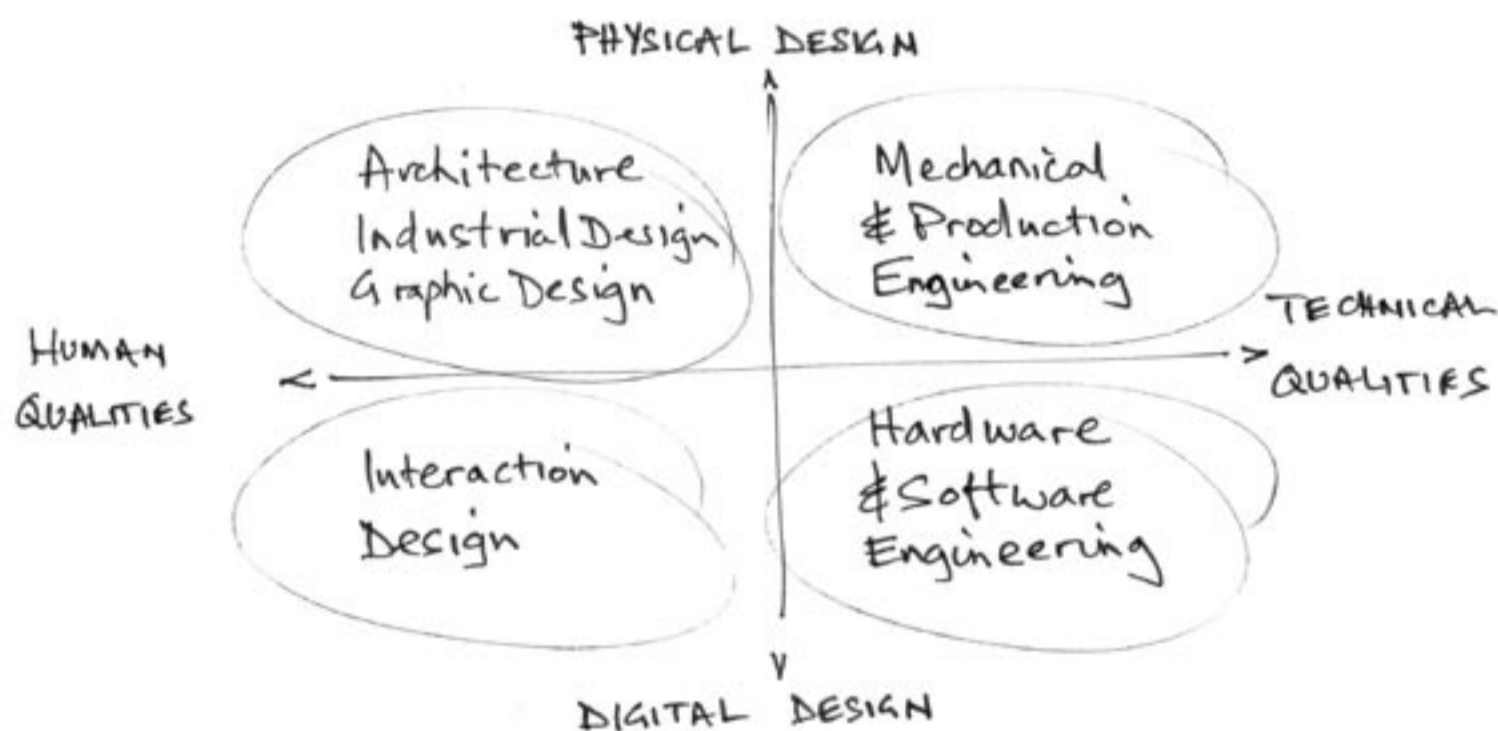
“Interactive Digital Objects” encompasses all of the things that include electronic technology, or are enabled by electronic technology. We usually think of technology as expressed in the design of the personal computer, with keyboards, mice and screens, but digital objects are much more pervasive. Think of interactive toys, greeting cards with verbal messages generated by chips, or toasters equipped with fuzzy logic. In cars the value of electronic technology continues to grow, and was already more than a third of the total cost of a typical vehicle by the 1990s. Computer systems control instrumentation, fuel economy, emissions, and emergency behaviors like airbags and antilock braking. Most people are unaware how much of their driving experience has been subtly altered by this technology, which has invaded the vehicle transparently, so that we don’t see it. →

“Interactive Digital Services” includes all the aspects of services that you use that are enabled or enhanced by electronics, including everything that makes use of the internet, as well as parts of simple everyday experiences. Think of telephone calls, banking, and online transactions. An airline has digital booking systems, information services, and control systems of all types from ordering food supplies to flying the planes. When designing services, one tries to think about designing the whole experience, and it is surprising how often the digital context occurs. →

“Interactive Digital Experiences” is useful as a catch-all for the design contexts that do not fall neatly into the object and service categories. In the computer realm, software for operating systems and applications is included, and this can apply to personal computers, laptops, palmtops and increasingly telephones, as internet access and messaging gain in popularity. It can apply to computer and video games, as well as other forms of interactive media and entertainment where digital technology is present. It can also apply to environments that are mediated in some way by digital technology; think of museum spaces, exhibits, hospitals, libraries, trade shows and art installations. It applies to the web sites and navigational structures on the internet that are focused on information and communication, rather than services. Think of everything that is more than an object or a service, where digital technology might help.

“A NARROW DEFINITION OF INTERACTION DESIGN IS THE DESIGN OF THE SUBJECTIVE AND QUALITATIVE ASPECTS OF EVERYTHING THAT IS BOTH DIGITAL AND INTERACTIVE, CREATING DESIGNS THAT ARE USEFUL, DESIRABLE AND ACCESSIBLE”

One can also think of Interaction Design in a narrower way as a discipline that is related to the experience and background of other design disciplines that deal in aesthetics and qualitative values, like Architecture, Industrial Design and Graphic Design. It is the equivalent of these disciplines in that the first concern of the designer is the values of the people who will use the design; the aesthetics, subjective and qualitative values, and human factors: the designer creates a solution to give pleasure and lasting satisfaction, and hence to fit the market, business and social requirements.



The broad view of Interaction Design includes the work of HCI (Human Computer Interaction) professionals, computer scientists, software engineers, sociologists, cognitive psychologists, cultural anthropologists and designers. It is natural for people outside the design and development disciplines to see this broad view, as they react to the resulting designs in terms of the experiences they have as users of interactive software, devices and services. If they think about the design at all, they are likely to do so as a holistic overall result, as they don't understand the individual roles of particular disciplines.

The diagram shows the positioning of Interaction Design as similar to Architecture, Industrial or Graphic Design, except that the context is digital rather than physical, and the designer operates in the technological domain of hardware and software, rather than the two-dimensional domain of print, or the three-dimensional domain of objects and spaces.

The curriculum of the Interaction Design Institute Ivrea (IDII) focusses on educating designers within this narrower definition of the discipline, drawing in students

with a broad range of experience from both subjective and objective design disciplines, and teaching them how to design fluently in the digital realm. The website www.interaction-ivrea.it says, “Interactive technologies need a new kind of design, a fusion of sound, graphic and product design, and time-based narrative. Developing this new kind of design will lead to a new aesthetic: one of use and experience as well as of form. Function and information (and perhaps entertainment) converge”.

2. ADOPTION OF TECHNOLOGY

This new kind of Interaction Design is most important when digital technologies are mature enough to be used for everyday life outside the workplace. David Liddle was project leader for the design of the Xerox Star, the founder of Metaphor Computer, and head of Interval Research. He has a simple explanation of the development phases that a technology can be expected to go through, a process that has profound implications for designing interactions, as the nature of the design process changes as each phase is reached. Here is his explanation of the enthusiast phase, the professional phase and the consumer phase:

“In the twentieth century at least, the adoption of a fresh technology, ordinarily passed through three stages, and seems to continue to do so now. Sometimes one of the stages may be very small.

The normal progression is first to enthusiast users, who actually love and appreciate the technology in an aesthetic way, who enjoy exploiting it. The fact that it may be difficult to use actually adds to the fun, and it's certainly the case that competing variants of it will always be operated very differently. This was clearly true of automobiles, clearly true of cameras and all photographic equipment, true really of all the things like that that we might think of. The enthusiast phase is important because the enthusiasts take the technology far beyond what the inventors and designers imagined could be done with it; they show the extremes of its potential. During this period there's always a great deal of ferment, quickly produced competing approaches. The controls for such a technology always vary a lot, because for a while at least, people try to use them as the basis for competition. If you're an enthusiast you're somewhat

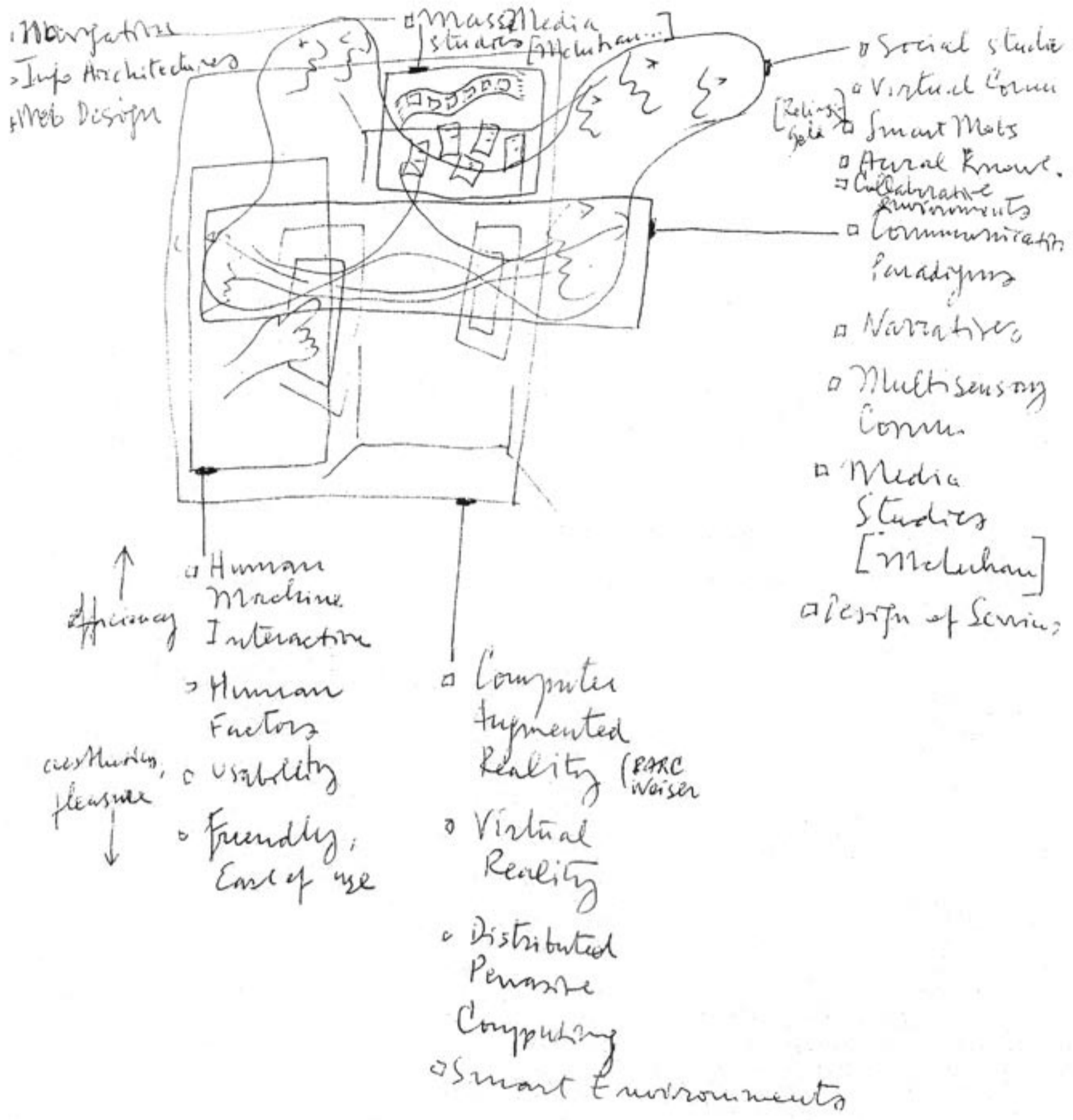
proud of your ability to manage all of the complexities and difficulties. Early automobiles broke down every four or five miles, and you had to stop and pump up the tires, or re-crank the starter or something, but that was a good part of the fun. It was after all just a Sunday afternoon thing that you did.

Once enough enthusiasts have their hands on a technology, sooner or later one of them will say, “I can use this in my work!” They get a clever idea about how they're going to do something really practical with it. Notwithstanding that they enjoy its use, they decide to find a way to fit it into some practical part of their life, either literally their livelihood, or at least their home life in a practical way. As this begins to happen, there is a great change in the priorities of the developers of the technology. For one thing, they become more focused on costs and prices, not because it's going to become inexpensive, but because it will now be judged to some extent by how practical or useful it's going to be. The people who buy it, whether business people or consumers, are now saying, “Well, is that worth it for what I'm going to do?” There becomes a much more stabilized view about how much things are permitted to cost, and reliability and so on becomes important, but particularly we see the standardization of controls.

After a product has built up big enough volumes through this business phase, that's when suddenly one begins to reach a price point where it's practical for consumers to buy it. It goes from being the buy based on the aesthetic property for enthusiasts, to a practical return on investment kind of purchase by a professional, and now it becomes a very easy discriminatory purchase for a consumer, who feels it's practical and within their price range.

The enthusiast wants that product to say, “Exploit me! Look at my capabilities”. The business user wants the product to say, “Look at the productivity I can give you; here's how I'll change your activities”. The consumer wants the product to say, “Look at how I fit in with your style! Here's who you are. Use me and enjoy my capabilities”.

In this consumer stage the priorities for the product have dramatically changed, and one thing that we always see is that most of the important controls become automatic; for example, automobiles have automated safety functions, and cameras are automated to allow you to point and click. In this third stage we see prices that allow easy consumer decisions, the automation of the most subtle and important of the controls, and a great emphasis on the compatibility of the lifestyle of the purchaser with the image of the product”.



- Inhabited Spaces of Knowledge
- the third space

Sketch by Marco Susani.

These three phases need different design skills and processes to achieve success. Inventors are often good at coming up with the first version of a technology, and can find the “enthusiasts” to adopt the technology by creating nothing more than an innovative solution. A design team of one person is sometimes enough, although great inventors like Thomas Edison employed a team of experts to increase their output. ↪

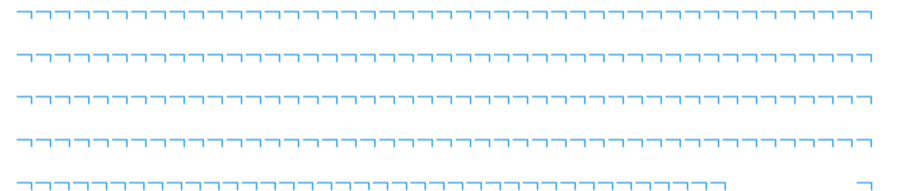
The inventor, even when supported by a band of technicians, is no longer able to develop the technology once it enters the “professional” phase. New values apply to the design when people adopt the technology for practical purposes in their work. Now it must be reliable, it must perform consistently, it must be priced to offer reasonable value, and above all it must be both useful and usable. This is a much more demanding set of requirements than the invention of the version of a technology that will appeal to the enthusiast. Large and complex organizations for development of new products and services in companies have evolved in response to this set of needs. Teams of developers must include people with scientific, technical and engineering skills to provide performance and reliability, business and value engineering skills to create solutions with the right balance between price and value, and marketing and human factors expertise to ensure the combination of usefulness and usability. ↪

A design for the professional phase does not need to be easy to use, as people take pride in acquiring skill in their work; their learned skill separates them from the unskilled and allows them to feel expert. It does not have to be enjoyable either, as people tend to take their work seriously, and be willing to try hard to be productive, even if the experience is not always enjoyable. Education for human factors professionals has evolved around this need for professional productivity, with methods that focus on evaluation of the way people use technologies in their work life, both civilian and military. The version of this contribution in digital technologies is called Human Computer Interaction (HCI). ↪

The makeup of a design team needs to change once again when a technology enters the “consumer” phase. Ordinary people will not buy products and services unless they like them, and find them easy enough to use to be valuable. There are plenty of examples where things are not so easy to use, and cause frustration, but the basic value proposition must be there. The VCR is a good example of this, as the basic function of playing a tape is an excellent piece of interaction design; you push the tape cassette into a slot that is easy to see, the mechanism grabs it and automatically starts the tape. Press the eject button and the cassette is

presented to you. By contrast, the functions needed for recording were badly designed for many years after the VCR was cheap enough to be accessible to consumers, with incomprehensible remote controllers, cryptic feedback, and little use of helpful automation. This classic example of bad interaction design persisted, resulting in all those examples of un-programmed VCR displays flashing “12:00”, until the interactions eventually made use of the TV screen for output. Here the value proposition of playing the tape was enough to justify the purchase, but most people never used the device as a tape recorder because it was too hard to use. ↪

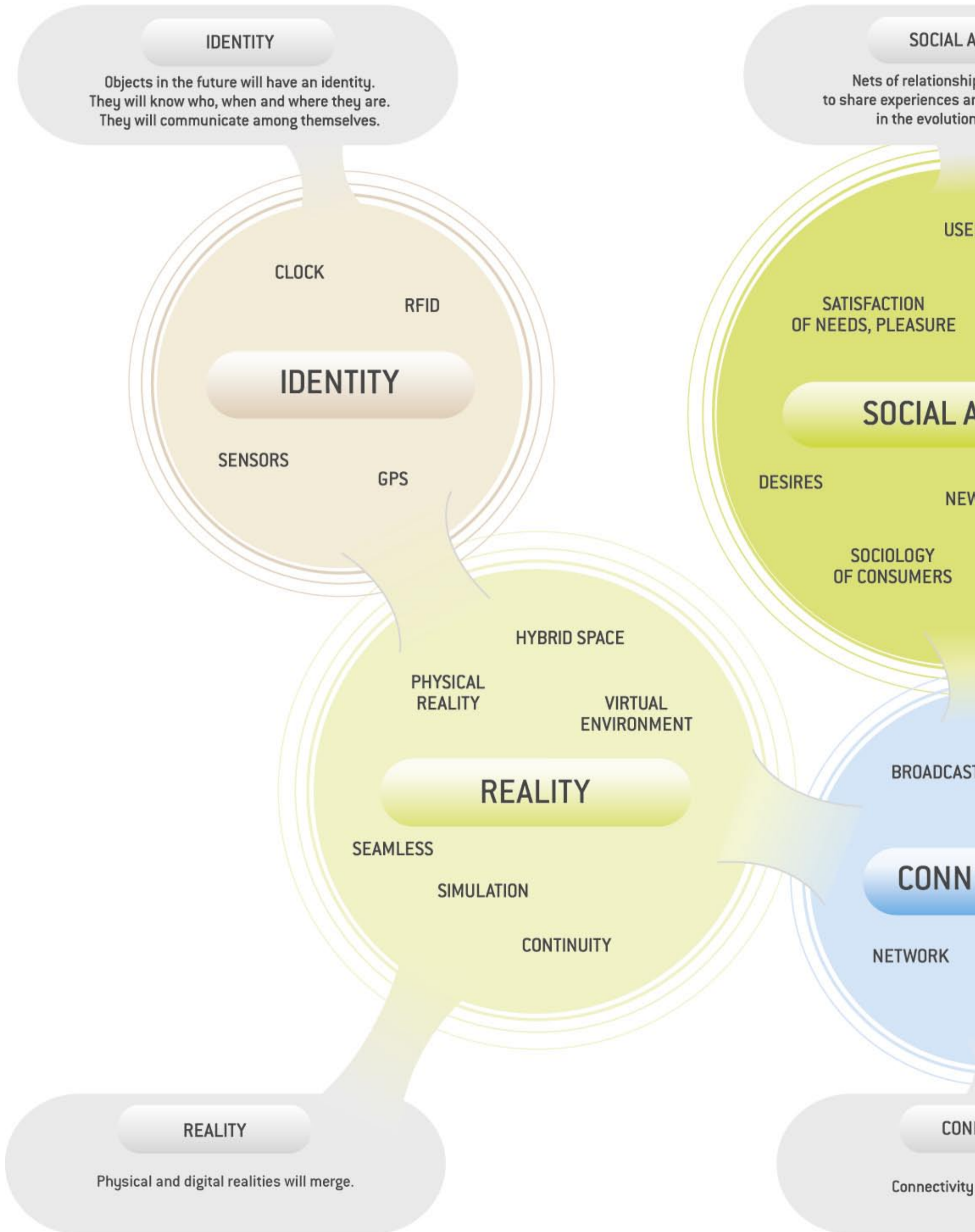
During the “consumer” phase the design team has to be structured to create solutions that are both easy to use and enjoyable. The same skills that were needed for the professional phase are still in demand, at an even more critical level, as the balance between price and performance is harder to achieve. Now it is also necessary to bring designers into the team who are capable of creating interaction design solutions that people want, that they find easy to use, that they enjoy, and that will give lasting satisfaction. In this situation Interaction Design fills the equivalent role for digital technologies that Architecture has filled for buildings, Industrial Design has filled for physical objects, and Graphic Design has filled for print. Designs must work at every level, but should be beautiful and delightful as well; success will depend on qualities of behavioral and aesthetically enjoyment. This is where the designers who emerge from IDII will come into their own.



END NOTES

- 1 Definition of Design; The American Heritage Dictionary, Third Edition, Houghton Mifflin Co.
- 2 WIRED Column 6.12, “Beyond Digital”, December 1998, by Nicholas Negroponte, a founder of MIT’s Media Lab.
- 3 “Everything that can be digital will be digital”, a tag line coined (or at least adopted) by Razorfish.
- 4 Don Norman, “Emotional Design”, Epilogue (published by Basic Books, a Member of the Perseus Book Group, 2004).
- 5 David Liddle is currently a General Partner in U.S. Venture Partners, and an Explorer for IDII.
- 6 This quote taken from an interview for “Designing Interactions” by Bill Moggridge, to be published by MIT Press in 2005.

THE PHENOMENA



OF INTERACTION

ASPECT

... allow people
... and be an active part
... of society.

... TESTING

SHARING
EXPERIENCES

ASPECT

... ENTREPRENEURSHIP

... TING

WI-FI

ACTIVITY

SMART DUST

CONNECTIVITY

... is a new dimension

EFFECT

Technology creates new business
opportunities that have an impact
but can also heal the environment.

NEW RITUALS

NET ECONOMY

BLOGGING

EFFECT

SUSTAINABILITY

DESIGNING
THE BUSINESS MODEL

WEB DESIGN

INTERFACE

ACCESSIBILITY

COMMUNICATION

USABILITY

DESIGNING
PRODUCT/ SYSTEM/ SERVICES

COMMUNICATION

The nature of ID is to facilitate mass access
to information, communication and services and
to create simple solutions to complex issues.