
Borg-Human Interaction Design

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Abstract

We use the term *borg* to refer to the complex organizations composed of people, machines, and processes with which users frequently interact using computer interfaces and websites. We contend that borg-human interaction (*BHI*) happens in a different context of traditional CHI characterized by the anthropomorphization of the interface, conflict with users, and dramatization of the interaction. This context requires the design of the *human facet* of the borg, a framework encompassing the borg's personality, social behavior, and embodied actions; and the strategies to co-create dramatic narratives with the user. We then propose six design methodologies to help designers construct the human facet of a borg.

Author Keywords

Borg; borg-human interaction; multidisciplinary design; design methods; anthropomorphization; user conflict; dramatized interaction; service design; service blueprinting.

ACM Classification Keywords

H.5.2. User Interfaces: Theory and methods; H.5.3. Group and Organization Interfaces: Theory and method.

General Terms

Design; Human Factors; Theory.

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Why Borg?!?

The *Borg* is a fictional entity which appears in many episodes of the *Star Trek* series. It is an agglomerate of forcibly-assimilated cybernetic-enhanced individuals from multiple species acting under a collective mind with “a *desire of universal machine perfection*.”

We use the term *borg* to refer to complex organizations of people, machines, and processes because it evokes in a remarkable way the three key characteristics of BHI: anthropomorphization, conflict, and dramatic interaction.

There is no intention to vilify such organizations in the use of the term. In fact, the *Borg* in *Star Trek* is not evil in itself: the other races see its actions as evil. For us, this in fact reinforces that the perception of humanity in BHI is created by the user, independently of the actual humanness of the organizations.

Introduction

Today’s organizations are complex entanglements of workers, machines, owners, buildings, rewards, systems and sub-systems, policies, associates, goals, and, too often, also other organizations. People have to interact with such organizations to accomplish their goals in life and, more often than not, they use a computer interface (usually over the Internet) in this process. However, most principles and practices used today in interface design are based on the assumption that users are interacting with pure machine systems, not with organizations. We believe this view is fundamentally flawed. The main difference, we argue, is that interfaces to organizations need to convey their personality, engage in social behavior, be embodied through consistent actions, and participate in dramatic stories co-created with their users.

The main subjects of this paper are the organizations made of people, machines, and processes which surround all of us in cyberspace and with whom we are interacting constantly. We refer to them as *borgs*, paraphrasing the fictional character *Borg* of the *Star Trek* television and film series. The key characteristic of borgs is that they are large scale organizations which display complex behavior resulting of the coupling of people and the machines inside them through interactions and processes. Large scale organizations are essential components of the modern life since the Industrial Revolution and there is a vast literature studying them, including the work on sociotechnical systems (such as [15]) and on organizational theory [9].

In many cases users’ interaction with borgs happens through human-human interaction with the people in it

(such in hospitals or schools) but more and more borg interaction is performed through computers and the Internet. Traditionally the CHI community has treated user interaction with pure machines and borgs almost indistinctively, as if it does not matter whether there are or there are not people and organizations behind the screen. Although the CHI practices acknowledge differences between stand-alone software and webpage interaction design (for example [5]), those differences seems to be ultimately explained as emergent properties of the Internet medium. We believe that distinguishing interaction with machines and borgs yields a much better understanding of why interfaces to machines and websites (which are almost always own by borgs!) have to be different.

Characterizing Borg-Human Interaction

The underlying premise of our work is that the presence of people inside borgs makes the interaction with and the interfaces to them fundamentally different from traditional interfaces to machines. We hypothesize here that borg-human interaction (BHI) is mainly distinct from traditional machine-human interaction because borg interaction is inherently *anthroporphized*, *conflictous*, and *dramatized*.

BHI is Anthropomorphized

Our daily observations of people interacting with borgs have shown us users, possibly because they know that borgs have people inside, perceive borgs as having human characteristics, treat them as (partial) human beings, and expect them to exhibit human-like behaviors. People often see in large organizations human qualities such as greed, pettiness, arrogance, and evilness. We contend that users perceive similar human qualities in most machine-based interactions

with borgs, such as in government websites, ATMs, search engines, webmail systems, social media sites, and, of course, airline companies. Notice that anthropomorphization is an important characteristic of user interaction with borgs but is not exclusive to them. People attribute human characteristics to objects, places, and machines even without any trace of real connection to human beings or organizations, and change their interaction patterns accordingly as discussed, for instance, by Reeves and Nass [10].

The important consequence of anthropomorphization is that the design and implementation of borg-human interfaces must take into account the need to provide the user with adequate representations and affordances to the perceived humanity of the borg. We propose that borg-human interfaces should be structured around a coherent personality model which can be designed through specific methodologies described later.

BHI is Conflictous

Organizations have goals and strategies to achieve them. But more often than not, goals of users and the organizations they interact with do not match, leading to some level of tension and conflict when they interact with each other. The basic consequence of this observation is that most interaction between users and borgs happens in a context of *conflict*. For instance, when a user goes into an online store, her goal is often to obtain the best of what she needs for the smallest price; in contrary, retailers “want” their customers to spend as much as possible in high-profit items.

It is interesting how most of the academic literature in interaction design tends to ignore, if not deny this conflict, which is, in our view, a quite straightforward

observation about borg-human relations. Interaction is often framed in a context of neutral dialogue, inherited from the “cold” interaction with machines; or as a collaboration process where the interface is supporting the users’ goals.

In BHI the conflict is most of the time a by-product of the conflicting values and goals of users and borgs. The important question for designers is how this conflict can be managed and, if possible, mitigated. For that, we propose to look into how human-human conflicts are dealt with, that is, through social norms and constructs, and apply those ideas to BHI design as described later.

BHI is Dramatized

One way people use to make sense of their interactions with other people in life is to represent their interactions as dramatic narratives. By making ourselves heroes or victims, and rendering other people as gods or villains, we can more easily make intentions, values, and goals explicit. And by using narrative structures such as causation, succession, and counterpoint, the representation of the complex temporal patterns of our social life becomes more manageable.

Our third working hypothesis is that borg-human interaction is *dramatized* in a narrative created by the user. The appearance of a dramatic structure in BHI is a subtle characteristic which often only surfaces in more complex interactions. Nevertheless, we believe it dramatically changes the user’s perception of the actions and responses of a borg’s website and therefore designers should be concerned with, and if possible design, the stories their users are creating when interacting with a borg.

It is not the goal of this work to provide empirical evidence of the validity of each of the three listed main characteristics of borg-human interaction, but instead to explore how they affect the design process in theory and practice. They are our working hypotheses for this paper, and although we do see the need to explore them further experimentally, through mechanisms such as structure interviews, focus groups, user surveys, and experiments, we defer that validation work to other venues.

The Human Facet of a Borg

If borgs are perceived as humans, are in conflict with their users, and the interaction is constructed as a dramatic narrative, an important set of questions arise for BHI designers. To what extent the human side of a borg has to be constructed to be perceived as an “artificial” human being, that is, how much do we need to personify the interface? Which human characteristics are more often perceived and needed by the users in borgs? When and how do users treat — and would like to treat — borgs as human beings? How to design interfaces which highlight particularly desirable human traits? How the interface can drive the drama behind the interaction process constructed by the user and better participate in it?

To address those issues, we introduce the concept of the *human facet* of a borg, which is the set and configuration of elements that create and control the perception of and the interaction with the borg’s human and social characteristics. The human facet of a borg combines elements of its graphical interface, affordances, and the internal processes which together are responsible for the users’ perception of the humanity of the borg. In many ways, we believe that

the need to design the human facet of a borg is the main distinction between traditional CHI and BHI design.

The basic framework for the design of the human facet of a borg focuses on four aspects of the expression of the humanity of a borg: *personality*, *social behavior*, *embodiment*, and *stories*.

Borg Personality

There is a vast number of proposed personality models of human beings. We have been exploring *personality theory*, a general name for psychological models which assign archetypal categories of personality to human beings, aiming to help predict the effects of having each archetype in a given context or how each archetype normally interacts with the other archetypes. Examples are the OCEAN model of Tupes and Christal [16] and Norman [6] which use five broad dimensions to describe personality traits: *Openness*, *Conscientiousness*, *Extraversion*, *Agreeableness*, and *Neuroticism* (or *Need for Stability*); and the popular *Myers-Briggs Type Indicator (MBTI)* [4] which classifies individuals along four dichotomic preferences: *Extraversion vs. Intraversion (E-I)*; *Sensing vs. iNtuition (S-N)*; *Thinking and Feeling (T-F)*; and *Judging vs. Perceiving (J-P)*.

More popular personality classification methods are horoscope signs, of which the most known are probably based on the Sun sign astrology (*Leo*, *Virgo*, etc.) and on the Chinese zodiac (*Rabbit*, *Monkey*, etc.). Personality archetypes can make concrete and communicable to the different stakeholders in the design process the personality traits to be present in the human facet of a borg. For instance, it could be set

as a design goal that "*This website should be a Virgo*", meaning that the website should be perceived as nurturing, patient, pragmatic, loving, methodical, dedicated, and flexible.

Borg Social Behavior

Designers of borg-human interaction must recognize the need for interfaces to address both the personal traits of the borg (as discussed in the previous section) and the social behavior patterns exhibited by the borg in its interaction with users.

Social psychology is one of the disciplines we can draw ideas and concepts from in this context. For lack of space in this paper, we only examine basic ideas of social psychology according to the psychological stream, often associated to Kurt Lewin's work [3]. Social psychologists from this tradition divide the social phenomena into two spheres: *intrapersonal* and *interpersonal*.

Intrapersonal phenomena of interest include the study of *attitudes*, or basic likes and dislikes; persuasion; *social cognition*, or how people collect, process, and remember information about others; *self-concept*, or how people perceive themselves; and *cognitive dissonance*, the feeling that someone's behavior and self-concept are inconsistent.

Among *interpersonal* phenomena studied in social psychology which may be relevant to BHI, we can list: *social influence*, or how conformity, compliance, and obedience manifest themselves; *interpersonal attraction*, including propinquity, familiarity, similarity, physical attractiveness, and social exchange; and *interpersonal perception*, which includes issues related

to the accuracy, self-other agreement, similarity, projection, assumed similarity, reciprocity, etc.

Another important aspect of the social behavior is related to how emotions are used to convey and mediate social interaction between human beings. In our BHI design strategies we pay extensive attention to how users' emotions can be better understood to borgs and how borgs can use emotions to better communicate with their users. *Emotional communication theory*, which aims to understand how emotions are used in the context of interpersonal communication, is therefore an important source of models for the design of social behavior of borgs. Several categorizations of emotion types have been proposed, including Ekman's [2] which proposes *happiness, sadness, fear, surprise, anger, and disgust* as the basic emotions. Alternatively, Russel's *circumplex model* [11] proposes a continuum representation of emotions according to two dimensions: level of *activity* (passive vs. active) and *valence* (negative vs. positive).

Borg Embodiment

Another important source of methodology for the modeling of the human facet of borgs are the many techniques used in arts and entertainment for *character embodiment*, such as the *Stanislavski's system* and *illusion of life*. Such concepts and techniques address how to make the human facet look real, inspire trust, and play effectively its personality, social behavior, and story role.

Stanislavski's system departed from the actor's tradition of reliance on facial expressions, excessive gesturing, and voice manipulation. Instead, Stanislavski

Illusion of Life

Disney's animators coined the term *illusion of life* to describe a set of 12 fundamental principles of animation [14].

For example, one of these principles is *anticipation*: "[the audience] must be prepared for the next movement and expect it before it occurs. [...] Before Mickey reaches to grab an object, he first raises his arms as he stares at the article, broadcasting the fact that he is going to do something with that particular object." [14], pp. 52.

Other fundamental principles of animation such as *staging*, *follow through* and *overlapping action*, *arcs*, *secondary action*, *timing*, *exaggeration*, and *appeal* may also be applied in the design of borg-human interaction animation (see [14], chapter 3).

focused on physical action: "*Acting is doing*." The best embodiments of characters do not pretend to be the characters: they act, move, and speak as the character (see Stanislavski [13]).

An alternative body of knowledge borrowing from concepts and techniques from puppetry and movie animation is also very important. Puppetry and animation core issue is to vent humanity onto inanimate objects and drawings. *Puppetry* deals almost always with the physical limitations of the puppet, with its inability to speak, to move, to have facial expressions, to have complex gestures. Nonetheless, the puppet comes alive, caring, loving, hating, and interacting with other puppets and the public. One of the contributions of puppetry to the modeling of the human facet of borgs is a very advanced understanding of which emotions can be expressed and which actions can be performed effectively in the context of limited movement and action [1]. Similarly, there are lessons to be learned from movie animation, where the focus is on how to make animated drawings convey emotions and humor. Disney's *illusion of life* [14] is a key reference in this area.

Borg Stories

While psychological models explore principles and methods from real-world human beings and their social and emotional interactions, dramatic models provide techniques to understand user behavior in the context of the dramatic stories they construct in their interaction with borgs.

A good example of a dramatic model is *character theory*, a discipline of literary and narrative studies, initially laid down by Vladimir Propp, a Russian

structuralist who collected and studied hundreds of folktales and proposed that there is a common typology of narrative structures. It is based on common subsequences of 31 basic steps [7] and the identification of 8 basic roles played by what he calls *dramatis personae*, or the characters involved in a typical plot: *hero*, *villain*, *donor* (who prepares the hero for his journey), *helper*, *princess*, *princess' father*, *dispatcher* (who sends the hero off), and the *false hero/anti-hero/usurper*.

As discussed before, the interaction of a user and a borg is likely to be constructed cognitively and emotionally as a dramatic narrative where the user is often the hero. A key question for the designer is which role(s) the borg should aim to take. The borg could be the donor, the helper, or even the princess' father (the gatekeeper to the user's goals), although, in many times, it may become the villain. Character theory has some of the concepts necessary to understand not only how to construct the human facet of the borg as a whole but also to define the different roles of the interface elements of the borg in its "fairy tale" encounter with the user.

BHI Design Methodology

We firmly believe that most traditional design methods used in computer-human interaction are also applicable to BHI, since there are many interface challenges which are basically related to the communication media (the computer screen, the hyperlink structure, etc.). We implicitly assume here that the overall BHI design process should also follow basic tenants and steps of a user-centered design such as, for example, the construction of user personas [8].

However, we contend there is a need of additional work to systematically expose and target the intrinsic difficulties of creating interfaces to borgs. We describe here six activities we believe are useful in BHI design: *back-office ethnography*, *borg personality workshop*, *conflict battle*, *puppet prototyping*, *comics workshop*, and *service blueprinting*.

Back-office Ethnography

We employ the term *back-office ethnography* to refer to the process of thoroughly investigating the inner organization and structure of the borg. We are liberally using the term ethnography here, since the actual process may include a variety of techniques, including but not exclusive to ethnography.

Back-office ethnography starts with collecting all kinds of material available about the borg: organizational charts, company values, sales and production information, growth plans, complaints from users, etc. Based on the information collected, a *borg map* is created which summarizes the basic nature of the borg.

Goals and rewards mapping is the next important step. Through interviews and organizational documents, we try to establish which the goals and rewards are for the different people and areas of the borg. Care should be taken to map actual, not stated goals: more often than not, the goal of many organizations is not to please the customer but to maximize revenue or profit. Similarly, rewards should be focus on actual metrics and incentives which guide the behavior of people in the organization.

The third step is to gather information about the business processes on which the interface have to rest

on. The main goal is to unearth the requirements and limitations of the process to create what we call "*the system*" x-ray. One of the best ways to produce it is to try to use anonymously the services currently provided by the borg and to examine user complaints.

Borg Personality Workshop

In the *borg personality workshop*, designers, potential users, and stakeholders try to establish together the main characteristics of the borg personality from the users' viewpoint. They explore individually and in group the personality traits of the borg by using the framework of the models discussed earlier. For example, a fake Myers-Briggs test may be applied to the borg, examining the preferences of the borg as the users and stakeholders perceive it. This leads to one MBTI type, whose characteristics are then discussed.

Often, participants in the workshop are likely to differ about the borg MBTI preferences which leads to the construction of multiple personalities. This is part of the process of the borg interface design since there may be conflicting opinions about the desired or actual personality of the borg. It may be necessary to carry on the multiple borg personalities throughout most of the rest of the design process to better explore the conflicts and stories each of them generate and the different kinds of issues each personality creates.

Conflict Battle

In parallel with the borg personality workshop, it is often useful to run traditional CHI methodologies to determine user personas. With the different personalities of the borg selected and multiple user personas established, the stage is set for the *conflict battle* in which participants take turns playing the role

of the borg and user personas in different scenarios of BHI.

The first goal of the conflict battle is to clearly document as many as possible *conflict cases*, including the situation in which they appear, the causes of the conflict, and how they relate to the borg's inner structure. The second goal of the conflict battle is to create *conflict maps* which depict the social behaviors and emotions involved in the conflict scenarios. This is done by participants acting out the scenarios as short theatrical sketches, while observers take notes of the social behaviors (such as aggression, altruism, empathy) and the emotions being exhibited by users and borg. The third goal of the workshop is to find better ways to manage conflict and create what we call *conflict mitigation charts*: after going to the process of acting out one particular scenario, participants and observers should look into possible ways of solving, mitigating the conflict, or better handling it.

Puppet Prototyping

The goal of *puppet prototyping* is to transform the conflict cases and conflict mitigation charts determined by the conflict battle into concrete interface actions which can express needed social behaviors and emotions between users and borg. While in the conflict battle we allow the full range of human actions and emotions, in the puppet prototyping we tunnel the interaction through representations of the computer interface.

We often use a technique called *constricted dialoguing* where participants are assigned the roles of user personas and borg and physically separated in two rooms connected through an interactive computer

medium such as a SMS image-enriched chat. The goal is to find mechanisms in text, interactive elements, and images, to convey the social behaviors and emotions in the conflict mitigation charts.

Another technique is what we call the *giant puppet workshop* where participants are asked to create a giant puppet, manipulated by multiple puppeteers, which has to interact with the user personas. Materials such as cardboard, colored paper, wire, glue, and recyclable elements are provided. Puppet handlers should consider the goals and rewards mapping when devising their actions. The overall behavior should also be constrained by the issues detected by "the system" x-ray.

Comics Workshop

The next important step is to develop and design the stories and narratives user personas and borg will produce together. One technique that we employ here is the *comics workshop*. It is an enriched version of the traditional storyboard technique where participants explicit the inner thoughts of the user and the people inside the borg, the story roles (in Propps sense) they play, and the overall story structure. For each interaction scenario, especially those rich in conflict, designers and participants produce a comics story showing the visual elements of the interaction, the emotional reactions of the user, and balloons with the thinking and strategy of the user, depicting, when necessary, his perception of what the borg is doing and trying to accomplish. The comics story also includes, when appropriate, the people inside the borg and what they are doing, thinking, and getting as rewards.

Service Blueprints

A *service blueprint* [12] is a representation of the user interaction with a service system which uses horizontal tracks, or swim lanes, to represent the actions and decisions of each person and element in the system through time. The user takes the uppermost lane, which is separated from the service provider lanes by the *interaction line*. From top to bottom different parts and roles of people in the system are represented, starting with the ones in direct contact with the user. All elements in the system which are never in contact with the user are grouped at the bottommost lanes, separated by the *visibility line*. Service blueprinting has been extensively used in service design and management due to its ability to highlight the influence of operational constraints, especially below the visibility line, in the overall user experience.

The comics stories produced in the workshop should then be analyzed in terms of character consistency, clarity, enjoyment, and conflict resolution. During this phase, elements from movie animation such as anticipation, staging, timing, and exaggeration can be tried to enhance the believability and consistency of the borg interface.

Service Blueprinting

To work out the practical details of the interaction stories of the user, we employ a service design technique called *service blueprinting*. Using the comics story as a reference, a service blueprint of the borg interaction with the user in each scenario can be produced to detail the actions and decisions of each element of the borg.

The service blueprints should then be analyzed in different ways. Looking vertically across the lanes, information and synchronization needs of each element should be scrutinized to make sure that all their actions happen as needed. A horizontal analysis allows a good understanding of delays and waits which may affect the user experience and the borg performance and perception. Also, by considering the multiple strips from different service blueprints of a certain role or system in the borg, the complexity of its particular operation is highlighted. Here it is important to check what is expected from a role in comparison with its goals and rewards as listed in the goals and rewards mapping, and what an element of the borg should do in comparison with “the system” x-ray. Often, this analysis leads to the detection of problems which may require iterative redesign of the interface.

Service blueprints, together with the other documents created in the design process, are then used to guide the development, deployment, and testing of the human facet of the borg.

Resistance is Futile

The key proposition of this paper is that more often than not the interface design process is done in the context of interaction not with a pure machine system but with a complex organization of people, machines, and processes we call borgs. We argue here that designing borg-human interaction is challenged by three key differentiating characteristics of borgs to pure machines and computers: anthropomorphization, user conflict, and dramatization. We have created the human facet framework to understand and model these characteristics, focusing on the borg’s personality, social behavior, and embodiment, and the stories borgs co-create with their users. We have also proposed six specific design methodologies which address some key aspects and characteristics of borg-human interaction.

In this paper we intentionally left out considerations and techniques for dealing with some scenarios of interacting with borgs which involve direct human-to-human contact with the human beings inside the borg. Many borgs have customer care centers and other facilities, physical or virtual, where a borg interfaces with its users through its employees and associates. In those interactions, the personality and social behavior of the borg is also played out and borg stories are constructed. We are exploring techniques similar to the ones described here to design the human-human interaction between users and the borg people.

The ultimate goal of this work is to trigger an expansion of CHI into BHI. We do not deny here the importance and validity of the most interacting design theories and practices. However, we believe it is important to recognize that in the current world, computer interfaces have fundamentally changed their nature from users interacting with machines to interaction with complex organizations of people. Our final goal is to make designers able to create interfaces in which users can structure their relationship with borgs reliably, recognizing their personality and engaging in rich social behaviors and meaningful stories in a context of reduced conflict.

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