BAD dESIGN BY DESIGN?
ECONOMICS MEETS OTHER TYPES OF INTERACTIONS

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Abstract
Economics, as a social science, has to do with the designing of interaction systems, mostly among humans and, as such, it overlaps with Interaction Design. In this paper I argue that the lessons learned by economists in designing interactions – and goods – can be also useful to the field of Interaction Design. Also, they can be surprising. For example, sometimes it makes economic sense not to strive for the best possible designing solutions, but instead to intentionally create sub-optimal interaction experiences. Hence the possibility of having a "bad design by design".

I also consider the relationship between (participatory) design and Open Source software production, to conclude that the two present some interesting analogies, and that the firmly established distinction between the designing and the production stage of a good may in time loose its hedges.

Introduction
A few centuries ago, the discipline of economics was not yet a well identified and separate branch of knowledge. Its foundation, and its subsequent development, required hardships and toil by a group of pioneers, often coming from very disparate fields of knowledge, such as moral philosophy, physics, and engineering. These efforts have produced a beautiful and rigorous theoretical construction, that many consider as a true sanctuary, that provides its priests – the economists – with a set of powerful tools to analyze reality. As an economist myself, I share a sense of respect for the intellectual construction, and for its foundations, that our predecessors have endowed us with.

In the eyes of many detractors of the science of economics, the project proved to be even too successful, because it emboldened economists, and made them somehow arrogant, to the point that they started using their analytical weapons to conquer, and to dominate, bordering fields of knowledge. And this happened indeed: other lands of knowledge – such as political sciences, sociology and geography – over the last few decades have become fair game for economists, who are now seen by their indigenous inhabitants as the analogue of fully armed assault brigade, in foreign lands, and without United Nations approval. Other social scientists see the economics of today as an imperialistic social sciences, and treated it with an equal share of scorn, of respect, and of envy.

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So, before any misconceptions arise between the indigenous inhabitants of the honorable design discipline, and myself, let me assure you, the readers, that I come in peace, that I bear no weapons, and that my only purpose is to contribute to a fruitful dialogue between our two seemingly very different fields of knowledge[2].
A difference in looks, I argue, and possibly in previous habits, because economics also has to do with the designing of interaction systems. In this field, economists have learned lessons that are often subtle and surprising: for example, sometimes the best design of a product is not the one that provides the interested parties with the best possible interaction experience, but an intentionally "bad" design. It may seem illogical to all those designers, whose mission is to prove their ability in doing their very best at the service of the final user of a product. Contrary to that belief, we will see that sometimes we observe examples of "bad design by design". And they are no mistake.

Another issue that I'll raise refers to the organization of the design, prototyping, and production process, by considering Open Source software production, an emergent and interesting designing and production method. I'll draw some parallels between Open Source production and the design and prototyping process familiar within the Interaction Design community, in order to point out and to discuss their similarities and differences.

As a prerequisite for both discussions, we need to understand in what sense economists consider themselves, more and more, as designers and engineers.

"Mechanism Design": the economist as an engineer and as a designer.
The objects that economists design are called "mechanisms", and they are a set of rules, that is, an algorithm, that solve a problem of allocation (of goods, or of other resources, or of people) in a situation where there are conflicting goals. A mechanism is an interaction system, in the sense that it gives form to, and orientates, a set of interactions between different economic agents. An example will clarify the point.

Assume that IDI Ivrea organizes an internship program for its students. When the numbers are not too big, this type of task can be effectively carried out in an informal manner, trying to juggle all the requests coming from the different actors – the students, and the organizations who participate to the program. In general, however, many conflicting goals are involved, and the allocation problem of an internship program is conceptually challenging. Some students are better than others, and so are some of the organizations participating. The students would like to do their internship within a good organization, but firms also would like to have the best students, particularly so when they look at them as potential future employees. Moreover, students differ among themselves in other dimensions: They live at different places, and they may prefer an internship not

[2] And to distract you as our troops get organized.

too far away from home. Some students, moreover, have spouses, and possibly children, and their degrees of freedom are limited by these facts of life.

Guaranteeing the "best" match between students and organizations is not easy, and "matching theory" - a branch of economics - is devoted to the understanding of these types of problems. When this theory is used not just to understand, but to actually solve a practical matching problem, we have an instance of "mechanism design"[3].

Price discrimination as mechanism design

The next example of mechanism design has to do with what economists call "price discrimination", and it leads us to the possibility of rationally desiring a "bad" design for a product. Producers of goods (or of services) would rather not to sell at a uniform price, but to impose a higher price to the people who are willing to pay more for the product – because they are rich, or because they very much like it. On the other hand, as long as they recover (marginal) costs, producers are more than happy to sell at a lower price to people who would not buy the product otherwise. "Price discrimination", as this activity is called, is very common, but achieving it is not straightforward, because potential customers are not going to easily let the producer know their willingness to pay: if a customer is asked how much he is willing to pay for a given product, knowing that what he declares will reflect itself in the price tag, he would probably understate the truth.

However, it turns out that there are ways to know, at least approximately, how much persons are willing to pay for a product or, in economists' jargon, to obtain a "truthful revelation of preferences". Often this result is obtained by putting people in front of options where, by choosing according their self-interest, they also implicitly (and, most times, without being aware) declare their willingness to pay. It is an instance of "mechanism design": when the mechanism is designed properly, people end up selfselecting themselves into the appropriate category, where they are made to pay according to their true willingness to pay.

A few examples clarify the point. We can roughly assume that there are two types of readers of a new book. Some of them are avid readers of some author's books.
They'd pay much for those books, and sometimes, the publishing of a new book by a well known author amounts to a memorable day in the life of her fans (and if you disagree with this, ask my nephew about Harry Potter). On the other hand, other people are interested in reading a given book, but not so much. Accordingly, they'd buy book if it is inexpensive.

The publishing house wants to keep these two types of people separate. The way this is achieved, is through the distinction between the hardcover edition and the paperback. The fact that the former has a better binding, and often is printed with a bigger and better readable font, is really unessential: the difference in costs between

[3] More details on the "internship problem" are in Varian (2002), with reference to Roth (2003).

the two editions is negligible, and in no way justifies the difference in price. The only relevant difference between the two editions is their timing: the paperback edition, typically, comes with a delay. The self-selection of customers is obtained through the difference in their impatience: The reader with a high willingness to pay is impatient, while the person who is interested in reading the book, but not so much, would rather wait for the cheaper paperback version of the same book.

Mail-in rebates are another example of price discrimination. A rebate is offered to the customers of a product who take the time to fill in a form and to send it to the producer. High willingness to pay customers, who tend to be richer, value their time more than others, will not bother to mail-in the rebate, and will pay the full posted price. On the other hand, the people who do apply for the rebate, by taking the time to do so, implicitly declare their low willingness to pay for the good, and end up paying the rebated price.

One last well known example of price discrimination by self-selection is provided by the air travel industry. The price of the same seat on an airplane can vary significantly, depending on the type of ticket, on how far in advance of the flight it is bought, and, in general, on the restrictions it carries. One typical restriction involves stopping over at the destination on Saturday night. There is no technical reason for that – airplanes are not required to rest away from home on those nights. The rationale for the restriction has to do with price discrimination: tourists – the low willingness to pay people – don't mind, and actually often prefer, staying out on Saturdays; on the other hand, business people, who are willing to pay more for their tickets, desire to be back from their trips for the weekend.
All these examples of price discrimination, and many others, have something in common: they involve the introduction of some type of bad designing. Mail-in-rebates are an example of bad design. If the purpose of the seller is to give a rebate of, say, $ 2 on a $ 10 purchase, there is an obvious way to better design the interaction with the customer: write "$ 8" on the price tag, and avoid requiring the customer to mail the rebate in to get the $ 2 back. However, by choosing this hypothetical "better" design, the discount would go to everybody, including the people who would buy the product even at the higher price: price discrimination would collapse.

Paperback books also are an example of bad design: they could be improved at very little cost by means of a better binding, and they could be printed in bigger fonts.
Also, they could be published right away, without making people wait. In other words, they could be their hardcover version. Similar considerations apply to cheap, but highly restricted, airplane tickets. If the restrictions were not there, the interaction between customer and product would obviously be better. In all these cases, the inconvenience of the cheap version of the good, however, is there for a reason: to obtain price discrimination.

With mail-in rebates, the bad designing is about the way a good is priced. With books, and with restricted airplane tickets, the bad designing also results in some sort of inconvenience for the customer.

Many examples of price discrimination through selfselection – which is one of the principal way, in real life, to price discriminate – regard the designing of the goods proper. The designing involves not a single product, but a suite of different versions of a product, so that they induce self-selection among different types of customers[4]. The way this is obtained is by artificially creating some sort of flaw in the lower price versions of the product, so that it is still appealing enough to the low willingness to pay customers, who pay less for it, while at the same time not being appealing enough to the high willingness to pay customer, who prefer to spend more for the better version.

The introduction of some form of delay in the enjoyment of the good, such as in the hardcover/paperback versions old books, is one example of such "flaw". And, as we have already noted for the book case, the difference in (marginal) cost to the producer between the different versions, is not what explains the difference in price. To the point that, sometimes, the more expensive version is the cheaper to produce: as in the case of the IBM Laser Printer "Series E", at the beginning of the 90's, whose slower and lower price version was obtained by introducing a "slowing" integrated circuit into the faster and more expensive version[5].

So, we see that in order to price discriminate, producers often actually have to design bad products. In those instances, the designing procedure is often not of a single good, but of a suite of versions. The job of the designer is to design them jointly, one in relation with the other, to obtain, for some of the versions, what we could call "optimally bad design". "Optimally" bad only for the producer, who reaps a higher profits, at the expense of the customers? Often, not so.

How justifiable, and how relevant, is "bad designing"?

There is a common perception, on whose cultural and historical origin I will not indulge, that the price of something has to be "fair". If there is such a thing as a fair price for something, then it must be unique, so that selling the same product (or two very similar products) at different prices to different people seems to be unjust, unethical.

However, price discrimination often serves the interest not just of the producer, but of the customers too, because it allows the market to also serve the people with a low willingness to pay. So for example, if after having read this, you came to the conclusion that it is unfair to sell the same airplane ticket at different prices, by artificially inventing a set of restrictions, well, think twice: if the airlines companies were forced not to price discriminate, chances are that those cheap fares that are at the base of most international tourism, and of some international academic projects, would not exist.

Not only some people would not be served. Many industries would not exist without the possibility of price discriminating, because competition on a unique price would drive the price below the level that allows the producer to recoup its fixed costs.

[4] Such as in first and second class transport in trains or airplanes.

[5] Cited in Deneckere and McAfee (1996).

This is particularly true for those industries that are characterized by a cost structure whereby there is a fixed high cost for setting up business and for building the "first copy", or prototype, of a product, but where the additional copies of that product are inexpensive. Such as a book, or a CD: writing the manuscript of a book, or writing, executing and recording a piece of music, requires much effort by highly skilled workers. However, printing a book, or burning a CD, has a very low unit cost. When the cost structure is as such, then price discrimination is indeed a crucial issue not only for the producer, in order for him to stay in the market, but also for the industry to survive.

It fact, most information goods, and many information technology products, share such a cost structure. Since these goods are increasingly important, then it follows that price discrimination is a practically very relevant issue, and that the idea of having a "bad design by design" is not just some type of curiosity.

Service Design vs. Mechanism Design

Before I move on to a different topic, I'd like to try to better relate the activity of "mechanism design", with design proper. A mechanism is not a physical good but, in my definition, it is an interaction system. Such a definition resonates with what designers call "services". So, can we translate mechanism design with service design?
In my opinion they are not exactly the same thing, and their difference is of interest for us to discuss.

Designing services, it seems to me, has mostly to do with taking care of the interaction experience once its rules have been laid out. Mechanism design, on the other hand, has to do with the designing of the interaction rules. Mechanism design can be seen as the "wired" part of the interaction machine. Service design is the way the machine looks. Mechanism and service design represent two different levels of what we could call an "interaction machine", by which I mean the practical implementation of a designed interaction system.

In fact, thinking about two separate levels within the interaction machine only represents a first attempt to relate service design with mechanism design. I believe that the wired components, and their look-and-feel, can't be completely separated. For example, restraints in the latter may endanger the implementation of a given mechanism design, and could require its rewriting. The two levels are interdependent. On the other hand, the presence of possibilities at the service level, not foreseen by the "economistengineer" working on the design of the mechanism, could open new possibilities in the designing of the "wired" part of the interaction machine.

We should develop a unified vision of design and implementation of the whole of the interaction machine, both wired and look-and-feel part. Such a unified approach could be advantageous to both disciplines: mechanism design, and service design. Or, should they really be thought as separate?

The organization of design and manufacturing: Open Source everywhere?

I have not mentioned so far that the study of organizations is one of the fields of knowledge that economists managed to colonize a few decades ago. For the purpose, economists developed the so called "transaction cost theory of the firm" (and of other types of organization)[6]. This knowledge, besides exposing my credentials in speaking about organizations, allows me to consider what Interaction Design could learn from a mode of organizing production that is receiving much academic attention: Open Source software production.

It is a type of production with very little structure, and it is very horizontal in the way of organizational relationships, where much room is given to collaboration and to experimentation. The tight relationship between production and experimentation is shown by one of the open source community slogans: "deliver early, deliver often": there is not a clear distinction between the planning phase of a product and the production phase.

Also, Open Source developers usually do not pay much attention to the codified tenets of software engineering, which is the discipline that establishes how software projects should be conducted. It determines, among other things, that the requirements of a software do be developed should be analyzed formally and at length. On the other hand, Open Source software development almost always starts with the purpose of solving a problem that the developers themselves face, and does not include a formal analysis of requirements.

There are noteworthy analogies between Open Source software production and ideas familiar within the designing community. Their governance system, to start with.
Within an Open Source software project, the way decisions are taken, besides being interesting in its own right, does not preclude, in principle, anybody's contribution. In this sense, Open Source software production is an example of what has been defined "participatory design", a theme of some relevance within the designing community (**cite**: Pelle Ehn). Another trait in common between Open Source software production and Interaction Design is the common emphasis on prototyping: (**cite**: Bill Moggridge).

These are just analogies, but suggestive ones, and they allow for some considerations. The first one has to do with incentive system: What makes people willing to play the Open Source game? We know that many Open Source programmers work for free. Economists' analyses are based on the idea that people are self-interested, so that observing highly qualified professionals not receiving a pecuniary retribution for their services amounts to a puzzle. One explanation is based on the observation that programmers productivity can vary enormously depending on their skill, and that letting a potential employer know about one's real productivity is not easy. By

[6] According to which, in deciding whether to do something by interacting in a market, or within the boundaries of an organization, of paramount importance is the issue of the costs that have to be incurred in carrying out the actual transactions. If these costs are relatively high in a market "arm-length" relationship, then there is room for setting up an organization where the same transactions are carried out by its members, within the boundaries of the organization itself, and without using a market. See Williamson (1975).

participating in a Open Source project, high quality programmers are able to reveal themselves as such, not just to the group of fellow programmers, but also to the world at large. While working for free, the acquire the reputation of a good programmer, and that has a significant market value (see Josh and Tirole, 2002).

The first message from Open Source to Interaction Design, then, has to do with the incentive system. If designers want to experiment more participatory forms of design, they should think hard about the incentives for participation, possibly taking suggestions from the highly successful Open Source community. The Open Source community experience suggests that persons may work even for free, as long as their good work contributes to the building of a good reputation, that can also be expendable in the future, for example on the job market. A crucial aspect of the Open Source community is that individual good work does not get stolen, to the point that one of the greatest "crimes" there is the stealing of code, by denying someone's contribution. The incentive system of Open Source software production is based on the aknowledgement of personal contributions to the project.
Another issue worth analyzing is the relationship between the designing of a good and its actual industrial production. Such a distinction is simply not present in the Open Source software production: the first version of a program is often made to meet the needs expressed by the programmers themselves, and it is used right away, at least by the programmers, who can put up with its early idyosincracies and, almost always, with the lack of decent documentation. Designing, experimenting, producing, and using, are all meshed together, and with this respect the Open Source software production method represents an impressive interacting system at work.

The participatory part of the design process of other creations, when it is present, and its experimental emphasis, on the other had only occur during the first stage of the production process. Once the product has been designed, regardless of how, it changes hands and goes to the factory: The designer has finished her job, and can move on to a new designing project. And, to the designer, the factory is to some extent a black box with impregnable walls.

Open Source software production suggests new questions, and a change perspective. Could the Open Source way of production, with such a tight integration between the designing and the production of the goods, be extended to goods other than software? Could we have a Open Source car, a bottle-opener, a chair? Is Open Source production an interesting curiosity good enough for software, and nothing more, or, can we have "Open Source Everywhere"?

I do not know, but I find this possibility very intriguing and worth exploring.
Those researchers, from the Interaction Design world, who are today thinking about the way in which the designing activity is carried out, will breath some fresh air by considering the evidence on Open Source software production. A few analogies do not make a relevant case, and more research work is needed. However, we should welcome the

adoption of an expanded vision of the designing and of the manufacturing problem, where the distinction between the two, designing and production, is not so obvious, and not so inevitable.

Conclusions

Economics, I have argued, is increasingly about the design of interaction systems, and its analytical tools allow for new insights in the field of Interaction Design.

I have provided a couple of example to make my point. First, I have shown a case of "mechanism design" – price discrimination – where it makes sense to produce goods that are intentionally and prima facie sub-optimal. Observing "bad design by design" is not an intellectual curiosity without practical relevance. To the contrary, is something that we should expect to observe frequently.

"Bad design" allows for price discrimination, which should not be considered unethical, because quite often it serves societal needs. It follows that doing price discrimination is in accordance with the objective of contributing, through good design, to human happiness. To summarize, in order to do a good design, sometimes what is needed is a "bad" design: things have become a little bit more complicated than they used to be. I think that it is healthy, because it means that we have enlarged our perspective.

I've also argued that a contribution to Interaction Design could come from economics as a discipline that studies organized behavior. The example of Open Source software production lent itself to a consideration of the process of designing and, in particular, of the distinction between designing and manufacturing. Thinking that the Open Source mode of production can be extended to other realms; that we can apply such a playful way of dealing with the things that we want to design, experiment, make, and use; and that we do all this at the same time, without a clear distinction of phases, and of roles, sounds futuristic at best. However, since the discipline of Interaction Design is thinking about its future, I believe that some science fiction is not out of place here.

The Interaction Design of tomorrow, then, should be able to think not just of the interaction between the goods it produces, and the people who use them, but also about the whole set of actors of the system: users, producers, and designers. There are many complicated interactions involved, so that a theory is needed to provide a framework and to make the problem's complexity manageable. Economics can give a hand in this effort.

An appropriate analytical framework would allow us to see more clearly through the several issues that have been raised. However, for such an effort, I am convinced, we would receive a double retribution: Not only we would understand better; also, we would also be able to do better. We would be more prepared to fulfill what I see as the highly ethical goal of Interaction Design: to make the whole interaction experience with the goods, both material and immaterial, that enrich our lives, as enjoyable and beautiful as possible.

Referencest

Deneckere, Raymond J, e R. Preston McAfee (1996), "Damaged Goods," (with P.
McAfee), Journal of Economics and Management Science, Vol. 5, No. 2, pp.
149-174.

Lerner, Josh e Jean Tirole (2002), Some simple economics of Open Source, The Journal
of Industrial Economics, Volume L, No. 2, pp. 197-234.

Roth, Alvin E. (2003), The Economist as Engineer: Game Theory, Experimentation, and Computation as Tools for Design economics, Econometrica, Vol. 70, pp. 1341-1378

Varian, Hal (2002) Avoiding the pitfalls when economics shifts from science to
engineering.
New York Times; New York, N.Y.; 29 agosto.

Williamson, Oliver E. (1975) Market and Hierarchies: Analyisis and Antitrust
Implications, Free Press, New York.