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► **To cite this version:**

Emeline Brulé. How do ‘smart’ objects describe themselves?. SIG Design Theory, 2015, Paris, France.  
hal-01246060

**HAL Id: hal-01246060**

**<https://hal.science/hal-01246060>**

Submitted on 21 Dec 2015

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# How do 'smart' objects define themselves?

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Workshop SIG–Theory and models of conception 2015

## Abstract

There are numerous definitions of technical Objects in various fields<sup>1</sup>. However, we still lack of a methodological approach to the definition of the so-called 'smart' Objects—technical objects imbued with digital 'intelligence'. Various frameworks have been proposed in the field of Computer Sciences for their classification and description. How to synthesize those different approaches in order to articulate the specificity of 'smart' objects—if there is indeed one? We will build upon a semio-pragmatic analysis of the phone, as a technical object which considerably evolved through time, to identify the aspects and issues at stake.

## Keywords

Smart Objects; Framework; Algorithms; Technical Objects;

## Summary

### 1. Technical Objects: framework and descriptions

A technical Object could be described as a situated (Suchman), composite and heterogeneous“(Akrich) form concretizing a scientific concept (Simondon). It is also “scripted” by and for human use (Simondon), has a discourse, although it is not only the result of the designer herself (Akrich, Latour, Verbeek). As such, technical objects are deeply politicized (Winner) and are to be considered as actors, contributing to shape the social fabric (Akrich). As they get widely adopted, they become natural, transparent: they tend to turn into a “black box” (Akrich).

Simondon insists that a technical Object should keep the largest margin of indetermination possible, in order for the inter-relationship human-machine to be fruitful.

By its agency and materials, the object takes stand. Its discourse can be contested, adopted, (mis)understood. What happens when part of this material is a learning algorithm, which is, in our point of view, the condition for an object to be categorised as 'smart'? The example of the phone, from the Telephone to the Smartphone, will allow us to identify the key differences induced by this specificity.

### 2. From the Telephone to the Smartphone

Since it was first patented in 1876, the Telephone became the visible everyday artefact of a worldwide network of telecommunications<sup>2</sup>—along with the cable network. It already was a connected object, identifiable in and by the network. From a system based on manual switching (and easily understandable), it became automatic, hiding most of its internal functions. From an object transmitting voice, it became multifunctional: call forwarding, call waiting, voicemail, fax...

One could say that the smartphone is just a phone with additional features, an 'augmented' object<sup>3</sup>, although most of them are unrelated to its ancestor. It connects to various networks, is identified by more criterions (localization, type...) and transmits more types of information. It is programmed to answer differently based on a personalization.

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1 In this summary, we will cite Madeleine Akrich's *Comment décrire les objets techniques ?* (1987), *Les objets techniques et leurs utilisateurs. De la conception à l'action* (1993). In philosophy, Gilbert Simondon's *Le Mode d'Existence des objets techniques*, Bruno Latour's *Aramis ou L'amour des techniques*, Peter-Paul Verbeek's *What things do* (2005). In anthropology, Lucy Suchman's, *Human-Machine Reconfigurations: Plans and Situated Actions* (2006).

2 Hurdeman, Anton A. (2003), *The Worldwide History of Telecommunications*, IEEE Press and J. Wiley & Sons, 2003.

3 Kortuem, Gerd, Fahim Kawsar, Daniel Fitton, and Vasughi Sundramoorthy. "Smart Objects as Building Blocks for the Internet of Things." *IEEE Internet Computing*, 2010.

But we see the emergence of applications actively learning from their users<sup>4</sup>. The Smartphone is not just a phone with more features. It is an object rescripting itself, not just through a program (which is discrete) but through a learning algorithm, understood as “encoded procedures for transforming input data into a desired output”<sup>5</sup> using software as a mean to execute itself. The output cannot be fully predicted, even by the algorithm designers.

### 3. ‘Smart’ objects: a question of agency

‘Smart’ Objects classifications, in Computer Sciences, are either based on their capabilities<sup>6</sup>, on the communication infrastructure (for example document-based<sup>7</sup>) or on their design dimensions<sup>8</sup>. If ‘connected’, ‘augmented’ or ‘smart’ objects are expressions often used without any distinction, our position is that both have their specificities.

A technical Object takes part of a larger network. It is always ‘connected’ to its environment. An ‘augmented’ object adopts features that are not natives to its first function. The ‘Smartness’ of an object is not about its ability of evolving or adapting: any object is modified through use, aging or even by the very perception we have of it. A ‘smart’ Object is an ever changing performative entity, based on a *shapeless* material—a learning algorithm. Which does have epistemological and political properties, but is, by definition “both obscured and malleable”<sup>9</sup>. Its discourse can’t be clear. We can’t know who’s talking, between the object, the designer, the algorithm, the user or the environment. Something that is often hidden as another augmenting feature.

On the one hand, this is the concretization of the technical Object as its best, the margin of indetermination (Simondon) where objects learn from their users and vice-versa<sup>10</sup>, giving the object the possibility to be a fully fledged agent. On the other hand, it blurs even further the logic underlying our everyday tools.

To define or describe an object of this kind, we need to take into account the relationships between its internal agents and the epistemological aspects of its learning algorithm when analysing or designing with / for them. And to identify where, in every ‘smart’ Object, are the controls.

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4 Such as Google Now.

5 Gillespie, Tarleton. “The Relevance of Algorithms.” In *Media Technologies*, edited by Tarleton Gillespie, Pablo Boczkowski, and Kirsten Foot. Cambridge, MA: MIT Press, n.d.

6 Hernandez, Marco E., and Stephan Reiff-Marganiec. “Classifying Smart Objects Using Capabilities,” n.d.

7 Kawsar, Fahim. *A Document Based Framework for User Centric Smart Object Systems*, 2009.

8 Kortuem, Gerd, Fahim Kawsar, Daniel Fitton, and Vasughi Sundramoorthy. “Smart Objects as Building Blocks for the Internet of Things.” *IEEE Internet Computing*, 2010.

9 Gillespie, Tarleton. “The Relevance of Algorithms.” In *Media Technologies*, edited by Tarleton Gillespie, Pablo Boczkowski, and Kirsten Foot. Cambridge, MA: MIT Press, n.d.

10 Ibid.