LATTS
Laboratoire Techniques, Territoires et Sociétés
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The social acceptability of innovation, decision-makers to the test of optical guidance for buses

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1 — Theoritical framing on technique and its imaginary

2 — Optical guidance for bus and prevalence of technological object to the detriment of action

Enlightened despotism *versus* obscurantism of the people

Following Coch & French studies who showed up that « resistance to change » as a kind of anthropological invariant, Zaltman & Duncan express**ed** it in an uncluttered expression : "*any conduct that serves to maintain the statu quo in the face of pressure to alter the statu quo"*.

The social acceptability is in some way the « progressive » replica to this resistance to change. A manner to analyze how to overcom it.

Decision makers imaginary faced with reality

Rather than starting from an *a priori* on the progressivm of innovations held by the « bourgeoisie éclairée » *i.e.* decision makers, innovators, manufacturers, managers. We will start by the idea that we should « lighten », in return, the social logic of these innovations. This perspective could be done from work aspect or production aspect. It could also be done from technique if we admit Marcel Mauss proposition as a criterion.

From this point of view, technique will be useful for us as test to evaluate the connection to reality of the production of the decision makers. A too big distortion of this relation will permit to understand the wandering of most of these innovations.

Definition of the technique : action *versus* object

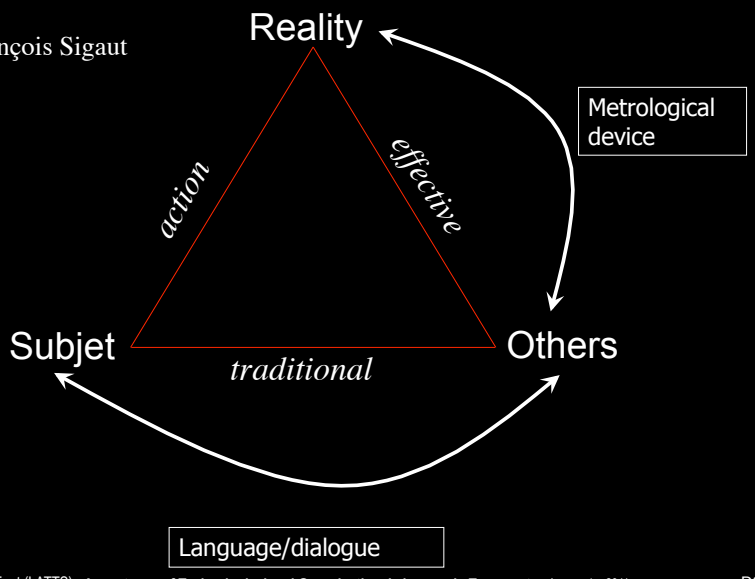
« *I call technique an action which is effective and traditionnal… It has to be effective and traditional. There is no technique and no transmission in the absence of tradition* ».

(Marcel Mauss,1935, *Les techniques du corps*. Traduction Nathan Schlanger, 2006)

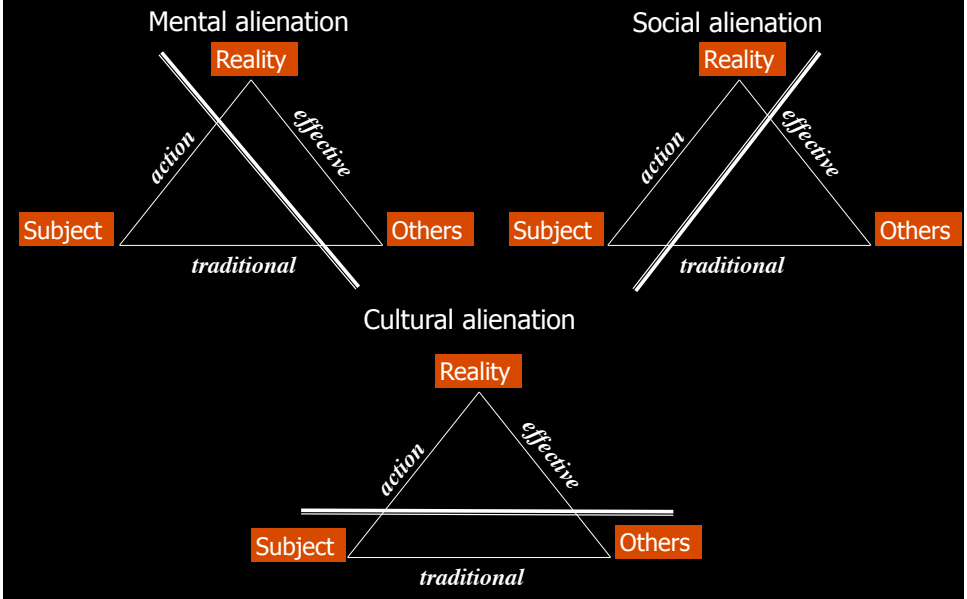
- ✓ Definion of technique as an action breaks up with the definition of technique as an object
- ✓ Tradition says that techniques are existing only if it also exists social ways to transmit.
- ✓ Efficiency leads to conceive technique as an action that concerns social judgement

The technique and the report in the reality

D'après François Sigaut



Report in the reality *versus* report in the « madness »



Technical objects as witnesses of the strain between conception & action

The gap on the perception of the reality between the operators and the ingenieurs can be analyzed from the technical object efficiency.

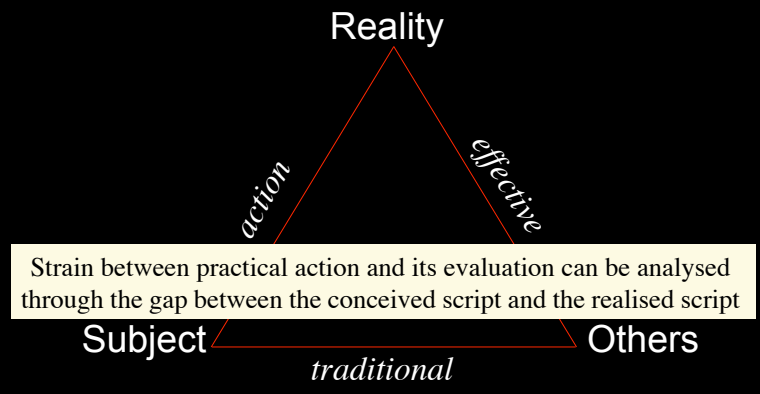
A technical object can be seen from the designer point of view. Approach that matches with the operating instructions mode → *The shape shows the supposed scenario*

Strain between conception and action

A technical object could be considered from the users and the operators point of view. We will then see the effective function. → *The shape fits with the real script*

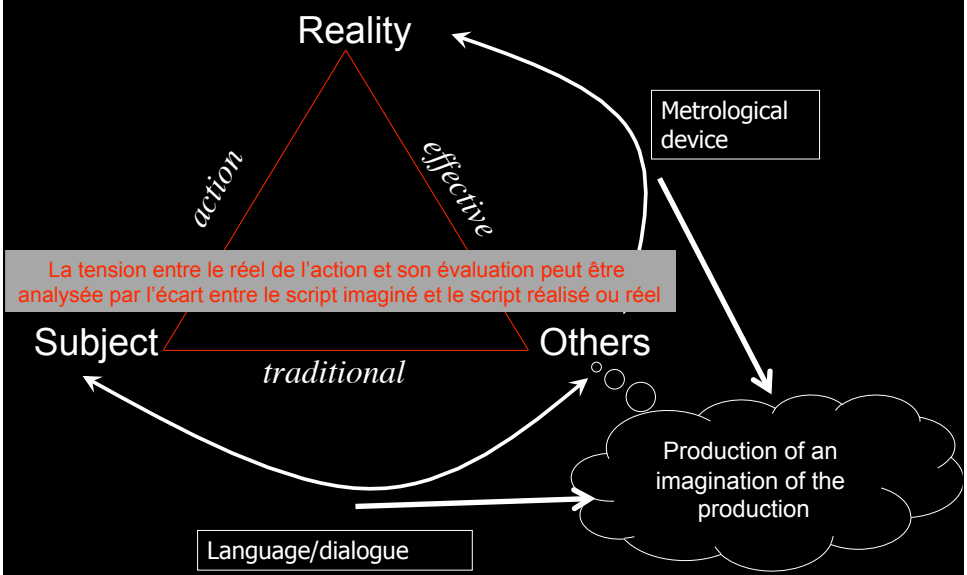
The objects in action, the relationship in the reality and alienation

From the effective function



From the functioning and the operating instructions

Return on the cleverness of reality and production imaginary



Optical guidance for buses : an automatic docking system for buses at the station

Optical guidanc is an innovation of the research programm initiated by the transport ministery to find out a go-between between the tram and the bus (1993-2003). It was supposed to improve the bus accessibility.

This research programm lead or will lead to the settling of this device on few urban public transport network : Rouen (2001), Clermont-Ferrand et Las Vegas (2004), Castellon (2008), Bologne (2011) et Nîmes (2012).

This device have been stopped at Clermont-Ferrand and Las Vegas and is hardly operating in Bologna.

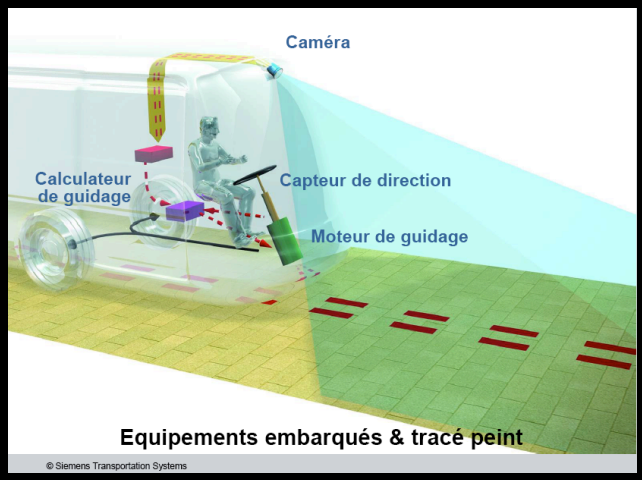
Optical guidance, a work representation

Introduction of optical guidance system, an automatic docking system for buses at the station, in three different public transport networks (Rouen, Clermont-Ferrand, Las Vegas) should improve the bus accessibility. The reason of this automation is usually the lack of confidence in the operator abilities.

The ingenieur's representation leads them to make driving independent from « *the possible nervousness of the driver* », to make driving more reliable because « *even with very good drivers, only the guidance systematicly allows a highly efficient docking, in its precision and repetitivness* » (Ferbeck, 2004).

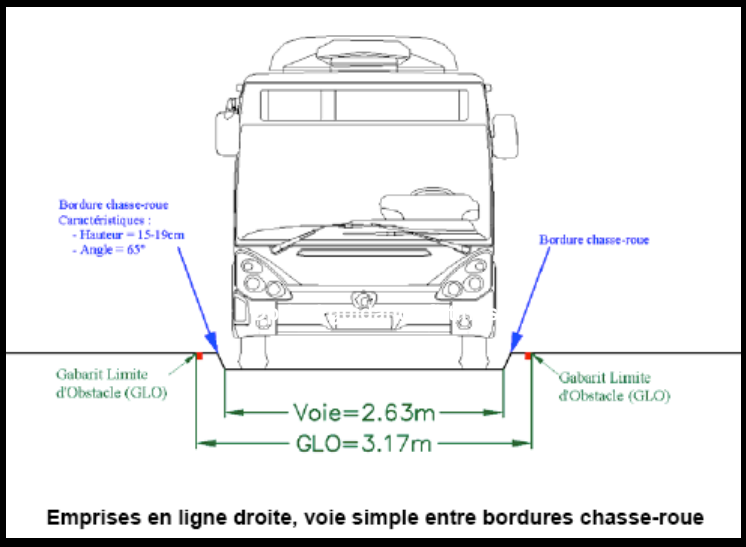
Not only the human driver is not reliable in its ordinary work, but he also « *complicate the security demo* » (Ferbeck, 2002).

Optical guidance system : description of the device



Optical guidance aims to improve the regularity of the bus docking at the station and reduce the horizontal gap. This should allow to improve accessibility to mass transit.

Optical guidance fittings



(Source Siemens)

Optical guidance fittings : TEOR in Rouen

Camera, unused steering wheel, road marking and design bus stop.

The optical guidance fittings : Clermont-Ferrand

Modifications to be made in the station to ensure the optical guidance and to improve accessibility are :

- ✓ Modifying the stations design;
- ✓ Calculating and planning the route of the possible **guidance** track;
- ✓ Modifying the station kerbs.

With or without optical guidance at Clermont-Ferrand

The optical guidance paradox

Result seems efficient. Though on these pictures, the optical guidance is inactivated. Bus with the optical guidance, even when inactivated, keep docking in a satisfactory way. Even significantly better than the other busline who share the same stations.

Docking in guidance mode and adapted station : re-invention of the Kassel kerb

The optical guidance is less adaptative than a classical driving, therefore the designers are obliged to simplify the docking. This situation allows the drivers do dock correctly even though optical guidance is not working.

« De chasse roue, le trottoir est devenu guide roue ».

Optical guidance paradox : a breaking down machine still working

In two of these public transport networks, automation turned out to be ineffective and has been dismantled. The first paradox of this analysis is that the bus company was satisfied of the docking whether the guidance system works or not. Despite the absence of the system, drivers compensate this lack by docking at the nearest of the pavement.

> « In the meantime, all MAX operators execute manual station docking. MAX operators have reported that manual docking of MAX vehicles is greatly facilitated by the center configuration of the driver's seat, allowing operators to maneuver the vehicle over the painted trajectory upon approach to the station with great accuracy ». (Las Vegas. FTA 2005)

> **" Optical Guidance** - The added optical guidance costs were not necessary because highly trained drivers can dock the vehicles almost as precisely and the automated system proved ineffective in the Las Vegas climate". (Las Vegas. FTA. 2006)

In an independan manner, the Nantes urban transport reaches to the same conclusions with its busway. (2006)

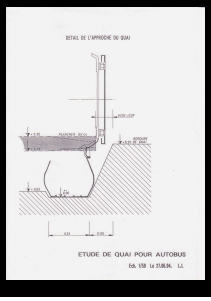


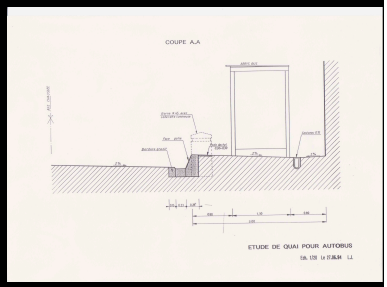
A docking on the Nantes Busway

Results of the local internal study of the Nantes urban transport network.

1994

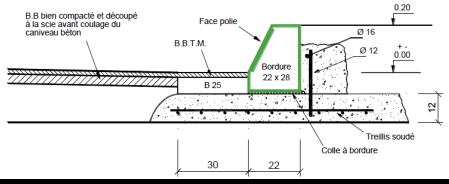
First outlines to inscribe the kerbs in the drivers activity.





Disposition générale

Le constructeur devra avoir en tête que cet ensemble est appelé à supporter des sollicitations dynamiques importantes. En effet, l'objectif fixé au conducteur d'accoster avec une lacune horizontale aussi faible (5 cm ± 5 cm) conduira automatiquement à développer des efforts importants sur la bordure.



2003

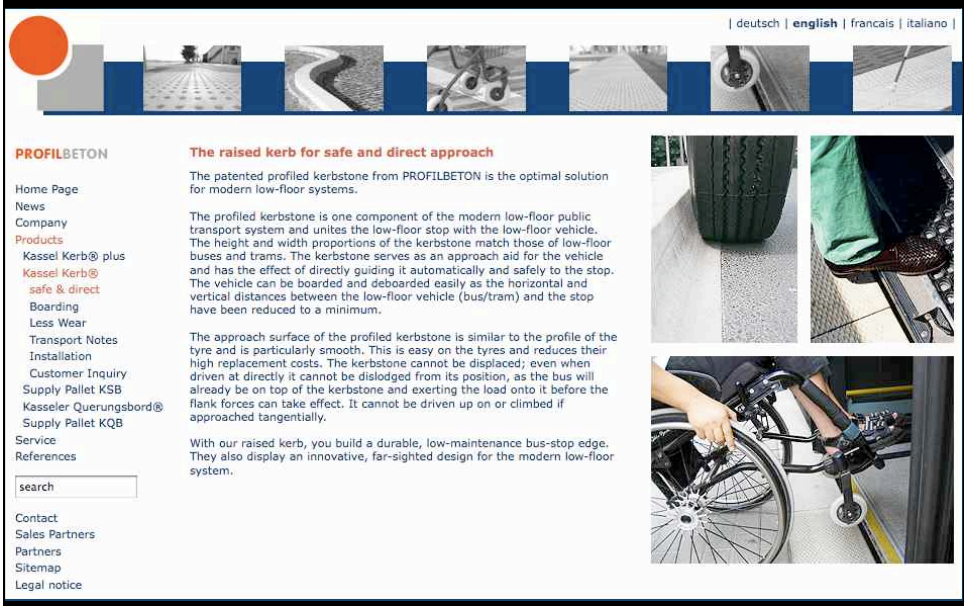
Codification of a « technique » of production of the kerbs that should permit the drivers to dock at the nearest

The invention of the « station accessible » to the bus is local only in France.

In Europe, it is formalised in an institutional manner:

> « It has been found that an angle of 65° to the vertical is best for the front face of the kerb with, if necessary, a drainage channel at the foot of the kerb of no more than 10 cm width. A width greater than this causes the bus to tilt. In effect the gutter can act as a positioning guide for the bus driver. The type of kerbstone used is Kassel, which has been found satisfactory, and has become well known under this nickname in the public transport community. Earlier kerbs suffered from some damage problems. It was also found that the road surface tended to rut because of the continued use of the same part of the road surface (especially when braking and accelerating). Strengthening of this part of the road has reduced this problem. In parenthesis, it is noted that driver training in correctly approaching and stopping at the boarding area is important, as is involving drivers in the design and development of the stops ».
>
> European Conference of Ministers of Transport, 2004, *Improving access to public transport*.

and industrial :



The french exception

Even though this stations design is known since 1988. It appears that in France, it is each time a new local creation. Either when a failure of the optical guidance occurs: the drivers keep on docking in a satisfactory way and the failure is kept hidden. The operators success is masked by the unsuccess of the technological object. Like it happenned in Clermont-Ferrand (or Las Vegas) or in more formalised manner but very localised, like it happened in Nantes.

We hypothesize that because of the specials bonds created between the manufacturers, the instutional transport researchers and the authorities, a special imaginary or representation of techniques that give priority to technical objects to the detriment of action has been created.

On this point, we will give two indications to demonstrate this hypothesis.

In France, the bus is not considered, it exists only in the shadow of the tram: as example, the research programm on go-between vehicles, either bus and tram.

The CERTU, can be considered as a spokesman, a propagandist of good practices, who faithfully expresses the urban public french transport ideology. When looking these publications chronology, we can note that BHNS have been created on the failure of the bus-tram.

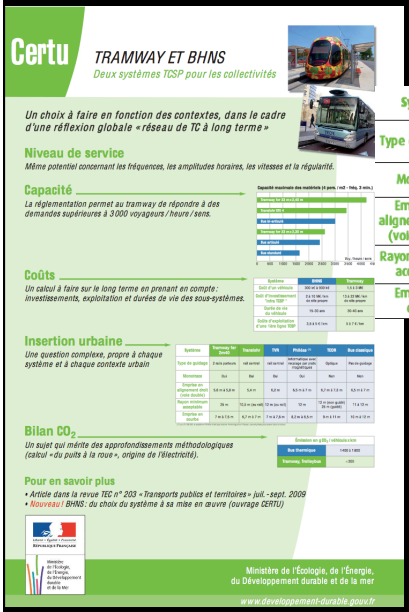
1994-2003 : trouver le chaînon manquant

- Gart/Ademe, *1996, Fonctions et pertinence des systèmes de transport intermédiaire (entre l'autobus et le tramway).*
- CERTU, 1999, NOUVEAUX SYSTÈMES DE TRANSPORTS GUIDÉS URBAINS, Présentation de quatre systèmes selon une grille commune.

2003-2011 : le bus par défaut, la prégnance du guidage optique

- CERTU, 2005, BUS À HAUT NIVEAU DE SERVICE (BHNS), Concept et recommandations
- CERTU, 2009, BUS A HAUT NIVEAU DE SERVICE (BHNS). Du choix du système à sa mise en œuvre.

But the BHNS keeps regretting the optical guidance.



Système	Tramway fer 2m40	Translohr	TVR	Phileas (1)	TEOR	Bus classique
Type de guidage	2 rails porteurs	rail central	rail central	Informatique avec recalage par plots magnétiques	Optique	Pas de guidage
Monotrace	Oui	Oui	Oui	Oui	Non	Non
Emprise en alignement droit (voie double)	5,6 m à 5,8 m	5,4 m	6,2 m	6,5 m à 7 m	6,7 m à 7,3 m	6,5 m à 7 m
Rayon minimum acceptable	25 m	10,5 m (au rail)	12 m (au rail)	12 m	12 m (non guidé) 25 m (guidé)	11 à 12 m
Emprise en courbe	7 m à 7,5 m	6,7 m à 7 m	7 m à 7,6 m	8,2 m à 8,5 m	9 m à 11 m	10 m à 12 m

By the respective positions of the « TEOR » and the « Bus classique », this table clearly shows the favour given by the CERTU to the optical guidance. The fact that a bus is drived by a driver is considered as absence of guidance !

From a pragmatic point of view, we can clearly see the advantage of having no optical guidance (emprise en alignement droit et rayon de giration, l'emprise en courbe est la conséquence).