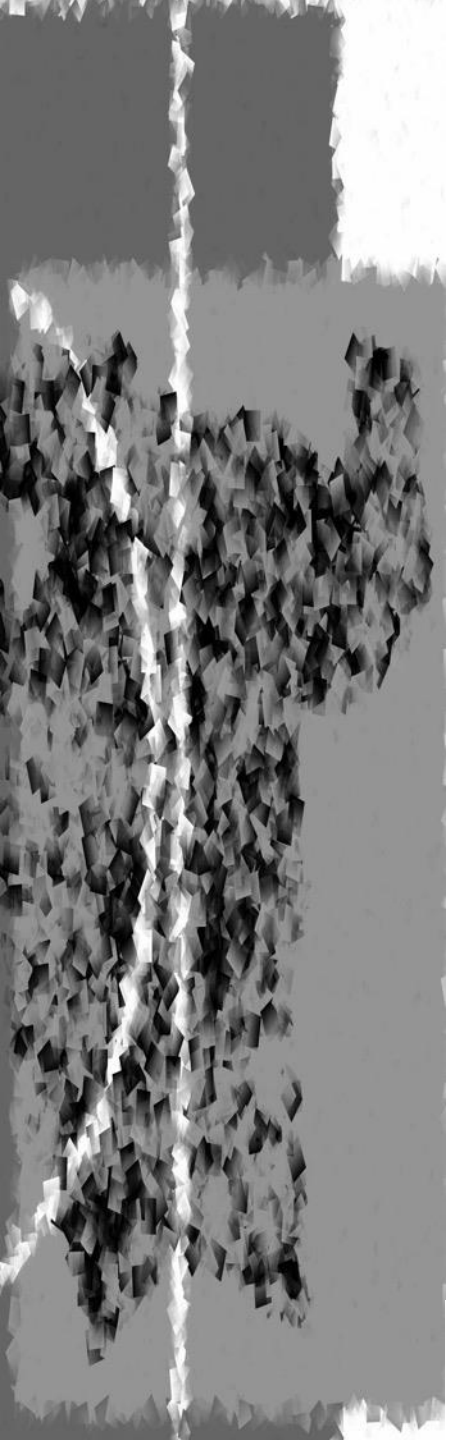

When drivers are not sure that their bus will stop… Trust and mistrust in technical devices through the concept of instruments systems

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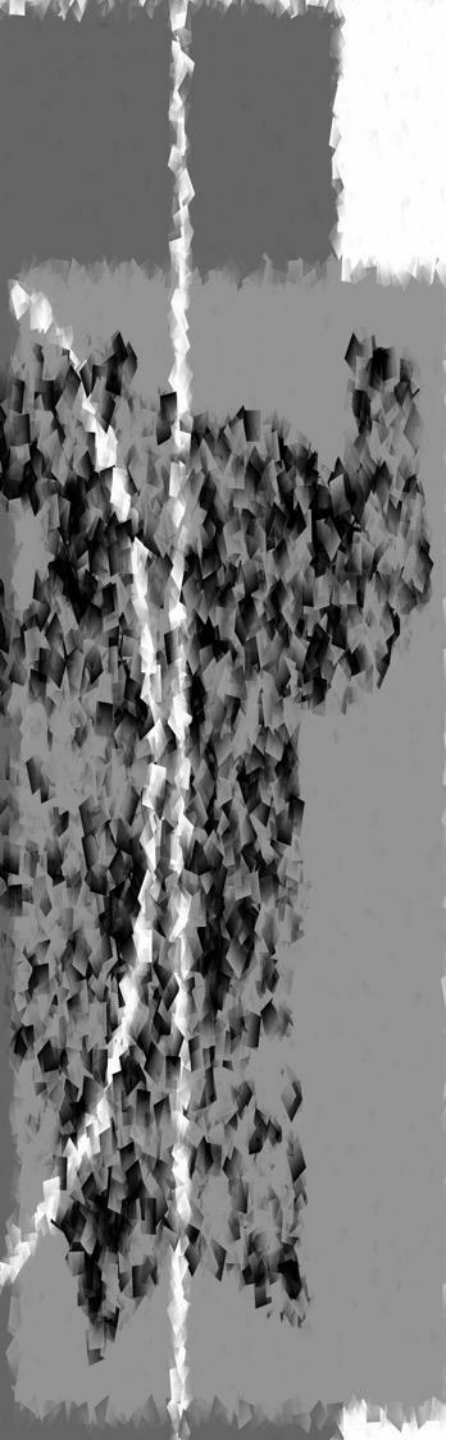
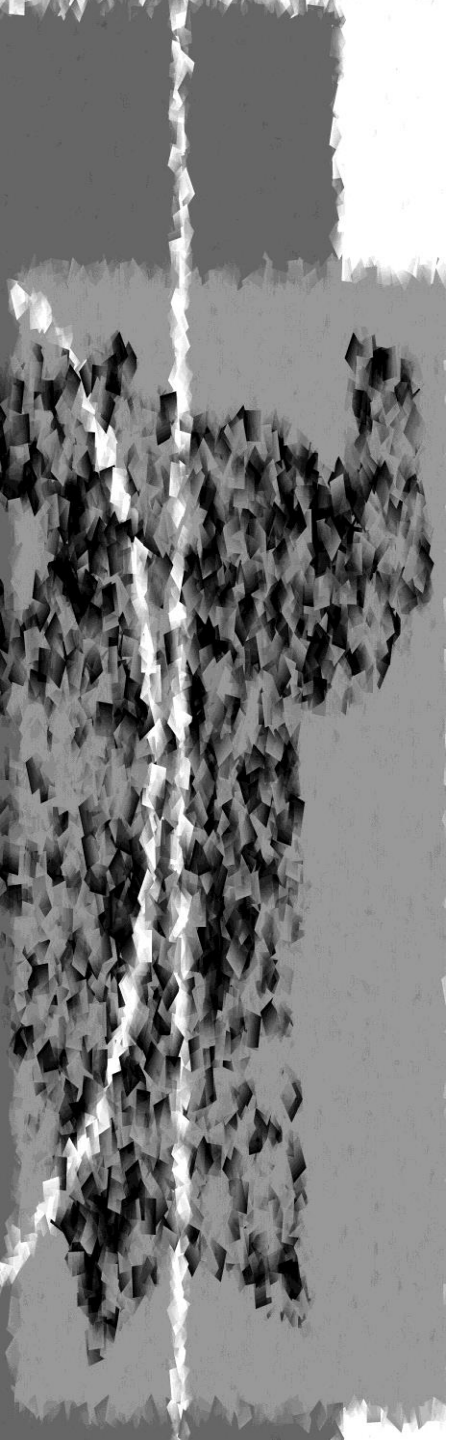


1. Empirical Situation
2. Instrumental genesis framework
3. Discussion

PLAN



- Missions of the company & Context
- Demand of the CHSWC
- Activity at the approach of a commercial stop: Trust or mistrust in brake devices and motionlessness

1- EMPIRICAL SITUATION

Empirical Situation

Missions of the company & Context (1/3)

- An urban transport company (France)
  - 40 different lines of bus
  - For an agglomeration of 25 municipalities
  - 1.000 commercial stops
    - several in the downtown
  - 17 millions of customers per year
  - More than 200 bus drivers
  - Etc.

Empirical Situation

Missions of the company & Context (2/3)

- The work situation of city bus drivers
  - They must obviously drive their bus
  - And… they monitors:
    - Traffic (pedestrians, other vehicles, traffic laws, etc.)
    - Interior of the bus
    - Operations of the bus (noise, alarms, etc.)
    - Travel time ("theoretical/real" gaps) and schedules
    - Etc.

Empirical Situation

Missions of the company & Context (3/3)

- A fatal accident
  - Several pedestrians were crushed by a bus
  - At a commercial stop of THE line of the city center
  - The FAE (Frein d'Aide à l'Exploitation = Operating aid brake) in cause
  - Etc.
- But why?
  - Human error?
  - Or technical failures?
  - A long and painful history…

Empirical Situation
Demand of the CHSWC

- Demand of CHSWC (Committee for Hygiene Safety and Working Conditions)
  - "In the suite of this fatal accident, there were several returns from drivers regarding strange behaviors of the buses, involving the brake devices and motionlessness
  - And many of them no longer trust in these technical devices
  - Are there real risks?"

Empirical Situation

Activity at the approach of a commercial stop

- Activity at the approach of a commercial stop
  - Drivers observed pedestrians nearby to identify:
    - If they wish to get on the bus
    - Some specific needs (disability, the elderly, etc.)
    - Etc.
  - At the stop, they also look:
    - Passengers entrances and exits (and doors)
    - People approaching the stop (elderly people, who run, with pram, etc.)
    - Etc.

Empirical Situation

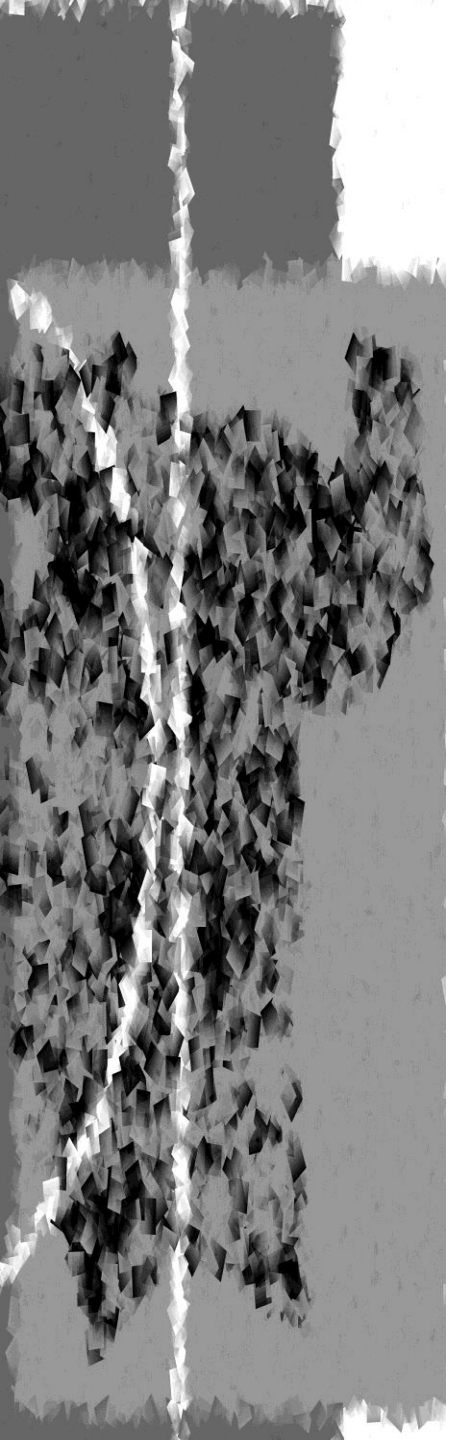
Brake devices and motionlessness

- Technical approach
  - 3 devices combinated
- Activity approach
  - Braking and immobilizing his bus

Empirical Situation

Activity at the approach of a commercial stop: trust or mistrust in brake devices and motionlessness

- Braking and immobilizing his bus
  1. Use of the FAE?
     - For brake:
       - by noone! presently…
       - And before by all drivers! Without other devices simultaneously
     - But in fact presently by everyone! Due to the automatic asosciated function « open the door »
  2. Brake pedal
     - A majority of drivers keep the foot on the brake pedal, without pressing on it
       - "otherwise it pulls" (for biomechanical reasons: limit the postures maintained)
     - A minority of drivers press on the brake pedal with the foot
       - "Not for all the stops"
       - "it depends on the slope or affluence"
  3. The parking brake is used by a very small minority
     - "It is not planned for that"
     - "It is poorly positioned for intensive use"



- Systems of instruments/resources & FMRS Method
- Emergences of the systems of instruments/resources: Redundancies, Complementarities and Values

2- INSTRUMENTAL GENESIS FRAMEWORK

Instrumental genesis framework

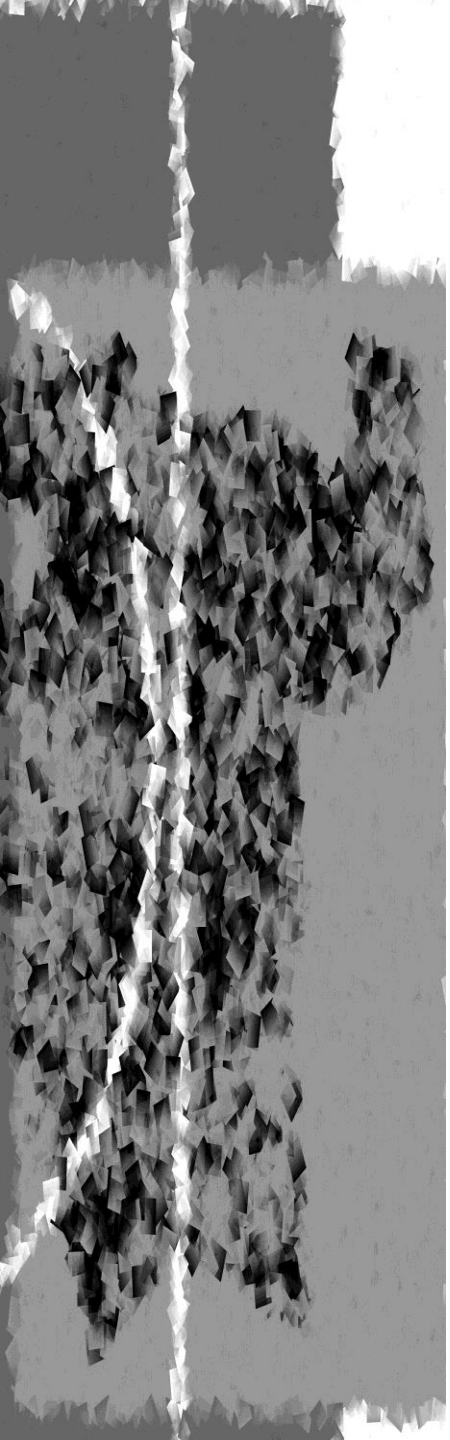
Systems of instruments/resources & FMRS Method

- Instrumental genesis framework (Rabardel, 1995) & Systems of instruments (Rabardel & Bourmaud, 2003; Bourmaud, 2006, 2010)
  - The concept of « Instrument »
    - Activity mediated by instruments
  - Theory of systems, for thinking the concept of « Systems of instruments »
    - « the whole is greater than the sum of its parts » (Pascal)
  - FMRS Method
    - Failures Methodology and Resources Substitutions (of functions)
    - Data collected, by observations or interview on the modalities of performing the activity during the failure of an instrument (with another)

Instrumental genesis framework

Emergences of the systems of instruments/resources: Redundancies, Complementarities and Values

- As results of FMRS Method, in a system of resources there are emergences (Rabardel & Bourmaud, 2003; Bourmaud, 2006, 2010):
  - Redundancies and Complementarities of functions
    - This double characteristic contributes simultaneously to
      - the system's robustness
      - and the flexibility and adaptability of its mobilization in relation with the variaility of circumstances
  - and Values, or System of values
    - Each function also involves the attribution of a relative value
      - as « more/less practical », « slower or faster », etc.
      - or « more/less sure »



- Trust or mistrust as emergences of the systems of instruments/resources
- Systems of resources / values and Occupational risks

3- DISCUSSION

Discussion

Trust or mistrust as emergences of the systems of instruments/resources

- Back to the empirical situation
  - The operators must necessarily trust in their devices, but yet...
    - Different events can occur that will alter it…
  - With the FRMS we know the operators realize a value judgment on their systems of instruments/resources
    - Trust is not an absolute but relative value
    - A low or a negative value will lead to the mistrust and the exclusion of the resource from the system
  - The challenge of rebuilding trust
    - « Trust can not be decreed, it is built » (Karsenty, 2013)

Discussion

Systems of resources/values and Occupational risks

- Discussion about two other situations
  1. Another Example of Serious Accident:
     - Trust or mistrust in technical devices

The installed aluminum plate transmitted a false message: "the zone is secured", whereas it was not

The old plaque conveyed a just message: "the area is dangerous"

Chute de hauteur (± 6 mètres) dans la fosse BVI en passant à travers le deuxième trou de la plateforme lors du nettoyage, la plaque d'obturation ayant basculé en marchant dessus.

***Blessures** : Fractures multiples au niveau du coude droit*

Principales causes :

!'En mono diamètre 1 seul trou utilisé, le deuxième est obturé par une plaque

!Les taquets de centrage n'empêchent pas la plaque de se déplacer lorsque du béton passe dessous et donc de pivoter lorsqu'elle est décalée ;

Actions correctives :

!Vissage de la plaque au sol (immédiat);

!Etude d'une plaque facilement escamotable

Plaque ayant basculé en marchant dessus

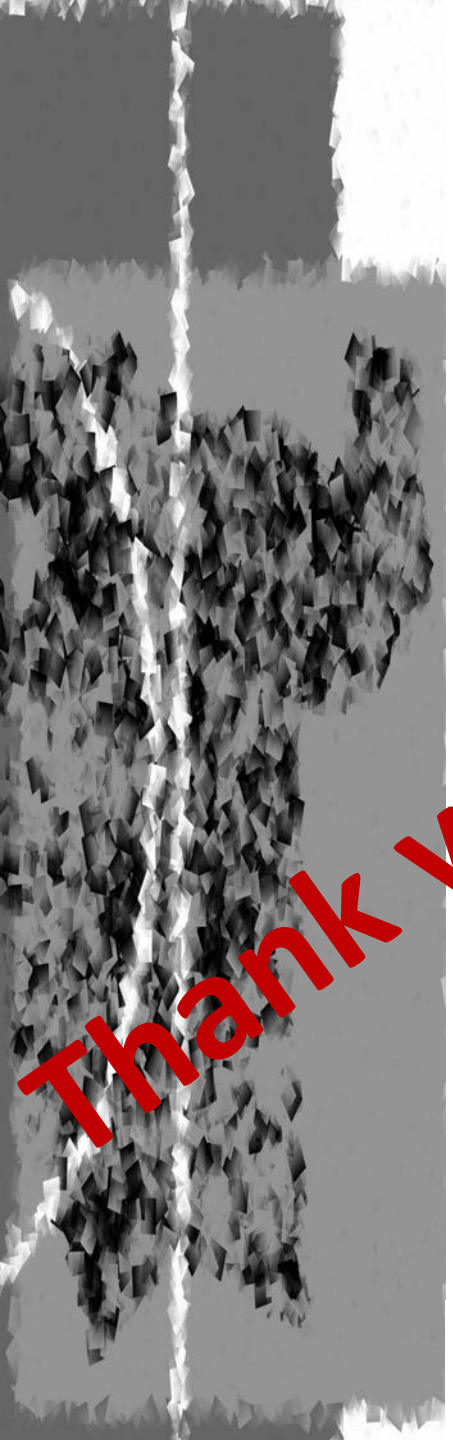
Au travail la chute de hauteur = 2ème cause d'accident mortel et 3ème cause d'incapacité permanente

TOUS LES ACCIDENTS SONT IMPORTANTS, ALORS PARLONS-EN !

Discussion

Systems of resources/values and Occupational risks

- Discussion about two other situations
  1. Another Example of Serious Accident:
     - Trust or mistrust in technical devices
       - A strong or positive value will, on the contrary, contribute to including this resource in the system, but yet…
  2. Another Example of Driving Vehicles:
     - Religious Beliefs as an item of the systems of Values



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Thank you!

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