Towards an Anthropological-Based Knowledge Management

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Abstract: "*To make the knowledge useful* […]*, the KM manager must create a single shared understanding among people of what the knowledge means to the organization within the context of its business domain and how it is intended to be used.*"(Malafsky and Newman). However people possess their own knowledge, meaning that useful knowledge from an individual or a collective will be useless for another. We defend the idea that knowledge isn't determined by a context of use but by people who own it. So, to enable knowledge management, we have to first classify knowledge according to people. This paper proposes a way to organize knowledge based on an ontological classification of people. An ontological representation comes from Philippe Descola's book "*Beyond nature and culture*" (2005), which explains that humans use their experience to organize the world, following a logical process in two parts, *namely Identification* and *Relations* leading to the modeling of their Ontology – Ontology with a capital "O" will be used in the context of the specification by an individual of what exist in the world and their relationships. That's the classification of these Ontologies in ontologies – "*a formal, explicit specification of a shared conceptualization*" (Studer, Benjamins, Fensel, 1998) – which leads us to an ontological classification. By linking an ontology to the knowledge that comes from its people, we will prove that both are related. In fact these ontologies determine knowledge and thus ontologies classification organize knowledge. While investigating the relation between ontologies and knowledge, we observe that using inadequate knowledge in a multi-ontological context can trigger crisis due to the information interpretation, strengthening the need to manage it. In an attempt to expand the scale of knowledge use which is determined by people ontologies – echoing an ontological capital of people –, we shall discuss about merging informations to create an heterotopic phenomenon by using several knowledges resulting of a consultation process based on mutual knowledge.

Keywords: knowledge, ontology, management, ontological capital, crisis.

Introduction: It's a known practice in knowledge management to use contexts or domains to organize knowledge but in fact it's not the best practice. The main purpose of this paper is to demonstrate that a knowledge classification emerging from people Ontologies surpass the traditional organization based on knowledge context of use. This ontological classification is created using Philippe Descola's two steps process which allow us to model people Ontology through *Identification* and *Relations*. While Identification organizes existing being in collectives using intrinsic ontological properties, Relations establishes their relationship through extrinsic characteristics. By aggregating similar Ontologies in a shared ontology, we are able to propose a multi-scalar ontological classification. To link these ontologies with knowledge, we use the anthropologist definition of knowledge which suggests that Ontologies are primary knowledge. To valid this proposition, we first demonstrate that the sustainable development ontology is a basis to knowledge creation in call for proposals and projects on the domain of the risks. Then we show that the sustainable development ontology shapes knowledge in any context of use by analyzing the land planning of a territorial project called Taonaba. While investigating this territorial project, it seems that an inadequate use of knowledge was related to the creation of a crisis between two communities. Indeed, the situation of Taonaba reveals a multi-ontological context – the sustainable development group and the Maroons – with a one sided use of knowledge on its land planning. Considering knowledge as information that an ontological framework successfully interprets, as a result it is impossible for the Maroons to understand the sustainable development believers' use of knowledge. A late consultation process which failed to integrate properly the Maroon expresses the need of mutual recognition to enable a real participation of each stakeholder. Eventually, the heterotopic properties of information make possible the co-utilization of knowledge which could solve multi-ontological problematic.

1. Ontological classification

The ontological classification is based on the hypothesis that we can organize knowledge through people's Ontology. We use Philippe Descola's two steps process composed of Identification and Relations – a capital I and R for Identification and Relations will be used to avoid confusion while we talk about these processes – to model Ontologies. People use the Identification to aggregate existing being in collectives and use the Relations to establish their relationships. If the resulting model of an individual is unique, shared models emerge at the scale of the collective, enabling a scalable classification.

1.1 Identification

The first step of Philippe Descola's process, Identification, is based on the projection of human ontological characteristics: the interiority and the physicality, to all existing being. Interiority is what we commonly call "*spirit, soul or consciousness*" (Descola, 2005) and physicality is referring to "*outer shape, substance, physiologic processes, perceptive and sensory-motor*" (Descola, 2005) of the existing being. Assigning attributes to each of these criteria will allow human to do a dual dichotomy interiority/physicality and difference/similar, determining their relative places on an ontological matrix. At the end of the Identification process we obtain collectives, using the continuity and discontinuity of the compared qualities.

1.2 Relations

The second step in Descola's method is made of Relations. Beside the intrinsic properties of the existing beings extrinsic relations are added. They fall into two groups divided in atomic relations:

- Some potentially reversible between two equivalent beings (gift, exchange and predation) situated at the "*same ontological level*" (Descola, 2005);
- Some univocal based on connexity (genetic, temporal or spatial) between non-equivalent beings (production, transmission and protection) "*linking several ontological levels*" (Descola, 2005).

1.3 Ontology modeling

To illustrate the whole process, we are going to present a fictive example. Imagine a human *A* and three other existing being *B*, *C* and *D*. *A* start the Identification by projecting his interiority and physicality over *B*, *C* and *D*. Then he assigns attributes to the physicality and interiority of himself, *B*, *C* and *D*: *A*(short, consciousness), *B*(short, spirit) and *C*(tall, unconsciousness), *D*(short, spirit). Next is the creation of the ontological matrix.

Table 1. Ontological matrix of the illustration

	Consciousness	Spirit	Unconsciousness
Short	A	B, D	
Tall			C

We observe on the Table 1 that the given example creates three different collectives *B* and *D* – called *E* –, *A* and *C*. *A* and *E* have a physicality continuity, but have an interiority discontinuity. *C* has a physicality and interiority discontinuities with either *A* or *E*.

Then, our human *A* explains the Relations between the collectives. *A* has a protectionist relationship with *E* and considers *C* as a production of *E*.
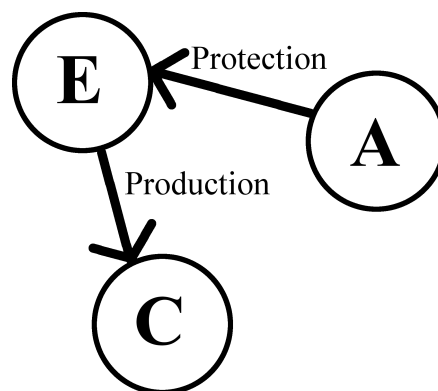

Figure 1. Human *A*'s Ontology, resulting of the Identification and Relations processes.

Figure 1 is the partial Ontology of an individual. As it is, this ontological model is a formal, explicit specification of one's conceptualization of the world. Therefore, are there similar Ontologies that we can gather in one *ontology* to enable a classification process?

1.4. Classification

To Philippe Descola, the continuities and/or discontinuities between collectives are driven by specifics Identification's modes: the animism, the naturalism, the totemism and the analogism.

"*Whether most existing being are deemed to have a similar interiority while distinguished by their bodies, and it's the animism* […]; *Whether humans alone have the privilege of interiority while relating to the continuum of non-humans by their physical characteristics, and it's the naturalism*[…]; *Whether humans and non-humans share, whitin a same class, physical and moral properties from a prototype* […] *and it's the totemism* […]; *Whether all elements of the world differ from each other on the ontological level* […] *and it's the analogism.*" (Descola, 2006)

Table 2. Modes of identification denoted by Philippe Descola.

	Same physicalities	Different physicalities
Same interiorities	Totemism Aboriginal from Australia.	Animism Amazonia, North America, Siberia, Melanesia and South-east Asia.
Different interiorities	Naturalism Europe since Classical Age.	Analogism China, Europe since Renaissance, West Africa and Mesoamerica.

This classification presented by Philippe Descola shows Identification trends, but do not enable the organization of one's conceptualization of the world in a shared conceptualization. In fact, Philippe Descola writes in his book that Ontologies are always hybrid to some extent. To create ontologies we have to study the common experience of the world shared by some people. It's the aggregation of the similarities between several ontological models. The accuracy of the ontology will depend of the level of abstraction we need to represent a common conceptualization of the world, that's why the size of the collective is an important element in this process.
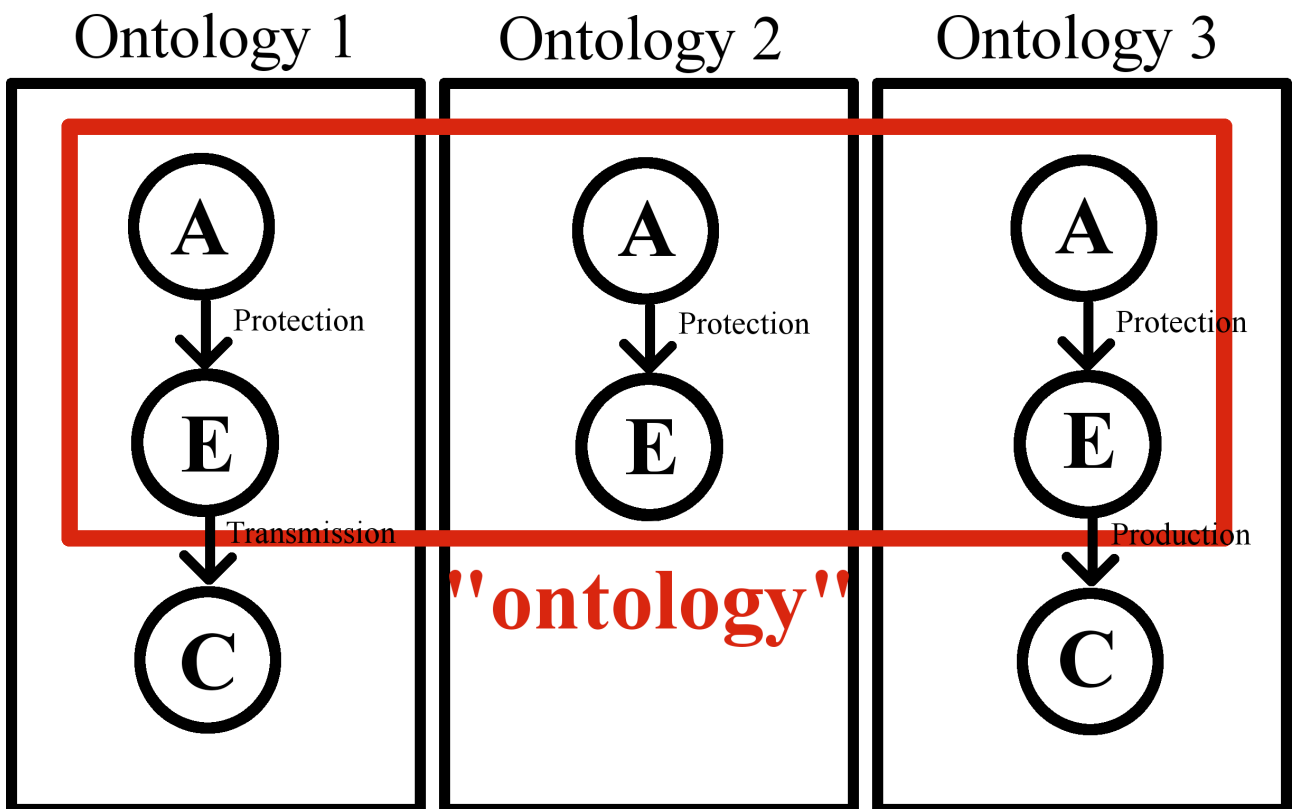

Figure 2. The creation process of an "ontology".

We can organize ontologies with a top-down scalable classification where the biggest collective with the more abstract ontology are at the top and the individuals Ontologies are at the bottom.
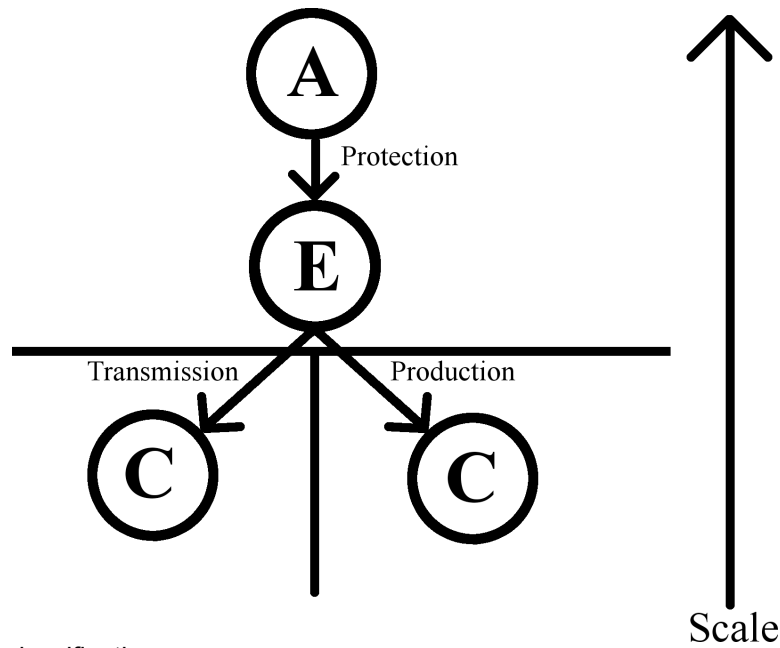
Figure 3. Ontologies classification.

To summarize, Identification and Relations allow us to model Ontologies. Collective experiences as ontologies can be used to organize and scale Ontologies. Being able to classify people in ontologies, we have to now analyze the relation between ontologies and knowledge. If we can prove that both are linked, then we will be able to associate useful knowledge with people.

2. Ontologies and knowledge
Anthropologists define knowledge as being first of all the one we have from our self and our environment, meaning that the ontologies we just modeled are representing primary knowledge. One of our objectives here is to demonstrate that this original knowledge emerging from people conceptualization of the world is present in any context of use and thus people's ontology classification come first in a knowledge management process. If our proposition is true, an ontology of a given collective should shape further knowledge built by this collective. To validate this hypothesis, we will study the relation between the ontology of sustainable development believers and the associated knowledge.

2.1 The ontology of the sustainable development believers
Sustainable development believers adhere to the naturalism Identification mode, dividing existing being between humans – society – and non-humans – environment – based on an interiority discontinuity and a physicality continuity. In addition, the sustainable development conceptualization of the world prescribes the human's protection on the environment as an economic factor, establishing a hierarchical relationship between the two of them.
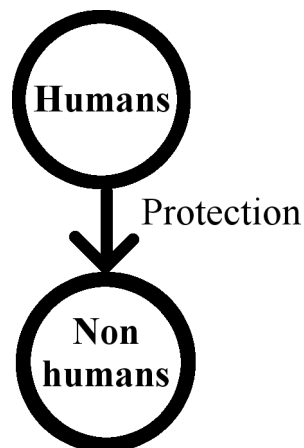

Figure 4. Simple representation of the ontology of sustainable development believers.

The sustainable development ontology – abbreviated SDO in this paper – is easily recognizable. It presents a characteristic duality, society on the one hand and environment on the other hand, connected by humans' protection of non-humans. Considering that this ontological model is the basis of further knowledge, we should be able to discover this remarkable setup in any context of use.

2.2 The sustainable development ontology footprint on knowledge

To prove our theory, we will first explore a call for proposals and a call for projects in the field of risk, as we think they are the best suited to show that knowledge is built on the SDO properties. Then, we will demonstrate the multi-contextual use of the ontology as primary knowledge by analyzing a territorial project. Once both will be proved, it will confirm the relevance of an ontological classification of knowledge.

2.2.1 Sustainable development ontology as a basis to knowledge creatio

The call for proposals that we study is a French one, titled "*Risks, Decision, Territories*" (available at http://www.developpement-durable.gouv.fr/IMG/pdf/RDT_APR2013-2.pdf). The thematic was "*The territories resilience in the face of the risks*". Most of the categories fit explicitly the sustainable development ontology:

- Axis 1 – "*Emerging risks*"
    - "*3.1.1 Risks associated with technological innovation*" → humans collective;
    - "*3.1.2 Risks associated with climate and societal change*" → humans and non-humans collectives;
    - "*3.1.3 Interaction between natural risks and technological risks*" → humans and non-humans collectives and their relationship;
    - "*3.1.4 Risks and economy*" → relationship between collectives in the sustainable development;
- Axis 2 – "New approaches"
    - "*3.2.3 The risk management division, the social inequalities*" → humans collective;
        - "*Communication, NTIC and territories*" → humans collective;
        - "*Social risks*" → humans collective;
- Axis 3 – "*Factors of improvement of territories resilience in the face of the natural and technological risks*" → humans and non-humans collectives.
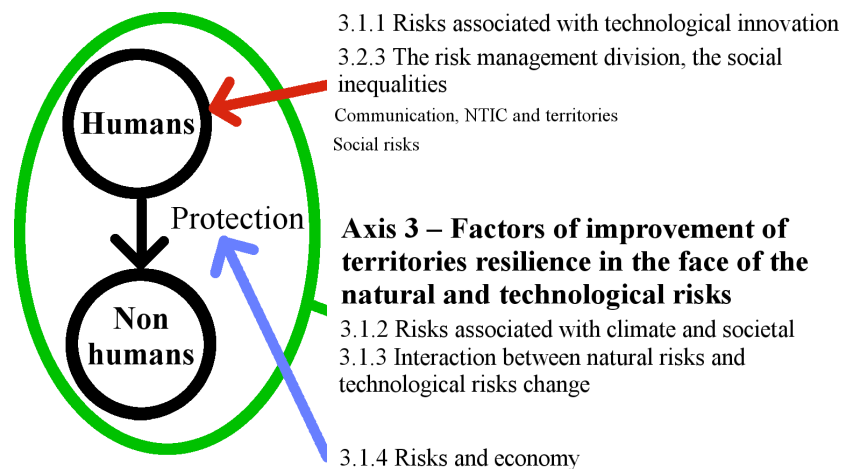

Figure 5. Sustainable development ontology and the conception of the risk

We observe on the figure 7 that the arising knowledge from this call for proposals is indeed structured by the sustainable development ontology. To confirm our observation, we analyze a call for projects by the French National Research Center (CNRS). In a context closes to the previous one, the title "*Socio-economic space of the environmental risk*" (available at http://www.cnrs.fr/mi/IMG/pdf/peps_esereaap2013vf.pdf) reflects every parts of the sustainable development ontology. As a matter of fact, we have the decomposition of humans – socio –, non-humans – environmental – and the hierarchical relation – economic. We won't continue our demonstration because it seems clear enough that the SDO is a support to create new knowledge in this call for projects.

Our analysis took place in the specific field of the risks to validate that knowledge emerges from an ontology. As primary knowledge, we need to highlight the multi-contextual use of an ontology. To reach this goal, we will study the consequence of the SDO on land planning knowledge.

2.2.2 A multi-contextual use of the sustainable development ontology

We will now introduce from prior works a territorial project called Taonaba, located in the French department of Guadeloupe in Overseas France in the town of Les Abymes.
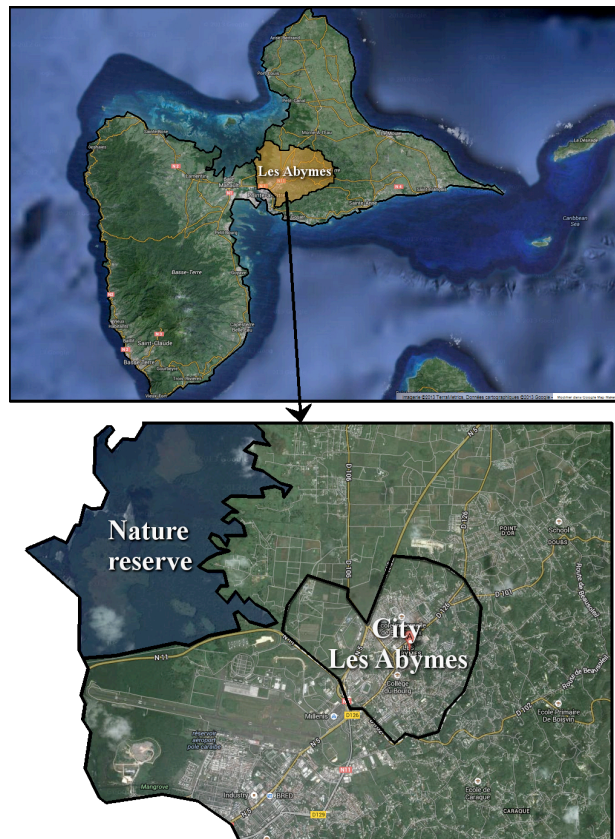
Figure 6. Les Abymes location on the Guadeloupe territory. Original picture after a Google Map satellite view.

The main idea of the project is to create a Mangrove House, close to a coastal wetlands characteristic by its ecological diversity of national and international importance. The place is part of the former nature reserve of the Grand Cul-de-Sac, nowadays included in the National Park of Guadeloupe and is classified as a worldwide biosphere reserve by the Ramsar convention (an international treaty for the conservation and sustainable use of wetlands). In addition, an interesting agricultural area is adjacent (remains of the sugar plantation of Belle-Plaine). The Territory approach of Taonaba is directly inspired by the creative process of "administrative" Countries LOADDT Pasqua 1995 then Voynet 1999, "*the law of June 25th of 1999, guidance for planning and sustainable development of the territory.*" (http://www.legifrance.gouv.fr, the French government entity responsible for publishing legal texts online). The desire to preserve, develop and enhance the richness has led in a sustainable development logic:

- An ecotourism development: to be the motor of the Abymes tourism through the local development of its richness;
- An ecological preservation: through education to safeguard the environment and ecosystems knowledge (agricultural areas, coastal wetlands);
- Local development (social well-being) by promoting the development of employment-generating activities for local actors, and creating a green space at the gates of the city.

Concretely, the city Les Abymes will develop a museum centre, as well as discovery paths by foot and boat.

Figure 7. Taonaba project. Original picture after a Google Map satellite view.

The figure 7 points the duality humans – museum center – and non-humans – nature reserve –. The protectionist relationship of Taonaba could be express by showing the orientation of the interaction between the two collectives – tourists at the museum going for a walk in the nature reserve. The SDO isn't used solely in the context of the risks, but also in the land planning and thus used in any context. Therefore, knowledge can be organized using an ontological classification. It's good to notice that this classification reveals an ontological capital of people. We believe that the importance of this ontological classification exceeds the unique purpose of proposing useful knowledge to the right people. In fact, while investigating Taonaba territorial project, it seems that knowledge use was related to the creation of a crisis.

3. Towards an ontological knowledge management

Taonaba is divided in two main ontologies: the Maroons one and the sustainable development one. This multi-ontological situation which is quite common will reveal itself more complex than expected. In fact a one sided use of knowledge will trigger a crisis and the consultation process will fail to reach its objectives. We think that these consecutive problems could have been avoided with an ontological knowledge management.

3.1 A multi-ontological situation

The description that we did of Taonaba comes from various press papers of the city Les Abymes to the general public. Yet the city Les Abymes isn't the only actor to work on this project. The semi-public company in charge of land use planning in Guadeloupe (SEMAG) jointly participates. The SEMAG and the city Les Abymes share the same ontology, that's what confirms the page "*Who are we?*" available on their website. However, one actor doesn't participate in the realization of the project but is directly involved. Indeed the Maroons, slave descendants who took refuge in the mangrove, live in the middle of the land planning of Taonaba. From someone that belongs to the SDO, it seems unbelievable that people could live in a nature reserve, but the Maroons believe that this place is their rightful home. Thus, we presume that the land planning of the Maroon community reflects another ontology.
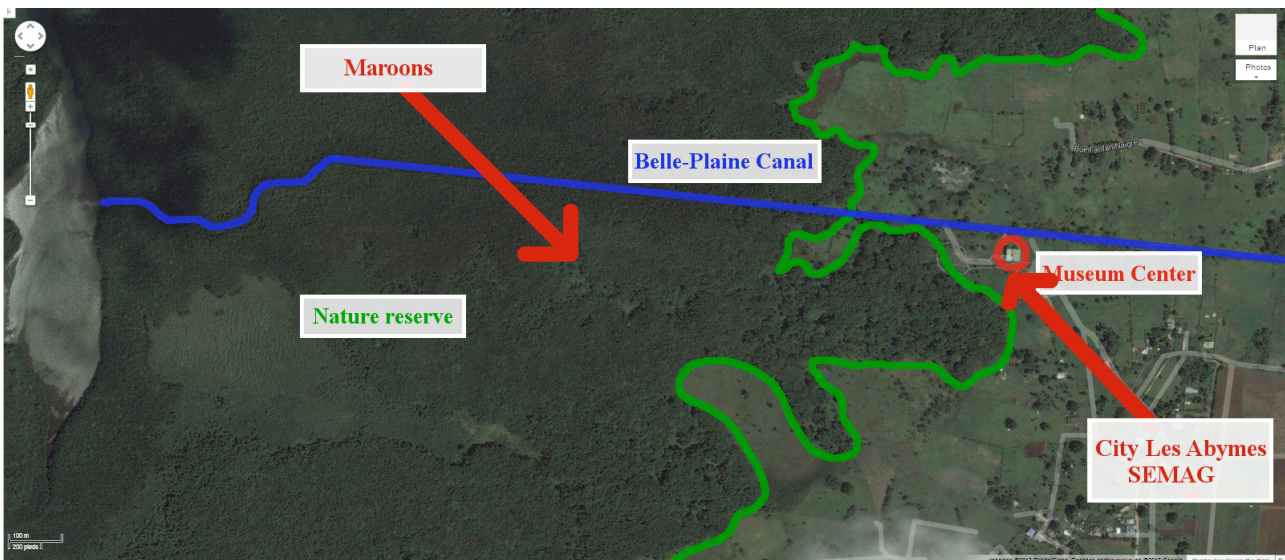
Figure 8. The Maroon location.

Our attention will therefore be focused on this particular situation between two ontologies and their relations in the context of the land planning of Taonaba.

3.2 A one sided use of knowledge

The Voynet law has two major consequences on the territorial approach. In fact, it ensures the coherence of the French territory through sustainable development and also includes participatory consultation as part of the process. Initiated by the city Les Abymes and the SEMAG, the consultation process concerns the humans collective in accordance with the SDO. It's worth noting that different ontologies may have asked for others collectives to participate, because people would have considered themselves as equal or inferior being. Thus, we expect that all the human actors take place in the consultation process. However we observe that "*the project is initially developed without taking into account the population living on the Belle-Plaine area*" (Lahaye, 2008) and alone are included in the process "*1) the city of Les Abymes, 2) the semi-public company in charge of land use planning in Guadeloupe 3) the architect and contractor of the project*" (Lahaye, 2008). If we refer to the figure 8, we see that the Maroons are in the area of non-humans and the city Les Abymes, the SEMAG and the architect are in the humans area. Consistent with the characteristics of the SDO, it makes sense that the Maroons weren't associated with the consultation process, because no human should be in the area reserved to the non-humans. The exclusion of the Maroons is unintentional but real. Without being able to find an agreement through consultation, start the construction of Taonaba project based on a one sided use of knowledge.

3.3 Taonaba crisis

With the Maroons out of the participatory consultation process, the land planning was led principally by the city Les Abymes and the SEMAG. If the actions of the sustainable development believers are justified by their own ontology, they weren't perceived as such by the Maroons. Indeed, the "*dwellers feel displaced and dispossessed of a space they have appropriated for a long time*" (Layahe, 2008). This resentment expresses the gap between the meaning of the knowledge used for the sustainable development holders and the Maroons. Tsuchiya explain that "*Although terms "datum", "information", and "knowledge" are often used interchangeably, there exists a clear distinction among them. When datum is sense-given through interpretative framework, it becomes information, and when information is sense-read through interpretative framework, it becomes knowledge.*" (Tsuchiya, 1993). To us, datums are sense-given through Ontologies which act as an interpretation framework and thus become information. When knowledge is used, it's expressed as information and to understand it as knowledge it needs to be interpreted by the same ontology which created it. In our case there, it means that the Maroons ontology will to sense-read informations produced by the sustainable development knowledge.
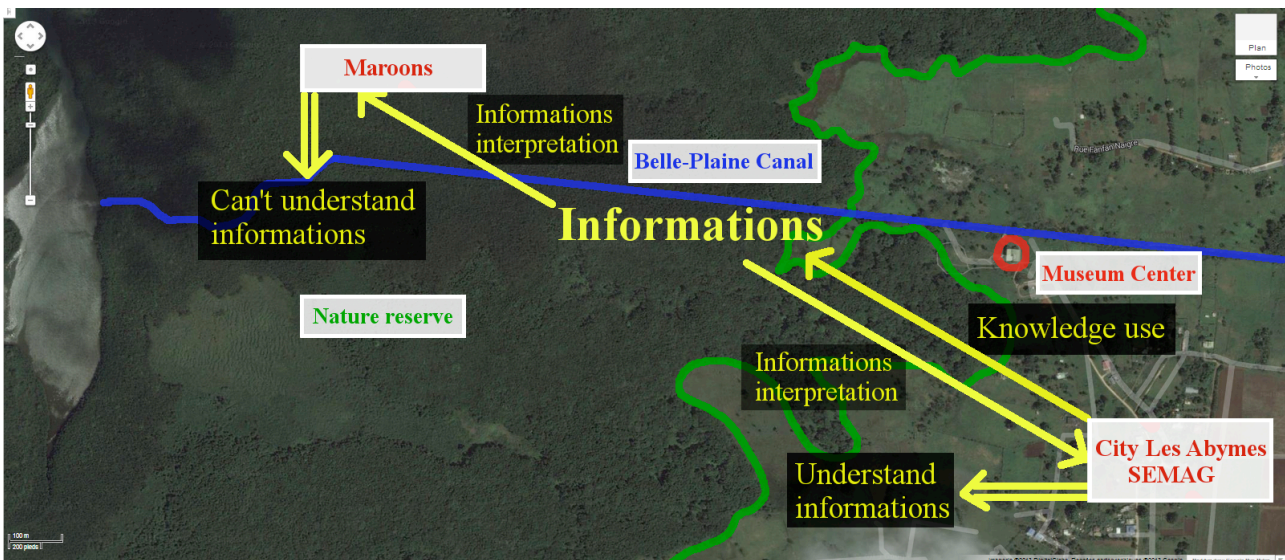
Figure 9. Information interpretation depends on ontologies. Consequences on the multi-ontological situation of Taonaba.

Unable to read the sense of the incoming information the same way the sustainable development believers do, the Maroons began "*vandalism (destruction of equipment, recurring thefts)*" (Lahaye, 2008) in response to the incomprehensible action of the city Les Abymes and SEMAG, considered as an aggression. This crisis reveals that knowledge used is inconstancy depending on the ontologies which interpret the created information. This scenario confirms the need of an ontological knowledge management and orients our reflection on a multiple use of knowledge which might satisfied several ontologies. Therefore, to start a co-utilization of knowledge, it is necessary to include the Maroons in the consultation process.

3.4 Participatory consultation and knowledge use
After the Maroons event, the city Les Abymes and the SEMAG which lead the Taonaba project became aware of this population and therefore logically integrated them in the consultation process. This turnaround marks the beginning of possible agreements to a joint creation of Taonaba land planning. However, as Nathalie Lahaye noticed, the participation of the Maroons in the consultation process didn't change the ongoing project. "*The organization of meetings, topics discussed (the development of the canal which correspond to the third phase of work under the SEMAG supervision) and the timing (pre-election period) suggests that participation is a way to interpret the interests of the planner as a general will, based on a local consensus to legitimize its actions.*" (Lahaye Nathalie 2008). Thus this kind of consultation where there isn't a mutual equality in the legitimacy to use knowledge can't result in a hypothetical solution on a basis of its co-utilization.

3.5 Mutual Knowledge
To enable a multi-ontological use of knowledge, each ontology has to be considered as equals. If we consider Alain Le Pichon's analysis, it is possible through mutual knowledge, "*the art of discovering and producing a concise network of 'relations of relations*'" (Le Pichon, 2004). This, in theory, allows the creation relations between ontologies because they are sets of relations. "*Mutual knowledge is built step after step and develops through mutual acceptance and recognition of the other's models*" (Le Pichon, 2004). Le Pichon illustrates this acceptance and recognition with the visual play of anamorphosis, in which, by adjusting the arrangement of "*these mirrors of hard, distorting glass, which is the way a given [ontology] looks onto another, [we get] the common field of mutual knowledge*"(Le Pichon, 2004). Once different ontologies reached a mutual acceptance, they can go through the consultation process to use jointly their knowledge, since none of them could be said superior to another. By using several knowledges, informations will be associated to the context of use and should be interpreted as knowledge by those who participated on it.
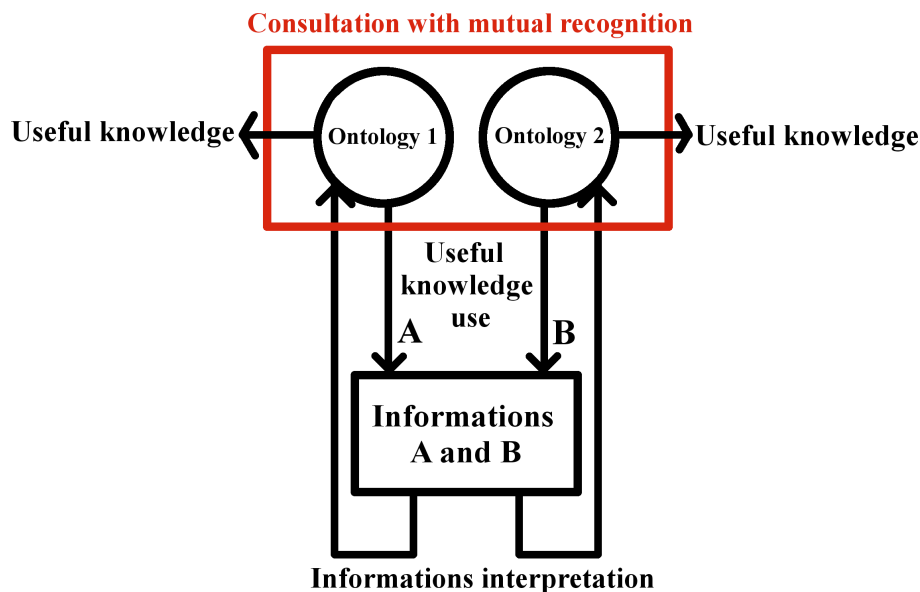
Figure 10. Consultation with mutual recognition and multi-ontological knowledge use.

The figure 10 shows that in theory the co-utilization of knowledge could lead to information merging. Applied to Taonaba, it means that the land planning would possess the information needed to generate knowledge for both the Maroons and the sustainable development group. To understand the feasibility of our process, we have to find a context where different meanings can be extracted from it.

3.6 Heterotopy and information interpretation
Michel Foucault's works on heterotopies stages this plural sense given process in a single context. *"There are also, probably in every culture, every civilization, real places, actual places, places that are shaped in the very fabric of society, and which are kinds of counter-sites, kinds of utopias actually achieved where the real sites, all the other real sites that can be found within a culture are simultaneously represented, questioned and inverted. Places of this kind are not part of any place, even though it may be possible to indicate their location. The places, because they are intrinsically different from the sites they reflect and speak about, I shall call them, by way of contrast with utopias, heterotopies."* (Foucault, 1984). Paraphrasing Michel Foucault, we could say that information functions as a heterotopy, since it has to pass through the virtual point of the ontology for the emerging knowledge to be real. Heterotopies confirm that's it possible to put together several informations in a single context to recreate different knowledges. Therefore, in a multi-ontological situation, a solution through a consultation process with mutual recognition can emerge from the co-utilization of knowledge thanks to information heterotopy.

This paper demonstrated that an inadequate use of knowledge can trigger a crisis in multi-ontological contexts. Most of companies have to deal with this kind of situation with their employees and customers. It's especially true with the globalization. This ontological classification is needed to manage knowledge adequately according to people, giving the possibility to propose the right information to the right person who will interpret it as useful knowledge and therefore it should improve companies' performances. Further researchs on informations merging, its interpretation by different ontologies and the emerging knowledges will be done to fully understand the process.

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