

# Viewpoints-based method and tools in territorial participatory design

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## Abstract

As a part of the Tatabox project exploring ways to define and locally experiment « transition to Territorial AgroEcological System » (tTAES), researchers and rural stakeholders (policymakers and farmers) organized territorial participatory design (TPD) workshops. Such TPD are especially challenging since actors projecting their activity into the future confront many viewpoints or controversial dimensions (farming systems, natural resources, food-chain...). To facilitate multi-viewpoints TPD, we propose a multi-ViewPoints model for both organization and knowledge purposes. It allows for adequate organization of TPD activities and agendas ; it also supports knowledge sharing, capitalizing, annotating and category-building with respect to the plurality of semantics of the TPD actors. It is presently experienced by rural actors in face-to-face meetings using classical maps and paper devices. In this paper we demonstrate and propose guidelines for Viewpoint-based software tools supporting meeting recording, annotation, information retrieval, cross-viewpoints visualization all along the TPD process.

## 1. Introduction

Consensus rarely exists in territorial participatory design (TPD) shared knowledge building, and even more so in agro-ecological TPD. It appears that discussing face-to-face, in « oral culture » organizations enhanced with « low tech » devices (paper maps, post-its and annotation walls, audio recording) is a good way to achieve an efficient tTAES design work. But « Viewpoints », as organizational and semiotic artifacts, can be introduced explicitly in such an organization of face-to-face TPD meetings. Taking the agro-ecological design as an example, this paper presents how they can take place into a concrete TPD organizational device.

Since such an approach can be successfully experienced without ICT tools, as we observed it, we also propose to study it more in depth and transpose it to a viewpoints-based ICT infrastructure, adapted to TPD workshops. The presents some guidelines we follow in the design process of Viewpoints-based ICT tools that support TPD activity.

The software modules that we are presently testing or developing have not only to complete face to face oral and paper devices, but also to reinforce the autonomy of concurrent viewpoints and categories and to make the knowledge more precise (facilitating a bottom-up categories-making process separately within each Viewpoint), without weighing down the design with unnecessary formality. These tools could also reduce the costs of TPD cycles which are very time-consuming both for animators and participants.

## 2. Related research

Especially in agro-ecology the participatory design (Berthet, 2015) has territorial issues needing especially multi-viewpoints confrontation (Pipek et al., 2000). To facilitate multi-viewpoints TPD it is necessary to make more precise what a Viewpoint can be defined in the particular context of a sequence of TPD workshops. In some regards it can be seen as an organization artifact (Teulier et al., 2000, 2004), a coordination mechanism (Schmidt et al., 1996) including also communication and knowledge aspects. Explicit ViewPoint is here considered here as a potentially fruitful notion to document the participatory activity we are considering.

Territorial decisions in territorial design can use TPD focus groups, serious game support and roles gaming (De Olde et al., 2014) (Martin et al., 2011). In our hypothesis, viewpoints are of major interest for these approaches because they both help to structure TPD activity (free or imposed group forming, agenda of discussions alternating groups with and without Viewpoint...) and to structure TPD knowledge issues (for knowledge sharing and capitalizing, annotations, category building) while respecting the plurality of semantics of the TPD participants. Viewpoints confrontations were studied, for example in scientists' work (Bowker & Star, 2000) (Felder, 2010).

Like scientists teams working in an interdisciplinary manner on complex phenomena, designers in TPD contexts can hardly convoke in a unique "panoramic" overview all events, proposals, disciplinary interpretations, categories, possible consequences, etc., involved in the design situation. They rather experience and know the situation as a conjunction of concurrent views on the situation, resulting into a controversial, dynamic and unknowable configuration of viewpoints.

In the scientific and technological domains areas directly interested in cooperation and collaborative knowledge engineering, the notion of Point of View has been studied by many scholars (Bowker et al., 1994) (Dourish, 2000) (Simone et al., 2001). Viewpoints have been considered in design activities to organize annotations on artifacts in mechanical design (Boujut et al., 2003) (Guibert et al., 2009). In participatory workshops, useful knowledge emerges from situated activity where actors' practical experience is influenced by several semantic grids coming from dominant viewpoints. Faced with "strong semantics", "weak semantics" have difficulties to establish their own language and categories, as analysed by (Bowker, 2010) and (Bowker & Star 2000) noting how classification (of diseases, of death/birth instant criteria, etc.) can become a pure power exercise profiting to actors dictating or influencing their language or their categories. It could lead to weaken or exclude certain stakeholders. Territorial Participatory Design has been studied in rural areas. Analysing several cases, like the ecological restoration of Grand-Lieu Lake, Teulier & Hubert (2004) use the notion of multiple "words of interest". They notice that stakeholders sharing common territory with various viewpoints are both independent and interdependent, « *with social positions usually very unequal and may be associated with the knowledge they hold or apply* ».

Therefore knowledge is here a key point. Figuring out, naming and building the items into categories, represents a major type of knowledge and major stakes in Collaborative Knowledge Engineering. Knowledge structured by viewpoints has been studied in Knowledge Engineering (Dourish, 2000) (Benel et al., 2009) (Cahier et al., 2013) especially for categorizing, naming domain items and relying them. A name, a category or a set of categories can be relevant in some of the worlds of action existing on a territory, but not for all. So as we will see below, TPD organization and agenda have to insure that the naming and categorizing of things can be "isolated" in Viewpoints, as cooperation artifacts. Viewpoints aim at considering the others' perspective, establishing equality or symmetry even when social status differ. They are a means whereby stakeholders can dynamically question and change their own representations on a regular basis.

### 3. Illustrating Viewpoints in agro-ecology TPDs

#### 3.1 Context of the experiments

To reduce the impact of agriculture on environment and human health, energy crisis and climate change, agroecology has to be designed with “weak” approaches opposable to “strong” ones. The second way promotes a stronger ecologization of agriculture by reducing inputs (fertilizers, pesticide, energy...) and using ecosystem services at the field, farm and landscape levels. It requires changing deeply the management of farming systems, natural resources and food-chain while dealing with a wide range of environmental and societal changes. To support them, agricultural actors and interdisciplinary teams of researchers require new methodology, where agricultural stakeholders develop vision (s) of the desirable « transition to Territorial AgroEcological System » (tTAES) applied to concrete and local agricultural systems.

“Tatabox”<sup>1</sup> is a french R&D project exploring ways to define and locally test tTAES approaches. In a part of this project, in 2015 and 2016, rural stakeholders (policymakers, farmers) are working in TPD workshops focused on Aveyron region (located in the south of France).

In these participatory workshops, participants have to make an inventory and to examine a large amount of ideas, problems, solutions, themes, things of the world, etc., by discussing and referring to two critical sets of issues :

- *not-precisely geolocated topics and items* : these topics and items can be for example grouped into categories so as to be situated onto non-geographic maps (e.g. topic maps)
- *more precisely geolocated topics and items* : they can be *both* situated on geographic maps *and* on non-geographic maps.

For this reason in the field experiments presented below (see Fig.4 & 6) we shared the wall or table annotation panels in two parts, respectively dedicated to geolocated vs non-geolocated items and annotations.

#### 3.2. General Method

In our approach in the agroecological TPDs field, a Viewpoint is a construct which has a conventional label (for example: the “Natural Resources”; the “Cooperative”; the “AgriFood Chain”). It can refer conventionally (as a network “node”) to particular people, places, semiotic attributes (colour), dates and documents participating to its use. The name of the Viewpoint can refer to a business, an opinion, a representative object, etc. Under its label, a given Viewpoint is an agglomerate, taking historical consistency in the context of a peculiar TPD sequence. It can be described more precisely with various keywords (for example, in the right part of Table Fig.3: archetypal actors’ jobs, communities, cultures and goals) helping stakeholders to understand, nourish and endorse the Viewpoint.

In the project Viewpoints were used to organize finer grain stages of “workshops by Viewpoints” alternated with “multi-Viewpoints workshops”, because in design activity it must be considered both the independence of viewpoints (leading to make each Viewpoint more explicit) and their interdependence (because the design is relied to given map and territory). In design of rural territory relevant Viewpoints are especially numerous and imbricated, Based on this general model, several detailed organizations are possible (see for example §3.3 & 3.4). Each Viewpoint is a “container” to store language elements, topics, categories and interpretations within the Viewpoint. So the Viewpoint is an artifact organizing both TPD activity and knowledge.

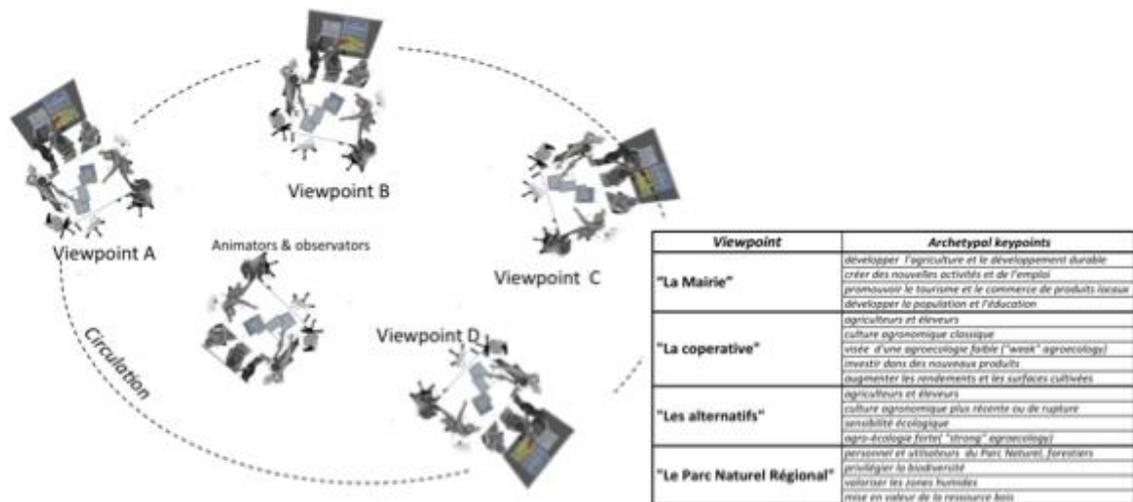
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<sup>1</sup> “Territorial Agroecological Transition in Action”: a tool-Box for designing and implementing a transition to a territorial agroecological system in agriculture”. ANR project (2014-2018) led by INRA Toulouse (National Institute of Agronomy) - <http://www6.inra.fr/tatabox>

### 3.3 A preparatory Role Play exercise with Viewpoints

First we designed a exploratory experiment<sup>2</sup>, whose one goal was to verify hypotheses or intuitions concerning Viewpoints:

- Roleplay based on Viewpoints can provide an efficient scaffolding to stakeholders' positioning practices, favoring a less influenced collection of ideas, and making the design more contrasted, active and detailed equally in all perspectives;
- Places and displacements [8], spatialized artifacts with semiotic attributes [18] are very important issues in participatory activities. If Viewpoints are associated with "protected places and times", assigning a fixed place to each Viewpoint (its participants, maps and annotations they each built) completed by circulation rules and semiotic parameters (e.g. colours of annotation) make the inter-Viewpoints confrontation more productive.



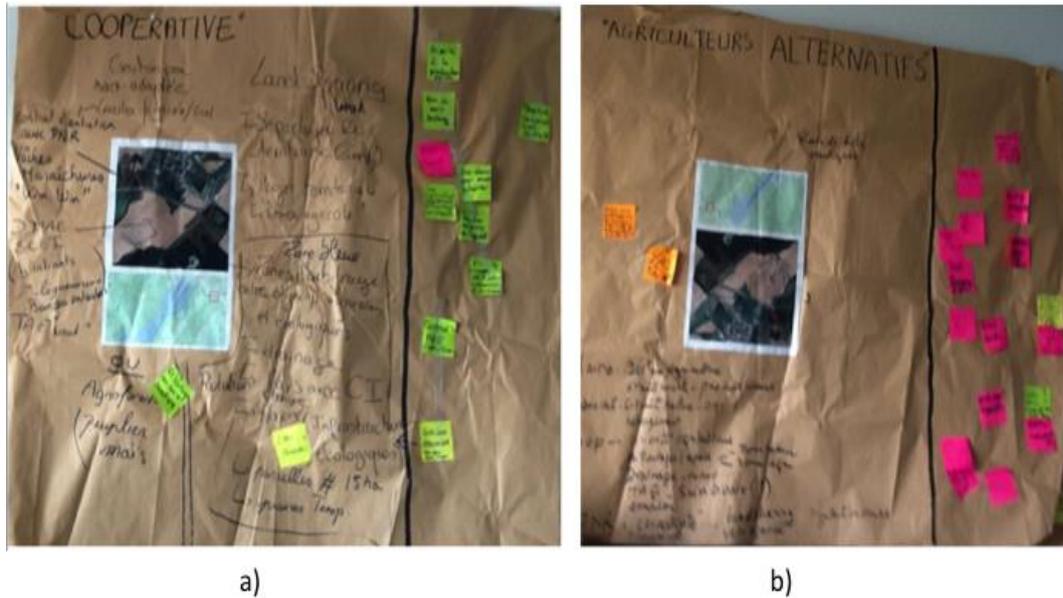
**Fig.3.** The device and the four Viewpoints in the roleplay exercise (February 2015)

To verify this hypotheses, 4 "mono-Viewpoint" teams (of about 7 people) were constituted from pre-established lists. These teams were disposed in a large room at distant places (Fig.3) so as to make overhearing between them impossible or difficult to perform. Each team could use a table (with documents and post-its) and a vertical panel. The panel (cf. Fig.4) was shared into two zones for annotations with and without map. For each team a different colour for post-it and pencils was imposed. In this experiment the circulation rules within the common room were changing in the course of time:

1. The circulation between Viewpoint was forbidden in the first 30mn, to give time to each Viewpoint to acquire an identity and make propositions for the territory.
2. Then, at t0+30 mn, a Viewpoint team could send 1 or 2 "spys" in order to observe the annotations in other places and report to their own group. Spys were not allowed to speak during their trip, but each group could write (and ask the spys to throw) written messages (questions, annotations....) to other groups.
3. Then, at t0+60mn, all Viewpoint members could walk around, observing three rules: to remain silent (only written communication), to keep a kernel meeting in their camp (to not dilute, read and react to incoming messages) and equilibrate activity of receiving and emitting messages.

<sup>2</sup> Conducted in February 2015 during 1h30 with 28 participants (scientists of the Tatabox project) in INRA Toulouse

Specific colours for post-its and for direct writings on panels allow to identify their origin, e.g. a yellow message from “La Mairie” answers to an annotation on the “La Cooperative” map (Fig.2a).



**Fig.2.** Wall trace of 2 “Viewpoint places”: a) “Coopérative”; b) “Alternatifs”.

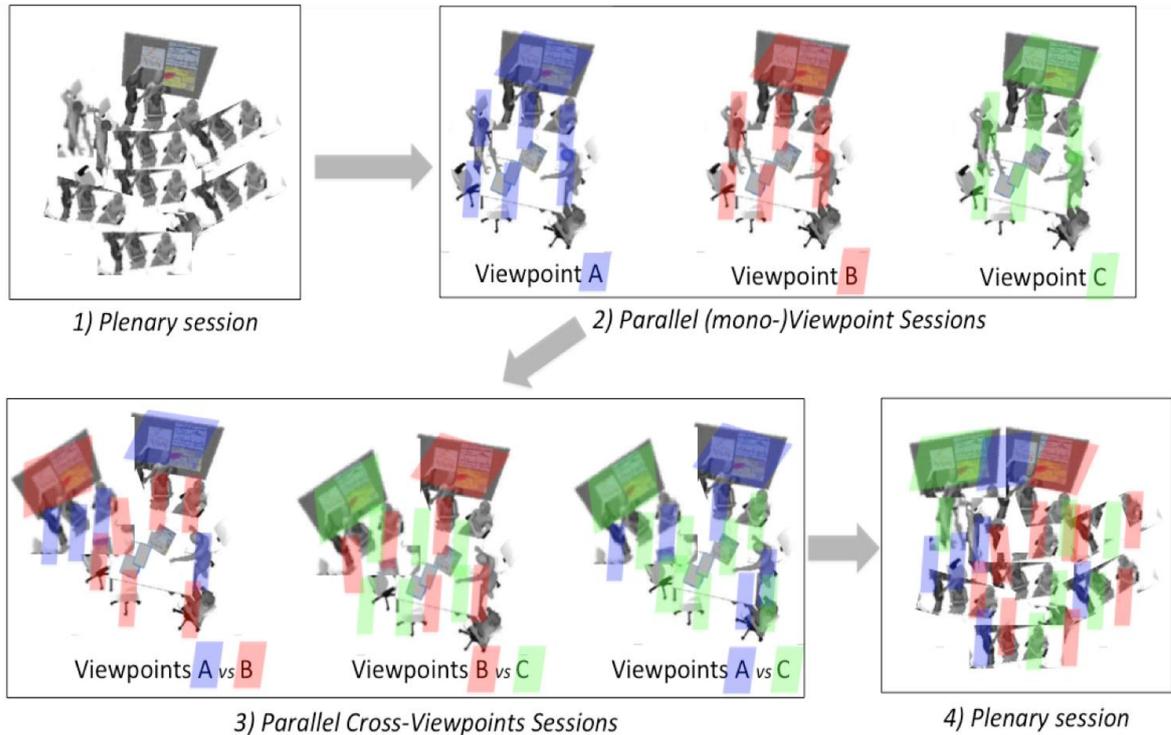
### 4.3 Participatory Workshop with Viewpoints

This workshop took place during a full day (13/11/2015), with 15 rural participants and a strong animation / observation team (10 people). A device was used with three Viewpoints (“Agricultural production”, “Transformation/Consommation” and “Natural resources”). This day was part of a sequence of meetings with the same stakeholders’ group (starting in April 2015, continuing in 2016<sup>3</sup>). The device for the day prescribed several working stages (Fig.5):

- 1) *Morning*: alternate plenary session and short parallel sessions (without Viewpoints), resulting in a shared list of 5 transverse “main issues” to be explored in the afternoon.
- 2) *Early afternoon*: three separated focus groups “by Viewpoint” were formed, in three different rooms. (participants were assigned to one group according to a predefined list). The 5 “main issues” were crossed with dominant subcategories of the Viewpoint. For example, “water”, “biodiversity” or “soil” were subcategories of the “Natural resources” Viewpoint. At the end of this session (2-4h pm), wall panels with post-its mapping by issues and by Viewpoint topics were photographed and duplicated.
- 3) *End of afternoon*: the members of the precedent groups were re-mixed into “cross-Viewpoints” focus groups (two Viewpoint by two Viewpoint). The second viewpoint wall panel previously photographed was displayed onto a screen nearby the first one (the

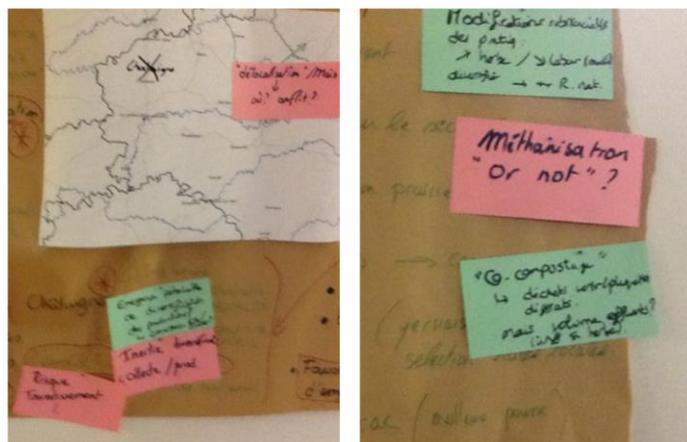
<sup>3</sup> The present paper does not report all results of this very rich serie of TPD experiments (it will be made soon in more details by complementary papers from other scientists involved). We only focus in this article on the Viewpoint model and its contribution to the TPD device (both at organization and knowledge levels) with classical paper support and possibly towards future ICT support. In addition to the multi-Viewpoints issue, many methodological ideas and innovations contributing to the TPD success were brought by other researchers invlved. Thanks especially to J.E.Bergez, E. Galvez, O.Therond, M.Taverne, G.Martin, A.Gonclavez, J. Ryschawy, M.Willaume.

original, on paper) in order to confront the two Viewpoints' knowledge, categories, arguments and annotations. This way participants were able to compare and discuss the two sets of annotations written in the two "mono-Viewpoint" groups during the previous stage.



**Fig.4.** TPD device (13 nov. 2015) structured by Viewpoints : a 2h session of 3 "mono-Viewpoint" groups was followed by a 1h one of 3 "bi-Viewpoints" groups

When new ideas or discussions occurred during cross-Viewpoints confrontation, the paper panel was conventionally overloaded (fig.5) by *green* post-its in case of agreement or of minor remarks, and by *red* ones in case of disagreement or of design dissension (design "clashes").



**Fig.5.** Annotation of "agreements" and "dissensions" during "cross-viewpoints" session

#### 4. Lessons learned and implication for ICT implementation

The results of these field experiments, both using the socio-technical Viewpoints model proposed put into evidence that :

- The positions of the different stakeholders are more clearly detailed when based on a system with Viewpoints. Even though paper was used as a support the way to design new agroecological model step by step by viewpoint stimulate interest, participation and codesign of participants.
- The TPD seems to be made easier during stages devoted to confrontation between Viewpoints. Discussion is fostered (between small groups or by peer to peer exchanges) when the device allows circulation of participants and cross-visualization of written annotations in Viewpoints.
- Comparing with stages without Viewpoints, theming and category-building were more coherent, more fine-grained and less laborious in stages with Viewpoints.
- Viewpoints-based devices and spatial circulation favor strategies or micro-alliances between stakeholders with dissimilar viewpoints, concerning ideas or territory issues.

Globally these positive results allowed us to sketch reflection, mock-ups, and tool selection, to propose some ICT functions implementing the model in computerized TPD collective practices.

1. The agro-ecological TPD Viewpoints-based device presented in §4.3 was a face-to-face one, only supported by paper. In a further stage, it may be interesting to propose a similar Viewpoints-based device, but supported (partially or completely) by ICT tools. Such computerized tools could allow both face-to-face and remote participation and accept more numerous designers. They could also reduce the costs of TPD cycles which are very time-consuming for animators and participants. By using the Viewpoint model presented Fig.1b and by learning from the lessons of its experiment, ICT tools should improve pertinence, granularity and all advantages noticed above. Naturally the Viewpoint-based computerized tools that we propose in order to accompany the TPD activity have to be designed to preserve the wealth of face-to-face discussion and knowledge sharing, not weighing down the TPD activity with unnecessary formality (Shipman et al., 1999)

Consensus rarely exists in TPD, and more rarely in agro-ecological TPD. In contrast, Decision Support Systems (DSS) or sophisticated Knowledge Engineering systems (such as Semantic Web systems based on domain “ontology”) are too formal systems, far from stakeholders’ practices (Bowker, 2010), encourage a top-down categories-making and are far from stakeholders’ practices especially when they defend conflicting perspectives.

We now are preparing a set of practical and simple computerized functions using Viewpoints, to propose them to actors and evaluate with those their usability in future TPD workshops. We just give below two examples :

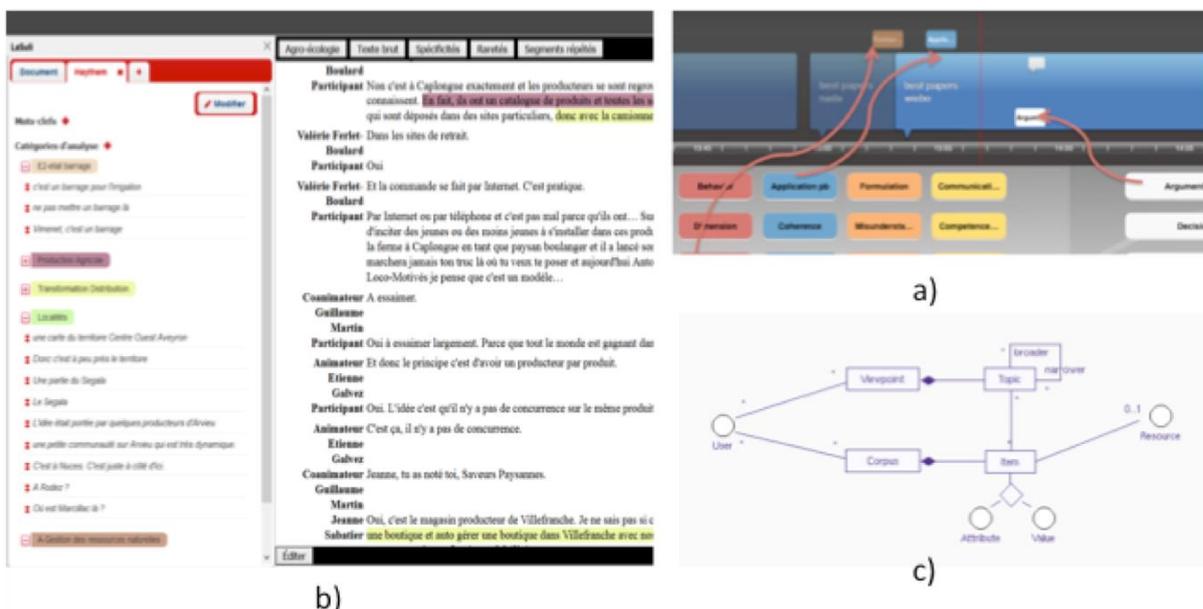
- MM-Report<sup>4</sup> completes the *audio* recording of meetings by indexing the audio content with coloured marks and tags for time, speakers’names, categories, design rationale topics. In the long records of the meetings (many hours), it helps actors in retrieving oral fragments and tagging them (fig.1a).
- Lasuli (Bénel et al., 2011) and Cassandre (Lejeune et al., 2011) are two Web-based associated tools<sup>5</sup> for qualitative analysis and co-working on the *written* text (transcribed from the previous audio records). As shown in (fig.6b), fragments can be selected, highlighted and associated with categories in Viewpoints. That way TPD actors can quickly retrieve what was

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<sup>4</sup> MM-Record and MM-Report are two complementary free IOS Apps (running on iPad and iPhone) developed by UTT for recording, hearing and tagging audio records of design meetings.

<sup>5</sup> Open-source tools (see <http://hypertopic.org/>)

said during the meetings. This tool allows cross-readings of annotated TPD verbatims, with categories organized by Viewpoints.



**Fig.6.** Some tools proposed to support Viewpoints in TPD activity: a) MM-Report (Matta et al, 2013); b) Cassandra (Lejeune et al., 2011 + Lasuli (Benel et al., 2011); c) Hypertopic model including Viewpoints (Zhou et al, 2006).

To demonstrate these tools to TPD participants the same set of colours was used for MM-Report Categories and for Lasuli Viewpoints (Fig.6b: highlighting of fragments on the left, colouring of categories on the right margin). Cassandra and Lasuli use the technical protocol « Hypertopic » (Zhou et al, 2006). (reminded in Fig. 6c) precisely designed to implement multiple Viewpoints organizing Knowledge on items. We presently use this protocol as an infrastructure to integrate existing or future tools and prototypes favoring Viewpoints use in TPD distant meeting.

## Conclusion

In the TPD workshops, Viewpoints allowed a more successful design by the considered stakeholder. Not surprisingly it appears that discussing face-to-face is the best way to achieve an efficient tTAES design work. The more efficient solution we recommend is to use Viewpoints to optimize the interaction in the oral culture patterns, just reinforcing them (cautiously) by selected spatial solutions and by a touch of written culture: co-writing paper supports, symbolic and iconic artifacts such as coloured Viewpoints.

Now what about the ways to use ICT in the next phases of the mentioned TPD ? Although the spectacular inflation of sophisticated tools offered by advanced ICT and Knowledge Engineering for managing domain Knowledge or discussing at distance, for the agro-ecology TPD we are faced with, (in complete agreement with the Tatabox project staff) we keep on considering that the best way is the face-to-face “artisanal” discussions we have described, completed by symbolic/ iconic artefacts. Such a position could seem strange in 2015, in our era of ICT-based “New Collective Intelligence”. In fact, stating that oral culture does remain the fundamental medium for conflict management in TPD, does not prevent from experimenting new ways to apply ICT Technology to it. This technological attempts, for which we gave a brief sketch in §4, is to provide a socio-semantic

infrastructure supported by Viewpoints ( Cahier et al., 2013) for actors' interaction. The oral discussion in face-to-face stays as a grounding principle, but its device is reinforced by artifacts combining paper and digital tools. A stake is to provide symbolic, spatial and semiotic distinctive language elements, such as explicit Viewpoints, to better organize the discussion work and its traces. In TPD workshops it should make it possible to take in account higher complexity, finer description of conflicts and higher granularity of knowledge, resulting into better tuning of human interaction, better engagement and better participation. Under these precautions, the « New Collective Intelligence » could be of some effect onto territorial participatory design.

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