

Territorial assemblages and Governance: the example of the Taonaba project (Town of Abymes, Guadeloupe)

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Summary

This article reports on an action research to support the urban community of Cap Excellence in Guadeloupe in its local sustainable development project. After summarizing the terms of the debate around sustainable development, and presenting the region, the search will be put back into the context of a more general approach of territorial* intelligence (TI). The limits of a local Agenda 21 in the form of a "programmed action plan" is the chance to enhance the concept of TI with that of territorial assemblage. Our study area is the natural reserve of the Grand Cul-de-Sac Marin of Guadeloupe, the second largest biosphere reserve designated by UNESCO in the archipelago of the Petites Antilles, more specifically the implementation of the Taonaba project, whose goal is to launch an ecotourism visitors' centre, operational at the end of 2012.

Based on the analysis of a large amount of data, the article describes an evaluation tool for territorial assemblages for participative territorial governance. Our results were presented to local government officials in the Urban Sustainable Development Forum, which our group organised from 2 to 4 April 2012, in the district of Abymes/Pointe-à-Pitre.

Key words: assemblage, territorial intelligence, governance, simplicial complex.

1. Sustainable development challenges and territorial assemblages

The challenges of sustainable development are now understood and accepted by a growing number of stakeholders. The limits of the concept of development can be measured in environmental

imbalances, the increase of social inequality and poverty, which can trace their roots back to the current economic system. The current economic downturn demonstrates the dangers of a development model based on a consumer society that places individual desire before the common interest. Despite an increasing public awareness, many people believe that sustainable development has not managed to address the three major challenges of environment, social equality and economic development, due to the inability of stakeholders to develop new institutional tools for governance and regulation, especially at a local government level. *Our hypothesis is that stakeholders find it difficult to assimilate the real consequences of efforts to integrate sustainable development on the methods of governing local or regional government districts.* One of the ideas for avoiding the overexploitation of non-excludable and non-rivalrous resources put forward by (Ostrom, 2010) is for resources to be managed by the local communities, using social norms and "institutional arrangements". But these transversal cooperation methods are difficult to design and therefore to simulate. Territorial Intelligence is an approach which provides a unifying, operational framework for managing coordination through cooperation.

**For the purposes of this paper the term 'territory' or 'territorial' is used to refer to, or pertain to a local or regional government district or borough.*

1.1 Sustainable development, territorial intelligence and assemblages

The concept of territorial intelligence (Girardot, 2000) is at the crossroads of the concepts of territory, knowledge society and sustainable development. It's an emerging, highly polysemous concept that means "all the multi-disciplinary knowledge which both helps in understanding territorial structures and dynamics and is intended to be a tool for sustainable development professionals in the territory (regional/local government district)" (Girardot, 2002). "Territorial Intelligence is the science which targets sustainable development as applied to the community in the local government area" (Girardot, 2009). "By bringing together the local government officials and the community to share information and make use of it cooperatively, in an interactive, iterative and forward looking process, territorial intelligence enhances the understanding of the structure and dynamics of the territory and the collective management of the territorial development". (Girardot, 2004).

Practically, the development projects depend on sustainable development partnerships (with respect to the EQUAL European programmes), organised within territorial observation units. These territorial observation units can be seen as prototypes of the "institutional arrangements" for governing the common-pool resources (CR) as described by Ostrom. Nevertheless, territorial intelligence is confronted with the question of what is important for stakeholders and tools in order to create collective choices in a pluralistic world, as well as to simulate better ways of coordinating activities in order to create the desired sustainability. We propose to work on enhancing the TI model with the help of thee tools: the so-called GAP model to handle the sustainable practices, spatial arrangements and the organisation of governance; the theory of assemblages which provides a new ontological framework for analysing the nascent coordination; and finally in terms of methodology, the theory of hypergraphs (Johnson 2009) and the simplicial complexes which gives us a toolbox to explore these assemblages. Computer models help in simulating these territorial assemblages.

	Sustainable practices	Spatial assemblages	Regulations
Objects	Consumption routines, transmission ethics...	Organisation and uses of space	Stakeholders' games, governance, project assessment
Observed relations	Components of practices in interaction	Coordination of territorial structuring activities	Disseminating facts, speeches, documents...
Analysis type	Sustainable lifestyle analysis	Services analysis	Controversy analysis
Participative research	GAP simulations		
	Change engineering		
	Tools (design, evaluation)		

Figure 1. The G-A-P model: Governance, Assemblages and Practices (Soulier, 2012)

An assemblage is equivalent to a practice. We have based our work on the renewal of practice theories in the consumption studies initiated by (Warde, 2005). We have use the concept of “sustainable practices” in the perspective of ecological transition (Spaargaren, 2011). The idea is

that ecological change (and any potential incentives) should not be based on individual choice (individual vision) or public policy and supply (systematic vision), but on consumption practices. Modernising current practices in favour of sustainable practices (mobility, habitat, purchases, etc.) is a more favourable starting point for encouraging environmental governance.

The second angle concerns space and spatial practices, i.e., the organisation and use of space (Lévy et Lussault, 2003; Lussault, 2007), but includes the dimension of sustainability (and social equity) barely covered in these works. The idea is that it's at the local level that it's possible to have an impact on production and consumption methods, for example at the regional level, by seeking to align them with sustainable development issues. It therefore seems realistic to describe the state of a territory according to the division of work and the coordination of activities under the dominant conventional system, in contrast to an economic model that requires the productive activities and more generally those of society to be reorganised, and to structure territorial organisation. We will draw on works on the theory of industrial organisation (Richardson, 1972), the model of product-resource conversion integrating the "effects of using" the service put forward by (Billaudot, 2002), and the framework of service economy or "servitization" (Bourg, D., Buclet, N., 2005) which leads to a governance that can mobilise the local government institutions (Gaglio, G., Lauriol, J. and du Tertre, C., 2012).

The last area deals with the organisation of the governance, as evidenced in the management of major urban projects. In the actor-network theory, the analysis of controversies is a good starting point for understanding the dynamic of assemblages used within it (Venturini, 2012). Above all it's this aspect that we will develop in this article, while still focussing on the question of the coordinating activities as a way of rethinking a "a system of territorial services" around a few major functions.

1.2 An analytical tool: territorial assemblage serving territorial governance

Our analytical framework for coordination is in line with the refocussing in the 1980's which led to reconsidering dualism as part of the social theory that opposed objectivism with subjectivism (Giddens, 1984) - where the reductionism to holism in sciences and philosophy (DeLanda, 2006) -

favoured a move towards the "coordination between social entities", which would form the *social relations* into primary entities, and the individuals and the collective institutions into secondary entities (Corcuff, 2007). One of the objectives is therefore is to understand how these semiotic-material coordination methods between heterogeneous entities link different elements (or parts) together in "assemblages", thereby forming organised "wholes" capable of a certain capacity of action or performativity (DeLanda, 2009).

This relational concept resonates with Foucault's concept of "apparatus" (*dispositif* in French). An apparatus is a "resolutely heterogeneous whole including speeches, institutions, architectural improvements, regulatory decisions, laws, administrative measures, scientific declarations, philosophical, moral and philanthropic proposals; in short, the verbal as well as non verbal, are the elements of the apparatus. The apparatus itself is the network which we build between these elements" (Foucault, 1984). The idea of a network of heterogeneous elements (bodies, speeches, objects, rules etc.) is interesting, but is limited to the parts of this network judged to have *internal relations* between each other: one component of a whole cannot be removed without losing its identity, this being determined internally by its relations to other parts.

However, to define the relations of the parts to the whole, the idea of the Deleuzien theory of assemblage is on the contrary the *exteriority of relations*, which alone enables us to think about a whole, not built by the parts together and which therefore will not produce a homogeneous network. "What is an assemblage? It's a multiplicity of many heterogeneous terms, which creates links and relations between them [...] In addition, the sole unit of the assemblage is co-functioning: it's a symbiosis, an 'affinity' " (Deleuze et Parnet, 1977, p. 84).

This initial concept of assemblage is enhanced by the ontology of the actor-network (Latour, 2005), since an essential ontological component is missing from the previous concept, the object. In fact, with Deleuze, there are neither actors nor actants, but instead pre-individual, virtual "components" which update (or not) in complex individuation systems, as with Simondon. We found it more useful to substitute the notion of component with that of the 'actant' proposed by Latour. The hypothesis of the actor-network is that an actor is the list of his relations, therefore his network. One of the problems with this ontology is well defined (Latour, 2010): an actor is defined by the list of his relations, while a network is defined by the list of actors within it. What is missing from this

simple list of relations is the transformation to which each actor subjects its relations that Latour and Callon call "translation". An actor is the list of his relations, *as well as* the transformation that each of the items on the list has undergone alongside or because of this relation. The idea of generalising the concept of the relation between two things (such as mainly the binary relations found in analysing social networks) to relations between many things, such as the method of simplicial complexes, is a way of resolving this paradox, by insisting on the combined or very multidimensional nature of the connectivity between social objects. The mathematical technique of simplicial complexes and hyper-networks (Johnson, 2009) enables us to follow and analyse a movement of relations between entities (individuals) and attributes (structures), while still considering the dynamic co-determination resulting from the activity of these entities (transformation).

2. Field of study: the Taonaba project

Taonaba is the name of an ecotourism development project of the Belle Plaine canal in the metropolitan district of Abymes in Guadeloupe. The main idea is to create a Mangrove visitor centre in Abymes. In fact the project area is typical of a humid coastal zone, remarkable both for its rich biodiversity, recognised as having both national and international importance, and for the extent of its marsh forest. Furthermore there is an adjacent agricultural area with an interesting historical heritage (remains of the housing for the Belle-Plaine sugar plantation). The desire to conserve and promote all these 'jewels' led to the Taonaba project.

The main idea of the project was to promote the ecosystems on the coast near to Abymes as part of a sustainable development programme, by bringing together three tools:

- ecotourism development: by acting as the driver for tourist activity in Abymes by promoting the agricultural region of the plain and the natural habitats;
- ecological conservation: by educating about environmental conservation and developing the understanding of ecosystems (agricultural regions, humid coastal zones);
- local development (social wellbeing): by encouraging the development of job creation activities for local policy makers and by creating a green belt area on the outskirts of the town.

Given the three areas for potential onsite activities, three types of target audiences have therefore

been identified:

- a scientific research centre in humid environments such as mangroves, aimed at scientists and students;
- an educational service, targeting mainly schools, providing a scientific but fun way to discover ecosystems;
- a mass market tourist service, for local visitors and tourists, offering a wide variety of indoor and outdoor activities, that are both educational and innovative in comparison to existing facilities in Guadeloupe.

The territorial process is directly inspired by the creation of administrative "pays" (multi-parish/town cooperative regions specific to France) (LOADDT Pasqua 1995, then Voinet 1999). The aim is to unite all the professionals, users and inhabitants of the area around a common, coherent project. This will be done by developing ecotourism and agricultural tourist activities around the Maison de la Mangrove (Mangrove visitors' centre), which are compatible with the main development of the Belle-Plaine canal. The method will be a local government charter, but also regional government contracts between the town and the different local government bodies, providing a legal framework and financial resources for the activities developed, by building partnerships.

Challenges in the territory will be to manage conflicts and motivate local government stakeholders, maintain and develop agriculture, manage urbanisation, conserve the rich natural and historic heritage, prevent pollution and support the development of an identity for the local government district.

A precise methodology was followed, as detailed in (Neffati et al., 2012). The town council of Abymes plans to continue rolling out 'sustainable development' projects and "public consultation" initiatives throughout the lifecycle of the Taonaba project. Below we describe an initial attempt aimed at providing local government stakeholders with an observation, visualisation and participative tool as a territorial assemblage of the Taonaba project.

2.1 Simulation of territorial assemblages and management by controversies

If we are not to stay with a formalist, logical and combinatorial representation of the phenomenon,

the analysis and simulation of the assemblages requires collecting relational and if possible longitudinal data. Several data capture techniques have been tested: web searches, social content aggregation platforms (Soulier et al., 2011, 2012) and as here, implementation and running a tracking platform. A Cap Excellence tracking platform has been set up with the goal of systematically monitoring the key elements in the local authority area, feeding the project under study with a significant data stream, starting to build an ontology in the field of territorial intelligence, demonstrating and monitoring the controversies encountered in the project, notably with respect to urban renewal, and finally, proposing a specific tracking of the town of Abymes (Soulier et al., 2012)¹. The analysis of fifty targeted sites has enabled us to find several themes of recurrent controversies, which we structured around environmental, economic and social questions. Graphs depicting the terms were then developed in order to identify the actors and their relations prior to analysing the scenarios for territorial assemblages.

However two difficulties appear in the analysis and visualisation of the assemblages: how can the transformation areas be calculated? "Can one try alteration as a subsistence method instead of always looking for the subsistence lying under the alterations?" (Latour, 2009); How can we visualise the dynamic of an assemblage? "The actor-network has never developed visual resources to match his theoretical ambition (...) However, the network presents the problem of the simultaneous visualisation of their activity and their relations" (Latour, 2010). To cope with the absence of calculations necessary for creating a transformation area and the inappropriateness of current tools to generate and visualise the dynamic of an assemblage, we have created a tool chain. This chain is fed by the tracking platform and the data provided by the technical departments in the towns of Abymes and Pointe à Pitre. The data extracted from these data sources are then categorized and stored within a database specifically designed by our team.

From a theoretical viewpoint, we have based our work on (Atkin, 1974 et 1977) who, in his work "*Mathematical structure in human affairs*" of 1974, starts from a *social* standpoint and moves towards a *mathematical* definition and a *and a geometrical representation of the "human affairs"*

¹ This microblogging *platform* based on Posterous.comTM and hosted in Cloud mode is made up of a series of integrated tools in a software chain: a *web crawler* (Matheo WebTM), bibliometric analysis software (Matheo AnalyzerTM), a software for the semantic and stastical analysis of textes (TropesTM), a content curation service (PearltreesTM), a service for extracting key word clouds (WordleTM), etc.

studied. More generally, we also note three social areas in the phenomena studied: the problems, the inter-related actants and the proposals/viewpoints/decisions/facts, where the different relations existing between these actants throw up a multidimensional interdependent structure and its dynamic².

Éléments sociaux	Représentation
Actant	
Relation entre deux actants (qui transforme ces actants)	
Regroupement d'actants inter-reliés et partageant le même point de vue	
Structure d'interdépendance autour d'une controverse	
Trajectoire / scénario	

Figure 2. Translation of social elements into a mathematical language

- an actant is translated into mathematics by an element belonging to a group of actants $A = \{a_1 ; a_2 ; \dots a_n\}$ and represented in the model by a vertex/node,
- a relation between two or more actants is translated in mathematics by an r_k belonging to all the relations $R = \{r_1 ; r_2 ; \dots r_m\}$, all the pairs (a_i, a_j) , and represented in the model by a ridge or link between two or more vertices,
- a group of actants inter-related by a common viewpoint (or a "piece of situation"), is translated by a cluster, a whole represented by a polyhedron known as a "simplex",
- an interdependent structure arising from different groups of inter-related actors for a given controversy, and representing the whole of the phenomenon studied is translated by a more complex polyhedron known as a "simplicial complex",
- A pathway or a scenario identified within the phenomenon studies is translated by a "connectivity path" or a series of simplexes sharing common elements.

In practice, six principal steps are needed to simulate assemblages:

- we select one or more controversies/problems that we want to study: we choose the topic or the question to which we want an answer,
- we identify the actants who will take part in in this test: creating and populating an 'actant' table in the database and generating the nodes/vertices in the model,
- we identify the different relations that they create between them: creating and populating a "relationship type" table and a matrix associating actants,

² These relations modify the identity of the actants who weave them together, thereby discovering the assemblage as the structure of a "transformation area".

- we identify the groups of inter-related actants and the situations or opinions linking these groups (and therefore that these related actants have adopted): by creating and populating an "opinion" table and a matrix matching actants and opinions as well as generating the related clusters/wholes in the model,
- we identify the possible pathways: by querying the database to identify the common elements between clusters and generating inter-cluster arrows within the model,
- finally, we generate the complete model and analyse it over time.

2.2 Studying the Taonaba project

To have a better understanding of the analysis of territorial assemblage, we have built an instructive example - the Taonaba case. In this example, the controversy studied is Taonaba (site of an eco-museum and a trail through the mangrove in the district of Abymes) and its current exclusion from the cultural tours planned in the urban community of Cap Excellence. The first step involves identifying the elements, as a result of a dialogue between one of the local government officials in Abymes, and in the background analyse the key word clouds from our tracking platform. A narrative (see below) identifies actants such as the town of Pointe à Pitre, the cultural centre, the TCSP (public transport using reserved traffic lanes), etc. which already seem to have specific links: *"Pointe à Pitre, town of art and culture, plans to connect its cultural sites (e.g. the cultural centre..) with a public transport service with dedicated traffic lanes (TCSP). However, the route for the shuttle bus is still being defined within the Cap Excellence urban community. Taonaba, in the district of Abymes, should in the future have its own cycle lane. How should this situation be studied?"*

The second stage involves identifying the actants and populating the databases. We therefore extract the actants from the previous narrative and enter them into the database. In modelling terms, we see as many nodes appearing around the vertices (the blue dots) as there are actants recorded (in our little example: the urban community of Cap Excellence, the town of Pointe-à-Pitre, the cultural centre, the shuttle bus (TCSP), Taonaba and the cycle lane).

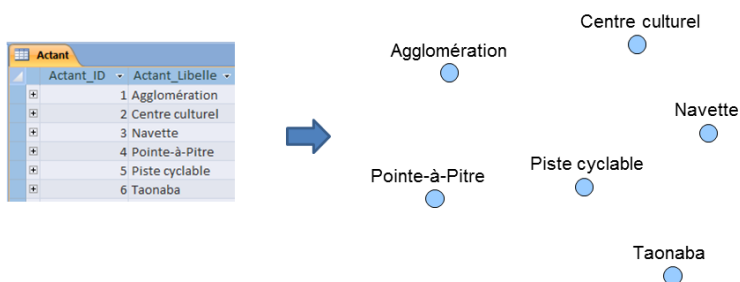


Figure 3. Step 2: Identifying the actors and populating the database (in french)

The third phase involves identifying the existing relations. We export these and enter them into the database of relations between the actants. In modelling terms, we now see appearing as many edges/links between the vertices as relations between the recorded actants (for this example, the types of relations are financial, geographical, political or related to accessibility, the multidimensional aspect therefore appears especially given the dual relation between the urban community of Cap Excellence and the town of Pointe-à-Pitre).

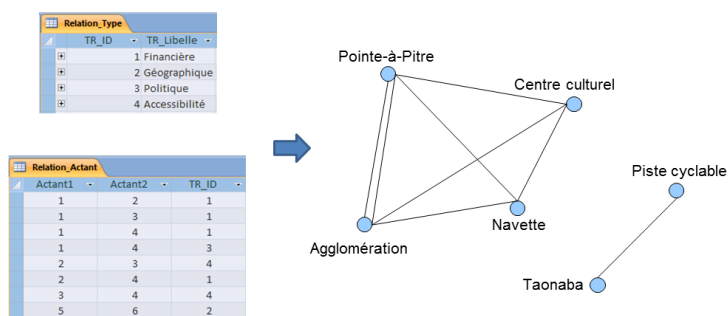


Figure 3. Step 2: Identifying the relations and populating the database

Examining the relations between the actants has produced groups which should be qualified in more detail. The fourth step involves identifying the points of view adopted by these inter-related actants, which seem to group together in clusters. Now, two main groups can be seen: that of Pointe-à-Pitre, the Cap Excellence community, the cultural centre and the shuttle bus, and that of Taonaba and the future cycling lane. In reality we have identified three views potentially adopted by these actors the cultural opinion, the transport and finally that of biodiversity. We therefore enter these new elements into the database. In modelling terms, we see additional nodes appearing (in this case green hexagons) in the middle of the groups adopting this opinion.

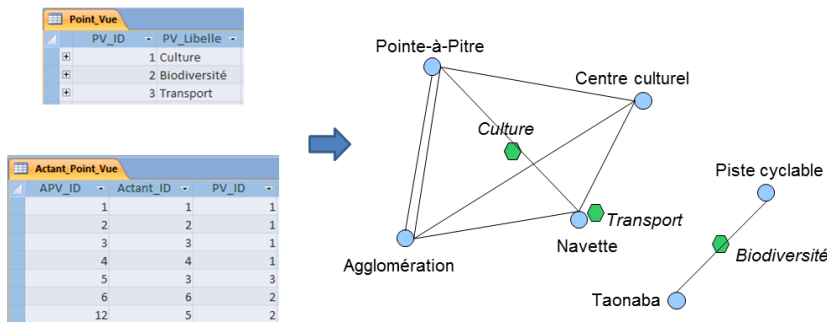


Figure 5. Step 4: identifying the points of view adopted by inter-related actants and populating the database

The fifth step involves identifying the pathways and querying the database. This is done via SQL (Structured Query Language) queries. The result of a given query shows which elements (actants or inter-related actants) are common to each pair of possible opinions. Here we see the "Culture-Transport" pair has a common actant, which proves to be "the shuttle bus". We can therefore deduce that a pathway (symbolised in the model below by a red arrow) is possible (but not certain at this stage) between the Culture and Transport opinions. This pathway indicates that a "flow" is possible between one of these opinions and the other.

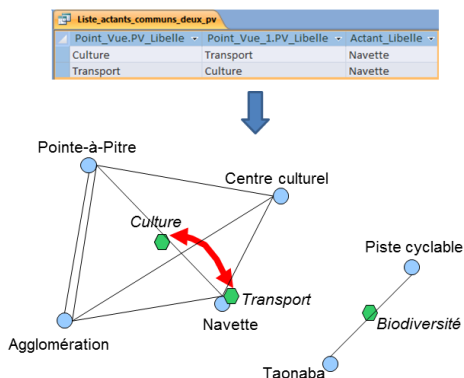
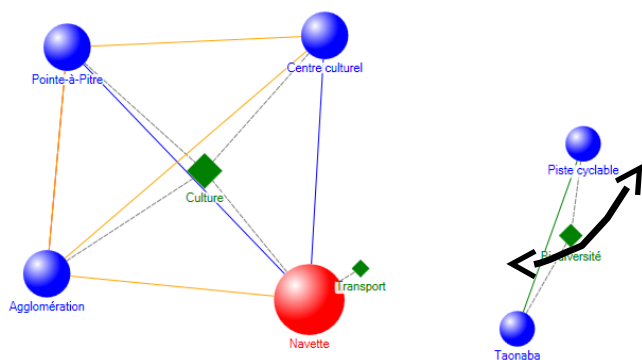


Figure 6. Step 5: identifying the pathways by performing a query

Finally the sixth step involves analysing the whole model in order to bring out issues requiring further examination, opportunities to develop and potentially, decisions to be taken. The elements entered and calculated in our database have been exported then reimported in NodeXL, now replaced by the analysis environment and visualisation of complex Gephi graphs. The following diagram presents the results from the model generation carried out using NodeXL:



(Figure 7. Model generated by NodeXL)

We describe the model, looking for any indicators which enable us to draw an initial conclusion. A first indicator is the red colour of one of the nodes which means that it is the "most complex" node of the model, in other words it has more lines entering and leaving it. Bringing this back to the social situation, this means that the "shuttle" actant represented by this node) is the actant which has the greatest number of relations with other actants. It is therefore the "most connected" to the others and therefore a key actant in the phenomenon studied. A second indicator is the total lack of link between the two groups shown: Pointe-à-Pitre, Cap Excellence urban community, the cultural centre & the shuttle and "Taonaba & the future cycle lane". In mathematics, this void is called a structural hole. It prevents any possible pathway between the elements positioned on the left and those on the right. No scenario, no influence, no exchange is therefore possible between the inter-related actants of the two sides. This structural hole perfectly explains the source of the controversy that we have chosen to study here: Taonaba is in fact included in the ecological dimension but excluded from the cultural dimension. We will return to these two indicators in the next section.

The calculations and analysis of the model have shown that a complex node highlights a key actant as well as a structural hole disconnecting Taonaba from the cultural opinion. Given these indicators and the "shuttle bus" at the centre of the phenomenon studied, the analyst hypothesizes that its extension to Taonaba may allow these two "parts" of the model to be brought together and therefore end, at least partially, the controversy. Therefore, by adding a new actant "a shuttle bus stop at Taonaba" and its various relations both with the shuttle bus and the cultural centre it serves, but also with Taonaba and its future cycling lane (which would allow people to transit between the new stop and the site, therefore retaining the ecological character of the site) appears to be interesting. Once

added in the database and having regenerated the model, this new actant and its relations to others emerge.

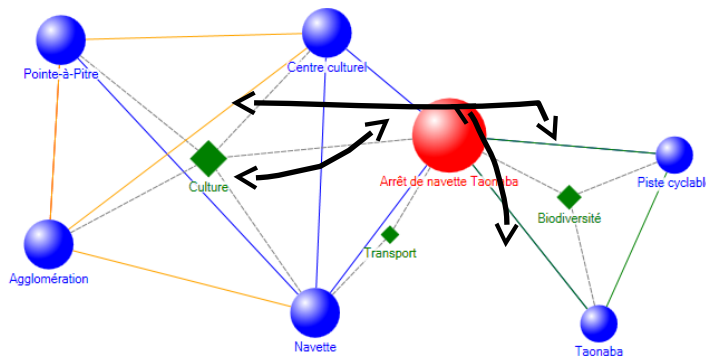


Figure 8. Adding a key actant and the emergence of new pathways

The structural hole has disappeared and the new actant has become key: the new shuttle bus stop at Taonaba. As we can see in the model above, this actant has joined the previous groups and adopted the opinions of "Culture" (since it is now part of the cultural tour of the Urban Community served by the shuttle bus) and "Transport" (since it's now one of the stops for the TSCP) and "Biodiversity" (since it helps access the Taonaba site without a car). It therefore becomes a common/shared element making pathways possible between the groups of inter-related actants and adopting from the start, the divergent opinions. The Taonaba site is now no longer excluded from the cultural world, since a pathway links the group to which it belongs to that with a cultural orientation.

Therefore the analyst can conclude that it would be worthwhile carrying out a general review of the public transport across the entire Urban community and not just at the level of the two towns. This small example shows that starting from the description of a phenomenon, assemblages can be modelled in order to detect missing elements, opportunities, issues for review, key decisions, and that the economic model applied to the Taonaba site by implementing a public service delegation based on a business plan targeting a ecotourism model seems to be insufficient. The specifications must take account of the dimensions highlighted and the links, which have emerged from the modelling of assemblages. Taonaba and the ACTe Memorial seem to have much in common.

3. Perspectives

Our analysis framework allowed us to approach local governance issues by studying practices, spatial assemblages and regulation. The assemblage theory and the associated formalisms encourage the dynamic analysis of the coordination between the entities involved. The Taonaba case demonstrates the usefulness of this type of tool. However, the link between the three proposed constructs and their use in evaluating coordination activities in terms of sustainability has yet to be developed and tested.

Nevertheless, visualising the multi-dimensional relations between entities in a situation, coupled with a spatial representation of the proximities between the (potentially) coordinated activities and the associated sustainable development indicators, could lead to the creation of heuristic scenarios encouraging mutual sharing of resources at a local level and relationship modes between "actants" that no longer form a classical commercial relationship (or between governed and governors), but long term partnerships (or sustainable and service based assemblages across the local government district). An extended framework is proposed further in annex.

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