The contrasted delineation of futures. The case of agroecological transitions in France.

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1. Introduction

In the light of sustainability challenges (climate change, biodiversity loss, environmental disaster, health and risk) and research innovation policy have received more attention from public or private actors in the face of demanding stakeholders seeking to question - if not controlling - innovation regime and the content of techno-scientific promises (Leach et al., 2012). Currently, innovation and R&I policy have been more and more accompanied by a reflexive governance of expectations (Voß et al., 2006), but also of regulation and even of discontinuation of socio-technical regime. This institutionalisation of governing science, technology and innovation corresponds to bounds of practices and knowledge that are dedicated to the delineation of futures which is covered by research insights (Borup et al., 2006; Eriksson et al., 2008; Andersen & Andersen, 2014). What one could call a manufacture of future corresponds to boundary-devices at the frontier of science and innovation policy in context of decision making: like planning, modelling for prediction, foresight exercises, innovation system forecasting, back-casting, and more recently predictive algorithm based on big data.

It follows that there is a growing need of academic studies to develop a stream of empirical investigation on policies that target the critique or even the abandonment of a given sociotechnical regime, and to consider the process of this abandonment as being also the manufacture of process of changes and delineation of novel sociotechnical configuration. When this type of challenge is driven by specific policies that orient the withdrawal of specific socio-technical assemblages that used to be innovative, a governance of discontinuation is at stake (Stegmaier et al. 2014). Studies on how future are manufactured in this type of processes, echoes earlier investigations about policy-making concerning the control of technological choice. From the first work about the emergence of Board of Technological Assessment (in the US with the OTA and in Europe with the Danish Board of Technology, see Vig and Paschen, 2000), a stream of work had described the framework, the momentum, the settings and the knowledge of technological assessment (TA), notably when TA has been exposed to controversy spaces which govern process of formal assessment (Cambrosio & Limoges, 1991). In the light of these investigations, an emphasis has been put on the structural effect of power-relations based on normative knowledge, but balanced by pluralistic mobilization in the appraisal of technology. This stream of reflection has issued concepts like Constructive Technology Assessment (Rip, et al., 1995), displaced the issue of impact measurement (Kuhlman, 1998) and considerably enriched the vision of public decision makers about uncertainty and precaution (ESTO report). Pluralistic views of technology are thus proposed has a key feature of policy making about technological choice (Stirling, 2008). The "precautionary principle" turn in Europe has thus convoked new approaches of governance for sustainable development (Voß et al., 2006) and various disciplinary inquiries about how system innovation - also named transition- can be influenced and governed by different type of actors (Elzen et al. 2004). In our view the present momentum of transitions in agriculture is supported by forecast exercises based on various types of modelling production of bioresources-biodiversity-climate change-demography that are important master frames for policy making in the long run. But at the same time, similarly to the CTA turn, the valuation of future is at play in many arenas that are more or less directly connected to transition pathways that entail a critique of the incumbent sociotechnical regime.

The rationalisation of future has thus a growing counter part in epistemic and material cultures of grass-root innovation, consumers' movement and civic engagement based on sociotechnical imaginaries, concrete utopias, and radical constructive social movement. Those bottom-up collective experiences share a common property: they ground the shaping of their expectation on a critique of the past or existing large sociotechnical system or incumbent innovation regime. Therefore the delineation of sustainable futures is not detached from the assessment of innovation and technology. The social and technical construction of futures relays more than ever on a large process

of re-exploring the lock-in that have enabled economies of scale and variety in the past and thus manufacture our "present futures". This association of future definition and retrospective critique certainly deserves a close attention and more empirical studies.

2. Exploring the manufacture of futures in the case of agroecological transitions

This is particularly the case for the debate about how agricultural production, food provision and environmental protection should be combined to answer transition towards more sustainable agro-food systems and thus open issues of conceptualising sectorial dynamics (Geels, 2004; Konrad et al., 2008), system innovation design (Barbier & Elzen, 2012) or multi-regime interactions (Sutherland et al., 2015).

Actually, behind the apparent consensus around a promotion of greening changes in the food chain, there are competing representations of objectives and pathways to change agrofood systems, reflecting different paradigms on the way their future is considered and revealing different worldviews and actors' interests (Levidow et al., 2014; Levidow, 2015). An epistemic turn is at play with the emergence of agroecology (Ollivier et Bellon, 2013) on the "basement" of the sustainability turn in agriculture: agroecology can be defined as the application of ecological concepts and principles to the design and management of sustainable food systems (Altieri, 1995; Gliessman, 2007) within a large variety of actors that are appropriating and transforming this concept, according to their objectives. The constitution of trans-epistemic communities among the world is also accompanied by definitional struggles (Vanloqueren & Baret, 2009) and contentions about agronomy inherited from a critique of the Green revolution (Sumberg and Thompson, 2012). This process leads to the coexistence of different visions of the future that are certainly competitive but also coopetitive, as some narratives dominate others, but also as some issues and cognitive frameworks could be combined in a common storyline, as it as been shown in the Dutch case (Smith & Kern, 2009).

Two novel "Grand Challenges" have gained recognition in policy arenas dealing with agriculture, environment and food provision: climate change and loss of biodiversity. It took a long time before the notions of biodiversity and climate change were taken seriously as drivers for agricultural policies, but it has thus become widely recognized that the development of industrial agriculture has seriously harmed the planet under the flagship of "nourishing the world". In the domain of agriculture this has led to an increasing attention for ecological practices at the farm place and ways of developing bioresources production. The concept of agroecology represents an idiom that was shaped over 20 years ago and reflected, in response to a then widely shared agrarian vision, a critique of the green revolution that was increasingly proving to be a failure. Currently, the use of agroecology as a definitional framework captures a critique of the agro-food regime at large. It targets new ways of doing research and producing knowledge, new ways to fulfill needs and secure access to resources and to engage various stakeholders in decision-making on issues related to the production and consumption of food. Thus, the focus is not placed on a biopolitics of nourishing humanity; agroecology means the biopolitics of access to resources that define the people in their humanity with a sense of distributive justice (Coll., 2014). With this scope the mobilization of this idiom to account for practices and policy entails an open delineation of sustainable futures.

Although the interest in agroecology is rising, there is a large divide between those who think that we should and can change our ways of food production and consumption, and those who primarily trade doubts. The latter visions are evidently still dominant and lead to a variety of incremental

changes that leave the overall agro-food system basically intact. Despite most governments' adoption of the notion of sustainable development as a basic policy principle, it has become increasingly obvious that the achievement of a 'post-industrial' society will not necessarily result in a more sustainable society, i.e. a society that is characterized by a better balance between economic, social and ecological goals. In this context, the relations between agronomic science, agricultural technologies, and public or private expectations are at stake in the manufacture of futures with specific claims that link the production and the access to resources with a sense of distributive justice.

3. Field of enquiry and methodology

Our field of enquiry relays on a comparative analysis of case studies of arenas where futures of agrifood systems are built (e.g. foresight studies on food systems, the French Government agroecological project, farmers initiatives…). The particularity of our approach of manufacture of future built around the agroecological transition is that we consider futures to be designed in various arenas including of course public policy arena (Rotmans et al. 2001). Therefore, futures are not built only in scientific or technical spaces, and limiting our analysis to "traditional" spaces of R&I policies would not be so relevant as they are prompted to open up. Therefore we bear in mind to open the account of different arenas implementing significant changes in ways of tackling with sustainability challenges (Tilman, 1999). Since co-construction is closely associated to agroecology, we aim also to open the consideration of different spaces implementing significant changes. We have thus tend to considered arenas as significant for an agroecological transition when they explicitly refer to a version of agroecology but also in spaces implicitly engaged in an agroecological transition that still remains disputed and coopetive. This communication proposes a first attempt to rationalise a collective work under progress, which relay on a collaborative analysis of case studies with a triangulation of their analysis based on a methodological framework to be presented here.

Actors of the incumbent agro-industrial regime tend to shape the "grand challenge" for agro-food systems by framing the debates around production imperatives, and therefore narrowing the options for radical innovation to greening initiatives. Thus a tension in governing change is to conciliate a common horizon for action and a plurality of futures to keep a diversity of options open in an uncertain context but also distinguishing "appraisal" and "commitment" (Stirling, 2006). In addition to political and scientific narratives on future, various actors' actions rely on explicit or implicit references to future, many of them articulating critique of agrofood industries and activities to redefine the articulation of food production and food provision like in organic farming or more recently under the agroecological umbrella (Elzen et al. 2016).

To account for various case studies an analytical grid has been set up to establish the various ways of manufacturing futures (table 1). In a rather classical – if not linear- way of studying policy making process (design phase, discursive phase, implementation phase) we have tried to grasp the socio-cognitive framework in use to elicit the vision of the future vision in relation to discussions of the regime of techno-scientific promises at play or intended in process or agroecological transitions. This grid is applied to a still on-going crosscutting collective work that mobilise 7 contrasted cases studies (table 2) that all entail objective of sustainable development in agriculture with a reference to agroecology and processes of change. These case studies reflect our conception of arenas and spaces where future are manufactured at different scale of time and geographical concerns (locality, region, nation and world).

Table 1: Analytical Grid

The "manufacture of future" process		
1.Building representation of future Objectives Actors Arenas Tools Content of the future vision	**2. Discussion about the manufacture of future** Objectives Actors Arenas Tools Content (and evolutions)	**3. Facing the Implementation of changes** Objectives Actors Arenas Tools Content (and evolutions)
Position of the future vision produced in relation to the regime of techno-scientific promises		
How is the problem framed? On which principles is the promise justified? How is the promise credibility and legitimacy built? Which role is given to research, innovation, technology? Position in relation to the critique of the productivist paradigm?		

Table 2: Portfolio of Case Studies

Case studies	Type of arena	Scale	Duration
PADDUC	Regional development Project	Region	**2014-2020**
TERRAE	Participatory Research Project	Multi-local at the regional level	**2013-2018**
Foresight Agrimonde	Foresight by Scientific Institutions	World	**Published in 2009**
Ecophyto Action 16	Implementation of public policy in agricultural education system	France	**Since 2013**
Agroecological National Project for France	Implementation of innovation policy with R&D programmes	France	**Since 2013**
Foresight Afterres 2050	Foresight run by a NGO with participatory implication	France	**Firstly published in 2009**
CIVAM Groups« Empreintes »	Networking of local initiative based on practitioners' association	Multi Local and networking	**Since the end of 90's**

4. Findings and cross cutting analysis

4.1. The analysis of a portfolio of arenas

Therefore, our findings relay on the analysis of these coopetitive definitions of expectation and we account for the constitutive tensions of the "manufacture of sustainable future". In this context, doing prospective analysis and forward looking approaches is not limited to the design of a specific foresight exercise; it tends rather to become the management of change in strategic elaboration processes, which implies constructive relations to stakeholders (Treyer, 2009).

In light of this approach, we depict how various rationalisation of futures are connected to strategic public or collective action dedicated to enforcement of sustainable farming practices, and how the connectivity of foresight on agriculture, local project, public action programmes shape an invisible portfolio of sociotechnical promises in agrifood systems but also on challenging revision of linking resource production and consumption behaviours (Table 3). The reference to agroecological is more or less present to identify contrasted pathways that proposes future based on practices that modernisation of agriculture had previously expelled. Scenarios of local initiative are thus delivering visions of the future that are sometimes already at work and at stake in existing initiatives. After the intense momentum of GMOs debate and the stabilization of a controversist space about the role of

biotechnology for future agrifood systems, there are petitions and storylines of transitions in agrifood systems that are directly connected to existing projects of local actions or even governmental programme.

Table 3: Presentation of Case Studies

Case studies	Type of arena	Actors **# = Heading the process; @= involved**	Objective and reference to agroecology
PADDUC	Regional development Project	# Local authorities **@ Practitioners, Local decision makers, Associations**	The goal of this regional programme was to regenerate pastoralism in Corsica, having both economic and cultural dimension. Defining sustainable system supposes to identify innovative pathways that would match both dimensions. Reference to agroecology is indirect.
TERRAE	Participatory Research Project	# ISARA-Lyon @ Three localities of the Rhône-Alpes Region	The objective of this project is to study, foster and accompany transitions toward sustainable territorialized food systems. The purpose is not to apply agroecological recipes but to ground changes on existing dynamics that are carried by local actors who define their own future.
Foresight Agrimonde	Foresight by Scientific Institutions	# INRA and CIRAD @ Scientific Experts	For both scientific institutions, the challenge of this foresight was to position them in the international agricultural research landscape. The aim was to issue contrasted scenarios of global food security challenge for 2050, based on a variety of productive and consumption. One of those scenarios is labelled "agroecological" entailing a deep modification of food consumption regime.
Ecophyto Action 16	Implementation of public policy in agricultural education system	# Ministry of Agriculture **@ Director of Agricultural Colleges, Teachers, Trainers**	The objective of this public action was to shape an agroecological referential for occupations in agriculture, notably with a principle of pesticide use reduction. The project links pedagogical changes and experiential knowledge to trials in educational farming structures in agricultural colleges.
Agroecological National Project for France	Implementation of innovation policy with R&D programmes	# Ministry of Agriculture @ Agricultural chambers, Technical Institutes, Cooperatives, Farmers' Associations and trade unions, research institutes	The Ministry of Agriculture is promoting and implementing a global project under a triple efficiency (economic, ecological and social) principle for agrifood systems. Ecological intensification is a master framework for a variety of coexisting models of agrifood systems. Transitions are supported through incentives and voluntary participation to programmes that favours new knowledge, practices and innovative technology. Agroecology remains a keyword to signify a breakthrough in the referential of agricultural public policy.
Foresight Afterres 2050	Foresight run by a NGO with participatory implication	# Solagro # Regional Council, Agricultural Chambers, Environmental Associations, Researchers …	This foresight is the expression of a non-governmental vision about the future of French agriculture to counter-balance incumbent vision. This exercise is based on a model that favour the optimisation of land occupation (MoSUT model) and frame compromises between needs and resources under technical and natural constraints with best agroecological practices based on ecosystem services delivery.
CIVAM Groups« Empreintes »	Networking of local initiative based on practitioners' association	# CIVAM Network @ Groups of farmers involved in cattle breeding	A local initiative of cattle breeders explores the possibility of alternative breeding practices. The structuration of a network and the maturation of problem definition are processes of knowledge and experiences with the explicit aim to favour grazing and local adapted "races". The vision of breeding is based on grazing autonomy and exchanges of resources at the local level. The underlying social structure is deliberately placed under professional identity.

This portfolio of case studies does not represent the entire projects and initiative that are - or have been- in relation to the definition of futures for agriculture and agrifood systems. Nevertheless it delivers a representative set of the type of arenas and situations in which the definition of futures is either an objective or a mean. One could easily extrapolate the existence of a web of situated initiatives, either in the communicational sphere, in the governmental sphere, or in the professional sphere, that tend to mix forecasting and back casting considerations.

4.2 Relations to future in discourses

4.2.1. Building representation of future

Various ultimate rationales are shaping the discourses that express vision of the future to justify the needs for change. The exploration of key documents, and some interviews realized with main actors driving or governing the selected arenas delivers four types of groundings (Table 4). Those ultimate rationales sketch futures in relation to space (local, regional, global) rarely trying to integrate scales, in relation to a critique (the desirable future is not the one that prolongs the present regime) and the concerned actors (local group, nation, world).

Table 4: Type of Groundings in discourses

- Feeding the world and increase the level of bioresources (Agrimonde, Afterre)
- Local economy survival (CIVAM, PADDUC)
- Ecological Deadlock of productivism (Ecophyto Action 16; Afeterres)
- Territorial dynamics with local and professional governance (CIVAM, TERRAE)

According to these master frames the coupling of vision of the future and of the supposed necessary transitions pathways are based on rather poorly explicit explanation of those transitions. But two contrasted approaches can be identified: one that favours the definition of a long term vision that is supposed to drag the present forward in certain direction and another showing a rather abstinent engagement in a precise definition of future and which corresponds to a kind of constructionist approach, precisely not to hamper the dynamics of changes and their ways of being.
Agroecology is thus sometimes explicit, but as discursive resource that shows variations: agroecology might represent a label for a certain technological approach (it is the case for the two Foresights); agroecology might also describe a methodological package of applying principles to action (Terrae); agroecology might also be an existing reality that express an alternative that could represent a future (CIVAM).

Visions of futures are rarely describing or even pointing the necessary changes that should be up taken, and more rarely even referring to political considerations when all discourses are clearly and explicitly mentioning the need of a governance of discontinuation. The definition of futures is then rather placed under an euphemising of social and political tensions.

4.2.2. Discussions about the manufacture of future

The various elicitations of future within the scopes of a master framework are associated to discussion of transition pathways according to two main factors. Each scope is addressing future at a certain scale in relation to the localisation of purposeful or already active transformations: foresights address a global scale (Agrimonde, Afterres) to shed light on main drivers of potential policies, when project and initiatives address a local scale with general principles (CIVAM, Terrae). If precise descriptions of those transformations are rather rare, the differentiation between arenas is placed on the type of evidence that should accompany the affordance of transitions and on the radical nature of changes.

There is thus a tension at work between: (1) a techno scientific approach of redesigning smoothly and contrastingly the present and grounding the affordance of transition on techno-scientific proofs (evidence based transitions) and (2) a experiential and pragmatic approach of profound redesign of the present associated to an iterative construction of future based on action and experiential learning (experiential learning based transitions). The former is largely argumentative and discursive and relays on evidence making of the future in a rather ballistic approach of action. As a

consequence the manufacture of future is rather associated to the mobilisation of scientific and technological approach of possibilities. The latter is a pragmatic and incremental engagement in actions, which tend to display seeds of the desired future in present time with a strong attention if not ethic of methods and principles of action. In between, public action or regional uptake of transitions are unsurprisingly trying to govern these two ways of transitioning, issuing a strange web of tensions, contrasts or even incommunicability, but also political processes of coupling those two approaches in the governance of transitions.

The performativity of the definition of future is thus based for actors on the capacity of impacting the governance of discontinuation. Means are rather different and the legitimacy processes are confronting evidence-based transitions and experiential learning-based transitions. The institutionalisation processes that are associated to the recognition of specific manufactures of future are thus based on a confrontation around the role and the nature of knowledge production that afford different scale and scope of the present reality.

4.2.3. Facing the Implementation of changes

The implementation of changes- though it is rather described in many details- is presented and afford in relation to the dominant sociotechnical regime of agricultural production. The existence of the domination of this regime is nevertheless to be questioned since the last decade has shown a large process of market-push niche innovation, organic farming extension and technological differentiations based on no till or reduced till practices and soil conservation.
Therefore, facing the implementation of changes can not by pass a discussion of how the dominant regime is *per se* a definition of future that might be challenge according to evidences of ecological deadlocks of industrialised agricultural systems. The continuation of the dominant regime is thus at stake under a discussion of the possibility of internalising sustainable practices.
The arenas that have been studied show this type of dialectical approach of transitions. The discontinuation of the dominant regime is the other way of facing the implementation of changes that are associated to manufacture of futures. We observe hybridisation of approaches (evidence based transitions and experiential learning based transitions) and blending of professional sub-culture within the neo-corporatist French organisation of agricultural development (organic farming professional culture; soil conservation professional culture; peasant professional; agri-entrepreneurial professional culture).
The dominant regime acts as a foil and reveal what the future should not be and therefore the critique of the regime is a powerful mean to establish alternative pathways (by contrast) or to legitimise alternative (by breakthrough). The arena that relays on national public action or regional programme of transition are particularly muddled by hybridisation and blending, with juxtaposition of objectives seemingly contradictory or global sustainable efficiency. The discourse of unlocking the dominant regime is particularly vivid.
Despite this apparent condensation of critiques that does not necessarily cover the entire factors that could be addressed in foresight exercises, we do not observe the formulation of an alternative regime of agrifood production, even not any alignment of the various definition of futures. The absorptive capacity of the dominant regime towards critiques and niche innovation is pointed out.
Therefore the definition of future and the implementation of changes are particularity political, at the level of creating the possibility of new sociotechnical arrangement (either by proofs or by experience and with compromise in between those approaches), but also at the level of the governance of public and professional engagements.

Conclusion

Our study purposefully targeted a cross cutting analysis of arenas in which transition in agrifood system are invoked in association with a specific definition of future. Those arenas are of course not linked directly by any formal political of economical setting, by it seems to us purposeful to explore the manufacture of futures, while enlarging the scope of enquiry from foresights exercises to project, programme and policy, similarly to what as been done to Technological Assessment. Our methodology is based on an abductive reasoning based on this cross cutting analysis.

Through various case studies of scientific, political and professional arenas in which the manufacture of future is at stake, we identify various representations of future and tried to extract main thrusts. We seek to identify how future building processes open up or close down opportunities for transformative change. Indeed, agroecological futures building has to deal with the rules imposed by the dominant regime, in particular concerning commonly accepted performance criteria. As the regime is dominant so are its judgement criteria, therefore the burden of proof falls on those advocating for alternative forward-looking approaches.

There are processes of articulation between agroecological principles and the dominant regime requirements in the manufacture of futures. Some actors intending to support a strong agroecological transition need sometimes to integrate some elements of the dominant regime in their future vision to access to decision-making debates (e.g. Afterres 2050, a scenario representing a radical technical change of production systems in France also demonstrates that it would still be compatible with the objective of maintaining an important level of cereal exportations). On the contrary, as societal concerns on some negative impacts of the dominant regime increase, dominant actors also seek to integrate some elements of the agroecological narratives (e.g. the French Ministry of Agriculture designed an "Agroecological Project" for France). Our analysis shows dynamics of hybridization, integration and conflict between different futures building. Those interactions between different future building processes have effect on how research and innovation policies define target of novelties and breakthrough challenges, and this is pointed out by a tension at work between discourse and action that promote evidence based transitions and those that are grounded in experiential learning based transitions.

The governance of the manufacture of future through scientific foresight – even though they could be counterbalanced by non-governmental foresight) is therefore challenged by other ways of manufacturing future, so to say more directly in the present time and having differences in scope and scale.

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Sarah Lumbroso is currently running a PhD thesis in science policy and she questions the performativity of foresights and prospective approaches in their attempt to change the agri-food systems, thanks to an empirical investigation on water quality objectives and aquatic environments. In particular she studies the link between the construction of a sighting change and its ability to mobilize stakeholders and to drive collective action, and the differences of representing transition pathways in action and in foresights.

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