Innovation policy at stake: Should we throw the baby with the bath waters or change the composition of the bath waters

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1- the ambition of this think piece

This paper is a personal elaboration to participate in the growing debate about the relevance of innovation policies and the need for change. The ambition is not to propose an 'innovation policy 3.0' (J. Schot, 2015 EU SPRI conference), but rather to identify the changing environment in which innovation policies develop, and a potential research programme to better understand them and offer revised conceptual frameworks to support policymakers in their continuing work of transforming 'innovation policies'. As suggested by S. Borras (2015 EUSPRI conference), I shall try to avoid the too frequent section on 'implications for policy' that concludes so many papers.

The debate has taken multiple directions already. My take is to gather them under 5 main headings. R&I policies are too supply oriented, and forget demand (more exactly social needs and the processes that transform them into 'demand' – Edler & Novotny, 2014). This links with a growing view that R&I policies forget their history and their historical strong role to serve public missions (or as we say now, challenges). Pushing further J. Schot (2015) considers that they are 'missing the boat' (my expression), that is promoting sustainability and energy transition. On a different level, C. Edquist argues that putting together 'research' and 'innovation' policies has become counter-productive and that they should be considered separately as was the case before with science and industrial policies. Finally quite a number of scholars focusing on governance argue that innovation policies are locked in national governments and systems approaches.

The argument I shall develop in this think piece, takes as a starting point the lasting structure of policy rationales around three complementary overarching priorities (Pïganiol 1964): foster the science base, support firm innovation capacity, invest in 'mission-oriented' R&D for public / 'collective' goods. I guess that most of the readers of this text will accept that this represents quite well the 'national' strategies produced in numerous countries these last five years and even the different EU framework programmes (and in particular H2020).

In brief I shall put forward four main points.

1- We face lasting questions in the first dimension, the science base, but in a completely different context that connects scientific research with capacity building and higher education. Thus if political choices drive to a separation again from innovation, we shall not return to classical 'science', but rather to research and higher education policies.
2- The core failure of innovation policies is about the second goal, supporting the innovation capacity of firms, not because the balance of instruments is not adequate, not because they do not support well small and technology-based start-up firms, but because they completely oversee the radical changes that have taken and are taking place in innovation activities (highlighting three of them to illustrate this inability).
3- The grand challenge discourse mostly remains a discourse with only marginal changes in implementation. And I remain sceptical about the chance of any radical transformation without facing a major 'immediate' crisis. However if we wish to anticipate such situations, I consider, contrary to the views of Kuhlmann & Rip (2015), that there is much to learn from previous experiences, in particular from the 'large programmes' after the second world war (on nuclear power, space or aeronautics) that drove to massive mobilisations of scientific and industrial capabilities in 'problem solving' approaches and multi-disciplinary gatherings (see Aylen 2015 for a beautiful example of the first UK nuclear bomb).
4- However I share with many colleagues, and in particular Kuhlmann & Rip, a further difficulty, the de facto multiplication of legitimate public authorities developing innovation policies. Whether it produces 'multi-level governance' requires far more empirical evidence, far more analytical evidence before turning to normative considerations, as advocated by S. Borras (2015 EU SPRI conference).

I shall deal with these four points after a short historical positioning.

2- Innovation policies and path dependence

Innovation has long been assimilated to invention and de-facto public policy focused on protecting inventors' rights so that they could get the returns from their inventions (IP). This was complemented very early on by ways for insuring consumer and worker safety (norms and standards). All these have given right to specific institutional developments that have spread in space and time and have internationalised very early on (remember that the first international trade agreement was on industrial patents, 1883). Both have been extensively used in shaping competition. But there have been also very early on, complementary policies to favour national firms (cf. List and 'infant industries' based on tariff barriers, and more widely the use of regulation to build non-tariff trade barriers).

Historians will show a progressive enlargement from this 'baseline' – especially starting with agriculture, but not only. However none of these developments did succeed in articulating the need for an identified specific policy. What changed the situation were the WWII 'breakthrough' innovations pushed by new scientific and technological developments (Manhattan is emblematic of one mode centred on big 'top down' projects but these were not the only changes and modes, think of the radar, blood transfusion, etc.). It generated two main developments. The first is well known and probably over-emphasised dealing with the need for governments to invest in fundamental science (see the emblematic report by Vannevar Bush, Science the endless frontier). The second one has been far more powerful in term of financial engagements: OECD, when created at the beginning of the 1960s, will call it 'mission oriented research'. This other dimension (long assimilated to Defence needs in a cold war environment) has always been prevalent in most national budgets, representing 90% of US

federal expenses for over 50 years. It took different terminologies over time, and we now live in a world of 'societal challenges' (remember however that environment was an intrinsic part of the first EEC research efforts along with medical research and renewable energy sources in the 1970s).

These three dimensions, as already mentioned, have been 'theorised' by OECD at its creation (see the 1960's rich period combining work on the first Frascati manual, the Piganiol report about 'politiques scientifiques et techniques' and the unique country review process put in place to help countries establish/reinforce their 'science administrations', Henriques & Laredo, 2013). These three dimensions have often been managed under two different administrations & policies (science & technology, and industry). They have changed names over time, and progressively in more and more countries they have been integrated into 'research and innovation policies'. Should we throw them away, and replace them by something else, or should we be attentive to the lasting relevance of old questions?

3- Fostering the science base: from fundamental research to capacity building

My ambition is not to come back to the history of this first dimension, then labelled as fundamental research and that we tend to call now academic research.
Questions raised already in the 1960s still feature on the top of the agenda, in particular: which overall effort (see the famous speech of Marburger on the science of science policy), which balance between core and competitive funding. More recently we have revived the debate between 'normal' and 'frontier' science.
These questions were associated with strong debates about the respective values of two opposite models: 'academies of science' (professional research in dedicated research institutions) and 'research councils' (research undertaken by academics in universities and funded by the councils on a project base). This debate has deeply changed, most organisational environments comprising both, as Germany illustrates very well (with the Max Planck, Helmholtz & Leibniz societies on one side and the DFG on the other). This dominant hybrid model (do not forget the role of national labs in the US, see Crow & Bozeman 2001) has further developed with alliances between PRO and universities, e.g. 'mixed research units' (such as the French CNRS has developed them) or mixed institutes (such as the recently created Karlsruhe Institute of Technology).
This has put on the forefront of policy discussions the role of Universities. And the shift has been so profound that the first decade of the 21st century has been marked by the notion of 'excellence' with its succession of policies and of rankings. This raises a whole set of new questions: are 'academically excellent universities' an encompassing answer[1]? What balance between 'capacity building' and 'academic research'? What connections between the different modes of capacity building (disciplinary vs. professionalised/vocational) and the types of research activities conducted? Should these questions be tackled at national or regional levels considering the 'smart specialisations' of European regions?
Questions abound and they tell us that it is difficult today to separate policies dealing with 'academic research' and with 'higher education'. Do these together build a new type of 'sectoral' policy, as it has been the trend in a few OECD countries? Do they represent a new type of 'framework condition' for friendly innovation ecologies?

[1] Our colleagues from Leiden (in charge of the Leiden ranking) and Lugano (in charge of the ETER registry of European universities) have calculated that the top 200 ranked universities in the Leiden ranking represent 80% of European university publications? How then should we consider the some 3500 other European universities?

This fast and oversimplified review tells that 'old questions' remain critical today, even if probably we need 'new bottles' (both institutional & organisational) to address them.

4- Supporting innovation capacities of firms: the need for a massive redefinition

4.1- the manufacturing sector as central target

The core of what academics and professionals discuss about innovation policies lies in the emergence and rise to prominence of activities dealing with the technology-based innovation capacity of firms in a permanently widening international competition, associated to the (quasi) disappearance of tariffs and trade barriers (one should not underestimate this political instruments that have recently been mobilised again by Argentina).

This dimension has given rise to a continuous stream of policy innovations (new problems to address, new instruments, new mechanisms…). I suggest a simplification to consider these developments by identifying three phases in policies (both successive and overlapping).

A first phase has been focused on established industries with a familiar answer of 'technical centres' for the industry or 'collective industrial research'. State intervention took then different forms, such as levies on industry turnover redistributed to the industry centre or tax exemptions or even direct support to industry collective centres. This phase is clearly delineated in history (post WWII until the end of the 1960s); however, it is interesting to see that this form has regained interest with regional 'technology resource centres' and even with new 'filière' based approaches.

A second phase corresponds to the reappraisal of innovation no longer considered as a linear but as a whirling process, entailing not only the innovating firms but their suppliers and 'lead' users. Innovation became perceived as network-based, open beyond the frontiers of innovating firms, requiring knowledge from multiple sources. This was translated at the country level into the national system of innovation approach. This entailed two main developments: one centred on university-industry relations, the other on collaborative programmes (the EC being the only 'government' to make it its major policy instrument). Most evaluations show that these policies de facto favoured large established firms (adding new policy questions about firm 'nationality').

A third phase lies in ways under which small firms (recognised as the key source of both manufacturing employment and of breakthrough innovation) have become central in the policy agenda, nurturing three complementary policies, for directly supporting innovation activities by firms (using criteria-based funding, e.g. ANVAR in France, or/and tax credits), for favouring a start-up ecology, and for pushing for proximity policies - industrial districts, clusters and/or poles.

All these policies – while often remaining marginal in overall Government expenses for R&D - have been supply-oriented. And this has generated a debate about more diffusion-oriented policies, focused on the use or absorption of new technologies, rather than on their developments (cf. Ergas, 1986). Diffusion-oriented policies have however remained marginal in most countries. Today we witness a growing interest in a proactive use of procurement by public authorities, and this is also reinforced by the emergence of multiple platforms promoting web sourcing of innovative solutions. This certainly represents an important dimension in a future research agenda.

However the main weakness of this overall dimension is to remain rooted in manufacturing industries (and manufacturing like industries). And even if we observe new discourse and agendas on 'reindustrialisation' (especially in the US, see S. Berger)[2], its relevance remains limited by the continuous reduction of the share of manufacturing industries in the GDP and total employment in OECD countries, and particularly in Europe (even considering Germany). It thus misses the core of on-going structural transformations that require that we redefine the scope of the activities we address.

4.2- should the scope for such activities radically change?

Remaining thus in this classical context drive policies to simply forget the core of on-going transformations. The key words that characterise the new challenges R&I policies face, can be characterised by three 'umbrella' terms: (a) service economy (b) globalisation, (c) new 'lifestyles' and political consumption. There may be more but these three combined drive us to ask ourselves if there is not a completely new paradigm to consider for relevant public intervention.

A- It is banal to say that we live in a 'service' world, but what implications does it have on our understanding of innovation processes, and in particular on the balance between technological and organisational/social innovations. My take is that we have three ways through which we consider innovations in services: (i) firms and sectors that operate in a "manufacturing like" mode (banks, transport operators but also most large construction firms are classical examples) and (ii) 'knowledge intensive business services' (that mostly span from outsourcing and offshoring and deal with B to B aspects: consultancy firms or computer services firms are well known studied cases). (iii) All the rest is supposed to correspond to the 'creative' tailored type (with the famous hair cut image pushed by economists). This however gives a poor view of the world of services, and in particular excludes nearly all services focused on 'individuals' – from health to tourism, leisure and culture. We have hints about them when they deal with activities that we can reconnect with 'extended manufacturing': there are multiple analyses of innovation in the videogame industry (and even there little about understanding conditions for winning games); we know about new drugs or new technologies in hospitals (however knowing little about the generalisation of new techniques – some of our colleagues speaking even of 'hidden innovations'); we start knowing more on hotel chains (and their 'analytics'). But we have overall little on the mass of innovations that have taken place in these sectors and firms, and about interactions supporting them (e.g. how local public investments in culture serve an economic dynamics of leisure and tourism). Most often we assimilate them to Pavitt's 'supplier-dominated' type (here depending upon the generalisation of the internet world). The now fashionable answer is to discuss new business models. The issue however remains: How can we better characterise innovation processes, so that we can identify ways in which public authorities can accompany firm efforts and build an environment that is more conducive to innovation efforts.

B- similarly we look at globalisation with classical eyes. And probably forget some of the implications of this movement. Let me elaborate about three of them (and they are many more).

Globalisation goes with growing concentration (200 firms do half of world industrial R&D, however weak is this indicator). This means that in most markets, a few firms play a dominant role, invest as much as many national governments, and cannot be considered under classical views of competition (the issue of a Government is not to incentivise large firms indifferently

[2] This discourse is also often linked to the emergence of a potential breakthrough manufacturing technology – additive manufacturing linked to 3D prinitng.

to invest more in RDI activities, but to negotiate with the right firm considering its environment of smaller firms).
Globalisation also goes with absolute and no longer comparative advantages. This has driven to a radical shift of manufacturing landscapes in multiple spaces and new forms of specialisation. Europe has even coined the term of smart specialisation ('being different from others') and looking at the French landscape only, one can measure the redistribution in manufacturing employment in favour of agro-food and luxury industries. This has even pushed countries like the US to speak of 'reindustrialisation' and open new programmes (e.g. advanced 'additive' manufacturing).
Globalisation is not only an issue of firm dynamics; it is also an issue of wide transformation of the relations between consumers and producing firms. The internet 'revolution' is no longer transforming targeted industries (like i-tunes and the music industry), it is a pervasive way to reconsider relations between producers and users in all sectors, enabling the generation of new firms or warranting a radical transformation in the ways firms operate (in the food industry, in textiles, in the access of most physical goods…). It has re-opened the box of innovation away from product development, focusing on processes (but mostly other than production processes). This is warranted by an ecology of new hardware and software firms, dealing with producer-customer interfaces, but one can anticipate that like locomotive producers in the railway age, they are central in the generalisation of this new world while remaining marginal in the overall economy. Another possible parallel lies in the role communication infrastructures played in shaping previous economic revolutions, but with a redefined notion of such infrastructures. Again both the way to analyse such transformations, and their implications for innovation policy remain unclear.

C- There has been work on the shifting role of users in driving innovation (cf. Von Hippel plea for democratising innovation). They represent an entry point to a new phenomenon whereby in a knowledge-based society, the vast majority of users/consumers are themselves part of innovations processes in their work (or at least change processes). They have thus all the capabilities to apply it to their use practices. Akrich had already touched upon this in the 1990s. And it is fast developing in multiple directions that question us. Again here I select only a few developments that can be captured by simplifying keywords: (a) crowd sourcing, (b) political consumption and/or responsible innovation; (c) social innovation, (d) DIY and/or sharing economy.

There is no need to discuss the growing distance between consumers/citizens and the financial system. The emergence of a new type of actors for supporting the start-up ecology (venture capital but also business angels) was a frontrunner of this growing gap. The explosion of crowd funding which establishes a direct link between an entrepreneur and his/her project and funders, has the potential of an in-depth redefinition of 'mediating' professional activities in innovation processes, and of redefining deeply the role of representative bodies/ public authorities in the de facto support of innovative activities (especially for all that does not deal with 'concentrated' and 'oligopolised' innovation activities, These other activities representing today the core of employment creation).

The new approaches developed by patient associations for gathering resources in order to support research and clinical issues for numerous orphan diseases, is another expression of the growing direct involvement of citizens in shaping 'collective' priorities. This links with the ability of NGO to impose new normative rules to given world markets (from coffee to wood through fish or even palm oil) compared to the equivalent failure of all forms of inter-

governmental activities in such issues[3]. This is further reinforced by the naïve attempts developed by public authorities (e.g. the EC with its code for responsible nanotechnology R&D, Delemarle & Laredo, 2014). Such transformations thus question classical ways of 'market framing' both at the national and at the inter-governmental level (and in particular the functioning of 'international' structures and agencies).

We also witness more and more movements (and corresponding innovations) that push for local purchase (far away from the classical 'buy British' type of campaigns, and through a myriad of organisational innovations). This links with the emergence of new arrangements – mostly at the local level - that promote different relations between production and use, producers and users, where technology may be mobilised as a resource but is never the driving source. We tend to speak of social innovation to qualify this poorly known and delineated set of on-going transformations. They often represent new forms of local collective activities and question the ways in which public authorities intervene.

They finally connect with the fast rising movements associated to the rising 'Do it yourself' society that has a long history (cf. home maintenance and upgrading), but now aims to redefine borders between what users buy and what they produce themselves (cf. the fablab movement, 3D printing, psychodelic drugs, etc.). It is complemented with a new relationship between ownership and use, as is witnessed by the fast growing movement of sharing home, car, clothing or tools on Internet platforms, even (as explored during the Argentinian crisis) sharing competences. What does the growth of this sharing economy mean for the ways in which we embed innovation in society (as a permanent source for renewed and enlarged consumption)?

All these moves combined (and I have no ambition to be exhaustive) drive to renew completely our research agenda about innovation location (which firms for which activities) and about innovation dynamics (one could for instance hypothesize a growing role of 'soft sciences' in innovation processes). This is central if we want to give a chance for policies to support & shape (over than by chance) these multiple and probably massive structural changes we face.

5 – From mission-oriented R&D to societal challenges: continuities and lessons to learn

Mission oriented research has been central from the beginning in 'science' or 'research and development' policies, and forms of funding have gone well into development, industrialisation or operationalization for a long time. In the oldest documents produced by OECD about such policies, the idea was that all government departments require R&D efforts to address on-going and anticipated problems[4]. This is why the Piganiol report advocated for

[3] The reference is strong here with political consumption. The underlying assumption is that the classical mode - the 'moral' framings of markets by national preferences through democratic processes – no longer works since the majority of what customers buy come from other spaces where they have no say on the moral/social rules of production. Thus the only way to play is to use their consumption power and push for other than governmental normative framings of markets.

[4] One interesting and important case has been, beyond defence, how new technology challenges have been addressed in the post WWII period. Governments developed a new mission oriented type associated with international 'S&T power'. This drove to the developments observed on nuclear electricity, space and aeronautics with new institutions

centralised allocation of resources to R&D (so that pressures on department budgets do not start by cutting funds for the future) associated with decentralised implementation (in each department, education and fundamental research being one!). In a way, recognizing that we live in a 'knowledge based society' emphasises even more this requirement. For each 'department' or 'dimension of public action', debates remain quite similar over time: what is the list of issues (or as we say now societal challenges) that require Government intervention? What efforts should be done? And how: for a long time the debate was about developing specialised research institutions vs. developing funding programmes or agencies. The debate today seems more about the balance between funding potential suppliers or using more importantly procurement policies, each having pros and cons. Ways of addressing these questions have changed over time – being more open, more inclusive, moving from classical 'government models' to 'governance modes'…

All dimensions dealt with by sectoral departments (and all problems) are not equal. And this raises a number of questions. In particular should R&I policies be reactive to the shifting geostrategic environment and the renewed importance of 'security and defence' in political agendas? What would be the implications on priority setting and on ways to conduct R&I policies? Would it drive again towards centralised & bureaucratic modes of conduct?

Another possibility of a break from departmental approaches lies in the energy/sustainability transition. Colleagues like F. Geels and J. Schot argue that this requires radically different approaches and drives to consider in a proactive way recent developments on multilevel framing. Whether we speak of the depletion of liquid fossil fuels, factor 4 or the circular economy, we discuss radical shifts in the overall organisation of our societies. A recent limited exercise on the future of European R&I Policies and institutions[5] considered one scenario driven by the climate crisis. It highlighted the importance of changes that would take place. This scenario showed that potential 'innovation' policies had to be taken within generic governance rearrangements, that they would be inserted into more widely defined adaptation policies concerning all aspects of lifestyles, that we would witness, depending upon areas of adaptation, varied and differentiated balances between social and technical dimensions, that it entailed new types of R&I activities, new modes of experimenting and new forms of citizen involvement. Thus, considering the energy/sustainability transition as a central long term hypothesis drives to both an important transformation in our research agenda, but also in the modes and formats of activities to be undertaken (with all the questions raised about their visibility and insertion in present ways of demonstrating our professionality). However we should be attentive not to overestimate the political possibility of such a shift. We have now lived nearly one decade with this 'incantation' (policy speeches at all levels) and nothing has changed in national and international policies. I take from the multiple works presented at the 2015 EU SPRI conference one key observation by analysts, the central role of "place" and with it the critical role of local policies and authorities. Does it anticipate a large shift where issues

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and large programmes. They were critical since they represented up to half of total budgets in quite a number of countries. In some countries for simplification they were assimilated for a long time to defence needs. They have been poorly studied (apart form historians) beyond characterising them as 'militaro-industrial' complexes. Going deeper in their modes of organisations, in the ways in which they have mobilised multiple disciplines, competences & industries might be a rich source for better reflecting on how to organise large solution-based programmes (see for an illustration the recent work by J Aylen on the first UK nuclear bomb).

[5] VERA project, http://www.eravsions.eu

such as 'climate change' that require direct involvement of citizens (in transforming their practices) are better addressed locally, and that 'global' policies could be better seen as the global articulation of 'places' for exchanging solutions, allying bottom-up in developing jointly new socio-technical solutions? The time is clearly not yet ripe for 'normative stands' and advice to policymakers (said differently there is a long way to go still before we can think as J. Schot advocates for an "innovation policy 3.0").

6- who is the policymaker? Discussing spaces of deployment of innovation policies

Most of our discussions on innovation policies take for granted the country level as the implicit space in which such policies deploy. And the dominant paradigm, since the 1980s (but it was present before in the first OECD model), is the 'national system of innovation' framework. OECD country reviews are a powerful translation of this equivalence.
However we face two simultaneous and entangled movements:

- If we look at the literature, there are 10 times more articles on 'regional systems of innovation', and, in Europe, there is a long stream about the 'Europeanisation' of R&I activities and policies (cf. Edler & Kuhlmann). This has driven to more and more use of the adjective 'multi-level' to take into account the fact that, in any location, there is a superposition of the effects or constraints of policies enacted by multiple public authorities/Governments. The relations these different interventions entertain (in the ways they are built as in their effects on targeted audiences - synergy vs. competition to simplify) remain however poorly analysed.

- At the same time, policymaking processes have deeply evolved, from a mostly technocratic activity (public administrations being de facto focal in defining and implementing these 'specialised' policies) to the legislative sphere (the creation of 'parliamentary offices of technology assessment' being a marker of this progressive shift) and to 'policy arenas' (where stakeholders discuss and act on the definition of policies in the open, and no longer through 'advisory committees' to the executive or through lobbies). This move from Government to Governance is now widely recognised, but requires far more work about its effective working and the type of transformations it produces.

There is even a deeper questioning at least at European level about the in-depth significance for innovation policies of the two major trends we witness: one toward more importance to 'framework conditions' favouring innovation, and the other on 'proximity' supporting the concrete innovation processes. The former is more and more delegated at higher levels than national states, thus to at least the European level, and even beyond. The latter explains the explosion of clusters, poles & regional policies. The national-regional distinction is often blurred because the references of successful NSI that have been widely mobilised are mostly region-states (Finland, Switzerland, even Sweden) when compared to larger European countries. So what is the future of national innovation policies taken between framework conditions that are more and more defined (or harmonised) at the European level (especially when taxation will be included), and concrete spaces for individual innovation processes that are more and more local (or trans-local, between regions that are most often in different countries).

These movements deeply question our de facto assimilation of innovation policies with the national level. They also tell us that we can no longer see the other levels (both the EC and the

regions) as continuations of national states[6]. The role of 'place' and the articulations between politically legitimate spaces that all develop innovation policies are central research issues that the present developments of 'multi-level governance' have hardly addressed. This is a serious analytical question that probably requites far more field-grounded work rather than new conceptual frameworks.

7- to sum up

My attempt tells that we should not throw the baby with the bath waters. There are important old questions that still require attention and important analytical efforts as old policy framings probably require to be reconsidered. We are in need of better understanding of the variety of articulations between capacity building and academic research, the focus on research-intensive universities and academic excellence being far to capture this variety.

Similarly we have lived a 30 years trend of relative dis-investment in innovation for collective goods. However, I do not think we should start de novo, forgetting the lessons learnt during the times where 'mission-oriented R&D' was central to all 'science policies' of the time. We should also not forget that collective goods require first and foremost, in democratic countries, political will. And should this be the case, in particular about sustainability and climate change, that solution-focused innovation policies would be inserted into the overall handling of the 'societal challenge', meaning that the idea that they could be in the driving seat or be autonomous in their deployment does not seem plausible.

Finally this analysis strongly questions the focus (even fascination) of the last 30 years on manufacturing firms, as if public authorities could not do much more than 'framing' markets and pushing 'emerging technologies'. Innovating firms are in all sectors; they innovate not only through technology, but much more through novel interactions with uses. Furthermore we have numerous developments that drive to question the articulation between innovation and growth. Policies have also tended to oversee the vast structural transformations entailed by globalisation. In one word, policies are most questioned where they have invested most. And we have as academics a clear responsibility due to our inability to provide new frames of analyses capturing these structural transformations.

It leaves a last question, I am not sure that our present developments on 'multi-level governance' help us to learn more about 'who is the policymaker'. Policies require legitimate authorities to be finalised and implemented, whatever process followed for their definition. And this remains an open issue for me, may be the most important one.

[6] I could even complexify the picture by adding the difficulties faced by international organisations in their ability to develop worldwide agreements about key issues, as is clearly shown by the repeated failures in addressing the climate change challenge. This contrasts with the ability of civil society organisations to operationalize their objectives, think of sustainable trade on wood or sustainable fishing just to mention a few. Even foundations such as the BMG have become central players in addressing malaria with innovations that cover as much prevention than cures (vaccines).