Knowledge, innovation, social inclusion and their elusive articulation: when isolated policies are not enough.

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1.- Introduction: stating the issue of elusiveness

A recent work edited by UNICEF (2012)[3] proposes ways of conceptualizing children poverty and development policy that are particularly useful to devise policies for social inclusion. The data on poverty is appalling: "More than eight million children die each year (some 22,000 per day), and most of their deaths are preventable. Hunger, malnutrition and lack of safe drinking water contribute to at least half of child mortality" (Unicef, 2012: 1). But the text goes on: "Addressing child deprivations, however, must go beyond. (…) looking at the poor only is unlikely to bring major change. *The critical issue is to address inequality* (op.cit.:10, emphasis added). Social policies are a main tool for that aim, and the text advocates strongly to put social policies at the central stage. "Social policy, as a transformative instrument against poverty and inequality, must transcend its residual role of safety nets and engage with broad public policy issues of distribution, protection, production and reproduction" (op.cit.:15). How can social policies transcend the residual role of providing safety nets to which they are explicitly or tacitly pushed by so many development approaches? One possible answer is to push social policies into mainstream development efforts by transforming them in a strategic asset for other "transformative policies", able of affecting the whole development process. This can be done. In fact, through the renewed light shed by innovation policies stemming from the "demand-side" (OECD, 2011), the issue of social policies as a possible starting point for such innovation policies comes often into the fore. It is striking, though, the sort of invisibility that knowledge, science, technology and innovation have for many of those that fight against poverty and inequality. Taking as an example the text edited by Unicef just mentioned: not once the words science and innovation are mentioned; as for technology, is role is only seen related to business firms (SME), a rather indirect way of addressing issues like hunger, malnutrition and lack of safe drinking water. We guess that claiming centrality for social policies without empowering them through their alliance with other public policies will bear little effect.

On the other hand, those that have strong development policies concerns while putting as well a special emphasis on inequality, find it difficult to conceptualize social policies as something else than safety nets. In a recent work (2010) by the Economic Commission for Latin America and the Caribbean (ECLAC), specifically concerned with equality, innovation is mentioned several times, always in relation to production but never associated with concrete social problems. The need for Science, Technology and Innovation (STI) to be coordinated with other policies is mentioned, but social policies are not among them.

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[3] Child Poverty and Inequality: New Perspectives. Isabel Ortiz, Louise Moreira Daniels, Sólrún Engilbertsdóttir (Eds) United Nations Children's Fund (UNICEF), Division of Policy and Practice, New York 2012

social policies, STI policies are below their radar. For many of those that are centrally and directly concerned with development policies committed to achieve equality, STI policies and social policies belong to policy spaces with little connexion. Based on different reasons, in both approaches, STI policies remain relatively isolated from social policies, and the later find difficult to overcome their little structural impact. This supports the idea of the elusiveness of the articulation of STI policies and social policies. But what about knowledge and innovation efforts targeted to empower poor people and to reduce inequality? They have flourished in recent times under many different names; it is not clear if such efforts belong to the same family or if they have clear distinctive and differentiating features; it is not clear, either, if those efforts have reached the status of a public policy and, in any case, if they are somehow linked to social policies targeting similar populations. The paper explores these efforts in section 2 and, in section 3, proposes a way of taking them into account under the same framework. Section 4 puts forwards the need to associate innovation policies and social policies and, finally, Section 5 discusses a concrete experience aimed at building academic knowledge commanded directly by social concerns and social policies.

2.- Exploring the concepts around innovation and social inclusion

The inability of development efforts so far to reduce inequality and the perception that the rapid pace of technological change is fostering inequality rather than helping to reduce it have spurred a renewed concern around how knowledge and innovation can be related to development and, in particular, to "*development as freedom*" (Sen, 1999).

Reflection around the relationships between science and technology and social problems is not a new issue in the Latin American context. As early as in the 1960s and 1970s a number of intellectuals, such as Sabato and Botana (1968) and Amílcar Herrera (1973) questioned the poor relationship between the production of knowledge and social needs stemming from the local contexts. Their conceptualization remained politically ineffectual, though. When the disastrous social effects of the application of the Washington Consensus recipes became too evident, targeted social policies explicitly conceptualized as safety nets were admitted, but knowledge and innovation policies, as weak as ever, were justified exclusively in relation to economic growth.

India shows a totally different tradition of approaches aimed at meeting social needs of the most marginalized population through innovation; such approaches began to be an important tool in this pursuit after independence, especially between the 50s and 60s. A wide range of initiatives were executed, especially for the introduction of innovations in order to protect and improve the quality of life and well-being of farmers, landless rural workers and artisans. (Debish, 2012).

During the seventies, coming mainly from the North, two socially influential conceptualizations were proposed, intermediate and appropriate technologies; both posit that innovation can be seen as something different than efforts to meet the market demands of the well-off. They were part of a broader movement against "the imperialism of Western technology" expressed mainly through Foreign Direct Investment (FDI) from and Multinational Corporations (MNCs) in developing countries. Concepts as de-linking and self-reliance where associated with technology policy, because foreign technology was seen as inadequate regarding local capabilities and price of factors. At that time, questions as the following were put forwards: what is more important, having access to the latest technology or opening room for local learning and innovation?; how can a country warrants its learning from foreign technology if it does not require adequate technology transfer and information disclosure?; why should a country open its internal market to technology or knowledge intensive MNCs without having the right to build upon that technology or knowledge its own industries? These last questions have been almost banned from open discussion through the action of the World Trade Organization. The appropriate and intermediate technologies have lost part of its original appeal given the process of miniaturization of some key high-technologies, both in physical

size and in prices, particularly well exemplified by ICTs. Who can nowadays say, for instance, that mobile phone technologies, in general, are not "appropriate"? Studies like those of Foster and Heeks (2013) show that mobile phone technologies may have quite positive effects on people living in harsh conditions, if some important requisites are fulfilled.

It can be posited that something new is happening in the way the relationship between Science, Technology and Innovation (STI) and social inclusion is currently conceptualized. In recent years, several studies, not only from academia but also from international organizations (UNDP, 2001; ECLAC, 2010; WB, 2010; IDRC, 2012), have put forward -although from quite diverse standpoints- the question around how STI can contribute to improving the living conditions of marginalized populations. The essence of what can be dubbed new is twofold: (i) the direct relationship between research and innovation and issues concerning social inclusion and/or (ii) the direct participation in the innovation process, in a way or another, of those whose needs will be fulfilled by the innovation. Perhaps only those who look at the poor mainly as potential consumers of a market fitted to their condition through specific innovations may disregard or overlook the former standpoints.

The current and hegemonic conceptualizations around how research and innovation impacts on social inclusion, mainly the trickle-down effect of economic development, are being challenged by the new approaches. Economic development is as important as ever, particularly so if it is linked to more formal and quality work, but it is not enough: it is an enabler, not a promise.

On the other hand, these new approaches, as some "old" ones, are less confident on the role of the market as an innovation driver. The Sussex Manifesto, for instance, posited that: "… the 'need' for science and technology in the developing countries is unlikely to take the form of a commercial demand coming from individual producers." (Singer et al, 1970: 20). If commercial demand will not be the driver of a rational use of science and technology in developing countries, it is indeed a complex challenge to link innovation to social inclusion. Moreover, it could be put forwards, at least as a hypothesis, that if market demand mechanisms are problematic, policy should come to the forefront.

Coming back to our assumption that direct links between innovation and social inclusion and direct involvement of the innovation would-be users are points in common among the new approaches, we can take some definitions -"pro-poor innovation", "frugal innovation", "inclusive innovation", "grass-root innovation", to see if our assumption stands.

Starting with pro-poor innovations, the definition provided by Berdagué (2005:15) of a pro-poor innovation system, focused on rural poor, is as follows: "... a multi-stakeholder social learning process, that generates and puts to use new knowledge and which expands the capabilities and opportunities of the poor." Berdagué put particular emphasis on the "process" part of this definition "...it is the social process of learning, discovery and utilization that is mainly responsible for the effective and sustainable (i.e., beyond the project) expansion of the capabilities and opportunities of the poor." (op.cit.:9) However, he highlights as well the huge pro-poor effects of some results, even without the direct participation of the future users, like some human vaccines, polio, for instance. In any case, it is clear that pro-poor innovations are intentionally such, so direct relationships are there.

Frugal innovation is a quite appealing denomination, particularly so in view of the effects on climate change of unlashed consumerism. Its characterization is as follows: "Frugal innovation is distinctive in its means and its ends... (It) responds to limitations in resources, whether financial, material or institutional, and using a range of methods, turns these constraints into an advantage. Through minimising the use of resources in development, production and delivery, or by leveraging them in new ways, frugal innovation results in dramatically lower–cost products and services. (...).

Often, but not always, frugal innovations have an explicitly social mission." (Bound and Thorton, 2012: 6). This is quite an "engineering" definition, and from a social inclusion standpoint it is clear that once a constrain for social inclusion is identified, most probably only a frugal innovation will be able to challenge it. When Srinivas and Sutz (2008) proposed the concept "capacity to innovate in scarcity conditions", where scarcity stems from various sources and not only from not being able to pay, such capacity could have been rephrased as capacity to perform frugal innovations. When the Cuban chemist Vérez-Bencomo spent fifteen years searching for a synthetic vaccine against the Influenza type b because the biological vaccine that have eradicated the illness in the developed world was impossible to pay, he did so as the only alternative he had in front of him: he performed a frugal innovation. Direct relationships between research and innovation and social inclusion are clearly present in this example, even though not necessarily the direct involvement of the users in the design. However, the users participation came in a later stage, when clinical trials required that parents of babies under two months volunteered, and they did, reassured by the trust in the public health system.

"Grassroot innovation" is quite a difficult to grasp concept. In actual UK it is defined as "community-led solutions for sustainability": its main traits are (i) being started by communities and (ii) being involved in different kinds of sustainability issues. In China, grassroot innovation is understood as "innovation made by individual folks". In a beautiful phrase, it is characterized as "a flash in the common people and embodiment of their wisdom" (Hua et al, 2011:1). Common people as the opposite of the elite, folks as opposite to government, just the wisdom of such people put at work to try to solve their problems. Other characterizations add some new features, for instance being bottom-up, spontaneous and interest driven, advancing gradually starting from direct experience, being practical and low cost (Aravind, G. n/d) . The issue of "spontaneous" is worth recalling, because it gives the idea of out of any planning process, just an answer from a challenge. Perhaps this not so often mentioned feature of grassroot innovations (if it is correct) could partly explain the difficulty for scaling-up that this type of innovation is reported to face.

The following characterization, referred in this case to India, is also telling: "The term grassroot refers to individual innovators, who often undertake innovative efforts to solve localised problems, and generally work outside the realm of formal organisations like business firms or research institutes." (Bhaduri and Kumar, 2009: 4). As it has been point out in the Indian context, the social valuation of grassroot innovation goes back to deep national identity issues. In a sense, the concept echoes the Gandhian philosophy of technology and social development by the common people: "... grassroot innovations, (iii) represents a complex set of socio-political and economic aspiration of people, who normally bank on their skills and practical experience, rather than formal body of technical knowledge, to carry out technological activities" (Bhaduri and Kumar, 2009:6). Direct relations are embedded in all these ways of visualizing grassroot innovation.

Finally, let's take "inclusive innovations". The World Bank (WB) makes no differentiation between por-poor innovation and inclusive innovations. Its approach "...focuses on how 'inclusive innovation'—policies that promote innovation for the poor and by the poor—can help improve the productivity and livelihood of those who operate mostly in the informal economy" (WB, 2010:359). The WB warns that top-down strategies have failed in the past, and that inclusive innovation policies "...mandates the involvement of the poor in identifying their development priorities and in providing incentives for various actors to serve their needs more effectively" (op.cit:338) In the Uruguayan experience to which we will refer later, inclusive innovation is seen as an orienting goal for research and innovation agendas. Direct relations are built-in the concept, because it is posited that the might of knowledge cannot be well matched to social needs unless such needs go directly into the working agendas of researchers and innovators with its questions, problems and challenges. However, such direct links are not something that goes without saying like in the case of grassroot innovation, where innovation is performed by individual folks aiming at their immediate needs; on

the contrary, mediation processes must be performed, the first of which is the process of identifying needs where new approaches to knowledge are required to meet that needs.

Even from this preliminary exploration the diversity of the theoretical frameworks and even the ideological visions involved in the emergence of new ways of framing the relationships between knowledge, innovation and social inclusion clearly appears. Such diversity has been accompanied by a sort of conceptual ambiguity. Similar terms to refer to different meanings and divergences among diverse theoretical approaches are common, showing eloquently that the issue is in a building stage (Arocena & Sutz, 2010; Iizuka & SadreGhazi, 2012).

3.- Selecting features to compare approaches

In the paper by Iizuka & SadreGhazi, 2012, comparisons between the different approaches linking innovation and social needs were made. It is interesting to recall the dimensions that organized the comparison, such as: who are the poor, which are the main type of innovations, how are the poor seen from the approach's standpoint (innovators, consumers, users), is profit a motive to search for innovation, through which canals does innovation diminish poverty, how are knowledge and capabilities building for the poor.

From a slightly different perspective, we present a comparison between some structuring characteristics of the approaches we have mentioned earlier, utilizing other features. We first proceed to present the contrasting features -Mode A and Mode B- and then we propose which approach fit better with each Mode. We know that much more theoretical work needs to be done to justify (i) the use of the term "mode", which has a particular history in innovation thinking, especially in the "Aalborg school" (Jensen et al, 2007) and (ii) a two branches taxonomy that aims at giving account of the most salient features of the prevailing conceptualization and practices of innovation for social inclusion. This is just an exploratory proposal, stemming from the characterizations made in the previous section.

	Mode A	**Mode B**
Origin	Planned	Spontaneous
Knowledge inputs	Multi-stakeholders in knowledge terms (including academic knowledge)	Single-stakeholders in knowledge terms (folk knowledge and wisdom)
Starting actors	Multidirectional	Bottom-up
Starting point and following steps	Theory Action- oriented policy Institutional learning Eventually successful experiences	Successful (in any sense) experiences Observed Explained Eventually theorized
Search for coordination with other actors	Constitutive systemic approaches Particular willingness to relate to the NSI	Relatively self-contained Protection of ongoing experiences from eventual de-empowerment by external forces

Roughly speaking, Mode A fits better with "inclusive innovation", while Mode B fits better with "grassroot innovation", while "frugal innovation" can fit either with Mode A or Mode B. There are

other features that do not fit so clearly with one type or another of innovations devoted to social inclusion: goals directly or not directly connected with money earning. Money earning goals, be it for individuals or for communities, are usually related to better insertion in markets, rise in productivity and consolidation of formalized working structures. Non monetary goals, mainly for communities or sectors of the population, take often the form of public goods, and are related, for instance, to health and environment as well as citizen empowerment. Of course, even if innovation is directed to provide goods able to better fulfil social needs, the concrete provision of such goods may need to be mediated by commercial production and, eventually, diffused through market mechanisms.

We would like to present a "situation" to be afterwards analyzed in the light of "modes of innovation for social inclusion". People that living to classifying garbage in Uruguay belong to the poorest part of the population; some of these people are not "new poor" but even third generation in the craft. The quality of life of such classifiers and their families is generally quite problematic, not only given their habitat conditions, but because garbage classifying is done near the house, participating in the task the whole family, including the often many children that these poor families have. Dignifying working conditions implies separating garbage accumulation and classification from the family space, but this is not possible for individual classifiers, and so cooperative organization starts. But becoming a cooperative implies a totally new set of rules, and it often entails earning much less in comparison to the former situation. So the challenge is how to devise a strategy for becoming a cooperative and at the same time assuring economic sustainability. The problem was taken by a university research team[4] that had worked for several years with the trade-union organization of garbage classifiers, who are informal in economic terms but not in "collective action" terms. The team, in close contact with the cooperative devised a strategy, including aspects like training as well as a careful study of the value chain in which the classifiers are inserted. One of the results was the identification of a plastic compacter machine that gave monopoly purchasing power to the buyers of the plastic part of the garbage, which pay very little for it. If the cooperative could semi-industrialize the plastic, it would free itself from the imposition of prizes from the purchasers. For this to be possible the machine should be reinvented, given that its market prize is unaffordable for the classifiers. In this way a new "knowledge demand" is identified and the research and innovative process continues. This is a planned process of innovation, with multiple knowledge stakeholders, started by the convergence of three actors (a university program to foster research and innovation for social inclusion, the former work of the cooperative studies group in the university extension team and the classifiers organized in the cooperative), its starting point cannot be fixed clearly, but it can be posited that at least it received the stimulus given by the program, in which case the theoretical and programmatic roots of the program may count as a starting point. Finally, it is entrenched with other actors, from the Municipality to the Ministry of Social Affairs. It can be described as aiming at a monetary goal and at citizen empowerment. We can associate then this "situation" with a Mode A of innovation for social inclusion with a primary monetary goal (citizen empowerment is here a means to an end more than an end in itself).

The former "exercise" tried to associate a "situation" of social exclusion to a "mode" of knowledge and innovation for social inclusion pointing to solve it. Would it be possible to generalize this exercise, so each possible experience could be associated to a mode of innovation for social inclusion? This would be useful, given that: (i) we face a "Babel Tower" of names that link innovation and social inclusion and (ii) innovations for social inclusion target quite different aims.

We propose the following table as a tool for diminishing the level of entropy in the field by providing a way of classifying diverse experiences of innovation for social inclusion along a

[4] Project: Classifiers of solid urban waste: from the precarious inclusion to the construction of a new waste management model. Cooperative Studies Unit (Universidad de la República). Research team: G. Srachu, M. Fry, M. Sanguinetti, L. Musto, F. Texeira, L. Elizalde, S. Berazategui.

common framework:

Experience description	**Modes of innovation for social inclusion**			**Main aims of the experiences**						
	Mode A	Mode B	Hybrid *	Increase work productivity	Empower citizenry	Improve everyday life	Provide a public good	Open a new productive field	Improve socio-productive organization	Increase earnings

Surely the aims are too narrowly listed, but this can be seen as a model to be improved, be it by adding aims or/and by sub-dividing some aims in more focused ones. Of course, more than one aim can be ticked for a given experience. "Hybrid" refers to experiences where some features of Mode A and of Mode B coexist; the * indicates that if an experience is ticked there an explanation should be provided.

4.- The need to interrelate innovation policies and social policies to enhance social inclusion

As we have already mentioned, it has been long acknowledged that the use of science and technology in developing countries will probably be weakly backed by market demand. The reasons that have been put forwards around forty years ago to explain this trend continue to be valid today. (Arocena and Sutz, 2010b) Given the dominant discourse, linking STI almost exclusively to economic growth and productivity raises, when in a given society such benefits come mainly from foreign countries, the local capacities tend to become rather invisible for people in general and for policy makers in particular, and a legitimacy challenge appears.

Some approaches, like ECLAC's, rightly insists that the productive structure of developing countries needs to change and that for that STI are of paramount importance. The fact is, however, that besides the "continent countries", China and India, the productive structure is transforming quite slowly in those countries, and in some cases it is even going backwards, towards being less knowledge intensive. The legitimacy challenge is hard to face in these conditions, without a national powerful source of demand for knowledge and innovation. Such a source can be provided by policies that have achieved important legitimacy in the last twenty years, under which umbrella endogenous STI capabilities may be allowed to show how valuable they are: social policies. But we face here well known difficulties: if social policies are mainly conceptualized as monetary transfer policies, aiming at the augmentation of private consumption -which importance is undeniable- little influence can they have in mobilizing STI capabilities. So, we have three types of policies, knowledge and innovation policies, economic and productive policies and social policies, relatively isolated one from the other. The consequences are that neither economic and productive policies nor social policies demand STI, and so the structural weakness of STI policies continues in a sort of vicious circle hard to break.

STI capabilities are enablers to problem-solving: the issue is where to start moving them. We posit that an efficient starting point would be to mobilize the knowledge and innovation demand derived from the aim to expand social inclusion, directly, systematically and in every possible dimension. This implies including the questions, problems and challenges stemming from social exclusion into the policy agenda of knowledge and innovation policies at all possible levels, from national policies to university policies. It implies, as well, that social policies in all possible places, like health, habitat, education, law, formulate its challenges in terms that allow action for knowledge and innovation. To give a simple example: if a social policy is unable to reach its goals because it implies providing a service that is too expensive (for instance, assuring that some devices are accessible in public hospitals) it can request more money to buy the expensive device or it can rise the problem to the knowledge and innovation national policy. If the latter is done in a systematic

way, there will be no lack of demand for STI capabilities, some solutions implying important demonstration effects would perhaps be achieved, legitimacy for STI can grow stronger and a virtuous circle of more demand and better answers can start, where more and more complex problems of social inclusion may be included in research and innovation working agendas.

Here is when innovation for social inclusion enters the scene to allow hope that this, even with its strong flavour of utopia, can be achieved. Innovation for social inclusion is not any more a strange arranges of words: it is a quite vibrant field of reflection and of action. We agree with the Steps Manifesto when it asserts: "In short, we need a new politics of innovation. This is not about being 'pro' or 'anti' science or technology, but about addressing real questions of choice: 'which science?', 'what technology? 'and, especially, 'whose innovation?' and 'what kinds of change? In other words, we need to foster more diverse and far more fairly distributed forms of – and directions for – innovation, towards greater social justice." (STEP, 2010: 2-3) But we say as well that we need new ways of knitting innovation politics with social concerns. A modest exercise in this direction is presented in the next and last section of this paper.

Coming back to the "modes" of innovation for social inclusion, it would be futile and counterproductive to aim at pushing any of them into the other: they are different and rightly so. But they could be put together in a sort of virtuous feed-back: grassroot innovation may feed the work of those searching for inclusive and frugal innovations with new demands as well as with solving strategies; the latter may help grassroot innovation to eventually scale-up, gain in efficiency or whatever other attributes the first innovators may want to add. People will learn to co-produce, in Ostrom's terms: "...co-production (is) the process through which inputs used to produce a good or service are contributed by individuals who are not "in" the same organization" (Ostrom 1996):1073). At some point, common work may become the rule. But this will only occur if isolated/specialized ways of looking into these issues give way to more holistic and combined approaches.

5.- Focusing on the perspective: experiences of the Uruguayan case on the generation of knowledge and innovation oriented to social inclusion

In recent years, Uruguay has experienced several changes in the orientation of public policies, such as the diversification of social policies and the new STI policy. However, even if these policies share the objective of contributing to social inclusion, they are not related; the process of changes has followed parallel paths characterized by the lack of dialogue.

In 2010, Uruguay approved the first STI National Strategic Plan (PENCTI), in which the importance of contributing to social inclusion was recognized. This was quite difficult to implement, though, given that the organization of the STI policy was in the hands of a Ministerial Cabinet with an almost exclusive bias towards productive issues, not including interlocutors from ministries or government agencies that try to solve key demands for social inclusion. This shows the persistence of divides between social and STI policies, and between social and productive policies (Arocena et al., 2010a). On the other hand, the design of social policies fails completely at capitalizing the capabilities of the STI policies to deliver possible solutions to tackle social problems. With the implementation of the new Social Development Ministry -MIDES-, the generation of knowledge was vigorously demanded and diverse types of agreements were made between the Ministry and the Public University. However, dialogue is often limited and skewed towards the social sciences.

We can refer to a social policy that is actually being designed to illustrate the point. The new policy on dependent care, National Care System (NCS), reached the level of a social policy promoted by the MIDES in 2008. Three years later, the NCS was in a primary stage of debate and discussion

with the actors involved. Politicians, governmental technicians and social organizations on behalf of the users participated in this debate. Researchers, especially from the social sciences participated as well, for example from economics, sociology, social work and psychology. Many of these disciplines have made substantial contributions to visualize the care problem and its consequences. But, how can the other disciplines contribute? What can engineers say about this issue from their expertise? What can medical technology or health sciences contribute to the solution of the care problem? The mismatch could be in the conception of what a social problem is and who can help fighting it. If we face a complex problem and this is not approached from a cognitive diversity, the solutions to it will probably fail to give an innovative step further.

Perceiving this mismatch as negative for social well-being is based on the assertion that STI is a key element -combined with others- for reversing social exclusion problems. As we have argued above, a strategic approach would be to conceive that social problems are not resolved exclusively in the sphere of social policy action. As it is recognized in the case of health problems by the Council on Health Research for Development (COHRED), health "cannot be solved in the health sector alone": the development of science and technology, and technical and social innovation in health are multi-sector activities which must address economic and social development goals together.

To bridge the gap between STI results and social inclusion the University of the Republic in Uruguay has implemented a strategy to directly link social problems with University STI activities in dialogue with social policies. The main strategy is the implementation of a competitive call for research projects: the program "Research and Innovation oriented towards social inclusion". The program had its first antecedent in 2003 in the middle of a large economic and social crisis. At that time the University decided to redirect some of its scarce funding for R&D into a program that prioritized problems stemming from the social emergency context. Since then the program has undergone several changes based on experience and assessment of programs results. In the successive calls no program was identical to the previous in terms of requirements, showing clearly the complexity involved in designing an incentive policy in this direction. Today the overall program structure can be understood within the analytical framework suggested above as the Mode A, which is outlined in the table below.

	Mode A	**Research and Innovation oriented towards social inclusion program**
Origin	Planned	Planning and direction process derived from a systematic incentive policy.
Knowledge inputs	Multi-stakeholders in knowledge terms (including academic knowledge)	Calls for contributions from all disciplines of knowledge, technical, managers, entrepreneurs, policy makers and actors directly related with the problems
Initiators	Multidirectional	The initial proponents can be any of the mentioned actors encouraging the integration of the others
Starting point and following steps	Theory, action- oriented policy, institutional learning, eventually successful experiences	The program started from a mixture between theory (the characteristics of knowledge production and innovation in the South) and action-oriented policy, sustained in the idea of "developmental universities"; it was followed by reflexive assessment of the program with quite a lot of institutional learning; some success experiences were achieved.
Search for coordination with other actors	Constitutive Systemic approaches Particular willingness to relate to the NSI	Bridges among stakeholders and prioritized social demands we built. Spaces for dialogues and the articulation of the actors who potentially can collaborate to solve the problem are permanently searched.

The orientation of the program's changes has been towards strengthening some complex dimensions arising from the relationship among knowledge, innovation and social inclusion. We will go into some depth in three of them.

(i). Social demand side

One of the bottlenecks faced by the program is at the level of social demands for knowledge and innovation which makes difficult to establish a priority-setting process. The weak demand for knowledge is not a new issue for the innovations studies especially in the case of developing countries. However, in this case several complex factors are added compared to how the issue is addressed classically as market or consumer demands. Firstly, we have the complexity derived from the generality of the category "social demands", that is, demands involving social inclusion problems. For this, Sen's approach on social exclusion and capacity building provides a particularly useful framework. (Sen, 2000) This approach allows locating the problems of social exclusion as multidimensional phenomena that are not limited to income poverty and where the capabilities deprivation are considered in their constitutive and instrumental character. The program has been aimed at facing both types of exclusion problems: constitutive exclusion problems come mainly from the health sector, while an instrumental exclusion problem comes from housing, information, and education. Secondly, we have the complexity associated with identify the actors involved in a social demand and how their demands can be accessed. For a social problem to meet with the knowledge that could help to solve it, the first precondition is that this problem becomes visible as a demand. And for make this travel -from recognizing a necessity to transform it in a problem and then in a public demand- certain agency capacity is required. Many times the individuals who suffer themselves the problem do not have the tools to transform necessity into problem and make it visible in demands. To address this complexity the program has tried several strategies, moving from a global definition of social exclusion and non-prioritization of issues to a prioritization that explicitly search for social demands with actors involved at micro, meso and macro level.

(ii). Translation and mediation of the demands: tailors are needed.

After complying with the requirements of demands collection, the program faces two new challenges. The first is the translation of demands into research problems. Acknowledging the complexity of this process and its highly localized[5] nature, the program introduced some flexibility in its structure, compared with more traditional research programs, and enabled the funding of the preliminary stages of research projects, i.e. the stage of collection of social demands and their translation into research problems.

As noted by Alzugaray et al (2012), in the program's history some projects have completed successfully the process from identification of a social inclusion problem until a solution was reached and implemented; however, most of the projects have difficulties in this last stage. Thus, another challenge lies in seeking mediations with the actors and institutions that could contribute to solve the problem by implementing the solution found at the research stage. This is a cross-cutting strategy to the whole process, particularly so because several critical points are located after a successful research outcome is achieved, for example scaling, dissemination and adoption. It seems too much to ask researchers themselves to ensure the mediation process; it is also too much for the University working in isolation. The solution of these problems may lie in the idea of "technological tailors", whose main attribute is to have the ability to connect "an opportunity with a need" and tailor the solution for those facing the need (Arocena and Sutz, 2003). This means that they are able to: understand the demand, translate it into a research problem, seek research agendas and skills to solve it, mobilize and coordinate the linkages so that results can be disseminated and adopted. Probably there are few individuals or groups, if any, who have these attributes and are able by themselves to mobilize the articulation of a whole system. We want to argue that if the goal is to

[5] The term located here has at least two meanings: i. The localized nature of the demands in the territory and the importance of contextual definition ii. The need to locate the demand within the knowledge that can translate it into research problem and contribute to their solution.

guide the production of STI towards social inclusion, and support these initiatives beyond individual will and capacities, then the role of mediator or tailor should be promoted by social policies in coordination with the policies of STI, reaching a systemic vision.

(iii). The challenge of legitimacy: overcoming isolated efforts

In the previous sections it was argued that the legitimization of STI policies in developing countries needs the strengthening of the domestic demand for knowledge and innovation: in our vision this can be promoted in partnership with social policies. This idea has guided the reflection about the program in terms of building the necessary legitimacy of the approach and of extending its reach to provide for its long-term sustainability. A big obstacle for these aims comes from the mismatch between STI and social policies at the national level, resulting in the construction of compartmentalized problems: silos for social problems, silos for technological problems, silos for knowledge problems.

One of the assumptions underlying the program is that research agendas can be partially reoriented to capture demands for social inclusion, and contribute to their solution by creating new knowledge, or adapting it to new needs. While this has been demonstrated in the short history of the program through the active participation of several researchers, the logic is not yet widespread due, among other things, to the contradictory signals emitted by the research system, a big challenge indeed. The reason is related with the legitimacy in terms of what kinds of knowledge generation are promoted, related to an assertion that Bacon made in the early stage of modern science*:* nothing that is not recognized and rewarded will flourish in science (Francis Bacon, in: Merton, [1960]1973). This is not a trivial issue for many researchers working on social inclusion problems, especially when coordination with stakeholders are required, given that this implies additional efforts which results may not fit well with to those promoted by the traditional mechanisms of incentives and rewards in the academic realm.

In this sense, the efforts of the program need to be backed and legitimized by more comprehensive evaluation mechanisms at the national level, where the generation of knowledge should be assessed not exclusively in terms of publications in high-impact journals but also in terms of the processes and inputs that contribute to solve social inclusion problems.

To summarize, it is worth mentioning that probably the approaches to innovation for social inclusion analyzed in this paper share the aim of building, step by step, inclusive national systems of innovation. We hope to have been persuasive in stating that for that, better linkages between STI and social policy are paramount. The experience gathered along the design, implementation and reflexive assessment of the program "Research and innovation for social inclusion" provides some insights for advancing along that path.

1.- Social policies may be a fundamental source of visibility, construction and prioritization of social demands which require STI activities for their solution: this is a role to be pushed forwards.

2.- Isolated efforts will lead to isolated experiences. Integrating systematically STI efforts to social inclusion as part of social policies will need "mediators", or "technology tailors", to ensure coordination among the many actors involved in these processes. ¿How can they be trained?

3.- A radical redesign of the academic system of incentives able to legitimize research agendas directed to the solution of social inclusion problems is needed. Movements in this direction are in the air.

4.- Someone has to help research results to go through the door of those in need for solutions. Technology governmental purchasing is an old and powerful innovation policy tool. If directed towards the problems that affect social inclusion it could generate more fluid interactions between different actors, in particular by encouraging the participation of enterprises (Alzugaray et al, 2012).

Every one of these lines of action is attainable. We hope to learn with others how to put them forwards.

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