

**Title**

Emerging Spaces and Governance  
A position paper for EU-SPRI

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## 1. Introduction

There are interesting STI Policy phenomena that are characterized as ‘spaces’, with the European Research Area as a prime example, and there are policy instruments related to the structuring of spaces rather than directly to knowledge production, organisations, or institutions, like the creation of European Technology Platforms. Actually, a language has emerged which refers to spaces in the metonymic expressions that are used, as when “round table” is used to indicate a multi-stakeholder dialogue, or when “platform” refers to a grouping of actors deliberating and pushing an idea or a domain or system. This is a prima facie reason to consider ‘spaces’ as a topic for STI Policy studies: we need to understand what is going on. However, in this position paper we want to make a further step and argue that ‘spaces’ are an opportunity for STI Policy studies by considering it as a topic in its own right, to be studied in depth, so as to improve present policies and suggest new approaches.

We are not limited to cases where the term ‘space’ is used explicitly, or implied metonymically. We are interested in the dynamics of spaces in STI Policy, and how understanding of such dynamics helps to design better policies and policy approaches. An example of such dynamics is the opening up of the European Union’s Framework Program to stronger industry participation since the 1980s, starting with the BRITE and ESPRIT Programs, which was characterized as the creation of a European-level transnational space together with the dedicated spaces for interaction and collaboration constituted by the various projects in these Programs. Kohler-Koch and Edler (1998) show how a small band of industrialists and scientists, together with some EC staff, created openings for such an approach and were actively persuading actors that they should participate in the Programs. After the first few years, and the appreciation of the new kinds of interactions and the products these led to, this approach for the Framework Program stabilized as the accepted way.

There are other examples like the present prevalence of forums of various kinds offering space for exchange and anticipatory coordination, with European Technology Platforms as a clear instance. Sometimes, bridging boundaries between science and society are the goal, as in the UK BBSRC Bioscience for Society Strategy Panel, and in open-ended but forceful discussion of important challenges, as in the French Grenelle de l’Environnement.

In these examples there are initiators who propose spaces, define them, and try to create them and get them working. Since spaces have to be created in existing orders, force fields and their dynamics have to be taken into account by these STI policy entrepreneurs, because outcomes will be co-determined by these dynamics. Phrased in this way, it is clear that we are considering a general policy problem. Thus, STI policy, whether about spaces or more generally, might learn from recent policy analysis, and from analysis in terms of arenas (as these occur) and interorganisational fields – to name just two examples.

Still, there is something specific as well: science and technology developments introduce (and are expected to introduce) new possibilities (“novelties”) with which existing orders have to come to terms. These developments create indeterminacies because the novelties are open-ended, surrounded by promises as well as (in some cases) concerns. Further exploration occurs, as well as attempts to reduce indeterminacies and create “going concerns”.<sup>1</sup> Again, this is a general challenge, but in STI policy and practice, spaces emerge and/or are intentionally created to address articulation of possibilities and reduction of indeterminacies for an STI domain, rather than for particular projects. To capture these dynamics, we do not start with policy entrepreneurs envisaging and creating spaces, but with emerging openings in existing orders, which are further articulated and turned into spaces. Many actors play a role, not just the policy entrepreneurs.



*Daisuke Hiraiwa (2009), Skin of*

### *Spaces 02*

Emerging and indeterminate openings turn into spaces which are characterized by:

- Spatiality in the sense of space to move about in (a social as well as a material space)
- Boundedness because of reference to boundaries
- Internal arrangements which depend also on the conditions for the space to survive in the wider world

The additional key point is about the dynamics of turning an indeterminate opening into a space, and its further institutionalisation which may introduce constraints on further development.

Given our conceptualisation of spaces (we will develop and support it in Section 2), the question arises how different it is from other, related social-science concepts. ‘Space’ differs from ‘network’ in its reference to boundaries (weak or strong). It differs from ‘advocacy coalition’ in that it creates affordances rather than is organized to push an issue. ‘Arena’ and ‘agora’ appear to be versions of ‘space’ addressing particular kinds of interaction (struggles and deliberation, respectively). An overview is given in Table 1.

Table 1. Social-science concepts related to ‘space’

<i>Term/concept (different elaborations)</i>	<i>Some key characteristics</i>	<i>Some key authors</i>
Social field; interorganisational field	Forces, constraints, mutual dependencies	Bourdieu; Powell
Arena (social; political)	Conflicts, definitional struggles	Strauss, Clarke, Hilgartner; Benz, Joly
Agora, spaces for assembly	Deliberation and inquiry b	Nowotny et al, Dewey
Social world	Organized around key practices	Becker
Contact zones, trading zones	Interactions between different worlds	Hart, Galison
Social network; Actor-	Density, betweenness,	Burt, Powell; Callon

<sup>1</sup> This is similar to the influential discussion, in March (1991), of exploration versus exploitation as strategic choices about innovation in an organization.

Network	extension; alignment, punctualization	
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We will discuss basic considerations in Section 2, and then proceed, in section 3, to present and evaluate existing STI policies and practices that build on spaces and their dynamics. This then allows us to make two further steps: first, to identify the added value of an approach in terms of spaces, and second, to outline new approaches to STI policies and practices (section 4). We will conclude in section 5 with a brief agenda for further work in STI policy studies.

## 2. Basic considerations

There are good reasons to push the approach of ‘spaces’, but before we elaborate this idea, a methodological consideration is in order. What are we doing? We have examples of what might well be an interesting and important phenomenon, and tentatively capture the phenomenon by ‘naming’ it (in the sense of Donald Schön’s analysis of how reflective practitioners create knowledge), and naming it ‘spaces’ (in the plural). Thus, we create an analytical category that can be explored further. The name (or label) ‘spaces’ has its own connotations, and we develop the specific connotations below. Here, the methodological point is that the move from interesting phenomena to a new analytical category is an iterative learning process. We have to find out what the analytical category can usefully be, and what sort of phenomena it directs attention to.

The learning process of the analyst has three components:

- Tentatively articulating and characterizing ‘spaces’ as an analytical category.
- Comparing and contrasting it with existing concepts, to see what the added value might be.
- Considering further interesting phenomena and checking whether they fall under the analytical category.

The result will be a more or less stabilized analytical category, not necessarily with a strict definition, but covering instances that have “elective affinity” (*Wahlverwandschaften*). Such a category can then usefully be applied to understand the present and future role of spaces as an approach in STI policy. Of course, there is a risk of reifying the analytical category (the fallacy of misplaced concreteness), applying it without checking its adequacy. Even so, there is at least a heuristic value in developing the analytical category as such.

A key point is that spaces are not pre-given, but emerging. There will be openings, sometimes created intentionally. Ensuing interactions articulate affordances and boundaries, i.e. a ‘space’ in the sense we are using the term. Further institutionalization can occur with attendant standardization and thus some closing. Or the emerging space may disappear, be discontinued, or opened up to further shifts. In other words, ‘spaces’ is not just a category, but also indicates certain dynamics. Understanding of these dynamics allows better use of spaces, up to designing them for policy purposes. In that sense, one can speak of an approach to STI policy in terms of spaces.

After these preliminary considerations, we are in a position to discuss spaces more systematically. In line with our methodological remarks, this discussion should be seen as a report on how far we as analysts have come in the learning process, rather than as the definitive word on ‘spaces’. Having made this proviso, we do claim that we are able to capture the interest of the phenomenon of spaces so that it can be mobilized to discuss STI policy and an agenda for STI policy studies.

We can specify three essential characteristics of spaces:

(1) Spatiality in the sense of space to move about in. It is a social space (of affordances) but with material and geographical features (materiality and location are an integral element of spaces, cf. also Lefebvre 1991)). Spaces allow room for new deliberations and experimenting, but also set accessibility conditions (an “entry ticket”) – cf. characteristic (2).

(2) Boundedness in the sense of reference to boundaries, and thus to an inside in contrast with an outside, even when the boundaries are always porous and more or less diffuse. The emergence of a space starts with attempts to identify and stipulate boundaries which demarcate (between inside and outside) but also have implications for what is to be done within these boundaries.

There is a contrast between localized (and often dedicated) spaces and diffuse spaces. An example of the former is the UK Bioscience for Society Strategy Panel (Alan Irwin, workshop presentation), an example of the latter is the “world” of membrane science and technology (Van Lente and Rip 1998). In general, there is a continuum: boundaries can be more or less defined, more or less porous, and more or less strictly maintained and guarded.

(3) Space is structured, in terms of affordances and rules for interactions, but also because boundaries have to be maintained with regard to pressures and dynamics of the wider world, which will structure the inside, already to create legitimacy for the space and for the interactions inside the space.

All this is in contrast with Cartesian space which is homogeneous (isotropic). Space in our sense is granular, full of gradients (social and material), and includes a grammar (or perhaps a script).<sup>2</sup> If we were into management studies, this would actually be an occasion to introduce a new management approach, captured by the three GRs: granularity, gradients and grammar.

There is a further consideration, about overall effects of such spaces. They afford deliberation and negotiation, and this may add up to overall societal agenda-building and *de facto* implementation in actions and interactions of actors. We are moving away from traditional policy making approaches here, because there is no central (and responsible) actor anymore. It is interesting to refer to the emergence of a public sphere (as discussed in political theory) from the 18<sup>th</sup> century onward, as a non-localizable space that builds on localizable spaces like the coffee houses of London and Vienna, and the salons of Paris. Taylor (2002) offers an important argument to consider the public sphere as a meta-topical space: “It is a kind of common space (..) in which people who never meet understand themselves to be engaged in discussion and capable of reaching a common mind.” “(..) the public sphere, as we have been defining it, (..) knits a plurality of spaces into one larger space of non-assembly.”<sup>3</sup>

<sup>2</sup> Cf. Bonneuil et al. 2008. There, as well as in the discussion of grammar of arenas in Rip & Joly 2004: 17, the emphasis is on more or less stabilized spaces. Here, we include the question how grammars emerge, in the small and in the large.

<sup>3</sup> The full quote is: We are now in a slightly better position to understand what a public sphere is and why it was new in the eighteenth century. It is a kind of common space (..) in which people who never meet understand themselves to be engaged in discussion and capable of reaching a common mind. Let me introduce some new terminology. We can speak of “common space” when people come together for a particular purpose, be it ritual, conversation, the enjoyment of a play, or the celebration of a major event. Their focus is common, as against merely convergent, because they are attending to the common object or purpose together, as opposed to each person just happening, on his or her own, to be concerned with the same thing. This kind of common space, in which people are assembled for some purpose—be it on an intimate level for conversation or on a larger, more “public” scale for a deliberative assembly or the enjoyment of a football match or an opera—is intuitively understandable. I want to call common space arising from assembly in some locale “topical common space.” But the public sphere, as we have been defining it, is something different. It transcends such topical spaces. We might say that it knits a plurality of spaces into one larger space of non-assembly. The same public discussion is deemed to pass through our debate today, and someone else’s earnest conversation

Given our identification of spaces in and around STI Policy, one can ask whether the public sphere is being extended to encompass issues of newly emerging science and technology (cf. Callon et al 2001 on technological democracy). Once such an extended public sphere is in place, based on experiences and learning in localized spaces like stakeholder and public engagement exercises, and the interactions between them, it will allow further localized spaces to be more productive and more reflective. This is a general point, and also applies to meta-topical spaces at a lower (e.g. sectorial) level than the public sphere: localized and dedicated spaces can survive because of relevant diffuse spaces being in place.<sup>4</sup> The complete “etiology” of what happens has to include overall landscape changes (another spatial metaphor), like the emergence of Enlightenment and bourgeois society and the rise of strategic science (as visible in the example of membrane science and technology). In the spaces for public engagement with NEST, relevant landscape changes include the increasing importance of public participation in decision making, and the need to get the push for NEST accepted by society.

These are general considerations. We note that this way of phrasing recognizes that spaces have a life of their own, so are not tools that can simply be mobilized and applied. Conversely, STI policy can avail itself of spaces that have emerged for other reasons.

When discussing spaces in and for STI policy, there are general questions about policy spaces, and specific questions derived from STI:

- about creating openings in existing orders -- that’s where embedded institutional and policy entrepreneurs play an important role,
- about design of spaces, with design requirements which can be derived from goals as positioned from the outside, and/or from insights into how actual functioning of spaces can achieve certain goals,
- about actual realization and structuring of spaces, as openings in an existing order, and their eventual specification and maintenance.

Thus, will be phases in the life of a space:

- Emergence of room to do/entertain things, tentatively – a space of projections.
- Recognized rules emerge for what is the space about, how to interact, and what are the modes of legitimisation/justification
- At the same time, boundaries are recognized, and this is part of the structuring of the space and what is contained in it: who’s in/out? What’s in/out?
- Institutionalization inside, but also from the outside: it becomes a recognized space. So the spaces have a life of their own even if they depend on context.

These phases occur in specific situations and contexts so will work out differently in different cases. But the scheme provides a mould for recognizing what is happening and enables formulation of guidelines for attempts to create dedicated spaces which have to function over time (i.e. governance through spaces), or just modulate the spaces that occur.

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tomorrow, and the newspaper interview Thursday, and so on. I want to call this larger kind of nonlocal common space “metatopical.” The public sphere that emerges in the eighteenth century is a metatopical common space. (Taylor 2002: 113-114)

<sup>4</sup> The diffuse space is still bounded, not by identifiable boundaries (it is meta-topical) but by reference to a covering notion (the public sphere – and what typically goes on in the public sphere and serves a function) or an umbrella term (MEMBRANE Science and Technology, NANOTECHNOLOGY, cf. also Rip & Voss (forthcoming) on umbrella terms), which are linked to inclusion/exclusion dynamics (e.g. does this count as public engagement or not? Who is allowed to speak in this world?)

We can fill in the scheme a bit further. Spaces assemble actors for interactions, but the actors need not have common goals. There is something at stake for all of them, but what it is, exactly, can well be different. And there will be struggles of defining the work going on in the space. At the same time, a space brackets out the outside world and in that sense is a protected space (with limited access) in which actors can temporarily and partially forget about their interests and strategies and interact in novel ways. The notion of space as a somewhat protected space is important not only for interactions but also for production. An important example is the protected space for experiments (in laboratories or otherwise) and for nurturing new technological options.<sup>5</sup> A protected space allows a focus on a joint product, and divergences can be temporarily bracketed in order to achieve such a product.

Having noted this, the converse of protection in a space is the multiple positionality of actors (and artefacts, for that matter). While they function inside the space, and share in the work, they have other positions and interests as well, which play a role in the interactions, up to introducing power differentials. This can be problematic, or at least be seen as problematic when such other interests interfere with the interactions/work inside the space. Public engagement exercises can suffer from such effects, as was visible in the German NanoKommission where industry members were angry about a Friends of the Earth press conference about their report on nanotechnology in food and agriculture because Friends of the Earth had not informed them beforehand. The link with positions and interests outside the space can also be seen as an advantage, in that the space becomes like a microcosmos, so that what happens in the space reflects possible interactions in the wider world,<sup>6</sup> and leaves traces with the participants that may induce changes in this wider world.

Seen from a particular space, multipositionality implies links with the outside. From a distanced perspective, multipositionality is a matter of actors being part of several spaces and organisations and groupings. Thus, there are linkages between spaces, and what happens in one space will not be independent of what happens in other spaces. Actors, including policy actors, can play on this, and there are actually ad-hoc dedicated spaces organized by intermediaries like the Keystone Center,<sup>7</sup> that bring actors together who have links to different spaces so that their interactions may have effects in these different spaces.

From an even further distance, one can see positions, linkages and interactions being entangled and in that sense somewhat interdependent. In a sense, these are networks, but the difference with regular network analysis is that the nodes in the network are constituted by spaces, which influence the network linkages. The patterns that occur will shape further positioning and interactions, and thus constitute *de facto* governance. It is in this evolving entangled order that openings occur and can lead to spaces. When somewhat institutionalized, these spaces are locations where work can be done that has effects on further activities, interactions and patterns. STI policy making is part of such ongoing interactions, and while it can try and create dedicated spaces, it cannot use them in a purely

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<sup>5</sup> Compare Law and Callon (1992), the story about the protected space for development of a military aircraft, where that space itself was covered and maintained through macro-level protection, in their case an agreement between UK and French governments. The possibility of such an agreement is part of a diffuse space, here about the importance of military innovation, in which such agreements are accepted/justified.

<sup>6</sup> This advantage has been exploited in Constructive Technology Assessment stakeholder workshops (with the help of sociotechnical scenarios to support strategy articulation). See Robinson 2009 and Parandian 2012.

<sup>7</sup> See <https://www.keystone.org/>

instrumental way because it has no privileged external Archimedean position to exert leverage from.

### 3. Existing STI Policies and Practices

We identify types of spaces that are explicitly used for STI policies. We do not aspire to be comprehensive, only to identify important types. This is sufficient to show the pervasiveness of spaces. On that basis, we can articulate, in section 4, the added value of an approach to STI and its governance that explicitly takes “space” as key entrance point, and develop further uses of ‘spaces’.

#### *-3.1 Collaborative Spaces: R&D partnerships (RDP), Consortia, Clusters, etc.*

RDPs have been around for a long time, linked to gradual differentiation of research & development, especially between professional R&D, partly taken up in universities and consultancy labs, academic research, public labs (since late 19<sup>th</sup> century) and industrial research (again, since late 19<sup>th</sup> century). The general goal is to improve production/exchange/transfer of knowledge and to foster innovation processes. Different forms of partnerships exist (bilateral partnerships, consortia), and they may involve different types of actors (government labs, academic institutions, big companies, start ups, etc.). The space of collaboration allows mutual learning processes. Productivity of such spaces is conditioned by contractual practices that lead to cooperative behaviors. In general, the condition for providing incentives is that proper definition of property rights (in general patents, but also trade secrets, etc.) is designed and implemented. Also, the functioning of spaces of collaboration depends a lot on circulation of human resources. Hence, training activities associated to RDP may play an important role.<sup>8</sup>

In most OECD countries, RDPs are used as tools for STI policy since the late 1970s. The main form is Public Private Partnership (PPP). Governments provide incentives for public research labs and for firms to collaborate. Also public research organizations have been asked to enhance their competences for organizing collaboration with companies (e.g. through the creation of Technology Transfer Offices -TTO). For emerging technologies, collaborative spaces have taken the form of wide consortia, which involve numbers of (generally public) research labs. Such consortia played a key role for genomics R&D. Localised clusters occur in biotechnology and now also in nanotechnology, as a 21<sup>st</sup> version of the Marshallian notion of “industrial district” (cf. Robinson et al 2007). They are now an object of STI policy, cf. also the French policy of “poles de compétitivité”.

As public support is involved (through subsidies and/or involvement of public labs) such collaborative spaces may be considered to blur the boundaries between public interest and private interest (up to abusing taxpayer’s money). This has led to attempts to specify boundaries and/or new categories, for example by defining “precompetitive R&D”, which can

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<sup>8</sup> The network of RDPs may have a second-order effect, the building of organizational fields, as shown in the case of biotechnology (cf. Powell et al. 2005).

justifiably be supported with public money. Boundary management through defining of spaces also occurs in the complex engineering of property rights, for example in the common definition of concentric circles of access in multi-actor collaborative projects and programmes, and through the general use of Material Transfer Agreements (a form of prospective protection). All this are ways to manage the interactions between inside and outside.

### *3.2- Coordination Spaces: Technology Platforms, Stakeholders' forums, etc.*

Since the late 1990s, STI policy has created explicit “coordination spaces”, with European Technology Platforms (ETPs) as a clear example. ETPs typically gather a wide range of stakeholders to be involved in the formulation and prioritization of research activities by means of vision development and the formulation of a Strategic Research Agenda (SRA). The main objectives of ETPs are coordination of expectations and stabilization of the environment of technology development.<sup>9</sup> They produce collective coordination devices such as scenarios, visions, roadmaps, codes of conducts. We note that collective coordination is a public good, and may therefore be produced sub-optimally, unless there is a successful coordination champion and/or a relevant government measure.

Interestingly, the EC defined some general norms for the functioning of ETPs. ETPs are supposed to be open and transparent. A voluntary code of conduct was elaborated in 2004 to ensure that ETPs function according to these principles and that they are not dominated by narrow interest groups. At the same time, they are expected to turn into dedicated Joint Technology Initiatives. There were close to 40 European ETPs and some of them have resulted in the creation of Joint Technological Initiatives (the Factory of the Future, Energy-Efficient Buildings, the Green Cars, etc.).<sup>10</sup>

The development of an ETP has bottom-up elements where stakeholders take initiatives, but in interaction with guidance from the European Commission. The general pattern is a three-stage process:

- Stage 1 – Emergence and setup: stakeholders, led by industry, come together to agree a common vision for the technologies concerned. The main deliverable of this stage is a strategic vision document (SVD) which describes the significance of the particular technology and outlines the medium and long-term development objectives of the ETP.
- Stage 2 – Definition of a Strategic Research Agenda: the Strategic Research Agenda (SRA) sets out research and technological development priorities in the medium and long-term. The development of the Strategic Research Agenda is coordinated by an advisory council in which the stakeholders participate. In some cases, Member States are also actively involved through a Member State mirror group. This mirror group reflects the views of the Member States on priorities. At the same time, a deployment strategy is specified which

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<sup>9</sup> The primary objective of the European Technology Platforms is to “define a coherent and unified approach to tackle major economic, technological or societal challenges of vital importance for Europe’s future competitiveness and economic growth”. European Commission (2004), ‘Technology Platforms: from definition to implementation of a Common Research Agenda’.

<sup>10</sup> See [http://cordis.europa.eu/technology-platforms/further\\_en.html](http://cordis.europa.eu/technology-platforms/further_en.html).

aims at the provision of a description of the elements required to implement the Strategic Research Agenda.

- Stage 3 – Implementation of the Strategic Research Agenda: the Strategic Research Agenda is implemented with the support of Community research programmes, where possible. At the same time, the Agenda is used by the Commission to identify priorities for the preparation of research proposals for research programmes.

ETPs are a striking example of anticipatory coordination spaces (Rip 2012). There are other examples, less explicit about coordination. Important are dedicated foresight exercises which create temporary spaces with coordination effects, depending on the extent of coordination that is in place already (findings from the FORMAKIN project, see Brown et al 2001).

**In general, coordination can be taken up as a matter of negotiation and monitoring, and spaces to do so can be created. Anticipatory coordination is more open-ended (by definition), and this implies that spaces, which allow interactions without specifying what they should lead to, are essential.**

### *3.3 Public Engagement Spaces*

The third type of space, temporary or continuing spaces for public involvement, has been addressed as such since the late 1980s. There is public engagement with NEST generally, for example in consensus conferences, citizen juries and other interactive activities, but also occasional dedicated engagement in research and innovation trajectories. An interesting example of the latter is the local monitoring committee of GM vines field tests in the Alsace (LMC et al. 2010).

The focus on upstream public engagement is particularly visible in the UK, because of perceived legitimization problems. This then raises the question how far the interest in public involvement from the side of policy makers is linked to perceived legitimization problems in other countries. Definitely, issues of legitimization and public acceptance are the background to the various exercises in public engagement.

The exercises can usefully be seen as the creation of spaces for interaction, often with strong boundaries (e.g. about who should be involved, as in the UK Gene Nation? exercise where only the “real”, i.e. unprejudiced public was allowed in, not the organized groups which had already formulated a position) and with an emphasis on articulation of opinions that could be put into a report of the exercise (Lezaun and Soneryd 2007). The link with decision making is weak, and by now, there may be some engagement “fatigue”. While there is quite some experience and literature about designing spaces for public engagement, the focus has been on the processes inside the space. This limitation is now recognized, but the subsequent question whether it is worthwhile to try and improve this particular strand of public engagement exercises is not addressed. A key point is to consider how such exercises are part of a wider world (cf. Marris et al 2008). Public engagement spaces may continue to be created, but they will remain superficial, unless broader issues and multi-level dynamics are taken into account.

The present focus on upstream public engagement should be repositioned as one attempt among others to improve interactions between science, technology and society through more

public involvement.<sup>11</sup> This requires us to address the question of what is meant by ‘public’ here. It is more than just having the “general public” (whatever that may be) involved. There are different publics, there is a reference to the public sphere as it has emerged since the 18<sup>th</sup> century and discussed in political theory, and there is a reference to the public interest. The role of NGOs of various kinds will be important, seen as “voices of civil society”, and they are now often invited to participate in forums. There is also the role of citizens in doing science, for example in medical and health care through the pro-active stance of patient associations. This might add up to “technical democracy” (Callon et al. 2001) – a diffuse, meta-topical space. The activities we mentioned have different origins, but they all indicate openings which can become engagement spaces. The general claim about a meta-topical space of engagement with NEST suffer from a lack of specification of the spaces through which this can be structured, and their relation with regular spaces of democracy.

One can broaden the scope by taking public engagement spaces as affording engagement in the public interest, to broaden the ways how STI/NEST is done, whether by publics or other actors. Then, one sees new interactions from the bottom-up, not necessarily in the public sphere as usually understood, but definitely referring to a public interest. One example are the “convergence workers” (Stegmaier 2009), at the moment especially ethicists engaging with scientists on the lab floor. This is still a minor activity, but it may become more important in the implementation of the European Commission’s policy about responsible research and innovation.<sup>12</sup> Another attempt at enabling and stimulating interactions is Constructive TA, aiming to broaden science and technology development trajectories. For NEST (and in particular, nanotechnology), Constructive TA developed strategy-articulation workshops with relevant stakeholders – ad-hoc spaces functioning as a micro-cosmos – , and supported by sociotechnical scenarios (Rip and Te Kulve 2008).<sup>13</sup>

In summary, the role of spaces for interaction and perhaps production of advice is clear in traditional public engagement, and to some extent also in the broadening exercises of convergence workers and Constructive TA. The limitations are also clear, in particular the focus on the processes internal to the spaces. To do better, an understanding of such spaces as cut out from an evolving social fabric, and reinsertion (of actors, of outcomes) into the social fabric, is important. Design of public engagement spaces thus has to be dual design, catering for both inside and outside. Public engagement with new science and technology may not as such constitute a diffuse space in its own right; there are tensions of various kinds. But an extension of the public sphere, focussed on NEST, may arise, which will then reposition public engagement.

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<sup>11</sup> Such interactions can give rise to ‘contact zones’ (Pratt 1991) and ‘trading zones’ (Galison 1997), spaces where people with different backgrounds mingle, interact and exchange things and ideas, and which become institutionalized, also through a pidgin or creole language that emerges. Pratt (1992: 4) emphasizes struggles when she presents contact zones as: "social spaces where disparate cultures meet, clash, and grapple with each other, often in highly asymmetrical relations of domination and subordination-like colonialism, slavery, or their aftermaths as they are lived out across the globe today"

<sup>12</sup> It is interesting also because ethicists are willing to define themselves as stakeholders in “good” science and technology development.

<sup>13</sup> Such scenarios span up virtual (because future) spaces, and allow actors to consider how to furbish such spaces more concretely. Thus, they are “prospective structures to be filled by agency” (Van Lente and Rip 1998b).

### 3.4-Local and global, and other links between spaces

There are further types of spaces, and interactions between spaces leading to accumulation up to the emergence/creation of spaces at a global scale. An example of the latter is visible in the issue of climate change and its science for policy, as well as some policy for science, arrangements. There are many interacting and overlapping spaces, but there is now also the International Panel on Climate Change (IPCC), a bounded space which might link up all these spaces and create some accumulation. The IPCC has to refer to its scientific audiences and to national support organizations, and this is reflected in its design, and the present attempts at re-design.<sup>14</sup> In this example, the issues themselves have a strong spatial dimension, and combine local and global, so scale is important, also for the scope of the spaces of STI policy that emerge and/or are created.

The spatial dimension is less striking in another example of local-global dynamics: protection of intellectual property (IP), linked to appropriation strategies and business models. One can see local research and innovation needing protection, with various ways of creating and maintaining protection (cf. Section 3.1), combined with global IP regimes, especially patent regimes. Locally, practitioners would behave so as to be protected, but also try to find outlets elsewhere, in the global world. Then, there might be an overarching meta-topical space (like the one offered by the present patent regime), which can be discussed and evaluated as to how well it contributes to the local spaces and their exigencies, but keeping in mind that fitting to ongoing local practices is only one possible strategy. Local practices might have to be stretched.

In between the local and the global there are emerging and sometimes institutionalized spaces. One example is “regulatory space” (L. Hancher and M. Moran 1989),<sup>15</sup> where experts and other actors circulate in a *de facto* space defined by mutual reference and dependencies. Using such a broad characterization, we can see further examples. In the world of standard setting, an interesting example is the International Life Sciences Institute (ILSI),<sup>16</sup> cf. David Demortain (workshop presentation. The phenomenon of ‘epistemic communities’, as

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<sup>14</sup> Here, we draw on studies of Silke Beck, cf. Beck (2012) and her project funded by the Program New Governance of Science of the German Bundesministerium für Bildung und Forschung. Hoppe and Wesselink (forthcoming), analysing how climate change is addressed, create a link between nature of the problem and governance style, which then requires spaces: “In the case of unstructured or ‘wicked’ problems (high value dissent and lasting deep uncertainties) an agonistic governance style will come about, allowing numerous and different types of stakeholders to play a role, perhaps with flexible boundary arrangements as spaces for open deliberation and social learning.”

<sup>15</sup> Regulation is performed through organizations in a specific space, called regulatory space, shaped not only by different national, legal, cultural frameworks, but also by circumstances of time and place. Understanding the dynamics of bargaining and network formation btw organizations is the key. The traditional contrast private vs public is overcome because of organizations.

[http://www.giuripol.unimi.it/Materiali%20Didattici/Ammannati%20Theories%20of%20regulation/Stuents%20presentations/BELLETTI\\_Organizing%20regulatory%20space.pdf](http://www.giuripol.unimi.it/Materiali%20Didattici/Ammannati%20Theories%20of%20regulation/Stuents%20presentations/BELLETTI_Organizing%20regulatory%20space.pdf)

<sup>16</sup> The official description on the website is: “The International Life Sciences Institute (ILSI) is a nonprofit, worldwide organization whose mission is to provide science that improves public health and well-being. It achieves this mission by fostering collaboration among experts from academia, government, and industry on conducting, gathering, summarizing, and disseminating science. Its activities focus primarily on nutrition and health promotion; food safety; risk assessment; and the environment.” ([www.ilsii.org](http://www.ilsii.org)) Industry plays a strong role in the organisation.

identified by Haas (1992) for the Mediterranean region, especially regarding environmental issues, depends on linked and overlapping spaces through which experts circulate.

There is coordination involved, but not dedicated coordination in and between organisations, or in an ST domain, as we discussed in Section 3.2. It is about accumulation and aggregation linked to connections between spaces, and thus possibilities of emerging coordination across spaces. In phrasing it this way, there is overlap with ideas from policy analysis about “coordination without coordinators” (Lindblom as quoted in Hoppe 2010). In policy analysis, the tension between the need for centralized coordination (to avoid fragmentation and duplication of effort) and the need for diversity and pursuit of (incremental) advances might be overcome when the idea of coordination without coordinators is made more concrete. What we add is how spaces, as concrete arrangements, create interaction and coordination, without specifying beforehand what should be done. There is ‘space’ (room) to explore and try out, even if this is constrained by the nature of the actual space.

#### 4. Considerations and further approaches

As became clear in Section 3, spaces are important in present STI Policy, and the perspective of ‘spaces’ helps to understand what is going on, and allows suggestions how to do better. There are broader issues as well. One example is the claim in Rip & Joly (2004) that the open-ended promises of new science and technology and the concerns and controversies about NEST have similar dynamics once one looks at the actual spaces in which promises and concerns are played out. Another example is how micro-level interactions (in dedicated spaces) may have macro-level effects (cf. passing remarks in Section 3 on accumulation/aggregation). A third example is about introducing novelty into an existing order: it will face resistance, and thus has to push its claims, and perhaps claim more than might actually be delivered.

It is important to keep these broader issues on the agenda. In this section, however, we limit ourselves to discuss immediate considerations (4.1), in a sense a continuation of the considerations at the end of Section 2 with the benefit of the look at STI policy in Section 3. And then outline some possible approaches (4.2). Our discussion will be, and cannot be else than, indicative, because it is about topics that deserve to be explored and studied further.

##### 4.1 Immediate considerations

When spaces become a topic for STI policy, the approach can be to create spaces, say as a special type of policy instrument; or to modify/improve what is there already. This gives rise to further considerations, some practical, others more foundational. In Section 2 we emphasized emergence of spaces, at first tentatively. For STI policy this is particularly important because projected NEST options open up spaces that were not there before. In general, an emerging space is gradually filled in, structured and bounded through what is happening. A key question thus is how spaces become “furbished” and how they shape outcomes, more or less productively, more or less legitimately. Conversely, there can be concern about spaces becoming less productive and/or less legitimate. These are multi-actor, multi-level situations with dynamics that are hard to influence. Still, the idea of STI policy is to devise/design action for the better – what also requires an idea of what is better, in the short term and in the long term.

We will develop this a little further. There is a dialectics of opening up spaces (against existing arrangements) and closing spaces against further extension and to protect them against

interference (so as to be productive). The key point however is not open vs. closed, but the actual ‘grammar’ which structures interactions and boundary work. If this is a ‘good’ grammar, closure is not problematic. There is a second-order consideration, however: will a good grammar (and thus a good space) remain ‘good’ in changing circumstances? In order to adapt if necessary, a further requirement on ‘good’ spaces is that opportunities for spaces to be opened up in new circumstances must remain on the agenda.

In phrasing the *problematique* in this way, we may seem to reify the boundaries, in the sense that there would be only two possibilities: there is a (strong) boundary, or there is no boundary. But in general, spaces are more or less protected, more or less bounded. Boundaries are constructed, modified and deconstructed all the time. Also, as we noted already in Section 2, there are diffuse spaces up to the meta-topical space of the public sphere. What does happen in practice is a focus (by actors as well as analysts) on what happens inside the dedicated space, as if it was separate from the wider world. But the actual impact of what is done and produced in a given space is conditioned by the type of interactions between this dedicated space and the wider world. While this appears obvious once it is said, it is not always taken into account fully. Particularly for “Public Engagement Spaces”, the studies and reflections on practices focus the internal dynamics (this is changing now, see Marris et al. 2008 for a case study of dual dynamics).

Diffuse spaces are important for how they enable and constrain dedicated spaces and their functioning. At the side of innovation, diffuse spaces are spanned up by open-ended promises, say about nano-enabled targeted drug delivery, or nanotechnology in general (cf. also Van Lente and Rip (1998) who show how a world was created around promising membrane science and technology). Uncertainties around performance and uptake of NEST can then lead to waiting games, and these can be overcome through dedicated spaces for interaction across the value chain (Parandian et al 2012). At the side of concerns, for example about biotechnology or nanotechnology, one sees specific spaces for interactions being created, drawing on a diffuse space of public engagement becoming legitimate and seen as a requirement to restore trust. Interestingly, this has led to the construction of a special type of more dedicated spaces: large-scale (national-level) dialogue exercises (with mixed results in the case of nanotechnology).

The upshot of these considerations is that the functioning of a space and what happens within a space is not just a question of ensuring that there is a ‘good’ space on its own terms. Relations with and embedding in the wider world are important. All this makes the question of creating spaces c.q. modifying emerging spaces, quite complex. The broad ‘design’ challenge for STI Policy about spaces and working with spaces can be further articulated by identifying tensions and trade-offs – as we did already when discussing opening up and closing.

There are tensions between openness vs. closure, transparency vs. secrecy, and informal vs. formal rules. Trade-offs occur all the time, and must be a topic in the design of spaces.

In some situations, quality of interactions may require that the exchanges remain protected and informal. This may be a condition for actors to participate, and exchange information and visions without formal commitment. This is a general point (cf. Chatham House Rules in the UK). It can be connected with the phenomenon of contact zones and trading zones, and with the distinction between front office and back office in politics, and in interaction and negotiation generally. Emerging spaces may have to remain informal when they are complementary to other more institutionalised spaces and serve as occasions for interactions which cannot occur in formal spaces. For instance, engineers employed by competing

companies may exchange technical information in professional or other meetings, and gatekeepers can share strategic information.

This may change over time, when more formal commitments become necessary or relevant. Having a set of rules helps to reduce strategic uncertainty. For instance, with the rules that organise European Technology Platforms, it becomes easier for competing actors to engage in a common enterprise. One could speak of ‘thin’ institutionalisation when the space is recognized as legitimate, but the interactions remain informal (and only informally checked for their quality). In contrast, ‘thick’ institutionalisation specifies the grammar and the granularity of the space, which is part of what makes the work in the space legitimate and authoritative in the wider world.

Both ‘thick’ and ‘thin’ institutionalisation have their functions. There is fluidity of interactions, explorations, collective experiments, and some reflexivity. Pushing for institutionalisation is sometime necessary in order to stabilise fluid situations and be productive. This may however be at the cost of an early lock-in. Thus, the governance of spaces in terms of level of institutionalisation implies trade-offs between stability and change. One key question then becomes whether institutionalisation of general rules which govern certain types of spaces – e.g. code of conducts of European Technology Platforms – is productive to guide the specific trade-offs.

It will be clear that we have now moved from design of ‘good’ spaces to governance questions, also because design is conditional on ongoing explicit and *de facto* governance. Spaces of interaction (in relation to science and technology in society) exist anyway, independent of STI Policy, as in local communities and communities of practice. There are also spaces of mobilisation and spaces of collective action, in general and particularly in collective innovation experiments (Joly et al. 2010). It would be a project in its own right to map and diagnose all this, and an important input into STI Policy and STI Policy studies about emerging spaces and governance. In this position paper, we build on our insights and on relevant literatures to identify important issues and prospects.

There are two general issues. One is about the scope of such governance, which should be seen as modulation of ongoing processes rather than steering with the expectation to achieve one’s goals. The other general issue is about the relation between specific dedicated spaces, their functioning and outcomes, and overall, aggregated outcomes. Phrased in terms of coordination, the policy question is one of coordination without coordinators (Lindblom, as quoted by Hoppe 2010).

The notion of ‘modulation’ is a way to avoid the Scylla of top-down steering and the Charybdis of delivering oneself to contingencies and day-to-day politicking. It links up with spaces because any tentative governance through spaces inserts itself into existing orders, and has to take them into account.<sup>17</sup>

Designing governance is an ambitious undertaking, but must also be modest because of the limited possibility for policy

<sup>17</sup> This includes considering potential effects. Possible disruption of tr considered carefully since this may hinder social functions. Think of tr some social relations (relation to elder people, etc.). Also, collective e communities which are structured by common goals and sense of sol important as far as social innovation is concerned. Possible contradict therefore be considered carefully.



and governance makers to make a difference. Modulation of ongoing processes, existing spaces and interactions, is the best they can do. Modulating what is happening anyway requires a different attitude/approach of policy makers, because they cannot then easily refer to achievements that can be put on their record.

*Eduardo Chillida (1963) Modulation of*

*Space*

The issue of aggregation of what happens in dedicated spaces and their outcomes is less important in collaborative spaces (although learning from experiences deserves to be accumulated and aggregated) than in coordination spaces and public engagement spaces. For public engagement exercises, the issue is debated in two opposite ways. There is the criticism about representation in public engagement exercises, compared with traditional democratic procedures, so that there would be little sense in aggregating outcomes and having them taken up in decision making. On the other hand, there is recognition of the occasional richness offered through public engagement exercises, but concern about lack of accepted ways to use it.

Continuing with the discussion of public engagement spaces, a way forward can be outlined. Just as a public sphere emerged in the 18th and 19th centuries, and is now a diffuse space that is a receptacle for outcomes from dedicated spaces, and where they are subjected to comments and discussion (and thus implementing deliberative democracy), one can consider an extension of the public sphere to include issues of NEST (cf. also technical democracy as discussed in Section 3). This will not be straightforward. While the possibility has been discussed since the 1970s (and one can see the establishment of TA organisations as a concrete step in this direction), it is only over the last two decades that such an extension is becoming visible concretely, e.g. because patient associations have now a legitimate input in health care research and innovation.

The point we can draw out of this brief discussion is that aggregation cannot be a purely bottom-up process. There has to be a diffuse space where aggregated outcomes of dedicated spaces are welcomed, and subjected to discussion and thus some quality control. Without such spaces serving as a receptacle there will be no aggregation

#### **4.2 Possible further approaches**

Rather than offering specific proposals, we indicate three overall directions to go, occasionally discussing examples.

##### **Recognizing/stimulating/creating spaces for new interactions – at different levels**

This way of formulating the approach is very open-ended, so many different initiatives could fall under it. It refers back to the general discussion in Section 2, and the discussion in Section 4.1, about the need to maintain opportunities for opening up in the face of tendencies to institutionalize and thus close down.

For example, consider the proposal in the Nordmann 2004 Report on converging technologies. Since the new generic technologies can be developed in different directions (and with different projected functionalities), there is an opportunity, and a need, to articulate goals in interaction between government policy makers, technology developers and societal actors (a tripartite

exercise). This recommendation was not taken up, but we can speculate and define spaces where it could be taken up. One possibility would be to have an “ST Chamber” in addition to regular Parliament. There were such proposals in the 1970s, which were not taken up. And it is not clear whether we can expect non-trivial results. Another possibility would be an equivalent of the World Economic Forum (Davos) combined with the World Social Forum. It could be organized with support of big foundations (like the Bill and Melissa Gates Foundation), and managed by organizations like the Keystone Center.

Another opportunity is offered by the presently fashionable discourse on Responsible Research and Innovation, linked to governance because the European Commission is pushing it (also in its Horizon 2020 Program) and Member States have to do something about it. This is not about spaces, but spaces will come in, for example in the way interactions between ST actors and stakeholders and civil society actors are organized.

These examples still have a modernist component, in the sense that they organize to achieve a goal. In policies that work with spaces, the actors and interactions in the space produce the outcomes, while shaped to some extent by the grammar and gradients in the space. If the aim is to open up, there still is the difficulty how to create an emerging space. The recent discussion of tentative governance may be helpful, even if it does not offer packaged solutions (that would be the modernist aspiration). From the perspective of tentative governance, working with spaces is about pre-institutional settings and activities where new things can happen. Spaces allow that because there is flexibility for big incumbents (in the institutional sense, rather than how industrial economics limits the meaning to firms): informality within a somewhat structured setting.

### **Opening up existing, institutionalized spaces to new interactions, experiments**

This is happening anyhow, but taking it as an STI Policy approach requires a critical diagnosis of the present functioning of the spaces. We mention a few examples.

For science, there is opening up of professional science through versions of citizen science. Interestingly, there is now recognition of the need for spaces for aggregation and quality control of such citizen science. Sometimes, separate spaces are created for alternatives to regular approaches (case of ALS drug, not officially accepted) and alternative approaches (up to indigenous knowledge). For innovation, there is the phenomenon of collective experimentation as an addition to mainstream innovation policy (Von Hippel 2004, Joly et al. 2010).

This is not the place to offer concrete suggestions, but we can point to the findings of the Agrinovim project on the struggles to create spaces to nurture novel approaches in agriculture (Wiskerke and Van der Ploeg 2004).<sup>18</sup> And to case studies of the role of users in technological development (Oudshoorn and Pinch 2003).

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<sup>18</sup> Further relevant findings were the role of narratives to articulate the approaches and create discursive and research spaces (Stuiver), and the possibilities of spaces for design and learning (Rip and Roep).

For policy making, and for societal agenda-building, there are new ventures with the purpose of opening-up, ranging from the Grenelle de l'Environnement,<sup>19</sup> to Rathenau Institute's way of societal agenda building combining seriousness and playfulness in Technology Festivals.

### Rethinking/re-doing governance

There are general governance issues, about trying out and learning. In *de facto* governance trying out things occurs all the time, but with limited learning. When intentionally, one can speak of tentative governance, and this requires spaces of openness, of probing and learning – how to produce governance as it were. But governance cannot be isolated, so spaces of probing and learning will not easily be bounded. There have been proposals for experimental law making, with evaluation and modification. In regulation, EPA has a tradition of announcing regulatory intent, getting responses (EPA organizes hearings), and then proceed – or not. There is also interest in so-called reflexive governance which anticipates on eventual functioning of governance activities (Voss et al. 2006).

In these literatures there is reference to spaces, without it being thematized. **STI policy tends to separate into two streams: the modernist stream of pursuing progress through promising technoscience, and the reflexive governance stream visible in transition towards sustainability. The spaces related to the one or the other stream have different shapes and grammars. The recent STI policy discourse of Grand Challenges may be an occasion to reflect on this; at the moment, the rhetorics (to justify investment in ST) and articulation of concrete programs get all the attention of policy practitioners, while STI Policy scholars appear to be waiting in the wings.**

## 5. An agenda for STI Policy studies

Our proposal about emerging spaces and governance is not just a proposal for a new policy instrument, even if our discussion in terms of design of spaces could be read that way. It is primarily a way of thinking about, and looking at, instruments and their functioning, taking 'space' aspects and dynamics into account, and doing better that way. This has implications for the kind of studies to be done. For example, in creating or modifying a space a policy or governance actor enables and constrains actors and interactions within the space, but it is they who define and produce outcomes. Thus, regular policy evaluation approaches with their versions of logic diagrams cannot be applied, and new evaluation approaches have to be developed. For example, by noting that attempts at governance through spaces are like problem structuring in evolving contexts (that's why traditional arenas need no longer be adequate). Evaluation is in order, by analysts not bound to terms of reference of a commissioned evaluation.

An agenda for STI Policy studies has to be a collective undertaking. What we can do here is to offer input into such a collective undertaking, and we have done that in terms of background conceptualisation (Section 2), evaluative descriptions of what is happening already (Section 3), and outlines of directions to go (Section 4). Particularly Section 4 offers building blocks for an agenda for STI Policy studies already.

An agenda for STI Policy studies addressing spaces will have three types of elements:

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<sup>19</sup> As was noted in the workshop about emerging spaces and governance, 3-4 July 2012, the effect of a Grenelles will be different the next time round, because opening up has been done already. This is a general point about opening up

- Improving what is happening already, building on present insights in spaces and their dynamics, as well as further studies still to be done
- Adding to what is happening already, again based on insights and considerations as offered in this position paper, and (hopefully) dedicated experiments
- Improving background understanding of spaces and their understanding.

Improvement studies can be done in a straightforward way (what went wrong? Let's do something about it). But this should be embedded in more general understanding of spaces (and other features) in STI Policy.

It is important to acknowledge that spaces are framed by cultural elements since this leads to recognise the importance of country differences in how to organise spaces. "Etats Généraux" are a "natural" way to organise public debates in France, etc. Paying attention to such national differences may lead to extend the research on civic epistemologies (as social and institutional processes involved construction of credibility of knowledge used for public decision making – see Jasanoff 2005) and consider spaces in the same perspective.

The big challenge, of course, is to devise new, or at least further, approaches based on recognition of, and insight in, the role of spaces. One starting point is to take our discussion in Section 3, and develop proposals and experiments in terms of spaces. Another starting point derives from challenges to governance of STI in society (and responses like reflexive or tentative governance), and explores how approaches in terms of spaces can add.

Such explorations have to be combined with better understanding of spaces, what they allow and what they could allow. There is then a need for comparative analysis, perhaps typologies of spaces (as we started doing in Section 3).

So far as space becomes a key (analytical and political) category, necessary to define analytical dimensions which may lead to systematic description, comparative analysis and typologies, linked to features like:

- boundedness / degree of inclusiveness / formal organisation of links between in and out/ ...
- degree of symmetry of positions
- equality / equity within the space

There is an assumption in such comparative studies that a space is something definable, an object of study. While this can be the case, it does not cover everything of interest. For one thing, we are interested in emerging spaces which are ill-defined by definition. That is why we discussed typical patterns of emergence in Section 2. For another thing, space is an aspect of policy instruments and approaches, and its functioning is bound up with the policy instrument or approach (in context).

In closing, we want to emphasize that 'space', as we discussed it, is not a metaphor (even if it can be used metaphorically). It is a phenomenon in its own right, with definite characteristics. Particularly important is our reference to openings and emerging spaces, which is a general phenomenon but very visible in and around science, technology and innovation introducing novelties. This then also leads to the tension between opening and closing during further institutionalisation.

The corollary is that spaces cannot just be created as one wishes as soon as one or another policy calls for them. Spaces have characteristics and a life of their own, and policy has to take that into account if it wants to be productive. There are many instances of emerging and stabilizing spaces in and around STI policy already, but there is room for improvement and perhaps development of further approaches. And there is a need for policy analysts as well as

policy practitioners to recognize that spaces emerge and develop independently from their initiatives, so that the best they can do is to modulate what is happening anyhow. This must be the background to any agenda for STI Policy studies to be developed on the basis of this position paper.

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