Traveling Imaginaries of Innovation:
The Practice Turn and Its Transnational Implementation

I. Introduction: Purpose of Study

"Innovation" has moved to the center of policy agendas around the world. Hardly a week passes without a major social actor announcing an "innovation strategy" for a city, region, or country.[1] It has become virtually impossible to talk about economic development or social progress in terms that do not invoke, explicitly or implicitly, the need for innovation. Innovation is imagined as the key driver of long-term economic growth and environmental sustainability; it is advanced as the essential prerequisite for a better future and a solution to persistent deficits in health, poverty, and economic inclusion. Increasingly, too, innovation is seen as the measure of success in policy domains as disparate as education, research, immigration, environment, employment, taxation, and risk governance. In fact, it seems as if all governmental functions *must* cater to innovation in order to appear legitimate, economically defensible, and modern.

Further, once seen principally an *analyst's category*, developed primarily by academic scholars asking in retrospect what innovation is and how it occurs, "innovation" has become in recent years importantly an *actor's category*, driven by the concrete, proactive practices of legions of policymakers, consultants, and institutional managers. Indeed, it has become common practice for all these actors to look instrumentally at the "successful" practices of supposed global innovation leaders and try to import them into their local strategies. As a result, innovation policy is increasingly dominated by a handful of "traveling imaginaries" of what innovation is and how it ought to be implemented, and pursued worldwide through the adoption of perceived "best practices" that are grafted onto existing institutional and social structures at home. Paralleling a broader trend in public policy towards comparative benchmarking, this reliance on plug-in solutions and policy toolboxes, commonly known as "best-practice transfer," has become a standard response to perceived policy needs (Bardach 1994; Bogan and English 1994; Booz Allen Hamilton 2001; Bretschneider, Marc-Aurele, and Wu 2005; OECD 1997b; Wessner 2013).

This proposed study views the emergence and worldwide dissemination of best practices of innovation as an exceptionally fruitful topic for science and technology studies (STS). A central task of STS has been to investigate how—at the intersections of science, technology, and society—new ideas and associated discursive formations, practices, and materialities arise and affect the world. Numerous efforts are underway to open up innovation for STS inquiry.[2] These acknowledge, first, that innovation is almost invariably associated with scientific and technological advancement, and hence sits squarely within STS's disciplinary purview. Second, STS methods are especially well adapted to examining the black-boxing of heterogeneous sociotechnical practices, institutions, and networks into circulating models that are represented as universally valid. Third, innovation policy is well suited to STS analysis as a hybrid domain of technical expertise and expertise-based activity that is at the same time profoundly value-laden and political. Many advances remain to be made, however, in a field where other social sciences—e.g., economics, policy studies, urban studies, geography—have long been active, but where the STS footprint is as yet light. Deeper STS engagement with innovation policy, taking account of crucial current developments, promises significant returns for the field's conceptual development and social relevance.

[1] As examples, in July 2014, the government of Alberta, Canada, launched a new Innovation Council to lead the province's innovation strategy (Alberta Government 2014); the leaders of the African Union adopted the "Science, Technology and Innovation Strategy for Africa" (African Union 2014); and the City of Chicago approved its first community development plan aimed at creating an innovation district (Elejalde-Ruiz 2014). Tufts University announced the launch of the new Tufts Institute for Innovation as part of its "Tufts: The next 10 years" strategy (Tufts University, Office of the President 2014), and the UK will release a revised Innovation Strategy as part of its 2014 Autumn Statement (Department for Business, Innovation & Skills 2014).

[2] The French research network IFRIS (Institute Francilien Recherche Innovation Société) is specifically dedicated to science, technology and innovation (STI) studies, thereby bringing STS insights to bear on innovation. Another effort, spearheaded by (among others) Mario Biagioli of UC Davis, seeks to "cross-breed" STS and innovation studies by linking centers where such work is underway.

In that spirit, this proposal sets out a three-year, cross-national study of the circulation and adoption of three models of innovation "best practice" in four urban regions located in four countries: Bangalore (India), Boston (USA), Cambridge (UK), Karlsruhe (Germany). Each city is widely regarded as a motor of innovation in its region and nation. The study hopes to achieve intellectual impacts at three levels: (1) by empirically investigating and theorizing what this proposal calls the "practice turn in innovation policy"; (2) by extending the STS literature on comparative policy analysis to the infrequently studied city scale, which has recently become a focal point of innovation policy and research; and (3) by expanding the reach and explanatory power of STS frameworks of co-production and sociotechnical imaginaries. The study also hopes to achieve broader impacts within and outside STS through education, training, and outreach, as detailed below.

II. Research Focus and Questions

II.A. The Practice Turn

The "practice turn in innovation policy" (or "practice turn" for short) is our term for the three-fold shift toward conceptualizing innovation policy as (1) the go-to answer for basic socioeconomic challenges confronting 21st-century nations and a touchstone for governmental legitimacy; (2) an *actor's category* that sees innovation as desirable and achievable through standardized practices; and (3) a benchmarkable activity, preferably implemented through "best-practice transfer." Innovation theory, STS, and social science more broadly, have not yet engaged in theorizing this "practice turn," or tracing and analyzing the implications of plug-in solutions for innovation in diverse societies. If innovation policy itself is a kind of first-order reflection by engaged actors on what is lacking in their own societies, then research on the changing nature of innovation policy—understood to include practices disseminated by engaged actors—is, in our view, a necessary second-order reflection to make sense of the ways societies are seeking to renew, and to some degree reinvent, themselves both democratically and sustainably.

II.B. "Best Practice" Models

This proposal aims to re-theorize innovation in a world in which that concept has become an actor's category in a manner consistent with Ian Hacking's observation that powerful social categories become "interactive" and "loop" back to reshape how societies view themselves and their organization (e.g., Hacking 1999). For this purpose, we examine three of the best known and most widely adopted "best practice" models that correspond to distinct visions of how innovation contributes to the public good:

- The **Massachusetts Institute of Technology (MIT) model** is an *institutional* best-practice model based on the notion that technology commercialization and regional development can originate from excellent universities with the help of supportive policy systems and high-impact entrepreneurial initiatives. MIT has been proactive in propagating itself as an innovation model through a decades-old tradition of international partnerships, from the Indian Institutes of Technology in the 1960s to present-day collaborations with Portugal, Cambridge (UK), Abu Dhabi, Singapore, and Russia. MIT's success is arguably the prime cause for the recent proliferation of "institutes of technology" across the globe. To policymakers, the MIT model suggests that leading academic institutions with global ambition and reputation can function as starting motors for technological innovation.
- The **"Silicon Valley"** model is a *regional* best-practice model seen as a mix of excellent academic institutions, venture capital, talented young entrepreneurs, and a risk-taking mentality that together produced an abundance of start-up companies and renowned IT multinationals. The 'valley' metaphor, emphasizing the idea of physical proximity between mutually synergistic actors and organizations, has spread widely across the globe. To policymakers, the Silicon Valley model suggests an approach based on critical-mass clustering, a quest for "singularity"-type game-changers, an entrepreneurial mindset, and plenty of venture capital as preconditions for successful innovation.
- The **"public engagement"** model is a best-practice model aimed at the *national public* or specific *sub-communities* affected by the dissemination of new technologies. It holds that innovation can succeed (i.e., be accepted by society and contribute to public welfare) only if citizens' concerns about technological change are sufficiently addressed in advance. Closely linked to STS concepts such as responsible innovation and anticipatory governance, public engagement has taken hold as a suite of

"technologies of democracy," particularly in Europe and North America, generating a sizeable critical literature of its own (Laurent 2011; Doubleday 2007; Felt and Fochler 2010; Wilsdon and Willis 2004). Compared to the other two models, public engagement is the least formalized model and not tied to one specific country of origin. Yet, it has become global standard practice that governments must consult with their citizens on major questions of sociotechnical change, and countries eagerly look to one another for best practices in this domain. To policymakers, the public engagement model offers the promise that publics, if properly consulted, will not challenge policy elites' judgments concerning the benefits of innovation.

These three models represent what many see as black-boxed, plug-in solutions for what is "broken" in national and local innovation systems, operating at different scales. Thus, the MIT model represents a desirable institutional bridge between science and engineering with a strong focus on mission-oriented research; the Silicon Valley model appears to offer a regional solution for translating inventions to the market, including the creation of consumer desire (e.g., Steve Jobs said he knew "better" than consumers what they want); and the public engagement model addresses potential disconnects between making an invention and effectively marketing it to national and global consumers (e.g., the public rejection of GMOs). At the same time, each model has given rise to vigorous critique that is often overlooked in the enthusiasm for practice-based innovation. Thus, questions have been raised about whether MIT is acting too much like a multinational corporation, and what the "MIT model" actually is. Silicon Valley has come under attack for mistaking entrepreneurship for sustained technological innovation, possibly creating a high-tech bubble, and increasing social inequality. Critics see formal public engagement exercises as mere tactical deployments to sidestep or stifle possibly unruly debate (Wynne 2006). We will examine to what extent failure to consider these internal debates is responsible for the partial successes or outright failures of best practice transfers in each study location.

II.C. Research Questions

The premises of standardizability and universality entailed in the very idea of "importing best practices" run contrary to established STS theory holding that "practices" are not in reality standard packages, but always reflect previous, locally specific understandings about what is lacking (or needed) in existing capacity. From this standpoint, using comparison as a first-order method to recapture *difference* in the face of proclaimed *sameness*, we will first investigate how each "best practice" model become a transferable entities in innovation policy. Second, building on the PI's prior research (Jasanoff 2004; Jasanoff 2005; Jasanoff and Kim 2009; Jasanoff and Kim 2013), we will conduct a series of cross-national comparisons to gain insights into the background conditions that define both the demand for best practice transfers and their on-the-ground effects in four localities. Third, this study will be positioned at the level of cities and regions as a scale for cutting-edge research on the meaning and implementation of new innovation practices (see below for more about this choice). By studying how innovation practices do or do not take hold in particular cities, we hope to show which background conditions (epistemic, economic, technical, organizational, cultural, ethical) are needed to (re)institutionalize practices in new settings. Fourth, we hope to illuminate in context-specific ways what will work, and what will not, to generate the public goods associated with innovation policy, and thereby promote a critical evaluation of the indicators we see evolving as benchmarks of innovation and/or innovative capacity.

The study will address the following interlinked research questions of theoretical and policy significance:

1. **How have policymakers construed these models, and what assumptions do they make about each?** How do the models feature in the views of key actors, and what explicit or tacit assumptions about the models underlie their adoption in each urban context? What policy discourses (e.g., around competitiveness or development) are being reinforced, displaced, or ignored by the focus on these models? Is there a common core of imagined characteristics across the research sites as to what is "best" about the "practice" being transferred? How do the different models relate to earlier framings of pipelines and systems, and at which scale is innovation being imagined (e.g., cities for themselves, cities in regions, cities as drivers of national productivity)? Why are some models deemed more

promising than others in some places, and why by the same token are others not taken up as readily?[3]

2. **How are the models being locally implemented?** How do the three models of practice fare when reproduced elsewhere? How are histories of regional and national development, institutions and communities reflected or erased in their implementation? What institutional channels of "transfer" have been created to link the original site of practice to the sites of importation, and with what if any bidirectional effects? What aspects of these models are most easily reproduced in different settings (i.e., what "travels well") and what aspects are difficult to embed in a new socio-cultural setting (i.e., what about them is "sticky" and does not travel readily)?
3. **How has the performance of each model been assessed or measured?** What were the expected and (to the extent one can tell) actual outcomes? What measures of success or accountability are being developed? What is the relationship between global trends towards comparative benchmarking in science and innovation policy and the assessment of "best-practice" models of innovation? At what level of aggregation are indicators being used? How do national level indicators relate to the evaluation of each model in its own local setting, especially as regards implications for sustainability and social justice?
4. **How does the circulation of these models feed back into the redefinition of each one?** What do the actors learn about the deficiencies of each model from seeking to implement it? How are the knowledge and experience gained from importing a model transferred or shared across scales (institution, city, nation)? Do reinterpretations resulting from transfer efforts influence the redesign of the models themselves?
5. **What policy lessons does the circulation of the models bring?** What does the importation of a model reveal about how the importing society perceives itself and what is lacking in the city or region that is trying to innovate? In what ways do actors reconsider the meanings of the MIT, Silicon Valley, or public engagement models, or the conditions for their success? For example, does increased circulation encourage deeper critique and reflexivity or rather a more rigid codification of practices? How compatible are local developments with the reasons that made the model innovative in the first place (e.g. openness, de-centralization, internal competition, bottom-up learning and institutional transformation)? Note that our study is *not* primarily trying to extract "lessons learned" from each adoption effort. Rather, it investigates the fundamental assumptions and limits of what it means to "learn lessons" when borrowing allegedly transferable models from other places.

III. Broader Impacts (including dissemination and training)

- This study will produce the first STS-inflected account of situations where the practice turn has become a principal *modus operandi* of policy-makers. This can potentially have a huge impact on policy. The trend towards best-practice transfer and plugin-type policy solutions is clearly on the rise. Yet, the development of analytic tools to theorize, evaluate, and orchestrate these attempts are arguably lagging. Our study will lay a basis for developing these tools and thus promote opportunities for policy-makers to use "practice transfer" in a more intelligent, responsible, and realistic fashion. We expect this study to provide resources for actors to *imagine* as well as do innovation policy, going well beyond the prevalent notions of "innovation pipelines" and "systems." We also expect our research to contribute to the improvement of the criteria by which actors evaluate policy options and outcomes under the new, practice-oriented paradigm of innovation.
- Our study will make explicit the assumptions and implications of innovation policy as a tool for promoting social welfare. We hope thereby to amplify a critical public discourse on a development in which important social welfare functions of the state are being redirected as and through innovation policy. We wish to draw attention to the displacements that take place through the transfer and import of best practice models. Here, the STS focus on the dynamics of knowledge-making in juxtaposition with traditional STS concerns with equity, power, and precaution in relation to S&T provide ways forward. The questions at stake resonate particularly with STS terms such as "responsible

[3] For example, India's early importation of the MIT model was driven by a different imagination of what an IT is and can achieve than more recent importations in other parts of the world. One can obtain a kind of historical "control" by looking at this case side by side with more recent efforts to graft "MITs" into other Northern contexts.

innovation," "sustainable innovation," and "anticipatory governance," which have already entered the policy discourse (Cozzens and Wetmore 2011; Barben et al. 2007; Guston 2008).

- We aim to disseminate our results and integrate our work with that of stakeholders in multiple ways beyond conventional scholarly outputs. First, we will communicate our findings to the practitioners we interview and also to practitioners in other locations where we have professional contacts. Senior leadership at MIT, government officials in several Southeast Asian countries, and policy researchers in several European countries, have already expressed keen interest in our proposal. Second, we will reach out to policy audiences and innovation professionals by seeking out appropriate venues for presentation and publication. For innovation at the city/region level, the US National Conference of Mayors or the European Union Committee of the Regions would likely be receptive audiences. Additional resources will be sought within Harvard, with considerable likelihood of success based on the PI's past experience, to hold workshops for academics and policymakers to refine the project's theoretical framework and analytic conclusions, as well as to carry ideas beyond Harvard.
- Our results are likely to have ramifications beyond the four selected sites to other cities and regions to which our team has close links and which have recently become hubs of innovation policy (e.g., Grenoble, Moscow, New Delhi, Sao Paulo, Jakarta, New York, Seoul). Collaborative relations between the PI and numerous international research groups will yield opportunities for extending the study. In particular, the Paris-based network IFRIS, designated a French national center of excellence, will consider preparing a parallel study of Grenoble. Similar partnership opportunities exist in Seoul; others will be explored throughout the project. In these ways, the project will promote better cross-cultural understanding as educational institutions, firms, and governments attempt to foster innovation in a world that increasingly depends on both subnational and supranational transfers of persons, ideas, goods, and information.
- The project will have significant impact on education and human resource development by training postdoctoral, doctoral, and (if possible) undergraduate researchers bridging STS and innovation policy analysis. This training will deliver not only more STS scholars with the capacity to understand highly relevant contemporary innovation practices, but also future practitioners who are well equipped to integrate understandings of situated practices, cross-cultural diversity, and public welfare implications into innovation policy. We envisage a new graduate seminar in "Innovation and Society," initially co-taught at Harvard by the PI with one or more of the postdoctoral researchers. The syllabus for the seminar would be disseminated through the Science and Democracy Network created by the PI (see mentoring plan), thereby circulating widely outside Harvard.
- The project will create digital work products for wider dissemination. In particular, the STS Program is developing web-based research tools designed to educate STS students and scholars in theory-driven qualitative research. A platform on sociotechnical imaginaries has been completed and others (on co-production, evidence, and bioconstitutionalism) are in the works. A similar platform will be developed on innovation and the practice turn.

IV. Theoretical Framing and Contributions

STS scholarship has long since shown that new scientific and technological paradigms can profoundly reshape the forms of social and political life associated with earlier knowledge systems and technologies (Kuhn 1962; Winner 1989; Bijker, Hughes, and Pinch 1987; Jasanoff 2004). The practice turn, in our view, marks such a paradigmatic shift driven by actors, wherein "innovation" is no longer applied as a *post-hoc* academic explanation for economic growth but is imagined as achievable through existing practices whose legitimacy is not necessarily questioned and which are assumed to be reproducible regardless of variations in context. The study will draw on three major areas of prior theoretical work and contribute new knowledge and insights to each.

IV.A. Sociotechnical Imaginaries

The concept of "sociotechnical imaginaries" in STS provides a compelling starting point for this proposal. It offers a means to link the activities of local innovators and policy actors with the abstract level of ideas and beliefs that connect actors at different locations and levels of government, through narratives, models,

modes of reasoning, and associated implementation practices that circulate beyond cultural or jurisdictional boundaries. It reveals connections between how social actors, including but not limited to governments, imagine and perform innovation, and how those enactments influence their policy choices.

Benedict Anderson's (1983) influential study of national identity, *Imagined Communities*, is often cited as the point of origin for the interest in the imagination in social and political theory. Particularly relevant to STS concerns is Anderson's insistence on the practices of power—initially print capitalism, but later also maps, museums, and the census—as shapers of collective imaginations. Arjun Appadurai (1990; 1996) also sees the imagination as a social practice, and he clearly perceives the layering of the ideational and the material in his descriptions of the five "-scapes" that compose his notion of global flows—but he does not connect S&T practices and the practices of power with the specificity of most significant work on imaginaries in STS. For Charles Taylor (Taylor 2003), "social imaginaries" importantly allow access to the expectations of ordinary people and the normative ideas that underpin these. In this respect, Taylor parallels the normative emphasis of the STS idiom of co-production (Jasanoff 2004; Latour 1993), but unlike mainstream STS Taylor pays scant attention to science or technology.

Expanding this concept to take account of the technological realities of modernity, Jasanoff and Kim (2009) defined sociotechnical imaginaries as "imagined forms of social life and social order centering on the development and fulfillment of national scientific and/or technological projects." This definition has been broadened in recent work to include sites of imagination other than the nation state (Jasanoff and Kim forthcoming). Research in this framework asks how durable ideas of how to pursue collective goods and prevent collective harms are constructed, and how these in turn co-produce varying scientific and technological futures (Felt and Wynne 2007). In the US, for example, such metaphors as "the endless frontier" of science, the belief that risks are physical and can be "contained," and the conviction that pervasive social problems can be solved through "technological fixes" (Volti 2006) have influenced policy in areas such as nuclear power, crop biotechnology, and personalized medicine (Jasanoff 1995; Jasanoff 2005). In South Korea by contrast the tie-in between technology and development has produced a brand of "technological nationalism" that has led to different trajectories from those in the US, e.g., for nuclear power and stem cell research (Jasanoff and Kim 2009; Jasanoff and Kim forthcoming).

Like any significant theoretical concept, the recently articulated framework of sociotechnical imaginaries can be expected to acquire far greater strength and robustness through application to new areas and problems. This study will contribute to such further development in four ways:

- *Extension and reception*: Innovation is itself a sociotechnical imaginary, seen to be *the* indispensable solution to all contemporary challenges of economic prosperity and social well-being. The proposed research will offer a more nuanced understanding of the workings of this overarching imaginary and its capacity to travel. It will shed light on how specific success stories (the best practice models) are transported, integrated and re-interpreted in efforts to bring innovation to new places. It will also show, through grounded empirical research, how competing imaginaries of sociotechnical futures (e.g., in health, food, security) struggle for preeminence under the label of innovation. Our project will thus make sense of the way innovation is projected to citizens as a public good—and what implications this has in terms of public welfare—in different sociopolitical contexts.
- *Standardization*: By illuminating how "best practice models" circulate "as if" they are globally standardized practices, with global validity, yet remain embedded within the particularities of local discourses and practices, we will augment well-known anthropological critiques of globalization as a smooth or unidirectional process and emphasize the role of diverse local institutions in importing, nurturing, or resisting the presumptions under which each "traveling imaginary" was originally constructed and stabilized (Appadurai 1990; Tsing 2005).
- *Reproduction and scale*: We will examine sociotechnical imaginaries systematically at scales smaller than the nation by targeting one institutional, one regional, and one user-centered model of practice. Showing how institutions, regions, and user communities either channel or resist traveling imaginaries should help clarify relationships between local, national, and global imaginaries of innovation, and the reproduction of imaginaries at multiple scales.
- *Institutional innovation*: By tracing how the circulating models of practice touch down in disparate

locations, we will show how traveling imaginaries themselves become agents of innovation, to the extent that they promote the creation or reconfiguration of institutions in line with imported models. Such institutions may include new research collectives (e.g., "IT's," research parks), forms of capitalization, training programs, or forums and processes for public engagement.

IV.B. Urban Studies and Politics

Innovation studies have only recently turned to the meso-scale of cities and regions, which remain relatively understudied in STS (Cooke et al. 2009; Braczyk, Cooke, and Heidenreich 2004; OECD 2006; Marceau 2008). The turn to cities is driven, on the one hand, by the insight that urban regions account for the majority of innovations and GDP creation in knowledge-based economies (OECD 2006), and on the other by a growing sense of a "spiky" world, in which a few highly innovative and economically prosperous regions dominate the global innovation landscape (Florida 2005). Many possible factors have been identified in accounting for the spikes, most related to the role of "agglomeration" (Cooke et al. 2009): for example, "business clusters" (Porter 1998); proximity (physical, organizational, cultural) and related benefits for the exchange of tacit knowledge (Saxenian 1996; Storper 1997); networking and spillover effects (Glaeser et al. 1992; Henderson 2003); the provision of institutional diversity (Keeble and Wilkinson 2000); the draw of "creative classes" (Florida 2002); and the creation of markets and organizational resilience (Athey et al. 2008). Silicon Valley and Boston have featured prominently in these works and in supporting the trend towards city-scale innovation policies more broadly.

The meso-scale of cities and regions is particularly pertinent to the comparative questions of impact and social justice posed in this proposal. First, the best-practice models we discuss have been implemented primarily at the city scale. Cities are home to the major institutions that shape innovation, from branches of government to regulatory agencies, and from research universities to corporate headquarters. Cities are frequent focal points of public demand for, uptake of, and reaction to, innovations. They are sites of material and symbolic politics. Demonstrations such as the "Marches against Monsanto," activism for climate change, anti-corruption or anti-nuclear rallies, or Occupy protests predominantly happen in cities. Cities provide an accessible middle ground between levels of innovation activity. They represent local communities with closely knit social fabrics. At the same time, they are part of national policy and identity, and frequently represent hubs for global knowledge networks. For example, top-level national policies such as job creation in the US, poverty alleviation in India, the energy transition in Germany, and industrial revival in the UK are often articulated into practice at the city level.

Further, cities are sites for investigating how locally conceived and articulated innovation practices circulate around the globe. It has been argued that the ambitions and achievements of global "inno-cities" (our term for cities that have developed a global identity of being innovative) might be better described through their relationships with other cities rather than to their home countries (Toynbee 1970; Rajaratnam 2007). By studying how cities are interconnected, one may cast light on why certain models become "standard," how these models travel, and how they are re-envisioned and embedded in local contexts. Arguably, too, cities are the places where the traditional models of innovation interface: the "linear" model, in which innovations are envisioned to pass through a pipeline from the research lab to the commercially successful firm and out to society; and the "systems" model, in which innovation involves the interplay of many actors and organizations, and for which the city represents a microcosm.

Last but not least, the city scale also offers an opportunity to bring STS concerns with the local and situated (Haraway 1988; Suchman 2007) into fruitful dialogue with work in urban studies (e.g., Clarke and Gaile (1998); OECD (2007); Frug and Barron (2008)) and cultural political economy (Jessop and Oosterlynck 2008). STS research suggests that the factors responsible for both knowledge generation and knowledge uptake are often defined at sites of production, through exchanges among producers and users (Woolgar 1991; R. Kline and Pinch 1996; Grint and Woolgar 1997; R. R. Kline 2002; Oudshoorn 2005; Suchman 2007; Suchman and Bishop 2000). STS also calls attention to tacit skills and knowledge that may not be apparent to actors outside a community of practice (Bijker, Hughes, and Pinch 1987; Pinch and Trocco 2002), complementing a literature on organizational learning and technological capacity-

building (Nonaka 1994; Kim 1999; Edmondson et al. 2003). With some exceptions, not focused specifically on innovation (Farias and Bender 2010), this interdisciplinary space remains to be developed.

IV.C. Innovation Policy

Studies of innovation policy, including the central role of science and technology for economic growth, have their origin, on the one hand, in the seminal works of economists such as Joseph Schumpeter (1934), Robert Solow (1956; 1957), Richard Nelson (1959), Nathan Rosenberg (1983), Paul Romer (1990), Philippe Aghion and Peter Howitt (1998), who identified technological change as a key driver of productivity. On the other hand, they draw on roots in research policy, where innovation has long been conceptualized as a linear discovery-to-market pipeline, with basic research at the front end and functioning markets at the rear (Bush 1945; Balconi, Brusoni, and Orsenigo 2010). These roots in the economics of growth and research policy have been supplemented by a rich, multidisciplinary body of work on innovation theory and practice, and research programs such as the Science of Science and Innovation Policy (see also see e.g. (Fagerberg 2006) for an overview on the innovation literature). One major influence has been the theory of national innovation systems (Lundvall 1992; Nelson 1993; OECD 1997a; Edquist 2005). Under this paradigm, different parts of the system are taken to serve complementary functions, and bottlenecks in parts of the system can undermine overall systems performance. Similar arguments can be made for regional or sectoral systems of innovation (Braczyk, Cooke, and Heidenreich 2004; Malerba 2005; Edquist 2005).

Innovation policy research has also contributed to our understanding of the conditions of technology commercialization, and how to assemble the necessary supporting components into "innovative ecosystems" (Butler and Gibson 2011; Mercier-Laurent 2011). In particular, governments have increasingly focused on the role of the university as the center of such ecosystems and as the heart of the "knowledge triangle"—education, research, innovation (Conceição and Heitor 1999; Acworth 2008). This underscores how closely education, research, and innovation are related (Ferranti et al. 2003; Edquist 1997). Learning is essential to acquire new knowledge, to update or discard outdated knowledge, and to respond to rapidly changing environments (Archibugi and Lundvall 2001; Gibson and Heitor 2005). On the other hand, this has led to a reconfiguration of universities around an entrepreneurial paradigm, where contributions to revenue creation for regional and national economic growth have become an explicit mission of the university (Clark 1996; N. Rosenberg 2002; Etzkowitz 2003; Etzkowitz 2002a; Ayers 1997). Innovation theorists have argued for a necessary erosion of boundaries between academia, industry and government to bring about innovation (Etzkowitz 2002a).

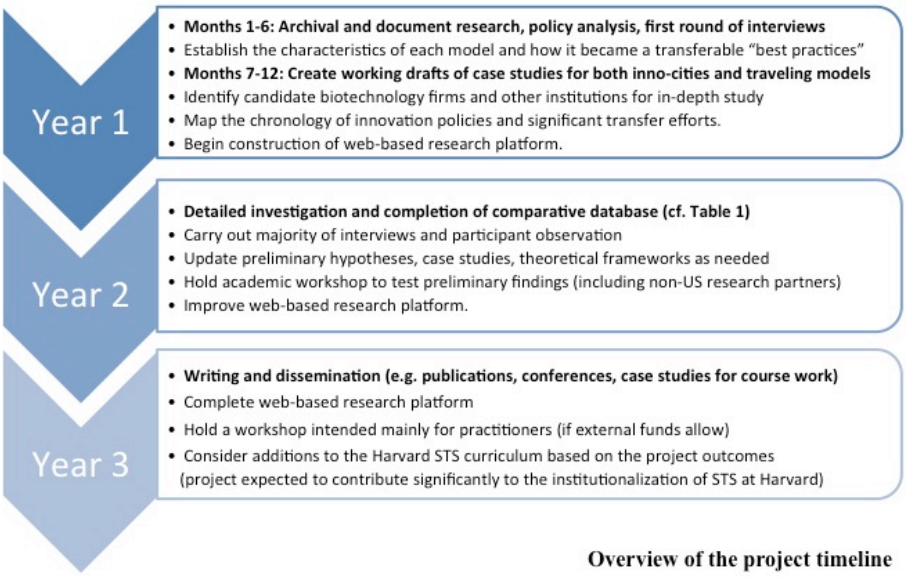
STI policy scholars have investigated the key role of institutional settings (Conceição, Heitor, and Veloso 2003; Acemoglu 2009) and argued that effective innovation strategies depend on alignment with other national policies (Vietor 2007). Innovation strategies today are increasingly complex, involving multiple systems adjustments at the same time, where it has become necessary to go beyond "specific policies related to, for instance, education, social issues, and industrial development" and "combine these specialized policies into holistic and coherent strategies" (Archibugi and Lundvall 2001). Contrary to the widespread belief that countries are merely at the receiving end of the fierce pressures of globalization, Breznitz argues that innovation policy is all "about choice" (Breznitz 2007). This is owed to increasingly refined understanding of different types of innovation—differentiating between product, process, organizational and marketing innovation. There is also ever-growing capacity to measure innovation on macro- and micro-scales (OECD 2010; OECD/Eurostat 2005).

Despite much interdisciplinary reflection on innovation theory and practice, however, many of the links between innovation and socio-economic development still remain "inside the black box," as Rosenberg once put it. Persistent blind spots in innovation theory include the sociocultural specificity and embeddedness of technological innovations and their institutional and regional contexts; relations between micro and macro levels of innovation activity (e.g., individual vs. organizational vs. regional/national/systemic); and the measurement of innovation beyond mere indicators of input and output (OECD 2010a; OECD 2010b).

V. Research Design and Plan

V.A. Overview

The research proposed here will proceed in five phases: (1) establishing how the three models came to be understood as "best practices" that can circulate; (2) producing city case studies (3) identifying salient similarities and differences across cases; (4) providing explanations and refining theoretical understandings; (5) deriving policy-relevant implications (cf. Project Timeline below). In collecting data for the case studies, we will parse the broad research questions stated at the outset into more tractable (i.e., researchable) form using parallel research protocols in each city. The aim is to generate comparative data for a "thicker description" (Geertz 1973; Ryles 1968) and a more nuanced understanding of the global dynamics of innovation.



Overview of the project timeline

V.B. Characterizing the Best-Practice Models

In tracing the critical turn from innovation as analyst's category to an actor's category, we will examine how, when, and with what ascribed meanings each best-practice model came to be seen as transferable across locations. While each of the three models we examine has a long institutional history, we are interested not in this history per se, but rather in how the *idea* of MIT, of Silicon Valley, and of public engagement became normalized and stabilized enough to constitute an imaginary capable of global travel and uptake. To this end, each model calls for a targeted research plan of its own.

The **MIT model** is anchored in an ample documentary history which covers early attempts to export MIT, e.g., to the Indian Institutes of Technology (Leslie 2006). However, these histories do not recognize the currently changing nature of MIT or contemporary efforts by MIT to export itself. Neither does this body of work cover the recent surge in Institutes of Technology that are being established without the help of MIT, such as the Karlsruhe KIT. Through policy documents, media reports, and literature analysis, we will trace which characteristics of MIT were and are seen as import-worthy, and how these efforts tie into broader discursive shifts from development in the Third World to innovation all over the world.

For the **Silicon Valley model**, through document analysis, media analysis and interviews, we will first identify the component elements that have come to be stabilized, e.g., the rise of venture capital and private equity finance practices, the emergence of the figure of the "tech entrepreneur," the growth of certain iconic technology firms (e.g., Apple), their links to universities and to the dotcom and post-dotcom economies, and narratives of success and failure. We will document when, where, and through

what events "Silicon Valley" became a cover term for these linked institutional identities and practices.

The rise of **"public engagement"** as a model for socially acceptable innovation is related to two decades of perceived crises regarding the risks and failures of new technologies around the world. From the BSE crisis to the GMO debacle in Europe, public engagement emerged as a way to re-configure democracy to be more hospitable to innovation in many Western nations. We will trace the rise of this model through controversy studies, as well as literature reviews (especially on public engagement experiments), media analysis, and interviews.

V.C. Choice of Cities

The four cities chosen for this study have each held the imagination of important actors (policymakers, researchers, businesses, publics) in their own ways. Each city has taken up two or more of the three models, usually in response to explicit policy mandates. However, each represents a different mix of social and institutional characteristics—as well as instructive successes and failures—in its own national context and globally. They stand in distinctive relationships to broader national policies of renewal and regeneration. In short, comparison across them will allow for significant generalizations while also offering ample safeguards and controls against facile conclusions. Several key similarities and differences (briefly summarized in Table 1) justify the selection of these particular research sites.

- **Bangalore**, as India's proclaimed "Silicon Valley," is a poster child for innovation in South Asia and other developing nations. With growing strengths in information and communication technologies, biotechnology, and electronics, it is an example of a high-tech economy superimposed on a site that is still grappling with struggles to ameliorate entrenched poverty, modernize infrastructures, and develop responsive institutions. The city features several of India's prime research and educational institutions alongside a rapidly growing young population, and is a hub for a returning population of MIT-educated engineers and entrepreneurs (Bassett 2009). Yet, observers of Bangalore offer blistering critiques of the injustice fostered by elite alliances that perpetuate poverty in the name of global economic development (S. Benjamin 2000; S. J. Benjamin 1996). Bangalore is particularly interesting as a site in which home-grown approaches (e.g., the championing of "frugal innovation" by some Indian actors) compete with attempts to import imagined best practices from abroad. Bangalore introduces a North-South dimension that prevents reification of such *a priori* categories as "developed" and "developing," showing that all four of the global inno-cities are also "ordinary cities" in many respects (Robinson 2006).
- **Boston's** urban region is widely regarded as innovation-friendly because of its wealth of institutions of higher learning and, historically, its Route 128, synonymous with innovation from the 1960s onward. The "MIT model," with its home in Cambridge, has had considerable impact on Boston's self-image as a center of innovation and on other institutions in the region (e.g., the Cambridge Innovation Center or Harvard's SEAS and Allston Campus, emulating to some degree the MIT experience). Boston remains one of the world's leading knowledge hubs and a "go-to" bio-innovation city, often seen as one of the few serious competitors to Silicon Valley's dominance as an innovation model. Yet, it is also seen as having "missed the boat" in some sense in the IT revolution and in commercial success driven by an entrepreneurial culture as opposed to state-sponsored R&D.
- **Cambridge (UK),** in seeking to reap technological benefits from the university's ancient history of scientific discovery, has benefited from such specific policies as the Cambridge-MIT project initiated by former Chancellor and Prime Minister Gordon Brown, new modes of university-industry collaboration, and public engagement exercises around new and emerging technologies. Despite its relatively small size, Cambridge has thus experienced implementing all three of our best-practice models of innovation. Highly successful in generating spin-offs, Cambridge has arguably fallen short of fulfilling the imaginary of basic science driving industrial development and global commerce.
- **Karlsruhe** and the region of Baden (one of Germany's intellectually and economically densest regions that also includes Heidelberg, Mannheim, and Freiburg) host some of Germany's prime companies and the heart of the "Mittelstand" (mid-sized businesses). A first-round victor in the German "Exzellenzinitiative" competition to foster elite formation and internal differentiation among

universities, Karlsruhe formed the Karlsruhe Institute of Technology (KIT) in an unusual move that bridged the historical divide between universities and extra-university research institutes. KIT, however, lost its "excellent status in a second competition. Karlsruhe also belongs to the regional "Biovalley" cluster that runs through Germany, France, and Switzerland.

Table 1 – Preliminary Overview of Research Sites

			Implementation of Best-Practice Models			
	Regional Characteristics	**Key Actors and Institutions**	**MIT**	**Silicon Valley**	**Public Engagement**	**Tentative Thrusts of inquiry**
Bangalore	Sprawling megacity; developing (BRIC) nation; strong recent economic growth, particularly in knowledge industries; young professional population	Chief Minister's Office; National Knowledge Commission; (relatively) strong research institutions; Indian Institute of Science, Tata Natl. Centre for Bio Sci, Indian Natl. Inst. for Advanced Studies	Attempts to secure an Indian Institute of Technology; other initiatives such as the Bangalore Institute of Technology	"Silicon Valley of India"	ESG-India, Ashoka Trust (ATREE), BATPIC Network	Innovation for development; imagined benefit for the poor; distributive impacts of innovation; science-engineering-entrepreneurship links
Boston	Medium-sized city; industrial nation; old manufacturing center; research and education hub; historic ties to national politics and public research; very international	Major research universities incl. MIT (+ intl. collaborations) and Harvard; start-up culture; Boston Mayor's Office; MA state government; Cambridge City Council	MIT, local emulation efforts targeting MIT (e.g. at Harvard)	Route 128	UCS, AAAS, Boston Museum of Science; Council on Responsible Genetics; local initiatives on SynBio (SYNBERC)	Entrepreneurship as economic driver; "exporting MIT"; Harvard-MIT collaboration and competition; debates on inclusion-exclusion
Cambridge	Small, ancient city; industrial nation; low manufacturing capacity; elitist Oxbridge tradition; "Silicon Fen" designation	National policy and funding bodies; university and colleges; research park and "spin-outs": local city council	Cambridge-MIT Institute (model transfer involving MIT)	"Silicon Fen"	Centre for Science and Policy; UC Public Engagement	Foster "translation"; retain global leadership; specific roles in bio and IT innovation
Karlsruhe	Medium-sized city; industrial nation; old manufacturing center; Mittelstand, "Technologieregion Karlsruhe" (close to other knowledge cities); "High tech meets good life" slogan	Forschungszentrum Karlsruhe; German Center for Technology Assessment, Fraunhofer Institute for Innovation and Systems Science; medium and large enterprises	Karlsruhe Institute of Technology (model transfer not involving MIT)	Biovalley	National Institute for Science Communication; proximity to political and policy centers; KIT Institute for Technology Assessment has branch office in German Bundestag	Competitiveness; "Excellence Initiative" amidst a traditionally egalitarian university system; integration of R&D institutes; imaginaries of scale and scale-up

V.D. Choice of Focal Sectors

The circulation of best practice models for innovation policy across different geographical sites is not in principle restricted to specific sectors of research and technology development. Nevertheless, particular sectors are seen at given moments in history as more or less promising sites of innovation. Two sectors that policymakers in the selected cities are consistently betting on are biotechnology (biotech) and information technologies (IT), as well as the combination of the two. We therefore choose these sectors as starting points for our inquiry.

This choice is compatible with our selection of "best practice" models, which in large part emerged from these two sectors. For example, Silicon Valley is famed for its IT success, includes the well-known "pipeline" of publicly sponsored basic research, liberal intellectual property rules, start-ups and spin-offs, venture capital, buy-out and scale-up by multinational corporations. More recently, Silicon Valley has been increasingly moving into the biotech space, with bio-informatics companies such as 23andMe taking the lead. MIT, too, is well- known for both its work on IT (e.g., the Internet, artificial intelligence) and

biotech (e.g., Route 128 biotech corridor, or companies like Genzyme). Moreover, both biotechnology and IT (e.g., Aaron Swartz case) have seen episodes of great public debate and resistance, which makes them particularly interesting as objects of study.

Both IT and biotechnology are important areas for all four cities in our study. Bangalore owes its reputation as India's innovation city in large part to a booming IT sector, but it also has a major presence in biotechnology and generic drugs in particular. In Boston, traditional strengths in pharmaceuticals and the increasing integration of IT and biotechnology, through collaboration between Harvard and MIT, are important ingredients in the region's success. In Cambridge (UK), the establishment of a partnership with MIT particularly served to commercialize the university's capacities in IT and the life sciences. Baden-Württemberg is part of Germany's "biovalley" and houses the largest software company in Europe (SAP). As sketched below, the cities represent a mix of size, relevant actors, research institutions, and policy focus, enabling potentially extremely informative and interesting comparisons.

VI. Research Methods

Our methods will combine qualitative, observational work at a micro-level with the analysis of primary materials, theoretically informed generalization, and policy recommendations.

- ***Comparison*:** Comparison is an extremely powerful method for drawing generalizable results from complex qualitative data, as demonstrated in prior cross-national comparative projects conducted at Harvard (Jasanoff 2005; Jasanoff 2011; Jasanoff and Kim 2009). The research team will develop common templates for gathering data at each site, centering on the questions elaborated below. Through in-person and (when necessary) electronic meetings we will maintain continuous oversight to ensure that the data are of similar quality and allow for robust comparative conclusions.
- ***Case Studies***: The project will develop historical case studies of the three best-practice models (see above), as well as four theoretically grounded and empirically researched case studies of their implementation in each city. Our case studies will be used to characterize the competing sociotechnical imaginaries that are driving innovation practices in each city, and the convergences or divergences within and across research sites. The research staff are all experienced authors of such case studies.
- ***Archival and document research:*** Our research will cover roughly two decades, from 1990 to 2010. This period, coincident with the rise of *innovation* as a specific policy imaginary and actor's category, begins after the end of the Cold War, German reunification, and the retreat from state socialism in India. Accordingly, it postdates the massive twentieth century geopolitical upheavals that might render the results of the study more equivocal. While this is not a classic historical project, it requires attention to history so that we can trace the development of the best-practice models and the origins of local imaginaries of innovation at each site.
- ***Legal and policy analysis:*** We will collect and interpret information on the formulation and implementation of laws and policies aimed at fostering best-practice transfers at each research location. Official documents offer key insights into the sociotechnical imaginaries of state institutions. Under this rubric, we will include not only governmental policies, both national and local, but also major policy decisions by academic and business institutions and civil society groups selected for detailed study.
- ***Interviews:*** Much of the information we seek for this study cannot be obtained from documents and secondary sources alone. Accordingly, interviews will be an essential component of the project. Interviews will provide deeper insights into the visions of the public good that actors seek to advance and the risks they wish to avoid. Semi-structured interviews will be conducted, using snowball sampling techniques to ensure adequate coverage. Interviews will be recorded wherever possible, transcribed as needed, and securely stored in the project's central data base at Harvard. Since interviews will be for the most part with elite and/or public figures, fully informed of the aims of the project and our confidentiality policies, we anticipate no difficulties in securing IRB approval. Sample issues to raise with interviewees include the following:
    - ***Policymakers:*** What national and local policies have contributed to (or detracted from)

implementation of each best-practice model in each study site?[4] This as yet poorly investigated field includes such city- or region-specific policies as Germany's "excellence initiative" (which initially rewarded Karlsruhe), former UK Chancellor and Prime Minister Gordon Brown's efforts to link MIT and the University of Cambridge, the Indian government's investments in national research centers in Bangalore, and Boston's continuous expansion as a biotech innovation hub under the auspices of the state and local government, biotech firms, and universities. We will ask about specific institutional innovations associated with the adoption of each model, e.g., changes in education and research programs, intellectual property rules, venture capital, or the promotion of university-industry linkages, as well as any criteria or indicators developed to assess and evaluate local programs. To our knowledge, the resulting in-depth look at city-specific innovation policies and implementation in regions of great interest to US policymakers will be a new and substantial contribution to the existing STS and innovation literatures.

- ***Knowledge Creators:*** In each city, we will map the spectrum of research institutions involved in innovation. Mindful of earlier research on the role of universities as engines of innovation, and the growing importance of the science-engineering interface, we will look at the specifics of that interface as reflected in research and education. We will ask how the boundary between science and engineering is overcome. We will study the appearance of new institutional forms and priorities designed explicitly to facilitate best-practice transfers, such as university-industry partnerships and high-tech incubators. Specific data collection goals include:
  - Mobility narratives across institutions, disciplines, sectors (actors' stories about how they got where they are, what they gained or lost, and what they would do differently);
  - New institutional forms for research and technology transfer (e.g., multi-center projects, centers of excellence, science and technology parks, new professional networks).
  - Feedback mechanisms if any between engineering practice and basic science.
- ***Business*:** Private sector initiatives have been essential to implementing each model at each study site. We will particularly study: (a) the links between MIT-like institutes and businesses; (b) the mix of universities, spin-off companies, and multinationals in each city, and the financial infrastructures that underwrite entrepreneurship and the role of venture capital; (c) business-civil society relations and modes of engagement. In addition, we aim to select one successful innovating firm each in the biotechnological/biomedical sector for in-depth study, including interviews and possible participant observation (see below).
- ***Civil Society:*** The role of civil society in making innovation sustainable is frequently underestimated. In part, this is the result of policymakers' tendency to foreground—through boundary work—material rather than social innovation, and to privilege formal policy instruments over bottom-up initiatives. We will compensate for the relative neglect of civil society by looking explicitly at "public engagement" initiatives, for example, consultative exercises in the UK (Rowe et al. 2008), neighborhood and civic politics in India (cf. Benjamin's (1996) idea of "neighborhood as factory"), Green Party initiatives in Germany, and patient-centered initiatives in the US (e.g., PatientsLikeMe). We will also consult with local academics and researchers who have studied these processes in depth in each city.

- ***Participant observation:*** Participant observation, supported if possible by internal resources from various Harvard centers, would deepen our understanding of the cultural specificities of imaginaries of innovation that cannot be obtained through other forms of research. Besides work done by the project team in relevant research institutions (where we are participant observers), we hope to draw on the growing pool of STS students at Harvard to create opportunities for four (one in each city) 10-12 week participant-observation opportunities for Ph.D. students or advanced undergraduates. We will use our extensive transnational networks to place students in suitable institutional "homes" during their research stays. The senior project team will offer the students training prior to their departure and mentorship during their work periods. Though not a substitute for research by senior

[4] This study recognizes politics as the bedrock from which policy emerges. However, we will not analyze recent political or ideological shifts such as the rise of New Labour in the UK, coalition government in Germany, marketization in India, or neoliberalism in turn-of-the-century America.

staff, such relatively short-term participant observation has become increasingly valued among ethnographers interested in multi-sited cultural transformations (e.g. Marcus and Fischer 1999; Marcus 1995; Rabinow and Dan-Cohen 2006). This research would also provide valuable training in transnational policy studies for junior researchers.

- ***Interdisciplinarity*.** The proposal takes interdisciplinarity seriously in two ways which Jasanoff (2010) calls "building an interstate highway" and "charting the high seas." First, several disciplines pertinent to the study methodologies are represented in the background and training of one or more members of the team—including STS, history of science, legal studies, technology and innovation policy, comparative policy and politics, and engineering systems analysis—ensuring that each field's distinctive intellectual strengths are reflected in the project. Second, as in the high seas model, this project expects to use STS scholarship to open up as yet uncharted domains of analysis and reflection in science, technology and innovation policy (STIP) and innovation studies.

VII. Research Team and Responsibilities

This project team possesses unique strengths in the form of decades of cultural and research experience in all four countries proposed for this study, rendering unnecessary prolonged periods of field immersion. A wealth of expertise on policymaking in Germany, India, and the UK already exists within the team, plus active professional contacts in all four countries. The choice of sites is not only theoretically justified but takes advantage of demonstrated, longstanding competence in area studies and comparative policy analysis led by the PI at Harvard and earlier (Brickman, Jasanoff, and Ilgen 1985; Jasanoff 1995; Jasanoff 2005; Jasanoff 2011; Jasanoff and Kim forthcoming). In short, this experience allows a relatively low-cost, ambitious study to build on prior investments in research and human resources by NSF and the PI.

Principal Investigator

- **Sheila Jasanoff** (Harvard Kennedy School) is Pforzheimer Professor of Science and Technology Studies. Jasanoff has thirty years of experience in comparative research and (post)graduate training and has published extensively on science and environmental policy and politics in all four countries represented in this study. She has close ties to academic networks and significant ongoing contact with relevant policy institutions and actors in each city and country. Jasanoff will be primarily responsible for overall project management, research personnel training and mentoring, comparative analysis, and dissemination, and for the Cambridge (UK) case study, for which she has special competence through academic affiliations and her prior research on the biotech sector. She will produce sole-authored publications, coordinate group write-ups of project results, and assume editorial functions as needed.

Other Staff

- **Sebastian Pfotenhauer** (MIT): Trained in technology and public policy at MIT and in physics and philosophy in Germany, Pfotenhauer is a specialist in the comparative study of innovation, collaborative and international innovation policy for technology capacity building, and the critical study of universities in innovation, with particular focus on the dissemination of the "MIT model" around the globe. A research scientist at MIT, he is currently co-leading a project on "Complex International Innovation Partnerships" and has worked at the OECD Division for Innovation and Measuring Progress and as a consultant to various governments in the development of regional innovation capacity. He has been particularly attentive to translating STS ideas for policy audiences (e.g., Pfotenhauer et al. 2012). He will be chiefly responsible for characterizing the MIT model and conducting the Karlsruhe case study.
- **Erik Aarden** (University of Maastricht): Aarden received his MA and PhD degrees in STS from Maastricht University in the Netherlands. His dissertation was a comparative study of the integration of novel genetic diagnostics in the public health care systems of the UK, Germany, and the Netherlands. Previously, Aarden worked in collaborative, cross-national European STS studies in Maastricht and as a staff member for the VDI Chair of Futures Studies at RWTH Aachen, one of Germany's premier engineering schools. Currently, he completing a two-year period under a European Union Marie Curie Fellowship. His prior research includes case studies in the US, India and Europe and comparatively addresses developments in medical population research and repositories in relation to health policies. It brings together national, local and global practices and policies that shape innovative approaches to

medical research. Aarden will be primarily responsible for characterizing the public engagement model and the Bangalore case study.

- **Margarita Boenig-Liptsin** (Harvard): Trained in international relations at Stanford University and history of science and STS at Harvard, Boenig-Liptsin brings to the project firsthand experience of the "Silicon Valley model." Her dissertation (expected 2015) on the history of programs of computer literacy in the US, France, and Russia prepares her to conduct comparative research on S&T and innovation. She is currently finishing a co-authored study of imaginaries of innovation at Singularity University (including some participant observation), and more broadly on the start-up culture in Silicon Valley (of which she is an alumna), as part of a Templeton Foundation funded project on "Transhumanist Imagination: Innovation, Secularization, and Eschatology" (with co-PI Benjamin Hurlbut). She will be primarily responsible for characterizing the Silicon Valley model and the Boston case.

VIII. Results of Prior NSF Projects and Current Grants

Standard Research Grant: ***Sociotechnical Imaginaries and Science and Technology Policy: A Cross-National Comparison*.** NSF Award ID 0724133 Dates: 9/1/2007-8/31/2010 Amount: $350,000.	*Intellectual merit*: Through a three-country comparative study (including the US, South Korea, and Germany), the project developed the concept of "sociotechnical imaginaries" to advance the understanding of the national and transnational politics of science and technology (S&T). Work supported by the grant resulted in: (1) data on policies and public debates related to nuclear power, stem cell research and nanotechnology in each comparison country; (2) theoretical reflection on and elaboration of the concept of sociotechnical imaginaries. Investigators successfully raised parallel funding for an international workshop on sociotechnical imaginaries, conducted in the fall of 2008; an edited volume resulting from the workshop, entitled *Dreamscapes of Modernity*, is forthcoming with Chicago. One substantial and widely cited publication has already resulted from the research (Jasanoff and Kim 2009). *Broader impact*: The project trained postdoctoral fellows S. Kim and J. B. Hurlbut (both now in tenure-track positions), as well as several visiting STS fellows and Harvard undergraduate researchers. It built links with two European centers around the concept of sociotechnical imaginaries, at Bergen, Norway and Vienna, Austria. The project gave rise to a new, web-based, research and teaching tool: the "research platform" on sociotechnical imaginaries designed and maintained by the Harvard STS Program.
Collaborative Research: ***Technology, Collaboration, and Learning: Modeling Complex International Innovation Partnerships*** NSF Award ID 1262263 Dates: 7/15/2013-6/30/2015 Amount: $198,263. PI Dava Newman (MIT); Research scientist (50%) Sebastian Pfotenhauer (MIT)	*Intellectual merit*: This recently launched project studies Complex International Science, Technology, and Innovation Partnerships (CISTIPs) as an emergent phenomenon through which countries seek to improve their technological and innovation capability in specific sectors by partnering with a globally leading organization. This project will look at two sets of case studies from the sectors of collaborative satellite development projects in developing countries and innovation ecosystems enhancement through international university collaborations. Drawing on several distinct bodies of literature, the project will analyze the technological, organizational, social and policy dimensions of these partnerships. The project, funded through the NSF SciSIP program, is broadly synergistic with the present proposal as its primary focus on *partnerships* casts light on key activities through which best-practice transfers are being enacted.
Standard Research Grant: ***Life in the Gray Zone: Governance of New Biology in Europe, South Korea, and the US*.** NSF Award Number SES-1058762. Dates: 06-01-2011 - 05-31-2014. Amount: $165,511. PI S. Jasanoff [**Unrelated study, in progress]**	
Standard Research Grant: **The Fukushima Disaster and the Politics of Nuclear Power in the United States and Japan.** NSF Award Number SES-1257117. Dates: 04-01-2013-03-31-2016. Amount: $175,684. PI S. Jasanoff; Senior Researcher Kyoko Sato (Stanford) **[Unrelated study in progress, no salary support for Jasanoff]**	
INSPIRE Track 1: ***Transforming Remotely-conducted Research through Ethnography, Education and Rapidly-Evolving Technologies***. NSF/Subcontract via Woods Hole Oceanographic Institution. NSF Award Number at Woods Hole: OCE-1344250. Subcontract Award Number A101073. Dates: 09-01-2013-08-31-2015. Amount: $229,678. PI S. Jasanoff; Senior Researcher Zara Mirmalek **[Unrelated study, no salary support for Jasanoff]**	