Building on the Past, Imagining the Future: Competency Based Growth Strategies in a Global Digital Age

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The policy objective for governments is classic and enduring: sustain the growth of employment and productivity to assure expanding real incomes of the citizens. Success requires that "under free and fair market conditions, the community (firms and populace) can produce goods and services that meet the test of international markets while simultaneously expanding the real income of its citizens."[5] Yet, the logic of competition and value creation in global markets has evolved. Consequently, old strategies of simply supporting the competitiveness of particular national flag firms or chasing smokestacks are clearly obsolete, but merely investing in R&D or education is not sufficient, and doing nothing is a formula for decline. Regions have to conceive new strategies to find distinctive advantages to support employment and productive activity. Those strategies will need to target competencies, not particular firms or specific sectors. We argue, first, that basic shifts in global markets have altered for firms the logic of value creation and the character of competition. Second, we contend that this changed value logic also alters the policy choices and growth strategies for places, be they regions or nations or simply communities. The focus of and foundation for policy analysis must be the domains of competency that underpin diverse activities of firms and are central to competitive advantage in sectors. Finally, we argue that there are no magic strategy

bullets, but rather an array of options and choices. Successful strategies will emerge by building on the past while imagining the future.

I. The new logic of value creation alters the policy problem, even though the objective of employment and productivity remains. Two shifts in the value logic are at once central to the competitive positioning of firms and critical to economic growth and productivity. Therefore, these shifts both create policy opportunities and constrain government action at the same time.[6] The two shifts are: the decomposition of production, with the corresponding intensification of competition from diverse new entrants; and the service transformation, that is, the expanding importance of services to productivity as their nature, organization, and delivery radically changes.[7] As a consequence firms are constantly searching for the sweet spot in value networks, the defensible point in the market. That constant search and adaptation demands an array of competencies -- from creative design and production strategies to innovative solutions to using knowledge.[8] Among them is the competency to manage the tacit interactions that allow firms to implement effectively the knowledge and understanding embedded within each competency domain, and to combine or recombine the competency domains in new and innovative ways.[9]

a. Decomposition of production: Production of both goods and services is no longer organized in vertically integrated hierarchical companies focused on home locations.[10] Businesses can ever more easily break apart their activities and then outsource and, more controversially, offshore the pieces, reassembling them back again for final delivery.[11] This process of production decomposition -- referred to in

manufacturing as modularization and in services as unbundling -- is at once geographical and organizational.[12] An array of American firms, for example, offshore activities to India within a corporate hierarchy;[13] while Infosys, an Indian company, provides means for companies to both outsource and off-shore activities.

As a consequence of this locational dispersion, the traditional strategy of supporting the "home, national flag" players in the market may not sustain the "home" communities. Support of national or regional companies often generates jobs and development in other places and countries. The debate over offshoring springs from this dispersion of production. The core location of innovation, not just employment, is at issue.

The notion of a value network or web of production modules and service bundles, as opposed to a simple chain, suggests the constant re-orchestration and relocation of the components of value creation.[14] Boeing and Apple create such networks quite differently; but they each retain the core product definition, at least for now. Each subsystem, module, task, or component suddenly becomes a potential product and a new competitor in inter-firm and international trade.[15]

The commoditization of particular goods and service activities accelerates the increasing pressure to innovate in products, processes, and firm-level organization. The semiconductor industry is a perfect example. Firms once had to both design and fabricate their chips. Now production is often decomposed into companies focusing on fabrication and process/manufacturing innovation and those that focus on design and product innovation. New competitive pressure appeared in all stages of production.[16]

Conversely, each point of entry creates an opportunity for firms and places.[17] Consequently, the competitive struggle is increasingly for distinctive advantages in the shifting "sweet spot" in value networks and the capabilities to sustain innovation. There are diverse strategies to capture advantage from the possibilities that the corporate re-orchestration of development, production, and distribution represents. Taiwan created a sweet spot through the business organizational model of the "pure-play" foundry. For Apple, the iPod is extremely well designed, but the iTunes service is what anchors its position in the market by providing easy consumption and a good user experience while at the same time offering one, but not the only, solution to the problem of intellectual property rights.[18]

b. The services transformation: Services, previously considered a productivity sinkhole in the economy, are increasingly viewed as a central part of a modern economy, serving as a driver of productivity growth, competitive advantage, and innovation.[19] The services industries have grown in quantitative size, becoming a significant part of the economy. The value of the intangible outputs of the residual category, services, is now larger than the value of the outputs of the goods sector. But the category is really an afterthought, a residual miscellany in the national accounts; a jumble of activities that are not manufacturing, extraction, or agriculture.[20] More importantly, the growing significance of services is not about the growth in quantity or value of activities labeled services. Rather it is that service activities, human activities in general, are changed when they can be converted into formalizable, codifiable, computable processes -- processes often with clearly defined rules, algorithms, for their execution.[21] Much of the service innovation then is around the adoption and effective implementation of IT tools.

Certainly routine and manual functions are automated, enabling the fundamental reorganization and relocation of service activities. However, it is not just the traditional service industries themselves that will be recast, but the entire business environment.

The algorithmic revolution, the decomposition of information and service processes, permits revolutionary innovation in business models.[22] There are varied and diverse consequences. First, once considered to be intensively personal services, such as home nursing, are changed into sensor-based monitoring systems.[23] Second, many service products, both media and finance, are in fact encapsulated information. Sometimes the information itself is the product. In other cases, such as financial services that encapsulation of information facilitates the development and application of sophisticated risk algorithms.[24] Conversion into digital format facilitates their delivery on-line to computers, cell-phones, iPods and the like. Third, and conversely, the encapsulation of information in digital form creates entirely new products from websearches to GPS location systems. Fourth, an array of internal company functions, even production, are suddenly available as services bought in the market. Modularization and outsourcing increasingly recast internal manufacturing functions as a service that companies can buy on the marketplace, as with semi-conductor fabrication and electronics. Indeed, the manufacturing division of IBM was spun-off as Celestica and is now one of the world's largest electronic contract manufacturers.[25]

Fifth, services have become central to value creation and critical to the effort of firms, including manufacturing companies, to escape the quagmire of commodity status.[26] IBM has, for example, transformed from a company selling a product in which service support provided competitive advantage into a Service company embedding

products in its offerings. Is the iPod, or iPhone (both, incidentally, produced and partly-designed on service contracts for Apple by various sub-contracts), a product or a portal to enter a services domain. Itunes has been crucial to the success of an otherwise commodity MP3 player. Slowly, the purchase of a CD blurs into a service, a subscription to download music. The services that ride on the product platform become the differentiated asset that creates value for the firm. This, of course, further blurs the already fuzzy line between product and service, and more generally blurs the lines between sectors. Consider the small device, the block of plastic that we variably use as a phone, camera, music player, document viewer, train-pass, or GPS navigator. Evidently, there are a range of industries and services competing for the equivalent of shelf space on the device. Is Nokia in the phone business, the software business, the music business, the camera business, or the PDA business?[27]

Finally, there are significant implications for the character of jobs and skills in the economy. We see the paradoxical development that as more processes are captured in algorithms, the relative value-creating weight of the tacit interactions -- those human activities and competencies that could not be captured in the algorithms -- grows.[28] The implication is that at once analytic skills and the management of tacit interactions becomes more critical. Indeed, the skill sets required in leadership of tacit interactions is sharply different from that required for the formalization and optimization of routine codifiable tasks. [29]

c. The consequences: The consequences for firms of the modularization and unbundling of production, the deconstruction of the vertical corporation, and the algorithmic transformation of services is a constant struggle for an ever shifting sweet

spot in the value network. A diverse and unpredictable set of competencies will be required to adjust and adapt. Firms must seek defensible positions with high value creation in the networks of development, production, and distribution. There are constantly shifting levers of advantage as, for example, internal functions such as development or production become services to be bought or sold on the market. Indeed, internal assets that at one period could create differentiation in the market can quickly become vanilla commodities. R&D can be bought from universities or through acquisitions of start-ups. Production can be bought as a service in the form of assembly, components, or entire implementation of production systems.[30] Firms producing equipment find themselves in the services business, for example, recently Nokia started to offer access to media products as a way of providing its network clients/customers an array of alternatives. For companies, this constant adaptation requires an array of competencies, or at least access to those competencies, as the requirements to compete move and shift. Perhaps central is the effective use of internal knowledge and access to external sources of knowledge, mobilizing what a firm knows and might need to know.

For places – regions -- the decomposition clearly means that local firms may so disperse activities that they don't assure jobs and productivity growth, the local factories may become irrelevant or the functions moved. So targeting support to a particular local or national firm will not assure growth. And indeed as the boundaries between sectors blur, targeting specific sectors can be fighting yesterday's battles. If firms will need a diverse array of competencies, then *places must become the source of these competencies*. Accordingly, the policy questions and solutions have to be rethought.

II. What should regions do? Places, not just products, risk commoditization. A place is a source of inputs into firms' processes of developing, producing, and distributing goods and services. If the resources or assets in a particular locale, whether technologies or the skills of labor, become widely available and can no longer be differentiated from similar technologies and skills in other places in the global market, they become commodities. As commodities they are immediately subject to intense price competition, competition that may be experienced as pressure on wages.[31] Places, as well as firms, must protect their unique offers from being commoditized in the digital economy. Places, as well as firms, must develop competencies and assets that allow them to retain high value added activities and good jobs. But that objective means different things for firms and places, and different things for different places. While the objectives of firms and governments can, quite evidently, be contradictory, they are also intertwined. Firms must operate somewhere, and regions want to be that location.[32]

A firm, however, may reorganize and relocate its activities in pursuit of its own advantage, drawing on capabilities and resources from wherever it can find them. The threat for a place is the cumulative loss of mobile activities. Consequently, a "place" must strategically combine its immobile assets (e.g. infrastructure, training, "brand," and tacit knowledge in its community and workforce) with their valuable mobile resources (e.g. capital and highly skilled labor) in order to attract other valuable mobile activities and firms in a global economy. Since the mix will likely be constantly shifting, places must pursue employment and productivity, but defending particular jobs may be counterproductive. Regions must invest in mobile resources, even at the risk of losing them. The University of California is a perfect instance. Substantial public resources are

invested in educating and training students who might move anywhere. But that investment has built a competency in research driven innovation that has made California and the Bay Area a center of high technology development, pulling in people, ideas, and projects from around the world.

One overly simple answer floating about is the imperative to innovate. Too often the term is so loosely used to refer to all changes which increase value creation across every stage of production, distribution, and services that it risks becoming more of a Mantra than a strategy. As an incantation, it does not tell a company, or a "place", which are the crucial changes or how to accomplish them. A strategy for regions must move from abstractly stating the need for innovation to concretely defining the areas and types of innovation where the region can excel and achieve lasting distinctive advantage. Determining what those areas are will depend on the unique actual and potential competencies of the region.

Similarly, it is easy to say, find the sweet spots in the value chain, that is create differentiated products for which the customers will pay premiums, or differentiated processes that create distinctive advantages. What we know is that places that have been successful in adapting have done so with a whole variety of market solutions. Consider the Nordic countries. In Denmark, small- and middle-sized firms, networked through a whole variety of community based mechanisms, have competed effectively. Although it has not always been understood, a competency in the low volume high quality production has been important in Danish success. At a time of massive off shoring from the Western economies, there has been an influx of manufacturing to Denmark based on the competencies of the factory floor workshop.[33] Finland's success has been built both

around the recasting of old competencies domains, for example the forest industries complex, exporting products such as paper and lumber and forestry tools, as well as mobile telephony, in particular Nokia, developing significant new competencies in domains Finland was not active before.[34] A significant and sustained public investment in competencies in these domains was a central feature of the story. Israel built success around diverse leading edge technologies. Ireland grew as an outsource heaven with special competencies emerging from that, and Taiwan emerged through innovation in process and product design with distinctive competencies. There was no single bullet. There has been no single strategy. In each case a distinctive advantage was established creating, and resting on, unique competencies.

III. Competencies must be at the core of growth strategies. Regional strategy must focus on, target, the core competencies that underpin diverse activities, firms, and sectors that are central to the competitive advantage of companies, and consequently of places as well. Developing competencies, and the regional capacity to see those competencies combined in productive and profitable activities, must be the focus of growth strategies. Strategies must assure that investments of all sorts continuously add to the region's competencies and the capacity to combine them productively. Consider the discussion about the creative class as an example of a "competency" and investment to develop it.[35] The notion of the creative class is that since creative and talented people are required for firms and regions to adjust and adapt in the global economy, policy should focus on attracting and promoting this talent, this competency. This is the right track, but a singular spotlight on this one competency is far too narrow a focus. The notions of attracting a creative class, distinctive investment in digital networks, or training strategies

are all aimed at this problem of developing regional competencies. Of course, as Jonathan Murray reminds us, the problem is fundamentally "developing the inherent creative skills broadly across the education system so that we raise the creative capabilities of all, not just a few elites. The higher paying value creating jobs in the economy will be filled by folks with a significant creative component to their skill sets. The issue is the broadly based Creative Capacity (we use the term competency)."[36] The regional capacity to combine and deploy these competencies in productive activity and profitable firms, supporting employment and growing real incomes, depends also on the infrastructure of communications and transportation,

Let us consider for a moment the notion of "competency" as the core requirement to compete in an intensely competitive global economy. In a world of commodities, the challenge is to find the sweet spot in the value network. The question for places is what investments to make, and how, so that firms at their particular locations can develop distinct strategies to generate specific advantages. The core idea is to consider what a place is competent to do, and how to deepen those competencies, expand the list, and assure the local capacity to combine competencies into productive activity.

But what are the relevant competencies or competency domains, as we will , them? Which competencies permit a firm or a locale to place itself in the high value added segments of the value network? We specify five competency domains here, each essential to corporate capacities to compete globally, and consequently something a "place" may want to provide. The list is not meant to be definitive, but indicative. Indeed, within each of these competency domains there is a wide array of "competencies" at play, some of which are not necessarily compatible. But even if we cannot draw the

boundaries clearly at this point, and might debate what falls in which category we need to start the conversation and the mapping somewhere. These competencies are sometimes bundled inside of companies and sometimes outsourced, but a region, a locale, wants to be the location where they take place.

The first competency domain is *product creation*. This is really a set of competencies beginning with conception, definition, and design. We emphasize that there is a major difference between the ability to come up with a new product altogether and the ability to define it and design it. That competency needs to be distinguished from production engineering.[37] Bang and Olufsen, the Danish high end consumer electronics firm has, in our view, defined many products, often doing the careful design and engineering in-house it has often taken an existing product conception, a CD player for example, and turned it into a design art-form. IDEO by contrast, is an instance of a company that sells aspects of this capacity as a service to other firms, helping them to define products and designs. For example, IDEO defined the first production mouse for Macintosh and Lisa. Or consider Motorola. With the advent of digital technology, people tend to forget that not so long ago this American company was world famous thanks to its competency to come with many a new analog mobile communication device, from the first commercially successful pagers, to the early, analog, mobile phones.

This activity, imagining concepts and translating the imagination into operational process/product, often requires tacit knowledge and skills that can't be codified and moved around easily. Hence those skills are a magnet to attract activities. And once the skills move part of the regions more general attraction is lost. Developing distinctive advantage and training in industrial design in general and in particular segments can

generate a “skill community” that attracts development and production activities into a locale. Once a region has successfully invested in or attracted skilled workers in this area of production design, it can be situated in the global production network value network where high value is generated. The production of mobile phones gives some insight into this. Mobile phones have become plastic and metal boxes wherein an entire array of services and features are bundled together. This bundling is often conceived of at the product definition and design level. Now mobile phones have GPS navigation systems, digital music playing capabilities, e-money service functions, pedometers, televisions, and internet browsers. It is no longer clear what exactly a mobile phone is anymore. Rather, it is a box of capabilities that have been conceived of and bundled by a concept team, and therein we see the value created. Take the case of the smart phone. Microsoft’s engineers create new reference platforms for the smart-phone. Then HTC, a Taiwanese firm, takes that reference platform and creates unique and differentiated implementations.[38] If regions are able to draw in or create those businesses, they can defend the value created.

The second competency domain is in *production engineering*, including manufacturing, the *integration of production activities* distribution, and logistics. There is clearly not a single expertise in this domain, and companies and places do differentiate within it. There is a radical difference between the lean production model of Japan or the volume models of Korea and the high quality low volume expertise noted in Denmark.

Much of the story of how high value is created in the modularization age is one of orchestration. As businesses activities break into modularized elements, those multiple sub-components risk floating away. Those disparate bits may (or may not) create high

value, but unless they are recombined for final delivery, they hold little market value in themselves. Obviously, the traditional vertically integrated company did such orchestration under one corporate roof and sometimes in one locale. Coordination was relatively easily, as everything was internal to one corporation and many times co-located in one region. However, as businesses break apart and modularize, some part of the business has to orchestrate those modules in order to ensure competitive success. Dell and Compaq (now part of HP PC and laptop division), as companies, have created value and advantage by very differently orchestrating sales and production for what amounts to commodity boxes. The product designs, let alone the constituent elements of the notebook computers, have been largely outsourced and modularized, and many business processes unbundled offshore. Cynically, much of the two companies business activities have been modularized, often turned into commodities, and now both companies produce almost nothing of the product sold to the customer under their name, in many respects the two are little more than a branded label on a shipping container. Dell and HP are, in a sense, the master orchestrators of modules that float around the global economy, with expert competency in creating high value from the management of disparate low-value modules. More recently they have made a new strategic move and taken that coordination a step forward by acquiring high end system OEMs, Voodoo in the case of HP and Alienware in the case of Dell, which is enabling them to try to differentiate the commodity boxes through performance and design.

Other companies opt not to deal with the final users but to sell orchestration as their fundamental line of business, whether as producers of specific products such as

notebook computers where the most noted example is Quanta, or as general contract manufacturers of diverse products such as Solectron or Flextronics.

The third competency domain is *innovation in the underlying components and constituent elements of products*, that is, integrating science and technology advances. This may be innovation in screen technology or micro processor design, or the production technology for semi-conductors. Each module, each unbundled process, is a marketplace target for innovation.[39] Research and design labs comprise much of the high end technical engineering skills that make our previous example of mobile phones possible. Science based engineering schools such as Berkeley, Stanford, MIT, and Georgia Institute of Technology link to companies that often "buy' their innovation in this manner. One mechanism for such investment is in advanced engineering communities and the appropriate institutions to link them to the private market.

Enormous private and public attention is focused on this domain. Indeed, the recent interest in venture capital, industry university relations, and many aspects of the open innovation discussion are all elements of this domain. Silicon Valley is evidently a "place" with this focus and competency; the list of its success would include Intel, National Semiconductor, Maxtor, Sun and so many more; but it is not alone. Israel's basic technology bet is an example of a successful national development strategy focusing on this competency, and similarly San Diego is a self conscious effort to create such competencies.

Branding and marketing is a fourth competency domain. But branding is no longer an afterthought. It is not separable from strategy, positioning, and investments in skills and technology. A company has to be able to deliver the brand it promises, and

hence be organized around that promise. Through creative branding, businesses can create blue oceans of value, that is, to define their offerings in ways that position them in large markets with few competitor -- blue oceans of value -- rather than being stuck in the waters of more established market segments with highly contested frenzied competition. They try to escape the commoditization trap. [40] Southwest airline entered the market with an innovative product offering of low-cost basic service and organized itself building a national network around that offer. Now, Virgin US airline is trying to differentiate its offering within the low cost segment by offering substantially different services in the cabin, soon to include internet access, on specific routes. The screwtop wine industry is in a different market than that of the sophisticated AOC, Appellation d'origine Contrôlée, wine products of France. Additionally, as value is often created in the mind of the final consumer, value is often defined by branding. For instance, Apple Computers introduced its iMac in 1998 not just as a computer with affordable and advanced computing capacities, but also as a part of a new lifestyle of creative, humanistic approach to computing. Since then, Apple has associated its brand with outsiderism with a youthful, artistic edge; the key for Apple has not been to brand itself to products, as it has been traditionally done, but to emotions and social identities. This strategic marketing, and branding, has saved Apple from its near death ten years ago and come back to creating enormous high-value for both the company and its region, Cupertino. BMW tries to become more than a car by branding itself as "the private independent car company" that produces the "Ultimate Driving Machine."

The list of competency domains would be quite long; these instances are meant simply as examples. Again, to repeat, the notion of a creative class likewise points at the

notion of competencies.[41] The debate must be about which competencies are central to the ability of firms and regions to adjust and adapt to the fluidly shifting global economy. These particular competencies must, of course, be combined in innovative ways within existing firms or new firms; an entrepreneurial competency if you will.

So our fifth competency domain, to truncate a very complex discussion for now, is a set of *bodies of knowledge embedded in infrastructures and business systems and the social competence to use them.*[42] For example, there is the competency to financing and launching innovative activity. The American venture system concentration in a few locations in the United States is a classic instance of a body of competencies that grew up initially and principally through the expansion of the IT industries. Likewise, there is the competency to exploit effectively the new possibilities of data and communications technology. That is not just a matter of collections of individual skills. It is very much a matter of the IT infrastructure. In the 19th century the critical transport systems in the economy were roads, railroads, and telegraph. In the 21st century the data network system, in all its varied forms, will be critical to the business experimentation central to generating competitive advantage. The IT infrastructure without the competency to use it, and to find new uses for it, is like new computer stacked in a school store room. Information technology required broadly based competencies in computer skills, not only to build the new tools as products and services for sale, but to effectively apply them, and imagine their implications for all the sectors that use them.

IV. Building on the Past, Imagining the Future.

For the government of a place, the question remains: invest in what? There are choices about what to target and how to measure success. How do policy makers identify which competencies are crucial for sustained growth, and which are secondary?

There are no magic strategy bullets in this era of networks, production decomposition, and the services transformation. Rather there are an array of options and choices. The Irish build by accumulating competencies from a portfolio of MNCs off-shoring into Ireland. The Israelis invest diversely in support of novel product innovation in advanced technology. The Finns have established national institutions to harvest technology from around the world, developing a distinctive capacity to identify crucial technology developments wherever they are occurring. They then make the public and private investments in the internal competencies that are required to effectively integrate in Finland the technologies they harvest abroad. The Danes have developed networks of small and medium sized firms, and armed them through public investments in training and institutes with competencies in several domains from design to technology. Taiwan through policies that institutionalize a unique division of labor between public research institutions and private companies has made heavy investments in both production engineering and product creation. Those investments contributed to a profound restructuring of the semiconductor industry that has seen much of firm design, development and marketing separated from production.

Strategy choices have emerged from two complementary perspectives. One perspective, building from the past, asks how existing community resources can be deployed and redeployed in new market and technology circumstances. This analysis begins by identifying, mapping, existing competencies and clusters of firms and

activities. It then consider how these competencies and clusters can be oriented, recombined, reposition, supplemented and complemented to be the foundation of value creating activities. The Swiss watch-making districts self consciously asked where their special array of skills could be redeployed. The Danes asked how their tradition of local networks and collaborations could once again be a foundation of competitive advantage.

A second perspective, imagining the future, seeks to envision and generate radical new trajectories of growth. Although this strategy does not build from a completely blank slate, new directions certainly require generating new competencies and establishing new infrastructural capabilities. There are clear stories of places – nations, regions, and communities – levering themselves onto new trajectories. Narrowly, the establishment of the UCSD campus of the University of California was the basis of a technology rooted growth trajectory in San Diego. More generally, American science based engineering and venture based entrepreneurship did not ineluctably emerge from the trajectory of American industrial development and growing wealth. Indeed, the flow of scientists from Europe to the United States before and after WWII created a special community of sophisticated breakthrough science while the challenge of sputnik pushed the US government to mobilize it. Tinkering with the investment and risk rules channeled that competency into venture based start ups. Different examples are ample,from the redirection of the French state after World War II in support of economic development to the strategies employed by Japan, Korea, Taiwan, or Ireland.

An initial task is to account for the diverse strategies; what institutional features and political arrangements seem to lead to particular strategies and successes? Why do the Israelis pursue a narrow focus on high end R&D and the Irish on FDI targeting? The

question is then, how and why do government choose specific policy directions. While the debate around the question of why governments choose specific policy directions, has had been fiercely fought in the social sciences for years, Breznitz argues that the particular cases of science and technology based competencies, the answer can be found by looking at three specific domains: i) the bureaucratic structure of knowledge, that is how do the developmental agencies access the scientific and technological knowledge they need; ii) the ways in which government treat foreign companies and capital both inside and outside the national border, in particular how does the state try to link local companies with the global production network and financial markets; and iii) the particular sectoral politics of state-industry relations and the ways in which they co-evolve.[43] For example, the Taiwanese development bureaucracy consist of officials with graduate degrees in science and engineering and deep knowledge of technology and the global industry, making it easier for them to view the public sector as the natural loci of industrial R&D. Politically, the Taiwanese were also very keen on the local industry to be Taiwanese owned and invested. Consequently, the government opted to establish public-research institutes-based development policies in both the semiconductors and software sub-sectors of the IT industry. However, while in semiconductors the politics of state-industry relations led to a mutually beneficial division of labor, in software state and industry directly competed and growth stagnated.[44]

A second task, a complement to the first, is to identify what capabilities, in the form of institutions or political coalitions are required to generate particular strategies. Two issues stand out from the cases and an analysis of successful strategies. First, there must be a dialogue between the public and the private about how public investments in

infrastructure and competencies can open private investment possibilities that generate broad growth and productivity gain. It is inevitably a discovery process.[45] The needs and concerns of firms present in the country or region are certainly a place to start. But they can only provide clues and hints of the issues at hand. Likewise, the evolution of particular firms or sectors can provide clues, suggesting which competencies are essential. But, we must remember that the firms and sectors most immediately at hand in a region are not necessarily a good guide to the competencies required for competitive advantage going forward. The second issue is the risk that the government investments are captured by particular private interests and used for narrow gain. Of course, the notion of competencies, unless more carefully linked to an argument about growth, employment, and firm competitiveness becomes a justification for everyone's pet project. The discovery process must, therefore, be insulated from capture.

Since dialogue and discovery are central, therefore, it is not surprising that many of the countries that have been quite successful in devising growth strategies have effective institutions for discussions and dialogues among different social groups, and between economic actors, what some of us have termed "collaborative-public-spaces"[46] [47]. When institutions of dialogue are effective they provide an interplay of conversation without allowing capture by private interests for narrow and immediate gain.[48] Those strategies inevitably involve a resolution of the simultaneous equation; how to at once solve the technical problem of supporting innovation and the political question of distributing the gains.[49]

A comment on the relation of the several "places" to each other is needed. Given the decomposition, modularization and unbundling, there are diverse competitive

strategies. There is no single path to competitive success, so regions are not necessarily rivals. While a company must find its defensible place in dispersed value network, the sweet spot of value creation, its success depends on all the other nodes and elements of that value network. Similarly, a "place" must its defensible node, and that node depends on its relation to other regions. Consequently, rather than bench marking in a numbers game that sets one region against others, a dialogue amongst regions can provide the contrast from which one sees one's own distinctiveness and hints and clues toward possible choices for the future. Since success requires distinctiveness, benchmarking with similar regions might not provide the answers. Regions might find that dialogues with, and inspiration from, a group of different regions, whose situations, choices, and dialogues are quite different, provide better insight. However, most regions tend to solely benchmark themselves to, and learn from, what they view as their most similar competitors.

V. Toward Competency Based Regional Growth Strategies. Regional growth strategies must focus on building competencies and the capacities to combine those competencies in productive competitive activities and firms. Supporting particular firms or sectors, particular clusters of jobs, does not work in an intensely competitive global economy with footloose firms, modular production, unbundled services, and shifting boundaries and definitions of sectors. Yet the core regional objectives remain the same, to assure that under free and fair market conditions, firms in the region produce goods and services that meet the test of international markets while simultaneously expanding the real income of the community.

The decomposition of production opens an entire panorama of possibilities to accomplish these goals. But there are no silver bullets, no particular maps that can define and guide choice. The national and regional successes of the past years have been diverse and based on quite different logics and foundations. Multiple solutions will need to be individually crafted.

Hence, governments can target the development of competencies on which competitive advantages can be created. The choice of the focus will depend of course both on the institutional and market legacies, and the possibilities perceived in the market by entrepreneurial private actors, as well as public/private analysis of emerging market and technological trends. Obviously the mechanisms for public/private dialogue will be essential.

Regional strategies will be as essential as ever, they will need to focus on the building blocks of success, competencies and capacities. The trick will be to identify which competencies are critical and can be effectively developed in particular places. And the related task is not to focus on particular competencies, but on the package of competencies the region will need to embody. Doing that will require mechanisms for public/private dialogue, sophisticated analyses, and discourse with other regions trying to solve the problem in ways particular to their situations

Endnotes

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[3] Dan Breznitz is an Assistant Professor of International Affairs and Public Policy Georgia Institute of Technology.
[4] Derek Luan Ming Wong is a graduate student in Political Science at Berkeley.
[5] Cohen, Stephen, D. J. Teece, L. Tyson, and J. Zysman. "Global Competition: The New Reality." *President Commission on Competitiveness.* Vol. 3., 1984. (This commission, chaired by John Young, then CEO of HP, led to the creation of the Council on Competitiveness.
[6] Harvard Professor Dale Jorgenson's path breaking work on productivity has altered views of how to track productivity and what is sources are. The evidence is quite convincing. For example see: Jorgenson, Dale W., Mun S. Ho, and Kevin J. Stiroh. Information Technology and the American Growth Resurgence. Cambridge: The MIT Press, 2005.
[7] Zysman, John, "The Algorithmic Revolution – The Fourth Services Transformation," *Communications of the ACM* 49:7, 2006.
[8] Our earlier research suggests that some firms and places, particularly in the Nordic countries, have distinctly new approaches to knowledge management, that those approaches are entangled with distinct high value added use of skilled labor, and that the firm choices about how to employ skilled labor can be influenced by policy. Zysman, John and Abraham Newman eds. *How Revolutionary was the Digital Revolution National responses, Market Transitions, and Global Technology*. Stanford: Stanford Business Books, 2006. See in particular the articles by Nielsen, Niels Christian and Nielsen Maj "Spoken About Knowledge: Why It Takes Much More than Knowledge Management to Manage Knowledge" and Schultze-Cleven "The Learning Organization: A Research Note"
[9] James Manyika "The Coming Imperative for the World's Knowledge Economy" Financial Times, He is drawing on a McKinsey study of 8000 companies across a set of subfields.
[10] The notion of production, which has traditionally centered on manufacturing, has expanded to include the "production" of software and web based activity Zysman, John. "Strategic Asset or Vulnerable Commodity?: Manufacturing in a Digital Era." Berkeley Roundtable on the International Economy. *BRIE Working Paper* 147A, 2003.
[11] For an example of UK business offshoring, see Abramovsky, L., Griffith, R., & Sako, M., "Offshoring of business services and its impact on the UK economy." Institute for Fiscal Studies. IFS Briefing Notes, BN51, 2004.
[12] The debate dates back a decade. Early work on this includes Tim Sturgeon's dissertation done at BRIE. See for example: Sturgeon, Timothy. "Turnkey Production Networks: A New American Model of Industrial Organization?" Berkeley Roundtable on the International Economy. *BRIE Working Paper 92A*, 1997.; Sturgeon, Timothy. "Does Manufacturing Still Matter? The Organizational Delinking of Production from Innovation." Berkeley Roundtable on the International Economy. *BRIE Working Paper 92B*, 1997. The unbundling label was popularized by Richard Baldwin; see, Baldwin, Richard. "Globalization: The Great Unbundling(s)." Report prepared for the Finnish Prime Minister's Office, 2006.
[13] Let us start a long list: Intel, Cisco, Goldman Sachs, Johnson and Johnson, Hewlett Packard, Lehman Brothers. All of these indeed are amongst the Business Week's best American firms to work with
[14] The term "value chain", is very much part of a paradigm of dependent suppliers. That sequential hierarchical set of relationships does not describe what is happening in the global economy. Now innovation is distributed. Perhaps overstated, but seemingly each node and component is a potential source change of the value creation process in a product or service. Control of that value process is therefore distributed as well. Consequently, rather than the term value chain with its hierarchical dependent relationships, we use the term "value network."
[15] See Breznitz, Dan. Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland. New Haven: Yale University Press, 2007.
[16] Fuller, Douglas B., Akintunde I. Akinwande and Charles G. Sodini. "Leading, Following or Cooked Goose? Innovation Successes and Failures in Taiwan's Electronics Industry," *Industry and Innovation*,

10:2, June 2003, 179–196; Fuller, Douglas. B. "Globalization for Nation-Building: Taiwan's Industrial and Technology Policies for the High-Technology Sectors." *The Journal of Interdisciplinary Economics*, 18, 2007, 203-224.; Borrus, Michael, James Millstein and John Zysman. "Responses to the Japanese Challenge in High Technology: Innovation, Maturity, and the U.S.- Japanese Competition in Microelectronics." Berkeley Roundtable on the International Economy. *BRIE Working Paper 147A*, 1984.; and Breznitz, Dan. "Development, flexibility and R & D performance in the Taiwanese IT industry: capability creation and the effects of state–industry coevolution." *Industrial and Corporate Change.* 14:1, 2005.

[17] Breznitz, Dan. 2007. Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland. New Haven: Yale University Press.

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[19] Baumol, William J. "Macroeconomics Macroeconomics of Unbalanced Growth: The Anatomy of Urban Crisis." *American Economic Review* 57 1967. 415-426.

[20] Miles, Ian and Mark Boden "Intoruction: Are Services Special?" in Services and the Knowledge-Based Economy ed. Mark Boden and Ian Miles. London: Routledge, 2000. This was a central argument in Cohen, Stephen, and John Zysman. Manufacturing Matters: The Myth of the Post Industrial Economy. New York: Basic Books, 1987. 51-54. But what are services? It is most commonly said that services are those economic market activities that don't produce or transform material objects and exhibit co-terminal production and consumption relationships; they cannot be stored or shipped and have immaterial natures. We can see problems with these definitions. Some services do indeed involve material transformation (barbers) and can involve shipments (consulting reports). In fact, what we delineate as services characteristics may actually just be historically specific circumstances to service production, defined by the technology and tools set given at the time. Furthermore, services are extremely diversified and heterogeneous; should we really be looking for one uniform definition to apply to all services, or should there be definitions fit for different types of services? This work on characterizing the heterogeneous landscape of services is what some scholars are now preoccupied with, albeit still with limited success. For more on the definition of services, see Gershuny J.I. and Miles I.D. The New Service Economy. The Transformation of Employment in Industrial Societies. London: Frances Pinter Publishers, 1983.; Miles I., Kastrinos N., Flanagan K., Bilderbeek R., Hertog B., Huntink W. and Bouman M. "Knowledge-Intensive Business Services: Users, Carriers and Sources of Innovation. European Innovation Monitoring System (EIMS)." EIMS Publication No. 15, 1995. Luxembourg; and Soete L. and Miozzo M. Trade and Development in Services: A Technological Perspective. Maastricht Economic Research Institute on Innovation and Technology (MERIT). Maastricht: Limburg University. Report No. 89-031, 1989.

[21] Zysman, John, "The Algorithmic Revolution – The Fourth Services Transformation," *Communications of the ACM* 49:7, 2006.

[22] Zysman, John The 4th Service Transformation: The Algorithmic Revolution. Communications of the Association for Computing Machinery Special Issue on Services Sciences, July 2006.

[23] Interestingly, there is a specific technology development project that has come out of our discussion of these issues. The Center for Information Technology Research in the Interests of Society (CITRIS) at the University of California has teamed up with research teams from Denmark and Finland to develop and experiment with sensor based home monitoring systems to replace home nursing and permit elders to remain at home. Note also that Central to the policy story is that services – whether finance, health, accounting or media – are embedded in social rules and regulations. Consider the example of health: the matter of how to use data is entangled with privacy regulations. The matter of who reads X-rays is part of professional certification. The use of nurse practitioners is linked to the professional role and income of doctors. Each service industry is a web of rules and roles that will have to shift and change for productivity gains to be captured. Capturing the value added and productivity will require not just new corporate engineering and business models, but also substantial social reorganizations. This inevitably means that economic policy becomes directly enmeshed in the complex politics of social rules and regulations, institutions, status and position. Thus, policy debates will go beyond the terms of market competition narrowly defined. There will be political fights about social rules and regulations, institutions, status and position, about – for example – who can read X-rays and whose private information is available to whom, and thus about how to distribute the gains from these new sources of productivity.

[24] Thanks to Jonathan Murray for not allowing us to drift into the purely operational and reminding us that the financial sector is about risk and money.

[25] See Sturgeon, J. T. Modular Production Networks: A New American Model of Industrial Organization. *Industrial and Corporate Change.* 11, 2002, 451-496.; Sturgeon, J. T., & Lester, R. "The New Global Supply-Base: New Challenges for Local Suppliers in East Asia." in S. Yusuf, A. Altaf & K. Nabeshima (Eds.), Global Production Networking and Technological Change in East Asia. Oxford: Oxford University Press, 2004. 35-88. Sturgeon, J. T. "Turnkey Production Networks: The Organizational Delinking of Production from Innovation." in U. Jurgens (Ed.), New Product Development and Production Networks. New York: Springer, 2000. 67-84.

[26] As part of a research project on services, we have done extensive interviewing.

[27] Less evident is the case of the automobile. For most people, an automobile is both the most complex manufactured good they own, as well as being their most sophisticated computer and information technology system. The car is both a transportation solution and as an information system. That is reflected in both the development strategies and product positioning of a company like Toyota. Consider Toyota's joint R&D venture with one of Japan's major cellular firms, KDDI, in developing Global Positioning System (GPS) road navigation systems with real-time traffic feedback information. By using the data it can gather, Toyota can enter Japan's approximately 4 billion dollar cellular Internet content market – either competing against, or selling information to, the likes of Google for location-based targeted advertising in cellular Internet searches.

[28] Stuart Feldman, then at IBM and now at Google makes this point in presentations. For example, at the CITRIS TEKES conference Helsinki 21 June 2006. slide 23 *The Services Transformation: Multiple Viewpoints*

29 Levy, Frank. and Richard J. Murnane The New Division of Labor: How Computers are Creating the Next Job Market. Princeton, NJ: Princeton University Press, 2004.

[30] Jonathan Murry, Microsoft World Wide Public Sector Technology Office cites the BMW relation to Magna Steyr. The Magna Steyr web documentation in 2005 wrote: "The BMW X3 was developed as part of a cooperation agreement between BMW and Magna Steyr. "The detailed vehicle concept worked out by BMW engineers was forwarded to Magna Steyr for serial development and production at Graz."

31 Rodrik, Dani Has Globalization Gone Too Far? (Washington D.C.: Institute for International Economics, 1997).

[32] This essay focuses on the notion of competency. Regional strategy is often discussed in terms of clusters. We think that is inappropriate. For clarity three distinct concepts must be separated. Our focus is the development of competencies in particular places permitting distinctive advantage and the analysis of competency domains. Clusters, we would note, focus on the input-output relationships of proximate related, principally, commercial activities. Value chains or networks, and we prefer networks, suggest the geographic dispersion of these activities and relationships. Consequently, we may speak of geographically specific nodes of competencies that may provide a region a distinctive position in these dispersed networks. To speak of global clusters is largely meaningless. If you eliminate the proximity factor there is no remaining content to the concept of cluster. One must differentiate that which is local and proximate from that which is dispersed. Hence in this vein, nodes of competencies are parts of networks of activity. Local clusters may also have a place, but there are separate from the competencies. The competencies maybe part of input output relationships with distant players. The three concepts, each useful, must be kept separate. Let us return also to the notion of value chain, which we have discussed above. We emphasize that the dispersed character of the production decomposition, and the increasing autonomy and indepdenent innovativeness of suppliers, makes the dependent hierarchical implication of supply chain as a characterization of the global economy inappropriate and misleading. Value chain. Perhaps overstated, but seemingly each node and component is a potential source change of the value creation process in a product or service. Control of that value process is therefore distributed as well. We emphasize that rather than the term value chain with its hierarchical dependent relationships, we use the term "value network."

[33] Kristensen, Peter Hall and Jonathan Zeitlin *Local Players in Global Games: The Strategic Constitution of a Multinational Corporation* (Oxford University Press, 2004):

[34] On Finland's transition, see Darius Ornston & Olli Rehn, 'An Old Consensus in the "New" Economy? Institutional Adaptation, Technological Innovation and Economic Restructuring in Finland', in Zysman, John and Abraham Newman eds., How Revolutionary was the Revolution? National Responses, Market Transitions and Global Technology in the Digital Era Stanford: Stanford University Press, 2006.

[35] Florida, Richard. 2003. The Rise of the Creative Class: And How It's Transforming Work, Leisure, Community and Everyday Life. New York: Basic Books.

[36] Thanks to Jonathan Murray for a careful reading of this text.
[37] Apple is the icon of a company whose market advantage begins by innovative product conception and definition. Linden, Greg, K. L. Kraemer, and J. Dedrick. 2007. Who Captures Value in a Global Innovation System? The case of Apple's iPod. Irvine: Personal Computing Industry Center.
[38] Breznitz, Dan. 2007. Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland. New Haven: Yale University Press.
[39] Ibid.
[40] Kim, W. Chan, and Renée Maubrgne. 2005. Blue Ocean Strategy: How to Create Uncontested Market Space and Make Competition Irrelevant. Watertown: Harvard Business School Press.
[41] Florida, Richard op.cit The Creative Class
[42] Again our thanks to Jonathan Murray who helped us phrase this particular competency.
[43] Breznitz, Dan. 2007. Innovation and the State: Political Choice and Strategies for Growth in Israel, Taiwan, and Ireland. New Haven: Yale University Press.
[44] Breznitz, Dan. "Development, flexibility and R & D performance in the Taiwanese IT industry: capability creation and the effects of state–industry coevolution." *Industrial and Corporate Change.* 14:1, 2005.
[45] Nielsen and Zysman develop this argument in presentations based on an unpublished presentation "Toward a Growth Strategy: Creating Value in A Global Digital Era". Dan Breznitz's Innovation and The State builds a systematic framework for comparison and debating policy choices. A virtually identical position is well developed and argued in. Rodrik, Dani *Industrial Policy for the Twenty First Century*, John F. Kennedy School of Government, Harvard University September 2004 prepared for UNIDO
[46] John, I think that looking only on that part of the discussion is wrong lets look also on innovation as in both my paper and Lester and Piore latest book. The terms "corporatist" and "neo-corporatist" are now used interchangeably, though the new forms of societal coordination should be separated from earlier forms used in fascist states. On corporatism, see Berger, Susanne ed. Organizing Interests in Western Europe. New York: Cambridge University Press, 1981.; Schmitter, P. "Still the Century of Corporatism," *The Review of Politics*., 1974.; Schmitter P. "Corporatism is dead! Long live corporatism!" *Government and Opposition.* 24, 1989. pp.54–73. On the linguistic confusion of terms, see Lucio Bacaro. "What is Alive and What is Dead in the Theory of Corporatism," in *British Journal of Industrial Relations*, 41:4, 2003. pp. 683-706.
[47] On Finland's transition, see Darius Ornston & Olli Rehn, 'An Old Consensus in the "New" Economy? Institutional Adaptation, Technological Innovation and Economic Restructuring in Finland', in Zysman, John and Abraham Newman eds., How Revolutionary was the Revolution? National Responses, Market Transitions and Global Technology in the Digital Era Stanford: Stanford University Press, 2006.
[48] Zysman, John and Eileen Doherty, Review of Shigeto Tsuru's *Japan's Capitalism*, Kent E. Calder's *Strategic Capitalism*, and The World Bank's *The East Asian Miracle*, in *The Journal of Japanese Studies*, 22:1, 1996.
[49] Tobias Schulze-Cleven, Bartholomew C. Watson, and John Zysman. "Innovation and Adaptation in a Digital Era: How Wealthy Nations Stay Wealthy," *New Political Economy* Fall 2007, Forthcoming.; and André Sapir, "Globalisation and the Reform of European Social Models." paper prepared for presentation to the European Union's Finance Ministers and Central Bank Governors at the ECOFIN informal meeting under the British Presidency of the EU, Manchester, 2005. A modified version has been published as a Policy Brief by Bruegel, a Brussels-based Think Tank in October 2005. For justified criticism on Sapir's paper, see Andrew Watt, Maria Jepsen and Henning Jørgensen, 'Critical Comments on André Sapir's "Globalisation and the Reform of European Social Models"', ETUI-R, 2005.