

CHAPTER TWO

STRATEGIC RESTRUCTURING: A FRAMEWORK FOR ANALYSIS

Introduction

Chapter One identified the analytic challenges at the heart of the global Information Revolution, and sought to identify the leading factors that account for the diffusion of new policy innovations and technologies around the globe. The greatest challenge was to frame research questions in a way that brings multiple factors together into a common field of analysis. Chapter One asked if economic structure is mainly responsible for global diffusion patterns. Are government policies responsible? Is the technology responsible? Through what exact mechanisms do these technologies diffuse? Do diffusion dynamics portend greater equality or inequality? These questions converged in the following puzzle: Why do countries with similar structural and economic features have divergent patterns of ICT distribution?

We have seen several different responses for each of these questions, but the prevailing social science frameworks are limited by their inability to view technology as deeply embedded

within social structures, institutions, and practices. They fail to understand technology as the product of particular historical trajectories. The mainstream literature rarely analyzes institutional and political influences on ICT. Many authors failed to convey a proper sense of balance between structural determination of ICT outcomes, and individual agents' ability to shape them.

To capture these missing elements, I employ a 'modified structural' approach, which insists on the importance of both institutions and politics in shaping ICT outcomes. The framework rejects the assumption that individuals can 'leapfrog' structural or institutional constraints. Both structure and agency are central to large societal innovations like the Information Revolution.

Why Political Economy, Why Structure? Describing the Framework

The framework I offer linking structure, institutions and policies draws on the long established field of political economy, which directly addresses the gaps in the literatures identified above. From classical political economists like Adam Smith and Ricardo, to Schumpeter and Polanyi, to contemporaries like Douglass North, political economists have taken seriously issues that other disciplines tend to overlook. Central to

political economy are distributional issues -- who wins and who loses in the process of social change (Schumpeter 1943). In addition, the best political economists focus not only on particular transactions, whether sales in a market or voting in the political arena, but also on the determination of the overarching 'rules of the game' that guide all transactions (Williamson, 1986). They analyze the rules governing the allocation of scarce resources across different categories of social actors, whether at the international level (e.g. nation states) or the sub-national (classes, elites or interest groups). Political economy addresses the overarching 'constitutional' questions of which societal actors are allowed to participate in setting authoritative rules, as the world moves from the older ICT regime of state run 'natural' monopolies toward a regime that is more liberal, competitive and globalized. In other words, which nations or groups get to participate in setting the new rules of the ICT game, which substantially determine who wins and who loses (or who wins more than others).

Nor do political economists shy away from looking the issue of power squarely in the eye, and explaining the power resources that social actors employ to protect and advance their own material or ideational interests. Political economy assumes that

human beings are self-interested animals constantly on the search for their own relative advantage, and it looks for self-interests behind administrative or technical rationales. Thus it tries to explain who gets what, and why. Finally, good political economists are highly suspicious of the claim that any one discipline or any single model is all-powerful and can account for all the interesting outcomes we observe in societies. Rather, political economy encourages us to pose the 'meta-question' - what paradigm, or what element of a particular paradigm, can provide the best analytic leverage over a specific problem under particular circumstances?

The down side of this approach is the risk of eclecticism. Broad, encompassing theoretical propositions may appear less rigorous, robust and convincing; some of the analysis may not dig as deeply into a single case as a more tightly focused model. But there are trade-offs in intellectual life as there are in markets and politics. There are certain moments in the life cycle of an issue area when breadth is especially needed; when confronted with a relatively new phenomenon, conventional models may provide the depth but equally miss the critical new interconnections and non-obvious overlaps among key trends that more narrow models will inevitably overlook. At such moments, applying political economy's more open-architecture meta-

frameworks can advance both expert and popular understanding. An open architecture intellectual approach is especially critical when reviewing the ICT experiences of many countries over a period of years. The brilliant scholar Charles Tilly (1984), in *Big Structures, Large Processes and Huge Comparisons*, demonstrates that it is possible - and fruitful - to tackle big global issues with care and discrimination, provided one is sensitive to the unique local conditions as well as to seemingly 'universal' processes.

Strategic ReStructuring: An Open-Architecture Model

In this section I introduce my Strategic Restructuring model and the dynamics that drive it. Afterwards I take up each component of the model in turn, describing in greater detail its logic, utility and how it can be applied. In brief, the model explains outcomes through the interactions among four distinct determinants. They are:

- 1) *structures* (especially social structures, but also economic and political structure);
- 2) *institutions* (that is, persistent patterns of roles and incentives);
- 3) *politics* (especially elite strategic behaviors); and
- 4) government *policies* (specifically, a mix of four policy balances between private and public

initiative; competition and monopoly; foreign and domestic; and centralized and decentralized.

In social science terms these are the *independent variables* I select to account for ICT diffusion. The *dependent variable* is the pattern of technology diffusion within and across societies. Accounting for the relationships among the variables, and analyzing them in detail, is the purpose of the SRS approach. Let me elaborate on each, starting with the dependent variable 'technology'.

My conception of what is conventionally called "Information and Communications Technology" is somewhat unusual, designed to capture the complex behaviors associated with its spread. I conceptualize ICT as a potentially powerful new societal resource. In this definition ICT is a scarce and desirable resource like capital or land. When introduced into a particular social setting, it has the capacity to empower and advantage some groups, but also to disempower and disadvantage others. Stated more formally, information and communications technology is defined as *a scarce and desirable resource over which groups and individuals contend in order to consume, control or own those resources for their own purposes.*

Individuals and groups who feel they will be advantaged and empowered by the spread of the new societal resource will try to

promote it. Others believe they will be disadvantaged and disempowered by some ICT technologies and will tend initially to block and oppose its diffusion, partly through ignorance of its full effects, but also correctly evaluating that their short term personal and professional status will be compromised.

In the final analysis, people are not really interested in 'technology'; they are interested in the desirable things technology can bring. Most of us are not interested in 'automotive technology' when we go to Beijing; we want to get a taxi or rent a car or get a bus to go from one place to another. Most are interested in depositing our money safely in a bank or ordering something with a credit card; we're not interested in 'financial technologies'. Therefore, the 'technology' to be explained must be intimately linked to the utility it provides the user, to her particular purposes and the meaning she brings to it.

There are of course other definitions of "ICT". Each has its own merits, but tends to ignore these essential societal and political implications. Other analysts define ICT as:

- a tool or instrument used concretely to achieve particular tasks;
- a particular industry within the ICT sector, whether computers, telecommunications, media or Internet;

- the overall "ICT" industry as a whole; or
- the particular goods and services that ICT can provide - email, voice communications, information storage and retrieval, and so forth.

These definitions are useful for some purposes, and not for others. They are not very useful to explain the diffusion of new technologies through society, and to understand their complex interactions with other aspects of society.

Independent Variables

To apply this SRS framework to explain ICT diffusion in a given country one begins by analyzing the independent variables cited above, starting with structure, before turning to analyze structure's linkages with leading institutions in the ICT and other key sectors; then the political and leadership dynamics in and around those institutions; and finally one considers the key policy variables that flow from the politics that so directly affect the distribution and use of resources like the Internet or cell phones.

1) The Explanatory Power of the Structural Level Structure

- the more or less permanent, fundamental elements of

society that do not change quickly or easily -- is described by several factors. These include:

- **Level of Economic Development**, by which I mean gross domestic product per capita; a widely used indicator in most of the work on ICT and development.
- **Economic Structure**, e.g. the sectoral structure of a country which captures the relative shares of domestic economic production contributed by agriculture, manufacturing, and services (including information) in the national economy.
- **Social Structure**, captures the class hierarchy of a society. For example, is the society composed mostly of educated white-collar workers, or mostly of farmers and peasants?
- **Political Structure**. Refers to local political culture, which, for example, may be highly participatory or authoritarian. People may see themselves as citizens or as subjects (Bendix 1956).

The structural dimension is the most appropriate starting place for analyzing ICT diffusion. When conducting comparative analysis, especially across many different kinds of nations, it is essential to get grounded very early in the most basic features of the society . Otherwise it is too easy to produce bad analysis by extrapolating from the basics of one's own society and assume that others share the same features.

What can we learn from analyzing structure? By analyzing the demographic and economic structures of a society the analyst learns that they shape in decisive ways the most likely patterns of **demand** for information and communications services and goods. For example, a society with a large agricultural sector and many peasants is likely to exhibit a much lower aggregate demand for modern IC services than a society with a large service sector and many white collar workers -- they can afford and seek out everything from mainframes to laptops to palm pilots. Poor rural agricultural societies peopled mostly by peasants have lower demand for high tech services. This does not mean "no demand", but, rather, lower demand and demand of a certain type.

Analyzing structure also tells the analyst a great deal about the **supply** side of the ICT equation. Some nations manufacture and export hardware or software; other nations

neither produce nor export ICTs. Whether a country is an exporter or importer is very important for its future development. The production structures will also shape the political forces most likely to coalesce around particular economic policies. Thus, the structure of demand and supply dramatically affects the kind of public policies - and hence the diffusion patterns - most likely to be found in a country.

The Explanatory Power of Institutions

Once the structural level is analyzed in a country, SRS turns to a careful analysis of *institutions*. Institutions directly guide the behavior of women and men through the incentives they provide to act in particular ways. Some of the institutions that shape ICT diffusion are centered within the ICT sector, while others operate more widely. It makes a difference if the institutional base of a country is federal like Brazil or centralized like China. Some institutions provide positive incentives for innovation and capital investment; others do not. In some countries, institutions tend to centralize political power; in others, political power is dispersed, institutionalized in federal, decentralized fashion. In societies like China one powerful, well-institutionalized political party dominates political life and widely shapes social and political behavior, including rules governing access

to the Internet. In Brazil or Ghana, there is no such institution, with very different results. Brazil's federal structure has again and again led to distinctive patterns of ICT innovation that do not occur in China or Ghana.

Institutional differences have huge impacts on the incentives to use Internet on the resources available to do so, and the political discourse that surrounds diffusion.

To analyze ICT diffusion in society comprehensively, at a minimum one should identify the leading institutions with ICT responsibilities. Typically, the most important include ministries of communication or information, state owned enterprises like the telephone company, regulatory agencies, specialized ICT bodies, and joint public-private sector institutions. Institutions are important in part because an individual's institutional position substantially shapes her substantive behaviors and politics.

The Explanatory Power of Political Analysis

SRS assumes that institutions and structures are important, but in the final analysis it is people acting individually and in groups that spreads new technologies through society.

Individuals are the social actors that make the Information Revolution happen. Individual people choose to buy computers or not; to use Internet or not; they choose to open an Internet

Service Provider or not; to develop new local content or not; to become a leader, a champion of freedom of the media, or not. It is also individuals who staff the institutions, who reshape and reform them, even as they are being guided by those same institutional rules. There is always an inevitable tension between structure on the one hand, and agency on the other, and each side is important. Indeed, SRS puts this tension at the center of the model.

Internet diffusion is greatly shaped, indeed largely driven, by the strategic decisions of individual elites. The role of farsighted and influential individuals in promoting particular patterns of Internet diffusion is huge, especially in the early years of Internet diffusion when the institutions that typically 'should' provide guidance, support and incentives for individuals have not yet been put in place. Yet individuals are largely invisible in today's scholarly work on ICT diffusion.

SRS concentrates on the political behavior of elites. This focus reflects the realities of the sector -- to the degree that there has been 'politics' in that sector it has very much been elite politics; it has not been mass politics. Furthermore, elites are the ones in position to reshape decisively that which most centrally interests me -- how the

institutional rules of the game get rewritten. Concentrating on elites is thus a conceptual and theoretical decision, not a normative one. Elites in this LDC context are defined both by their senior positions within formal organizations like companies, NGOs and government agencies, as well as their high educational and professional status. Thus, the work of the SRS model is done by the strategic calculations of individuals in a variety of institutional settings. Their calculations are driven partly by their position within formal institutions, partly by their analyses of the broader structures and social dynamics of the society in which they are embedded. They recognize emerging opportunities and threats, and they respond strategically to those structural and institutional cues. As I will describe below, these critical actors are driven by very mixed motives -- personal, institutional, professional, and political.

To explain Internet diffusion then, this step of the SRS model identifies the leading individuals or "Information Champions" who lead the charge for liberal ICT diffusion in their society. Sometimes these are leaders of NGOs, at times senior government officials; in other times and other settings, private sector entrepreneurs. Without exception, in all countries there is a small group of "Information

Revolutionaries" bent on changing the rules to enhance diffusion along lines they believe imperative; typically these are along very liberal lines.

But not all individuals are radically committed to Internet diffusion, especially through liberal models. 95% of the people in the world are unconnected to modern networks, and most of them are probably relatively indifferent to new ICTs, given their other priorities. To explain Internet diffusion fully, therefore, it is equally imperative to identify those individuals and groups who oppose rapid diffusion; opponents calculate that the introduction of these new resources risk undercutting in some way their own institutional interests as regulators, ministry officials or telephone company managers. In developing countries these individuals often form a political bloc or coalition that supports a top-down version of diffusion that might be called "controlled diffusion" rather than "liberal diffusion". Proponents of controlled diffusion do not adopt liberal diffusion just because they read a compelling brief; more typically the changes occur through negotiated settlements spread out over years.

In all countries, therefore, the history of Internet expansion is the history of these two and other groups of elites variously collaborating and conflicting with one another to

influence the pace and direction of Internet expansion. Thus, SRS focuses on inter-elite *bargaining*, which it defines as occurring at two levels. Most immediately, they bargain over particular transactions - they negotiate over the price of their broadband access, over whether an ISP license will be given to their company or whether they can have foreign partners or only local ones. They negotiate with the monopoly suppliers of IC services. This is the level of individual transactions. At the second level, at the structural level, individuals and groups negotiate over the general "rules of the game" that govern those particular transactions. Even when individuals are good negotiators, it is more often the rules in place that determine the price of broadband, or relations with monopoly suppliers or foreign partners. These rules are typically institutionalized in law and regulation. And at particular and unusual moments in history, many of these laws and regulations are challenged by more and more people, driven in turn by rapid technological and other changes in society. We are at such a moment today. SRS is one method of explaining these dynamics.

The Explanatory Power of Policy Balances

The final factor that shapes diffusion, and is also a central element of SRS, is the relative balance of certain public policies. Comparative analysis of diffusion demonstrates

that the pace, extent and effectiveness of IC diffusion can be directly shaped by four public policies. I consider the four policy balances taken together to act somewhat as *an intervening variable* in the SRS model. Policy balances lie somewhat ambiguously between the upstream factors of structure and institutions, and the downstream element of diffusion. In some respects the balances are tied to institutions, of which they can be considered both the product and/or the producers. On the other hand they are the immediate constructed outcomes of political bargaining. Policy is the medium through which the influences of elite politics is made most directly manifest, and policies provide very immediate incentives to employ or not to employ new ICTs, to employ them in some ways and not others. When a government policy sets ISP prices high, then Internet demand is certainly lower than it would be otherwise. Where elites in countries can find the 'right' balance that provides positive incentives for diffusion, and where the structural conditions are propitious, then Internet diffusion is enhanced. Where these four balances are out of synch with one another, or set up negative incentives, then diffusion occurs much more slowly than it would otherwise, and slower than in other countries where the policy balances are favorable. To explain diffusion, therefore, the analyst needs to review these balances

and their effects - balances between private and public; monopoly and competition; domestic and foreign; and centralized and distributed ICT governance structures. As I describe later in subsequent chapters, these balances correspond to broad political economy categories - **property rights** (private-public balances; domestic-foreign); **efficiency** (monopoly-competition); **governance** (central-distributed balances). In Chapter Six I turn to another policy dimension - equity - which I refer to as the fifth balance.

The SRS model leads us to concentrate on the process of rule making, and the societal actors most involved. The model pays less attention to final or even intermediate consumers. For example, SRS does not analyze in detail the structure of demand that characterizes different countries. This is not an unimportant matter, since the demographics of demand shape the provision of ICT supplies as well as the kinds of political coalitions that will form within the sector. The demographics of demand are also important because there are important differences between demand or use from one country or region to another. Contrasting the demand structure in LDCs and DCs the comparative evidence indicates the Internet is a more elitist technology in poor countries in terms of income and other demographic features. Thus, in the US the percentage of

Internet users who in 2000 completed university, some university, secondary and incomplete secondary are 86%, 70%, 53% and 31% respectively. But in Romania the same categories are as follows: 22%, 13%, 4% and 3%, with big jumps between the top and the bottom. (7:1 vs less than 3:1 in the U.S.). Among other implications, this means that when we aggregate users into national units and assert something like , "Americans" or "Swedes" are on-line and interconnected we are saying one thing. When we say "Romanians" or "Sri Lankans" are connected we are saying something quite distinct. There is excellent comparative work being done on this subject by a research consortium at UCLA, and by InterMedia. I return to these kinds of demand-side features directly in Chapter Six.

Liabilities of the Strategic ReStructuring Framework

All theories and conceptual frameworks have drawbacks as well as strengths. Intellectually, they have various degrees of parsimony, power, conscilliance and elegance. They also differ in their mechanics, in their capacities actually to be applied in many circumstances by different observers. Some require lots of data (whether numbers or interviews), some little. Some can be done easily by researchers outside the country; others require the researcher to be in country pursuing local details.

The SRS framework has its own strengths and drawbacks. It places a very high premium on comprehensiveness and explanatory power over parsimony. A parsimonious theory selects one powerful variable, which claims to explain a great deal (the theories of Freud or Marx, for example) Others rely on several independent variables to explain outcomes. Such theories should however demonstrate "conscilliance," that is to say, the elegance with which one part of the theory fits together with another part of the theory, especially where they may operate at different levels of analysis (macro, meso, micro, etc.) (Alford and Friedland 1986).

To be employed properly the SRS model requires considerable commitment by the analyst to conduct complementary analyses at different levels of analysis - macro, micro and in between. It certainly requires substantial investigations within the country. The model is 'expensive' because it takes very seriously the subjective views of the local actors, and assumes that different people in the re-structuring processes will hold very different perspectives about important ICT-related issues, and it insists that the analyst go in and uncover those different perspectives, since they drive behaviors. Different actors bring different meanings to the technologies. In other words, using the SRS model requires a lot of field work trekking

about asking a lot of people a lot of questions about a lot of things. SRS analysis cannot be done at arms length. It is retail analysis. Finally, by concentrating on those with social influence I choose not to provide as much detail on the general ICT consumption patterns of the population as a whole. That is, I chose not to detail the demand patterns of various consumers by income, education, gender and so forth. Robinson and others (2000) are doing excellent work on this topic, but because it is less directly political I choose not to do so here.

The Structure And Evolution of the Information Sector

At least since the publication of Bell's brilliant The Coming of Post Industrial Society(1973), there have been substantial debates over the structure of information societies, and the power and meaning of contending theoretical formulations to describe information sectors and their relations to the structure of society as a whole. Four years before Bell, a Japanese intellectual, Yoneji Masuda, published a remarkably prescient book about sectoral transformations that rings true more than thirty years later (Masuda 1981).

Much of the debate hinges on alternative ways to measure the extent of the information sector and its effects beyond the confines of that primary sector on other economic and social sectors. Certain theorists claim that, in this process of ICT

diffusion, industrial society is transformed into a 'post industrial ' or 'information' society. Scholars have employed various ways to measure the extent of the information sector. The simplest and least satisfying is to describe the "diffusion of computer and telecommunications technologies as the defining characteristic" (Steinfeld and Salvaggio 1989, 7). This is akin to what I call the Techno-Determinist paradigm, and equates ICT diffusion with major societal change. The Information Society therefore is equivalent to the number of appliances and applications that citizens own in a society. Others like Porat (1977) measured the extent of the information sector in terms of its contribution to employment, that is 'knowledge workers' as a share of the total labor force. Porat's now-classic multi-volume study of the U.S. economy found that half of that country's labor force was employed in information activities by the mid-1970s.

Others concentrate on the consumption of ICT, using such measures as the number of telephone calls per capita or the per capita consumption of newspapers. Another frequently used approach is to analyze the economic weight of the ICT sectors in their contributions to GDP, relative to other sectors like manufacturing and agriculture.

As Salvaggio and Steinfeld (1989) point out, there is also a tradition of critical treatments of the scope of the Information Society that don't fit easily into these other categories. Writers like Schiller insist that the Information Society is simply the latest expression of voracious modern capitalism, now in a more global and technology-intensive guise (Schiller 1999). Such writers are as critical of the potential costs of the IS as many other writers are celebratory of its potential contributions. They point to the concentration of ownership and control among global conglomerates, and the abuses of civil liberties and even democracy that may result. As citizens' viewing options narrow, content variety is also restricted. More and more, content will be produced by mostly U.S. and Western based Multi-National Corporations, and culture in Africa, Asia and Latin America will be overwhelmed by media materialism. This is the dark side of the Information Society.

Before we conclude that there are indeed structural shifts toward a new kind of society in LDCs, we need to counterpose the concepts of 'Information Society' against the underlying realities of developing countries. What is the relevance of Bell's formulation of a 'Post Industrial Society' for people in Africa still seeking an efficient **agricultural** society? Indeed, does it even make sense to use a term like the Information Economy or the Knowledge Society for developing countries? Is

the 'Information Economy' a hoax, an intellectual two-step? While many wax enthusiastic about the revolutionary, transformative nature of the new technologies, few have stepped forward to describe these trends or imagine what the structure of an ICT-transformed LDC might look like.

Bell (1973) and Castells (1998) make an important qualitative argument beyond the usual quantitative balances between economic sectors. Their argument concentrates on science and technology's role in modern society. Both argue, though Castells (1998) more strongly, that the central elements in the IR are sectoral shifts *AND* the increase and spread of the use of the scientific method of experimentation. The Knowledge Society is thereby created through the sustained and accelerating application of more knowledge to more societal elements. The IR is thus defined by the spread of new knowledge practices and a new mind set. This transformation is both cultural and economic.

When sophisticated LDC observers use the term the term 'Knowledge Society', they tend to do so in cautious terms. These observers are aware that structural shifts are happening in some countries, and although they are aware of the future potentials, they are hesitant to predict future LDC outcomes. Skepticism about the transformatory role of ICT is rife even in major development institutions like the World Bank, a strong and

optimistic advocate of ICT use in LDCs. Other skeptics include insightful intellectuals like Robin Mansell (1998), professor at London School of Economics, who insists that "ICTs are best considered as tools", not transformative agents. 'These technologies do not create the transformations in society by themselves, they are designed and implemented by people in their social, economic and technical contexts". For her, ICTs are best viewed as 'capabilities', like other capabilities such as education or health. ICT's are not automatic change drivers or societal transformers.

Even with these caveats, the ICT-related structural shifts caused are important signposts. The illustration below captures the essence of my structuralist argument. It describes the economic evolution of today's G-7 countries from the 19th century to the 21st (the United States of America, Japan, Canada, the United Kingdom, Germany, Italy and France). Each circle represents the economic weight of one sector compared with the weight of the other. The larger the circle, the greater that sector's share of gross domestic product (GDP). The smaller the circle, the smaller that sector's contribution. This illustration is meant to be heuristic and not definitive; I recognize that reducing national economies to three constituent pieces is a simple rendering of a complex reality. There are

also very serious measurement problems when one retroactively applies a term like the 'information sector' to 1800 or 1900.

[Insert Figure 2.1 about here]

We can see that, in the 1800s, the economic structure was dominated by agricultural production. The political elites of the period, from Thomas Jefferson and George Washington to their local counterparts in France and Germany, were all deeply rooted in farming and plantation life. By 1900, factories had sprouted across America. In the UK, cities like Birmingham spewed dark smoke from the steel industry and capital goods companies. In Germany and France, the industrializing trend was the same. Yet agriculture remained extremely important for national life.

Politically, farmers' parties and land based movements were struggling to retain authority in the face of a growing and restive industrial workforce. Industrial elites sought to impose their world view on the still-agricultural society. Conflicts erupted over issues like tariffs, money supply, labor laws and infrastructure support. Some societal elements embraced industrialization and commercial agriculture, other elements supported industrialization selectively, others mightily resisted all change. Some sought to accelerate

industrialization's changes, others sought to slow down reform's pace. Karl Polanyi (2001) captures these contradictory imperatives in his term 'double movement'—different interests embracing or rejecting different restructurings at different times. New groups, new interests, and new political and economic elites emerged, and each tried to influence these restructurings in ways in which it could benefit.

By 1950, the balance between agriculture and industry had shifted decisively in the U.S. and other Western countries. The industrial build-up associated with military conflict accelerated this re-structuring, as industrial innovations and processes had become society-wide and no longer were confined to a single sector. While still an imperfect transition, given that a significant proportion of the population still lived on farms, it was apparent that Americans were witnessing the supremacy of the industrial sector. The demographic importance of urban populations and the political dominance of urban elites now overshadowed agricultural elites. Services were a rising proportion of GDP as farm work declined and information processing work increased.

Structures, institutions and laws usually lag behind economic and demographic shifts. In the United Kingdom and the United States, mid-century legislative representation still

over-rewarded rural constituencies, but this too was rapidly changing. The US Supreme Court's decisions of the early and mid-1960s (Baker v. Carr and other re-apportionment decisions) re-allocated power from rural to urban constituencies. The transition from agricultural society to an industrial society involved massive institutional restructurings and substantial dislocations. There was, as Schumpeter (1943) wrote, 'creative destruction', although more creative for some and more destructive for others. New patterns of winners and losers emerged, as losers scrambled to protect their material and moral interests by blocking change when they could. Industrial elites sought to restructure market, state and society in ways that would benefit their material, political and societal preferences. The motors of change were rising incomes and new technologies, which both complemented each other. These two facets combined to increase levels of market demand and consumption. 'Business' now included both international and domestic business, and America's share of world markets loomed large (especially after the destruction of much of the industrial base of Europe and Japan). Educational access also widened during this period.

These changes occurred in parallel but not identical ways in the world's advanced capitalist nations. The general trend

was toward modern mass society based on manufacturing, although each country's path to post-war industrial capitalism was unique, as Hollingsworth, Berger and others demonstrate.

In the lower right hand quadrant stands the latest moment in this process of economic and political restructuring. The millennial year 2000 is in some ways the mirror image of 1800. The Information Economy has ballooned beyond all expectations. Agriculture in today's G-7 countries now resembles the information economy in 1800 -- tiny in economic weight, but exercising some political weight. The comparative evidence suggests that the U.S. is ahead of the pack in its structuring of an information political economy, but the G-7 as a whole is following this trend (OECD).

Our own current moment of transition is not an easy leap from one state to another. Transition is neither automatic nor frictionless. The lesson of the earlier periods is that we should expect friction and political contention. The G-7 nations did not leap suddenly and effortlessly from one state of being to another, from pure agriculture to perfect industry. Agriculture is still important in Europe; values associated with rural, pre-industrial life remain vibrant and appealing, and institutions like the church and community associations guard the old ways that are deeply treasured and buffer individuals

from market excesses. Even during today's, putative transition from industrial society to information society, France and Italy's most volatile public demonstrations concern agricultural politics. It is not a swift move from familiar institutions to shiny new territories. The current transition stumbles along in the guise of millions and millions of tiny experiments and tests.

Were we to construct a similar sequence for developing countries, we would discover a vastly different picture. Most developing countries have not reached Quadrant Four. Many of the world's poorest countries have not reached quadrant three. The two billion people of Africa and South Asia live in countries that look more like Quadrant One. Rural agricultural elites dominate the daily political discourse. Literacy rates are low. Social conservatism is high. These are the structural contexts in which information and communication appliances are being diffused. The ways in which today's underdeveloped countries experience industrialization is quite different than in European nations. For India and China, industrialization comes on the back of foreign domination and colonialism. Without understanding the extent of economic backwardness and social conservatism in LDC's, we profoundly misunderstand the nature of ICT diffusion.

Structural Perspectives: Take Two

Let me suggest another take on the structural context in which ICTs diffuse globally. The previous illustration shows that the first transformations toward an Information Revolution began in the G-7 and have diffused throughout their societies over the past two decades, accelerating in the past ten years with the invention of the Internet and telecommunications reforms. Changes in developed countries are moving at a fast and perhaps accelerating pace. The rate of change for the developing world is less apparent and less certain.

With the available data, we cannot be certain about the rates of primary and secondary change associated with ICT diffusion. This holds even within the core sectors of telecommunications, broadcasting and computers. Work by this author and Rodriguez (2000) suggests that the spread of ICTs may be moving faster in developed countries. The OECD and the non-OECD nations are both moving towards more information use, but developed countries seem to be doing so faster.

The changes in the relative weights of ICT and non-ICT sectors will have large and growing impacts on the economic and political relations within developing countries, and between LDCs and DCs. The relative sizes and growth rates of this new

sector will impact manifold relations between developing and developed countries. LDCs with more robust ICT sectors will attract more foreign investment. The cumulative effect of these domestic structural changes, and their impacts on international power structure will be substantial.

Social structures and political structures are also important for ICT diffusion. A country with a large educated middle class, many entrepreneurs, and many young people will have a particular ICT diffusion pattern. The typical social structure of advanced capitalist societies resembles a pyramid. There is a long narrow top, a bulging middle class and a solid working class base, and a relative small layer of very poor people at the bottom. While each advanced country differs in the details, this is the modal profile for advanced societies. This bulging middle class provides both a large **supply** of knowledge workers to create and distribute new innovations. This middle class also represents the **demand** for those products and services.

The typical social structure of a poor developing country resembles a different structure. The social base of poor peasants and a poor working class is a much larger proportion of society. The critical bulge is in the middle - the modern salariat and petit bourgeoisie - is growing, although much

thinner than in many countries. There is more often than not a huge difference between the top and the bottom of these societies. These structural features will also affect diffusion rates. These social structure differences are significant for demand and supply side ICT. A large, educated class means more engineers and inventors to supply new ICTs. A large, prosperous middle class means more people to buy new appliances and services.

If the class structure tends to closely follow the sectoral structures described earlier, political structures exhibit greater autonomy across the same structures. In mentioning 'political structure' I mean something akin to political culture—that is, the dominant, long-standing lines of political or ideological cleavage, and the channels through which power is exercised (Almond and Verba 1989).

In developing countries where democratic participation is shallow and pro-forma, complex patron client ties often operate with greater force than in the developed world. These ties link powerful local religious and secular leaders with their followers through various combinations of traditional fealty, charisma, and material benefits. These ties are almost always more important than simple market incentives of neutral demand and supply, and prove more persuasive than formal voting

incentives. These ties are instrumental for shaping the allocation of all scarce resources, including ICT -related resources. These structures mold other political patterns, including institutional centralization and decentralization, unitary and federal arrangements, and presidential and parliamentary systems. Each of these structures is also likely to impact on ICT reform potentials. Petrazinni (1996) makes this argument clearly in the case of LDC telecommunications reform, claiming that the more autonomous is the government from social pressures, the more privatization is likely to succeed. India's federal structure of many separate states set inside a relatively democratic polity, has slowed the spread of telecommunications reform, even as it has contributed positively to the growth of broadcast diversity. China's heavily centralized, top-down system made it possible for a firmly committed central political elite to bulldoze through ICT reforms. China has mobilized billions of dollars and built enormous infrastructure projects at breakneck speed. India's slowness and China's speed reflect each country's political and institutional structures. The Chinese political structure also reflects broader historical and cultural patterns of Confucianism and traditional values. The dividing line between 'structure' and 'institutions' is imprecise.

These features of 'structure' provide several insights for ICT and less developed countries. Structure reminds us of the slow pace of societal change; these processes are long term in nature. Revolutions in social structure do not happen overnight, even in today's turbo-charged societies. Changes in developing countries also have earlier antecedents. We can search for insights from these earlier periods even as we recognize that certain fundamentals may vary from one period to another.

This structuralist perspective also demonstrates the different starting points for different countries, and how far many countries must travel. A structuralist perspective also raises important questions about diffusion mechanics. As the revolution proceeds, change must be transmitted from one sector (the ICT sector) outward, as it spreads to become a society-wide revolution.

From Structures to Institutions

As important as these structural patterns are, they do not determine every single ICT outcome. Mediating between these broad structures and a phone call from "X" to "Y" stands a very dense network of interconnected institutions, groups and individuals. These individuals and groups, acting through a variety of public, private and NGO institutions, directly shape ICT outcomes.

In their sweeping analysis of the embeddedness of institutions in contemporary capitalism, Hollingsworth and Boyer (1997) refer to the "social system of production", delineating "the industrial relations system; the system of training of workers and managers; the internal structure of corporate firms; the structured relationships among firms in the same industry on the one hand, and on the other, firms' relationships with their suppliers and customers; the financial markets of a society; the conceptions of fairness and justice held by capital and labor; the structure of the state and its policies..; ...all these institutions, organizations, and social values tend to cohere with each other...into a full-fledged system." And deeply embedded within these institutional systems is the production and consumption of knowledge.

A central tenet of this study is that the **Information Revolution is an institutional and political revolution more than a technical revolution.** We open ourselves to profound analytic errors if we concentrate on the technical aspects of these epochal changes. The production and consumption of knowledge occurs in a complex institutional system where interactions occur among a variety of institutions. "Since [social] activity takes place outside each of us...it is necessary to fix it, to institute outside us, certain ways of

acting and certain judgments which do not depend on each particular will taken separately...One can...designate as 'institutions all the beliefs and all the modes of conduct instituted by the collectivity" (Hechter, Opp and Wippler 1990).

I use 'institution' here to refer to concrete organizations with names and addresses, as well as legal sanctions embodied in law, such as the institution of property as conventionally defined.

The most important and difficult reforms in the telecommunications and broadcasting industries are not 'merely' technological innovations. The greatest challenge for CEOs and senior government officials is achieving political consensus and reforming the rules and institutions.

The importance of effective institutions in development of societies is beyond doubt. One definition of an underdeveloped society is precisely one where the institutions are underdeveloped and weak (North 1990). Consistently structured sanctions are at the core of a national information infrastructure. Institutions structure positive and negative incentives for particular ICT uses. In Kahin/Wilson (1997), we refer to the National Information Infrastructure as a national system in which technology is extremely important, but chiefly a set of interlocking institutions that guide and constrain the

behavior of consumers, suppliers, public officials and citizens. The institutional adjustments leaders make to accommodate new technologies imperative for successful ICT use (Mansell and Wehn 1998).

Institutions in Action: Taiwan's Institute for Information Industries

In the mid-to-late 1970s the Taiwanese economic and political elites grew concerned that the island's future economic performance was tied to a set of industries that were losing their competitive global position. They believed Taiwan needed to make a leap from one kind of industrial base to another. After a series of deliberations, they decided to target information industries. How would they get from here to there? There was a feeling that the existing institutional means - conventional ministries, state firms, private associations -- were not up to the task at hand.

Through a series of interviews I conducted in Taipei, I found that, in 1979, this coalition created a new institution called the "Institute for Information Industries". Taiwanese officials hoped it would help Taiwan make the jump into new ICT areas. The Institute for Information Industry was launched under the sponsorship of one of the most important institutional players on the island, the Ministry of Economic Affairs. The new

Institute was designed so that the prestigious MEA could draw on governmental as well as private sector resources to achieve new national goals.

The government set out to promote the effective and efficient use of ICT and thereby strengthen national competitiveness. This would be accomplished by research and development, by cultivating ICT professionals and generally through the attempt to "facilitate ICT industry development." Its leader, Major General Gao, pointed out that "If we are to compete globally we must apply ICT to all organizations and companies. But not everybody appreciated this need at first. We at III had to go into industry and help them recognize the problem and to introduce new procedures and processes" (Interview 1999).

Taiwan has emerged as one of the most successful ICT economies in the world. Major General Gao insisted on the importance of the 'harder' R&D initiatives, such as software development, but he also insisted on the importance of institutions in promoting these trends. "People didn't understand the Internet. But we put together a team to review its implications for the country. We had about 20 people; the team recognized that the Internet could be our window on the world. I thought it could help our companies do business, and I

wanted to expand its use. So in the start, we decided not to charge anything for Internet use." In 1994 the Institute for Information Industries spawned the "SEED" ISP, and the number of users quickly shot up to 20,000. 1994 was also the same year Taiwan created its own "National Information Infrastructure Steering Committee," to help build the Taiwan information highway.

It is difficult to put a figure on the contribution of organizations like III. Similar bodies were created in Thailand, India, Malaysia and other countries within and beyond the region, many of them created in the 1993-96 period, and my interviews in these three nations and in Taiwan indicated that they had mixed successes and some outright failures.

The history of the Internet and other innovations in the U.S. has been variously described, and it is generally agreed that the diffusion of the Internet occurred through a succession of institutional innovations from an original research and development activity launched by the Defense Advanced Research Projects Agency (DARPA). This activity was then financially and managerially supported by a very complicated and rich network of institutions, one after the other, from the Defense Department, to universities like Stanford and Wisconsin, followed by the eventual involvement of promotional agencies like the National

Science Foundation. This high level of public institutional engagement occurred in a national environment rich in private firms and corporations, yet government and research bodies launched the revolutionary processes, which were then handed off to private actors and rapidly commercialized (but even then, in the early days under substantial government monitoring). The United States country enjoyed an environment rich in efficient and highly interconnected institutions.

Regrettably, many analysts miss the problematic nature of institutions in poor countries. Interested mainly in the technology itself, too many analysts overlook the role that institutions play even in advanced countries. The institutions that enabled the Information Revolution to occur where and when it did are not present in many LDCs.

There are several complementary ways to analyze institutions' impact on ICT. One must recognize that getting and using information is a social process with a beginning, middle and an end; it is not an isolated, one-step activity. The contours of this process are guided, sustained and blocked by institutions. Within this process, institutional incentives substantially shape the way people will research, invest in, produce, sell, distribute, pay for and use information and communications technology. Invariably, these activities occur

within the context of one or more institutions, between universities, research laboratories, and commercial outlets.

The National Research Council (NRC) recognized the sequential and institutional basis for knowledge production and use when they prepared a new methodology to help institutions like the World Bank and others assess a national knowledge system for countries. The NRC wrote that a "National Knowledge System of a country comprises those institutions that control and regulate the flow and use of knowledge in the economy and society...." (National Research Council 1996). They identified a train of activities that countries engage in. These include **creating** knowledge, **providing** access to knowledge, **assimilating** the knowledge, **diffusing** knowledge throughout the economy and society, and **using** knowledge for social benefit and productive enterprise.(Ibid, 1-2) They developed this approach in a study of rural areas in Canada, and found that the contribution of institutions to achieve each of these steps was even more important than originally anticipated. Where an institution was weak or failed, that step in the processes failed, jeopardizing the entire diffusion process(National Research Council, 1999).

We also look at institutions and ICT diffusion as a commercial **product cycle**. The product cycle describes the stages that characterize a product's market introduction, its

use and its removal. The product cycle for technology moves through several stages that include research and development, investment and financing, commercialization, production, distribution (wholesale and retail) and product servicing. New products move onto the market as old ones are taken off. This process does not occur in a vacuum however. At each and every stage, there are institutions that advance or retard forward movement. A more institutionally nuanced understanding of this process recognize that "Institutions" are there to bracket each stage.

Products never invent themselves, sell themselves or diffuse themselves. Technology never diffuses on its own. Institutions push and pull innovations through the institutional processes described above. In places like Silicon Valley or Bangalore, we find a succession of interlocked institutions, from small start-up companies, to venture capital firms, to industrial parks and company incubators, to producer industry associations, to downstream marketing firms, to sophisticated buyers. If these institutions are not functionally well internally, nor working well in concert, ICT diffusion will not proceed smoothly. These commercial organizations are, in turn, embedded within a complex set of interacting institutions, laws and regulations. Tax codes promote and prevent innovation,

tariffs protect and promote industries, agencies export promotion and import protection, patent laws may advance high tech investments (Evans 1995). All these institutions and laws have their own trajectory, and each country's ICT path is unique. All institutional environments are not created equal.

Each institutional process must be viewed as firmly embedded within an overarching culture. The U.S. diffusion process is quite different from the French process, which has fewer small and medium size enterprises and different views about personal risk and reward.

Prof. Lewis Branscomb, a Harvard Professor and former chief scientist for IBM, takes the institutional argument one step farther. It is not enough simply to have institutions that meet narrow needs. Matters like trust and efficiency are also involved. "Functioning economic institutions that trust one another, an infrastructure for information and distribution that is flexible and inexpensive and reliable, an attitude toward the balance of personal reward and collective well-being that is conducive to responsible economic behavior -- these are the requirements for science-based development." (Raymond 1966, 2)

The reasons why Palo Alto and Boston, and later Bangalore and Pretoria, became hotbeds of technological innovation have little to do with hardware. They had a great deal to do with the

unique institutional history of each site. There were universities, research centers and customers in Palo Alto and Boston; there were science projects and small engineering firms in Bangalore, and R&D agencies in Pretoria. These institutions are the incubators of innovation. They provide raw material [human and material], they nurture the incubation process and even find jobs and buy the new products (Saxenian 1999).

Leading Institutions in the ICT Sectors

Several clusters of institutions occupy center stage in the ICT sectors of developing countries. These institutions decisively shape nearly all critical sectoral outcomes. The success or failure of these institutions shapes the success or failures of the entire sector.

While each institution is treated individually, they are all closely intertwined into an integrated policy system. The performance of one institution is difficult to separate from the performance of another. This is why reforming the ICT sector is both complex and contentious - the **relationships** among many institutions are what must ultimately be reformed. Fixing one institution will not change the systems that govern various sectors. One institution will not significantly alter ICT outcomes.

The interplay among these institutions is critical for the Information Revolution's success. Intra-governmental relations are important, and equally important are the ties between government and actors like private sector institutions and civil society groups. In an efficient and balanced ICT governance system, separate institutions mesh smoothly so that knowledge flows smoothly from where it is produced to where it is needed, either through state or non-state institutions. The most sophisticated analyses of economic development point precisely to these partnerships among institutions as the true catalysts for successful qualitative changes in productivity (Sell 1999). My experience in the poorest LDCs is that the most difficult step for senior officials to admit is that private sector interests have something useful to contribute to the national policy process. Senior officials often view businessmen as interlopers, or as enemies of the state.

While formally the same, institutions in LDCs are **not** the same as those in developed countries. Their performance differs substantially. Institutional relativity must be kept in mind when analyzing the Information Revolution in LDCs. The following are several generally accepted features of LDC institutions.

- (1) Power and authority tend to be more concentrated at the top, with less consultation between the CEO and subordinates
- (2) Extra-formal patron-client ties compete with the formal bureaucratic authority relations (cf. 'cronyism') within and between organizations.
- (3) Overstaffing at all levels.
- (4) Greater risk of under skilled, under experienced staff.
- (5) Greater risk of corruption.
- (6) Lower overall organizational efficiency.

The following are inter-organizational features often found in LDCs:

- (1) Limited relations with customers or clients
- (2) Risk averse behavior
- (3) Susceptible to external pressures for employment and contracts

Inter-Institutional Ties and ICT Development

At least three essential elements of inter-institutional dynamics are important for sustained ICT diffusion. First, the *interactive* effects among clusters of institutions are important determinants of ICT performance. Superior institutions operate as nodes of interconnected networks. They are not isolated,

freestanding entities. Second, institutional features are neither inevitable nor predictable. Institutional features are highly *path dependent*, reflecting earlier institutional decisions. Third, there seems to be an unpredictable *threshold effect* as institutions mature and interact. At some point, a spark ignites ICT potential and a mature and effective system connects and consolidates. The benefits from these interactions seem to flow from learned experiences, shared substantive knowledge, and trust developed through personal networks and commercial exchanges.

Bangalore is Not a Miracle City

The "Miracle City" of Bangalore, India exhibits all these inter-institutional elements. Bangalore possesses a rich network of educational, training and scientific institutions that supply the necessary inputs to its highly touted software miracle. Bangalore's wealth is created from the networked interaction of the men and women who pass through the city's institutions, absorb the city's values and learn critical development strategies. In this dense, science-packed city, a critical mass of entrepreneurs, engineers, scientists, and managers has emerged. They trade e-ideas and e-solutions to e-problems over Italian coffees and strong teas at Bangalore's cyber cafes and traditional cafes. Bangalore is not a modern miracle. It's the

result of decades of steady institutional development and political leadership.

Social networks exist prior to technological networks. Young people attend primary and secondary schools, join social clubs, graduate from professional school, move through religious and civic associations, and make friends who are members of other clubs and groups. They build trust and social capital (Putnam 2000). These dense ties form the social capital on which entrepreneurs and technicians build 'technical' networks. Some locales possess dense sets of institutions conducive to widespread and sustainable ICT diffusion. Other locales do not.

Like its counterparts in Cambridge and the San Francisco, Bangalore's suburbs possessed a rich network of supportive ICT institutions necessary; for a poor, developing country, Bangalore has a wealth of institutions. It claims three universities, 14 engineering schools, and 37 polytechnic schools. It contains a large number of aeronautics, defense, health, and environmental research centers. (Stremlau 1996) High-tech industrial estates abound, including one hundreds of acres large that houses multinationals like Motorola, Hewlett-Packard and 3M (Stremlau 1996). Millions of dollars flow in from other LDCs, including Singapore's investments into a "Information Technology Park". Bangalore is a truly extraordinary mix of

institutions. Half the number of institutions would be remarkable for a country where the per capita annual income is estimated at \$ 2,200 for 2000. (CIA World Factbook 2000).

Today's dense network of institutions and the educated elites who populate them did not originate today. They are not Johnny-come-lately successes. They are the results of a long, consistent tradition of engineers and educational excellence dating back 50 years to the colonial period under Britain, which put the city on the path to a digital future. Staying on that path was dependent upon a series of incremental decisions guided by a vision to stay a particular course. The tradition of excellence was reinforced under British colonialism, and accelerated after independence in 1948. Bangalore benefited from the vision and leadership of India's first Prime Minister, Jawaharlal Nehru (Prime Minister from 1947 to 1964), who half a century ago vowed to make it "The City of the Future". One commentator wrote, "It would be a place where scientists could get away from the multitudes and produce ideas and programs that would guide the nation's ambitious plans to achieve economic and military self-reliance." (Stremlau 1996) Nehru and all subsequent Prime Ministers put their money where their vision was, pumping resources into the city in order to make it a true Indian technopolis. (Stremlau 1996) . The government "spent

lavishly in the building of Bangalore's civilian science and technology infrastructure as well as the nation's most sensitive and advanced military and space research facilities."

(Stremlau1996) Nehru structured the institutional rewards to make scientists want to go there. In my interviews in India, people frequently referred to this very consistent, long-term support for information and technology centers based around Bangalore. One keen observer I interviewed noted that successive Prime Ministers selected large national projects to support programs including the national nuclear program, and the Indian space program. Typically, a Senior Science Advisor who served as the point man to promote and protect resources flowing to India's scientific institutions, including those of Bangalore. A recent Advisor who pressed his boss to build the human and the physical infrastructures of the Indian telecommunications industry. Without successive decisions over many years, Bangalore would not have achieved its tremendous success.

Even with this slow, steady accretion of critical institutional, material and human factors of production, the city of Bangalore did not become a household name among the global ICT crowd until the early 1990s. It first had to pass a threshold point—societal networks, indigenous institutions, and

'old boy' networks were not enough. The final ingredient was the spark of steady external demand for locally supplied products and services. Although India has a huge English speaking middle class, the largest in the world, India's domestic demand alone was not enough to jumpstart Bangalore's ICT industry. Even today, the forward linkage between Bangalore and the broad mass of Indians is minuscule; Bangalore remains an economical enclave. The missing ingredient was **consistent** demand for information services. For international businesses, the local industry provided low cost valued-added inputs. Multinationals started in India with low-level 'back office' activities way down the value chain. A substantial multi-billion dollar business for increasingly sophisticated services and goods emerged later. Indian knowledge entrepreneurs were able to move against the expectation of many local Indians.¹ Combining with Bangalore's rich institutional networks, foreign supply-and-demand elements coalesced, and a modern ICT Mecca was born.

Elites in other cities are eyeing Bangalore's miracle jealously, seeking to re-create it institution-by-institution. Privileged by a huge influx of foreign capital and foreign companies, cities like Hyderabad are reaching for similar status. Both cities are "showcasing themselves as global centers for knowledge-based industries." It is an open question whether

other Indian states and cities will successfully create and resuscitate individual institutions, and enforce a productive, progressive, inter-institutional governance system.(India Today2000). But as McKendrick, Doner and Haggard find in their recent study of the hard drive industry From Silicon Valley to Singapore, global corporations are aggressively seeking location specific benefits in new locations such as strong research universities, specialized labor, or clusters of critical suppliers (McKendrick, Doner and Haggard 2001) Achieving greater sophistication requires institutional and policy incentives that prompt intimate inter-institutional linkages between demand and supply, design manufacturing, and customer satisfaction. According to two observers of a proposed ICT plan for another Indian state, Tamil Nadu, "the extent to which the benefits of the 'Information Revolution' are actualized will depend on the success with which countries' regional sub-divisions incorporate into policy and initiatives these inter-linkages between various components of an ICT strategy. The Tamil Nadu government's ICT strategy, although progressive and comprehensive, is deficient in its understanding of these inter-linkages, and needs to address them to ensure that a flourishing IT industry translates into regional development."

Silicon Valley and Route 128 Are Not Miracles

Annalee Saxenian (1996) demonstrates convincingly that very similar factors operated in other ICT success stories like California's Silicon Valley and Route 128 around in Cambridge, Massachusetts. In both Cambridge and Silicon Valley there were important private and public institutions, and dense networks that advanced and sustained the design, diffusion, and use of innovative new technologies. These included the Massachusetts Institute of Technology and Harvard in Cambridge and Stanford and Berkeley in California.

Popular culture and academic studies remind us that California has outpaced Massachusetts. Saxenian unequivocally attributes Silicon Valley's absolute successes and its relative triumph over the corporate and educational IT complexes in Cambridge to Northern California's unique institutional patterns. She cites the critical importance of high-quality, world-class single institutions like MIT and Stanford. Especially critical are institutional cultures that emphasize mutual problem solving and information sharing among engineers; institutional incentives promoted openness.

Saxenian found that the institutional patterns in old New England were more rigid and hierarchical. Executives expected tasks to be met in-house, and there was not as much outsourcing

and collective problem solving among different companies as in the West. New England's Puritan traditions there were more authoritarian and top-down. The institutionalized patterns of high inter-firm labor mobility that prompted high levels of knowledge sharing were absolutely essential for the Valley's success.

Other ancillary institutions were also in place to provide the essential upstream inputs the burgeoning computer industry required. These included institutions supplying skilled, smart workers (universities like Stanford and Berkeley), and institutions supplying capital (venture capital firms). New social institutions sprang up to support the "softer" but essential elements of trust across elite groups, such as the voluntary private-public partnerships that markets require to function effectively.

Beyond the more obvious and visible organizations like think tanks and for-profit corporations are two institutions whose effectiveness helps or hinders ICT diffusion—property and property rights. Economic historians like Douglass North recognize the regular predictable protection of property rights as the cornerstone of long-term, sustainable economic development (North 1990). Entrepreneurs and managers seeking

sales, investment, and innovation opportunities in the ICT sector simply will not sell, invest, or innovate if they believe the property rights regime ("rules of the game") is not adequately specified and enforceable. As risk takers seeking benefits, they need to have confidence that the fruits of their labor will be their own (minus the tax man's share). Confidence comes with reliable, transparent institutions that structure activities and secure core privileges and rights of property—the right to use property however one wishes, the right to the fruits of one's property, and the right to dispose of property. The provision of these fundamentals is a prime responsibility of institutions, whether courts, legislative bodies or regulatory agencies. In many ways, the right of property is the world's most important institution, yet during the transition from a world of atoms to a world of "bits" and "bytes", the protection of property rights is especially problematic (Negroponte, 1995). Sparr (1999) recognizes this point in her argument about the importance of property rights in cyberspace. Cyber rights and intellectual property rights are especially difficult to enforce in poor countries where institutions are weak. A very similar process occurred with the sharing of lessons and of institutional development in the international effort to reduce the risks of the Y2K problem.

ICT Impacts on Institutions

The relationships between institutions and information and communication technologies are reciprocal and iterative. Institutions impact ICT; ICT impacts institutions. We have argued that political, economic and educational institutions always have major influences on the sequencing and overall performance of the Information Revolution. The converse is also true; ICT are starting to have some impacts on the structure, staffing and performance of institutions in developed countries. The degree and the ways in which these institutions absorb the pounding waves of innovation associated with the new ICT's will greatly shape the position of these countries in the evolving global system, and eventually the overall contours and performance of the international system itself.

The conventional wisdom, buttressed by a growing body of empirical work in the West, suggests that the introduction of ICTs like computers and the Internet encourages organizational decision-makers to make the following changes within and between modern organizations, *given the right kind of circumstances*:

- o flatten vertical hierarchies within organizations;
- o tilt the desired skill mix toward staff with higher educational attainment;
- o regularize and rationalize work routines;

- o increase organizational transparency;
- o reduce some costs (communications) while raising others (hardware); and
- o facilitate the shift toward team management.

In addition to these mainly internal shifts, the introduction of these techniques may alter external relations between organizations:

- o tighten links with upstream suppliers;
- o tighten links with clients and customers; and
- o tighten links with external competitors and allies.

These claims have been substantiated for some organizations operating under certain societal and institutional conditions. They have not been confirmed for all organizations under all circumstances. As one excellent report of the US-based National Research Council insisted, there is no such thing as 'the' impact of 'information technology'. There are only multiple possible impacts of particular applications under particular circumstances in particular organizations. In general, the vast majority of the case-level analysis of formal organizations has been conducted within the most sophisticated organizational structures within the most advanced sectors of the most economically advanced countries. Most of the research has been done on business organizations in the United States, the UK, and

the Nordic countries. Extrapolating across to other very different conditions is unwarranted. Regrettably, there has been far less analysis of the impact of ICTs on organizations in developing countries. The evidence we do have demonstrates rather different outcomes.

Since modern ITs are less well absorbed in LDCs, ICT affects fewer institutions, and affects them in more shallow ways, than their counterparts in the developed world. Penetration is thin, and overall effect is modest. The ICT-institutional dynamics probably parallel those in advanced countries, but with important differences of scope, speed, depth and impact. The **independent variable** will differ between a typical LDC and DC.

Also, the "typical" organization in the "typical" LDC (already a big assumption) differs substantially from organizations in the typical DCs. The same technology dropped into a modal LDC organization and a modal DC organization will have very different consequences. LDC organizations tend to have specialized features as we saw above. These are, of course, broad generalities, and all of them do not apply to every organization in every LDC.

It is possible that ICTs will have consistent impacts on most LDC institutions, but some impacts may run counter to

conventional wisdom. Institutions in LDCs are often enmeshed in deep-seated patron-client ties where the ostensible organizational purpose can be displaced or redirected for implicit political, personal or general welfare purposes. Government organizations sometimes act as employment agencies of last resort since governments try to keep unemployment rates, and the political costs of unemployment, low. The impact of a particular ICT application on a American firm or government agency may be quite different when the 'same' ICT application is dropped into an LDC agency. Personnel "downsizing" might not result from ICT diffusion if it runs counter to strong political imperatives. Political imperatives may blunt technical possibilities, and ICTs may serve, at least initially, to buttress elite power. Loveluck makes this argument in his work on the effects of the Internet and other new technologies on the communist power structure in China.

ICT Impacts on Organizations and Sectors : Examples

Given the terrible paucity of empirical data on these issues, I will draw on my own research, and that of others, to give a few examples drawn from different sectors, and speculate on possible impacts. A serious assessment of the evidence provides a cautionary tale and a warning not to reach

conclusions too quickly. Let us look at several examples where ICT might have impacted organizational structure.

TeleCenters in Developing Countries

Data on telecenters has been used to make a variety of points about ICTs and developing countries. One of their central messages is the complicated, non-obvious relationship between core technologies and institutional structures. Telecenters provide one case study of the ways that modern communications technologies at the center of small institutions can vary substantially.

The most serious efforts in this area have been done by the most serious organization in the field, the International Development Research Centre (IDRC), of Canada. According to Dorsey and Hess (1998 3), "the developed world model of personal acquisition and ownership of technologies that facilitate access to and participation in the Information Age is not replicable in the foreseeable future in the developing world. Alternative models must be pursued." (as quoted in TELECENTERS). This accurate conclusion, given the low levels of per capita income and of effective demand, implies that new organizational forms must be found to launch even the Information Revolution's first order changes. ICTs cannot be embedded in homes and offices as they are in the developed world.

One such institutional innovation is the telecenter. The telecenter, "variously called community learning centers, telecenters, telecottages, cybercafes, etc. [are] facilities connected to telecommunications networks. They provide a range of public electronic services. At the low end, telecenters provide telephone, fax and e-mail services. More sophisticated configurations provide Internet connectivity with specialized information retrieval or distance learning delivery" (Elmer 1999). While admitting that "[t]he potential of computer-based technologies for solving problems of sustainable development is tremendous," because telecenters can address both technological access and equitable access, this author concludes that telecenters are still in such "an embryonic state, the impact of telecenters on sustainable development is largely untested... Despite the lack of empirical evidence, however, the telecenter model appears to be a promising option for reducing knowledge gaps within developing countries" (Elmer 1999). .

There are various organizational models among 'telecenters', from fully funded government centers, to entirely private sector entrepreneurial ventures that earn profits to survive. There are freestanding telecenters (Ghana), and others attached to municipal buildings like post offices (South Africa). Some have large staffs, some have small staffs. In two

nearby villages, the institutional forms may differ substantially. According to researchers S. Kyabwe and R. Kibomba (1999), in one Ugandan village the ownership and management is community based, and in its neighbor, it is semi-private/semi-public. These different structures attract different customers who used each telecenter for slightly different uses. Each telecenter had different impact on its community.

Given this organizational variability, it appears that the core technology package does not strictly determine institutional housing. The problem, of course, is that there are so few (if any) reliable studies of ICT's impacts on poor countries' institutions, especially beyond the more-studied corporate sector. Still, the telecenters undercuts the argument that ICTs automatically reshape LDC institutions. There seems considerable leeway in responding to the 'imperatives' of technology. There is not 'one best way' of institutional design when providing ICT services. The 'right' institutional design hinges on a variety of factors, including the needs and purchasing power of the potential user population. This holds for smaller freestanding institutions like telecenters, as well as for ICTs embedded within larger, more complex institutions.

Other Impacts: ICTs and Changing Organizational Dynamics Among NGOs in West Africa

The links between ICTs and organizational structure and performance emerge in interesting ways, as I found out doing field work in West Africa. As a leader of a team of three senior researchers on a mission sponsored by the National Academy of Sciences, we were charged to design a framework for assessing the impact of ICTs on developing societies, especially the impact of the Internet. Because these technologies are so new to Africa, commercialized only in the mid-1990s, we quickly realized that we couldn't hope to demonstrate impact on 'society'—whether on entrepreneurship, capital accumulation, family structure, or labor patterns. The ICTs were too new. We might, however, be able to see some impacts on the organizations that housed and used these tools. After interviewing ICT experts and senior people in government ministries, private firms, trade associations and NGOs, we concluded that at best we could begin to see modest impacts on institutional operations and on budgets of selected organizations, especially those in the NGO sector.

The institutions most affected in our small sample were NGOs with close ties to overseas donors, or NGOs that were local offices of overseas international organizations. Even among

information ministries, government agencies in West Africa were rarely connected through Intranets, or the Internet. When computers were used in government they were more likely to be employed for work processing or financial accounting. They were rarely networked. Universities were also severely limited by their ICT resources.

For NGOs like ENDA or ONG in Senegal and for think tanks in Ghana, the ICT staff reported that they were able to substantially reduce communications costs, often by 1/3 to one half (National Research Council 1998). The local staff also reported closer ties to other like-minded international groups, finding themselves more in the loop and better able to participate in international movements. These ties helped them to be better informed about the ways global issues affect local interests. They reported greater possibilities for cross-national policy and political campaigns.

We found an ICT diffusion pattern that may have implications for institutional restructuring and performance. West Africa's communications network seems to have diffused in the following manner:

(1) initial ties reach to overseas headquarters, affiliates and funders;

- (2) links were created to the headquarters of other NGOs in the country with similar interests;
- (3) ties to colleagues in the organization through Intranets;
- (4) the development of ties to organizational clients; and
- (5) slow development of links to an organization's field offices in other countries.

These trends may indicate how organizations will adjust their institutions to these new opportunities. This diffusion pattern suggests that for poor nations, major ICT-prompted institutional changes are not likely in the immediate future.

In the more sophisticated nations of the developing world like Brazil or Korea, the Intranet and Internet appears to be having more direct institutional consequences, more in line with what we witness in developed economies. Some leaders in the corporate sector in LDCs are seizing the implications of electronic commerce and committing resources to re-tooling company operations and structures to take advantage of e-commercial opportunities.

Aside from the availability of brand new technologies to help extend the reach and influence of grass roots community organizations, the IR also seems to be affecting the structure and organization of traditional media. When one talks to journalists and activists in developing regions, one of the

things most exciting to them is the way they are better able to meld the low cost of information of the Internet, with the reach and accessibility of traditional media like radio or television. Alongside the crumbling of state-owned publishing and broadcasting monopolies one sees the rapid growth of new independent radio and television stations. Some of these are community-owned, others were started by private entrepreneurs, both provide new sources of information. To the extent that these changes are diffusing beyond just a small ICT-intensive core, they may be more important for LDCs than DCs—the former are more authoritarian and repressive. IT-enabled changes occur against a backdrop of government-civil society relations of authoritarianism, dictatorship and a political culture in which the central state accords little respect to independent organizations. Free media makes a huge difference. If the pressures that caused the flowering of civil society continue, along with the continued diffusion and effective use of modern information and communications resources, we can expect to see progressive changes for the developing world.

A New Culture of Communications

All of this suggests that with the right leadership, vision and institutional fixes, poor countries can begin to reduce political authoritarianism and economic poverty by effectively

deploying the right ICTs. This may be true within limits, and there are instances of poor countries with poor institutions making great advances with the Internet, the World Wide Web and telecoms. But, the leadership's capacity to use ICT to make quick institutional fixes is still limited, even under the best circumstances

I have been has been struck by the number of respondents I interviewed in Africa, Asia and Latin America who, on their own, used the term "culture of information" or "culture of knowledge" to characterize the nature of the challenges they face. They report that success is not simply a question of using imported content or hardware. For the leadership, it is the challenge to foster a new set of attitudes, expectations, and values that encourage people to lean toward the creation and diffusion of knowledge. (Interview, Kamel, Egypt)

The term 'Knowledge Culture' suggests a degree of difficulty more daunting than a 'technology transfer'. The latter is mechanistic, pre-determined and minimizes human agency. The former is organic, open-ended and assumes human agency within a particular structural context. India's showpiece city of Bangalore did not become Silicon City because of 'technology transfer'. It developed a special culture

nurtured by leadership, institutional development, and the availability of values, attitudes and behaviors that could support a silicon city. Just as the indigenous local cultures of Santa Clara and Cambridge could be manipulated by information champions to support innovation, diffusion and local ICT sustainability, all developing countries must create a local ICT enabling environment that draws on traditional and modern strengths.

The challenge for leaders is to create a hospitable environment for creating continuous application of intellectual energy in order to give it greater and greater value and transform it into 'knowledge', to distribute it and redistribute it again to more and more potential users. This is the great insight of Manuel Castells (1998). The IR is a process in which institutions, groups and individuals interact to redesign the production and distribution of ICT services. These interactions cannot be mandated or forced, but can be guided and facilitated with vision and leadership.

Politics

Politics is a critical element missing from current ICT diffusion analysis. When politics is omitted, we find thin, static and ultimately unconvincing portrayals of reality. I

argue that without sufficient political will and support, the IR cannot be started or sustained.

The classical definition of politics is "who gets what, why and how". Politics occurs in all venues, not simply at the ballot box or the rally. Terms like office politics, bureaucratic politics, party politics or 'big money politics' capture the wide range of activities in which "who gets what" matters a great deal. It especially matters when the services or goods getting distributed are scarce ones for which there is considerable competition and conflict. ICTs fit easily under the rubric of scarce resources, and no more so than in developing countries.

Politics Under the Old Regime

Until recently, the "politics of ICT" was a rarified and elitist affair. Determination of who got what ICT services was a technical and administrative matter, not subject to a lot of consistent, high visibility politicking. There were of course moments when politics seemed to dominate, but on the whole, the 'politics' of ICT lacked the visibility of other substantive policy areas like land redistribution, abortion or education. The presence or absence of information and communication technologies in LDCs did not mobilize political masses since because services were scarce, and people could not easily afford

them. The politics of ICT in these countries became the politics of patronage. 'Politics' meant knowing senior people at the relevant ministry, relying on friends at the PTT, and earning political patronage in the local branch office. From most accounts, 'politics' also meant a lot of bribing. In a country like the Congo, the **official** waiting list for a telephone was **ten years!** The conditions of extreme scarcity set up perverse incentives—for would-be customers; it became customary to offer bribe in order to jump the ten-year queue. As bribes increased, the incentive to expand service decreased.

The politics of broadcasting or print media differed somewhat, but followed a similar pattern. In most LDCs the T.V. stations and radio stations were either owned and operated by government agencies, or by elite families dependent upon the political powers. Protests against censorship and state control may have occurred, but they were intermittent and often ineffective. The 'politics of broadcasting' was more open than in telecommunications, but it too was an affair of citizens (or competitors) against a stable and insulated monopoly.

In both telecoms and broadcast there were always implicit pressures on central government elites to guarantee the delivery of public services like telephones. The business community and local governments also exerted pressure on national elites to

distribute more efficient ICT services. The possibilities for political tensions were greater for federal states like Brazil and India than in centralized countries like China. Most of the action occurred through elite interactions within the Ministry of Communications, the operating company (usually a state-owned corporation) and other relevant government agencies like the Treasury. NGOs and citizens groups were rarely involved in distributional decisions.

Iron Triangles and Policy Monopolies

There are several ways to characterize the old politics of ICT. Scholars like Halperin refer to these tightly circumscribed interactions as 'bureaucratic politics', where the major players are not political parties or NGOs, but big government institutions (Halperin, Scheffer and Small 1992). Another useful term may be 'iron triangle', where political elites are linked with (commercial) actors, civil servants, and legislators into an "iron triangle" of political action that works to exclude others. Baumgartner, Jones and Macleod (2000) use the term "policy monopolies" to describe particular policy domains that resist pressure from outside groups. Such monopolists make claims for exclusivity based on their expertise—the issue area tends to be difficult and complicated.

I found that this form of politics is especially characteristic of a certain type of policy issue that I term an "E-issue" (Wilson 2000). "E-issues" include the politics of energy, the politics of the environment, and now the politics of e-commerce. E-issues are characterized by their technological and cognitive complexity and their sudden appearance on the agenda of senior policy elites. These forms existed in DCs; they were especially elitist affairs in developing countries.

Lindberg (1997) points out that, because of their expertise, hierarchical control and ability to mobilize resources, inter-organizational coalitions of elites can generate dominant policy outcomes. They can increase their individual and collective resources and eliminate conflict and cooperation by controlling the agenda and excluding other actors.

Thus, the politics of ICT in developed and developing countries was never a populist affair, nor was it politically neutral. Powerful forces that could penetrate the iron triangle were heard, less powerful voices remained excluded. For the most part, who got what and when was determined by elites in capital-intensive and urban-based units that included both public and a few private actors.

The politics of the Information Revolution is, therefore, a question of the ways that established elites within these iron

triangles are pressured by newcomers to alter their substantive policy positions (i.e. state ownership, monopolies, and skewed distribution) and restructure their engagements with outsiders. Sometimes state elites changed their tunes quickly, but most often they did not. It is still an empirical question as to whether, and to what extent, organizational and substantive changes have occurred in any given country, especially those that yield new patterns of global allocation. There is a decisive overall global trend toward restructuring substance and access, but the national and sectoral patterns and the paths to them are quite idiosyncratic. Illustration 2.2 shows that there are multiple paths to greater competition and private ownership. [Insert Illustration 2.2 about here]

It is essential to keep in mind that the old individual national ICT regimes, especially between the mid 1960s and late 1980s, existed in a much more restrictive and constrained global political environment. The World Bank and other international bodies supported domestic state-owned monopolies. Most countries in Latin America and Africa were military or civilian dictatorships. Asia was not much better. Repressive political economies discouraged popular mobilization for greater communication. Debt-blasted economies meant middle-class growth

was sluggish. If iron triangles governed ICT, iron triangles governed many areas of public policy.

A Politics of Transition

I agree with Vogel's (1991) characterization that the liberal reforms of telecoms in the 1980s and 1990s were in the last instance the work of senior elites within the state—the President or Prime Minister's office, the ministers of communications and information and their staff. Interest groups and outside reformers may have proposed change, but it is the state elites who actually selected alternative actions. It is very curious however, as Vogel demonstrates (Vogel 1996), that it was state elites who, by liberalizing, deliberately robbed themselves of some of their formal powers in telecoms.

My research findings also agree with Cowhey (1990) that the substantive changes in policy toward greater liberalization reflected new patterns of political mobilization among a variety of important economic actors, particularly in the business sector. The outsiders' own political clout grew relative to the state, and their incentives to push their public sector counterparts to do new things, or old things in new ways, was decidedly greater by the end of the growth spurts of the 1990s. Confronted by growing competitive pressures, business elites had both the motives and means to press for liberalization. In the

aggregate, there was also a slow accretion of people into the middle classes of the developing world that added some demographic heft to businesses' own demands.

While public ICT policies are in the first instance crafted and designed by a small group of technocratic elites, the sustainability of policies and programs rests largely on coalitional and constituency bases. The old regime of rules and regulations rested upon an often implicit coalition of PTT supporters, and through the political inaction of the unserved classes. Unless and until substantial elite political realignment occurs, major policy changes will not occur. If they do occur they will not be easily sustained until a new coalition is crafted.

Peter Cowhey makes a parallel argument to explain the 'big bang' of telecommunications liberalization in advanced capitalist countries (Cowhey and Aronson 1993) He claims that deregulation in the US resulted in large measure from the slow crumbling of an old political coalition built upon AT&T's monopoly position. Based on the technologies and commercial conditions at the time, the policy and institutional arrangement of the old regime worked well through the early 1980s. After the technological changes of the 1980s, however, globalization and hyper-competitiveness began to alter coalition member's

calculations. Especially notable was the pressure on earnings of large ICT consumer corporations that felt compelled to lower basic costs in order to remain globally competitive. Cowhey (1993) demonstrates that at the same time, other corporations (MCI and Sprint most notably) believed it was time to challenge the domestic, quasi-public, AT&T monopoly. The combination of an anti-establishment coalition of would-be suppliers, anxious customers, and ideologically supportive legislators and jurists undermined the old monopoly rules in the United States. These trends were visible globally, as when the U.S. pressed the Brazilians to eliminate barriers in their domestic information processing markets.

What Cowhey (1990) and Singh (1999) underestimate in the 1980s and 1990s is the constant direct pressure on developing countries to change their domestic regimes. Among the external constituencies for liberal reforms in developing countries, none was more relentless in its push for change than the World Bank. The World Bank's ICT impact varies by precise issue, area and country. There is no single unambiguous pattern. India resisted Bank blandishments more than Mozambique and Ghana. Poor African nations proved more vulnerable than wealthier Asian ones. The Bank had been the biggest single lender of loans for telecommunications infrastructure to all developing countries.

Many poor countries relied heavily on Bank staff work to substitute for their own thin technical expertise. Staff and consultants did everything from providing policy guidance to designing placement of telephone lines.

The Bank's role is discussed in greater detail in Chapter Seven. Singh and others who draw conclusions based mainly on Asian experiences minimize the determinative role of the Bank in the diffusion of liberal reforms in other poor countries. The Bank played the role of a powerful and consistent member of the core ruling coalition that determined policy priorities in Africa, Asia, the Caribbean and Latin America. Singh (1999) writes of India, "After 1991 it is safe to argue that an 'international' liberal coalition continued to strengthen in India comprised of large business users, domestic and international businesses engaged in the Indian market, multilateral institutions like the World Bank and the WTO, and foreign governments. Large users, in particular, lobbied the Indian government fiercely through their service organizations." Singh insists on modeling these international actors "as interest groups...that impact upon domestic political processes (Singh 1999). For poor countries, these institutions often had determinative impacts, as I will argue in Chapter Seven. It was not simply an ICT issue. As countless scholars have

demonstrated, when the debt crisis and global stagnation led LDC economies on a downward spiral for a decade or more, the IFIs stepped in aggressively to press orthodox financial and economic reforms across the board, including in the telecoms sector.

Personal Politics: A Mixture of Motives

In much of the ICT literature, actors' motivations are seen as an exogenous variable determined outside the model. Underlying these analyses is the basic assumption that ICT actors share identical concerns—to see ICTs diffused rapidly. Yet, human motivations are more complicated than portrayed in the models. Outside the world of technology determinism and neo-classical economics, women and men are driven by many motives, rarely acting on one dimension alone. Societal actors do not only respond to one set of incentives. By factoring in multiple motivations, we gain a better appreciation for the limits and possibilities of the Information Revolution in poor countries. Based on my own observations, here are the most important motivations at work among central state elites in their restructuring of the information and communications sectors. Elites seek to:

- o meet the goals and responsibilities of the institution in which they work;

- o promote and advance the use of modern ICT technologies and services;
- o preserve (and if possible extend) their current institutional authority and privilege;
- o protect the interests and authority of the current regime in power;
- o all other things being equal, allocate the ownership, control, consumption and other benefits of reforms and new technologies first to NGO and private sector groups and individuals who support the regime;
- o protect the nation (and regime) from overseas threats to its political sovereignty, cultural integrity and economic opportunities; and
- o delay or block the introduction of new technologies that threaten to empower their political opposition.

This list reflects the imperatives and priorities of those closest to the incumbents in power, whether political or institutional. The incumbents are most often the defenders of the status quo, but there are other political actors with different priorities and motives; they are most often the Information Champions who challenge the status quo. The Information Champions have different motivations and different

priorities. The motivations that guide the more progressive, and indeed radical innovators, include:

- o advance the interests of one's countrymen by helping to bring them greater access to the new networked technologies like the Internet;

- o advance one's own interest to be in a position to influence the future evolution of the technologies and the services they provide;

- o do battle with the forces of state control at every level to achieve wider ICT diffusion (or when appropriate, ally with them to promote diffusion; and

- o for survival's sake, don't overly antagonize the prerogatives and authorities of the current regime in power (unless you need to do so to achieve #1)

In other words, the same base and exalted motives driving human beings in other sectors of the political economy drive them in the ICT sectors. At the end of the day, the Information Revolution is fought over the allocation of scarce resources, and the rules and practices that guide those allocations. These fights over rules and practices occur among individuals and groups seeking to advance their ideational and material

interests. They do not occur among technologies, nor even among large aggregates like "society".

The Politics of Individual Information Champions

Employing a modified structural framework helped uncover one of the most interesting if unexpected political realities of the Information Revolution—the influence of deeply committed local ICT innovators and groups. Having begun my research seeking structures, in the end the most surprising finding was the role of individuals. The interactions among the structural level and the individual level proved to be intriguing. These individual Information Champions were important in every country I studied. Although I began by examining institutions and structures, individuals kept "intruding" into the research. I was forced to adjust my methods in response to the new findings. These innovators and groups have tremendous impact in shaping critical Information Revolution outcomes. These are the people who make the Information Revolution. In every country, whether large or small, these individuals champion new ICTs and aggressively press to change the old statist rules and practices. Their individual biographies make fascinating reading in and of themselves, and as insights into the processes of social change, insights available through what C. Wright Mills called the "sociological imagination", which allows one

"to grasp history and biography and the relations between the two in society", and to "understand the larger historical scene in terms of its meaning for the inner life and the external career of a variety of individuals."(Mills 2000 [1949],5-6). Two aspects of these individuals seemed especially salient—the personal characteristics of each individual, and the characteristics of the surrounding social networks they collectively constructed.

Individual Features

Not every individual is identical from country to country. "Information Champions" are generally individuals who press the existing rules, procedures and institutions to enhance wider distribution of ICT services, by introducing innovative technologies and practices. They are similar to what Rogers calls "Early Innovators", and appear early in the process of social innovation, in a variety of institutions, whether public, private or civil.

Exactly who were the people who saw opportunities on the horizon that others did not see? Who were the first Information Champions? For my research, I used a "reputational" technique to answer this question and learn about these individuals. I accumulated names from diverse sources, including published reports, well-known ICT institutions, and overseas nationals.

I constructed initial lists and interviewed each person; they in turn provided additional names during the interviews. In every case I asked who were the top five or ten most influential individuals involved in Internet diffusion. Once identified, I interviewed many of the top champions and found that they shared similar features.

Each showed common features of education and training. Most early innovators were **educated abroad**, often in the U.S., and many worked overseas for several years. While abroad they were exposed to the whiz-bang gizmos and enhanced services of the new technologies. More importantly, they were exposed to these new applications in a cultural and institutional context that encouraged and rewarded experimentation and change. These individuals were also trained in **technical fields** like electrical engineering and computer science.

Second, the early innovators shared certain attitudes and values. After years abroad these wanderers typically returned home to their country driven by a compelling **sense of duty** and because they recognized unique **opportunities** to do something socially important and personally rewarding. Personal wealth was rarely their top priority. Respondent after respondent reported the twin motivations of duty and opportunity, especially those who returned in the early-to-mid 1990s before

the Internet's commercial possibilities were fully visible. Most Champions demonstrated an almost **missionary zeal** about the work they were doing and the benefits it could bring their people. This explains why many of the leading Internet innovators left lucrative jobs and comfortable conditions in the Western world to return home and slog it out in difficult circumstances.

A dominant theme in the Champions' professional and personal lives was their sense that they were participating in a **global social movement** of great significance. During graduate school and their early professional lives, these individuals interacted with similarly-minded people around the world, as well as with citizens of their host country. They also attended international conferences like the World Internet Society where the zeitgeist of benevolent globalism was in the air.

If some of the Champions saw themselves as a part of a global trend, they were driven by local imperatives. In the words of the activist slogan, they thought globally and acted locally. In dozens of conversations with Information Champions from many countries it was clear they were deeply motivated by a kind of nationalist altruism. Their greatest enthusiasm was for bringing these powerful new technologies back to their own countries. Like earlier modernizers in 18th and 19th century

Europe described by Gerschenkron (1999) and others, these individuals were driven by the recognition of the tremendous potentials of the technologies, and the difficult realities of their country. These individuals were the first to see the digital divide before it became a fashionable term in the West. Like Russians returning to St. Petersburg from Paris in the 1800s, they knew the advanced state of the new technologies, and the extreme backwardness of their own populations.

Their **social backgrounds** were also similar. A disproportionate number of those I interviewed had parents in the middle classes, often in the liberal professionals like medicine, teaching or law. Some of the champion's parents were engineers. Individuals from very rich or very poor backgrounds were conspicuously absent. The parents seemed to share a professional autonomy, a taste for which they passed to their children. These were not the children of the commercial classes.

While demonstrably civic minded, these early individuals possessed a mix of **altruism and idealism** and **political pragmatism**. Whether derived from their practical training as scientists and technologists, something inherent in their personalities, a professional ethos or local conditions, the information champions recognized that some very practical political steps were required.

Whatever idealistic naïveté they might have maintained abroad was typically dashed when they got home and confronted the institutional and political realities of the telecommunications and broadcast iron triangles. In the early 1990s (and still today in many developing countries) the local elites in the telecommunications sector were uninformed about the Internet's possibilities. To the degree they knew about cell phones, the Internet and pagers, they were often extremely suspicious or outright opposed to their diffusion. In nearly every conference, consultant's report, newspaper interview or conversation of the period, the Internet innovators decried the deeply held conservatism of telecoms managers and ministerial officials. The innovators had few illusions about the opposition of the anti-innovators. The senior officials of the monopolistic, hierarchical, centralized state-run P&T and the MPT shared none of the positive excitement over the capacity of the Internet to destroy hierarchies, promote competition, and promote distributed outcomes. They were, after all, in the monopoly business.

The information champions shared a final feature; given the huge institutional and political barriers to rapid and effective ICT diffusion, the champions came to share a set of **well-defined policy goals**. They knew what was required of them to make their

technology dreams a societal reality. They were not driven by strong political ideologies of left or right. Most eschewed a clear ideological position. They formulated their conclusions about the policies required domestically and internationally, and how to employ solutions through pragmatic reasoning of what worked and what didn't. For more Chinese, Brazilians or Jordanians to get the Internet, the Internet's price must fall. For the Internet's price to fall, the state-run monopolies must lower their prices. For the state-run monopolies to lower their prices, they needed competition, more private sector pressures, and more consumer concern. In other words, state monopolies had to change their structure and behaviors. Who would do the restructuring? Some Information Champions took the final step to become "Information Revolutionaries" when they realized that collective action was required to restructure the old and invent the new. This was a process of redesigning information technologies as a process of building informed constituencies.

The Information Champions built constituencies around the world. Their views reflected similar institutional and policy realities on the ground—ignorance, suspicion and opposition. These individuals reached similar conclusions about the institutional changes necessary to advance their cause, re-balance the structures of ICT sub-sectors, especially the

balances between public and private, domestic and foreign, monopolistic and competitive, and centralized and distributed administration. Adopting these "radical" positions moved some beyond being analysts and researchers to being advocates and champions. 'Information Revolutionaries' were bent on radically and actively restructuring old rules and regulations to make way for the knowledge society. The Revolutionaries were pushy activists who didn't take no for an answer, and they allied themselves with NGOs or other institutions in the countries who would advance their cause.

In one developing country after another, we see waves of committed ICT missionaries returning to their communities and bringing the new tools of an information age. Most wanted to 'do their own thing'—to stay in touch with friends, to chat online, to go home and build up computer labs in their local college, and sometimes even to start their own companies. Many of these individuals found that even to 'do their own thing' required getting the local state monopolies to provide infrastructure support and services, whether leased lines or new telephones. Since in many instances the traditional suppliers were hostile to such ideas, ICT enthusiasts became ICT Champions who grew into "Information Revolutionaries". In order for these people to be personally successful, they were going to have to

changes their government, which required that they band together with others. Some of these individual features were not unique to the ICT sector, as Rogers shows.

Social Network Characteristics

The Information Champions' recognition of the collective political nature of their circumstances, and their need for kindred spirits led them to seek each other out. In most countries this led small groups of like-minded people to come together to pursue common goals. They overcame the barriers that face all new groups, which were substantial in the beginning (Olson 1971). But their strong beliefs in modernity and later, their selective benefits, maintained the networks. They created social networks that were a kind of social capital creating trust across individuals and institutions.

The collective actions of these individuals created new, actionable knowledge which they and others use to innovate in ICTs, as "small groups working closely together, sharing insights and judgment, both develop and circulate knowledge inevitably as part of their practice.", as occurred in Silicon Valley.

These ICT Champions were especially visible in value-added sub-sectors like mobile telephony, paging and the Internet. ICT champions were less visible in the reforms of existing large-

scale, state-led broadcasting or telephone monopolies. The clear successes of the Internet champions reflect the newness of the technologies. The new value-added services expanded into a relatively empty social space devoid of dense institutional architecture. The mandarins of the old services were comfortable with long-term clients, protective of their constituencies, and linked closely to their upstream equipment suppliers. The thinness of the political and institutional terrain of the new technologies was by contrast, open for smaller, politically weak and institutionally innovative groups. There were no existing Institutes of Internet Policy nor Ministries of Paging. The institutionally under-populated terrain provided a hospitable environment for distributed networks to develop unhindered. One "Revolutionary" said, "For years we were so small that we were beneath their radar screen." Government officials therefore did not initially bother them. In economic terms, barriers to entry for new, smaller firms were low. New entrepreneurs didn't need high levels of financial capital, nor did they need political capital to break the barriers erected by the political elites. When the Internet appeared on the radar screens of senior officials, they were small potatoes when compared to the billion dollar players in landlines and satellites.

As I interviewed the early instigators several salient dimensions emerged from our discussions. The initial ICT coalitions were similar in size, in coherence, in group initiative, and group membership. As they shared individual traits, they also shared group traits. In each country, initial networks formed that were relatively small. These were people who got to know one another in the early stages through their search for advice on technical matters, or by meeting at promotional events. Small groups are easier to maintain than large ones (Olson 1971).

It is curious that the size of the country did not greatly affect the size of the founding group. In a country of 1.2 billion people the list of the top ten innovators is remarkably consistent. When one inquires in a small country like Senegal, the lists is also quite consistent. The initial networks were small, constructed by and from people who were technically-trained and occupied overlapping professions in different institutions. The early institutions tended to be research centers, universities and selected government ministries like education or science and technology (S&T).

There were some interesting differences as well. The coherence of the networks differed substantially. Differences reflected the incentives for individuals encapsulated in their

particular institutions - universities, government ministries, and firms - to break out from their organization and cooperate across them to form mutually supportive networks. In some countries champions created clubs of like minded people; the founding of a local chapter of the Internet Society is a good indicator of group cooperation (or in some instances like Thailand, internal group conflicts). Senegal formed close-knit networks of advocates, when some individuals even came together to create a new publication that would serve the community. In other settings, individuals were socially aware of each other, met occasionally, but didn't create an autonomous separate group outside their institutional homes. In some circumstances these were not 'groups', these were individuals similarly situated in a variety of institutions and networks who held common values, pursued common goals, used similar strategies, and acted in parallel to achieve their goals. These should be characterized as more of a dispersed, informal network of convenience than a formal organization. I return to this idea of intermediate bodies in Chapter Seven.

The composition of the groups proved a curious feature—a similar **membership structure**. In countries where a collective did emerge, as in Morocco and Brazil, there were often one or two people from technical universities, one or two people from

NGOs, and someone from a relevant ministry or parastatal body. It was especially important that there was always someone who had close personal ties to the office of the President, Prime Minister or top communications officials. This feature proved important in moving the Internet reform agenda forward.

The original impetus for cross-institutional communications came from many sources. In most LDCs I visited, a small group of people began to meet in the late 1980s and early 1990s. These were always informal meetings, whether in Moroccan cafes or Senegalese universities. One can find distinctions between top down and bottom up networks initiatives, where the former occurred in places like China.

A country's structural and institutional features don't automatically translate into particular organizational forms for the networks of champions. But particular substantial cross-level consistencies exist. For example, the behavior of the "Information Revolutionaries" in China very much reflects the top down, highly authoritarian structure of the communist system and its closely controlled statist institutions. The regime simply does not permit autonomous interest groups to operate. Instead, the Internet Champions' interactions occurred in a series of special state commissions and joint research - ministry initiatives, with a growing role of the state owned ICT

corporations and the state security bureau. In Brazil by contrast the highly federalized institutional structure, combined with an unequal economic structure, is reflected in the high mobility of the same small group of champions across many different institutions in a relatively short period of time, often in different regions.

While structure and institutions set broad common parameters for individual behavior and group dynamics, there is considerable autonomy within each national political culture. Senegal and Ghana are both poor, agricultural based economies with semi-democratic political structures, yet there are substantial differences in each ICT communities. Reflecting elite structure and culture, as well as a French colonial heritage, the Senegalese research, commercial and governmental innovators were in close and consistent cooperation. In Ghana, the intersectoral interactions were less frequent, less inclusive and less cooperative.

It is still early to make the leap from describing emerging social networks to concluding that a particular network configuration shapes performance outcomes. It does appear that greater system heterogeneity - more members across more institutions (universities, firms, government, NGOs, etc.,) with greater communication - produces greater technology diffusion

and sophistication. I will describe these national systems in greater detail in subsequent chapters.

These patterns of innovation and elite political interaction demonstrate a number of features that scholars have noted in other contexts. In his study "Understanding the Role of Leadership in Economic Policy Reform", Wallis (1999) points out that major policy paradigm shifts of the type I am describing occur when performance anomalies occur that 'shouldn't' occur according to elite expectations and past performance. His review of the experience of structural adjustment programs finds that poor performance in one area occasions questions and a search for quick fixes. Policy makers begin with ad hoc experimentation to eliminate the anomaly (as was done with World Bank-led economic reforms in developing countries) until it becomes apparent that a piecemeal approach is not fixing the problem(s). The problems are then recognized as being more systemic, and officials reluctantly turn to more comprehensive alternatives they hope will be more effective. This was very much the experience of ICT policy diffusion.

Under these conditions, new leaders may emerge who are driven by their formal roles and their policy ambitions. These new leaders may advocate the reconstruction of public policy on the basis of a new paradigm, provided that the paradigm is both

coherent and authoritative. Wallis(1999) points out that, in patrimonial states with strong reliance on patron-client ties, these changes will almost invariably threaten well-entrenched and influential groups that benefit directly from the current state of affairs, and actively oppose reforms. Based on his analysis of policy changes in New Zealand, the author concludes that these dynamics are best described through a 'conspiracy theory' capturing the combative, strategic and occasionally secretive behaviors of conspiracy groups.

This conclusion comes close to what I describe about 'cyber revolutionaries'. Wallis (1999) employs a useful and suggestive conception of the issue; he defines the conspiracy group as "shared goals among two or more with substantive views...These individuals provide 'coherent policy leadership' that is highly focused, and they are "willing to use their own authority and political skills to overcome and circumvent the resistance to reform generated by special interest groups; to bring bureaucrats in line; to lead public opinion by taking firm positions on contentious issues" (42).

Wallis (1999) also emphasizes, quite correctly, the collective nature of the reform project. Rarely does one person achieve all that is required. Wallis (1999) discovers a 'division of labor' involved in the provision of leadership,

with not every individual fulfilling every tasks required. Within this political context where a handful of innovative ICT activists struggle to effect substantial reform, others have identified complementary patterns.

Everett Rogers' rich and suggestive sociological work on patterns of innovation across a variety of different sectors finds that the process of innovation and diffusion is marked by the engagement of different groups of individuals (Rogers 1995). He too analyzed the personal characteristics of each group, their attitudes toward risk, their salient values, their communications behaviors and their personal relationships.. His pioneering work remains useful in the study of ICT diffusion, although in a later study on ICT diffusion in the banking industry he modifies somewhat his earlier conclusions somewhat by insisting on the importance of minimal threshold levels needed for those technologies to achieve rapid diffusion. Drawing on observations of innovation in a variety of activities, Rogers (1995) finds that at the start of the innovation process a small percentage of individuals is willing to assume the high risks associated with employing new technologies. Typically this group of early adopters constitutes only 2.5% of a given population. Later, other groups, from Early Adopters (10-15%), to Early Majority (33%) to Late

Majority (33%) and Laggards (10/20%) are eventually willing to try out the new techniques. The risks are lower since some of the 'bugs' have been worked out, but the rewards may also be lower.

This is often cited as evidence of a universal diffusion pattern, and it is persuasive. It is also quite suggestive of what may be occurring among "Information Champions" or "Information Revolutionaries", who seem to overlap with the innovators. Fine and Rostenne (1998) have applied this approach imaginatively to East Africa. They write, "Empirical studies indicate that Innovators tend to have a much higher than average level of entrepreneurship, income and often, but not necessarily, of formal education. Innovators two most distinctive traits are that they crave innovation and that they are 'outsiders'. They are not part of any establishment or in-crowd. Consequently they are less affected by social risks, ranging from social isolation to ostracism and downright opposition, which are associated with transgressing accepted behavior and embracing innovations. Also, Innovators see change as a means of self-fulfillment. In terms of diffusing innovations, Innovators constitute a critical catalyst that must be present, but managed with care. Innovators will often volunteer to assist in the process of diffusion. However, their

outside status can severely limit their usefulness beyond the very first stages of the process." (5).

As useful as Rogers' approach may be, we should be careful of extrapolating blindly from this pattern, derived mainly from U.S. experiences in a few sectors. We know that many of these ICT innovations are carried by private sector elites. We know that entrepreneurial activities in much of the developing world occur within a complicated social mosaic marked by sharp ethnic boundaries. Given these societal boundaries, it is not obvious that Roger's pattern of innovation will hold in countries where one ethnic group dominates the public sector and another the private. We don't know if these new communication and information technologies will remold these diffusion patterns in new countries in new ways, either to accelerate or retard their diffusion.

The Contribution of Leadership and Vision to the Information Revolution

Understanding 'leadership' is especially important in the current conditions of radical change within the global information and communication industries. During periods of big structural change, such as the one we are experiencing, the contribution of good leadership is substantially magnified (as

are the costs of bad leadership). (Minitrom 1997). Leadership means appealing to others to convince them to follow a route to a particular set of goals. In this author's interview with the visionary leader of Motorola, Robert Galvin, the CEO offered a concise and insightful definition of leadership in the ICT field. Based on his many years of experience, he noted such traditional features like charisma and knowledge. Galvin stated that the most important task of the leader is taking people to a place they didn't know they needed to go. This simple formulation captures, I believe, the heart of leadership. One might also add what is implicit in Galvin's formulation—'and providing the means to let them get there'. Leadership involves mobilizing resources to achieve strategic ends, as the leader must be able to consciously match her or his strategy, with the resources necessary to achieve the strategy's ends. Effective leaders provide the psychological and professional bridges between previous period of certainty, and later periods of wider agreement.

Many years ago the 'father of organizational sciences' defined organizational leadership as "the indispensable social essence that gives common meaning to a common purpose, that creates the incentive that makes other incentives effective,

that infuses the subjective aspects of countless decisions with consistency in a changing environment." (Barnard 1989)

A number of well-known examples come to mind in the ICT field that make this point clearly. Hewlett and David Packard's innovations in organizational structure and incentives for their new company made them wealthy and set new organizational standards for the growing semi-conductors industry. Andy Grove at Intel realized that institutions needed to change in order to effectively use technology, and that change would arise from visionary and consistent leadership. John Chambers at CISCO has led his company from a traditional to a virtual organization. His company was restructured, but it could only be restructured with a visionary leader at the helm.

Leadership in ICT is important the world over, from Tata in India, to Koos Becker and Thabo Mbeki in South Africa. The top leadership of Lee in Singapore gave the world its very first ICT vision in 1992, before the United States. My observation of the U.S. and developing countries suggests there are several different kinds of ICT leadership. Five distinct types of ICT leadership emerged from my research: promotional, issue, ideological, structural and political leadership. Each of these leadership traits is important. They tend to be complementary, not exclusionary; in the real world they are

blend together, though analytically they are distinct. They are rarely all demonstrated in the same person. Successful ICT initiatives, in companies or countries, manage to identify leaders to pursue all these aspects.

Promotional Leadership. The leader **promotes the general idea of the importance of the global Information Revolution to his or her followers.** The message from the leader is, "Pay attention to these big new changes in ICT; they are neither ephemeral nor hype. They are consequential for your life in a variety of ways". This is where vision enters, linking the 'call to arms' with broader needs and goals. A senior leader who might not be an official within the ICT sector, but carries broader political responsibilities is often the person to fill this role. The prototype for this ICT leader may be U.S. Vice President Al Gore, who for years was consistent in his call for an information super highway. The South African president, Thabo Mbeki, played a similar role in his country, and President Mahithir has radically reformed Malaysia's ICT sector through his personality, his control over resources, and his constant repetition of ITs' importance for all Malaysians. This kind of leadership is especially important early in the reform and diffusion process.

Issue Leadership. Certain leaders stake out a particular position on one or two ICT issues and push them forward relentlessly. This may be distance education, privatization, access, or universal service. Others may take opposing views. The leader presses his case forward, publicizing the superiority of his position. The pit-bull tenacity of Brazilian telecoms Minister Motte was legendary on issue leaders was Mr. Dewang Mehta, Executive Director of the Delhi-based National Association of Software and Services companies (NASSCOM), who pressed tirelessly for greater government support for software. His slogan was, "The Indian government must go from red tape to red carpet for its ICT companies", and he believed the government had, for the most part, heeded the private sector leadership on this issue. Minister Hu in China became known as a bull dog in favored competition and diversification maven, since he pushed these themes constantly.

Intellectual Leadership. Intellectual leaderships frames important ICT concepts. For example, if ICT is defined as an economic issue, it will mobilize one constituency, creating a particular kind of agenda. If ICT is defined as a matter of national sovereignty under assault, other constituencies and institutions are mobilized. This is work done by government officials and senior people in the research and scientific

communities, such as those in MIMOS in Malaysia or by intellectual in the popular press. Will leaders frame ICT issues so that they are defined as directly relevant to other important issues that citizens care about? These are issues relevant to issue leadership.

Structural Leadership. This is one of the most important and least understood aspects of ICT leadership. It is also one of the most difficult aspects of leadership to achieve. This form of leadership seeks to redefine these rules to make them fit current national needs. This happens in the ICT sector as in other markets and sectors. Such rules include whether ICT will be owned by public or private institutions. Will ICT ownership be a monopoly? As older structures collapse during a period of transition control over the writing of new rules is up for grabs. Typically, each parties seeks to redefine them to their favor. Collectives typically provide this kind of leadership, whether specially appointed Blue Ribbon commissions, inter-agency task forces or political parties. Often, the top political leader in the country must step forward and provide adequate political 'cover' to allow individual and collective leaders to act without their restructuring initiatives getting blasted out of the water. The Chinese "Informatization" strategy is one example.

Political Leadership. In order to advance ICT visions, and truly bring about favorable ICT conditions, leaders must establish constituencies and coalitions in support of their positions. Political leadership in the ICT sector means explaining to particular constituencies how their conditions will improve by following the path the leader creates, and then actively mobilizing them. The effective political leader will also be able to maintain a coalition to mobilize his constituency.

Leadership and Vision

Closely related to ICT leadership is ICT 'vision'. Vision has proved extremely important in explaining why some countries and companies move forward in the Information Revolution, and others stagnate. In the ICT context, 'vision' is a body of arguments or doctrine that conveys effectively and coherently the ways that ICT services can advance the core values and goals of a given group, institution or society. An ICT vision describes the present, offers an attractive image of the future, and provides a way to move successfully to that future. The key is that ICT vision is **not a vision of freestanding 'technology'**. It does not emphasize shiny new toys, but suggests ways that people can use the application of new tools to solve basic organizational tasks or broad national objectives. In other

words, an ICT vision advances a broader societal and institutional agenda through the use of information and communications technology.

A vision is not a one-time event, but a message conveyed repeatedly in speeches, articles, and manifestos over a period of time. Vision provides a matrix for making sense of a complicated and chaotic world. A strong vision has emotive as well as analytic content. Successful visions are eventually diffused through a society or group, as more and more people embrace the vision and come to alter their behavior based on that vision.

There are two excellent examples of linking an ICT vision to social imperatives: Dr. Mahathir in Malaysia, and the back-to-back leaders of South Africa, Nelson Mandela and Thabo Mbeki. In my research in these two countries I found that the considerable success of the two governments in diffusing ICTs lay in part in the visions of the countries' leaders. While quite different in many respects, Mahathir and Mandela (and later Mbeki) mobilized important constituencies to support ICT innovation by appealing to social cohesion and prosperity goals. The risk of social collapse and chaos was not an idle threat as interethnic warfare was fresh in the minds of both populations. If ICTs could be defined in a way to show their strengths in

creating jobs and bringing people together, the Information Revolution would be supported [Wilson, 1999b).

The great scholar of business, Alfred Chandler, found that successful leaders employed successful strategies and vision to lead their firm forward. In reviewing years of business activities he found that vision, strategy and institutional change were closely linked. Indeed, He coined the phrase 'structure follows strategy'. Leaders used their vision and strategy to re-design institutional structures to become more effective instruments of competition. In the Information Revolution, vision and strategy are closely linked.

Four Balances

What we call the 'Information Revolution' occurs when some significantly powerful and politically coherent segment of the national state elite decides that political, economic and social conditions require a re-balancing of long-standing ICT sector relationships. This is in large part a shift or reconstruction of core policy balances. The recent history of ICT industries suggests that there are four major balances that appear and re-appear. They are the balances between public and private sectors, the balances between monopoly and competition, the balances between domestic and foreign ownership, and the balances between centralized and distributed administration. By

privileging these four I do not deny the importance of other issues. However, these four balances constitute the building blocks of policy stability and they are absolutely central to all industries. Other issues, such as Intellectual Property Rights (IPR) are quite important but relevant mainly to firms and policy makers in one or two sub-sectors. These four balances often must be settled before other important issues can be settled. It is difficult to imagine a stable policy environment for computer software production if the relevant parties have not yet sorted out the role of the state, the status of foreign investors, the nature of competition, and the government's organization. As a rule of thumb, these four constitute about 80% of what is important to know about developing countries.

Private-Public Balances

The shift between private and public is at the heart of the Information Revolution. It represents a critical shift in the source of sectoral ownership, control, wealth, innovation, and power and authority. It is a shift in sector dynamism and initiative, from senior civil servants to senior corporate managers.

The technical and economic arguments about the relative benefits of public and private initiative are well rehearsed. They, however, should not mask the raw interests that lie just

below the surface. From the Second World War to the present, the power and the money in the ICT sectors was controlled by senior officials in government ministries and government-owned enterprises. Senior officials in publicly owned institutions like the World Bank controlled global money. These state-based elites, and their inter-governmental networks, were authoritative and unchallenged. They had particular constituencies and formed a cross-national elite coalition to ensure regime functioning and longevity. It was senior government officials who had the decisive say in investing billions of dollars of capital, or purchasing billions of dollars of ICT equipment.

Supporters of state control have long made several arguments about its benefits, arguments especially prevalent after World War Two. First, the absence of local investors to supply pools of capital to telecoms and broadcasting presented a genuine problem for poor countries. Since the capital required for these networked technologies was so large, only government had the financial wherewithal to build out the infrastructure. Building out these networks also demanded substantial planning and organizational sophistication, for which government, had a distinct advantage.

The broadcasting industry was a means for nation building and creating a sense of unity among polyglot populations; government ownership could create a greater sense of unity than commercial operations. The telephone system and broadcasting were key peaks in the 'commanding heights' of the national economy, too strategically important to be left to the private sector. All these arguments seem to buttress and be buttressed by the capital intensive, large-scale nature of the technology. In very practical terms, these arguments were wrapped into two final factors. One was the ideological justification that the state had a moral and political obligation to provide basic services to its citizens. The state could be relied upon to act for the good of the community, providing services others could not. Through the actions of the ITU, the World Bank and others, the international regime supported these principles materially and ideologically.

To what extent have these underlying conditions changed? The slow and steady rise of larger middle classes in many LDCs has led to more investors, more entrepreneurs and more management talent. Big changes in the technology mean that investments have become less large and lumpy; small and medium-sized companies are now starting ISPs or other ICT businesses. Global broadcasting has made national borders more porous so the

rationale for state monopolies has diminished. The leaders of the international regime press hard for much more space for private initiatives, and private firms are investing billions abroad, eclipsing the World Bank and other government agencies. Political shifts are also occurring. As middle classes grow, they become more aggressive in asking for things their global counterparts want - public services like power and communications, and say in governing their lives (Inglehart, 1988).

It is no longer accepted that the central state is the first and the final protector of the public interest. Civil society is now active in promoting public interests. The new trends, including the poor performance of state owned enterprises, have thrown earlier assumptions into question.

Our understanding of the relationship between states and markets in modern capitalist economies has become much more sophisticated over the past several years, moving away from the manichean, 'on/off', intervene or not generalities. A more nuanced understanding of the wide range of activities that governments do to support or undercut markets is now the norm. Students of government-market relations like Peter Evans, Schmitter and Streeck point to the **variety** of roles that states can play, from monopolistic direct ownership and control of

production, to more arms-length regulatory and informational activities that promote and protect private entrepreneurs. There are also a wide variety of **tools** governments may use to achieve those goals. In addition to ownership and operational roles, governments set policy guidelines, regulate economic activities, and set and protect property rights. Governments affect their will not only by issuing direct commands, but by exercising their authority more subtly through incentives given to producer and consumer firms, individuals, government agencies, and civil society groups.

Monopoly-Competition Balances

The market for telephone services was originally quite competitive, with more than 500 companies in the U.S. alone. As the industry consolidated, telecoms came to be defined as a natural monopoly, especially in poor countries. LDCs had so few human and material resources on the supply side, the argument went, that they shouldn't be wasted through unnecessary competition. Parallel telephone lines and competing companies seemed wasteful in countries where there were only a few dozen trained engineers. On the demand side, poor populations were often scattered across the countryside and hard to reach economically. With commercial ventures, they might be ignored completely. Governments were at least rhetorically committed to

enhancing equity, and could pressure a monopolist company to use its revenues to cross-subsidize the poor. In return for being granted a monopoly, the company was obliged to serve poor populations. The balance in favor of a state monopoly was backed by a powerful international regime and local elites.

Conditions have changed enough to drastically undercut old rationales. Research on ICT sectors and other sectors indicates clearly that increased competition has the greatest positive impact on sectoral efficiency and innovation. The experience of much of East Asia suggests that government's insistence on rigorous inter-firm competition makes more difference than whether a firm is private, public, foreign or domestic.

Domestic - Foreign Balances

Domestic-foreign balances are heavily freighted with political and symbolic significance. This is especially so for developing countries, whose elites often feel themselves the victims, not the beneficiaries of past foreign interventions. One African intellectual put it this way: "When the Europeans first got to Africa we had the land and they had the (holy) book. But it didn't take long before they had the land and we had the book." There are very deep concerns that this time around the foreign powers will get the land, the book, the television station and the telephone company.

Among developing country elites, the desire for new technologies and content is inevitably tempered by their experiences of colonialism and neo-colonialism. At least since WWII, most developed and developing countries held telephone, water, electricity, broadcasting, as the 'commanding heights' that had to be protected from foreign influences. It was feared that foreign takeovers would bring highly deleterious effects, whether economic, political or cultural. These effects were thought to include cultural alienation and corruption, appropriation of national economic resources, and reduction of national security. Since small poor developing countries, and some larger ones as well, had small local entrepreneurial classes, then de facto any opening to the 'private' sector meant bringing into the country a flood of foreign companies and their suspicious behaviors and interests.

The people I interviewed all recognized the need to invite foreign capital into their country. It is foreign capital, they realized, that has the most know-how to create a knowledge society. It is foreign capital that brings exciting content, and foreign capital that produces up to date software. In political terms, foreign capital also brings jobs. Work done by this author and Rodriguez indicate conclusively that more investment in technology alone does not automatically correlate with

economic growth (Rodriguez and Wilson 2000). Yet we can say that without foreign investment, and without access to foreign markets, growth and development are hindered.

Centralized - Distributed Balances

Under the old regime sectoral responsibilities were concentrated in a very small number of government bureaus and enterprises. The Ministry had responsibilities for policy setting, regulation, property protection, and monitoring. The state owned enterprises (SOE) carried out the operational tasks required to achieve government's broad goals (in point of fact, the SOEs were often the tail that wagged the governmental dog, since they possessed far more technical expertise and money, than the ministries).

The centralization in the ICT sectors seemed to fit perfectly with the technological 'imperatives' and authoritarian political trends of the 1970s and 1980s. Democracy and decentralization were not pushed onto the world's political agenda until the late 1980s with the wave of democratization that swept the world during that tumultuous and change-filled decade (Huntington 1991). The rise of indigenous bourgeoisies and bourgeois democracy gave political impetus to open up once-closed Third World bureaucracies. Newly mobilized groups in civil society demanded greater institutional

transparency and accountability. As new governments came to power, and as old ones implemented reforms, responses often came in the form of decentralized systems of governance, including reformed governance systems for economic sectors. This somewhat distinct trend (closely tied to globalization) intersected with trends toward cheaper, more portable and powerful communications technologies; together they made decentralized institutions much more likely, and a much better fit between reformed institutions and liberalizing political and economic trends.

One of the most dramatic changes in the balance between distributed and centralized administration of the sectors is the growth of regulatory agencies around the world. I describe this radical innovation in sectoral governance in more detail in the appendix to this chapter.

The Balances are Political

To be sustainable these policy rebalances are accompanied by parallel restructurings of the country's underlying political coalitions. Such restructuring typically requires a group of aggressive elite reformers to actively take on, and ultimately take apart, the old coalitions. It also requires that reformers actively seek out, encourage and create a brand new political coalition that will support the new policies. Unless this elite realignment occurs, major policy changes will not be

sustainable. Even liberal reforms that push back the state from direct ownership need the full complement of pro-reform political coalitions to support the changes, pro-reform politicians to write new rules, pro-reform spokesmen to popularize changes, and pro-reform policy intellectuals to publish justifications for the new order. Successful ICT reforms rely on politicians to outmaneuver, neutralize and punish opponents of reform. The 'right' technology is not enough. The 'right' technology and the wrong politics leaves the revolution stranded high and dry on the sands of the past. The Information Revolution takes the "right" politics to make the kinds of institutional and structural changes required to bring the full benefit of technology to society.

The Balances Are Neither Absolute Nor Identical

I want to emphasize that these categories represent **balances**, not **absolutes**. The SRS framework is designed to be analytic and comparative, not normative. I am not concerned with judging these categories against an absolute international (or American) ideal. Experience and analysis teaches that there is decidedly, no "one best way" for achieving the benefits of the Information Revolution. Each country's accommodations and resistances to the IR are unique. Each finds its own balances.

Illustration 2.2 shows that there are multiple paths to greater competition and private ownership.

These four categories of strategic and policy options for organizing the ICT sectors are quite neat and conceptually distinct. Very few would confuse the public and private dimension with a foreign and domestic dimension. These distinctions hold up in theory, but in actuality, the distinctions overlap. In many LDCs, especially the least developed ones, the tiny size and weakness of the local private sector means that almost any medium to large size private enterprise is likely to be foreign. The private - public split in the ICT sectors of poorer countries quickly becomes a foreign - domestic split as well. And where the only significant domestic ICT service provided is the state-owned telephone monopoly, then the competition-monopoly dimension also merges into the state-private and domestic-foreign dimension.

Politics at the Heart of the Balances: Conflicts During the Shifts

The shifting balances are neither neutral in their distributional impacts nor in their politics. These are massive global processes involving billions and billions of dollars, every world nation, economic and political jostling, and perceptions of national security. It is little wonder that the

shifts are hotly contested, bitterly fought and generate fiery passions of ideology and local interest. Producers vs. consumers, rural vs. urban, labor vs. capital, civil servants vs. private businessmen, high income vs. low income, local vs. foreign capital, fixed line vs. wireless companies—the lines of potential conflict are all present, and can be exacerbated by shifts of authority and resources. Because of its political centrality, national elites everywhere have wisely decided that the Information Revolution is far too important to be left to engineers, economists and computer geeks.

Which societal interests will get to control the richest and most politically sensitive sector in the modern world? Which domestic interests (and which nations), will gain the authority and power to take decisive decisions about the allocation of trillions of dollars of technological resources? Who gets all that power and all that money? In order to answer these and earlier questions about the relative importance of structural and non-structural factors, we must review and compare material across more than one country. It is to these comparative issues that I now turn.

Why Comparative Cases?

The interactions among policies, politics, institutions and structures are best understood by analyzing and comparing them in concrete historical circumstances across several countries. Working with comparative case materials at the country level complements and fleshes out the cross national large 'N' analyses with details from particular countries. It is only through these richly detailed historically specific cases that one is fully able to appreciate the contexts of ICT diffusion. Comparative cases are the only means to capture the nuanced interaction among variables that operate at different levels of analysis - structural, institutional, political. Large data sets can only take us so far; comparative cases complement them. Guillen and Suarez (2001) are among the handful of analysts who employ large 'N' data sets as well as paired country comparisons to account for the diffusion of Internet Service Providers (ISPs). They too are interested in the comparative explanatory power of economic structure on the one hand, and on the other, non-economic variables like institutions. Once they perform their large N quantitative analyses of their 142 country sample concentrating on economic structure, they do paired comparisons between Argentina and Spain, and Ireland and Singapore, selected according to their reliance on French (continental) or English legal systems. They find that structure does explain most of the

variance, but in order to more fully account for differences in ISP diffusion rates across the paired countries, it is also useful to analyze the different incentives that legal systems provide.

Doing Comparisons: Most Similar, Most Different

There are several ways to select cases for disciplined, cross-national comparisons of policy outcomes. Typically, comparative politics employs either a 'most similar' or a 'most different' research strategy, and there are plusses and minuses to each. (Sartori 1997) The 'most different' strategy can capture a wide range of empirical variation along independent variables] to see what effect such variety might have on outcomes. The 'most similar' strategy by contrast allows the analyst to hold more variables constant (such as size, level of economic growth or region), and thus try to pinpoint which variable seems to have the greatest impact on outcomes. One scholar writes: "A most similar approach implies that...the more circumstances the selected cases have in common, the easier it is to locate the variables that do differ and which may thus be considered as the first candidates for investigation as causal or explanatory variables. A most different approach involves...a comparison on the basis of dissimilarity in as many respects as possible in the hope that after all the differing circumstances

have been discounted as explanations, there will remain one alone in which all the instances agree (Pennings, Keman and Kleinnijenhuis 1999; Geddes 1990).

Because my research tries to capture the wide range of societal challenges and ICT responses found in very different kinds of developing countries; yet also seeks to explain why even in similar countries there are substantial differences in ICT performance outcomes, I employ a 'mixed' research strategy. This enables me to capture the strengths of each approach, and to account for information and communications outcomes in many different kinds of countries.

Beyond suggesting cause-effect relations, this comparative approach also helps illustrate in a variety of settings the more general arguments about process that I make about the relations among structure, policy outcomes and behavioral/institutional factors, especially strategic restructuring. That is, the structured comparisons permit not only a search for causation, but also an opportunity to explore the constitutive picture of Internet diffusion in its own terms, and the ways that different actors interpret important developments and trends in their own subjective fashion.

In any comparative study one is obliged to make a choice - either to go 'wide' by covering many countries but in a more

superficial fashion, or to go 'deep' and try to capture the complex, often contradictory dynamics of a few countries, but omitting many cases. For my purposes going deep makes more sense than going wide and shallow.

To meet the 'most similar' test I concentrated on the principle independent variable - structure - and selected two developing countries with important structural similarities - China and Brazil. Both have comparable broad sectoral structures: they are at similar levels of economic development, and have similar sectoral structures.

Both countries are among the largest countries in the world in terms of physical size, and both have very large populations. Both countries dominate the economies of their regions. Furthermore, both are important markets for ICT services and goods. Both have large, influential sub-national units with significant cross-unit variation. Domestically, both have substantial cross-regional differences in income. These are giant countries whose decisions will affect millions of their own people and millions in other countries.

Of course Brazil and China have important differences as well, and some of these will emerge in the cases, especially in terms of cultural context and the structures and dynamics of

politics. Still, they provide a "most similar" fruitful comparison to explore ICT diffusion.

To draw on a 'most different' research strategy, I wanted to select a country example that contrasts sharply with the structural features just cited above. A companion contrasting developing country should be relatively small, with a very different level of economic development and contrasting economic structure. Whereas Brazil and China have a substantial manufacturing sector, we would want to pick a country that hasn't. We would want a contrasting institutional structure and it would be especially enlightening if it were from a region other than Asia and Latin America. The country I selected to fit the profile is Ghana. This small, mainly agricultural West African nation has sufficient structural differences to provide a robust contrast with Brazil and China and meet the requirements of a 'most different' case.

Industry Selection: Why Focus on the Internet?

With the countries selected, I then selected an industry. It was not my intention in this book to provide a complete case study of every ICT sector, industry or application (although, foolishly, I did begin with that ambition). Instead, I chose to concentrate on only one industry -- the Internet -- that has become so central to the emergence of modern knowledge

societies. There are a number of analytic benefits for tracking the growth of the Internet relative to other ICT industries one could potentially analyze.

- o Despite its importance, there are very few comparative, empirical case studies of Internet diffusion available anywhere, especially in contrast to the more abundant research on telecoms or even broadcasting. ²There are very few sustained industry studies in LDCs. Case studies of Internet diffusion will therefore be especially valuable empirically.

- o The Internet is so heavily dependent on **upstream** telecommunications infrastructures that studying the Internet also tells a great deal about telecoms.

- o At the same time the Internet is increasingly linked to many **downstream** activities in other information and communication industries, including radio and newspaper, that studying the Internet therefore reveals much about a variety of other ICT applications. For example, the Internet is used increasingly by editors and publishers of conventional media to distribute their content downstream to their customers. The Daily Graphic in Ghana is published on a web site, as is the Peoples Daily in China.

- o Internet is also fast becoming a platform for a wide number of other economic, social and government sector

applications, such as electronic commerce, education and so forth.

o Finally, because the Internet is a brand new highly distributed resource it lends itself to being seized by grass roots groups in civil society, more so than big television or big telephone companies. The Internet offers us a look at what is reported to be a very different kind of politics. Analyzing the politics of the Internet in each country reveals a great deal about what makes that country tick, from the ground up, whether Brazil, China or Ghana.

According to Mueller and Tan in their study of China, "Two things have made the Internet a revolutionary innovation. Its decentralized, bottom up development gave users both more control and more investment responsibility. Also, it could tap into uses, technologies, and applications outside the control of telephone monopolies and established mass media interests. Both features made it an incubation site for new competitors, entrepreneurs and ideas." (Mueller and Tan 1996, 82). For all these reasons, I concentrate on the Internet in this study.

Conclusion

In this Chapter, I have argued that while broad structural features of the economy account for perhaps two thirds of the differences between nations, the remaining difference must be found by carefully analyzing the evolution of ICT industries within a country. My solution is to employ a modified structural framework to explain cross-national differences in ICT diffusion. My Strategic ReStructuring framework also seeks to fill in the analytic and conceptual gaps left by other models. This approach takes structures seriously, but insists that institutions and politics both go a long way to explaining ICT outcomes in developing countries. Indeed, it is the *interactions* among structures, institutions, politics (including leadership) and outcomes that should attract the attentions of engaged researchers and thoughtful practitioners. This modified structuralist approach is admittedly somewhat more expensive in terms of the time, resources and knowledge required to apply it properly to illuminate ICT outcomes. It requires, for example, lots of data on different kinds of variables at several different levels of analysis - macro-economic data on sectoral structures and GDP/pc; institutional descriptions (of the type provided here), as well as evidence of institutional structure and performance. It also requires evidence of individual behaviors, especially of ICT leaders or 'champions'. All this

requires extra work above and beyond other leading approaches, and getting consistent data on poor countries is rarely easy. Furthermore, as one moves closer to the individual, micro-level in any country, but especially poor countries, the more difficult it is to obtain the specific knowledge needed. Still, this modified structuralist approach, while expensive, will provide payoffs by linking different levels together, and showing the interaction among structural, institutional and political variables in three case studies - Brazil, China and Ghana.

[Insert Figures 2.3 and 2.4]

Ministries

At the top of the ICT sector's formal hierarchy are the relevant technical ministries. Traditionally they are the most authoritative state guides for the production and distribution of information in the modern sectors of developing countries. They go under various names with overlapping responsibilities - ministries of Telecommunications [country 'X'], of Communications [Ghana], or of Information []. Some countries have ministries of communications which have telecoms responsibilities, and a separate ministry which controls broadcasting (e.g. "Information"). Others combine telecoms and broadcasting in a single agency. In many socialist and statist countries, the "Information" agency was in effect a propaganda arm of the state. Computers rarely have their own ministry; different aspects are assigned to different ministries - hardware manufacturing may be lodged with the ministry of industry, while R&D and software may fall under science and technology. Other ministries also have mixed responsibilities. Telecommunications is sometimes housed with other utility functions like transportation or electric power.

Many of these portfolios have been re-shuffled in the face of the tumult in the technology and the commercial markets. Over the past decade central governments have transferred responsibilities from ministries to special committees and then back to ministries again (as was done in the Collar period in Brazil 1990-92)

Typically ministries under the old regime possessed similar formal responsibilities. These included policy making for the sector or sub-sector; policy monitoring; issuing regulations for company operators in the sector, both public and private. Because these sectors were heavily statist, in most LDCs perhaps the biggest ministerial responsibility lay in close oversight of state owned monopolies like television or telephone. The functions of the ministries in this regard ranged from ownership of the shares of the enterprises, to appointing their boards and senior executives, to approving their budgets; they usually directly contributed financing to the enterprises as well (i.e. their investment budget, especially to serve areas that are not commercially viable)

In addition to these not inconsiderable formal responsibilities ministries were the political eyes and ears- and occasional strong arm -- of the central political authorities, able to impose politically-connected staff and to

insist on politically-motivated investment priorities (i.e. wiring the communication minister's home village first).

The crashing waves of the Information Revolution have greatly disturbed the settled complacencies of the ministries. The spread of new norms and expectations have subjected them to substantial new pressures. The basis for their authority is shifting away from direct ownership and close control, to a more arms-length relationship through which they supply policy guidance and monitoring. Many have been downsized and workers retrenched. Their overall power has almost certainly diminished. There are notable exceptions, like China's super-ministry created in 199? out of the fusion of the powerful Ministry of Electrical Industries with the even more powerful Ministry of Post and Telegraph (MPT). MII is arguably more powerful today than in the past, though it too is feeling the competitive pressures of other bodies.

State Enterprises

The same forces buffeting the ministries have battered the state enterprises even more severely, as they have been subjected to commercialization, privatization and, perhaps most seriously, real competition.

For much of the post World War II period, the watchword was 'state ownership of the commanding heights of the economy, and

those commanding heights were entrusted to state owned enterprises. Variouslly called public enterprises, parastatals or state owned enterprises (SOE)s these were the bodies that actually produced and broadcast the television and radio programs, that invested in the landlines and connected the telephone calls (or not) and produced the heavy equipment the other enterprises needed. These were enterprises like EMBRATEL the state-owned long distance telephone company of Brazil, as well as Telebras the publicly-owned holding company for the 20-odd separate companies that operated within each of Brazil's states. It includes the Ghana National Broadcasting Corporation that held a monopoly. In socialist or communist countries like China or India, state enterprises are extensive. In China the local computer manufacturer Legend is state owned, as is most of the economy (but the share of the GDP produced comes disproportionately from the 'private' or more independent company sector. Most of the biggest monopolies in the sector (i.e. television, radio, telephone) were 100% state owned.

The organizational structures of these state enterprises matched their weight in the markets -- they were weighty and top heavy. Relative to private enterprises they were almost always overstaffed, sometimes by a factor of two or three. While the enterprises were formally under the technical ministries, very

often they were the tail that wagged the dog and were far more powerful than the ministries themselves.

Since their monopoly positions guaranteed high incomes and high status, the enterprises had little incentive to perform well, and so accumulated a very mixed performance record. Some did quite well along all dimensions: service quality, numbers of people served, financial returns. On the other hand, many others performed poorly, especially in the mid to late 1980s when LDCs were severely pressed by huge debt repayment obligations, and sub-par international markets for many of the products they produced. LDC governments in every region then systematically starved their telephone companies of investment capital, simultaneously forbade them to raise their rates, all the while insisting on universal service or access for more and more people. This combination of lower revenues and higher service expectations guaranteed poor performance, and that is exactly what happened. This period saw sky-rocketing telephone waiting lists; deteriorating call completion rates, shrinking TV audiences, and other signs of disaster. It was this collapse of so many systems that led many local constituents to agree that drastic changes were needed in the SOEs structure and behaviors. When the World Bank and other foreign advisors showed up at the

doorstep with a new orthodoxy, the poor consumers were ready for just about anything.

With so little competitive pressures on them the senior management had precious little incentive to innovate or dramatically improve their services. The quality of state-owned television shows was not very good, serving up warmed-over programming with aging themes and formats. When new technologies came along they were most often developed by more aggressive and innovative firms outside the state system.

By the early 1990s the global trend toward commercialization and privatization began to reach the telecommunication sectors. Some countries moved early like Malaysia, which commercialized its telecoms company in 1987 by transforming its legal status from a state company to one that now had to operate under commercial statutes just like private firms. It was partially privatized by the government in 1992, opening up its shares to private Malaysian stockholders. Its technical and commercial performance improved, as often happens when privatization occurs especially if it is accompanied by competition. In francophone West Africa governments allowed new market entrants into radio and television that pushed state enterprises to try to improve their own programming.

The absolutely essential role of the interplay among these institutions should not be underestimated. Not only are the inter-governmental relations among agencies critical, but so are the ties between government agencies and other actors, such as private sector institutions and groups from civil society. In an efficient and balanced system of ICT governance the separate institutions mesh smoothly so that knowledge flows smoothly from where it is produced to where it is needed, either through state or non-state institutions. The most sophisticated analyses of economic development point precisely to these partnerships among institutions as the true catalysts for successful qualitative changes in productivity. My experience in the poorest LDCs is that the most difficult step for senior officials is to admit that private sector interests have something useful to contribute to the national policy process. They too often view businessmen as interlopers, if not the enemy.

Specialized Bodies

Given the innate conservatism of so many of these long-standing government bodies, it is not surprising that when government elites conclude that these new technologies are important for the national economy, national security and national welfare, that they turn to bodies outside the regular

ministerial system. In this quickly changing field of information and communications, where expertise wasn't widespread in LDCs, special task forces, commissions and blue-ribbon panels were frequently convened by the top political elites to advise them as to what new directions to take for ICTs. The number of nations who employed this form is itself quite notable, starting in 1992 with Singapore, followed by the Clinton administration's 1993 NII Task Force, and then eventually by similar bodies in Japan, France, China and other nations. Later in the 1990s, countries as diverse as Ghana and Brazil became involved. To greater or less degrees these government commissions co-opted representatives of diverse stakeholders into their memberships. Typically, they include scientists, government officials from 'supply side' ministries and enterprises; business people; educators, and consumer groups.

All these ad hoc bodies tended to take up very similar issues including the need to build out basic infrastructure, the importance of private investment, the potential contributions to national development, and so forth. Typically the bodies made their reports directly to the relevant minister or sometimes to the head of state. Sometimes these temporary bodies were transformed into more permanent institutions (as in China-

check). Sometimes their leaders became ministers or assigned other ICT duties. For most bodies, the exact organizational form was less important than that the central message of the IR's importance for the nation came through loud and clear.

The purposes of these specialized bodies were both technical as well as political; leaders recognized this was a set of issues where technical knowledge was low, there was not much understanding of the stakes involved and the way forward was unclear. There were also problems of assigning bureaucratic rights and responsibilities, and juggling the roles of the private and public sectors.

Smart and secure leaders used these specialized commissions to reach out to key individuals and constituencies beyond the government. Some included labor and consumer groups; most included business and academic interests. Labor and business were especially important groups to include in these bodies, since both groups could in effect go on strike if they disapproved of government's direction. Labor could literally strike when their employment security was undermined, and when the ICT reform programs seemed to ride on the back of eliminating their jobs, with few upside gains visible and where other stakeholders were not expected to share the burden of privatizations or downsizing. Business could also refuse to play

along. If the rules and regulations were soft and uncertain, if what the government proposed was too risky, or imposed too many burdens on private entrepreneurs and managers, then they would engage in a de facto capital strike.

One sub-set of specialized bodies, different than those with fixed or short mandates, are the research and development agencies. Whether university based or free standing like the Chinese Academy of Sciences or Brazil's CNP, they made timely and important contributions to the early development of the MII in many developing countries. Work still needs to be done on these specialized institutions, including NECTEC in Thailand or CSIR and other newly-minted organizations in South Africa [SEE Derrick Cogburn for an exception on South Africa's specialized bodies.

Regulatory Bodies

Regulatory agencies are the newest and the oddest institutions in the ICT sectors. Under the old regime the need for a separate regulatory institution was not obvious -- government owned, operated and set the performance and evaluation criteria for the provision of telecommunications, broadcasting and other ICT services. For each market there was often only one company, controlled and monitored by one ministry. The monopoly model was administratively

straightforward -- government decided what it wanted and then told its company what to do.

By contrast, the competitive model is much more complex. Instead of only one company supplying 100% of the market, there are more than one. Whether a duopoly with only two firms, or a dozen competitors, the monitoring and oversight was more decidedly difficult for government officials to do successfully.

As the balances shifted from one company to many, it also shifted from government to private ownership. The consequence was that government officials couldn't simply call in enterprise managers who were in effect their employees, and give them their marching orders. Private owners and investors couldn't be called in from time to time and instructed. Instead they had to be convinced provided with incentives to take action they might not take in the absence of regulatory incentives. Furthermore, the purposes of the regulations changed radically.

There were 'regulations' to guide production and supply ICT services under the old regime, of course. But the purposes of regulation was to promote and sustain a dominant domestic public monopoly. This meant protecting and privileging the monopoly incumbent. But with technology changing and globalization accelerating came greater pressures to permit new firms to compete head to head.

Government companies were no longer the only ones in the core ICT supply business. Countries opened up to competitors, multinational companies, multilateral and bilateral institutions, as well as IGOs. According to the new orthodoxy governments were now supposed to shift from being the main or only supplier, to being one supplier among several, or to withdraw from the supply business entirely. They were expected to serve a new, high-minded and disinterested role -- no longer using every regulation to favor their company, they were now expected to keep an arm's length away from their own company and create a **level playing field** where no one company is given an advantage over the other. This could include their access to operating and investment capital, or to customers and particular niches in the market.

In effect, these changes demanded actions against the grain of fifty years of practice - that officials in fact disadvantage and dismantle the incumbent, and help the potential new entrants break into the market. From promoting monopoly to promoting competition the new goals were reluctantly and imperfectly embraced in DCs and LDCs alike. The press for new pro-market regulatory structures could be quite galling to government officials in developing nations. Even when supportive of the new goals in principle, my experience with LDC officials

is that they were still nationalist enough to view the new (usually expatriate) companies as foreign interlopers bent on cream skimming and cherry picking, and would not serve the public interest.

In institutional terms this meant creating independent or semi-independent agencies with their own staff and senior officials, all separate and distinct from the Ministry. The new regime in South Africa created two bodies -- SATRA the more traditional; and the United Service Agency which was designed to suggest innovative ways to distribute ICT services as broadly as possible across the society.

An institutional problem too little appreciated by enthusiasts of radical reform (especially those from the U.S.) is that there has been very little if any real experience with independent regulatory authorities outside of North America. In some respects they are like baseball- a complicated team activity invented in North America and now exported around the world; but which other populations watch with some puzzlement and uncertainty.

As the rebalancing proceeded, officials aiming to create the new institutions found that if their countries wanted to move from non-market to market conditions and reduce the role of government, ironically, it had to be done, and done

aggressively, by government itself. It soon became clear that only the state had the authority and the power to build down the monopoly and build up its competitors and a market.

Collaterally, officials also found that shifting the balances worked best with some kind of constituency behind it. Creating an autonomous agency free from heavy politicization required a politicized constituency in favor of depoliticization that would take aggressive political steps create new conditions.

Typically, the new regulatory institutions are designed to meet several tasks, which can include **licensing** new would-be market entrants; **rulemaking** (where regulators are given authority to establish specific rules necessary to implement broad government policies; **enforcement and adjudication**; **management of scarce resources** (like radio frequency spectrum); and approving **equipment** and **technical standards**.

Here too the importance of inter-institutional relations is critical. A regulatory institution that is internally efficient but unable to make headway in disciplining other powerful institutions in its task environment will simply be unable to create a functioning competitive market for Internet, telephone, radios or other applications.

Courts and Legislatures

The importance of institutional endowments and the allocation of legitimate authority across institutions within the ICT sector has been decisively argued by Levy and Spiller. In their cross national study of the fit between newly designed regulatory agencies and the prevailing institutional patterns of a nation, they point to the interactions among legislatures, courts and the executive. They show convincingly that as countries set out to create new regulatory structures, the designers must take cognizance of the overall authority patterns inherent within the general system of governance, including relations among the legislature, parties, courts and other bodies. They draw a sharp distinction between the more frequently analyzed **regulatory incentives**, and the broader, often overlooked **system of regulatory governance**. (Levy and Spiller 1996).

Joint Public-Private Sector Consultative Arrangements

I use the term 'consultative arrangements' here rather than 'consultative bodies' because private-public consultations still tend to be quite ad hoc and indirect in many countries. They may be intermittent, not well staffed (or with no independent staff of their own) and relatively non-formal. One of the most difficult 'institutions' to create is the set of norms,

expectations, material incentives and practices that bring together all the relevant ICT stake holders, consistently, into a national dialogue. Yet the distributed, demand-driven nature of the IR requires many voices to be heard. This bold strategic step is neither easy nor automatic.

And less importantly, against the predictions of some social science models. "Dependency" theorists predicted the opposite of what occurred -- Indian firms would remain stuck in low level markets. They did not. Indian entrepreneurs were able to carve out more space for themselves in the international division of labor.

² An important exception is the work of Wolcott and Goodman (2000) and the MOSAIC team.