

Possibilities at the Convergence of Government, Industry, Academia, and Society, Enabled by 21st Century ICT Policies

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"The problem of how to organize industrial society on truly democratic lines, with democratic control in the workplace as well as in the community, should become the dominant intellectual issue for those who are alive to the problems of contemporary society" Noam Chomsky¹

Executive Summary

In recent years many government entities in Latin America have embarked on projects to incorporate Information and Communication Technologies - from here on referred to as ICTs- into their societies. From local efforts in small towns to full-fledged national initiatives, there has been a lot of experimentation not only with new technologies but also with new policies to bring about this change and become part of the global knowledge economy. This paper looks at one particular case in Manizales, a medium sized city in Colombia that has been tinkering with these concepts for the past decade and since 2000 has a formal initiative, Manizales Knowledge Axis, known by its Spanish acronym MEC². The analysis of the Manizales endeavor will then be used to suggest lessons learned that can be applied to the upcoming National ICT Plan for Colombia based on what can be replicated, what should be avoided, and what needs to be added that is missing from MEC.

The framework utilized for this analysis is the social learning cycle as stylized by Boisot and explained in detail by Gilles Paquet in his book *Governance through Social Learning*³. This framework lends itself well to the current challenges of governments trying to cope with systemic changes as long-standing paradigms shift. From blurring boundaries to distributed power and collective intelligence, ICT policies have to deal with such rapid change that they themselves have a better chance of being effective if thought of as transformative. The social learning cycle dissects them in two phases: In phase I issues that need to be dealt with are detected (scanning), then solutions are codified (stylizing the problem) and finally generalized (abstraction). In phase II the new knowledge is made available to larger communities (diffusion) that in turn decodify it so it becomes part of the pool of knowledge (absorption) to be applied in concrete ways (impact), and the cycle starts again.

By looking closely at the different stages of the social learning cycle it is possible to identify precise points where good intentioned policies fail to have the desired impact. Also, due to the constant learning involved and embedded feedback mechanisms, corrections can be made over time to bring policies back on track.

¹ (Chomsky, 2005)

² *Manizales Eje del Conocimiento*

³ (Paquet, 1999)

MEC was launched as a short term endeavor but its multidimensional systemic approach and flexibility have kept it alive well beyond its initial 3 year-period. Its strengths, all of which can be replicated at the national level, are in bringing to the table the industry, the academia and the civil society; identifying priorities at the intersection of interests; providing the right incentives for collaborations to flourish among them; maintaining continuity through administrations; embedding in the process feedback mechanisms; being able to adapt to the changing needs. Some weaknesses are the lack of long term vision for the coffee industry, then in crisis, and its emphasis on the individual abilities in a time where the power of the collective is being harnessed. More important than avoiding a mistake in the identification of the right issues to tackle is the lesson that mistakes in that area cannot be fully avoided because predictions will not be 100% accurate, but there can be built-in ways to constantly reevaluate and quickly adjust the course along the way.

The missing piece that ought to be added to MEC as well as the National ICT Plan is explicit attention to the knowledge flow. Providing unidirectional access to information through technology goes only so far; becoming equal players in the global knowledge economy and fostering economic growth requires technological fluency, active participation in knowledge generation and sharing, and development of local content. MEC has provided indispensable infrastructure and has started to take steps in the right direction, but a lot remains to be done for a larger fraction of society to reap the benefits of the new policies. The same can be said about reaching the full potential of the possible economic growth.

Introduction

Starting from the given that there exist a clear desire to be part and take advantage of the knowledge economy in developing countries, this is an exploration of innovative means to effectively achieve these goals using not only new technologies but new policy mechanisms aligned with the shifting paradigms affecting society's progress in the 21st century. The framework outlined here will be used to assess Manizales Knowledge Axis or MEC, a project to strengthen human capital and local development through the useful appropriation of ICTs and its scalability, so lessons learned can be taken into account in the National Information and Communication Technologies Plan to be launched in Colombia in 2008.

Both MEC and the Colombian National ICT Plan address directly the Millennium Development Goals, specifically Goal 8: Develop a global partnership for development, Target 18: In cooperation with the private sector, make available the benefits of new technologies, especially information and communication technologies⁴. MEC is a project to strategically bring Manizales, a medium sized city in the Colombian coffee region, to the knowledge economy. The Colombian National ICT Plan is a country-wide initiative

⁴ (UN Web Services Section, Department of Public Information)

to delineate policies and strategies for the development and promotion of ICT in all sectors of society.

Neither the goals nor the kinds of interventions are new to the country or the world. In particular in Latin America, there have been government attempts at incorporating ICTs in almost every country in the past decade, from modest InfoPlazas in Panama to large-scale eMexico. However, technologies along with their uses and applications seem to have transformed at a faster pace than governments can respond to them. In order to cope, policies themselves ought to be thought of as a transformative process so they can adapt to the changing demands.

What is changing

"In the dynamic, innovative, and cooperative environment of the learning economy, the capacity to learn increasingly determines the relative position of individuals, firms, and national systems" Gilles Paquet⁵

The last decade or so has seen a transformation, still in course, affecting what some call the knowledge ecology, namely the institutional framework that creates the capacity to access, produce and use knowledge throughout the economy.⁶ ICT policies need to address a variety of emerging issues such as the ones outlined below.

Perhaps one of the most distinct qualities of the new millennium is what can be captured as blurring of boundaries. While the 20th century saw the clarification of boundaries between countries, disciplines, industries, etc. we now live in a world where all boundaries seem to be under attack. The sciences have been steadily moving towards interdisciplinary research, private foundations have been merging efforts with public institutions, ethnic affiliations with strong working connections persist beyond geographic frontiers, what used to be separate modes of work or study using face-to-face versus virtual approaches have become blended models, and the list goes on and on. Significantly for this case study, ICT policies can potentialize outcomes by aiming at the blurring lines between government, academia, industry and society.

Hierarchical structures have been making way for distributed ones. From flattening of business to open source models for product creation, increased participation of diverse actors, whose voices were previously not heard, open up opportunities for interactivity and immediate feedback worth paying attention to. At the same time, the increased complexity comes with the need to use systemic approaches.

While traditional R&D continues to play an important role in today's world, alternative channels of knowledge generation and dissemination provide additional options to developing countries. It is in their best interest to look at innovation as applying

⁵ (Paquet, 1999)

⁶ (UNCTAD secretariat, 2007)

knowledge new to the context even if it is not new to the world⁷. Reutilization of ideas, adaptation of successful concepts developed elsewhere can be as vital and sometimes more efficient as generation of new ones.

Furthermore, technological advances come to scene so rapidly that leap-frogging or using of new technologies skipping intermediary steps can be beneficial, in particular for developing countries.

Another major change in the knowledge landscape is the increasing power of the collective. Communities of practice have been taken to the next level. Collaborations across time and space enabled by all sorts of technological tools and the emergence of the internet as a platform for co-authored content and social networking are bringing a multitude of new actors to the innovation stage.

What can be done

“Experimentation with quick feedback is the only way to learn if one is concerned about guiding the evolution of the socio-technologic-economic system through the use of the forum and government as a learning system”
Donald A. Schön⁸

The first wave of government response to the ICT hype focused on dissemination of information. While this is a necessary first step, access per se does not result in increased productive use. Even less so when the amount of available information continues to grow at an astonishing rate. Furthermore, information does not equal knowledge and while information can be exchanged like a commodity, tacit knowledge, the one that can make a difference when it is acquired, requires interacting with the information, sometimes at length, in ways that promote deep learning and understanding. Knowledge is also context-specific, socially and culturally embedded, and dependent on the recipient's absorptive capacity.⁹ It follows that a concurrent step alongside increased access needs to address augmenting the learning capacity, with special attention to learning to learn.

Policies dealing with information and communication, in particular those whose goals include knowledge appropriation, ought to pay close attention to the information flow. While some aspects of it are clearly visible and easy to track, others are less obvious but have a direct impact on the usefulness of information dissemination. Foray and Lundvall point to the disparity in the codification and transmission between different parts of knowledge: although much know-what and know-why has been ever more effectively codified and can be produced and distributed as a quasi-commodity, know-how and know-who have remained tacitly and socially embedded. The latter depend a great deal on social cohesion and trust, on much trespassing and cross-fertilization among disciplines, and on the development of networks capable of serving as two-way

⁷ (UNCTAD secretariat, 2007)

⁸ (Schön, 1973)

⁹ (UNCTAD secretariat, 2007)

communication links between tacit and codified, private and shared knowledge, between passive efficiency-achieving learning and creative-destructive Schumpeterian learning.¹⁰

The social learning cycle provides a useful framework for this analysis. The cycle has been stylized by Boisot and divided into two phases emphasizing cognitive dimensions and diffusion of new information. Phase I takes widely available concrete information to detect anomalies and paradoxes, becoming less diffused (scanning step), then codifies solutions (stylizing the problem) and generalize them (abstraction). Phase II makes the new knowledge available to larger communities (diffusion) that in turn decodify it so it becomes part of the pool of knowledge (absorption) to be applied in concrete ways (impact), and start the cycle again.

The cycle may be compromised along the way by cognitive dissonance that prevents scanning, epistemic inhibition that interfere with codification, immediatism that keeps the new knowledge from generalizing, lack of diffusion because of property rights, disregard by beneficiaries stopping absorption, or difficulties in implementation that diminish impact.

Manizales, Knowledge Axis

*"MEC should promote the dialogue between the past, the present and the future of knowledge, supported by the historical memory, local identities and the potential of the new media as an element of local development"*¹¹

Manizales is a city of about 370,000 inhabitants¹², equidistant from the capital Bogota and two main industrial cities: Cali and Medellin. Located at the heart of the Colombian coffee-growers axis at 7,000 feet, Manizales enjoys a privileged weather year round and is surrounded by fertile hills apt to harvest the best of Arabica coffee plants. As early as the 1930s the coffee industry began to flourish and by the 1960s Manizales was known as a coffee emporium in the country. In the 1980s Manizales solidified as a university town and attracted industry R&D. Annually, Manizales hosts the Manizales Jazz Festival, the International Theater Festival -one of the major theater events in Latin America-, and the Manizales Fair.

In 1997, public and private agents of development in Manizales, interested in bringing global trends to the area, pointed to knowledge as the most important item in productive activity. In the field of scientific, technological, social and administrative knowledge, they concluded, is where businesses, sectors, regions and countries compete to successfully participate of the global economy. With seven universities and a long-standing cultural tradition, Manizales provided favorable conditions to be the region's knowledge axis. This was the perception of Germán Cardona Gutiérrez, an engineer who

¹⁰ (Paquet, 1999)

¹¹ (*MEC sobre.*)

¹² (*DANE - departamento administrativo nacional de estadística.*)

conceived MEC while he was Manizales' major.¹³ The local development plan for 1998 to 2000 incorporated elements of this new trend such as knowledge generation and appropriation as well as personal and social learning.

The Regional Center for Coffee and Industry Studies¹⁴, CRECE, conducted a diagnostic study in 2001 that resulted in the definition of the vision allowing the articulation of programs aligned with the city's development goals. In 2002, the public administration officially launched MEC through the Institute of Finance, Promotion and Development of Manizales¹⁵, Infimanizales, and identified knowledge generation and technological innovation as their new assets. The main goal was to promote local economic development through the construction of the knowledge society; to generate skills and abilities of individuals, as to appropriate, in a useful way, technological advances, so they can become instruments of a new economy based on knowledge.

One of MEC's strengths has been to include all interested sectors and constituencies. The pillars of the initiative are community, education, research and industry. The community dimension promotes citizen expression and participation. It recognizes the importance of the virtual public space, open to all, and treats access to public information as a fundamental human right. Virtual communities occupy center stage and giving internet access to all citizens becomes a priority. Access to information is considered from the social, intellectual and economic perspectives.

Education is contemplated for all life stages, not just the traditional school age. Two premises guide the educational dimension: life-long learning and education are essential in the knowledge economy not only for work but also for personal development, and learning transcends education but schools remain important in the process of knowledge acquisition. The goal of this dimension is to promote equal opportunities within the educational system regardless of income or abilities. Acknowledging the importance of English in the modern world, special attention is given to bilingualism.

The research dimension is characterized by autonomy and independence of government and industry, interdisciplinarity, connectivity, and innovation. It is there to provide bridges between and within industry and academia. It is conceived as an enabler of knowledge generation and diffusion developing a culture of exploration and passion for creation.

The industry, represented by the business community, brings to the table the ability to innovate. The economic changes induced by the new global economy based on the information and knowledge society not only introduce new products but also new production systems and new ways to organize businesses and work. These changes are understood in the context of a profound transformation of the city.

¹³ (MEC orígenes.)

¹⁴ *Centro Regional de Estudios Cafeteros y Empresariales*

¹⁵ *Instituto de Financiamiento, Promoción y Desarrollo de Manizales*

Initial projects include teacher training in ICT, Virtual School, Bilingual Manizales, Community Telecenters, and Observatory of New Technologies. Another key reason for success is the perseverance of several city majors to keep, if not the exact same project, at least the core ideas alive. The major that followed, Néstor Eugenio Ramírez Cardona, embraced MEC as its own, strengthened the industry dimension, evaluated and revised the strategies and added several projects such as e-Government, the Library Network, a Convention Center, a free trade zone, technology parks, and industry incubators.

Summary of strategies

Dimension	Goals	Projects
Community	<ul style="list-style-type: none"> • Foster access to new technologies promoting equal access to opportunities • Give adequate information to consumers so they can act on their rights • Provide government and public services • Promote use of appropriate software for data sharing • Incentivize dialogue between local and global groups • Create online spaces for children and youth 	<ul style="list-style-type: none"> • eGovernment portal • Community Telecenters
Education	<ul style="list-style-type: none"> • Policies of equal access • Teacher training and professional development in the use of new technologies • Blending of learning and entertainment • Stimulus for acquisition of equipment to access networks from home as educational complement • Building of a knowledge network involving students at all levels and professionals in the job market • Professional networks for graduate studies on knowledge society 	<ul style="list-style-type: none"> • Teacher training in ICT • Virtual school • Little Scientists • Active Urban School (based on the success of the rural Escuela Nueva) • Bilingual Manizales
Research	<ul style="list-style-type: none"> • Development of autonomous projects in technical support • Fostering of interface 	<ul style="list-style-type: none"> • Media Lab. • Observatory of new technologies • Specialized seminars

	<p>design for better human-computer interaction</p> <ul style="list-style-type: none"> • Management of resources like computation, music, audio, video, graphics, animation and communications to generate information tools and services • Experimentation with virtual reality, sensors, information agents and the like • Implementation of the program ONDAS promoting early education in science and technology 	<p>and events</p> <ul style="list-style-type: none"> • High velocity network for universities • Strengthening of the research community
Industry	<ul style="list-style-type: none"> • Use of new technologies in businesses • Continuing education to update competences and professional abilities • Strengthening of the entrepreneurship spirit • Use of ICT to access economic development opportunities • Search of alternatives to generate industries and jobs 	<ul style="list-style-type: none"> • Business incubator INCUBAR. • ParqueSoft Manizales. • Manizales 100% entrepreneur • Business park MEC

One of the competitive advantages of Manizales is its technological infrastructure. None of the above projects would have gone far would it not have been for the parallel development of the ICT infrastructure. Between 1997 and 2007 the local telecom provider, Emtelsa, now UNE, experienced a tenfold growth in employees while expanding wired coverage to the whole city¹⁶. Its leadership was supported by the government policies in a beneficial synergy. With the former Emtelsa manager, Juan Manuel Llano, now as the newly elected mayor of Manizales, it is fair to expect continuity in ICT programs and MEC strategies that have worked. He will also have the opportunity, once again, to gather feedback and correct course where needed.

Although some of the projects have either disappeared or never crystallized, there are many that have survived the test of time and are now functioning on their own. Some

¹⁶ (YouTube - *juan manuel llano alcalde manizales EMTELSA.*)

notable examples are Parquesoft¹⁷, Telecentros Comunitarios¹⁸, Manizales Comunidad en Línea¹⁹, and the Media Lab²⁰.

MEC has been recognized internationally with several awards and distinctions. The Virtual School project has been finalist in the most prestigious international competitions recognizing the use of ICTs like the Stockholm Challenge Award 2003-2004 and the Global Junior Challenge of Rome in 2001.²¹

Manizales, in turned, won the IV Iberoamerican award of digital cities of AHCIET in 2007²² in the category of medium-sized cities.

Public Learning

"Markets are pretty good at allocating resources and encouraging innovation in areas where the right incentives are operating, but governments are not necessarily good at figuring out what incentives to establish in the first place." Thomas Malone²³

Governments enjoy the privilege of a bird's-eye view as well as access to in-depth historical analysis; they have natural connections with other sectors of society; this puts them in a unique position to envision the future. Since they are generally looked upon for guidance on directions to follow, they have the opportunity to shape the future by setting priorities and providing incentives that move the region forward on the desired path.

Long-term vision is key to accomplish long-term goals. As obvious as this sounds, government's duty to solving immediate problems and desire to appropriate the latest trends tend to get in the way of looking past immediate results. In the case of Manizales, the initial long term vision fell short on two areas. On one hand, an emphasis was placed on the abilities of the individuals right at the time when the world started to harness the power of the collective. On the other hand, the coffee price decline in the international markets was misread as a sign of decline of the whole industry and MEC was set to look for alternative businesses like call centers. Though it was accurate that the coffee prices had lowered and the call centers were successful in economies that were being displaced elsewhere, there was a lack of long term visioning to see that the coffee industry had –

¹⁷ (ParqueSoft :: Poder humano para tus sueños.)

¹⁸ (Telecentros comunitarios manizales.)

¹⁹ (Manizales comunidad en línea.)

²⁰ (Laboratorio de entornos virtuales :: Media lab.)

²¹ (Jaramillo)

²² Premio Iberoamericano de Ciudades Digitales

²³ (Thomas Malone, Patrick J. McGovern Professor of Management, MIT Sloan School of Management, 2007) while talking about government policies for dealing with climate change. Stated at the MIT Communications Forum on Collective Intelligence on October 4, 2007 published on video through MIT World: <http://mitworld.mit.edu/video/494/> Video Time index 54:20

and still has- a lot of growth potential but the marketing needed to adapt to reap the benefits of the growth. Businesses like Starbucks flourished, the specialty coffee market expanded worldwide, and Colombian coffee went from being one of the few known brands to being one more among many. The chief problem with detecting the wrong anomaly while scanning the environment in phase I is that the rest of the learning cycle is easily affected as the efforts concentrate on solutions for the wrong problem.

The previous point highlights the importance of flexibility, even at the problem identification step and the cyclical aspect of social learning. The *Tiendas Juan Valdez* initiative is addressing the Starbucks phenomena, hopefully utilizing what has been learned from the coffee market behavior in the past few years and applying ICTs and the power of the knowledge society to Manizales' 100 year industry.

Government policies are expected to look out for the public good, even if particular interests are taken into account. Within this broad well intentioned context there are many options available, some tested through time. The balance between doing what has worked in the past and venturing into unknown territory to keep up with the new paradigms of society becomes of particular importance in times of rapid change.

Despite the difference in scale, with Panama opening 75 Infoplazas between 2002 and 2007, and Mexico launching roughly 10,000 Digital Community Centers during the same period, governments of both countries invested heavily on centralized efforts and formulated policies putting them in charge of the implementation of community technology centers across their countries. This resulted in institutions that by their nature are slow to react. In Panama, a national department for science, technology and innovation²⁴ –Senacyt- was created in 1997 as an autonomous institution whose mission is to transform science and technology in tools for sustainable development²⁵. The Mexican equivalent, the e-Mexico National System, is an instrument of public policy designed by the Mexican government to drive and procure the country's transition towards the information and knowledge society²⁶. Both have suffered greatly when the government that started them left.

In contrast, MEC has partnered from early on with local institutions from industry, academia and civil society, and has served more as a facilitator and provider of incentives affecting many aspects of society without a single centralized entity in charge of implementation. Instead, it has created and supported several seemingly dispersed projects, all trying to move the city towards a common goal. Its main role might have been providing inspiration; bringing attention to a vision that encompasses all aspects of society and has began to take root in the collective local conscience, even if people do not realize where it came from. Though some of the criticism that MEC has received has to do with the lack of a centralized agency, the fact that the projects belong to many and

²⁴ *Secretaría Nacional de Ciencia, Tecnología e Innovación*

²⁵ *(Sobre senacyt.)*

²⁶ *(eMexico national system.)*

have been implemented by diverse groups in the society, has facilitated its pervasiveness and continuity.

Looking at MEC through the social learning cycle lenses it becomes clear where the strengths and weaknesses are. A great deal of attention has been given to Phase I. From informal conversations to systematic studies, the environment has been scanned on multiple occasions and important issues have been clearly identified and addressed -save for the exceptions discussed above. Codification and generalization of the solutions have possibly been MEC's greatest accomplishment. The breath and depth of the goals and projects described above is impressive and has proven effective.

Phase II is where improvements can be made. Addressing the technology gap, augmenting the coverage, maintaining the services affordable as initial funding runs out are current challenges to be dealt with. However, the bold bet of the government of Manizales has paid off and can be looked upon as an example of transformative policies that take advantage of the new affordances brought about by the global economy. One key construct has been the government as a learning system. A first step in this direction was to acknowledge the role of technological innovation and knowledge generation in development and economic growth. This realization is inline with the United Nations Science, Technology and Innovation task force approach of development as learning²⁷. Equally important has been the ability of the public administration to continually gather information from the field, reflect on the process, realign as necessary, and build on the local strengths addressing not only the know-what and know-why but making strides into the know-how and the know-who.

Lessons for the Colombian National ICT Plan

What has been learned in MEC has applications in diverse settings, but the emphasis of the following reflections is on the upcoming National ICT Plan for Colombia about to be launched. They are roughly divided into what worked and is worth replicating, what did not work and should be avoided, and what is missing and could be incorporated in future undertakings.

- Right from the start MEC sought to involve multiple sectors. The government initiative included industry leaders, educators, researchers and civil society. This has proved to be very beneficial and is completely aligned with the goals of giving the area a jump start in the global economy, as well as the focus on knowledge generation and appropriation, and the incorporation of technological innovation.
- A systemic approach is a must if a country is to integrate the many sectors that should benefit from the use of ICTs.
- Local adaptation is key for the innovations to take hold and be relevant. Even the best ideas will fail to be absorbed and therefore create an impact if the people who

²⁷ (Juma, Yee-Cheong, & UN Millennium Project. Task Force on Science, Technology, and Innovation, 2005)

could benefit from them do not embrace them. This is true in particular when introducing new technologies that people have lived without for most of their lives. A classic example is language of the interface. Online communities depend critically on the understanding not only of the words and sentences but the context that surrounds them. A plain translation of words without adapting the interface to the local context could very well stop the adoption of an otherwise powerful resource. The high level of acceptance of the Telecentros site speaks volumes to this issue.

- A long term vision that benefits the majority of the population, which almost by definition includes those who are not in power whose voices are rarely heard, is very hard to achieve by focusing on the immediate concerns and interests of private industry. Though it is important to bring those concerns and interests to the table, it is fundamental to look beyond them. Envisioning the future of a country should be as independent and autonomous an endeavor as possible. It should look at the world not only as it is but as it could be. It ought to imagine the best possible scenario even if the means to get there are not obviously at hand. A case in point when looking at ICTs is choosing a particular brand of software or hardware before thinking about the desired outcome. For example, Manizales' decision to stick with wired telephony ended up working because its topography is not great for wireless transmission, yet the vision should have been to get the best possible connectivity regardless of the connection mode.
- Although the use and appropriation of technology appear in several pieces of MEC, achieving technological fluency at all levels of society could be a more explicit goal. The same is true for knowledge generation and dissemination. A better understanding of information flow would make it easier to get rid of bottlenecks and more generally promote the productive use of accumulated knowledge, both the locally generated and the newly available from the rest of the world. It would also result in a more fluid multi-way interchange as opposed to a one-way avenue where the majority of the population acts a receiver of what a minority creates. In the current global environment it is not enough to learn to use the latest products as they will sooner rather than later become obsolete. Training needs to go beyond learning to use version x and seriously address the much needed skill of learning to learn. A new generation is growing up in that context and those who fail to be exposed to this new culture of learning or grew up in the previous generation will need extra help to catch up and be competent in the knowledge economy.

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