Toward a Multilateral Effort in Measuring e-Business for Development

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We propose a new multilateral effort in measuring e-business (including e-commerce), as well as other forms of Information and Communication Technologies (ICT), in support of development policy and programs. It would require that international organizations, governments, businesses, and non-governmental organizations coordinate their efforts in producing more accurate, reliable, and comparable metrics on ICT usage and their impact on development, especially economic through the use of e-commerce and e-business. We focus on 4 action areas: (1) developing an international database; (2) building new policy capabilities; (3) creating forums for exchange; and (4) providing training to transfer best practices. We first discuss the present international trends in ICT policy, and the importance of measuring progress in this area. We then address the goals this new multilateral effort could seek to achieve in the measurement process. This leads us to outline the present state of measurement, from the perspectives of the end-users (mostly policy makers) and producers (mainly National Statistical Organizations or NSOs) of such data and information. Finally, we try to identify the key challenges in building the proposed measurement infrastructure.

- Information and Communication Technologies (ICT)
- Internet
- e-commerce
- e-business
- digital divide
- developing countries
- development metrics
- multilateral cooperation

1 Introduction

We propose a new multilateral effort in measuring e-business (including e-commerce), as well as other forms of Information and Communication Technologies (ICT), in support of development policy and programs. It would require that international organizations, governments, businesses, and non-governmental organizations coordinate their efforts in producing more accurate, reliable, and comparable metrics on ICT usage and their impact on development, especially economic through the use of e-commerce and e-business.

We first discuss the present international trends in ICT policy, and the importance of measuring progress in this area. We then address the goals this new multilateral effort could seek to achieve in the measurement process. This leads us to outline the present state of measurement, from the perspectives of the end-users (mostly policy makers) and producers (mainly National Statistical Organizations or NSOs) of such data and information. We try to identify the key challenges in building a new measurement infrastructure within such implementation environment.

Based on this assessment, we then discuss a number of possible areas for action. Among others, we focus on the 4 areas raised in a recent UNCTAD Background Paper on measurements [1], namely: (1) developing an international database; (2) building new policy capabilities; (3) creating forums for exchange; and (4) providing training to transfer best practices. We conclude with a discussion of the challenges in implementing this new international infrastructure to measure ICT and e-business, with a view to ensuring policy efforts in this area remain focused on development priorities (e.g., United Nations Millenium Development Goals).

2 Current Trends in Measuring e-Business for Development

As many success stories have confirmed, the diffusion of ICT, the Internet, e-business and (more specifically) e-commerce hold great promises for developing countries [2, 3]. This is one of the main reasons for holding the upcoming 2nd UN World Summit on the Information Society (WSIS), to be held in Tunis in November 2005 [4]. This event, like its 1st edition in December 2003, brings a new sense of urgency for action, one that should lead governments to take a wide range of policy decisions in the years to come.

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As many have pointed out [5], while such dynamism will certainly provide positive energy to help narrow the Digital Divide, we must keep in mind the institutional strengths and weaknesses of world summits. Among others, they are primarily focused on communication as opposed to action, with impacts felt more on the longer term. To the list of issues recently identified, we may add that a rapid expansion of government and business actions in ICT can easily lead to dispersion of efforts, uncoordinated and contradictory policies, disappointing and slow results, waste of scarce public funds, failed investments, and (worse of all) wider disparities between high and low income groups within developing economies. Finally, ICT development programs may be pressured to focus primarily on short term goals with results touching only those presently using ICTs. As such, it would exacerbate the prevailing perception (and too often unfortunate reality) that getting access to ICT and adopting new e-business practices is primarily a concern for high-income citizens and sophisticated, internationally oriented companies.

Therefore, it is imperative that we build reliable mechanisms to ensure that such policy activity around ICT and e-business will prove positive. Several UN organizations have already initiated significant effort in this direction. A joint event was organized during the 1st WSIS in Geneva in December 2003, allowing leaders of ICT measurement to take stock of the issues and areas for action [6], which helped bring the measurement of e-business on the WSIS agenda. This was also related to on going initiatives such as the development of a new set of common indicators [7, 8] and a new portal for the ICT measurement community [9]. These efforts relate directly to broader UN ICT initiatives, such as the mapping of ICT indicators to UN Millenium Development Goals (MDG) [10].

Overall, these efforts are laying the foundation for a longer term process to measure ICT for development. But unfortunately, the urgency of the situation may be greater than we perceive it, as we may effectively have only one chance to prove this right, as we are talking about massive one-time investments that tend to loose value much faster (and in much more unpredictable ways) than other assets. Our window of opportunity is very narrow compared to previous development efforts of similar scale.

In addition, the scope of monitoring is much larger than is usually the case with other development policy areas. Indeed, the ICT priority action areas touch upon a greater diversity of development goals, such as: e-learning, e-government, fairer trade intermediaries, faster market and business development, consolidation of small buyer and seller power, access to capital, ICT infrastructure, local technology entrepreneurship (e.g., offshore development, open source products, IT-intensive business process outsourcing), etc. All these areas have their own challenges, and require policy makers to forge collaborative networks with a wide range of technical and industry experts. They also involve numerous coordination interfaces, some of which are completely new, as governments in many advanced economies have discovered in the past few years.

Given this context, it is crucial to get a more accurate and regular measurement of the impacts of ICT and e-business on development. Such data will allow all parties involved to manage risk and coordinate highly complex policy actions on several fronts. Measurements also play a key role in carefully identifying threshold and saturation points in various areas, and therefore keeping policy makers' attention focused on what really counts. As well, the use of more flexible measurement processes and data analysis tools shall prove determinant in leveraging this policy-making infrastructure and delivering the most accurate, highest quality information to the right decision makers at the right time. Finally, the new measurement process and infrastructure will ensure greater international comparability of statistics, by ensuring that models built in developed countries are properly adjusted for emerging and less developed economies, a problem still predominant in the ICT measurement literature [11, 12].

3 The Need for a Multilateral Effort

In order to produce more accurate, reliable, and internationally-comparable metrics on the impact of e-business on development, ongoing efforts by international organizations need to be matched with initiatives by governments, businesses, and non-governmental organizations (NGOs).

First, governments have already responded positively by committing their respective National Statistical Organizations (NSOs) to collaborate regionally and within various UN initiatives. As such, there is great hope that the diverse ICT metrics being collected will converge toward a core set of comparable indicators. NSOs are well positioned to ensure comparability, especially due to the use of commonly agreed-upon standards in interpreting and reporting social and economic statistics. In addition, they are well equipped with the necessary reach to citizens and businesses, and have a greater control on the regional segmentation and stratification of possible statistical samples.

However, NSOs are encountering major obstacles in measuring the development impact of e-business. Among other issues, their measurement methods rely primarily on mass surveys. As well, the capabilities of various NSOs is very uneven, leading to major deficiencies in supporting evidence-based policy making [13]. In addition, since NSOs rely primarily on discreet measures, as opposed to composite and factor models, their metrics suffer from lack of context, with significant limitations in how we can use them for policy making. As indicated by a recent review [14] of the ICT measurement and e-readiness literature, there are a number of weaknesses from

> "In particular, we noted that there are limitations associated with the discrete indicator measures, the technology adoption and diffusion measures, and the measures of economic factors. They focus on one or more aspects of ICTs, but are unable to measure and effectively represent the richness of ICTs in all their key dimensions. For the most part, the discrete indicator measures represent raw data which needs to be converted into information. To achieve an understanding of the impacts of ICTs requires measurement methodologies that go beyond the facts, and reveal why certain kinds of impacts are occurring… ICTs do not represent a single innovation. Instead, they represent a cluster of related technologies. So using a single variable does not capture the richness of what is happening. So, even though these studies do establish a link between ICT adoption and the factors that influence adoption, they do not provide an answer to how strong the links are, diminishing their value relative to policy making." (p.23).

As such, it is clear that efforts to develop national statistical capabilities should also be matched with support from other sectors, especially business and NGOs. A multilateral effort, involving various partners nationally and internationally, would create a new measurement process focused not only on statistics but also their proper use in policy making. In addition, the new process would encompass more than the mere task of data gathering and reporting, and would focus primarily on ensuring data relevance and quality, as well as producing decision models focused on bottom-line development goals.

While the collaboration of businesses to this new measurement process should focus primarily on ensuring a more fluid data gathering process, the role of NGOs is more promising to emphasize development goals. Much as in other areas of development policy, NGOs are well fit to manage local changes by introducing foreign management methods to exploit development opportunities, a form of innovation called "social entrepreneurship" [15]. This is precisely the set of skills required to manage the implementation of ICT in developing areas, and in turn help monitor its impact from the grassroots. While recent research [16, 17] indicates that ICT implementation by NGOs requires better monitoring by donors, they provide at least a more accurate reading of the impact of technology on society and business. In addition, they can help NSOs identify the more indirect and less measurable impact of ICTs. Indeed, while existing measurement systems focus on citizens and businesses owning technologies, we need to measure as well how the use of ICT by business and government helps improve the welfare of those they serve [18]. These indirect impacts are more accurately monitored by NGOs, and therefore a new multilateral measurement system, while being led by NSOs, should rely on

local actors such as businesses and NGOs to gather data and monitor its relevance for development.

Another stakeholder is universities, which are closely associated with NGOs and can provide significant services to support a new ICT measurement process. They are well equipped with most of the resources required by this effort, as they can blend and leverage key skills and assets such as [19]:

- A hands-on knowledge of e-business technologies in various sectors,
- A closely knit network of research collaborators throughout the ICT industry,
- A first-hand understanding of the needs of data end-users, especially policy makers,
- A proven ability to develop innovative data mining tools for policy analysis,
- A capacity to train both data producers and users in best practices and tools.

Overall, a new multilateral measurement infrastructure and process would provide well-defined roles for all actors and sectors. It would build upon the coordination effort of international organizations, and would further support the development of NSO capabilities. It would also provide for closer collaboration with businesses in managing data gathering and processing, and bring NGOs to forefront in monitoring the actual impact of ICT for development, leveraging them as a privileged source of information to monitor policies and programs.

4 Implementation Environment for the New Measurement System

Developing a multilateral ICT measurement infrastructure shall prove a challenging task. Creating such a complex, fully integrated statistical and decision-support system requires an accurate understanding of the implementation environment within which ICT and e-business policies are developed.

There are 3 issues we must consider before designing these new tools for measurement, which are: (1) to get a sense of how metrics are used for policy making; (2) to understand the overall goals of policy makers; and (3) to identify the operational concerns of data producers.

4.1 Using Metrics for ICT Policy

Government decisions and actions in ICT and e-business have often suffered from lack of accuracy in many ways. Whether it is the definition of policy targets, or the proper implementation of policies and programs, public and private organizations face tremendous challenges in adopting a data-driven approach to decision making.

To help overcome this major deficiency, policy makers at all levels can rely on metrics in many ways, in order to:

- **Define Policy Objectives:** Accurately identify the right groups of people to help, so as to pinpoint the actual digital divide, and ensure ICT policies remained focused on development priorities (i.e., narrowing the gap between high and low income groups). As research on Internet and e-commerce use demonstrates, several policies may have contradictory effects, either enhancing or reducing access to the Internet [20]. Policy objectives must be carefully identified and integrated.
- **Target Policy Actions:** Properly determine the required size of public and private commitments, especially in right proportions to the actual (not simply apparent) needs, so as to carefully allocate large policy budgets, and guarantee the most efficient and effective use of public funds and private sector investments. One of the main drivers in increasing the development impact of ICT is the adoption of e-business, especially by small businesses [21]. Policy actions that are targeted only at more traditional and established industries may be reducing the overall impact of e-business on economic and social development. As such, it is necessary to target policy actions towards those sectors that are most conducive to innovation in ICT use, and most probable to have a broad impact [22].

- **Align ICT Policies With National Priorities:** Clearly delineate the boundaries and conditions of national interests in developing indigenous ICT capabilities and resources, especially when it is necessary to resolve key debates about international dependence and sovereignty, such as those related to privatization and FDI. As demonstrated in other sectors, policies that tend to control foreign participation in domestic ICT industries and markets can cause further reduction in the impact of their technology diffusion and implementation [23].
- **Ensure Policy Effectiveness:** Conscientiously reporting to donors and/or field auditors, especially by controlling and holding actors accountable, and enforcing data-driven decision rules, thorough investment analyses, and portfolio oversight. It is very difficult to measure the effectiveness of ICT policies and programs for development [24]. They are of diverse scope, scale, funding, and impact, and therefore they require flexible standards in measuring effectiveness. In addition, it is important to carefully manage the accountability process, in order to ensure that metrics are reliably interpreted at various levels of decision-making [25].

4.2 End-User Perspective

We have identified so far only some of the numerous ways in which policy makers can use metrics to make better decisions. To maximize its impact, it is therefore crucial to focus this information infrastructure on the overall goals that drive the demand and use of metrics. Indeed, this infrastructure must ensure that it helps policy makers accomplish the following end-results:

- **Reset Priorities:** e-business and ICT policies must be refocused, and therefore require the use of metrics to renegotiate efforts across the board. Among other priorities, it involves refocusing existing efforts on citizens with the most pressing needs, and on supporting local entrepreneurship.
- **Build Vision:** A new vision of policy analysis and decision-making processes must emerge, and be deployed at all levels of government, industry, and society. Policy-making must be reengineered to leverage new databases, make comparative analyses, and promote a culture of accuracy at all levels.
- **Coordinate Policies:** There is a constant risk of rapid exhaustion of resources and efforts, and therefore policy coordination is crucial in ensuring continued success in implementing ICT policies. Such coordination requires the establishment of key processes to leverage policy interdependencies, and especially to detect potential savings, efficiencies, and multiplier effects, with reliable estimates justifying the close coordination and in some instances the full integration of various efforts (e.g., linking such diverse policy efforts as promoting ICT entrepreneurship, providing local workforce training in ICT, and building e-government tools for local institutions).

4.3 Data Producer Perspective

However wide-ranging, policy makers (or end-user) interests must be matched with actually producing the ICT and e-business metrics. This requires due consideration to the operational concerns of data producers (i.e., mainly NSOs). Among others, the following issues in developing metrics must be addressed:

- **Measurable Goals:** The e-business technologies and practices targeted must have clear inputs and outputs. Data producers can resolve this challenge by properly compiling, classifying, interrelating, and (possibly) integrating a number of models that help gauge the implementation, evolution, and impact of policies on ICT and e-business for development. This approach can help producers make sense of metrics in their context.
- **Value of Data:** The relative (and widely varying) benefit/cost ratios of the data must be shared by many end-users, and be properly correlated to strategic initiatives. It is unthinkable that metrics can be collected on all decision items at all levels. Yet, data producers can devise innovative approaches to help push forward the "statistical possibility frontier" (e.g., by combining advanced technologies and field-level common sense, by involving end-users, etc.).
- **Analytical Tools:** Policy analysts, at all levels and in such diverse organizations as government, business, NGO's, and universities, need access to advanced tools to manage

this data. For example, data warehouses, On-Line Analytical Processing (OLAP), Data Mining (DM), and simulation engines can be used to produce reports, estimates, and scenarios at varying units of aggregation, time, and geography.

5 Building a Multilateral Measurement System

Given the challenging implementation environment, we propose the creation of a Multilateral Measurement System (MMS). This new Statistical Information System (SIS) and its associated Program Management Office (PMO) would support the measurement of development impact of ICT, the Internet, e-business, and e-commerce. It would require moderate investment from international institutions, as it would build primarily on existing institutions. It would also come to support many other efforts in developing NSO and NGO capabilities. This effort would be effectively a public asset that benefits all countries equally, and especially concern all sectors, whether international, government, business, or non-governmental organizations.

As we compare, on one hand, the concerns of end-users and data producers, we find several action areas for this new initiative:

- **New Processes:** To help improve and deploy new policy processes built to exploit new international measurement guidelines and metrics databases.
- **New Metrics/Tools:** To leverage existing and new industry relationships in order to customize and adapt metrics for complex e-business technologies.
- **New Forums:** To stimulate international cooperation to transfer capabilities to countries joining this multilateral effort.
- **New Training:** To build new educational programs to train policy and statistical analysts, and ensure international comparability through common standards.

5.1 Providing New Processes

The creation of a new measurement infrastructure requires the proper reengineering of policy making processes, especially around data-driven decision making practices. This has always been a major challenge of all organizations, and most noticeably in the public sector.

Therefore, by leveraging its expertise in process reengineering and the proper application of analytical methods, the MMS could help in overcoming the obstacles to such changes. In particular, it could actively manage the necessary "process innovation" effort through wide-ranging international networks. To this end, a number of possible actions can be envisioned:

- To actively research and identify the best practices recently developed by a number of leading (more experienced and/or better equipped) NSOs, governments, agencies, etc.
- To carefully document their processes into standards, and build deployable guidelines with workflows and roles, tasks and deliverables, staffing/positions, analytical models and tools, information systems and technologies, etc.
- To build an international database of local experts to help in this research and standard development exercise, and to identify potential employees/partners capable to work within these redefined roles and positions, so as to rapidly ramp-up the capabilities of the data producing or data using organizations.
- To help senior officials implement the WSIS consensus on data-driven and evidence-based policy-making, and to create proper mechanisms to communicate and promote change throughout various decision-making structures and professional communities.
- To help policy units in key areas of ICT and e-business to identify specific line-of-business and technological capabilities required for in-depth analyses, and to identify policy coordination opportunities to reach new levels of efficiency and effectiveness in building and leveraging these capabilities.
- To carry out some reengineering exercises to demonstrate the validity of these new standards and approaches, and to properly monitor the emergence and implementation of this new information infrastructure for measurements.

5.2 Providing New Metrics/Tools

There is a growing research community focused on developing new ways of measuring the development impact of ICT and e-business. As such, the MMS should be responsible to leverage such networks not simply to produce rich databases, but also in developing, testing, and refining complex metrics. Research teams can accomplish this by leveraging their diverse knowledge base of technology, policy, and data-driven analysis. Several initiatives can be launched, such as:

- To integrate and repackage survey instruments, previously built for specific regions of the world, and to customize them to other contexts/constraints.
- To create a global network of ICT suppliers to build a common template to assess technological capabilities of ICT industries, especially for complex technologies and wide-ranging, deep, and complex development impact (e.g., surveying the networks of partner firms of large ICT providers, and measuring their relative impact on development, factoring for the impact of ICT investments on trade or FDI, and vice versa).
- To use groups of local experts, especially from university research centers, as field agents to find new metrics, to validate several statistical instruments and tools, to develop new industry contacts to help fuel ongoing data gathering efforts, to properly target development needs of various ICT and e-business policy initiatives, etc.

5.3 Providing New Forums

The emerging evidence-based policy making approach requires a stronger "community of practice" in using data in formulating solutions to development problems. In particular, given the need for innovation at all levels throughout the implementation environment, this community must be clearly focused on the development of a new knowledge base. It therefore needs to be far different from the traditional communities built primarily for networking and learning, and be instead a truly experimental milieu.

The MMS, by developing stronger relationships with research institutions, could serve in providing alternative forums for this innovative community of practice. It would provide leadership and stimulate collaboration through existing and new virtual forums focused on measuring ICT and e-business. These forums would provide for a rich and effective community in designing and testing new ideas, concepts, models, methods, tools, etc. These initiatives could take several forms, such as:

- To invite NSOs and ICT analysts to international academic meetings, whether to attend research conferences in the substantive fields of NSOs, or as special regional workshops in the various technical areas of key ICT and e-business policy areas.
- To build an international, virtual, online support network, allowing for extensive and deep discussions on leading issues, and jointly moderated by NSOs and universities focused on this international capability building effort.
- To maintain through this virtual network a constant flow of cases, news, models, new data, methodologies, instruments, etc., especially in specialized ICT and e-business policy areas, in order to reduce the cost of researching and applying new tools, especially at lower ranks within policy units, who are often key in bringing new practices and in improving policy making efficiency.
- To identify private consultants ready to go through and pass a certification process managed by more experienced NSOs, and who are willing to contribute to these virtual networks as well as deliver practices internationally.

5.4 Providing New Training

Traditionally, policy makers have relied on educational programs focusing mostly on general concepts. It was assumed that managers would learn the "how to" part on the job. However, most professions have become more technical and now require extensive exposure and practicing/exercising with elaborate models, methodologies, and tools. Very often, this knowledge base is tied to advanced technologies, and is weaved within complex workflows to leverage such assets throughout the analysis process.

The MMS should therefore play a consultative, developmental, and leadership role in helping various organizations, especially universities, in building new training programs for NSOs and policy makers related to measuring ICT and e-business for development. It could allow the development of an international network of evidence-based policy analysts and statistical officers. The MMS could add value to this effort with various initiatives, such as:

- To build new training programs, fully accredited through leading international bodies and professions, and allowing governments to stimulate the implementation of the new measurements infrastructure, especially by offering this training to their professionals and managers as an incentive and/or reward for innovation.
- To carefully weave and synthesize, on one hand, the emerging standards and guidelines in managing the international measurement process, and on the other hand, the skills required to properly operate the advanced business intelligence and database tools and technologies.
- To provide a flexible, hybrid model in delivering an international training program, mostly by relying on an accredited research institution as the hub, and forging strong alliances with local institutes to deliver the program according to regional needs:

    a. The theory half of this program would most likely be developed and delivered in a remote or e-learning mode, so as to ensure common standards and guidelines are the same everywhere.
    b. The methods half or technical skills of the program would be best delivered in a face-to-face mode, especially to capture all the strengths and weaknesses of local policy communities as they would learn how to use such tools and master related skills.

- To ensure that trainees are provided with truly hands-on expertise, especially by working with the most experienced NSOs to deliver the face-to-face or technical portion of the program, thereby effectively guaranteeing the quality and reliability of training content and delivery.

6 Coordinated Implementation Process

Given the dispersed and uneven capabilities of the ICT and e-business measurement community, it is crucial to develop implementation agenda that favors nationally-based leadership. As such, the key actors in this process should be NSOs and the MMS PMO. Both can share responsibilities by leveraging their respective areas of expertise, and ensure that the new systems and methods would find roots in various communities.

6.1 The NSOs

Statistical agencies remain in many countries the most active proponents and leaders of a more rigorous, data-driven approach to policy-making. At least this has been the case with experienced NSOs in the field of ICT and e-business measurement.

Consequently, we may think of NSOs as responsible for steering the emergence of this information infrastructure, and for its deployment among various sectors and levels of ICT policy making. We may envision the following steps through which NSOs could accomplish this mission:

1. **Identify users:** Given the wide-ranging diversity of ICT and e-business policy areas, it is crucial to better identify and survey data end-users. This is also the most effective way to confirm the importance of such an infrastructure, and to estimate the potential value it may bring to various policy sectors.
2. **Build consensus:** As most changes in organizational culture take time, NSOs will need to proceed cautiously and patiently in preparing the ground for this initiative. The key turning point will be the establishment of a high level consensus on the need for an measurement infrastructure, and its possible architecture built around international guidelines.

3. **Set priorities:** This initiative must also serve as a valuable opportunity to reset ICT and e-business development priorities in their right order. The case for a more rigorous policy making process must also be coupled with due consideration to the urgency of reducing the digital divide (a goal that is often absent from many policy initiatives).
4. **Create NSO unit:** To be capable to pursue this initiative, NSOs must build the central command unit necessary to interface a wide diversity of policy areas, institutions, international channels, etc. This shall require a different skill set than the usual ICT and e-business statistics office, most likely focused instead on policy community management, and extensive ICT experience in the private sector (so as to ensure thorough understanding and relationship with various policy sectors as end-users of the data).
5. **Adopt standards:** The NSO unit responsible for this initiative should be the leading group demonstrating the state of the art in implementing international guidelines. It shall act as a host for other policy areas to learn how to implement these standards and processes, and serve as a consulting office to build and certify fully operational data-driven policy analysis units in the various priority action areas of ICT and e-business for development.
6. **Invest in tools:** Given the difficulty in using high-end analytical technologies, the NSO unit would be responsible to serve as a regional operation and maintenance center for the business intelligence information systems used by their regional policy communities.
7. **Invest in training:** All parties, including the NSO unit leading the initiative as well as their policy constitutions, should actively participate in a common international training program. This would become the key incentive and driver of the initiative in difficult moments, especially in times of implementing new processes, staffing new positions, and using new technical tools.
8. **Share outputs:** All parties should take leadership in their respective areas to share the results of extensive data-driven policy analyses. This shall serve as a legitimizing factor and also in promoting the proper approach in using various measurements for policy making.
9. **Improve DB tools:** As active members of this international measurement infrastructure, all parties should have a continuous quality improvement plan in place, in particular focused on systematically developing and testing new tools, especially in partnership with leading international authorities in their field of expertise.

6.2 The MMS

The creation of this new MMS and its associated SIS and PMO should provide for a flexible and fluid coordinating agency for all international and national statistical organizations, as well as various stakeholders, including policy makers, business, and NGOs. The MMS should therefore synchronize its efforts with those of NSOs and follow similar steps towards a fully coherent and operational measurement infrastructure. The following efforts may be required throughout the implementation process:

1. **Assess needs:** As NSOs would identify end-users, the MMS should help them in identifying their needs. This may take the form of active observers in various negotiations, and in documenting processes and requirements.
2. **Identify experts:** It should leverage international expert networks to help NSOs and ICT and e-business policy organizations to staff this new infrastructure. This effort should feedback into the NSO consensus building initiative, as experts would help take in action some communities in need of leadership.
3. **Set deliverables:** As NSOs would arrive at a clear set of ICT and e-business policy priorities, the MMS PMO should be better able to identify the gaps necessary to be filled by the measurement infrastructure. As such, it would define the key deliverables that universities shall provide this community. It would also help determine the scope of the initiative, and to properly allocate work among the international network of supportive institutions.
4. **Find incentives:** The creation of NSO units dedicated to steering national measurements initiative should coincide with the identification of key resources to provide incentives to the stakeholders to get involved in this international process. It should be an opportunity for participants to develop cost-effective projects in researching best practices and in developing basic international guidelines.

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5. **Optimize process:** Once the MMS PMO would be endowed with the proper resources, it should work with NSO units to bring these best practices into standards. In that case more efforts may be required to reengineer and optimize several policy-making processes in various ICT and e-business areas. As such, it would take a consulting role throughout the various policy communities in determining the scope and scale of changes required to properly implement a data-driven approach to policy making.
6. **Create DB tools:** The development of the underlying SIS and IT tools required to run this infrastructure would need to be built in phases. As NSO units would progressively invest in these tools, the MMS PMO should launch various initiatives to research and customize tools to various policy communities.
7. **Launch training:** Training providers, especially universities, should build new educational programs in close partnership with leading and experienced NSOs. It should be built to meet the needs identified locally, and therefore be flexible enough to allow for hands-on training that would enhance general learning, especially as it relates to interpreting data for policy making in various contexts.
8. **Publish findings:** To provide greater visibility and credibility to the data-driven policy analysis of various NSOs and agencies, the MMS should partner closely with neutral research actors such as universities to help publish these findings in various communities. This shall also prove useful in bringing the emerging metrics framework to bear on public debates, beyond regular policy forums.
9. **Improve standards:** As NSO practitioners would continue improving the technical side of the infrastructure, the MMS could partner with the policy leaders of various ICT and e-business areas so as to constantly improve the standards and processes used by these constituencies. This shall serve as a vital renewal of training programs, and also a mechanism to ensure continuity throughout the community of practice.

7 Conclusion

We proposed a new Multilateral Measurement System (MMS) to support the various stakeholders in measuring the impact of ICT and e-business on development, and helping policy makers in using this information for analysis. This new program would build upon existing initiatives by international organizations, and would be built in partnership with National Statistical Organizations (NSOs) as primary actors in leading this transformation towards evidence-based policy making. This new measurement infrastructure would also depend directly on government agencies, business, and Non-Governmental Organizations (NGOs) to carry out data gathering, impact measurement and interpretation, as well as consultations on guiding policy making based on MMS information sources.

While the implementation of this new system would present significant challenges, especially in obtaining the necessary commitments from various institutional levels, its reliance on existing initiatives should provide for a simple solution to a complex problem. As well, its development of flexible methods, such as relying on NGOs and universities to help NSOs in building measurement capabilities, should help meet rapidly growing needs for data-driven approaches in ICT and development policy making.

This paper was focused on the institutional rationale and implementation process of a new MMS. More work is needed to analyze the configuration of the underlying systems of such an information infrastructure. As well, more accurate metrics are needed to gauge the scale and scope of NSO capabilities in dealing measuring the impact of ICT and e-business on development. Finally, future research should be aligned with such frameworks as the UN MDG, providing better guidance for this new infrastructure.

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