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## **GLOBAL e-READINESS - *for WHAT?***

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**Nazli Choucri  
Vincent Maugis  
Stuart Madnick  
Michael Siegel**

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# GLOBAL e-READINESS - *for WHAT?*

N. Choucri, V. Maugis, S. Madnick, M. Siegel  
and S. Gillet, S. O'Donnel, M. Best, H. Zhu, F. Haghseta

Massachusetts Institute of Technology  
Cambridge, MA 02139

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## Abstract\*

A wide range of studies on e-Readiness, undertaken over the past several years, constitutes the 'first generation' in our understanding of e-Readiness. These are pioneering efforts and have begun to chart unknown terrain. Their contributions are commendable. But, as with all pioneering efforts, these studies are fraught with uncertainties and ambiguities in both theory and practice and lack robust foundations for empirical analysis. As such, they provide little guidance for business and government, thus obscuring the realities as well as the opportunities. For example, current e-Readiness studies and attendant indices assume a fixed, one-size-fits-all set of requirements, regardless of the characteristics of individual countries or the demands for specific applications. Most e-Readiness studies provide little information on how their indices were constructed and why, or how they might be adjusted to analyze particular e-Business opportunities.

This paper (i) reviews this 'first generation' of e-Readiness inquiry, (ii) draws upon the results to develop research strategy for framing the 'next generation' and (iii) shows the design and preliminary results for a 'next generation' of e-Readiness initiatives – in theory and in practice. Our framework extends beyond the basics in terms of general requisites for e-Readiness -- and seeks to provide tools to address the diverse needs of different e-Business applications, highlight alternative paths to e-Business, and clarify the possibilities in different economic contexts. We present an initial theory for capturing critical factors and derive a data-model for tracking and representing evolving e-Readiness experiences. The utility of the data model is shown with reference to e-Banking in different countries as well as specific applications of e-Banking opportunity.

**Keywords:** e-readiness assessment, value-creation opportunities, pathways, profiles, leapfrogging

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\* Report of the *Group for Globalization of e-Business*, Center for eBusiness at MIT, Sloan School of Management.

## 1. New Challenges

The rapid rate of Internet penetration throughout the world, coupled with dramatic advances in uses of information technology in business and industry, is creating an extensive literature on various aspects of 'e-Business' and 'e-Commerce' as well as a special interest in 'e-Readiness' both here and overseas. Recent studies showing the increasing knowledge intensity of economic activities in almost all of the industrial countries contributed to an accelerated interest in e-venues for growth in the developing countries. National and international institutions alike appear to be focusing on the e-potentials for growth in private as well as public sectors, and almost every developing country is now mounting a national information technology (IT) development plan. And preparations for the forthcoming World Summit on Information Society (WSIS) planned for 2003 and 2004 are placing IT-related issues at the center for global politics.

Underlying these trends is an implicit expectation that successful e-Business and e-Commerce (however redefined) can take place if, and only if, emergent initiatives are built on robust foundations of readiness. However, the notion of e-Readiness means different things to different people, in different contexts, and for different purposes. As a result, a large gap exists between ideas and concepts, on the one hand, and practical applications and implications, on the other. Gaps also exist between new expectations and capabilities in place. Investors as well as policy makers would be well served by the availability of tools to reduce ambiguity about decision and choices in this general domain. Much of what we know about e-Readiness – in theory and in practice – comes from a range of studies that provide a view of past performance, current assessment, and future expectations. Jointly, they reflect on the characteristic features of 'first generation of e-Readiness assessment'. This paper reviews these studies, identifies central tendencies and selectivity features, and proposes an approach that, we believe, provides the basis for the next generation of e-Readiness – for research and policy, assessments as well as realities.

## 2. 1st Generation e-Readiness

The track record of studies addressing e-Readiness matters is as impressive as it is wanting. They are impressive because they reflect the views and interests, the methods and approaches, of consulting firms, academic researchers, and government organizations, national as well as international. They are wanting because it is difficult to extract a coherent view of the realities at hand, or the methods upon which they are developed. As pioneering efforts, these studies are limited in their theoretical underpinning and, by extension, lack solid foundations for empirical analysis. As such, they provide little guidance for business and government, perhaps even obscuring the realities as well as the opportunities. Nonetheless, when closely scrutinized, the record to date yields a 'baseline' of current understandings, illustrate central tendencies, and provide some important insights (if not evidence) for further inquiry to help reduce uncertainties and ambiguities in both theory and practice. [Appendix I](#) presents something of a 'census' of the key studies, in terms of characteristic features and central foci.

The census of this 'first generation' e-Readiness assessments shows that roughly 137 countries have been assessed at least by one set of tools, 55 countries have been assessed at least five times by different organizations, 10 countries have been assessed more than 8 times, and many of the less developed countries have had no assessment at all. Methodologically, most assessments are based on statistical studies or questionnaires, country cases, ad hoc interviews,

and summary evaluations of IT-readiness for economic growth and/or for business opportunities defined in the most general terms<sup>1</sup>. Highlights are presented in Table 1 below:

**Table 1**  
**Key Features of e-Readiness Studies\***

<b>Model</b>	<b>Type</b>	<b>Author</b>	<b>Description</b>	<b>Focus</b>
<b>Readiness for the Networked World</b>	Statistical or questionnaire based ready-to-use tools	Center for International Development at Harvard University	Rates communities along 4 progressive stages of development in 19 indices. Based on communities self-estimation. No prescription for improvement.	Access, Learning, Society, Economy, Policy.
<b>E-Readiness Rankings</b>	Statistical or questionnaire based ready-to-use tools	The Economist Intelligence Unit and Pyramid Research	Tallies scores across 6 categories, five of which include a total of 29 indicators. Combines business environment rankings (70 separate indicators) with connectivity scores. Brief explanation of the results and the changes since last ranking.	Connectivity and technology infrastructure (25%), Business environment (20%), Consumer and business adoption (20%), Social and cultural infrastructure (15%), Legal and policy environment (15%), Supporting e-services (5%)
<b>Global Diffusion of the Internet: Case Studies</b>	Country case studies	The Mosaic Group	Indicates stages of Internet growth and usage through combination of statistics, narrative description and comparison. Focuses on 6 Internet statistics.	Pervasiveness, Geographic dispersion, Sectoral absorption, Connectivity infrastructure, Organizational infrastructure, Sophistication of use.
<b>International Survey of E-Commerce</b>	Interview and survey based reports	World Information Technology and Services Alliance	Report based on a survey to technology companies on their experience with e-barriers and asking for recommendations. Provides charts and narrative accounts of the answers. Only general conclusions, no country-by-country assessment.	How ready are world markets for electronic commerce? Economic factors, Regulatory environments.

\* This table is indicative, not exhaustive.

This first generation of e-Readiness studies assumes a fixed, one-size-fits-all set of requirements, regardless of the characteristics of individual countries, the investment context, or the demands of specific applications. Many e-Readiness reports provide little information on how their indices were constructed, or how they might be adjusted to analyze particular e-Business opportunities. The details and methodologies of assessment are not always publicly available (if at all), and there is a general tendency to provide ‘single standard’ views and values<sup>2</sup>. Ambiguities in methodology compound uncertainties of analyses and results. More to the point, the prevailing ‘one size fits all’ feature obscures the very differences that investors or policy analysts require in order to reduce uncertainties or, possibly even make more educated decisions. Finally, there is no attention to the most fundamental of questions, namely: *e-Readiness for what?*

<sup>1</sup> Bridges.org (2002). E-Readiness Assessment: Who is Doing What and Where, and Bridges.org (2001). Comparison of E-Readiness Assessment Models.

<sup>2</sup> Put differently, attention is given to general propensities with a degree of aggregation which then obscures potentially important differences. See Appendix V.4.

### 3. e-Readiness for *What?*

In fairness to the first generation assessments, they were exploring uncharted terrain, guided by little precedence, and hampered by the reliance on trail and error tactics. It is therefore remarkable that they do provide some foundations for thinking about next steps for theory and policy forging the next generations of e-Readiness. The challenge therefore is to separate the proverbial wheat from shaft and derive as robust inferences as possible. Earlier studies should be credited for providing solid foundations for next stages of e-Readiness analysis.

Drawing on studies listed in Table 1, among others, and assessing existing reviews of such studies – and benefiting from their experiences and insights – we have proposed and designed a new approach to ‘measuring e-Readiness’. This approach consists of a coherent and internally consistent conceptual framework coupled with operational tools to help support new and evolving directions of readiness strategies. Jointly, based on lessons learnt to date and their implications for emerging realities of the 21<sup>st</sup> century, we then designed and executed a research project with theoretical as well as practical dimensions; (i) structured in both empirical and analytical terms, and (ii) predicated on the assumption that *one size can seldom, if ever, fits all*.

#### 3.1 Toward Next Generation e-Readiness

Our approach begins with the development of an *operational* definition of readiness for conceptual as well as measurement purposes. On this basis, we then formulated a *data-model* for the analysis of key readiness requisites. Closely coupled with the conceptual framework, the data model is intended to ensure internal consistency in our measurement strategy. The next step was to undertake initial assessments of *alternative pathways* toward e-Readiness within and across various dimensions of readiness consistent with our rejection of the ‘one size fits all’ proposition. These alternative pathways provided the basis for empirical illustrations of *opportunity-driven* assessments for applications on-the-ground with respect to a specific type of e-Readiness opportunity in a particular domain. Accordingly, we tried to identify and frame the relevance criteria for select-targeted applications to a given opportunity.

Shaped by the quest for ‘value-driven’ opportunities, commensurate with prevailing performance potentials, our approach is grounded in the realities of a specific situation. At the same time, the conjunction of an operational definition with a data-model greatly enhances prospects for replicability, scalability, and validity. Furthermore, it enables the analyst to engage in fairly customized inquiries, given that customization can be made at the level of the economy, the industry, the firm, the opportunity, the investor etc. These features, together, provide robust foundations for e-Readiness studies.

#### 3.2 e-Readiness Defined

We define ‘e-Readiness’ as the *ability to pursue value creation opportunities* facilitated by the use of the Internet. Simple as this statement might seem, it does enable us to parse it into operational variables for purposes of analysis and measurement. Specifically, we seek to measure the *degree* of ability and the *capacity* to pursue, in the *context* of specific opportunities identified. Jointly, these three basic factors are the foundations of our conceptual framework and serve as anchors for attendant data analysis.

The objection might be raised that definitions amount to nothing more than unnecessary semantics. In this case, however, the quest for definition has a specific purpose, namely to anchor a conceptual framework to (i) provide systematic guidelines for specific applications, (ii) facilitate comparisons and case studies, (iii) enable useful ‘matching’ for abilities with opportunities, and (iv) create an architecture for e-Readiness tools and data model to test utility.

### **3.3 Value Creation Opportunity**

Our approach is distinctive in its emphasis on value creation opportunities as being central to the entire e-Readiness exercise. This allows us to address a wide range of questions reflecting different stakeholder interests and objectives. Questions that can be addressed include, for example: What specific opportunity is being considered in country X? If, for instance, the opportunity considered is e-Banking, what is the intended goal? Is it the goal to increase per capita income, strengthening the financial sector, or foster institutional development? What are the investment requirements for meeting this goal? Given current conditions, what are the alternative paths or possibilities for reaching the specified goal? What other value-creation opportunities exist in this situation? What factors might cause the effort to fail?

These are all practical questions; but they require the use of theoretical as well as empirical guidelines.

Moreover, the convergence of different questions, or contingencies, at any one time highlights the importance of *targeted* e-Readiness assessments. For example: “What is the best investment to improve the likelihood of success of a specific opportunity in a specific country?” Or, alternatively, “Which countries show the most promise as a new market for a particular set of opportunities?” or, “What is the current state of e-Readiness for a specific opportunity in a specific country?” and so forth. Despite apparent similarities, these questions differ significantly in their intent, focus, and information requirements – even as we take into account the multiplicity of potential perspectives of relevance in any particular case.

### **3.4 Multiple Perspectives**

Our view is that there is no one single key question central to the e-Readiness domain, but that the relevant questions as well as the strategy for producing answers are driven by *who* is asking that question, *why*, and for *what* purposes. To illustrate, for businesses, with primary interest in expansion into new markets, the question might be the nature of ‘fit’ between the business and the relevant context and contents of potential applications, or opportunities. For national governments, whose interest is in effective targeting of investments in IT, the question might be: what are best ways of determining ‘gaps’ and ‘needs’, and strategies for closing the need-gap. For governments of developing countries, as well as for international institutions, the objective might be to bring IT capabilities to bear more readily on development objectives. For non-governmental organizations, special interests, and such groups, the question might be how to mobilize select constituencies in support of particular IT strategies. And the examples go on. The degree of convergence or divergence among various objectives, on the one hand, and prevailing e-Readiness conditions, on the other, is clearly an empirical question.

In this connection, it is useful to be able to address different types of questions, for different audiences from the same data base and to consider that variables may have different meanings in different contexts, as well as for different intended applications (or investment

opportunities). Context matters and often highlights potentials for substitutability, for customization of activities, and/or for ‘leapfrogging’. Radio connectivity may substitute for telephone lines. Cell phones diffusion could reduce (even eliminate) the need for large scale investments in land lines; e-communication may provide useful substitutes for physical mobility; and so forth. Leapfrogging is always a contentious issue, nonetheless developing economies need not replicate the technology trajectory of the West nor the modalities for expanding applications of information technology.

Differences and contentions aside, the fact remains: there is a solid consensus that whatever the information needs might be – at any point in time, or for a particular readiness question – these needs are not well met. Current practices in data compilations and analyses, assessments approaches, or tools employed have some built-in limitations. Further, the expansion of worldwide electronic connectivity, the increasing penetration of e-venues in emergent economies coupled with new IT based opportunities in industrial countries place new demands for more discriminating methods for capturing ‘e-Readiness’. The above-mentioned World Summit on Information Society is a reflection of the increasing importance of IT policies and strategies in the global economy, in development programs, and in managing the increasingly sensitive difference between IT opportunities in industrial and developing economies.

Building upon the 1st Generation studies, our research extends toward new directions in theory and measures. Ultimately, we seek to formulate a ‘map of e-Readiness’ to help guide potentials investment and policy directions in increasingly e-Contingent opportunities and possibilities. Such efforts are essential prerequisite for building next generations of e-Readiness tools.

## **4. Framework and Methodology**

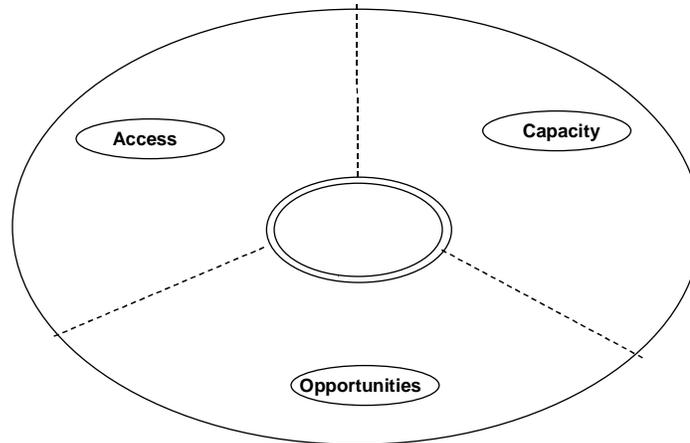
The first generation literature on various aspects of e-Readiness, electronic connectivity, and implications for economic development has identified a large number of variables that are considered to be relevant to e-Readiness. But, the relevance to *what*, *how* and *why* is often obscure. Yet, as noted earlier, they do provide important observations and insights toward the formulation of a conceptual framework as a necessary precursor for a data model to help capture both content and direction of empirical analysis. Our proposed framework derives from, and is the basic definition of e-Readiness as a function of *the ability to pursue value creation opportunities*. Methodologically, the core elements of the definition can then be parsed to represent the e-Readiness for any community, investor, nation, business etc.

### **4.1 Conceptual Framework**

Earlier studies provided the foundations for a rough rule of thumb – a set of criteria – to help to distinguish among (i) factors essential to *access* conditions (related to enabled physical connectivity), (ii) factors pertaining to *capacities* that are necessary but not sufficient (pertaining to social, economic and related policy conditions) for e-Readiness, and (iii) variables that provide ‘final proof’ of e-Readiness mobilization -- namely capturing the convergence of necessary and sufficient bases for realizing a particular *value-creation opportunity*. The simplified diagram in [Figure 1](#) below serves as a reminder of the basic logic.

**Figure 1**  
**Domains of e-Readiness**

Ability to Pursue Value-Creation Opportunities



In this context, our key propositions are that (i) different countries (or economies) are characterized by different e-Readiness profiles or propensities defined by their individual access and capacity conditions; (ii) given the variety and diversity of characteristics, there may well be a wide range of variables that shape propensities for both access and capacity – with respect to some opportunity; (iii) such propensities enable the pursuit of specific applications within the broad opportunity context that a country may have at any point in time.

It is likely that some e-Readiness factors are more informative than others, however, it would be useful to know what factors are critical, for which profiles, why and how. At the same time, e-Readiness profiles are not fixed; they are subject to investments, policy, and a host of contextual socio-economic factors. Given this variability (and flexibility) different countries can and do embark on different pathways toward greater e-Readiness in general or toward e-Readiness targeted toward a specific opportunity. It is fair to ask: *Profiles* of what, precisely? *Pathways* from where and to what? And for what type of opportunities?

We use the term ‘profile’ to cover two sets of fundamental features central to enabling e-Readiness: one pertains to broad conditions of *access*; the other to the *capacity* to utilize the access factors available. We use the term ‘pathways’ to mean context-dependent applications or delivery mechanisms enabled by the infrastructure in place, existence of supporting services, extent of affordability etc.

The conceptual framework and the companion data model serve as guides for quantifying past performance to the extent possible, and to identify those variables that are most significant indicators of access and of capacity. Since these conditions are clearly not identical in form, type or nature, we regard them as *sets of clusters*. By clusters we mean a set of variables within and across domains of access, capacity and opportunity whose high inter-correlations point to an underlying set of common attributes<sup>3</sup>.

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<sup>3</sup> Note, however, we did not undertake ‘cluster analysis’ in the formal statistical sense.

Each cluster, in turn, consists of a set of constituent factors all of which must be in place – to one degree or another – in order to signal the relative degree of e-Readiness in any particular situation and for any specific opportunity (or objective). These are the measurable elements of the data-model. By extension, the empirical question is, which *variables* dominate which *clusters*? In the absence of theoretical directives, it would be fair to say that we proceeded empirically along lines of trail and error. Simple statistical measures of association were drawn upon, informed by displays of data properties coupled with comparisons within and among cases. This probe – the conceptual framework and the data model -- owes much to the first generation of e-Readiness studies<sup>4</sup>.

Table 2 below shows e-Readiness in terms of domains and clusters. Appendix II lists the specific components (variables) for each of the individual clusters within domains of access and capacity.

**Table 2**  
**e-Readiness: Domains & Clusters**

<u>Domains</u>	<u>Clusters</u>
<b>1. Access</b>	(a) infrastructure (b) services
<b>2. Capacity</b>	(a) social factors (b) economic factors (c) policy factors
<b>3. Opportunities</b>	(a) opportunity penetration (b) specific applications

On this basis, we can hypothesize, for example that: If *access* conditions are in place, then *capacity* considerations come into play. If both access and capacity are in place, then value creation *opportunities* can be pursued. In other words, there can be no viable *opportunity* creation in the absence of access and capacity conditions. These hypotheses are framed largely for heuristic purposes and to guide more careful considerations of e-Readiness potentials<sup>5</sup>. It also points us to the important realities on-the-ground and to the possibilities for pursuing different strategies and pathways toward *value-creation*.

The sequence implied in this logic serves as a point of departure for articulating the data model more fully. For example, the research framework generally points to a wide range of

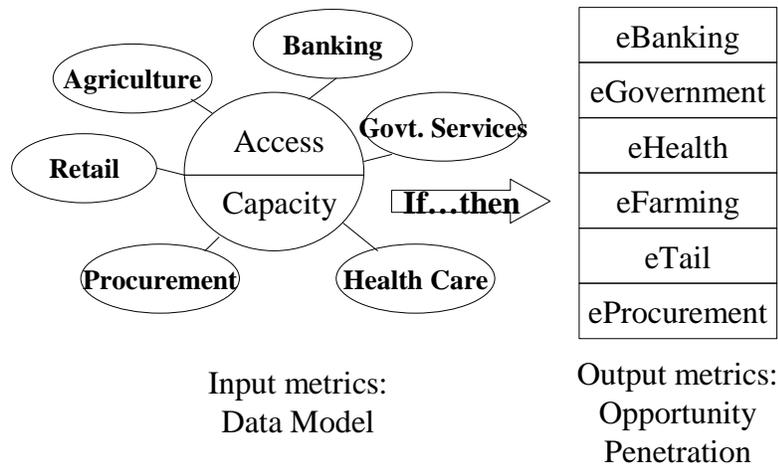
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<sup>4</sup> Specifically, the conceptual framework (in terms of differentiation between *access* and *capacity*) is extracted from the results and inferences of First Generation e-Readiness. The specific variables selected for populating the data model emerged from basic and initial probes of association and correlation yielding ‘groups’ of like-factors across a large number of countries. Ten countries were selected for full data-coverage. The profiles were derived through cross-country comparisons (scaling key indicators) for the ten countries and the pathways were derived by cross-country comparisons of the five industrial countries.

<sup>5</sup> Relevant here is the possibility that a country may rank low along all variables leading to penetration. Since our illustrations are drawn from a select number of countries, we can infer only that ‘low rankings’ reflect low been pathway potentials rather than no pathways at all.

opportunities that could be enabled by particular sets of access and capacity conditions. Moreover, by extending the general framework we can focus on more specific *types of opportunities*. To illustrate, we show in [Figure 3](#) the generalized research framework where we distinguish between *access and capacity* positioned as ‘inputs’ at the center of the diagram, and list ‘outputs’ in terms of some general types of e-Opportunity penetrations in different sectors or economic activities usually dominated by physical rather than e-modalities.

**Figure 3**  
**Research Framework**

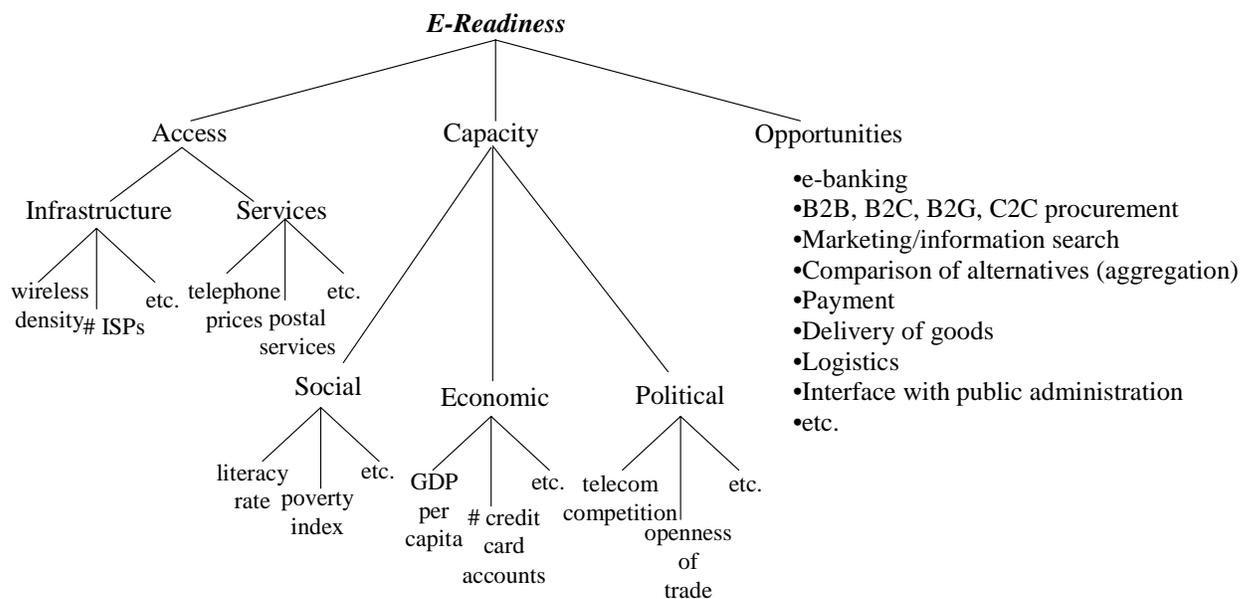


This approach allows us to make a systematic transition from general analysis of e-Readiness features to more specific and targeted analysis of e-Readiness profiles and pathways.

#### 4.2 Data-Model & Metrics

For purposes of simplification, we show in [Figure 4](#) below a tree structure view of the data model, which displays the derivative approach we have adopted as well as some factors illustrative of each cluster within the domain set(s). These highlight core variables and required measures, and raise additional research challenges for the next steps. For example: Is this representation adequate for considerations of scale and scope? What are alternative representations? What representations are most useful for *what* purposes and in *which* contexts? And, given that value creation opportunities are central to our approach, how can we best highlight the new value opportunities?

**Figure 4**  
**Data Model (simplified)**



This simple view allows us to steer data collection and analysis and to generate some initial results. The key steps include (i) populating the data model quantitatively, (ii) focusing on specific cases to identify key access and capacity factors in relation to an e-Readiness opportunity, and (iii) identifying observable pathways to e-Readiness in relation to specific opportunity-driven applications.

In [Appendix III](#) we present an alternative view of the data model and its multidimensional properties. It is designed to retain internal consistency and further expand its utility -- as shown later on in discussion of test cases in the Pilot Project.

## 5. Pilot Project: Next Generation of e-Readiness Opportunity

### 5.1 Purpose & Test Cases

In this section we report on a Pilot Project targeted to the next generation of e-Readiness initiatives. The project focused on a set of ten countries; five more industrial and five less so – in order to identify (i) commonalities and variability in *e-Readiness requisites* across countries, (ii) the pathways to *penetration* for a particular activity, e-Banking, as a specific opportunity within the Banking sector; and (iii) pathways to specific *opportunities* of e-Banking applications.

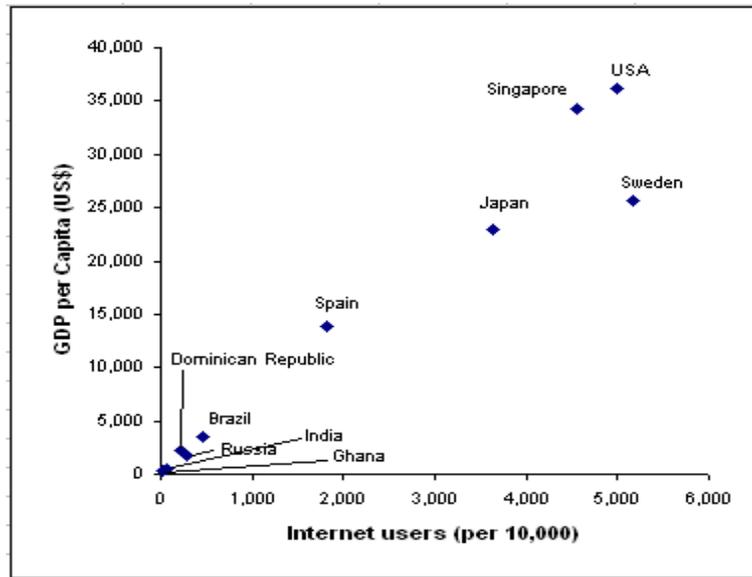
The ten countries include Brazil, Dominican Republic, Ghana, India, Japan, Russia, Singapore, Spain, Sweden, and the United States.

## 5.2 Profiles - Variability & Commonality

A comparison of the industrial countries cases enabled us to identify different ways in which they have met their access requirements and realized their socio-economic capacities. It also allowed us to explore *differences* and *similarities* in access and capacity among a set of countries generally considered as ‘e-Readiness’ successes. In other words: what is distinctive about success cases?

Taken as a group the ten countries together showed the expected bi-modal profiles of access – i.e. industrial vs. developing -- with respect to infrastructure and services requirements; the same bi-modality holds for the capacity conditions<sup>6</sup>.

**Figure 5**  
**Internet Users and GDP<sup>7</sup>**

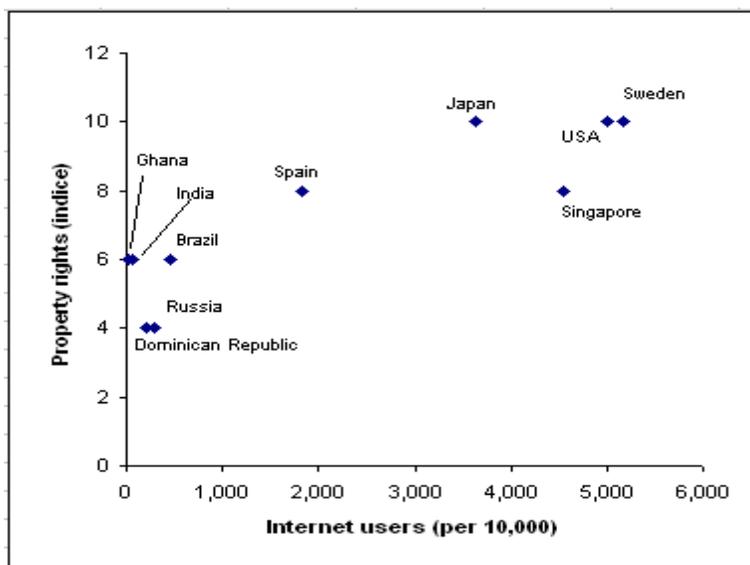


A closer look at the five industrial countries, however, shows that the variability within the access domain is explainable by contextual factors. With respect to capacity - namely social, economic, and political variables -- what appears significant in terms of capacities-in-place is less the usual variables pertaining to ‘level of development’ than variables related specifically to political conditions, namely political stability, government performance, and regulatory frameworks etc. In this connection, at least, politics matter and matter a lot.

<sup>6</sup> For specific comparisons of country profiles please see Appendix IV.

<sup>7</sup> For Internet Users observations are for 2001 and for GDP they are for 2000. See Appendix V.5 for full references.

**Figure 6**  
**Internet Users and Property Rights<sup>8</sup>**

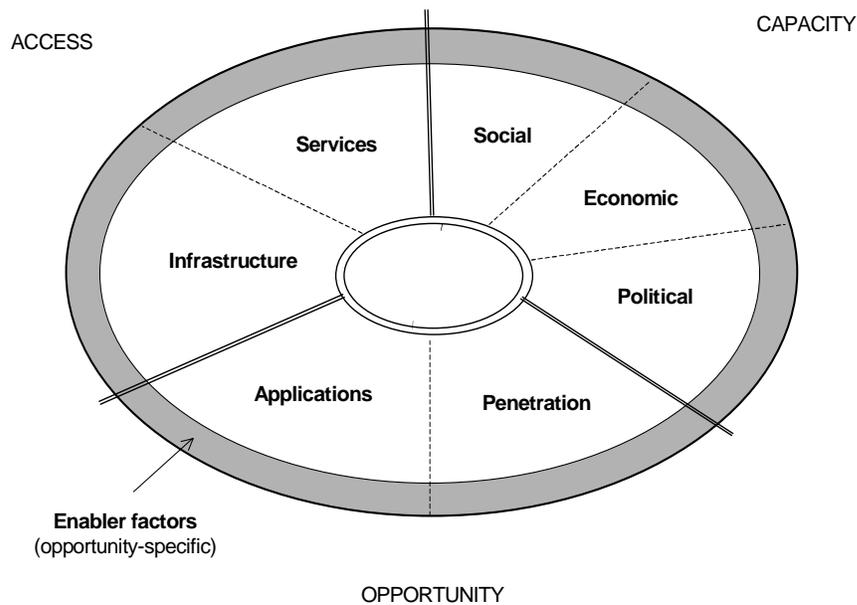


Despite the general congruence with underlying socio-economic indicators (as GNP per capita), it is the policy-related variables (as property rights) that provide added insights into the e-performance of industrial countries – rather than the usual socio-economic developmental variables per se. The comparisons above highlight in a simple way both variability and commonality across the ten cases.

Straightforward as these profiles and figures might be, they do provide some guides for next steps by pointing out the relative salience of key variables. To update our argument so far, we refer back to [Figure 1](#) which shows the overall framework (in a simplified way), [Table 2](#) which builds on the lessons of the 1st Generation studies, and to [Appendix III](#) that provides an alternative multidimensional view of the conceptual framework. Extending the overall argument, [Figure 7](#) below represents the profile view of access, capacity and opportunity conditions of e-Readiness. The surrounding set of *enablers* (i.e. supportive factors) integrates the variables pertaining to the sector where a particular e-Opportunity is considered. For example, for the banking sector, variables related to traditional banking practices will be located in the access and capacity clusters, while those pertaining to e-Banking will be in the opportunity clusters.

<sup>8</sup> For Internet Users observations are for 2001 and for Property Rights they are for 2000. See Appendix V.5 for full references.

**Figure 7**  
**e-Readiness Framework**



### 5.3 Pathways to e-Banking Opportunity

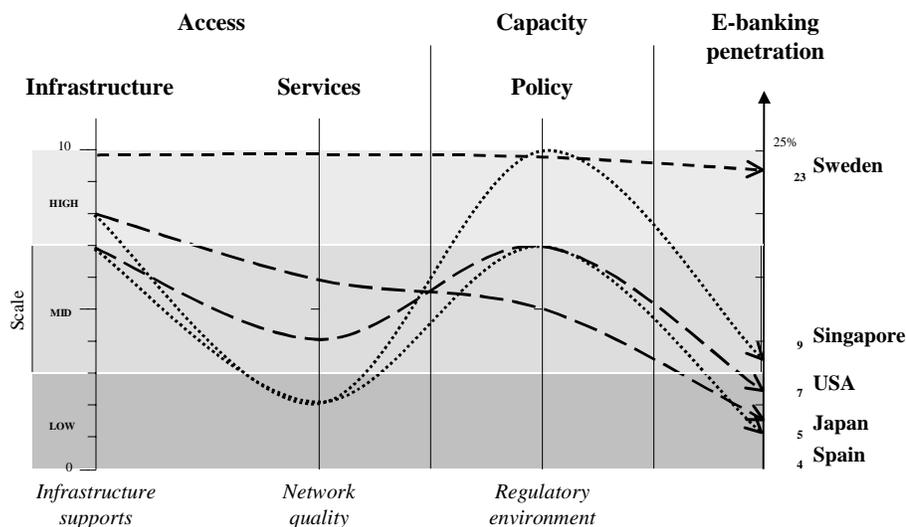
The next step is to address matters of pathways – in terms of pathways to penetration, on the one hand, and pathways to specific opportunity target, on the other. Based on this logic so far, we explored pathways to e-Banking for five industrial-country cases and the requisites in place that allowed for overall e-Banking penetration as a precursor to specific e-Banking applications. In other words, there must be a degree of penetration before it is possible to engage in specific forms of e-Banking.

Figure 8 below illustrates how overall e-Banking penetration is reached given levels of access and capacity<sup>9</sup>. This approach provided the basis for identifying relative influences of key factors and deriving pathways for purposes of comparisons<sup>10</sup>. The figure clearly shows the dominance of Sweden in e-Banking penetration relative to the other cases considered, gained through high levels in the respective areas of infrastructure, services and policy.

<sup>9</sup> We used a simple normalization approach consisting of scaled indicators rankings 1-10 for each variable for the five countries in order to emphasize variation of key indicators within and across the selected cases. The opportunity penetration (right axis) is shown as percent of the respective population.

<sup>10</sup> These comparisons are among the five countries only, since the intent is to highlight differences and similarities among them.

**Figure 8**  
**Pathways to e-Banking<sup>11</sup>**



If we consider that Ghana, one of the less developed in this group of ten states, had essentially no e-Banking applications at the time, one might ask how our pathways model could be of any use to understanding and developing Ghana's e-Readiness, and for addressing the specifics of *readiness for what?* At a minimum, the pathways approach should allow Ghana to explore various options towards increased e-Banking penetration – without having to necessarily replicating the pathways of other countries nor naively racing to “top-up” some assessment's set of indicators<sup>12</sup>. With structured probes into the conjunction of relevant access and capacity factors as well as critical enablers, Ghana may even be able to contemplate multiple pathways to e-Banking opportunities.

#### 5.4 Pathways to Specific e-Banking Activity

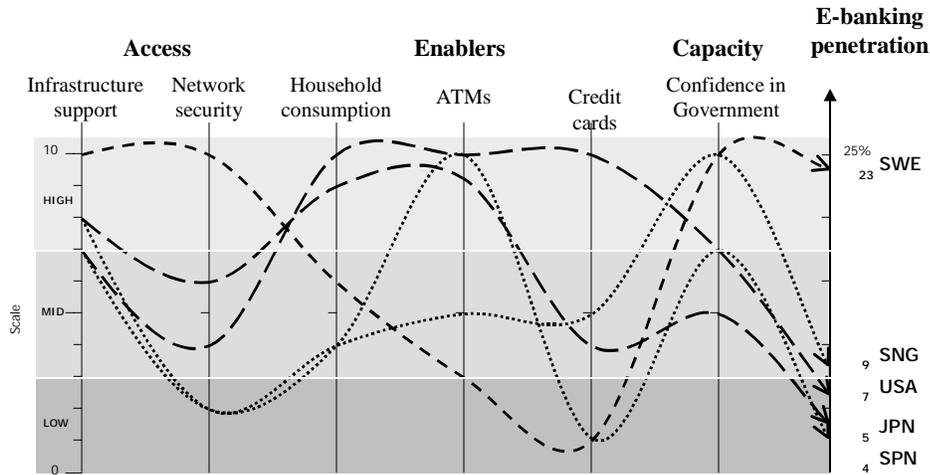
Extending these comparisons further, we probe into the application-specific pathways within e-Banking for each of the five industrial countries. Here we explore a somewhat different proposition, namely that, *if* access conditions *and* the necessary enablers (or requirements) are in place, *then* capacity factors make possible the pursuit of specific e-Banking applications. The logic here is that if access and capacity shape penetration of the *overall* opportunity across countries, then enabler (i.e. supportive) factors in individual countries shape the penetration of *particular* applications.

We considered five specific e-Banking activities: balance checking, funds transfer, bills payment, shares trading and financial services purchase. [Figure 9](#) shows the respective levels of enabler factors integrated in the original pathway diagram while [Figure 10](#) reveals some differences as well as commonalities in the particular uses of e-Banking.

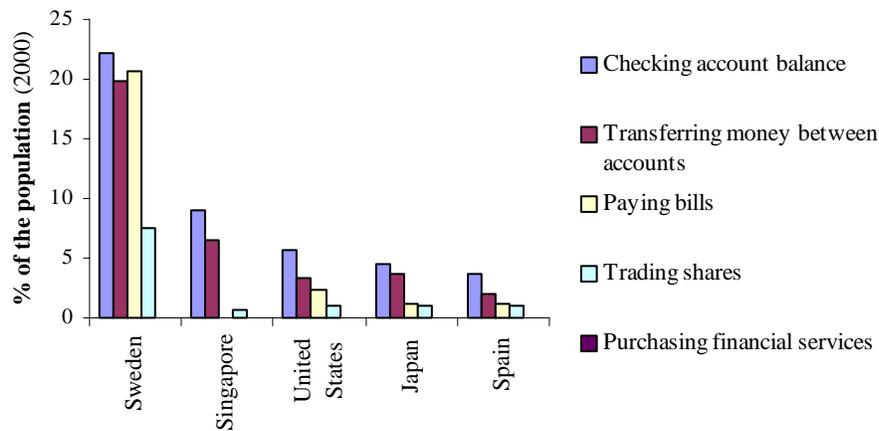
<sup>11</sup> Figures for Infrastructure supports are for 2001; Network security for 2000; Confidence in Government for 2000 and e-Banking penetration for 2000. See Appendix V.5.

<sup>12</sup> See the logic in footnote 5 above.

**Figure 9**  
**Pathways to e-Banking (2)**<sup>13</sup>



**Figure 10**  
**Penetration of e-Banking Activities per Country**



Regarding relative shares of own-applications, each country appears distinctive. Clearly, the lead country in all e-Banking applications is Sweden; and the dominant application across

<sup>13</sup> Figures for Infrastructure supports are for 2001; Network security for 2000; Confidence in Government for 2000; e-Banking penetration for 2000; Household consumption for 1998; ATMs for 1999 and Credit cards for 1999. See Appendix V.5.

countries is balance checking. But only for Sweden does the use of e-Banking for billing purposes exceed uses for transfer of funds. How are these differences accounted for?

In [Appendix IV](#) we present some ‘radar diagrams’ to profile the differences within and across the five countries and to point to the relative influence of key access and capacity factors on e-Banking overall and specific applications penetration. Closer analysis enabled us to specify these influences more precisely as for what factor(s) shape what application(s), the nature of influence (positive or negative) as well as their levels of impact. We also carried similar analysis for the uses of particular e-Banking terminals.

## 6. Next Steps

This research effort is a first step. It has built upon the first generation studies by transcending the earlier practices by explicitly rejecting the ‘one size fits all’ premise of earlier assessments. We developed conceptual, methodological, and empirical foundations for an alternative approach that could help frame the next generation of e-Readiness. Clearly, we need to test our approach in a wide range of issue-areas and different situations<sup>14</sup>.

Specifically, it is essential to expand country coverage and extend the entire data-model (i.e. fully populate the model covering all the key variables). An improved specification of the data model will involve greater conceptual consistency as well as more desegregation of units, levels, opportunities, etc. For this reason we find it important to extend further coverage of the elements within each of the domain conditions (see above) and then to introduce additional principles of differentiation.

This means that we have turned our attention to matters of *distributions* (referring to the specific population or market segments in question, such as rural vs. urban, etc.), and to *users* (referring to the relevant domain parameter within the distribution, for example, rural access), as well as to specific *enablers* (such as rural Internet access – for particular applications). In [Appendix III](#) we presented a view of a specification of the data model, which departs from the tree-structure shown above, and introduces significant dimensionality. Transcending matters of data and data model, key next steps include a focus on understanding the dynamic process essential to enabling IT applications and the alternative venues for so doing.

This is another way of saying that we must develop a more robust set of ‘rules’ and tools for coupling conditions, content, and context than we have done to date. At the more operational level, we need to explore how different types of organizations can focus their investments and expenditures to best reach penetration goals -- and/or choose among pathways, and/or consider multiple e-business opportunities -- and determine which is most likely to succeed given available pathways as well as existing access, capacity and opportunity specific requirements. Next steps should allow us to answer questions as: What are the best investments for reaching a certain level of e-opportunity? What are the alternate requirements for reaching a certain level of an opportunity? And so forth.

The foundations are now in place as we look to the development and specification of the next generation of e-Readiness assessments.

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<sup>14</sup> So far we explored some aspects of e-Health and of e-Procurement, introduced in Figure 3 earlier.

## LIST OF APPENDICES\*

### **I. 1<sup>st</sup> Generation Studies – Comparison Tables**

Compares the key 1<sup>st</sup> Generation e-Readiness studies in terms of characteristic features and central foci.

### **II. Select Variables**

Lists the specific components for each of the individual clusters within domains of Access and Capacity.

### **III. Alternative Data Model**

Proposes an alternative multidimensional view of the Data Model and its properties designed to retain internal consistency and further expand its utility.

### **IV. Profiles of e-Banking Opportunity**

Shows differences within and across countries and points to relative influence of key Access and Capacity factors on overall and specific applications penetration.

### **V. Comprehensive References**

Provides Bibliography and lists relevant Data Sources.

\*Appendices I, II, IV and V by Vincent Maugis and Appendix III by Farnaz Haghseta.

## APPENDICES

### I. FIRST GENERATION STUDIES – COMPARISON TABLES

This Appendix compares key 1<sup>st</sup> Generation e-Readiness studies in terms of characteristic features and central foci: Reports on assessment studies and tools, Statistical or questionnaire based ready-to-use tools and third party reports, Country case study models, Interview and survey based reports. See [Section 2](#).

#### 1. Reports on Assessment Studies and Tools

<i>Quantity assessed</i>					
Report	Author	Date	Description	Content	Tools
<b>Comparison of E-Readiness Assessment Models</b>	Bridges.org	2001	Describes existing e-readiness assessment models in 3 categories (ready-to-use tools and questionnaires, third party surveys and reports, Digital Divide reports and position papers). Draws comparison, carries analysis and provides recommendations.	Comparison: Topics covered and level of detail, Category focus, Assessment Methodology, Result of assessment; Analysis and recommendations: Definition of E-Readiness, User's/Tool's goal, Focus for assessment, Measurement issues, Towards a more comprehensive tool.	10+
<b>Who is Doing What and Where</b>	Bridges.org	2002	Looks at where e-readiness assessments have been carried out, and by whom. Emphasizes that significant duplication of effort has occurred in some countries, while others are devoid of useful data. Tables.	The 137 assessed countries are organized on a 7 regions basis. The models are separated into in-depth case studies and those that are based on a questionnaire or statistical assessment.	19

#### 2. Statistical or Questionnaire based Ready-to-use Tools and Third Party Reports

<i>Quantity assessed</i>					
Model	Author	Date	Description	Focus	Countries
<b>E-Commerce Readiness Assessment Guide</b>	Asian Pacific Economic Cooperation (APEC) Electronic Commerce Steering Group	2000	Gauges a country's readiness for e-commerce through a 6 categories, 100 multiple-choice questions detailed questionnaire. No overall scoring. Countries are recommended to work on areas with 'less than optimal answers'.	Basic infrastructure and technology, Access to necessary services, Level and type of use of the Internet, Promotion and facilitation activities, Skills and human resources, Positioning for the digital economy.	n/a

<b>Readiness for the Networked World</b>	Center for International Development (CID) at Harvard University and IBM		Rates communities along 4 progressive stages of development in 19 indices. Based on communities self-estimation. No prescription for improvement.	Access, Learning, Society, Economy, Policy.	19
<b>Cross National Analysis of Internet Development</b>	Crenshaw, E. M. and K. K. Robinson. Ohio State University Department of Sociology.	1999	Statistical metrics and hypothesized model of technology development state the probable relationships between 10 variables. Provides narrative explanation of how the factors are likely to shape technology development.	Level of technological development, political openness / democracy, mass education, presence of a sizable service sector, tele-density, foreign investments, ethnic homogeneity, sectoral inequality, population density, quantity of exports.	n/a
<b>Readiness Guide for Living in the Networked World</b>	Computer Systems Policy Project (CSPP)	1998	Rates communities along 4 progressive stages of development in 5 categories. Based on a 23 question questionnaire.	Infrastructure, Access, Applications and services, Economy, Enablers.	n/a
<b>E-Readiness Rankings</b>	The Economist Intelligence Unit and Pyramid Research	2002	Tallies scores across 6 categories, five of which include a total of 29 indicators. Combines business environment rankings (70 separate indicators) with connectivity scores. Brief explanation of the results and the changes since last ranking.	Connectivity and technology infrastructure (25%), Business environment (20%), Consumer and business adoption (20%), Social and cultural infrastructure (15%), Legal and policy environment (15%), Supporting e-services (5%)	60
<b>E-Readiness Rankings</b>	The Economist Intelligence Unit and Pyramid Research	2001	Tallies scores across 6 categories, five of which include a total of 29 indicators. Combines business environment rankings (70 separate indicators) with connectivity scores. Provides brief account of the results and changes since last ranking.	Connectivity (30%), Business environment (20%), E-commerce consumer and business adoption (20%), Legal and regulatory environment (15%), Supporting e-services (10%), Social and cultural infrastructure (5%).	60
<b>Global Diffusion of the Internet: Questionnaire</b>	The Mosaic Group	1998	Indicates stages of Internet growth and usage through combination of statistics, narrative description and comparison. Focuses on 6 Internet statistics.	Pervasiveness, Geographic dispersion, Sectoral absorption, Connectivity infrastructure, Organizational infrastructure, Sophistication of use.	n/a
<b>Global Technology Index</b>	Howard A. Rubin and MetricNet	2002	Qualitative and quantitative statistics on country's technological sophistication and strength using 25 indicators in 5 categories. Ranking graphs.	Knowledge jobs, Globalization, Economic dynamism and competition, Transformation to a digital economy, Technological innovation capacity.	49

<b>Information Society Index</b>	World Times / IDC	2002	Statistical ranking based on 23 indicators in 5 categories. Only the list of rankings.	Computer infrastructure, Internet infrastructure, Information infrastructure, Social infrastructure.	55
<b>Information Society Index</b>	World Times / IDC	2001	Statistical ranking based on 23 indicators in 5 categories. Only the list of rankings.	Computer infrastructure, Internet infrastructure, Information infrastructure, Social infrastructure.	55
<b>Knowledge Assessment Matrix</b>	World Bank		Online statistical assessment using 61 indicators in 5 categories. Default scorecards and optional measurements. Only values and graphs.	Performance, Economic Incentive and Institutional Regime, Education and Human Resources, Innovation system, Information Infrastructure.	100
<b>Risk E-Business: Seizing the Opportunity of Global E-Readiness</b>	McConnell International and World Information Technology and Services Alliance (WITSA)	2000	Rates countries in 5 categories on a scale of 1 to 3. Provides extensive analysis and recommendations.	Connectivity, E-leadership, Information Security, Human capital, E-Business climate, Public-private partnership.	53
<b>Ready? Net. Go! Partnerships Leading the Global Economy</b>	McConnell International and World Information Technology and Services Alliance (WITSA)	2001	Rates countries in five categories on a scale of 1 to 3. Provides extensive analysis and recommendations.	Connectivity, E-leadership, Information Security, Human capital, E-Business climate, Public-private partnership.	53

### 3. Country Case Study Models

					<i>Quantity assessed</i>
<b>Model</b>	<b>Author</b>	<b>Date</b>	<b>Description</b>	<b>Focus</b>	<b>Countries</b>
<b>E-Readiness and E-Needs Assessment</b>	Country Development Gateway Projects, World Bank Development Gateway	n/a	Basic country assessments with a modified version of CID's methodology. Carried by CDG local teams.	19 categories focusing on technology infrastructure, pervasiveness of technology, regulatory policy and business environment.	30+
<b>Global Diffusion of the Internet: Case Studies</b>	The Mosaic Group	1998	Indicates stages of Internet growth and usage through combination of statistics, narrative description and comparison. Focuses on 6 Internet statistics.	Pervasiveness, Geographic dispersion, Sectoral absorption, Connectivity infrastructure, Organizational infrastructure, Sophistication of use.	25

<b>Internet Country Case Studies</b>	International Telecommunications Union (ITU)	n/a	Detailed case studies of ICT in the target country. Includes statistical ranking based on Mosaic's methodology, and recommendations.	Background, Telecommunications, Internet, Applications	16
<b>Country ICT Surveys</b>	Swedish International Development Coordination Agency (SIDA)	2001	Detailed case studies focusing on the ICT sector through 5 main categories. Provides recommendations to improve ICT usage.	ICT policy process, Connectivity and access, Human resources, Structure of ICT sector and major users, Major areas for development opportunities.	4
<b>Information Communications Technology Country Assessment</b>	United States Agency for International Development (USAID)	n/a	Detailed case studies of countries using a 5 categories framework. Provides detailed action plans for countries to pursue in the future.	Pipes (access), Public sector (Government policies, e-government), Private sector (usage), People (training), Existing development programs.	4+

#### 4. Interview and Survey based Reports

*Quantity assessed*

<b>Model</b>	<b>Author</b>	<b>Date</b>	<b>Description</b>	<b>Focus</b>	<b>Countries</b>
<b>Negotiating the Net Model</b>	Center for International Development and Conflict Management (CIDCM) at the University of Maryland	2001	Based on interviews with key actors in a set of institutions. Describes the processes and outcomes of negotiations between key players over the phases of development, identifying major contentious issues likely to remain problematic in the future.	Background and history, Key players in Internet development, Internet development and ICT policy over time, Negotiation between players in developing the country's Internet.	n/a
<b>International Survey of E-Commerce</b>	World Information Technology and Services Alliance (WITSA)	2000	Report based on a survey to technology companies on their experience with e-barriers and asking for recommendations. Provides charts and narrative accounts of the answers. Only general conclusions, no country-by-country assessment.	How ready are world markets for electronic commerce? Economic factors, Regulatory environments.	n/a

## II. SELECT VARIABLES

Appendix II lists the specific components examined for the individual clusters within domains of Access (Infrastructure, Services) and Capacity (Social, Economic, Regulatory). See [Section 4](#) above.

### 1. ACCESS

#### 1.1 Infrastructure

Air passengers carried  
Airports  
Cable lines  
Internet hosts  
Internet Service Providers  
Internet usage  
Internet users  
Personal computers  
Ports & harbors  
Radios  
Railroads  
Roads (paved)  
Roads (total)  
Roads (unpaved)  
Standard Internet Access Lines  
Telephone lines  
Televisions  
Wireless lines

#### 1.2 Services

Average electricity cost, households  
Average electricity cost, industry  
Competition in ISPs  
Cost of local call  
Daily newspapers  
Electric consumption  
Electric production  
Government online services availability  
Internet service provider access charge  
Internet speed and access  
Laws relating to ICT use  
Secure servers  
Telephone services

### 2. CAPACITY

#### 2.1 Social

Contraceptive prevalence  
Flexibility of people to adapt to changes  
Highly skilled IT job market

Infant mortality rate  
Labor force  
Life Expectancy  
Life Expectancy (female)  
Life Expectancy (male)  
Literacy (15 and older)  
Literacy (female)  
Literacy (male)  
Maternal mortality  
National culture openness  
Number of business degrees awarded  
Number of engineering degrees awarded  
Population  
Population 15-64  
Population growth rate  
Population over 65  
Population under 14  
Poverty Index  
Scientists and engineers in R&D  
Secondary school enrollment  
Skilled labor force  
Technology assessment index  
Tertiary school enrollment  
Unemployment rate  
Urban Population

#### 2.2 Economic

ATM/cash dispensers  
B2B sales  
B2C sales  
Banking accounts  
Central banks  
Commercial banks  
Consumer price index  
Cost-of-living index  
Credit cards  
Exports-goods  
Exports-services  
Foreign Direct investment  
GDP  
GDP growth  
Household final consumption expenditure  
Human development index

Imports-goods  
Imports-services  
Inflation rate  
Other banks  
Personal income tax rate  
Real Interest rate  
Soundness of banks  
Stock market capitalization  
Total exports  
Total imports

### **2.3 Policy**

Adequate regulation and supervision of  
financial institutions  
Administrative burden for startups  
Business regulation

Conflicts  
Control of government corruption  
Entrepreneurship among managers  
Government effectiveness  
Intellectual property protection  
Migration rate  
Patent applications granted by USPTO  
Patent applications, residents  
Political stability  
Press freedom  
Property rights  
Protection of property rights  
R&D expenditures  
Regulatory framework  
Rule of law  
Tariff & non-tariff barriers

### III. AN ALTERNATIVE DATA MODEL (ADM)

The tree structure of the e-Readiness data model shown in Section 4 above is instructive in its coverage, but somewhat misleading in terms of under-representing the importance of dimensionality, distributions, nestedness, and potentials for wide range of applications. The tree-structure shows “what” but not “why”. However useful as a heuristic device, for more instructive and operational inquiry, the model-view is unduly limiting and may constrain our understanding of possibilities as well as opportunities.

This Appendix proposes an alternative view of the data model and its properties designed to retain internal consistency but further expand its utility by specifying five design rules, namely, to (1) provide a *system framework*, (2) define *domain* representation, (3) incorporate *distributional* features (4), enable focused *applications* and (5) identify critical *requisites*.

#### 1. SYSTEM FRAMEWORK

##### 1.1 Overview

The proposed framework adopts a system-wide view, which enables analysis of, or attention to, specific attributes features of actors, investors, governments etc., as well as international or system-wide developments. The latter include, for example, the strategies of international institutions in support of economic development, investments in IT and related sectors, or businesses, as well as evolving concern with matters of sustainable development and sustainability – of economies, regions, societies, firms, or businesses. We propose a nested and hierarchical framework characterized by rule-driven criteria for linkages across and within levels.

##### Model Features

The Model proposes nested, hierarchical features, which span from general attributes to specific features. It is constructed with four key elements of e-Readiness, namely Domains (e.g. access), Distributions (e.g. rural), Applications (e.g. rural access) and Requisites (e.g. rural Internet access). It also allows for coherent linkage across constituent elements (adapted from GSSD<sup>15</sup>).

##### 1.2 Data-Model Structure

Given the nested system, the model structure for representing substantive domain-attributes consists of four key elements (noted above), namely (1) domain focus; (2) distributional aspects of relevance; (3) specific application envisaged; and (4) the requisites that must be in place for an opportunity-driven application. This structure enables user-driven granularity in response to opportunities at hand, or other driving factors. Nestedness assures some degree of conceptual coherence required at the implementation level.

##### Dimensionality

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<sup>15</sup> Global System for Sustainable Development - <http://gssd.mit.edu/>

These 4 dimensions are represented in a hierarchical structure that lies on slices, rings, cells, and concepts. The mapping of this structure to the elements is as follows:

- Domains: Slices
- Distributions: Rings
- Applications: Cells
- Requisites: Concepts

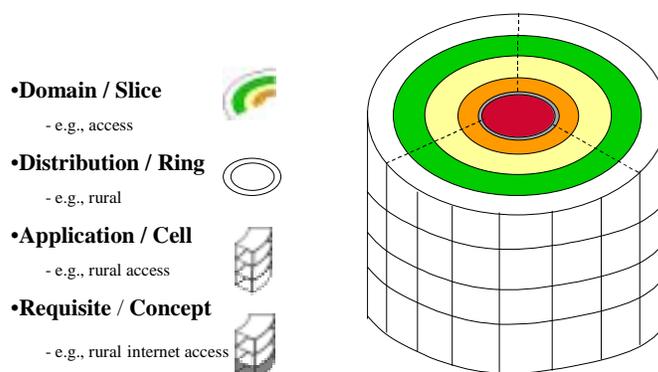
An overall view of this architecture, with the elements shown in increasing granularity, shows:  
Slices → Rings → Cells → Concepts

### 1.3 Visual Representation

For example, a user interested in a specific set of *requisites*, such as rural Internet access, responds to a particular *application*, i.e. rural access; as well as *distributional* factors, in this case, the rural location. These features are all embedded within, or nested in, a particular *domain*, which in this case is, specifically, access.

This hierarchical framework can then be used as a guide for domain representation, namely tracking e-Readiness features in any particular opportunity-driven investment (or activity). It also helps localize potential obstacles or enablers.

#### e-Readiness Framework



## 2. DOMAIN REPRESENTATION

The *domain structure* features provide a view of the e-Readiness mode in the most aggregate or inclusive terms; i.e. this refers to what we need to know about e-Readiness in any particular case in order to make a choice among potential investment opportunities. Conceptually we differentiate among (a) infrastructure-related factors shaping overall *access* measures, (b) performance or *capacity* related measures, in terms of (c) specific *opportunity* application.

### 2.1 Measurements

Since the goal is to provide useful and operational measures of e-Readiness – taking into account earlier efforts and related literatures – the data model must capture attribute elements (including

enablers and obstacles) shaping type and extent of Internet access; but it must also be specifically cognizant of prevailing capabilities on the ground. These are usually shaped (and constrained) by socio-economic features, as well as by the policy and regulatory frameworks in place. Jointly, access and capacity variables generally capture the ‘demand’ side, while the prevailing opportunity set (and the specifically opportunity in question) is essentially the ‘supply’ side. Extending this idiom, the task is to ‘match’ the ‘demand’ with the ‘supply’.

### **Measuring Key Domains of e-Readiness**

1. Access
  - (a) Infrastructure
  - (b) Services
2. Capacity
  - (a) Social factors
  - (b) Economic factors
  - (c) Policy factors
3. Opportunities
  - (a) Opportunity penetration
  - (b) Specific application

#### **2.2 Access, Capacity, Opportunity**

Effective access to e-networks requires an infrastructure system congruent with current conditions, coupled with reliability in all supporting services. And both sets of access conditions must be as stable, at least to some acceptable degree. Factors affecting actual e-Readiness performance are largely socially constructed including norms, values, education, training, modes of economic activity, regulatory frameworks -- all intertwined to generate overall operational capabilities for e-Readiness for a given opportunity (as illustrated in the case example in section 6 below).

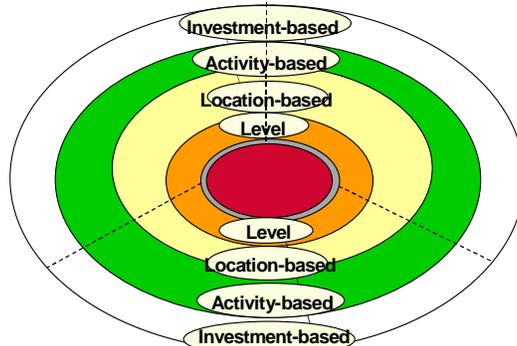
### **3. DISTRIBUTION FEATURES**

This feature of the data model allows for *specific* focus on a particular special, functional, or activity application.

#### **Distribution Criteria**

Consistent with the nested system structure, the data model uses four distributional factors as the prime criteria of differentiation: *Organization* Level (e.g., local, regional, national), *Location-based* Level (e.g., rural, urban), *Activity-focus* Level (e.g., residential, educational, commercial, governmental, health) and *Investment-based* Level (e.g., business sector).

## Distributional Groups (Rings)



### 4. APPLICATION SPACE

The application criteria are distinctive in focusing user-attention to a particular locus of measure within the overall data model. This locus is at the intersection of domains (i.e. access, capacity, opportunity) and distributions (level, location, activity, investment). It enables the user to focus on a particular segment of the domain space in the context of a particular distribution factor.

#### Application

At this level, the model serves as a ‘map’ to provide the most specific context that is of concern in an e-Readiness inquiry. The presumption (as embedded in the data model) is that all other measurements required are available (and consulted) and that the specific target space is identified and is the subject of measurement at this point. And this then leads to the most targeted measurement. needs for the most targeted, namely the critical, requisites.

#### Applications (Cells)

Cells are intersection of Slices and Rings. They enable to examine an e-Readiness domain from a distributional perspective. For example: Access (slice) + Rural (ring) = Rural Access (cell).

### 5. CRITICAL REQUISITES

At this point we show how e-Readiness is measured for a particular *application*, in a specific domain, at a targeted *location*, with respect to some specific type of *value-driven opportunity*. In the context of the nested system, this is as close to ‘the ground’ as feasible here. It points to the most granular view required, and the most detailed (micro) level of aggregation.

#### Requisites

Measures of requisite factors are the most focused metrics required for guiding choice or decision in any particular case or for any opportunity. At this level of granularity, all data-based

measures that are needed have already been compiled and assessed. What remains to be done now is to obtain measures for the requisite conditions necessary and sufficient for making a decision about a particular investment or action-opportunity.

### **Requisites (Concepts)**

Concepts are a subset of Cells. They are requisites of e-Readiness, for example measures of, or for, a particular application, e.g. Rural Access, such as telephone, internet, hardware, local content, etc.

So far, we have presented a system-wide nested, hierarchical data-model – as an alternative to the tree-structure in the main body of the paper. Consistent with earlier discussion, we now illustrate the nested-data model with a case where the specific opportunity in question is identified to be one of e-Banking. This example shows how the data model can be mapped on to e-Banking as a value-driven opportunity. In this case, of course, that specific opportunity emerges as the result of the model application. However, if we postulate given such an opportunity we can inquire as to the extent of e-Readiness for a particular economy, society, country, etc.

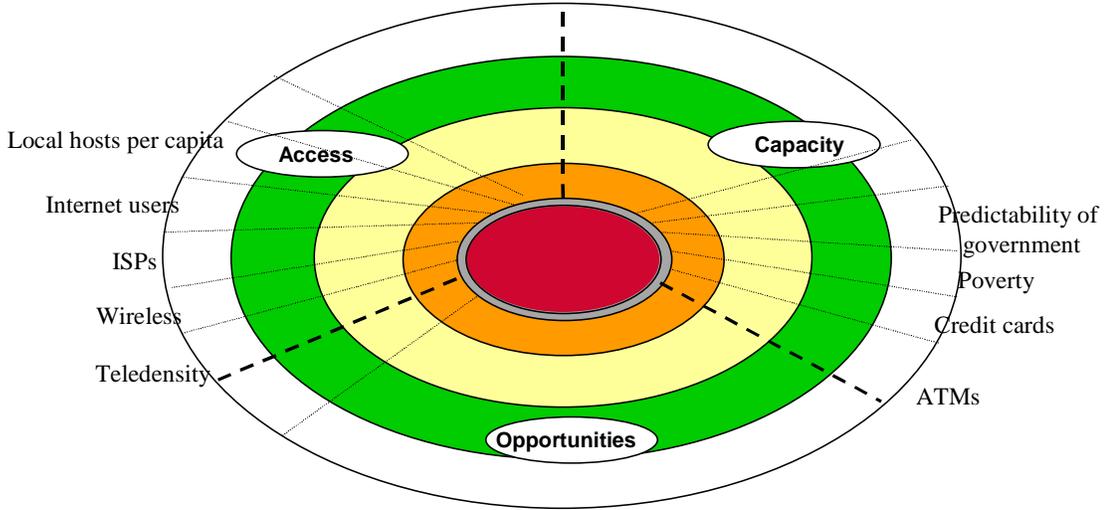
## **6. DATA-MODEL FOR AN E-BANKING CASE**

Recognizing that e-Banking is a relatively novel financial activity in industrial countries – with considerable variations in degrees of effectiveness and efficiency, this case is useful in helping us ‘walk through’ the data model for a systematic evaluation. We begin with the domain level, the vary basics that must be in place for any e-Activity to be considered. Then we show the linkage-connectivity from domain-measures to the most granular measures at the most operational level of an investment opportunity. The logic-sequence is represented below:

# 1. e-Banking Example

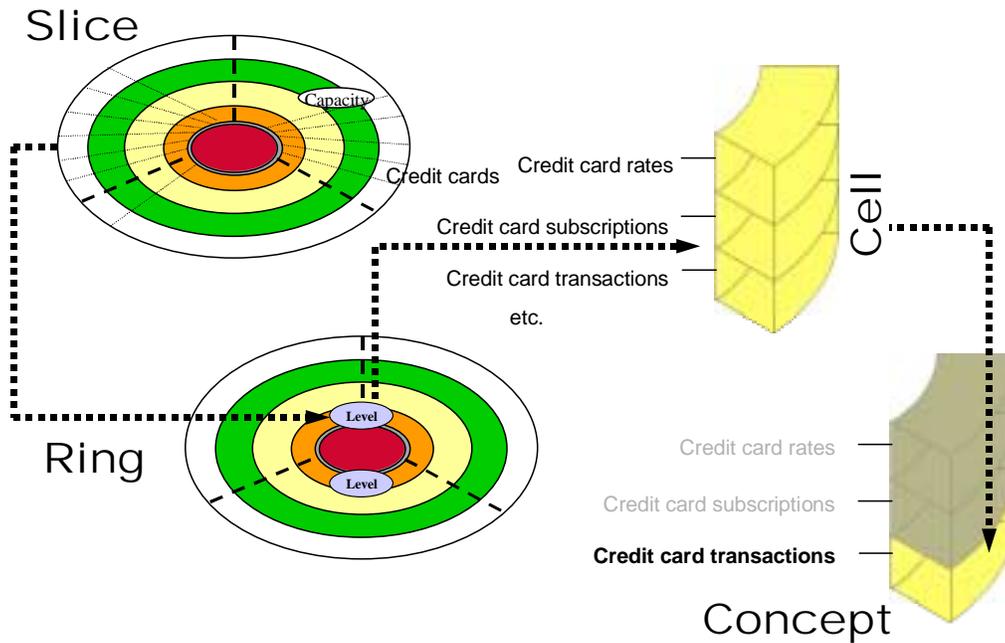
Relevant Domains (slices)

- These are the domains (slices) that apply to e-Banking.



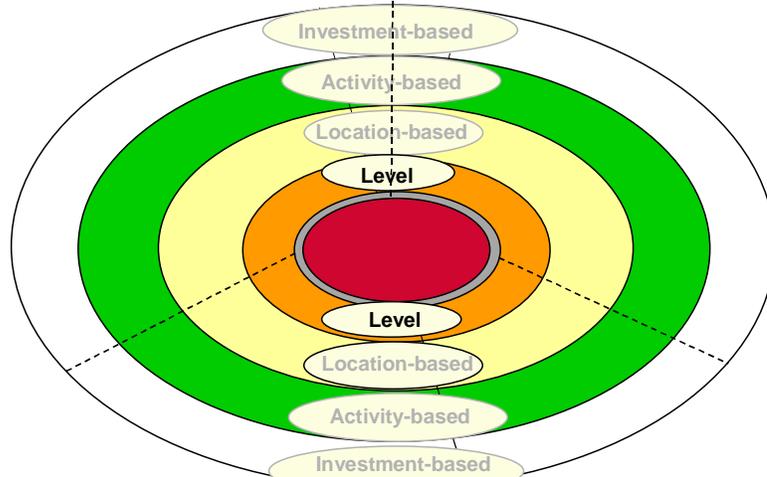
# 2. e-Banking Example

Summary



### 3. e-Banking Example

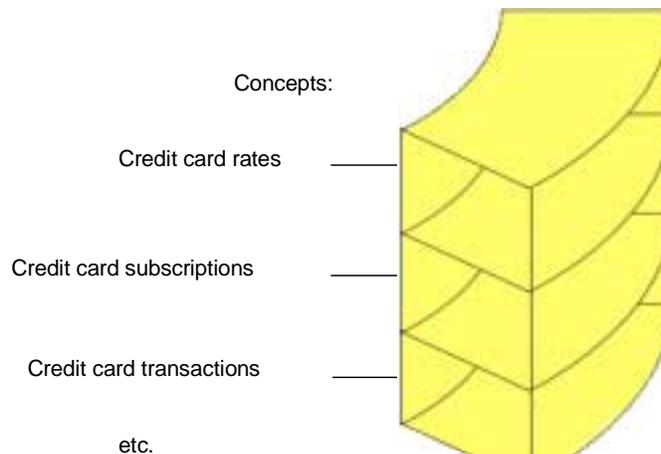
- Each domain (slice) has an applicable distributional level (ring). For example, we might want to look at **credit card usage** on a **national level** (the entire country or countries).



### 4. e-Banking Example

National Credit Card Usage (Cell)

- The cell contains all information relevant to **national credit card usage**.



This example traces the data model logic of e-Readiness for one particular investment opportunity. In the above, we do not illustrate a comparative assessment (across investors, investments, etc.) or changes over time or examination of alternative contingencies, i.e. “what would happen if...?”. We point only to the essentials of the data model. The real test of effectiveness is an applied one, by subjecting the model to the empirical test(s). Meanwhile, we

can formulate a set of propositions (essentially hypotheses) about what we expect to be the value-added of this alternative data model strategy.

## **7. GAINS FROM ALTERNATIVE DATA-MODEL**

What are the advantages of the proposed data model? What are the value-added gains? These queries imply locating sources of value added, as well as showing locus of operational benefits.

### **7.1 Sources of Value Added**

Potentials for value added of the alternative data model accrue from two sources, namely, those that are more generic in nature, and those that are relevant to specific types of applications. Since replicability is critical to systematic inquiry, a transparent methodology facilitates replication. Consistency in data model structure is, clearly, an essential prerequisite for consistency in data collection methods. In general, the alternative provides greater flexibility in configuration coupled with a more integration across its features. By enabling greater consistency in measurement (across all elements of relevance) there is more system-wide coherence. The architecture is more transparent in its features, individually and collectively, and this transparency facilitates analysis and assessments of multiple pathways. Moreover the methodology and ‘rules of operation’ are more explicit. Variables are factored in explicitly and transparently. This reduces ways in which variables are factored in specified and this reduces the risk of ad hoc implementation. This means that there can be greater overall system coherence and consistency coupled with more flexible ways of exploring and illustrating the ‘pathways’.

### **7.2 Increasing the Utility of Case Studies**

Much of the first generation literature on e-Readiness has been sweeping in nature and aggregated in its inference-base. We do have information about general ‘indices’ or general results from evaluation and assessment studies. But this practice makes it more difficult to move from generalities to specifics, or from broad trends to case-specific inferences or hypotheses. This practice also reinforces the usual difficulties or impediments associated with cross-case or cross-country learning. In sum, systematic measures are necessary for effective comparisons; and comparisons are essential for improved understanding of e-Readiness conditions.

Mapping out the chosen paths for a set of case studies will allow us to examine why certain paths were chosen over other alternatives in different cases, and to apply our findings to a pathway model that can be applied to new e-Readiness assessments. For example: What e-Readiness path has Japan followed to support e-banking opportunities? What alternative paths could it have been pursued to reach the same ends? What does this tell us about e-banking requirements for other countries?

### **7.3 Next Research Tasks**

The conclusion of the main paper ([Section 6](#)) noted some next steps in our research initiatives. Here we point to three specific tasks that are particularly relevant to the alternative data model. First, is to explore potential application of aggregation technologies to e-Readiness domains. This in itself will increase flexibility of use since it to provide flexible, integrated

approach bypasses need for e-Readiness data compilation and maximizes user-relevant data-retrieval. Second, is to provide operational foundations for web-based e-Readiness assessment tools in order to help guide decision and policy, and to anticipate e-Readiness implications of changes in access and capacity conditions. And third, is to provide possibly a practical example of potential gains from deploying joint COIN<sup>16</sup> -GSSD capabilities<sup>17</sup>. New tools are needed for improving measurement and tracking, for enhancing the overall coherence of e-Readiness systems and structures, and for providing some degree of 'predictive' utility in this domain.

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<sup>16</sup> Context Interchange - <http://context.mit.edu/~coin/>

<sup>17</sup> Laboratory for Information Globalization and Harmonization Technologies - <http://ebusiness.mit.edu/research/papers/142Madnick,%20Harmonization.pdf>

#### IV. PROFILES OF E-BANKING OPPORTUNITIES

The following ‘radar diagrams’ are to be viewed as Profiles that reveal differences within and across countries across a set of key e-Readiness variables and highlight the relative influence of key access and capacity factors on e-Banking outcomes (with respect to overall and specific applications or activities). They can be considered as illustrative Profiles. Together with the Pathways graphs presented in [Section 5](#), they help to identify country-specific challenges as well as problems and opportunities thus clarifying where it might need to develop policy strategies and/or concentrate future investments.

To graphically illustrate and facilitate comparisons<sup>18</sup> the variables used for building the profiles are normalized on a scale of zero to 10 (lowest zero - diagram center, and highest 10). The opportunity outcomes are shown as percent of the respective population<sup>19</sup>.

- [Profile 1](#) represents the Access and Capacity clusters of the e-Readiness Framework and the Opportunity overall penetration. This profile attempts to capture the essence of a country’s performance in (or preparedness for) the particular opportunity considered. See: 5.3 Pathways to e-Banking Opportunity.
- [Profile 2](#) represents two clusters of the e-Readiness Framework (Access, Capacity) and the Opportunity overall penetration, along with the Enabler (i.e. supportive) factors. See: 5.4 Pathways to Specific e-Banking Activity.
- [Profile 3](#) represents the Opportunity dimension of the e-Readiness Framework (overall and specific applications penetration). See: 5.4 Pathways to Specific e-Banking Activity.
- [Profile 4](#) represents the two clusters of the Opportunity domain along with the Enabler factors. See: 5.4 Pathways to Specific e-Banking Activity.

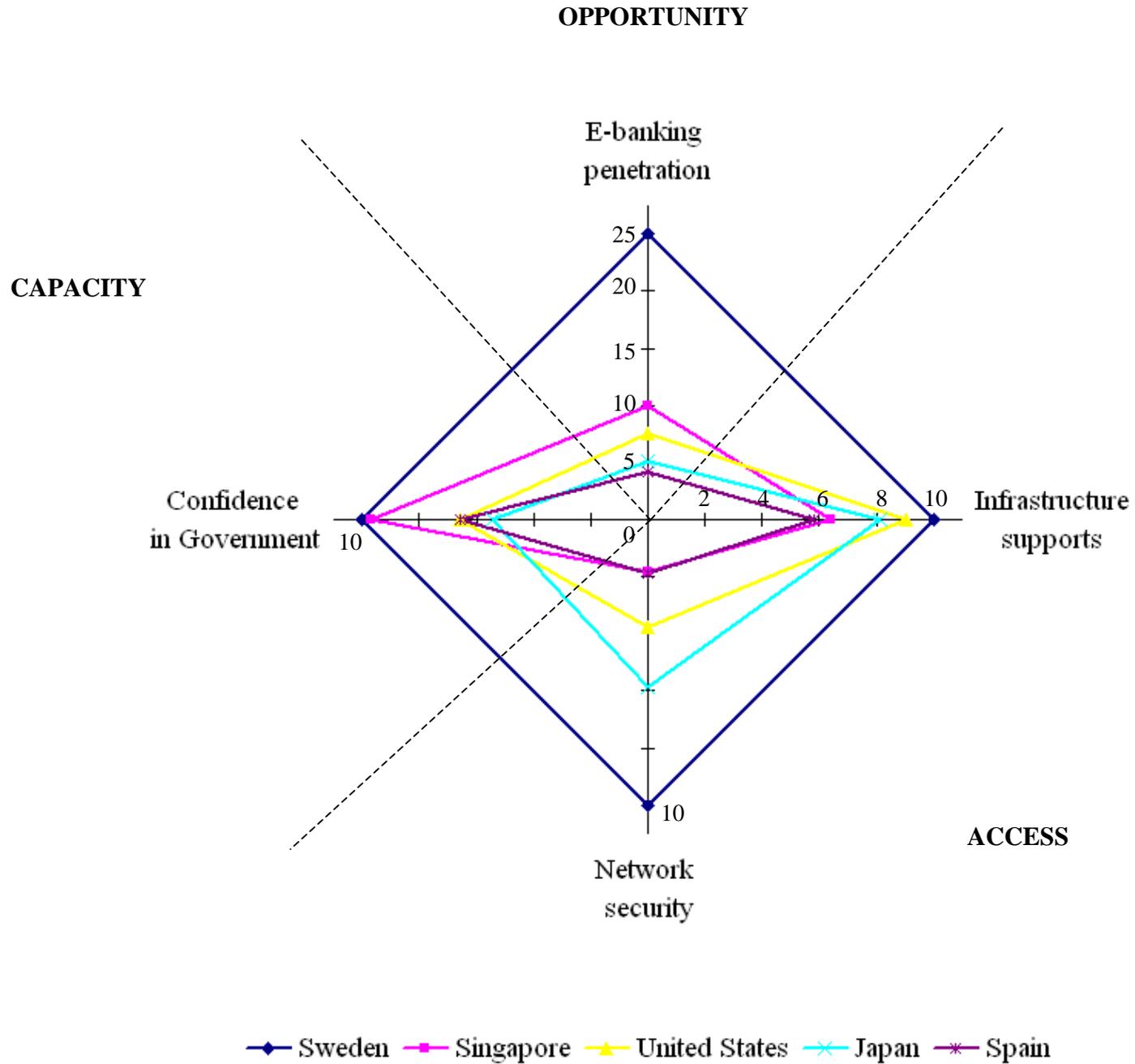
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<sup>18</sup> The ‘radar method’ of data display for comparative purposes is commonly used in policy contexts, nationally and internationally. In research circles, however, it is less frequent.

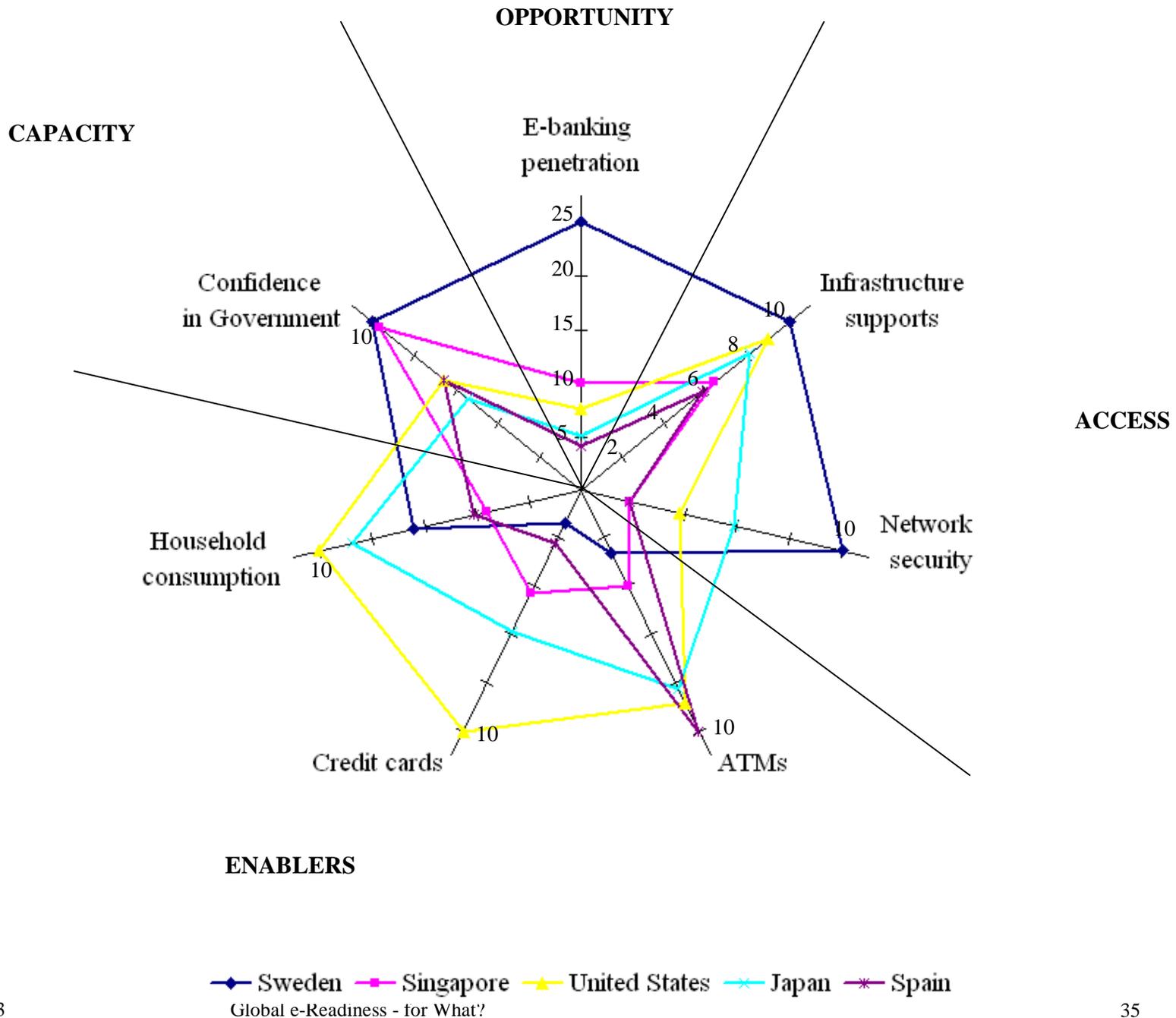
<sup>19</sup> Figures for Infrastructure supports are for 2001; Network security for 2000; Confidence in Government for 2000; e-Banking penetration (overall and specific applications) for 2000; Household consumption for 1998; ATMs for 1999 and Credit cards for 1999. See Appendix V.5.

# 1. OPPORTUNITY PENETRATION, KEY ACCESS & CAPACITY INDICATORS

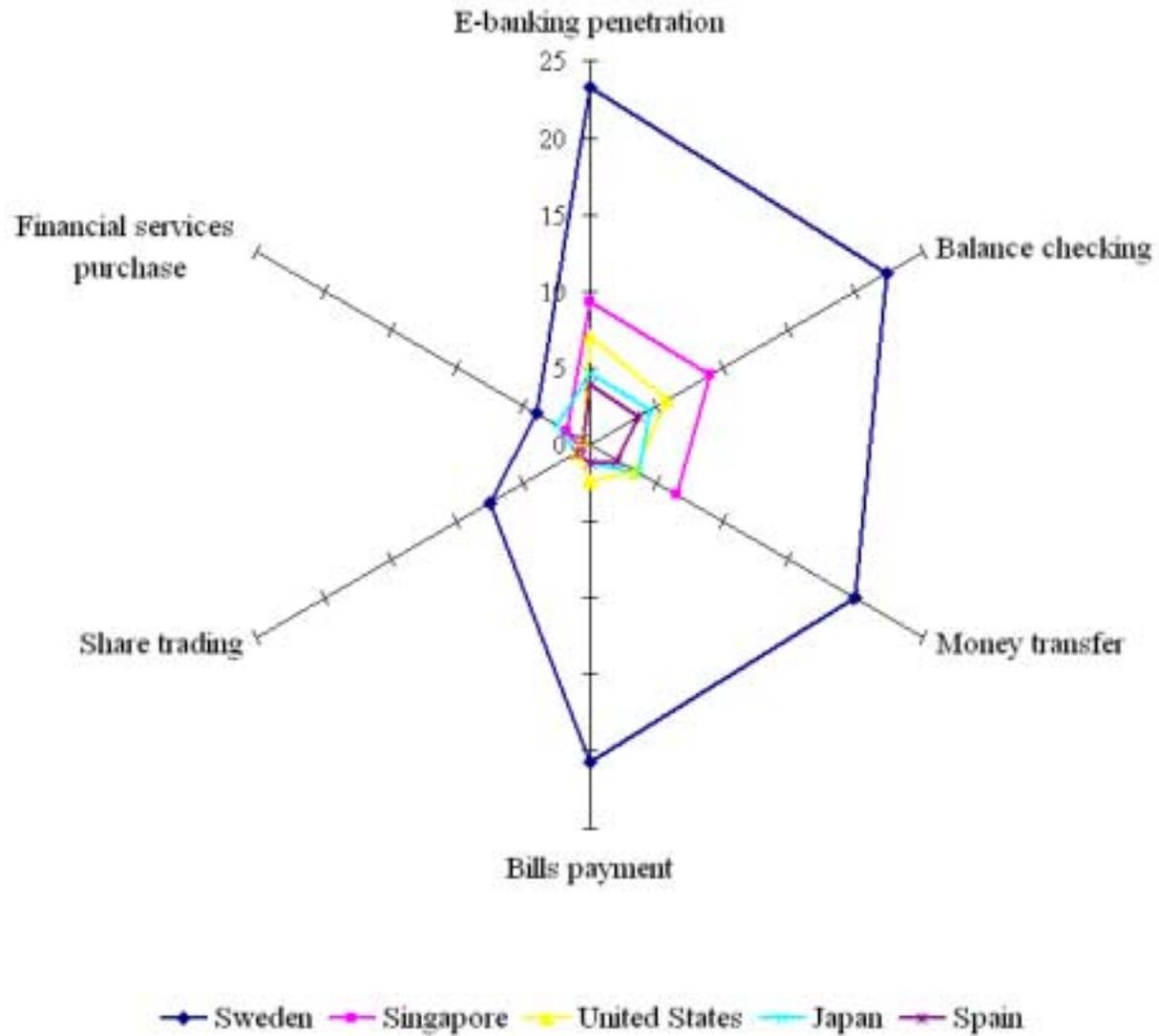
(Penetration in % of respective Population, Indicators scaled 1-10)



**2. OPPORTUNITY PENETRATION, KEY ACCESS & CAPACITY INDICATORS, ENABLERS**  
(Penetration in % of respective Population, Indicators scaled 1-10)

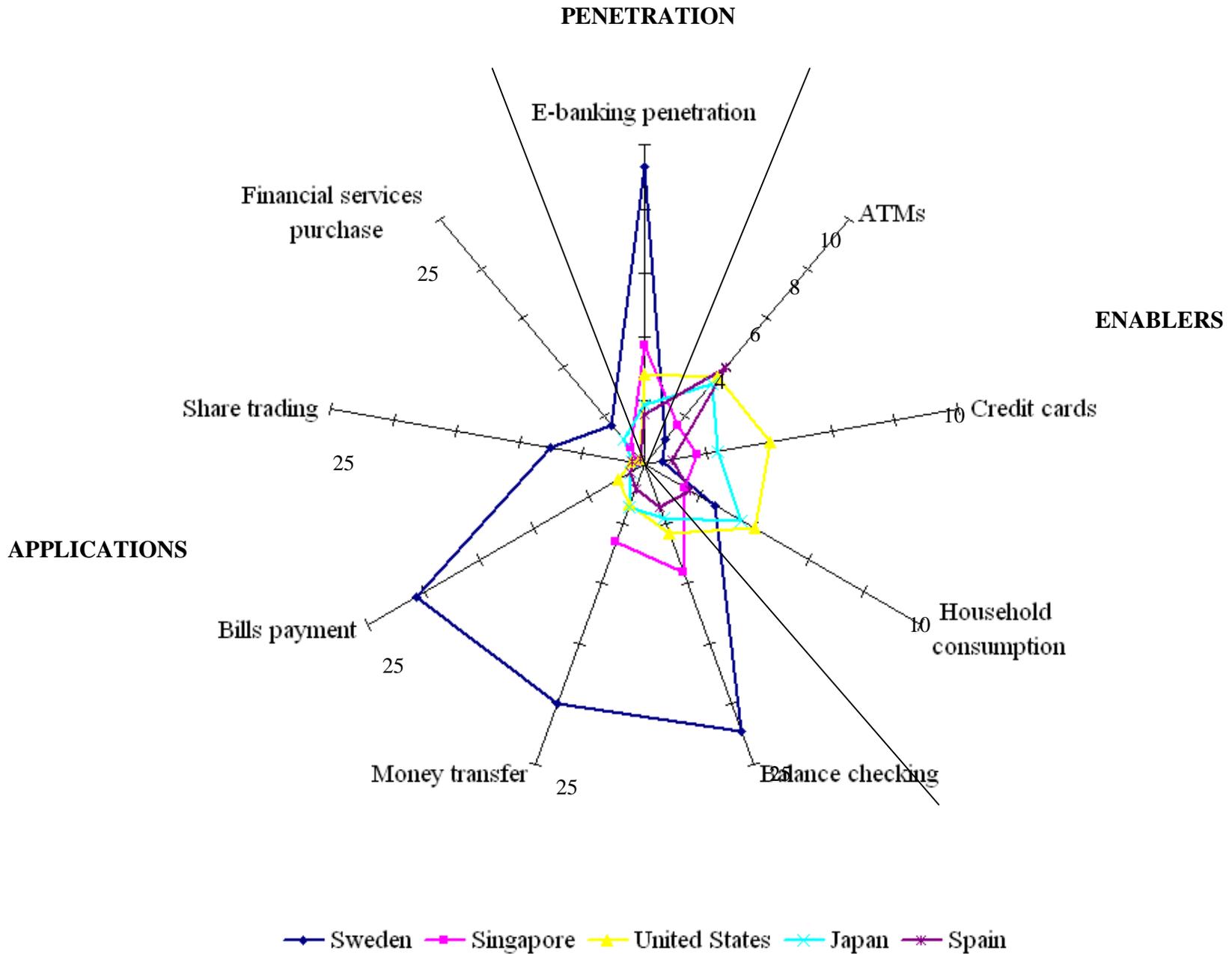


**3. OPPORTUNITY OUTCOMES: OVERALL & SPECIFIC APPLICATIONS PENETRATION**  
 (% of respective Population)



#### 4. OPPORTUNITY OUTCOMES & ENABLERS

(Outcomes in % of respective Population, Enabler factors scaled 1-10)



## **V. KEY REFERENCES**

This Appendix presents an extended bibliography on Global E-Business. The entries are organized into six categories, namely E-Readiness, Global E-Commerce & Digital Divide, Country Case Studies, Indicators for E-Commerce Measurement, E-Banking and relevant Data Sources.

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World Bank Global Development Network Growth Database

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