

Digital Strategies for Developing Countries

Roberto Sasso
President
Technology Research Club, Costa Rica

Abstract

From a definition of Digital Wealth, it is argued that Digital Technologies are both an opportunity and a threat to developing countries. It is shown how Digital Technologies present developing countries with the opportunity to rapidly grow productivity and thus create the basis for sustained development. Digital Divides, between and within developing countries can grow very quickly in countries that fail to create healthy digital ecosystems. A framework for putting together a national digital strategy is presented, along with prioritisation scheme to help choose amongst the many initiatives that are usually put forward. Practical considerations for the implementation of the strategy are drawn from experience in both private sector and the public sector in developed countries. Further research is required to firm up knowledge on how developing countries can adapt, foreign knowledge, to their own economic, political and technological reality.

Contents

1	DIGITAL WEALTH	2
2	DIGITAL DIVIDES	4
3	DIGITAL ECOSYSTEMS	5
4	NATIONAL DIGITAL STRATEGIES	6
4.1	A framework for digital strategies	7
4.1.1	Components of the Strategy	8
4.1.2	Prioritisation of strategic initiatives	9
4.1.3	Prioritisation exceptions	10
4.2	Implementation considerations	11
4.2.1	Governance	11
4.2.2	Standards	12
4.2.3	Applied research	12
5	FURTHER RESEARCH	12
6	REFERENCES	13

1 Digital Wealth

Wealth created by the production or use of digital technology is considered digital wealth. Digital technology is comprised of all hardware, software and services utilized to store, process and transmit data in digital form.

A significant portion of developed nations' GDP is made up of digital goods and services. The global IT industry alone accounts for several trillion US dollars a year, the telecommunications industry is at least as large, if not larger.

In recent years a few developing nations have started to produce a significant amount of digital goods, mostly software in India and China. Hardware is also being manufactured in some Asian countries, mostly under contract to Western companies who provide design and specifications and thus retain the intellectual property.

But the whole IT and telecommunications industries together represent but a fraction of digital wealth herein defined. The intelligent deployment of digital technology can, and should, produce many times more wealth than its cost. It is, however also true that unwise (and many times, corrupt) deployment of technology can have a very large cost indeed, for not only are the resources invested not recovered, but huge opportunity costs are also incurred. In these times of rapid and constant change, opportunities not taken can soon become liabilities; for increased productivity that is not achieved will seriously undermine a nation's competitiveness.

Profitable deployment of digital technology requires more than acquiring the technology. In 1997 Strassmann^[1] showed that, in the US, there was no correlation whatsoever between the level of IT investment and investor returns. To take full advantage of these technologies, organizations require management skills that are in short supply even in developed economies. If the return on technology investment is negative, then the deployment of technology is, in the case of developing countries, squandering resources and forfeiting wealth creation opportunities.

The knowledge and skills required to manage the deployment of Information and Communications Technologies (ICT) in such a way as to create wealth (add value to the economy) have been greatly enhanced over the last 13 years. Standards like ITIL and COBIT have emerged to help managers ensure an orderly and well directed deployment of technology. Enterprise Architecture has emerged as a discipline that, although not simple, ensures alignment between the technology investments and the organization's strategic objectives. The Clinger Cohen Act, passed by US Congress makes it mandatory for all Government agencies to develop such architecture. Furthermore, standards setting bodies, like OMG, have developed standards that guarantee vendor independence and future-proofing of technology investments.

Terms and abstractions related to software architecture are particularly relevant to the profitable deployment of digital technology. They form the basis for enterprise agility, which is crucial to survival and growth in today's economy. Yet, software architecture, in spite of its strategic relevance, is poorly understood in corporate boardrooms around the world, even more so in developing countries.

As organizations grow in complexity, the need for seamlessly integrated business processes supported by user-friendly software grows more than proportionally, yet the technicians required to construct and maintain this type of software infrastructure are few and far between, especially in developing countries.

So still today, most organizations in developing countries run software that is not compliant to modelling standards, which is not well integrated in seamless business processes and thus fails to produce a positive return on technology investments. It is clear that investments in technology that do not return more than they cost, are a drain on national economies that can ill afford it. Failing to invest in digital technology, on the other hand will surely condemn a developing economy to remain undeveloped. In today's global economy it is quite impossible to compete without the information provided by global connectivity and efficient processes that can only be achieved through automation. Cheap labour can never compete with lean, efficient, automated processes.

Even agricultural processes require the benefits of automation and connectivity to be able to compete in today's economy. Farmers that go about their business in total ignorance of the world markets constant, and sometimes, radical shifts, are doomed. Poorly educated people who work the land without professional advice about what to produce and how to look after it in a sustainable way are at a serious disadvantage. This type of professional advice can only be efficiently delivered on a wide scale through extensive, and intelligent, deployment of digital technologies.

Unscrupulous vendors have been caught before today selling outdated proprietary technologies to third world countries, using corrupt practices. This is the worst form of technology deployment, for it not only does it not produce a return on investment but it takes up large amounts of senior management time, effort and attention, in projects that are doomed from the outset. Time thus wasted can never be recovered.

Developing economies will not grow their GDP three to ten fold (to become developed) by working three to ten times harder or longer. Nor will farming three to ten times more land, or building factories three to ten times larger, achieve the required growth. Development will only come with a substantial increase in productivity. It has been shown that 87.5% of the world's increase in productivity between 1980 and 2005 came from the deployment of technology and only 12.5% came from the increase in the scale of production. Economic development will come from making workers three to ten times more productive. Large-scale increases in productivity come from education and technology. Increasingly the world's GDP is more dependent on services and less dependant on manufacturing and agriculture. As Juan Enriquez^[2] puts it, "countries that insist in producing things you can see and touch, will become poorer every day". In the

last 50 years global production went from being roughly a third each: agriculture, manufacturing and services, to being more than two thirds services and agriculture accounting for less than 4% of global GDP.

Countries like Ireland, Israel and Singapore have shown how it's possible to develop an economy quickly based on education and technology. They have managed to drastically increase the productivity of their population through the intelligent use of technology. Some say, these small countries were, in fact, helped by the lack of natural resources they can dig out of the ground to sell, as countries that have such resources can be easily distracted away from education and technology.

2 Digital divides

With the breakneck speed of technology development (Kurzweil[\[3\]](#) assures its double exponential speed) differences between have and have-nots is growing at a similar pace. The term Digital Divide has been mostly used to describe the difference between countries who, have and adopt digital technology, and those who don't. But the term applies equally within countries, especially within developing nations.

In most developing countries there is a small population that is as digitalized as the best in the West, and a vast population very much void of any access to digital technology. The digital divide between the wealthy and the poor, of course, tends to exacerbate the situation, as the wealthy become more productive and the poor fall further behind. But there are other digital divides as, if not more, worrisome than this.

There is a clear digital divide between the rural and the urban areas in most developing countries, which is quite ironic given that one of digital technologies' capabilities is to produce what Cairncross calls "the death of distance"[\[4\]](#). There is also, in developing countries, a digital divide between companies large and small and between government and private organizations. The fifth digital divide is also found in developed countries, it is the divide between digital natives (< 27 years olds) and the digital immigrants (older folks).

Each one of these five divides is trouble in the making. Unconnected people with no access to benefits of technology will become more disenfranchised and resentful. Rural population will have, yet another, reason to migrate to urban areas, thus worsening the social problems created around the world by such migration. Small and medium companies today account for more than 70% of the wealth created by developing countries, their lack of access to digital technology is seriously impacting their ability to compete, and is likely to be a leading cause of their demise.

The demise of many small and medium companies in developing countries will not necessarily stop the economies from growing, but it will slow down growth and as the economy becomes more dependent on large companies, wealth distribution will surely suffer. In developing countries, wealth distribution is as important as wealth creation.

In developing countries, government organizations tend to represent a larger share of the economy than they do in developed ones. If these government organizations continue to be less able to successfully deploy digital technology; they will invariably place a larger burden on the tax paying communities, diminishing even further the countries competitiveness.

The lack of digital awareness and understanding by the older generations, in developing economies, will slow the overall adoption of technology (as they are still in charge). Waiting for the older generation to retire is not an option because the divide keeps getting wider every day.

3 Digital ecosystems

Let us consider the digital ecosystem to be the combination of actors, technology and knowledge required to create digital wealth. It is typical of developing countries, where digital divides are growing fast, that growth of digital wealth creation is stunted by the absence of a healthy digital ecosystem. In many cases the health of the digital ecosystem is hindered by simple lack of size, that is, the ecosystem is not large enough to harbour representatives of all the different knowledge fields and business models required. In other cases, successful vendors have managed to eradicate competing technologies and/or business models thus producing the same results.

Incomplete digital ecosystems are considered unhealthy due to their inability to grow beyond a limited size. In countries where a certain set of skills and knowledge is very scarce, whole technologies are unable to be deployed thus allowing the competing technologies to flourish. But technologies and technicians that flourish through lack of competition soon lose their sharpness and become complacent. When a technology lacks competition, it no longer needs to deliver added value to be successful in the market, and so it doesn't.

Examples of unhealthy ecosystems abound. In many developing countries the outsourcing business model is unavailable, mostly because it is associated with cost reduction (costs are already quite low) rather than with service quality. This example shows how the initial low costs associated with IT development and operations leads to low quality of service that cannot be easily solved since management has no alternative to in-house development and operations.

Other examples of incomplete ecosystems include countries where Open Source Software (OSS) has been made obligatory in all government agencies. This produces an inordinate amount of IT professionals dedicated to OSS at the expense of all others. A software market seriously skewed towards OSS prevents some very useful and value-adding software to be successfully deployed, and, for example fail to make important inroads in the integration of systems, which is required to significantly increase productivity. In this case, expense is, again kept low, but productivity increases are not achieved.

The opposite is also true, countries where OSS has failed to grow (proprietary vendors have successfully nipped them at the bud) the lack of competition from OSS alternatives has lead to over spending (in a monopolistic environment) in software that is under utilized and fails to add value.

The responsibility to breach digital divides cannot and should not be placed solely on governments' shoulders. There are, for sure, national policies required, as well as investments in education and infrastructure; these are necessary but by no means sufficient. All stakeholders must participate in the development of a National Digital Strategy that is aligned with the country's ability to execute, one that can build success upon success. The leadership required to bring friends and foes together in an effort on national unity is a clear opportunity for visionary politicians, but is also fraught with the perils of politics. The need to embrace digital technology is too important to be left to the pitch and toss of politics, a non political leadership from any of the many stakeholders is more likely to produce results as it will not be a target of political bickering.

4 National Digital Strategies

Most countries these days have some sort of plan, Strategy or Agenda. Few will be successful though. Some will be polluted by politics, the interests of technology vendors will contaminate some and others will be undermined by short sightedness and selfishness. A few that will succeed will do so by harnessing commitment from all stakeholders and nourishing a digital ecosystem that supports and promotes many different technologies and business models.

There is no clear definition or guideline to the profitable deployment of digital technology. Even in large well-managed companies in developed economies, the management of technology is a challenge. There are many problems facing the efficient deployment of technology. Dealing with legacy systems while implementing new technologies is not he least of them. But the hardest problem to deal with is the fast pace of technology development together with the ever-increasing pace of changes in the business environment.

Technology takes time to implement and even more to fully adopt and feel comfortable with. It is not infrequent to find that by the time a technology or system is fully assimilated by an organization, it's become obsolete. Obsolete technology is to an organization like an anchor to a sailboat.

Singapore is probably the best example of a series of clear, well-articulated digital strategies that have lead to a developing country becoming developed. Over the last 30 years Singapore has published at least 5 succeeding strategic documents that have laid out the roadmap of digital (en economic) development. Few countries, developed or not, have the discipline and ability to execute that Singapore has shown. They have set themselves reachable targets; successive strategies have been able to build upon previous successes.

There is definitively an advantage for countries that started early the adoption of ICT as this forced the required technical education. But it is also true that countries that started later have much less legacy systems to deal with. The issue of legacy systems seems to be harder to deal with in developing countries for at least two reasons. First, the relative size of technology vendors with vested interests is so great, that they have been able to stall technology migration efforts in most government organizations for at least a decade. Second, in developing countries, senior management has not yet come to realize the need to get involved in issues like Enterprise and Software Architecture. In developing economies, systems' integration and legacy systems are still viewed as "technical issues", and as such are left to technical staff to deal with.

The key to a successful Digital Strategy seems to be its ability to cut through interests of politicians and technology vendors, to serve as a National Shared Vision and produce a simple well-articulated roadmap to get there. This is, of course, easier said than done, not least due to the severe tendency to speak in tongues that IT professionals have developed over the years. If senior management have problems understanding the IT professionals (both in house and out), politicians have a more serious problem when it comes to prioritising national resources to implement a digital strategy.

4.1 A framework for digital strategies

The vision of where the country sees itself (in terms of digital competence) in three to five years time is certainly a good starting point, but specialized knowledge must also be added, in particular of how technology is developing and what are the deployment requirements. When deploying technology, it is not rare that the horses are put before the cart. Some common cases are:

- Using digital technology to automate the delivery of a government service, without automating the production of the service itself.
- Attempting to synchronize many separate data bases that contain the same basic information (eg, citizen or company information), instead of unifying them.
- Giving legacy systems a new user interface instead of renewing or replacing them.
- Developing/Implementing systems before the networks required for deploying them nation-wide are in place.

It is considered a sound basis for a successful strategy the aim to reduce (eventually eliminate) the five internal digital divides while looking to achieve a completeness (health) of the digital ecosystem. It is not considered possible to successfully reduce the external divide while the internal ones are growing and/or the digital ecosystem is incomplete. Once the internal digital divides start to close, then the focus can shift to bridging the external digital gap.

There are at least four chapters that a digital strategy for a developing country must address (discussed below). Like in any other organization, the digital strategy must be aligned with the overall (national) development strategy.

Since ICT can impact almost all sectors of the economy, the digital strategy must always include initiatives to support the countries main development themes (e.g., education, health, industry, tourism). Furthermore, initiatives that support several development themes, are common to several chapters and which help to close several digital divides could have the highest priority, as they are likely to produce the largest impact. A robust prioritization model is certainly required as it is the only way politicians can cut through the jargon and the emotional content of the many proposals put to them. The basis for such a model is presented below.

4.1.1 Components of the Strategy

It is clear that any digital strategy in a developing country must contain a chapter on **Education**. Digital technology must be viewed not only as a subject (or collection of subjects) to be studied by the population, but also as an education tool, which, if used wisely, will reduce the costs and increase the quality and coverage of education. If this were considered to be “digital education”, then a holistic approach leading to the creation of a new digital culture is required to change the mindset of the population in such a way as to make the “digital way” the default way of doing things.

Many OLPC (One laptop Per Child) projects have sprouted around the world in the last few years; they are, obviously, a step in the right direction. One of the learning’s of some of these projects is the need to train teachers first. Some 15 years ago a multivariate analysis showed that the single most important variable in the success of computer in schools programmes was the teacher’s ownership of computers. Since then many attempts have been made in developing countries to help teachers buy a computer (cheap loans, special discounts, etc.) most of those efforts have, however, failed. It is now considered that computers should be given free of charge, as a tool, to all teachers that undergo the required training. So it can be said that OLPT, should precede OLPC, and that eventually we should all move towards OLPP.

Waiting for a generation to grow up with a new mindset is not an option, the increasing speed of change demands that developing countries change even quicker if they are ever to breach the gap. So a short-term education and training programme is required, probably aimed at both technical and management staff so that legacy systems can be successfully dealt with and a new view of the role of systems in organizations can be adopted, one which leads to positive returns on technology investments.

Connectivity is the other, seemingly compulsory chapter in any National Digital Strategy. It is not possible to envisage a country becoming digitally competent without a first class digital communications infrastructure. Here again, those who started early have an advantage, for they have produced the necessary technical knowledge, but are at a disadvantage because they carry large expensive legacy infrastructure. Here, foreign technology and service providers, if not dealt with in a very fair and open manner, can be very dangerous to a developing country. In many cases the old state-owned monopoly has given way to a private duopoly, which has brought the required technology, but at such high prices as to hamper the development of added value services.

The real reason, however, to develop a National Digital Strategy, is to lay the path and set the direction for higher **productivity**, which is the key to developing a country's economy. Different countries tackle this in different ways; some identify the few key industries where ICT must be deployed to propel that industry into new level of efficiency and effectiveness, while others look to increase productivity across the board without favouring any industries in particular.

A fourth, often useful, chapter that a National Digital Strategy might have, is a chapter on **e-Government and Transparency**. Automating government services is a vital part of any digital strategy. Due to the relative large size of government, in its role as buyer, employer and operator, e-government initiatives promote digital culture, digital services and the digital economy

Developing countries are often less than transparent and very prone to cumbersome processes inflicted upon the citizens. The lack of transparency leads to lack of trust, which in turn leads to lack of governance. Transparency can be greatly enhanced by digital technologies. But, most importantly, the process of introducing and deploying digital technologies in the government of a developing country can be seriously hampered by lack of transparency. Lack of transparency will help vested interests of politicians and technology vendors to prevail over the public interest. Furthermore, lack of transparency will not only hamper the deployment of ICTs but, even if ICTs were successfully deployed, lack of transparency will certainly keep the country from reaping the full benefits of technology. An opaque society will balk at the prospect of implementing electronic markets that promote competition and lower prices. An opaque society will feel threatened by the social networks that today's technology can implement.

But, perhaps the greatest value from promoting transparency in a digital strategy will come from the benefits of transparency itself. Transparency is not only required by regulatory bodies more and more around the world, is also good business. As Tapscott [5] eloquently puts it, transparency towards all stakeholders is the key to loyalty. In a digital world; a customer is only a click away from the competition. Increasingly, tactical gimmicks will not achieve customer retention; customer retention must instead rely on a strategy of transparency.

Considering e-Government initiatives always in conjunction with transparency forces the automation of not only the delivery of the government services but also the production of these services, because performance indicators cannot be published for non automated services, even if they are delivered through digital channels.

4.1.2 Prioritisation of strategic initiatives

The first and most obvious point is that the number of initiatives must be in line with the country's ability to execute; this should be assumed to be inversely proportional to the country's digital competence. In most developing nations this number is quite low, in some cases less than five initiatives can be taken to fruition at the same time. There is a flawed argument that says that many projects and initiatives should be launched, as this will increase the probabilities of at least some being successful. The outcome of a project

or initiative is not random, it depends on the management skills and resources assigned to it, therefore as the number of concurrent initiatives grows, management skills get thinner in each project and they all become more likely to fail.

Digital initiatives encompassed within the four general chapters, support the main national development themes, help close the digital gaps and present an attractive cost/risk ratio in order to be included as part of the national Digital Strategy.

How well an initiative supports a development theme, or how much it will help close a digital gap is, to a large extent a subjective measure, but nevertheless a useful one.

The cost/risk ratio of any project or initiative is much easier to measure. Outsourcing models can, and usually are, used to take almost all risk out of a project. Most governments in developing countries are not very good at delivering projects (of any sort) in time within budget, ICT projects tend to carry even more risk.

Apart from the risk involved in delivering technology implementation projects, governments in developing countries face the challenge of operating the technologies within acceptable service levels. Again, outsourcing can greatly reduce the risk. A very attractive byproduct of technology outsourcing by government agencies is the development of a healthy local digital ecosystem.

It is proposed, therefore, that initiatives from all four chapters be measured by a group of experienced professionals as to how well they support the national development themes, how much they would contribute to the closing of each one of the digital gaps, and ascertain an accurate cost/risk ratio.

A matrix should be built with a row for each proposed initiative and a column for each digital divide, for each national development theme, estimated total cost and estimated risk involved.

The few initiatives that have a greater impact (on the national development themes and the digital divides) and present the most attractive cost/risk ratio should be chosen.

4.1.3 Prioritisation exceptions

Infrastructural initiatives (like next generation networks and government-wide systems integration) deserve a special treatment, as on their own, they produce little impact, but they are enablers of other initiatives. In many cases, without the required infrastructures in place, other initiatives are not possible, or their cost/risk ratio is so huge they become unviable.

Sometimes, there are also public relations initiatives, which might deserve a special treatment. These are initiatives that have little impact on the national development themes and digital divide gaps, but provide good image and/or generate savings that can help fund the high impact initiatives. Such could be the case of an initiative to replace all the office software in government agencies with open source and/or cloud computing alternatives – this would allow the government to claim it has no illegal software and

generate savings that, although might not be significant, would benefit the public opinion of the governments' digital strategy. Another such initiative could be to have the whole cabinet go actively into Twitter and Facebook, this is a very low cost initiative that could produce an image of transparency that could be very beneficial to the credibility of the digital strategy.

4.2 Implementation considerations

Implementing a digital strategy is challenging, even in the most digitally competent organizations. Implementation delays and cost overruns can wreak havoc with a country's digital strategy and undermine a government's political well-being. Giving out outsourcing contracts is by no means enough to manage the risk inherent to the implementation. Contracts have to be managed; different government agencies (often managed like fiefdoms) need to be coordinated and technological decisions have to be made which are likely to impact future developments.

The need for ICT government-wide governance stems from the fact that, specially in developing countries, a large amount of wealth is squandered in paperwork, red tape and unnecessary redundant processes.

Because digital technology is developing at ever-increasing pace, care must be taken not to choose technologies that are heading for a dead end. The adoption of industry standards can, to a great extent, prevent vendor lock-in and technology dead ends.

The ability to distinguish between real technology trends and vendor-generated hype can give a country the ability to leapfrog technologies and thus accelerate its way up the technology adoption curve. To do this, the country must have access to independent applied research.

4.2.1 Governance

Experience has shown that a government, like any other organization, must have a CIO. The amount and degree of centralization is open for debate. In some countries every government CIO reports directly into the overall government CIO, who has its own budget and charges the different agencies for its services. In other countries, agencies have more independence, in some a CIO Council operates as an effective means of coordination and cooperation between agencies, but individual agencies might still be required to submit capital expenditure projects for review.

The need for an enterprise architecture, is now well understood in industry, but only beginning to make its way into government agencies, the degree to which EA is made compulsory and how it is enforced, will vary from one country to another, it is not an easy task to undertake. There is no agency better placed than the Office of the CIO for this task.

4.2.2 Standards

The only known way to future-proof technology investments is to adhere to open industry standards. Nowadays most hardware adheres to such standards. Software standards, on the other hand are much more difficult due to the speed of new trends and developments.

Independent industry open modeling standards can be used to assure the ability to change the software systems as fast as the ever-changing user requirements and/or to guarantee the ability to adapt the software to new hardware being developed.

It is the role of whichever governance structure deployed to investigate where and how such standards are being developed and to make sure all government agencies adhere to the chosen standards.

4.2.3 Applied research

The only way to separate real trends from vendor hype is to devote time and effort to applied research. To constantly study the new technology in order to understand both the technologies and the business models it supports and/or promotes. Early detection of real trends can help a country avoid costly technological mistakes which tend to translate into years or decades of catching up.

5 Further research

Whilst a detailed comparative study of national digital strategies will no doubt be very useful, a deeper insight into how to export and import experiences in this area is sure to be needed.

Relevant experiences involving legislation and public-private partnerships in successful developed nations like the US, UK and Australia provide an overall background to the formulation of digital strategies for developing nations, but provide no hint as to how to adapt them to the local realities.

The development of technology is taking place at such a fast rate, that leap-frogging is the only possible alternative left to developing countries to ever catch up. Leap-frogging over whole technologies and/or business models is not without perils though. In the process of deploying a technology, a country as a whole learns things, which even if not immediately applicable, will be useful during the deployment of the next generation of technologies.

Many projects involving the deployment of latest technologies in a developing country have failed. Often foreigners, that lack the cultural nuances, implement these projects, with funding from multinational organizations. It is not clear whether these projects fail due to the lack of the consultants' local knowledge or due to the local digital ecosystem's lack of completeness (perhaps due to leapfrogging).

It is clear that developing countries need sound digital strategies to guide the deployment of ICT in order to substantially increase productivity and thus develop their economies. It is not clear, however, how developing countries can best leverage the experience from

developed countries. To suggest that developing nations must follow the same path that developed nations did, is a defeated proposition since developed countries are lagging further behind all the time.

6 References

[1] The Squandered Computer, Paul Strassmann, 1997, Information Economics Press

[2] As the Future Catches You, Juan Enriquez, 2001, Random House Inc.

[3] The Age of Spiritual Machines, Ray Kurzweil, 2000, Penguin

[4] The Death of Distance, Frances Cairncross, 2001, Harvard Business press

[5] The Naked Corporation, Don Tapscott, 2033, Free Press