Information Systems and Infrastructure Development in Poland

An Evaluation of the ePolska Plan

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Intro

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Introduction

This report evaluates the Polish government’s strategic plan for IT Infrastructure development: “ePolska: Plan Działań na Rzecz Rozwoju Społeczeństwa Informacyjnego w Polsce na lata 2001–2006.” It examines the current situation for Information Technology development in Poland and makes recommendations for future action. Frameworks proposed by Richard Heeks, as well as the experiences of other countries, can help to predict the success of initiatives planned by the Polish Government and suggest alternative plans of action. I will not investigate the formation or the drafters’ underlying motivations, only the plan itself and any secondary effects that the initiatives included in it might cause. I begin by summarizing the current state of Poland’s information infrastructure, then present the main ideas of Heeks’ work, and attempt to fit some of the elements of the plan into Heeks’ framework. Finally some recommendations for future progress are included.

Overall the plan is strong. It will create a strong network infrastructure to ensure that Polish citizens have access to information resources. The plan calls for the creation of educational programs to ensure that citizens have the skills to utilize these resources. Government agencies will construct information systems that will improve their internal functions and relations with citizens. But the plan does not take every part of reform into account. The plan does not include guidance for the design of these systems. Some of the measures of the plan may not bring the expected benefits. The plan’s goals need to hang together for the whole to work. However, the elements for improving information systems and infrastructure are present. Even if some of the weaker parts of the plan fall by the wayside, the infrastructure created in the plan will improve the lives of Poland’s citizens.

Information Technology is not an end in itself, however. New computers, telecommunications equipment, and improved means of access for Poland’s citizens do not automatically guarantee that they will become digital citizens of an information society. Poland’s government must manage its own information strategically and provide useful services to its citizens as technology comes to them. In order to do that, it must build an informational and service backbone while it is building physical Internet backbones. Otherwise, Poland’s initiatives to provide Internet access to its citizens will primarily allow them to use the commercial Internet, but not enjoy real gains in government service.

Background
This report is unusual in that it concerns itself with a post–communist, Central European country. Information Technology development literature focuses on areas traditionally thought of as developing, and there is not a lot of material on post–communist countries’ plans for developing their IT capacity. Post–communist countries are unusual in the area of information technology development, because most have some sort of existing infrastructure but are unable to meet demands for access and services. They also face challenges of funding, finding directions for development, and the ongoing privatization of formerly government–run telecommunications industries.

At the same time that it is attempting to deal with its legacy infrastructure, Poland is preparing to enter the EU in 2004. Integration into the EU will require Poland’s government to make information accessible to the EU and information systems able to interoperate with existing European systems. Accession to the EU is one of the major motivations for change, and the EU’s own plans for IT development are used as a model for Poland’s strategic plan. The EU’s objectives of standardization imply that participant governments have to make information available in a way that is useful to the EU bureaucracy in Brussels. In order to insure that Polish citizens are able to access and use IT resources at the same level as citizens of the EU, Poland’s government will have to institute measures for education and improvement of infrastructure.

Poland’s geographical location is another factor motivating examination of its IT infrastructure. Poland serves as a conduit between East and West, both in a physical sense (highways and railways) and as a telecommunications link. Poland has opportunities to work together with its neighbors to take advantage of the telecommunications capacity of pipelines between continents, which could greatly improve the accessibility of both voice and data services across Poland. Another force pulling Poland’s government toward development of its information systems is the private sector and existing IT user base. As citizens become more accustomed to using the Internet to get information and purchase goods and services, they begin to expect the same capabilities of government. Businesses that are involved with the government ask for services to be provided via the Internet to expedite day–to–day transactions. For Polish enterprises to compete with those in other countries, Poland’s government must do what it can to expedite formalities and information exchange between government and businesses. By creating useful information systems that help enterprises get business done instead of miring them in rules, the government can strengthen the private sector indirectly. Poland’s government can also improve the competitiveness of the Polish workforce by improving education and access to information.

Current Situation

Poland’s Internet and telephone infrastructure and market situation remain inadequate to support a fully developed information society. Around 5 percent of Poles used the Internet in 2000, an increase of 60 percent from the previous year.[1] There is a clear demand for Internet services, but there are still barriers to access. Prices for equipment and software remain prohibitively high for most citizens. Per capita Gross Domestic Product for Poland in 1999 was 3991USD,[2] and a personal computer costs around 400USD—almost ten percent of that. Access to the Internet remains slow in most places and a number of factors prohibit Poles from accessing the Internet easily. Telekomunikacja Polska SA (TPSA), the Polish National Telephone system, provides dial–up access to the Internet. Anyone with a stationary telephone is able to dial in to TPSA’s number and get a point–to–point protocol (PPP) connection that is similar to Internet Service Provider (ISP) service in the US; however, this service remains slow and overburdened. At certain times during the day, it is impossible to get access via TPSA’s dial–up connection, and TPSA’s shoddy service has been the subject of controversy. After a number of boycotts of TPSA service by users, TPSA has changed its service from a per–minute fee to a monthly fee for Internet access[3]. Thirty hours of connection via this service costs a fee of 64.20 Polish z³oty (PLZ).[4] The protesters consider the fee excessive for the amount of service provided, considering that transfer speeds are quite low (around 1 kilobyte per second)[5]. While TPSA is offering some alternatives to dial–up access, such as ISDN (Integrated Services Digital Network) service, their prices remain out of reach for many Polish families. Other ISPs are available in major cities.
NASK (Naukowa i Akademicka Sieć Komputerowa), the administrator of Poland’s academic network, offers unlimited service for 50PLZ per month and a 50PLZ startup fee for a basic account, and has options to expand the service for more[6].

Issues behind Poland’s Internet usage go beyond economic barriers. Many adult Poles lack technical knowledge. Poland’s economic situation made computers a rarity until recently, and few people have had any sort of technical education. In Polish schools, the ratio of students to computers averages forty-to-one, compared to ten to one in Europe and five to one in the US. [7] Few technically savvy teachers are available to teach. Creators of the new curriculum need to make computers a tool used in all disciplines, rather than restricting technical education to Computer Science topics.[8] Outside of schools, Poles often have had little contact with computers. Adult Poles need some way of getting familiar with technological tools standard to an office environment. In order for e—government initiatives to work, citizens must be able to use computers, and e—government services, like any other application, must be easy to learn and use or they will remain unused.

In the sphere of telecommunications, different market conditions create vastly different conditions between the use of stationary and wireless telephones. TPSA is the largest telephone company in Poland, and it holds sway over much of Poland’s stationary telephone market. A few competitors have appeared in recent years, such as Netia, Energis Polska, and others, but TPSA’s market share is still quite large. Current regulations require that TPSA have only one competitor in each local market, although the regulations concerning the markets are beginning to change[9]. TPSA’s record of service provision in the telephone market is poor. Overall Poland lags behind other post—communist countries in the number of subscribers for stationary telephone service, although this is not due to lack of demand. Many rural areas are without telephone services, and the waiting time between a request for subscription and the arrival of service was 1080 days in 1998 and 810 days in 1999. By comparison, waiting times for a new connection in Hungary and the Czech Republic, , asdjfhaskdfh in 1999 were less than 100 and 50 days, respectively,[10] Poland surpasses both Hungary and the Czech republic in outstanding requests for connection many times over[11]. Poland is grouped at the bottom of the list, with countries such as Russia, Portugal, Spain, and Italy in a recent analysis of stationary telephone subscribership over consumer purchasing power[12]. The market is beginning to open, despite some obstacles. Recently eight telecom companies were given permission to operate nationwide.[13] While some companies have found gains by advertising provision of service where TPSA has none, TPSA remains in control of the market in the areas where it holds sway.

The wireless telephone market is vastly different from the market for stationary telephones. While the stationary telephone market is largely run by TPSA with few competitors, the wireless market is divided between three companies: Plus GSM, Era GSM, and Centertel. Wireless service is on a par with that of the rest of Europe. Polish customers are able to use add–on services such as Short Message System (SMS) and web browsing via Wireless Application Protocol (WAP) on almost every plan, and wireless providers cover 95 percent of the country, and over 99 percent of the population lives within reach of a wireless provider.[14] In stark comparison with Poland’s standing in stationary telephone service, in the analysis cited above, Poland is grouped with Finland, Sweden, and Denmark in subscribership over consumer purchasing power, and trends indicate that Poles will continue to purchase wireless service at about the same rate of growth[15]. As a result of the difference between stationary and wireless service, some families purchase a cellular phone before they are able to purchase a stationary telephone.

It is not enough to simply provide channels of access to citizens. There must be some sort of content at the end of the line allowing someone to do more than shopping. Simply supplying technology by itself does not improve the lives of Polish citizens. By providing access and making information available, the government plans to allow greater participation by and better education for citizens. The amount and quality of information available on government websites tends to vary. Most of the 13 ministries’ web sites are very much like those of West European or US governments, at least at the top level, but they tend to vary

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somewhat in look and feel, even within ministries. Most of the ministries allow bilingual (English or Polish) access. Recently Newsweek Poland rated Poland’s ministries on their web pages, finding a range of results. The best web site, Ministry of Finance, was cited as being updated daily, with clear pages and useful links. The worst, Ministry of Foreign Affairs, was the exact opposite of Finance’s pages, difficult to read from the first page on and items on the minister’s travels updated a month after the fact. Ironically enough, the Ministry of Infrastructure (Ministerstwo Infrastruktury – MI), which oversees telecommunications infrastructure, among other things, landed within the bottom three for its difficult to read and poorly updated website.[16]

E-government is based in both infrastructure and content, but it is more than moving organization processes from the physical to the virtual world. Real e-government reform refers to the restructuring of information systems: information, people, physical resources, and technology. It makes information available and understandable to citizens and workers, and manages inputs and outflows of information in ways that surpass traditional gains of efficiency or speed. Poland’s usage of e-government is currently rudimentary. The United Nations and the American Society for Public Administration (ASPA) define five stages of progress in e-government: governments with “emerging web presence” have a few official websites with static information; “enhanced web presence” refers to governments with more web pages and web sites with more methods of information access; “interactive presence” occurs when users can submit information for processing and receive forms online; “transactional presence” means more advanced interaction with government websites, generally paying for services or fees; “integrated presence” refers to a fully integrated e-government portal that allows “one-stop shopping.”[17] According to a recent UNPAN study, the government of Poland is in the interactive stage of e-government development. Polish citizens are able to email public officials and post comments on web sites, as well as search public databases and download forms.[18] Polish citizens are not able to participate in transactions currently, although the Ministry of Finance (Ministerstwo Finansów – MF) is currently implementing a project to make Poland’s tax system available via the Internet, and other transaction environments, detailed in the ePolska Plan, are in the works.

Information systems that reach the citizens of Poland are beginning to appear. A system outlined in Phare ‘99, an EU financial and technical assistance program, has pilot “urzędomyat” (Government Office Kiosks) in seven cities that allow citizens to find procedures for getting things done, which offices to go to, their locations and operating hours, the documents required and fees involved[19]. The effectiveness of these kiosks will rely on the quality of information that they allow citizens to access. Kiosks of this type can be subject to fatal flaws. Heeks indicates that when the focus of kiosk implementation is on technological processes, rather than on providing information, the system does not provide what citizens are looking for[20]. When goals of the program are not clearly defined or the information provided by the kiosks is not what citizens are looking for, the kiosks will simply not be used, and the system will be a failure. Urzędomyat are only one example of e-government measures currently under development.

**Evaluating the Potential Effectiveness of Reforms**

Richard Heeks’ book *Reinventing Government in the Information Age* attempts to apply the author’s experience as well as a number of case studies to make determinations about different approaches to reform that is grounded in information technology. IT–based reforms are often touted as bringing large gains in efficiency or scaling of the system, but IT reform may be much more than that. IT reform improves organizational process by improving three areas. IT can: supplant existing processes, automating existing processes that are handled by humans; support current processes by improving the information that humans attempting to make decisions will use; innovate by creating new processes that were not previously available.[21] Heeks notes five basic types of benefits that IT–based reform can bring to an organization: reducing the cost of operation, increasing output for the same cost, producing the same amount of output faster than before, improving the quality of outputs, and producing outputs that are different from the ones that were previously produced. These gains can include improved organizational efficiency, decentralization
of decision-making and the improved sharing of information, the improvement of accountability measures, better management of resources, and what Heeks calls “Marketisation”: the support of market relations and the delivery of new kinds of service. One example of a marketisation initiative might be smart cards used to receive unemployment pensions and look for work and training opportunities.[22] The application of IT to change may meet with varying degrees of success.

Heeks outlines four approaches to information age change: ignore, isolate, idolize, and integrate. He calls these the “four−eyes model.”[23] In the ignore approach, decision makers have little or no knowledge of IT, and pay little attention to IT in planning. Officials believe that use of IT would either complicate work or duplicate processes without adding any benefit. Budget expenditures for IT are minimal. The isolate approach is characterized by officials who are aware of the potential of IT, but remain computer illiterate. Officials include IT in planning, but consign responsibility of managing and implementing IT to the “experts.” In this approach, change is often limited to mere automation of tasks, with an assumed improvement in efficiency, or IT is included in reforms as an afterthought, without any relationship to the reform itself. For example, an administrative reform might include an initiative to put a computer on everyone’s desktop for word-processing and spreadsheet capabilities. While desktop computers adequately fulfill these tasks, this initiative does little to improve information management within the organization or redesign existing processes with the help of IT. At the same time, these poorly thought out initiatives may be the source of significant budget expenditures for IT, and IT staff is allowed to act and make decisions without much oversight. In the idolize approach, officials are more computer literate than those in the isolate approach. They may have a murky understanding that information is important. They are able to use computers and overestimate the potential of IT, understanding it as a silver bullet for change. Instead of integrating IT with change in a fashion in which IT supports change, IT is put in the center of reform initiatives, with the expectation that organization−wide transformation will naturally follow. IT staff receives exaggerated budgets, are expected to work miracles by simply plugging in new equipment, and are under constant scrutiny from bosses who are eager to take credit for the reforms that work. Finally, the integrate approach sees information as the important factor rather than technology. Officials understand that information is a resource needing to be managed, which is central to all of the organization’s functions. IT is a means to achieve reform ends, rather than the end in itself.[24] Use of Information Technology is supplanted by the use of Information Systems, which incorporate IT, human, and other elements to create a cohesive system of gathering, processing, storing and retrieving information, and the redesign of information systems and utilization of IT are integrated into the process of change, motivated by the objectives of change. An Information Systems manager or Chief Information Officer replaces the IT manager.

These approaches are largely for descriptive purposes only. In practice, approaches often incorporate elements of everything. Because these changes are implemented on a number of different levels, from organization−wide reforms to initiatives that are taken on by a single office or department, one manager or team member can have a large amount of influence on the approach to change.[25] While it is true that organizations and officials learn from their mistakes and may progress from one approach to another, because these approaches are determined by officials’ knowledge of information technology, development from one stage to the next may not be the rule.[26] If an ignorant manager replaces an idolizing manager, then the organization’s approach will regress. Often successive changes are approached as if they were unrelated to each other. Variations in an individual’s knowledge make a significant difference in approach as well. If an official has a good conceptual understanding of the potentials and shortcomings of say, Local Area Networks, but is new to wireless protocols, they may embrace an initiative to implement wireless networking without ever questioning the difference between wired and wireless networking (idolization), and end up implementing an insecure network. The difference between approaches may determine the difference between success and failure of a reform.

Another factor that may affect the success of a reform is the set of assumptions made by the planners of reform. What Heeks describes as “conception−reality gaps”[27] are created when those who are attempting to
create a reform make assumptions that are not in line with the real workings of the organization. When the gap between the assumptions made in creating an initiative and the reality of an organization is too great, change may fail. For example, imagine that a group is designing a budgeting system for a large organization. The design of this kind of system often includes some basic assumptions about the behavior of managers who will be creating budgets using the system. If the users of the system behave in a fashion different from the assumptions of the planners, acting in a way that the planners were not able to foresee, the budget system may fail. Often organizations encounter situations that create incentives for people to behave differently than expected. Sometimes a politically charged atmosphere causes behavior that seems irrational. One of the most common conception–reality gaps that ends in failure is the one−measure−fits−all approach, the assumption that what worked in one situation is applicable in another without alteration. Initiatives suffering from this flaw seem to be invariably doomed. Perhaps the users of the budget system have an incentive to report different figures than the ones that should be entered into the system, or count the resources allotted them in a different way than anticipated. The end result is that the data entered into the system is skewed in some way and the budgeting system may be abandoned if there is no way to correct the data and make it useful to the organization. While initiatives that have smaller gaps between conception and reality may have better chances for success, Heeks emphasizes that if the gap between conception and reality is too small then change is impossible. The risk of failure of a system is proportional to the size of the conception–reality gap. The benefits received if the system is a success are also related to the size of the gap and the risk of failure. In situations where the conceptions of the authors of change match the reality of the existing situation, benefits can be impressive. Heeks notes that sweeping initiatives that span agencies and involve great changes carry the most benefits and the most risks, forcing the public administrator into a decision between incremental and revolutionary changes. Heeks names a number of areas or dimensions that should be examined in order to determine the size of the conception–reality gaps in each. These include: Information, Technology, Processes, Objectives and motivations of the people involved, Staffing and skills of the project, Management, and Other resources (namely money and time). Heeks calls these dimensions the ITPOSMO model for examining initiatives.
Within these dimensions, there are a number of conception–reality gaps, which Heeks calls archetypes, may cause initiatives to fail. These gaps are the most common, although conception–reality gaps may be found in all of the dimensions of the ITPOSMO model. “Rational–reality gaps” occur when those creating reforms assume that the decision–making process is logical and rational, while in fact other incentives guide the process. Reform initiatives are often created with the assumption that actors’ decisions will be guided by reason. In the majority of organizations, this is not the case. While the decisions made may be rational from the perspective of the actor making the decision, they appear irrational if “factors such as self–interest, personal objectives and subjectivity”[29] are not included in the understanding of the decision–making process. Heeks writes that public–sector initiatives are often prey to rational–reality gaps. Private enterprises tend to operate with some assumption that self–interest is what influences employees to act in various ways, and they craft their reforms in a way that reflects this self–interest.

“Private–public gaps” exemplify this difference. While there are a number of initiatives to make government more like business, Heeks notes that these measures may do more harm than good. Heeks includes some of the differences between private and public sectors. Public organizations often have a wide range of goals that they endeavor to meet, including political, social, and economic goals. Their accountability is to voters, legal requirements, and legislative oversight, which may change depending on the political climate. Public sector institutions are often the sole provider of services, and rarely must compete with other institutions in order to achieve success. Similarly, these organizations are not in the business of producing or selling wares. Public–sector organizations, which provide a number of services and collect much more data, also have more information about their clients than do private enterprises, which monitor primarily what their clients purchase. The scope of services and data collection that takes place in the public sector also means that the scale of reform projects is as a rule much larger than in the private sector. Heeks writes that initiatives for change that are based in private sector reform initiatives are more prone to failure because they take less account of organizational realities.

“Country Context gaps” occur when there is a difference between the assumptions of reform and the context of the country in which it will take place. Countries may differ in their understanding of all of the ITPOSMO dimensions. Every country has different attitudes about each of the parts of the ITPOSMO model. Gaps occur when different cultures have different approaches to valuation of information or understanding of organizational objectives. Heeks notes that often public administrators in developing countries operate in very different environment than that of the industrialized world. Developing countries’ organizations tend to be much more centralized, with highly politicized and sometimes highly variable operational environments,
while organizations in the developed world are decentralized, and many of the existing processes are stable. The “raw materials” of change that developing countries may not have constitute another gap. Developing countries often have different human, physical, and monetary resources that make the blanket application of changes from the industrialized world impossible. Infrastructure that is common in the industrialized world may be rare or nonexistent in developing countries. Not all of these problems occur in instances when a developing country attempts to enact reforms that have been instituted in the industrialized world. Heeks writes that such gaps occur both in transfer of changes between industrialized countries and between industrialized countries and developing countries.

Judicious application of Heeks’ reasoning allows the observer a chance to examine reform initiatives and place them somewhere along the continuum of Heeks’ “Four-Eyes model.” It is possible to find initiatives that seem to have ignoring or isolating approaches, and suggest better alternative approaches to reform. Understanding ITPOSIMO components of reforms makes it possible to understand the underlying dimensions that reforms may require. Pointing out the gap between the conception of the reform and the reality of the situation, and evaluating that gap in terms of its risk and benefits may be another matter entirely. One of the luxuries of researching change is that reform successes and failures are easily seen from the standpoint of the researcher after they occur. They are not so obvious to the authors of reform, who may see a number of factors as potentially influencing the success or failure of the initiative. It is the responsibility of the implementers of change to ensure, to the best of their ability, that all of the factors stack up to success rather than failure.

Overview of the ePolska Plan

The ePolska Plan, or the Action Plan for the Development of Information Society in Poland for the years 2001–2006 (Plan działania na rzecz rozwoju społeczeństwa informacyjnego w Polsce na lata 2001–2006), created by the Ministry of Infrastructure in 2000, contains a number of initiatives to create an environment conducive to the development of information access and usage in Poland. It does not go into the design or implementation of individual Information Systems. The plan establishes a set of goals, moving from the basics to more complex initiatives, encompassing physical network infrastructure, network performance, stability and security, technology education, initiatives to improve the usage of IT (including e-government), rural telecommunications improvements, and the uses of digital radio and television. All of these goals are accomplished with the objectives of: preparing Polish society for technological change, preparing Poland’s laws to take account of new situations, preparing Poland’s economy for e-commerce and new forms of work as well as improving innovation and competitiveness, creating an IT–aware, transparent and user–friendly administrative framework, and creating and disseminating Polish culture.[30]

The goals of the program mostly concentrate on adjusting Poland’s economic and social conditions for the advent of widespread use of IT. The language in the ePolska plan uses buzzwords about bringing Polish citizens into the “wiek cywilizacji cyfrowej” (age of digital civilization) and creating a “spoleczeństwo informacyjne” (information society).[31] In the experience of the west, the “digital age” is a somewhat more elusive state than many originally thought. A number of issues about the creation of an “Internet Society” in both the US and EU remain unresolved. While Poland has some initiatives that allow the Internet to act as a tool for citizens participating in government and society, the bulk of the Internet’s potential remains unutilized. In the eEurope Action Plan, themes include “e-content”, “e-research”, “e-security”, “e-education”, even “e-transport.”[32] However, the eEurope plan does not involve the concept of “e-rights.” Similarly the ePolska plan is silent on establishing the rights of Polish citizens to obtain, use, and share information, or for safe and sane rules about the use of programs and content. Poland has a history of emulating the United States, if it decides to follow the US’s example and craft a law similar to the US’s Digital Millennium Copyright Act (an extension of copyright law which has been used against fair use and innovation), its citizens stand to lose a significant amount of their freedom for use of content. It is also significant that while there are a number of references in the plan to the European Union (EU) and integration
with its rules and systems, including the eEurope plan, the measures in the plan do not put integration with the EU at the forefront of the development of Poland’s IT infrastructure.

A road map of the ePolska Plan

- Goal 0 – Development of IT Infrastructure
- Goal 1 – Universal, Cheaper, Faster, and Safer Internet
  - Universal, Cheaper, and Faster Access to Internet Resources
  - Fast Internet for Scientists
  - Network Security
  - Free Software
- Goal 2 – Investment in People and Skills
  - Education in the Digital Era
  - Work in the Knowledge–Based Economy
  - Universal Participation in the Knowledge–Based Economy
  - Polish Cultural Resources in Global Networks
- Goal 3 – Stimulating Better Use of Information Technology
  - Electronic Economy
  - Online Public Administration
  - Online Judiciary
  - IT and Communications in the Police
  - Online Public Health
  - Online Social Integration
  - Intelligent Transportation Systems
- Goal 4 – IT and Communications in Rural Areas
- Goal 5 – Development of Digital Radio and Television
Fitting the ePolska Plan into Heeks’ framework

Heeks’ framework can be used to determine the planners’ approaches to reform and the types and sizes of conception-reality gaps for these reforms. One of the difficulties in the evaluation of the plan lies in its vagueness. A lack of detail about the information systems included in the plan makes it hard to examine the dimensions of the ITPOS MO model. Reforms are outlined in broad terms throughout the plan, and the plan gives few details about the requirements for individual tasks. Many of the goals concern themselves with the creation of favorable conditions for further development. In many cases, the individual ministries and agencies are left to determine the scope and details of the information systems, including their own standards. The plan provides no overarching standard for the collection, storage, or retrieval of government information. It appears that separate projects will be implemented without much collaboration, and eventual attempts to create a unified environment in which information is shared between ministries and agencies may be greatly complicated by the lack of standards that span different initiatives. When Poland decides to integrate information systems to allow access to information across organizational lines, this lack of standards will force more scrapping of existing systems and creating ones that conform than would have occurred had systems been built with integration in mind from the beginning.

The plan also sets out budget sources and timelines for achieving goals. Most of the initiatives outlined in the plan do not rely on help from the EU or the private sector, although a few are part of larger measures such as Phare. Responsibilities for implementation of the plan lie with ministries, local government, and organizations such as the KBN (Komitet Badań Naukowych), and by pointing out budget sources for each task, the plan reduces the chances that reform will be unfounded and unimplemented. It is unclear where oversight for implementation of the plan comes from—no body is clearly named that will evaluate the success of the many parts of the plan as a whole. Citizens may be left to make determinations on their own as to the effectiveness of the plan.

Integrating and Idolizing Measures

In terms of the “four-eyes model,” the measures in the plan have elements of both idolizing and integrating approaches. By making a comprehensive plan for the development of IT infrastructure, Poland’s government is avoiding approaches to development that are isolating or ignoring. While most of the goals in the plan are integrating measures, they do contain elements that are idolizing. As noted above, the plan is full of language about the “Digital Age,” creating a Polish “Information Society,” and entering the “Information Era.” The most prominently idolizing measures in the ePolska are those that rely on unproven technology.

Unproven technology appears in particular in three parts of the plan: work in the information age, rural development, and online health care. In the second section of Goal 2 of the plan (Work in the Information Age), the authors include the creation of infrastructure for telecommuting. Telecommuting initiatives are not without their problems, and the ePolska plan takes the safe route by researching possibilities and attempting to create an environment that allows it. Telecommuting, which so far appears mostly in the IT industry, has not yet become widespread in the US and Western Europe. Special conditions in Poland may make telecommuting even more difficult. The plan bills telecommuting as improving work by reducing costs for employers and by allowing those in rural areas with little economic activity to work in jobs that would otherwise be unavailable. In a situation where employee time is not strictly monitored, losses of productivity due to the distractions of home and the price of networking may incur larger costs than the employer originally accounts for. Some evaluations of telecommuting have found that it increases the employer’s legal liability[33] and security issues.[34] Hopefully, the implementation of the plan will include some examination of these concerns. If the implementers of the plan focus on the potential gains rather than the real pitfalls, the technological components of this reform will outweigh the human and organizational components, and the initiative will bring no real gains unless organizational obstacles are removed.

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Goal 4 (IT and Communication in Rural Areas) returns to the use of telecommuting or “telework”, this time for rural areas in particular. While creating an environment conducive to electronic commuting seems to be a good idea, rural areas will need more development than urban areas before effective telecommuting is possible. It is also probable that the majority of people living in rural areas in Poland will continue to lack the skills or experience that allow them to be successful telecommuters. There are fewer people with IT skills in rural areas, and the economic situation of most rural areas and small towns means that there are few or no stores where one can purchase a computer or software. The high price of equipment is a large relative barrier to entry in rural areas where the average income is lower than in cities. The network capabilities of rural areas are often too poor to allow telecommuting without a costly special arrangement such as an ISDN line. As a result of all these factors, there are few rural residents who are able to make effective use of IT. Applying information technology solutions like telework in areas lacking infrastructure to allow effective use of the technology and where there is an insufficiently skilled population will do nothing to improve the economic situation of those areas.

A similar imbalance in planning occurs in the measures addressing online health care. The plan’s conception of information technology development for public health emphasizes the use of technologies that are emergent, such as endoscopic surgery, or in initial development, such as “telemedicine,” noting that standardizing initiatives will improve health and reduce costs. Simultaneously developing high-tech medical care and seeking to reduce costs may require some very difficult decisions about health care priorities. The plan calls for the creation and improvement of a number of databases covering hospitals and medical centers, doctor and specialists, and persons who are covered by state medical insurance. Standards for information exchange and regulations governing payments for medical service will be created by the Ministry of Health (Ministerstwo Zdrowia – MZ). A team selected by the MZ will create a plan for limited use of select telemedical services.

Although the plan mentions the creation of a means of accessing information about medicine and local physicians and plans the creation of a database of facilities and providers, it does not contain any initiative to hook these databases into a publicly accessible service. It is significant to note that this area of the plan does not approach the subject of improving the health insurance system, or provision of care in hospitals by introducing hospital information systems in order to expedite everyday hospital tasks. While the plan makes note of endoscopic procedures and telemedicine, it does not focus on less glamorous services. Nor does it outline any measures to improve access to important public health information, such as warnings about outbreaks of disease, water or air quality problems that may threaten citizens’ health. Such exaggerated reliance on technology while other improvements are passed by can cause local managers to feel that higher management is disconnected from the reality of the situation, and that their solutions do not fit the problem.

All three of the measures outlined above are idolizing initiatives. Each of them demonstrates a reliance on technology that is a long way from implementation. They rely on that technology to create changes beyond the scope of their participants. In Goal 4 the emergence of telework is billed as an economic stimulus for rural areas, bringing economic opportunity and improvement. The assumption in the plan is that the appearance of these services will improve the situation by merit of their availability. Even if the goals above are implemented, it is unlikely that the existence of the possibility for telework or telemedicine will in and of itself improve Poland’s small-town economies and health care system.

The previous section highlights some of the idolizing measures of the plan, but the bulk of the plan is made up of integrating measures. Each of the parts of the plan addresses a different area of improvement. If all of the measures in the plan are successfully implemented, Poland will have a fast network infrastructure and citizens and government institutions with the ability to make use of it. The plan’s structure and motivations ensures that many of ITPOSMO dimensions are covered, though not all. The proof of such a comprehensive plan is in the success of its implementation.
Integrating measures in the plan approach government information as a resource to be strategically managed. Much of the plan concerns itself with ways of making information more accessible by means of infrastructure improvements, by improving the average citizen’s ability to make use of information and resources and by creating systems that allow citizens and public administrators to make better use of information. The final part of Goal 2 projects the creation of an online information repository for use by citizens, students and foreigners. This includes making an inventory of cultural resources and the creation of an information system for inventory of existing archives, the construction of a Polish Culture Portal by the Ministry of Culture and National Heritage (Ministerstwo Kultury i Dziedzictwa Narodowego – MKiDN), and testing a pilot version of the second stage of the Polish Culture Portal, the Encyclopedia of Polish Culture. The plan also states that a Virtual Polish Library will be created, although it refrains from assigning the task to any ministry or institute. It is safe to assume that the MKiDN will be charged with carrying out this task.

Information systems that manage cultural information will allow Poland’s cultural heritage to be shared by the world, and a virtual Polish library will encourage the spread of Polish literature and writing further around the world. Online cultural resources will help as much in the education of Polish students as they provide resources for the world outside of Poland. A problem with the reform may occur if informational resources are selected which no one is interested in. This part of the plan is dependent upon the rest of the plan: the availability of Poland’s online cultural resources rests upon the placement of computers in schools and the improvement of Poland’s networks to get information to the students and teachers who need it. With online resources and the infrastructure to reach them, Polish schools will have access to many more resources than they would be able to purchase in physical form. It remains to be seen if the planned education infrastructure will be enough to allow every Polish student to access online libraries. As the first two goals in the plan are implemented, hopefully the network infrastructure will mature to the extent that every student will be able to make use of online resources without restriction, but it is possible that some schools will be left behind.

In the next integrating initiative, the plan goes on to cover the creation of a government-wide system for implementing information systems in public administration. Initiatives to improve on-line public administration are focused on the creation of a system of service that fulfills basic requirements of accessibility, confidentiality, reliability, and quality of data. The plan states that information management in public administration should follow three precepts:

- Open relations between administrative agencies, political elites, and citizens, which is embodied by the assurance of universal access to the information of the public sector.
- A close relationship between administration and information recipients.
- Integration of political efforts between government agencies, having a effective IT infrastructure and using integrated information systems.[37]

The plan aims at the creation of standards for Internet development in public institutions, requiring administrative units to have some sort of Internet presence, completion of a job search database and accompanying wide-area network (WAN), the creation of nationwide networks for public administration and the modernization and integration of local public administration networks to the wider network, as well as the development and modernization of internet connections.

The Ministry of Internal Affairs and Administration (Ministerstwo Spraw Wewnetrznych i Administracji – MSWiA) is charged with the creation of rules about access to information, and individual ministries are charged with creating mechanisms to allow universal access to public information in conformity with these rules. The MSWiA will create rules about the sharing and joint financing of national IT infrastructure and
laws controlling electronic information exchange, and electronic signatures. The Ministry of the State Treasury (Ministerstwo Skarbu Państwa – MSP) will build an information system for processing and storing restricted information and ensuring that MSP’s operations are in conformity with legal requirements. The plan calls for a number of measures standardizing education, qualifications and practices for IT professionals, echoing previous initiatives in the plan.

The plan lays out a number of goals that are joint ventures between agencies, such as the creation of elements to ensure that government administration resources are safe and that the system for distribution of information in time of crises is effective, and IT systems for effectively fighting crime, overseeing borders, and protection of the environment. The Ministry of Foreign Affairs (Ministerstwo Spraw Zagranicznych – MSZ), as a point of first contact for the world outside of Poland, will develop and maintain its Internet website and its offices, including the installation of an e-mail system, and the procurement and exchange of computers together with software.

While these initiatives are all important to ensure that further e-government initiatives are successful, the plan does not set forth stringent requirements for the implementation of information systems. The plan contains recommendations for creating a healthy regulatory environment surrounding the development of IT in Poland, but in general, the plan requires the creation of information systems without making any recommendation to their particularities. The plan does not mention requirements for quality of service or accessibility of these systems, nor does it attempt to forecast any obstacles or complications in the implementation of these measures. The lack of specifics makes it difficult to estimate the eventual success of these initiatives.

The initiatives outlined in this section of Goal Three are those of a responsible government that is at the beginning of the institution of e-government initiatives. This section covers a variety of different dimensions of change, including processes, management of information, and monetary resources. The initiatives in the plan do not focus overly much on technology, but on the organizational components and processes that may benefit from the introduction of technology. The objectives in the plan place technology in a supporting stance for existing processes, rather than molding processes to fit the implementation of technology. The measures in this part of the plan supplement existing government processes, such as a procurement system, with technology, such as an on–line procurement system that can bring gains in efficiency, speed, and productivity. What remains to be seen is if the supplementation of these processes creates new, heretofore–unseen possibilities or new processes. The main objective of this section is the creation of an environment that allows the different ministries involved to manage and share information well, and the measures outlined in the plan serve that objective.

The next measure in the plan that is particularly integrative is the development of the judiciary for online operations. The courts represent an area different from the other sectors of government in that they have a longer history than other government institutions, they have a large amount of influence over many areas of daily life, including a role in guaranteeing citizens access to public information, and the court system in Poland is farther behind than other public agencies in the implementation of information systems. The plan’s long–range goals for the Ministry of Justice fall into two main categories: the replacement of paper–based exchange and distribution of information with electronic information exchange and the creation of a transactional environment that allows citizens to access information and submit requests for service electronically. The plan requires the continuation of the implementation of the Center of Nation–wide Court Registries (Centrum Ogólnopolskich Rejestrów Sądowych – CORS), which is composed of National Court Registry, consisting of registries of enterprises, associations, and creditors. CORS also requires the creation of a new Real Estate registry (records of ownership and sales), which includes electronic links between courts and a new set of laws allowing the introduction of real estate registries in electronic form, and the testing of a pilot program for these services in six centers throughout Poland. The plan includes an information system for the public prosecutor aimed at fighting organized crime and new forms of crime that are beginning to appear. For the courts, information systems and “global court applications”[38] will be ordered in 2002,
implemented in 30 select district and regional courts in 2003, in 12 court district offices in 2004, then in 12 more in 2005. Electronic access to court agencies will be created, but a date has yet to be set.

If the measures above are carried out as planned, Polish citizens will be able to request information and services via the Internet and judges and lawyers will be able to access and exchange information electronically. Ideally, information technology will support the functions of the judiciary by making processes more efficient and information more accessible, and create the possibility of new forms of interaction between citizens and the judiciary. A transactional system can bring improvement in the time required to process a request for service, and a reduction in costs for the judicial system, but there are some benefits that may go beyond gains in efficiency. By moving transactions from the local courthouse (which for many citizens may be in the next city or further) to the Internet, and to a standardized system, the court system can serve more citizens with the assurance that the service provided is the same for all citizens, hopefully removed from problems such as corruption and misinformation. By moving to an on–line transactional environment, the judiciary has the ability to impose standardization and rationality on a system that before may have seen some variation between local offices.

There are some problems with using Heeks’ Four–Eyes model to evaluate the ePolska Plan. As always, hindsight is clearest: the model works better when evaluating a reform that is already complete. It is difficult to fit a measure into the continuum between ignorance and integration with confidence until it is implemented. The course of an implementation process determines a lot of a measure’s final place in the Four Eyes model. Approaches to IT reform can change with changes in leadership or in the organization carrying out reform. What initially appears to be an integrative project may end up an idolizing one if the organization implementing it takes an idolizing stance, whatever the intentions of the measure itself. However, it is possible to make some rudimentary determinations about reforms before they are implemented, by examining the reform plan’s initiatives and stance towards integrative issues. Reforms in the plan that focus too strongly on technology as driving factor in change rather than a factor supporting change are unable to fulfill the needs of citizens and public servants.

Conception – Reality Gaps

By merit of creating a comprehensive plan for strategic use and development of IT initiatives, the government of Poland is seeking to hold an integrative stance. The goals laid out by the plan dovetail with each other. Each goal’s success will depend on the success of the preceding parts of the plan. The plan covers a number of the ITPOSMO dimensions in its scope, including technology, objectives, skills, financing, and information. Other dimensions, such as process and management are not quite as clearly defined. The plan understands that the reforms it puts forth will proceed in a rational manner, and it rarely makes note of any kind of political or bureaucratic climate that may be unique to Poland. In reality, some unexpected changes may cause problems for the implementation of some of the measures in the plan. For one example, the State Fund for the Rehabilitation of the Disabled (Państwowy Fundusz Rehabilitacji Osób Niepełnosprawnych – PFRON), charged with a number of measures in the plan, may have a rocky future. Officials have denied that the government fund may be liquidated with others in the near future,[39] but it is clear that the organization’s future is disputed.[40] The reality of Poland’s government restructuring support of its agencies is not taken into account in the plan.

Another case involving conception–reality gaps concerns the implementation of network infrastructure. Improvements to network infrastructure may constitute a rational–reality gap if the benefits fall on users in a different manner than the plan expects. In Goal 1 (Universal, Cheaper, Faster, and Safer Internet) measures include improvement of Poland’s network infrastructure. Two high–speed networks, which carry both academic and nonacademic traffic, serve Poland: the Scientific and Academic Computer Network (Naukowa i Academicka Sieć Komputerowa) and the POL–34 network. These two networks in turn are connected to the European TEN–155 network and to Stockholm. Local areas are served by 22 municipal area networks.
and 5 supercomputing centers. Currently these resources are enough to serve the needs of Polish researchers, but as the European Union continues to develop, Poland must continue to keep up and participate in collaborative research efforts with other European research centers.

The PIONIER network program, created by a consortium of the State Committee for Scientific Research (Komitet Badań Naukowych – KBN) and interested parties, will include a number of initiatives that improve academic resources. PIONIER will be completed in 2005, with pilot programs in 2002 and 2003, and installation and utilization of optical networks in 2004, in two stages. The first stage will link major metropolitan networks. The second stage will create links to each of the 43 old Województwo (provincial) cities’ MAN. The optical networks created under PIONIER will reach speeds of 10GB/s, allowing for utilization by academic and government initiatives. Polish citizens will probably only be able to see the benefits of PIONIER after some time, however. Even at the best institutions, access is not as transparent and universal as it could be.

Once PIONIER is brought to the major metropolitan networks and MANs, bringing fast networks to citizens will depend on the ability of Internet Service Providers (ISPs) such as TPSA to improve their own networks and services. The understanding in the plan is that the creation of infrastructure will improve conditions for everyone, and that the benefits of better networks will reach all users equally. This is a rational–reality gap. Logic dictates that network infrastructure improvements will benefit everyone who makes use of the networks. In reality only those with the ability to have relatively fast connection to the Internet will see the difference. Fast networks between cities have existed for a long time in the US, but the bulk of consumers were limited to modem access until cable and DSL (Digital Subscriber Line) service became accessible, despite the existence of technologies such as ISDN (Integrated Services Digital Network). The bulk of households in the US accessing the Internet continue to do so via a modem connection, and network improvements have a diminished impact for the average user.

The next case of conception–reality gaps occurs in Goal 2 (Investment in People and Skills). Measures to improve schools continue to bring technology to classrooms while teacher training and skills lag behind. Education is crucial to the ability of citizens to take advantage of new technologies. According to the ePolska Plan, “the pace of coming technological change in the contemporary world is causing modern information society to work out a new paradigm of education” and “the largest obstacle limiting universal Internet usage is teacher training.” The first section of Goal 2’s initiatives focuses on creating curriculum for informational education, training educators, distance education, and creating points of Internet access for schools and public institutions. The largest initiative in this goal is the creation of Internet labs in middle schools across Poland, and the creation of Internet labs in every municipality.

Both of these initiatives fall under the aegis of the program Interkl@sa. Interkl@sa provides teaching resources and installation of Internet laboratories in schools. The program also offers training for educators through a joint agreement with Intel and Microsoft, as well as vocational training provided by local schools in agreement with Cisco Systems. Interkl@sa has supplied around 70,000 computers to schools between 1998 and 2001. The last middle school (gimnazjum – grades six to eight) in the country received computer labs in 2001. All high schools (liceum) in the country will be supplied with labs by the end of 2003, and all elementary schools (podstawówki) will have labs by the end of 2005.

These measures may contain another rational reality gap. The effectiveness of these labs remains to be seen. Some of the plan’s assumptions about schools’ operation may be wrong. The rationality of the plan expects that a school computer lab will be used by everyone in the school equally, and that teachers will work together to share and utilize the lab to its fullest. This may not be the situation present in many schools. The installation of a single lab of computers does not necessarily satisfy all of a school’s didactic needs. However, it does create a resource that may be contested by many educators who wish to make use of it at the same time. Such labs also run the risk of being used exclusively by computer science classes, if teachers of
computer science are the only teachers in the school with the skills to make use of them. Educators in the west have noted that computer labs can be in high demand. While the ePolska plan points out the lack of teacher education as the largest obstacle to creating a Polish Information Society, schools are still being outfitted with computer labs.

Although the education initiatives are in the process of implementation, training and education requires more time than the installation of a computer lab. For education to make an impact, there must be some effort made to continually update and revise curriculum and to continue the training of teachers. InterKl@sa is attempting to make the best of the situation by entering into public–private partnerships with IT companies to train educators. InterKl@sa is going to the companies that are the source of change.

Another conception–reality gap lies between the existing state of Poland’s information technology resources and the intended goal. This spans a number of the dimensions of the ITPOSMO model. The gaps include technology, staffing and skills, and management. Some of the more idolizing measures lack existing technology to support them. Most importantly, the lack of skilled workers and educators will undermine the plan’s possibilities for successful implementation. While the plan includes a number of bold measures to improve Poland’s situation, it requires a skilled base of technical workers to implement these measures. In addition to a lack of technically skilled workers, there is a lack of management experience with some of the technical measures in the plan, which may also cause some problems with implementation.

The plan attempts to create an infrastructure that will allow the development of a cohesive and usable Polish Internet, from the physical network up to e-government websites. Each of the goals in the plan moves up another level, outlining goals to be accomplished that will allow improved utilization of the resources made available by the other goals in the plan. Initiatives to create classroom computer labs that are part of Goal Two will rely on the effective implementation of measures such as improved network infrastructure (Goal Zero) and a universal, secure Internet (Goal One). The motivation behind building labs, besides providing students with basic computer skills, is to make use of online government resources (Goal Three) and cultural resources (Goal Two) to improve education overall. If everything hangs together, then all of the goals of the plan will be achieved. The goals in this plan, if successful, can greatly transform the operations of government and the everyday lives of citizens. Failure to satisfy the requirements in one or more areas means that other goals in the plan fail as well, or at best function with limited realization of their full potential. With the emphasis on all the parts of the plan operating together, it is important to note that the plan does not mandate standards that allow different systems in different parts of the plan to operate with one another, nor are requirements set for integrity and access of data. The authors of the plan assume that parts of the plan will follow a sensible approach to creating standards about access and the integrity of data. Sensible approaches however take a number of different forms, and it is quite foreseeable that one organization can build a sensible system that does not provide the quality of information required by another organization.

This is especially important for Poland, because many offices and agencies are at the beginning of their transition to electronic data storage from paper documents. The plan does not mention the difficulty of moving from paper and legacy systems to electronic information systems. This indicates that the authors of the plan may not have fully evaluated Poland’s current situation, and the extra effort required to bring these systems into the electronic world may make the difference between success of the plan and capsizing in a quagmire of data entry and conversion of elderly databases to fully–functioning, interoperable database systems. If these offices design systems and databases that satisfy the greater informational needs of the whole country, Poland’s government can nip in the bud future problems with interoperability, duplication of data, and data integrity.

Finally, the authors of the plan used the eEurope plan as a base for Poland’s plan. This modeling creates the risk of a country–context gap. Many of the measures in the plan are intended to make Poland conform to the standards of the European Union. While EU countries are aiming for achievement of the eEurope plan, the
state of their current networks and information systems in government is quite different from those present in Poland. Poland is attempting to implement its own version of the eEurope plan, but its starting point is quite different, and the gap between the current state and the planned state of affairs is much larger than it is for west European countries. What happens after Poland’s accession to the EU remains to be seen. At the time of the writing of this document in 2002, the last year of the plan is four years away, and the plan does not examine as to how its initiatives fit into the administration’s larger designs. It is possible that planners expect that after Poland enters the EU, that organization will take on the bulk of planning IT strategy initiatives for the future. The plan seems to concern itself mostly with catching up to Western Europe and Poland’s entrance into the “digital age,” and what happens after that entrance is complete is left up to the reader to imagine. It would be very helpful to be able to put the plan’s initiatives into a larger framework than that of the next five years.

Just as in the Four Eyes model, evaluating the plan on the basis of conception−reality gaps can be at times problematic. The plan fills out a number of ITPOSMO dimensions, such as technology, information, skills. Other dimensions, especially organizational dimensions such as management and structures, are not factored into expectations for success, although there are a few exceptions, such as the recognition in the plan that the static organizational structure and long history of the courts system may make the judiciary more resistant to change than other branches of government. Going on the content of the ePolska Plan alone, there is little information about what organizational conditions may do to influence the success or failure of the initiatives in the plan. In order to have a more complete picture of the ITPOSMO dimensions, it would be necessary to have a better picture of organizational conditions and relations than the one provided in the plan.

The Future of Public Information Systems in Poland

At some point in the long−range development of Poland’s information systems, integration of services and information will take place. The ability to access information from many disparate sources gives both public administrators and citizens a better understanding of government operations. One of the greatest obstacles to new initiatives in government is that separate agencies hold different pieces of information, each in a different format, and decision−makers do not have an integrated tool that allows to see the whole picture.

Imagine that a city is attempting to solve a problem with, say, pollution of its waterways and canals as a result of sewage leaking into local streams and creeks. The health department has data on diseases and bacterial counts and what residences and properties are within health code standards. The public works department has an information system that describes the state of the sewer system, where pipes run and how often they need to be maintained, and information on how much water moves through the system. State and national environmental officials have water quality data for the area’s rivers and streams. Zoning offices and the courts have information on property values in a geographic information system that allows mapping of the city by property values. Local statistics offices have information on demographics in the city. Only by accessing all of the data will public planners see that the sewage problem is worst in inner−city, low−income areas and that outbreaks of disease occur because of the sewage outfalls. While it is possible to get all the agencies to send their information to a central office that analyzes it and creates reports, it requires a lot of inter−agency collaboration and some sort of clearing−house for analysis. If agencies are required to meet standards for data integrity and fit into some sort of larger framework that has a tool for managing and analyzing information, then problems with managing collaboration are resolved, and the need for an analysis clearing−house is removed. One of the solutions that provides for integrating information across large agencies is data warehousing, where an all−encompassing database system is built that holds all of the data that the organization makes use of, and has some sort of tool manipulating and querying the entire system.

This monolithic approach to information management is useful in the private sector, where enterprise divisions may be regulated by strict rules, or in data−intensive research projects, where researchers are able to determine informational requirements from the outset and stick to them. In practice, agencies in the public
sector may be harder to manage, and the amount of information collected and processed by the government is extraordinarily large. Divisions between state, local and national levels of government may be barriers to instituting strict organizational requirements for data. Researchers working on collaborative projects in the life sciences have encountered similar obstacles to exchanging information, and some vendors, IBM especially, have begun researching solutions to allow querying and manipulation of large, dissimilar databases as if they were a single data warehouse. A sort of “federated” design, composed of many parts, but allowing access through a single interface, may be an effective solution to allow governments to manage the very large stores of data that they collect and process. The federated design makes use of software wrappers between each information system that act as translators between systems. Because access restriction may be required between branches or levels of government, the wrappers can be written to allow transactions to occur only when they are authorized. Government information requirements can be changed at a moment’s notice, and the use of a monolithic data warehouse would require that relationships would have to be created for the entire warehouse. A federated system would allow agencies to develop their own applications and data stores, which could be added or removed from the federation easily.

In order for a federated environment to be successful, the individual parts must be able to work together. The components of the federation will need some kind of guiding standards that are common to every component. For data to be able to be handled by the various parts of the system in a modular fashion, each piece needs to have some common characteristics that every part of the system can understand and retrieve information from. Without defining these standards before the creation of the parts that make up the modular system, pieces may not interoperate.

As governments begin to create large-scale transactional portals for service that cut horizontally across agencies and vertically between the local and national levels, integration of data and the ability to view the entire system as a whole will be more and more desirable. If all agencies and levels of government can conform to a generalized, open standard, it will be much easier to integrate services that come into being as a result of new developments. Modularizing information systems that fit into a larger whole will allow governments to make more efficient use of their systems. Duplication and disparities in data will appear much more quickly and may be rectified more easily. A single unified system will also allow participation in EU informational activities more easily than forcing each individual agency information system to interact. The trend of the EU is standardization, and it makes sense for Poland’s government to expect that information systems should be standardized. Even if Poland’s government does not use a federated data system, instituting a set of open standards for information will make it easier for agencies to exchange information informally.

**Conclusion**

Poland has limited resources to meet demands for information and information-based services. The ePolska plan is a good plan for the next few years of IT infrastructure development. The goals of the plan work together well, and measures include attempts to connect information with the end-user across the board, educating citizens in the use of new tools and bringing access to them in schools and public places. To date, the physical infrastructure sections, network and computer hardware, have been quite successful. Whether effective use will be made of these tools remains to be seen. While the plan is subject to the use of some buzzwords, the most of it is sound developmentally. Some of the measures in the plan are premature and could be replaced with more down-to-earth measures. Some foreseeable problems not mentioned in the plan that may present obstacles to successful implementation are the lack of unified standards for development of agency information systems and the difference between goals and Poland’s present situation. If all the parts of the plan are implemented well, Poland will have a healthy framework for providing information and services to its citizens and public administrators. The creation of infrastructure is the first step in improving service provision across the country and to the world.

Introduction
Poland must make the best of its limited resources and concentrate action and funding on the initiatives which will bring the most benefit and those that form the basis of more advanced initiatives in the plan. Improving markets for providing networks will allow initiatives such as telecommuting and telemedicine to be more effective in the future. Infrastructure is not the only area that should be concentrated on first. By improving skills and education for its citizens, Poland’s government can ensure that there is enough skilled labor for improvements to occur. Putting public services online will encourage private enterprises to take part in the Polish Internet. These parts of the plan should be concentrated on. Working on areas which require advanced infrastructure to bring benefits and are far from full development is largely a waste of time.

**Potential Problems and Solutions in the ePolska Plan**

<table>
<thead>
<tr>
<th>Weak Point</th>
<th>Possible Solution</th>
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<tr>
<td>Idolizing initiative:</td>
<td>Ensure that technology is not the only aspect of reform, but supports the change of processes behind the reform.</td>
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<tr>
<td>Over-relying on technology</td>
<td>Be flexible about responsibilities and directions</td>
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<tr>
<td>(Telework and Telemedicine)</td>
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<tr>
<td>Rational – Reality Gap:</td>
<td>Use the framework of the plan (as in Goal 0) to improve ISP service. Create incentives for Internet Service Providers to improve their own infrastructure. Ensure that wiring goes beyond city-to-city links and links universities and public kiosks.</td>
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<tr>
<td>Reorganization and new missions in mid-plan</td>
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<tr>
<td>Rational – Reality Gap:</td>
<td></td>
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<tr>
<td>Network infrastructure improvements may not reach all users</td>
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<tr>
<td>Rational – Reality Gap:</td>
<td>Ensure that teacher training initiatives are carried through for all teachers. Make the benefits of using computers clear to all levels and subjects. Understand that some unusual situations will occur, such as resource sharing and hoarding.</td>
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<tr>
<td>Introducing computer labs creates contestable resources,</td>
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<tr>
<td>teacher training may not keep up</td>
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<tr>
<td>Country – Context Gap:</td>
<td>Understand that Poland’s progress might not match that in the EU Make use of EU countries’ experience in implementing systems not yet finished in Poland, ie take advantage of being a late adopter of technology</td>
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<tr>
<td>Objectives of the ePolska Plan aligned with eEurope Plan create a larger jump for Poland than for EU countries</td>
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</table>

Simply building the infrastructure is not enough. It is analogous to building roads with no destination in mind. While Poland’s government is preparing to create physical channels of access to government services and information, it must build information systems and resources from the inside out, starting with public officials and eventually making systems accessible to citizens. Although sharing information between branches and offices is ideal, the creation of a monolithic information system is out of the question. Creating a system which deals with all of the information that government generates at all levels is simply too great of
a task. Poland’s government is in the midst of reform and preparations for EU membership, which means it must expect a large amount of reinvention. Building a monolithic system makes sense if a government is not anticipating change, but a federated system that allows interoperation between different systems and the addition of new systems is ideal for the environment that Poland expects to encounter. A federated system allows the inclusion of existing information systems and new systems into one cohesive system. Designers can create software wrappers between information systems that allow disparate systems to be used and viewed as a whole, while restricting access when necessary. Instead of building a large data warehouse to handle all of the information processed by the entire government, existing disparate elements can be brought into the system and new modules added. Poland’s government should create this system with a single portal for e-government services in mind. Following the path of infrastructure construction, Poland’s government should concentrate on building systems which will be used in the federated system, but first available only to public administrators and officials, then to organizations which require access to Polish government IS (e.g. contractors, nongovernmental organizations), and finally to citizens as they are increasingly able to access these systems. Officials will be able to use the capabilities of Poland’s information system to provide better service to citizens as the access channels are built. When the citizens of Poland are able to access these systems themselves, they will be part of an overarching information system that allows access across ministries and branches of government and at local, state and federal levels.
Institutions

CORS  \textit{Centrum Ogólnopolskich Rejestrów Sądowych}  Center of Nation–wide Court Registers

CSIOZ  \textit{Centrum Systemów Informacyjnych Ochrony Zdrowia}  Health Care Information Systems Center

IDN  \textit{Institut Dziedzictwa Narodowego}  Institute of National Heritage.

KBN  \textit{Komitet Badań Naukowych}  State Committee for Scientific Research.

KRRiT  \textit{Krajowa Rada Radiofonii i Telewizji}  National Television and Radio Council.

KUP  \textit{Krajowy Urzęd Pracy}  National Labor Office.

MEN  \textit{Ministerstwo Edukacji Narodowej}  National Ministry of Education.

MF  \textit{Ministerstwo Finansów}  Ministry of Finance.

MG  \textit{Ministerstwo Gospodarki}  Ministry of the Economy

MI  \textit{Ministerstwo Infrastruktury}  Ministry of Infrastructure

MKiDN  \textit{Ministerstwo Kultury i Dziedzictwa Narodowego}  Ministry of Culture and National Heritage

MSP  \textit{Ministerstwo Skarbu Państwa}  Ministry of the State Treasury
Intro

MSWiA  Ministerstwo Spraw Wewnętrznych i Administracji  Ministry of Interior and Administration

MSZ  Ministerstwo Spraw Zagranicznych  Ministry of Foreign Affairs

MZ  Ministerstwo Zdrowia  Ministry of Health

NASK  Naukowa i Akademicka Sieć Komputerowa  Scientific and Academic Computer Network

PFRON  Państwowy Fundusz Rehabilitacji Osób Niepełnosprawnych  National Foundation for the Rehabilitation of the Disabled

PIONIER  Polski Internet Optyczny – Zaawansowane Aplikacje, Usługi i Technologie dla Społeczeństwa Informacyjnego  Polish Optical Internet – Advanced Applications, Services, and Technologies for the Information Society

TPSA  Telekomunikacja Polska Spółka Akcyjna  Polish Telecommunications Company

URT  Urząd Regulacji Telekomunikacji  Office of Telecommunications Regulation

UZP  Urząd Zamówień Publicznych  Office of Public Procurement

ZUS  Zakład Ubezpieczeń Społecznych  Social Insurance Agency

Glossary of Terms and Abbreviations

GIS  Geographical Information Systems.
GPS  Global Positioning Sensor.

ISDN  Integrated Services Digital Network. A technology for data transmission, it is always on and faster than standard modem–based (PPP) connections.

ISP  Internet Service Provider. Firm providing Internet service to people and businesses.

ITS  Intelligent Transport Systems.

MAN  Metropolitan Area Network.


PESEL–NET  Polish network connecting provincial information centers.

POLWAN  Polish regional digital police network.

PPP  Point–to–Point Protocol. A standard for transmitting Internet packets over serial and phone lines

REGON  Rejestr Gospodarki Narodowej. National Register of Economic Entities.

SMS  Short Message System. A means of sending short text messages to and from mobile telephones

Telework  Technology which allows employer and employee to be in physically distant places.
Uniwersalne Komputerowe Stanowisko Pracy
Universal Computer Workstation. A secure personal computer system with hardware authentication.

Urzędomat
A government office kiosk.

WAN
Wide Area Network.

WAP
Wireless Application Protocol. Protocol allowing applications and data to be sent to mobile telephones and devices
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[27] Heeks, p59.


Possible Solution