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AN APPLICATION OF UNDP PROPOSAL FOR IT DEVELOPMENT OF IRANIAN GOVERNMENT

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Abstract

Nowadays Information Technology (IT) allows governments to serve its citizens in a more effective and efficient manner. The United Nation Development Programme [UNDP, 2001] has introduced the framework of "Development Dynamic" which consists of five important interrelated areas for the enablement of IT. This provides an IT policy tool that can be used by the government within developing countries. This paper seeks to extend it for IT development of the Iranian government. For this purpose, primary elements of the intended model are derived through a few popular IT development models, literature, and expert opinion. Finally, a survey is conducted in order to validate the model.

Keywords: e-Government, information technology development, development dynamic, information society, national information infrastructure (NII).

1. Introduction

Two of the most powerful forces presently in the world are the spread of Information and Communication Technology (ICT) and the global effort to achieve more widespread social and economic development. It has long been suggested that these forces are in opposition: the development agenda aims to help developing countries make great strides forward and thus to close the gap between rich and poor countries [UNDP, 2001]. Information Technology (IT) strategies in developing countries' governments should firstly target the improvement of their operations and processes and also the level of the government's ability to cooperate. This new unavoidable position for the world governments is now referred to as good governance [Zhang, 2004]. Many national, state, and local governments are developing tools to assist managers to make decisions concerning IT investment and implementation.

Acknowledging the necessity of utilizing the new electronics, information, and communication technologies, the movement toward the implementation of IT projects has recently received the attention of the authorities and policy makers throughout the world. This vision of "enabled government" has offered a momentous opportunity for developing countries to improve and streamline their government's operations, provide breakthrough performance, and reduce their existing gaps with developed countries. Information managers in government must be aware of the many problems including both organizational or technical [Asproth, 2005] which are likely to appear.

It is highly likely that these can be prevented by having an appropriate reference model which can also assist the government's IT leaders to save both money and time by conducting all the necessary projects and activities in a timely manner.

Research objective:

Reducing cost and wasted time, increasing user participation and the quality of government services

Based on this viewpoint, a customized approach to IT development of government is required because: (1) Current IT development models are rarely applied in the field of governance; and (2) Each country's government requires its own unique model of IT development because of cultural, economic, technical, political and social differences. For example, while IT literacy is a big concern for Iranian top IT managers; it is not a significant problem for Danish counterparts (according to the Economist Intelligence Unit 2007 statistics: Denmark e-readiness rank: 1st, Iran e-readiness rank=69th). Consequently, the main purpose of the paper is to develop a model for IT development in the government, so that policy makers will be assisted in choosing strategically aligned ICT initiatives for implementation and to streamline their workflows and thus assist citizens to be served more effectively and economically. Therefore, this paper intends to answer the following research question:

Research Question:

What is the appropriate model for the IT development of Iranian government?

We have chosen the "Development Dynamic" framework of UNDP as the basis for this study because it identifies the key areas that should be addressed in each national IT initiative, and has attempted to elaborate a relatively comprehensive model. In this research, after conducting a review of related literature, a broad search has been performed on a variety of global IT development models, which are proposed for application within national environments. Our proposed model has been generated based on these and has been enriched by studying the literature and some technical reports. In addition some interviews have been conducted and validated by a questionnaire survey given to the experts involved. This paper is divided into six sections including these introductory comments. Section 2 provides a review of e-government research and relevant issues. Section 3 describes three significant IT development models. Section 4 presents research methodology, section 5 shows the findings of the study, followed by some conclusions.

2. Literature Review

This section focuses on providing a list of research within governmental IT development. Electronic manifestations of government offer new levels of access to government information and services [Jaeger, 2004]. For example, e-government is considered as a technology which has the ability to assist in the simplification and automation of transactions between governments and constituents, businesses, or other governments [Sprecher, 2000]. The term e-government is of recent origin and the research and practice is still in its infancy [Löfstedt, 2005]. IT has the potential to transform government structures and to improve the quality of government services. Technology provides two main opportunities for government: (1) increased operational efficiency by reducing costs and increasing productivity, and (2) better

quality of services provided by government agencies [Gil-Garcia et al., 2005]. However, a holistic developmental approach provides some important guidelines involved in addressing different aspects, which may have an impact on advanced governmental systems [Wimmer, 2002].

In the literature, there are a considerable number of papers regarding IT development within governments. Most notably, Layne and Lee [2001] presented a four stages model offering a path for a government to follow and suggested challenges, from both organizational and technical aspects. Later, a maturity model was proposed whose main focus was based on the front-end of e-government [Andersen and Henriksen, 2006]. Table 1, introduces 6 papers which were found in the *Science Direct* database which are related to the subject of this paper; and, provide some useful information such as their contributions, research method, countries examined, author and year of publication.

Author	Contribution	Research method	Countries examined
Joia et al. [2004]	A heuristic model for developing G2G enterprises	Case study	Brazil
Sharifi et al. [2004]	An adaptive approach for implementing e-government	Case study and action plan	Iran
Andersen et al. [2006]	e-government maturity model	Empirical study	Denmark
Wimmer et al. [2002]	Important guidelines to addressing different aspects impacting governmental systems	Case study and survey	Europe
Layne et al. [2001]	A model for developing fully functional e-government	Observation and action plan	US
Stratford [2004]	Developments in US e-government efforts	Case study	US

Table 1. Summary of Related Research Papers

3. IT Development Models

In this research, after the completion of the literature review, a broad search was made on IT development models. Although, many models were found regarding IT development, only three models were selected for the following reasons:

- They had been offered by highly prestigious international institutes.
- They had been offered for application within the national environments.

The models are: (1) "Development Dynamic" of United Nation Development Programme (UNDP), (2) "Mosaic Group" methodology of International Telecommunication Union (ITU), and (3) "National Information Infrastructure" framework of Computer System Policy Project (CSPP).

3.1. Development Dynamic

Development-focused ICT strategy uses as it leverage the powerful synergies of ICT acting as an enabler of both social and economic development. In this regard, the United Nation Development Programme [UNDP, 2001] proposed a framework entitled: "Development Dynamic" (see Figure 1) and they point out five important interrelated areas for strategic intervention: *policy*, *infrastructure*, *enterprise*, *human capacity*, and *content and applications* (these will be referred to as the components of the dynamics and are explained in section 5). Our model is intended to be developed based on these five enabling concepts, through their subsequent analysis and by means of fine tuning.

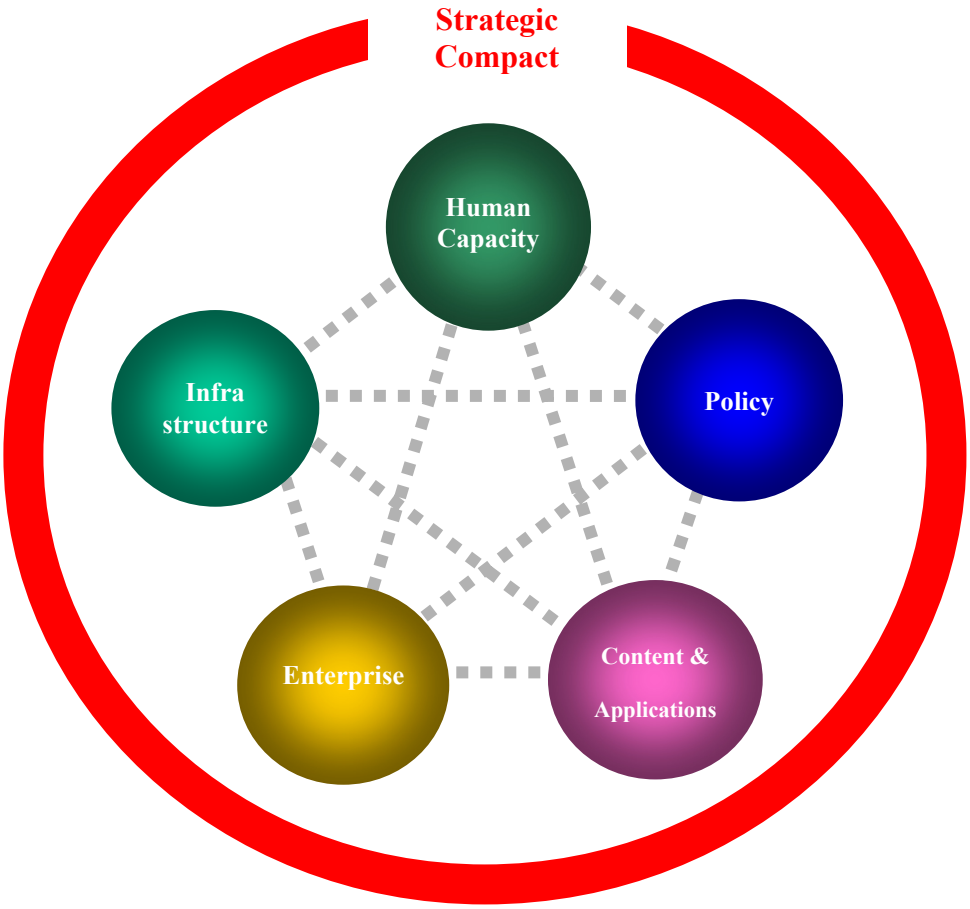

Figure 1. Development Dynamic framework. Source: [UNDP, 2001]

3.2. Mosaic Group

Mosaic group methodology (see Figure 2) looks at the diffusion of ICT in the public sectors. It touches on issues such as isolation and undersized markets that countries face in adopting ICT [ITU, 2002]. It also examines how government can evolve into an information society, which is particularly relevant in the context of the World Summit on the Information Society (WSIS) [WSIS, 2004]. This methodology has been developed by ITU in order to characterise the state of the Internet in an economy. Mosaic considers six factors as follows (each factor is explained in section 5):

• *Pervasiveness*,
• *Geographic dispersion*,
• *Sector absorption*,
• *Connectivity infrastructure*,
• *Organizational infrastructure*; and
• *Sophistication of use*.

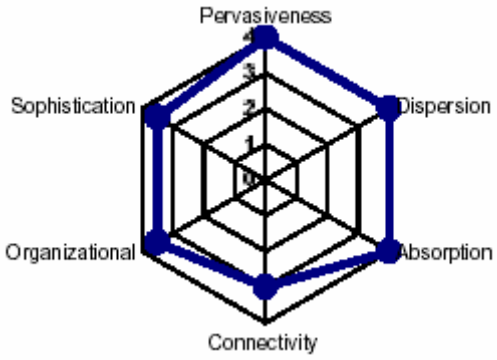

Figure 2. Mosaic group methodology. Source: [ITU, 2002]

3.3. CSPP framework

CSPP has identified the following eleven important public policy principles that will have to be addressed jointly by the public and private sectors before the information infrastructure can become a reality (each principle is explained in section 5). CSPP looks forward to working with the new Administration, new Congress, and other industry groups to address these issues [CSPP,1993].

1. *Access*,
2. *First Amendment* – To ensure freedom of expression in an NII, First Amendment principles guaranteeing freedom of speech, as articulated by U.S. courts, should apply to electronically-transmitted communications.
3. *Privacy* – Consumers of NII services have a right to privacy in their use of the NII.
4. *Security*,
5. *Confidentiality*,
6. *Affordability*,
7. *Intellectual Property,*
8. *New Technologies*,
9. *Interoperability,*
10. *Competition*,
11. *Carrier Liability* – Information services carriers and distributors who have no editorial control over the contents of electronic information should not be liable for the content of the information transmitted over the NII.

4. Methodology

The research question calls for a qualitative approach. As it was mentioned previously, the basis of the model was founded on the five enabling concepts of

"Development Dynamic" and the attempt was to enrich it through fine tuning. After analyzing the three aforementioned models, a primary model was explored. The next step involved a series of in-depth interviews with some academic experts. These interviews were transcribed and systematically analyzed in order to identify the underlying concepts and assumptions that they hold. The objective of these interviews was to identify the issues perceived by these experts in order to add new elements which can complete and enrich the model. As a result, five important elements were explored, as shown below:

- E-readiness
- IT literacy
- Web portal
- User friendliness
- Out sourcing mechanism

A structured questionnaire was designed, which consisted of elements derived from the primary model and this acted as the basis for the survey set up with the governmental authorities. The top-level agency heads and directors of eight Iranian government departments were targeted. The open-ended questionnaire was distributed to these authorities at their workplaces. All of questionnaires were completed within a six-week period. The questionnaire was designed to reveal the opinions of the experts concerning the significance of each of the primary model elements. A five-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) was used in this research to determine the weight of each element. Finally, the assumption was made that each element with an average score of 4 or more at the end of survey would be included as part of final model.

5. Findings

After analysing the results of questionnaires, the elements whose average weights were 4 or above (in the 5 point Likert scale) were placed together with the related components of "Development Dynamic". It was possible to act in this was because of the comprehensiveness of this framework (see Figure 3). In total, 19 elements were categorized into five interrelated components: *policy*, *infrastructure*, *enterprise*, *human capacity*, and *content and applications*. They are briefly presented below in related categories.

5.1. Infrastructure

This refers to a reasonable level of global connectivity and network infrastructure capacity for key sectors in order to take advantage of leading edge technologies. This is in addition to interventions to promote ubiquitous access through universal access funds and the support of community networks and public access points. This category contains *Geographical dispersion*, *Connectivity infrastructure*, and *access*; which are described below:

5.1.1. Geographical dispersion

This means concentration of the Internet, from none or a single city to nation wide availability. The facilities can cover more places and enable the public to:

- Access government information through the government home pages;
- Members of the public can use the facility for e-mail communications;

• Browse other Internet web sites; and
• Access to Electronic Service Delivery (ESD) for those families without personal computers (PCs); and etc.

5.1.2. Connectivity infrastructure

Infrastructure is generally a set of interconnected structural elements that provide the framework supporting an entire structure. The term has diverse meanings in different fields. Infrastructure may refer to information technology, informal and formal channels of communication, software development tools, political and social networks, beliefs held by members of particular groups. In this regard international and domestic backbone bandwidth is very important.

5.1.3. Access

All individuals must have access to the national information infrastructure because of the essential role of citizens in the government's IT growth. The greater the number of people who have access to the national network infrastructure, the greater the efficiency earned by the government.

5.2. Content and Applications

ICT capability to achieve developmental goals will not be effectively achieved without content that is responsive to the users' needs and local conditions and building applications that are focused on achieving these goals. This category contains *Sector absorption*, *Sophistication of use*, *security*, *confidentiality*, *Web portal*, and *user friendliness*; which are described below.

5.2.1. Sector absorption

This refers to a degree of IT application in the various fields. Internet should be utilized within education, commerce, health care and other public sectors. IT usage in a wider range of contexts results in a higher rate of IT development.

5.2.2. Sophistication of use

IT usages differentiate between the conventional and the highly sophisticated. However, it is important to use both those that involve high priority and innovativion. One example is in the use of the Internet rather than traditional media (e.g., newspapers, radio, television) to keep up-to-date with current events. At present it appears that the major purposes for using the Internet in Iran are conventional (e.g., communicating with others, surfing and searching), there are signs that the Internet is beginning to be used more widely.

5.2.3. Security

Information available through the NII must be protected against unauthorized access, tampering, and misuse and to be consistent with the application requirements and the desires of the user. If users feel that a virtual environment is as safe as a physical one then it will certainly become preferable to interact with the government more electronically.

5.2.4. Confidentiality

Users must be convinced about the confidentiality of communications and the data. If government employees and citizens are confident that their data and communication

will not be accessed by people or organizations that they do not want, then participation will increase.

5.2.5. Web portal

At the end of the dot-com boom in the 1990s, many governments had already committed to creating portal sites for their citizens. One of the issues with reference to governmental web portals is that different agencies often have their own portals and sometimes a statewide portal-directory structure is neither sufficiently sophisticated nor deep enough to meet the requirements of multiple agencies. In conclusion, an attempt should be made to maximize citizens' participation by creating appropriate web portals with well-classified information and e-services.

5.2.6. User friendliness

One way to increase user participation is by providing maximum user friendliness for the applications. User friendliness is a general term used to describe the degree to which a system is usable by as many people as possible. In other words, it is the degree of ease with which it is possible to reach a certain location from other locations. This should not be confused with usability, which is used to describe how easily an entity (e.g., device, service, the environment) can be used by any type of user.

5.3. Human capacity

Basic literacy is of crucial importance for development and, as such, is one of the imperatives adopted by the UN Millennium Summit. However, for the purposes of adopting a strategy that deploys ICT as an enabler, it is not an absolute requirement that a country begins with a high literacy rate. Also, in order to deploy ICT for development, it is important for countries to achieve a critical mass of knowledge workers, intermediaries and technology, and motivated entrepreneurs. This category contains *Pervasiveness*, *E-readiness*, and *Information literacy*; which are described below.

5.3.1. Pervasiveness

It means users per capita and the degree to which non-technicians are using the Internet and affect the IT development of government. Each citizen must have affordable access to all the modern telecommunication services available today. Every family requiring a telephone to be able to call a relative in another community or overseas should be able to do so with little difficulty and at an affordable rate. The most fascinating development in IT has been the popularization of the information super-highway yet it remains an absolute luxury because of the high cost of access.

5.3.2. E-readiness

Another important effective factor is the readiness of users for the deployment of IT initiatives. E-readiness is the ability to use ICT to develop the economy and to foster the welfare of the country. There are several benchmarking indices at the macro (also called global, universal, etc) level, e.g., those calculated by the UNPAN, World Bank, Economist Intelligence Unit etc.

5.3.3. Information literacy

Users should be familiar with IT advantages and Internet usage in order to accelerate IT development. Several concepts and definitions with regards to information literacy

have become prevalent. One concept defines information literacy in terms of a set of competencies that an informed citizen of an information society ought to possess to participate intelligently and actively in that society. Jeremy Shapiro and Shelley Hughes [1996] define information literacy as "A new liberal art that extends from knowing how to use computers and access information to critical reflection on the nature of information itself, its technical infrastructure and its social, cultural, and philosophical context and impact".

5.4. Policy

The overall policy environment, the degree of transparency and inclusion, and, more specifically, the regulatory environment, can all have a major impact on the development dynamic. In addition, key policies in each of the strategic action areas as well as policies supportive of fair competition and property rights, are important to harness the potential of ICT to achieve the development goals. This category contains *Affordability*, *Intellectual property*, *New technologies*, and *Interoperability*; which are described below.

5.4.1. Affordability

An affordance is an action that an individual can potentially perform in his environment. However, the more exact meaning depends on whether the word is used to refer to any such action possibility or only to those which the actor is aware of, both of which are common uses. However, to promote maximum use, the NII must be affordable for the users including citizens and businesses.

5.4.2. Intellectual property

Intellectual property (IP) laws confer a host of exclusive rights in relation to the particular form or manner in which ideas or information are expressed or manifested, and not in relation to the ideas or concepts themselves. The term "intellectual property" denotes the specific legal rights which authors, inventors and other IP holders may hold and exercise, and not the intellectual work itself. Several authors have emphasized the problem associated with how to ensure authenticity and how to preserve the evidence [Bearman, 1994; Duranti ,2001; Rothenberg, 2000; Wilson, 2000]. Intellectual property laws are designed to protect different forms of subject matter, although in some cases there is a degree of overlap.

- *Copyright* may exist in creative and artistic works (e.g. books, movies, music, paintings, photographs, and software) and give a copyright holder the exclusive right to control reproduction or adaptation of such works for a given period of time (historically a period of between 10 and 30 years depending on jurisdiction, more recently the life of the author plus several decades).
- A *patent* may be granted for a new, useful, and non-obvious invention, and gives the patent holder the right to prevent others from using the invention without a licence from the inventor for a given period of time (typically 20 years from the filing date of a patent application).
- A *trademark* is a distinctive sign which is used to distinguish the products or services of different businesses. An industrial design right protects the form of appearance, style or design of an industrial object (e.g. spare parts, furniture, or textiles).
- A *trade secret* (which is sometimes either equated with, or a subset of, "confidential information") is secret, non-public information concerning the

commercial practices or proprietary knowledge of a business, public disclosure of which may sometimes be illegal.

To sum up, the fundamental principles such as copyright should apply to the governmental electronically available information.

5.4.3. New technologies

While impossible to anticipate all of the technologies that will eventually be part of the NII, the political and regulatory environment must encourage the development of new technologies and their incorporation in the NII. These technologies can update IT initiatives in government and increase its performance.

5.4.4. Interoperability

Interoperability is connecting people, data and diverse systems. The term can be defined in either a technical or broad manner, taking into account social, political and organizational factors. In telecommunication, the term can be defined as:

- The ability of systems, units, or forces to provide services to and accept services from other systems, units or forces and to use the services exchanged to enable them to operate effectively together.
- The condition achieved among communications/electronics systems or items of communications/electronics equipment when information or services can be exchanged directly and satisfactorily between them and/or their users. The degree of interoperability should be defined when referring to specific cases.

The NII must support maximum interoperability among networks both in the country and internationally.

5.5. Enterprise

Given the important role played by the private sector in developing ICT infrastructure, creating jobs, and fuelling growth, supportive conditions and prospects for endogenous and sustainable wealth creation are central to the workings of the dynamic. This category contains *Organizational infrastructure*, *Competitiveness*, and *Out-sourcing*; which are described below.

5.5.1. Organizational infrastructure

The state of private sector companies which serve the government and citizens such as the Internet Service Provider (ISP) industry and market conditions is important for governmental IT development.

5.5.2. Competitiveness

Private sector companies must be free to compete with each other for in-house governmental IT projects. The greater the competitiveness between companies, the greater the opportunities for more high quality services to be accomplished.

5.5.3. Outsourcing

This means updated governmental rules for supporting the IT private sector in order to activate outsourcing mechanisms which have the ability to reduce the governmental load. Outsourcing involves the transfer of the management and/or day-to-day execution of an entire business function to an external service provider [Overby, 2007]. The client governmental organization and the supplier company enter into a contractual agreement that defines the transferred services. Under the agreement the

supplier acquires the means of production in the form of a transfer of people, assets and other resources from the client. The government organization agrees to procure the services from the supplier for the term of the contract.

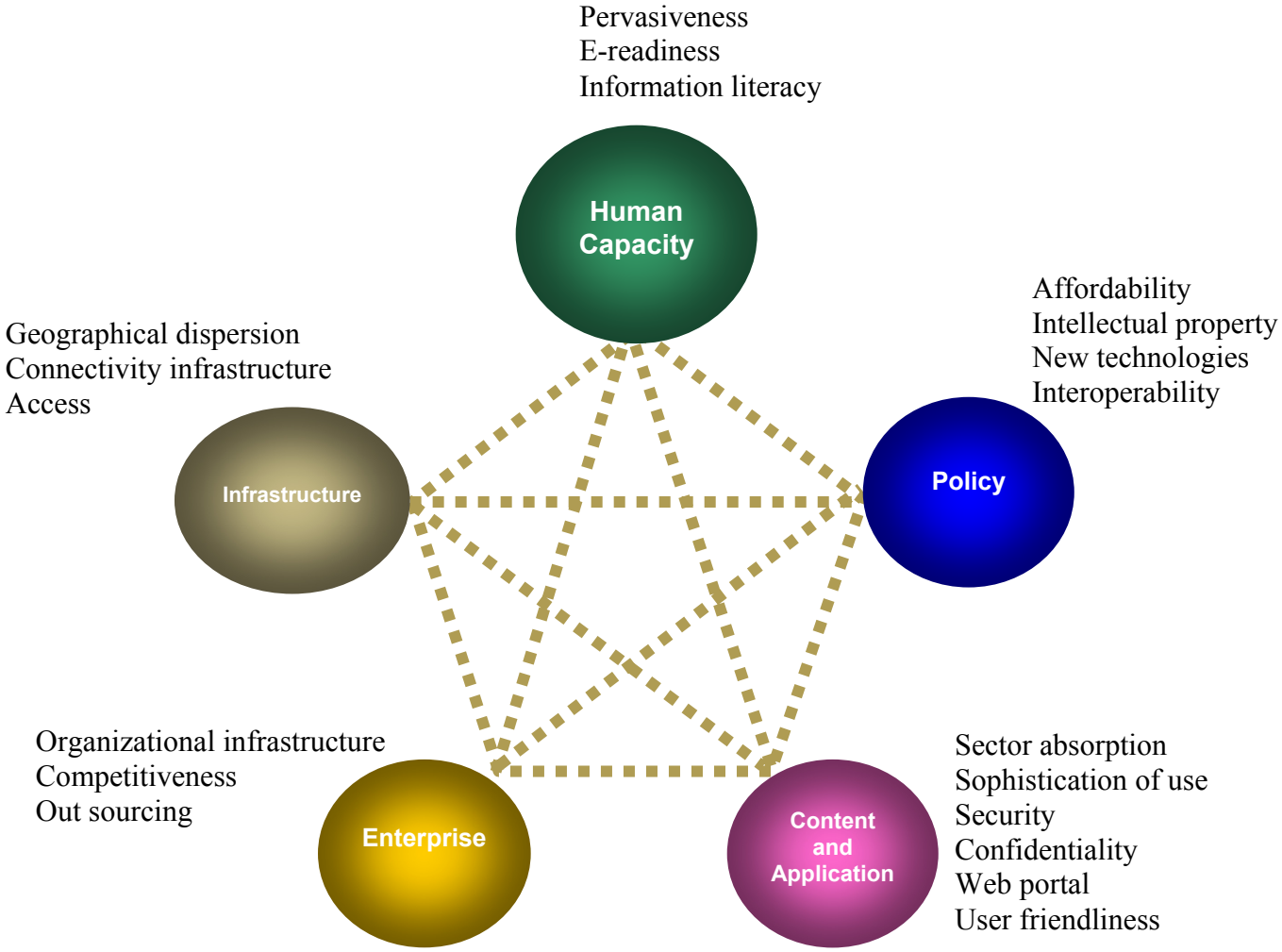

Figure 3. IT development model of Iranian government

6. Conclusion

One of the most important preconditions for the eventual development of the Information Society is IT development within the government. Indeed, by following a reference model this could assist the government policy-makers to possess sufficient insight in order to achieve national IT development goals. Additionally, it assists them to save money and time by timely conducting all the necessary projects and activities.
In the model proposed here, 19 elements were categorized into five interrelated components including: policy, infrastructure, enterprise, human capacity, and content and applications.

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