

# BOSTON CONSULTING GROUP (BCG) MATRIX ANALYSIS DURING THE STRATEGIC PLANNING OF GOVERNMENT ADMINISTRATION INFORMATION SYSTEMS (GAIS)

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*This paper deals with the BCG matrix analysis applied during the Strategic Planning of a selected group of Government Administration Information Systems (GAIS) i. e. Customs Administration Information System (CAIS), Tax Administration Information System (TAIS), Treasury Information System (TRIS) and Local Government Information System (LGIS).*

*This selection is taken to be a representative corpus of the GAIS.*

*The characteristics of the GA members will also be mentioned. These include its importance, non-profit making, availability, privacy and confidentiality, complexity, its common data bases, interconnections, fast growth and changes, international profile, changes, vulnerability, education and the high costs.*

*The BCG matrix analyses are made on the activity level of GA members.*

*A possible common BCG matrix of GA on its activity level will also be discussed.*

**Keywords:** BCG-matrix, strategic planning, information systems, government administration.

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## 1. INTRODUCTION

The subject that will be dealt with in this paper are the Government Administration (GA), Government Administration Information Systems (GAIS) and its Strategic Planning. These analyses are mainly based on the documents of GZAOP (Gradski Zavod za automatsku obradu podataka, Zagreb- Municipality of Zagreb Data Processing Centre). GZAOP runs CAIS, TAIS and LGIS.

BCG matrix analysis will be used to support the Strategic Planning of the Information System (SPIS). A separate BCG matrix will be applied to each of the selected GA members, and then, if possible, they will be brought together into the common matrix. We will start with the a profile of the GA and as briefly as possible find out why GA processes [11] are of such great interest and why they are investigated so much. In this paper we are dealing with only 4 GA members, and each has the specific aims to support the international trade (CA), to support the collection of taxes and money duties (TA), the Treasury activities (TR) and the local government processes (LG). Let's look at some of the basic GA characteristics.

The following is based on a profile of GA processes, so its supporting GAIS should be considered under the following characteristics: *the main aim, its importance, non-profit making, the availability, privacy and confidentiality, its complexity, the common data bases, interconnections, fast growth, its international profile, the changes, vulnerability, education and the high costs* to run it. After profiling the GA, it will become clearer as to why we pay so much attention to the Strategic Planning of the Information Systems (SPIS) for this environment.

*The main aim* is the right answer to the SPIS question: What we would like to achieve? Where will we go to? The basic and common aim of the GAIS is to give the best possible support to the GA processes, e.g. to improve GA services to the GA, or (more importantly) to the citizens, at a lower cost. It is performed by a separate IS, that are members of the GAIS, which should work together but they don't, as for yet!

*The importance of the GAIS should be regarded as the most demanding task because of the fact that* every modern government can function only when it has strong IT/IS support [06], [07]. The IS like the Customs Administration Information System (CAIS), the Ministry of Interiors Information System (MIIS), the Ministry of Defence Information System (MDIS), and the Health Insurance Information System (HIIS), all give vital support to the GA processes.

GA activities are *non-profit making* activities, so the GAIS is also a non-profit making job. The DP Centre is usually a part of the GA, e.g. it is not on the open market and the rules of market competition are not applicable [02]. It means a guaranteed job and protection from market stress. But, SP is still crucial while running IT/IS support, as it should obey the rest of GAIS characteristics that have been mentioned here. This characteristic makes this investigation so special and very different to standard business process analyses.

*Its availability* should be 365 days a year, 24 hours a day. It requires all sorts of back-up systems such as CPUs, data bases, FEPs, lines, modems, terminals, and people. The required HW resources to do this demanding job will be discussed in more detailed in section 2 of this paper and will be based on a typical Governments Data Processing Centre (GDPC).

Although most of GA data is not confidential, it is usually related to the *privacy* of the person or business. Here we need to mention that some data (MIIS or MDIS) are by nature, confidential and they are protected by rather sophisticated software and hardware methods.

As the GAIS is a set of hundreds of IS, its *complexity* is obvious [07]. This complexity should be regarded from the point of the enormous variety of its processes, its large data networks, data consistency, data reliability, data security and data availability.

The variety of the GA processes vary from income tax collection to welfare action, as in public health protection etc. Using these facts, this paper deal with the four the most significant government activities, namely the tax office, the custom office, the treasury and the local government. These activities are IT/IS supported by the Tax Administration Information System (TAIS), the Customs Administration Information

System (CAIS), the Treasury Information System (TRIS) and the Local Government Information System (LGIS) and these points will be discussed later.

*Common databases* are crucial [10] in providing the data consistency to the GAIS for specific databases like citizens register, the cadastre, space location unit names, law acts etc. They should be created and up-dated by only one institution and then made available to the others. At the same time, this significantly lowers the costs of the GAIS.

*Interconnections* should be looked at in terms of the GAIS members and the connections outside the GAIS group. Electronic Data Exchange (EDI) usually uses the Telecom and Internet services. Private networks are applicable for the police and the army.

Inside the GAIS group, each member can share the DP functions such as book-keeping, administration, document circulation, Web applications, mail and most importantly the common data bases. Outside the group more significant connections are with the Chamber of Commerce members, or banks and via the Internet specific international databases like stock exchanges, knowledge bases etc.

*Fast growth*, which is between 20% and 30% per year with regards to the number of the on-line transactions, and the growth of the batch processing which is around 20% per year [07]. It means that every 2-3 years GAIS needs new HW/SW solutions. The best thing to do is to rent a host configuration, otherwise it is too expensive to buy a new one every couple of years. Fast growth also implies the need for continuous staff education, performance analysis and a continuous improvement or radical reengineering of the main business processes.

*The International profile* of the members of the GAIS is so obvious because all countries have quite similar GA processes. The differences are so insignificant that the idea of making the GAIS a commercial product seems possible. It looks like this will only a matter of time seems only the matter of time.

*The fast changes* in the GA processes have two important aspects: the frequency and the short time that is available for applying them inside the GAIS. In fact GAIS has to follow all the laws and regulations concerning changes. The DP people have to, more or less, read, understand and insert those changes into the GAIS members. Our country was and still is in transition, and this means there are a lot of changes to the existing laws, and there are changes made when new laws are written. There are thousands of them and we witness these changes almost daily.

*Vulnerability* is in the network environment because of the viruses, misuse and intentional or unintentional damages. A series of precautionary measures, HW (e.g. back-ups) and SW (e.g. pass words) should be applied.

*Education* first of all has a precautionary multi-level structure, from the terminal user to the DP specialists. Education uses continuously be applied to the IT changes. There are enormous number (up to hundred thousand) of people using the terminals (usually "smart" workstation). This means an "army" of people need to be educated. We have not mentioned the additional PC tool users or the DP specialists yet. DP

knowledge has already got an important place in the job application form. To conclude we can say that education in the GAIS area is rather complex and never ends job.

**High costs** On top of everything, GAIS is a very, very expensive IS complex. Roughly estimating, for example, one typical GAIS DP Centre (to be explained in the next chapter) costs over US \$ 10M per year. We must pay special attention to this fact during the SPIS phase. Here we simply must mention manpower costs. About ¼ of total costs are salaries. And let's say there are 250 people per Government Data Processing Centre (GDPC). For about three or four month a year GDPC needs 300 people, but for the rest of the year the DP load can covered by 100 people. In the near future it will be probably less expensive to hire an outsourcing SW company then to keep 250 people for the whole 12 months. Costs deserve, in any case, a much more sophisticated analysis and this will be the topic of some other paper. Now we only need to mention the fact that GDPC must run according to the ISO 9000 in order to standardise its activities and in order to be ready to use the outsourcing SW company.

## **2. TYPICAL GOVERNMENT DATA PROCESSING CENTRE (GDPC)**

A typical GDPC (Fig. 1) is only used to illustrate the required GAIS HW resources, the other resources have already been mentioned but they cannot be discussed because of the volume restrictions on this paper. The host is configured on a base of the multiple CPUs (usually 3, e.g. IBM CPU with 335 MIPS-6GB, 3XS390 9672-R25)) which are running in a parallel mode while giving each other backup. A test machine should be separated from the production one, and this will give the programmers the freedom to do tests during the real production run.

External disk memories are about 1000 GB with "mirroring" (RAID). They also have dislocated safety storage (cartridges), multi protocol access (TCP/IP, ATP) and collaborative work with customers (e.g. Lotus Domino). (Maček V, Brumec J. 1999). Main frame units are interconnected by fibre optic links. The data communication network of 5000 to 10000 terminals are distributed all over the country usually for tax, custom and local government (registry office, voters' register) purposes. The rate of on-line transactions is about  $2 \times 10^6$  per day or it may be even more.

## **3. SPIS IN THE GAIS ENVIRONMENT**

We can imagine that one day ("Once upon a time ..."), Mr. Bill Gates of Microsoft said to himself, let's make ICONS instead of the instructions to run MS DOS. And then the Strategic Planning (SP) was done. (Well, the story is little bit longer and starts with icons idea of Xerox, Atari GEM, McIntosh, IBM-MS Win 3.1 and after their "divorce", OS/2 of IBM and Win95 of MS were born). Anyway, Mr. Gates recognised the proper value of icons and said WHAT should be done. WHAT was enough? Who, when, how, where etc. come later.

It is the same for the SPIS of GAIS. Only instead of ICONS there will be some less brilliant idea namely, better support to GA via better strategic planning. Of course, it is too general task, because we always tend to do things better, but even so, in this

case we know that the Strategic Planning of GAIS was never properly done. So we know WHERE we go to, e.g. we know WHAT we want to achieve.

First of all way do not we make the most adequate definition of the SPIS for the GA and the GAIS complex. The SPIS is, by definition, given by Brumec (1997) "SPIS is a long range planning of the useful effects of IS and IT implementation in business within the strategic planning of the whole business system development". Brumec (2000) made the additional remark that "Strategic planning means tuning of the company resources with the surrounding impacts". We have considered definitions given by Mintzberg (1979), Johnson and Shoes (1993), Bryson (1995), and Robson (1997). Finally, we can reaffirm the definition given by Maček and Brumec (1999) that "the SPIS for GAIS is the long range planning of the useful effects of IT implementation, under the general planning strategy of performing and improving government activities".

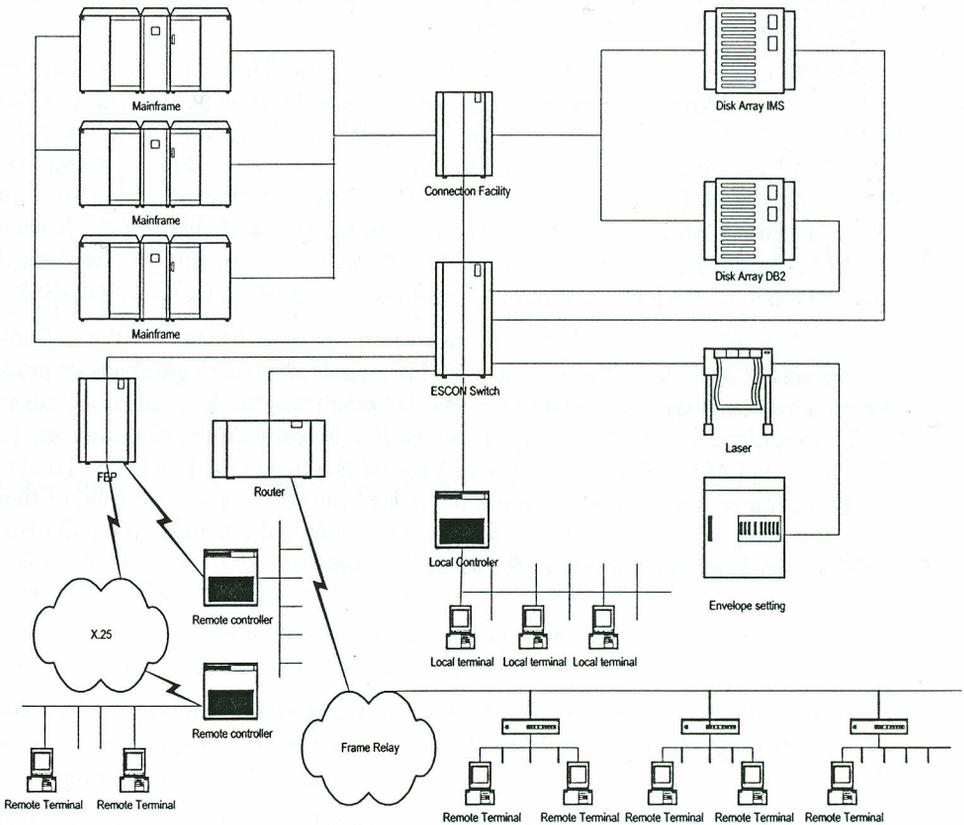


Figure 1: A typical Government Data Processing Centre and its adequate network

It means that the strategic plan for the GA will be based on the investigation of WHO (Who, what and way) are we now, WHAT (what we want to achieve and why) and HOW (how to get there). This is our first strategy, the GA strategy. By looking at this we will be able to create GAIS strategy and its adequate IT strategy.

#### **4. THE BCG MATRIX OF THE GA PROCESSES**

Among the long line (BSP, BSS, BPR, 5F, SWOT, E/M, VCM etc.) of positively verified methods to analyse the business system processes, the BCG (Boston Consulting Group) matrix seems at the SPIS stage of GAIS, a short and clear analysing method. This statement is true if we consider the single GA member, but it is even more appropriate if we treat the whole group of GA members. A selected group of GA businesses for the Tax office, Custom office etc. can be easily compared and contrasted by the BCG matrix. The best explanation is given by Robson W. (1997) who said: "The matrix produced by BCG is a tool that is so familiar to business analysts that using this technique, along with SWOT, has become to be regarded as an effective minimum standard in assessing organisations."

SWOT (Strengths, Weaknesses, Opportunities and Threats) in assessing the GA can be used as a kind of 'pocket sized' method. It is the four fields matrix, which can be filled by following the 7 steps, suggested by Weihrich (1982). Strengths and weaknesses will classify the internal circumstances of the GA, while opportunities and threats will define its external circumstances. Anyway, further investigations into assessing organisations are inevitable. The aforementioned statement of W. Robson, for GA SPIS purposes, can incorporate BSP method too. Then the proposed minimum standard chain of methods in assessing organisation would be BCG-SWOT-BSP.

As when as this, the BCG two by two matrix is very flexible in the definition of the subjects of its fields. They can classify businesses, divisions, products or processes. We are concerned with processes here. For GA analyses, the level of processes will be used, recognised by BSP method in our earlier investigations, Golec *et al.* (1994), GZAOP's on TAIS, CAIS materials and Vidović S. (ed.) (1992) on TRIS. To avoid the fact that some of the processes should be located into more than one field of their two by two matrix, we will explain this so as not to confuse the matrix. We will also try to build up common, general matrix for the GA processes.

Table 1. The BCG-matrix of GA activities and their importance vs. their independence on IS/IT

		The importance of the GA activities	
		LOW	HIGH
The dependence of the GA activities on IS/IT support	HIGH	These GA activities are now rather undeveloped but are very promising for the near future. These are rather young activities, based on new demands or new possibilities. Risks are high and those investments needed to purchase the new services should be carefully analyzed. In the future these activities are expected to be of mayor importance.	These GA activities give a good service and they are expected to do so in the future. An increase in service variety and quality is expected. IS/IT usage is high enough to increase the level of service. Theirs further development makes these activities even more important.
	LOW	These GA activities provide services of relatively small importance. An increase in volume and importance is not could expected here. IS/IT usage is low and could be increased.	These GA activities provide a good standard services. They form the major source of GA information. They are not expected grow significantly. IS/IT usage should be increased to improve the service level. These activities are of major importance.

In this case the BCG matrix's fields show the relationship between the importance of the GA processes and its dependence on IT/IS support (as shown in the Table 1). The group of the activities, inside a member of the GA will be known "an activity".

#### 4.1. The BCG matrix of the CA

*CUSTOM ADMINISTRATION* has 8 activities, as is shown in Table 1: Space control, Decisions making, Planning, Administrative services, Custom inspection, Common services, Registers, Finance.

*Space control* activity consists of 2 processes: *Space analysis of the CA activities and Environment protection*.

*Decision making* activity consists of 6 processes: *CA decision making activities, Scheduling, Official's election and appointment and Normative deed creation*.

*Planning activity* consists of 5 processes: *CA operational plan creation, statistics, regional CA analyses and development planning*.

*Administrative services* activity consists of 9 processes: *Import/Export companies registration, Consignment depots registration, Banker's guarantees registration, Custom declaration entry and verification*.

*Custom inspection* activity consists of 4 processes: *Performance of the administrative inspection procedure, Appeal procedure, The violation inspection procedure and Custom penalties registration, Reporting to the Ministry of finance*.

*Common service* activity consists of 6 processes: *operating materials acquisition, labor and properties insurance, standard office administration, records and office em-*

ployee activities, Issuing of the CA official Gazette, Sessions preparation and monitoring.

**Registers activity** consists of 6 processes: *Commodity code list maintenance, Customs rate list maintenance, Customs clearing algorithm maintenance, The clearing of the other fees and Custom bonding, Customs commodity lading and The customs declaration register, The temporarily imported/exported reproduction material register and The consignment depots commodities register.*

**Finance activity** consists of 6 processes: *Customs fees calculation, Invoicing, The collection of duties, The temporarily imported/exported commodity registration, Temporarily imported/exported reproduction material registration and The consignment depots commodities registration.*

Table 2: The BCG-matrix of CA activities and their importance vs. their dependence on IS/IT

		The importance of the CA activities	
		LOW	HIGH
The dependence of the CA activities on IS/IT support	HIGH	<i>Space Control</i>	<i>Administrative services Registers</i>
	HIGH	<i>Common services</i>	<i>Finance Decision making Planning Custom inspection</i>

#### 4.2. The BCG matrix of the TA

**TAX ADMINISTRATION** has 8 activities: *Space control, Decision making, Planning, Administrative services, TA inspection, Common services, Registers and Finance.*

**Space control** activity consists of 1 process: *The space analysis of the TA activities.*

**Decision making** activity consists of 2 processes: *Normative deed creation and proposing to parliament, Reporting to the Ministry of finance.*

**Planning** activity consists of 5 processes: *The activity scheduling, The TA operational plan creation, Statistics, Development planning. Session preparation and monitoring.*

**Administrative services** activity consists of 3 processes: *Standard office administration, Income statement entry, Income statement verification.*

**TA inspection** activity consists of 3 processes: *The performance of the TA inspection procedure, The appeal procedure, The TA penalties registration.*

**Common service** activity consists of 6 processes: *The acquisition operating materials, Labor and property insurance and the issuing of the official TA Gazette.*

**Registers** activity consists of 7 processes: *The taxpayer register, The space units register, The companies register, The current account holders, The citizen register, The cadastre and Companies register.*

**Finance** activity consists of 6 processes: *The calculation of taxes, Documentation printing, Invoicing, The collection of taxes, Bookkeeping.*

Table 3: The BCG-matrix on the importance of TA activities vs. their dependence on IS/IT

		The importance of the TA activities	
		LOW	HIGH
The dependence of the TA activities on IS/IT support	HIGH	<i>Space Control</i>	<i>Administrative services Finance Registers</i>
	HIGH	<i>Common services</i>	<i>Decision making Planning TA inspection</i>

#### 4.3. The BCG matrix of the treasury (TR)

**THE TREASURY** has 8 activities: *Space control, Decision making, Planning, Administrative services, TR inspection, Common services, Registers and Finance.*

**Space control** activity consists of 1 process: *Space analysis of the Treasury activities.*

**Decisions making** activity consists of 2 processes: *Budget preparation and Adoption of the budget.*

**Planning** activity consists of 2 processes: *TR financial plan creation and Session preparation and monitoring.*

**Administrative services** activity consists of 3 processes: *The rightful claimant's forms entry, Rightful claimant's forms verification and Standard office administration.*

**Treasury inspection** activity consists of 2 processes: *The Performance of the internal and external administrative inspection process and the Appeal process.*

**Common service** activity consists of 3 processes: *The acquisition of operating materials, Labor and property insurance, and the issuing of the official TR Gazette.*

**Treasury registers** activity consists of 15 processes: *The general treasury ledger, DB of budget bookkeeping, Requirements estimates, Large economic needs, Spending, Income (aggregated data), Approved spending (user rights), Yearly spending for capital investments, Incidental expenses, Deficits and overdrafts, The budget reserve, The annual account, Obligations, Payments, Receipts.*

**Finance activity** consists of 6 processes: *Budget execution, Financial transaction processing, Bookkeeping, Budget revision, Finance statistics, Reporting to the Ministry of finance.*

Table 4: The BCG-matrix of TR activities and their importance vs. theirs dependence on IS/IT

		The importance of the TR activities	
		LOW	HIGH
The dependence of the TR activities on IS/IT support	HIGH	<i>Space Control</i>	<i>Administrative services Finance Registers</i>
	HIGH	<i>Common services</i>	<i>Decision making Planning TR inspection</i>

#### 4.4. The BCG matrix of the local government (LG)

**LOCAL GOVERNMENT** has 9 groups of the activities:

**Space control** activity consists of 9 activities: *Environment protection, Cadastral measurement, Land book-keeping, Cadastre, Street naming, Land development regulations determination, Land preparation, Contracting and issuing of building permits.*

**Decisions making** activity consists of 6 processes: *The issuing of the official Gazette, sessions preparation and monitoring, decision-making, activities scheduling, officials election and appointment and normative deed creation.*

**Planning** activity consists of 5 processes: *The Operational plan creation, statistics, Condition for regional analyses, spatial (physical) plan creation and development planning.*

**Administrative services** activity consists of 7 processes: *Documents and signatures certification, Complaints settlement, Monitoring of the legality of work, Inspection board activities, administrative procedures, non-administrative procedures and magistrate court proceedings.*

**City Properties management** activity consists of 7 processes: *Public utilities financing and construction, Facilities and equipment construction, Housing resources*

*maintenance, Municipal rent determination, Municipal rent collection, Municipal properties management and Municipal properties technical maintenance.*

**Common services** activity consists of 6 processes: *Municipal management book-keeping, the acquisition of operating materials, Labor and properties insurance, Office administration and Office employee activities.*

**Registers** activity consists of 10 processes: *Economic subjects registration, Business premises registration, The issuing of the employment book, Agriculture and forestry activities registration, Cultural monument registration, Conservatory supervision, Cultural subjects registration,*

**Finance** activity consists of 3 processes: *Budget preparation and acceptance, Taxpayer determination and tax and fee collection.*

**Inspection** activity consists of 2 processes: *The performance of the internal and external inspection processes and the appeal processes.*

Table 5: BCG-matrix of LG activities and their importance vs. their dependence on IS/IT

		The importance of the LG activities	
		LOW	HIGH
The dependence of the LG activities on IS/IT support	HIGH	<i>Space Control</i>	<i>Administrative services Registers</i>
	HIGH	<i>Common services City properties management</i>	<i>Finance Decision making Planning Inspection</i>

With regard to the BCG point, the *Space control* activity should be more improved. At the moment it has a low impact to the LG activities but they certainly deserve a lot of attention since they have the most potential.

*Administrative services, City properties and Common services* activities provide services of relatively little importance. The volume may increase their importance is not expected to. The IS/IT usage is low.

*Registers* and *Finance* activities provide a good service. They form the main part of GA information. They are not expected to grow significantly and their IS/IT usage should be increased. These activities are of great importance.

*Decision-making* and *Planning* activities provide a good service and they are expected to do so in the future. An increase in service variety and quality is expected. Their IS/IT usage is high enough to increase their level of service. The need for more development makes these activities even more important.

## 5. CONCLUSION

The common GA matrix doesn't exist, but there are 8 activities (out of 10) which have the same position in all 4 matrices (Table 6). One of two "non compatible" activities is **Finance**, x which is in one matrix (TA), and is highly dependent on IS/IT and of low dependence on the other 3 matrixes. However, **Finance** is of great importance to GA business in all 4 of the matrixes. The second "non compatible" activity, **City properties management**, appears only on the BCG-matrix of LG.

We can conclude that the common (80%) matrix of selected group of GA members can be used in practical GA businesses analyses, with the exception of the FINANCE activity (Table 6). Also, after the SPIS stage, the common GA activities can be designed as unique IS modules. In this way a significant saving (all the resources) can be. The Internet allows us to market this type of knowledge (common IS modules) worldwide.

Table 6: BCG-matrix of GA activities and their importance vs. theirs dependence on IS/IT

		The importance of the activities	
		LOW	HIGH
The dependence of the activities on IS/IT support	HIGH	<i>Space Control</i>	<i>Administrative services Registers (Finance) ↓</i>
	HIGH	<i>Common services</i>	<i>(Finance) ↑ Decision making Planning Inspection</i>

This BCG analysis makes it possible to find more realistic answers to the WHAT and HOW questions. The answer to the question WHO should be given by the Data Processing Management Center. In connection to this we suggest:

- Activities from the lower left quadrant, which are less demanding, and they allow us to free the higher quality resources and use them to perform more demanding tasks, and outsourcing usage is possible;
- To cover the activities from the lower right quadrant, we suggest to organize the task group that is very good informed about standard the DPC activities and get them to improve the present service level. This group should also be responsible for the educating of the DP Center's customers;
- To cover the upper left quadrant, we suggest assign several talented designers to develop the new GIS applications. One should start by involving the space presentation of the information inside the new and current GAIS;
- The upper right quadrant should be assigned to a very experienced and creative group of people. They should improve and develop the basic GAIS functions by using the latest IT.

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## ANALIZA BCG MATRICE TIJEKOM STRATEGIJSKOG PLANIRANJA INFORMACIJSKOG SUSTAVA DRŽAVNE UPRAVE

### Sažetak

*U radu je prikazana analiza BCG matricom odabrane grupe informacijskih sustava tijekom strategijskog planiranja cjelokupnog informacijskog sustava državne uprave: carinski informacijski sustav, porezni informacijski sustav, informacijski sustav riznice i informacijski sustav lokalne uprave. Ovakav odabir predstavlja reprezentativan dio informacijskog sustava državne uprave za podršku radu tijelima državne uprave. Također su prodiskutirane značajke članica državne uprave: temeljni cilj, važnost, neprofitni način rada, dostupnost, privatnost i pouzdanost, složenost, zajedničke baze podataka, međusobna povezanost, brzi rast, međunarodni profil, promjene, obrazovanje i visoki troškovi.*

*Analiza BCG matricom napravljena je na razini aktivnosti članica državne uprave, a prodiskutirana je i mogućnost izrade BCG matrice na razini aktivnosti za državnu upravu.*

**Ključne riječi:** BCG matrica, strategijsko planiranje, informacijski sustavi, državna uprava.