Analyses of User Requirements – The First Step towards Strategic Integration of Surveying and Cadastral Services

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Key words: user requirements, external users, internal users, SWOT analyses, business strategy, ICT strategy

SUMMARY

Efficient and effective performance or doing business of an organisation lies down in optimal use of skilled human resources and in availability of well organised and institutionalised technology in order to best meet the user requirements. Meeting these requirements can be considered as a critical success factor and it can be observed that this is more recognised as such by different businesses.

From here the need of addressing the issue of *analyses of user requirements* is derived. The methodology presented in this paper to identify these requirements based on structured interviews and questionnaires posed to relevant external and internal users. The approach leading to complete, factual and concrete results is introduced as well as the outcomes from these explorations - the lists of user requirements. This list has been used (amongst others) as input for a SWOT (strengths, weaknesses, opportunities and threats) analysis matrix.

Results from analyses of user requirements should be an initial input for the development of both Business and Information and Communication Technology (ICT) strategies which should preferably be developed and implemented in alignment. All this facilitates the development of the businesses with innovations in products and services.

Finally this paper argues that provision of cadastral and surveying services - which are tailored based on analysed user requirements is the first step towards a strategic integration within the surveying community and closely related to the application domains to society in general.

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1. INTRODUCTION

For the purposes of development of an ICT strategy for the State authority for geodetic works (SAGW), Republic of Macedonia, a study has been performed with attention to the identification and approaches in meeting user requirements – which was considered as being critical success factor. Related field work and analysing activities were executed (Todorovski, 2006).

The ICT strategy for SAGW is theoretically based on the MIT strategic alignment model (Henderson and Venkaterman, 1993). All relevant external and internal users are identified and they are involved in the process of collecting required data and information. Adequate questionnaires have been developed - different for external and internal users. During the field work interviews have been executed. A methodology with a focus on achieving complete, factual and concrete results has been developed.

All data and information are systematically collected for the business as well as the ICT domain. Based on the method of comparing and SWOT Analyses they are analysed. Results from these explorations are the lists of user requirements and SWOT Matrixes.

Results from analyses of user requirements have been a primary input for the revision or developing a new business and ICT strategies - to be developed and implemented in alignment. All this facilitates the development of the businesses with innovations in products and services.

Finally this paper discuses that provision of cadastral and surveying services which are tailored based on analysed user requirements can be the first step towards a further strategic integration within the surveying community, close related domains and society in general.

2. IDENTIFY CURRENT AND POSSIBLE FUTURE USERS

A land administration system is in part an administrative system that must meet the needs of good government. It must also address the requirements of non-governmental institutions and the general public. Before altering an existing system or introducing a new one, it is essential that the requirements of those who will use or benefit from the system are clearly identified (UN/ECE, 1996).

For successful companies/organisations (that have progress and prosperity in their perspective) satisfying user requirements is recognised as a critical success factor. For well

performing organisations providing cadastral and surveying services the analyses of these requirements become a regular practice in their every day working activities. The Netherlands Kadaster is very good example regarding this issue.

Living and working in the digital environment, ICT is more and more present in every aspect of human existence. Following the basic principles of the MIT model where business and ICT 'domain' should be functioning in alignment on strategic *and* operational level, these two domains should always be considered as being of key importance. Both domains should be adequately analysed from user's perspective.

The strength of the strategic alignment model lies in its ability to establish a relationship between the strategic and operational aspects of the organisation's objectives and its ICT policy (Molen, 2003a).

Good practices are showing that it is worth to assign resources in activities to get a clearer list of *who* are the users of particular cadastral and surveying products and services, for *which* purposes and *how* are they using them - from external user point of view. At the same time it is good to clearly identify *who and how* is creating/producing such products and services - from internal users perspective. Or straightforward: identify/list the external and internal users.

When creating the lists of all relevant users for the time being, it is good to be creative, to think about and to involve new and possible future users. Most valuable answers from external users/companies will be from persons who are directly involved in usage and processing the data and surveying services. For the needs of the development of the ICT strategy for SAGW, lists of external and internal users have been made including name, position and organization/company (more details can be found in the Appendix No.1 of (Todorovski, 2006)).

3. INTERVIEWS AND QUESTIONNAIRES

Dutch Kadaster performs surveys on customer satisfaction and wishes on information periodically (on three years period), and uses different methods for identifying its external and internal user requirements. Last survey conduct by Kadaster, examining users wishes on information, showed that customers would like: digital, up to date, reliable and legal certainty, complete, rapidly accessible, tailor made and quality assured information (Sipman, 2005).

Following the example of the Netherlands Kadaster, and similar organisations in Slovenia, Croatia and Serbia, where analysing user requirements is becoming a regular practice, for this study, this practice is accepted too. For this purpose different questionnaires have been developed for external and for internal users of products and services of SAGW.

3.1 External Users

External users which have been involved in the interviews are from two main target groups: the public and the private sector. The total amount of external users interviewed has been 15, and when choosing which people in these organisations/companies to interview criteria was to look for persons who are most involved in using the products and services from SAGW (template questionnaire can be find as Appendix No.1 to this paper).

The structure of the questionnaire for external users is in three parts. It starts with questions to get more familiar with external users core business, with the level of ICT present in their organisations, with automated processes, usage of internet, links to other organisations and with companies, and activities to develop their ICT and ICT strategies. Knowing the users business is the basis to provide more added value to the user in the future.

Questions in the second part about the most frequently used products and services provided by SAGW. This part is about the availability of digital data and products, of a 'one stop shop' for ordering, of time needed for delivery and it is about prices of the products and services. Following were questions and suggestions on how to involve users for analyses of their requirements and on their willingness to participate in the specifications of a new product, processes or service.

The questionnaire finishes with the topic on line access, ordering, delivery and payment of products and services via internet. Having in mind that right now SAGW is using internet only for one-way information supply, all interviewed replied that any data or product offered by internet will be useful.

Customer satisfaction requires a focus on the adoption of an open, transparent and innovative approach to the provision of products and services, and arrangements that guarantee delivery times and quality specifications (Molen and Lemmen, 2003).

3.2 Internal Users

To identify the internal user requirements, interviews and questionnaires were carried out within SAGW, with the highest management of SAGW, state advisors, head of sectors, head of departments, head of local cadastral offices and employees involved in ICT affairs, the total number of interviewed persons has been 16.

Two kinds of questionnaires have been. The first questionnaire (the template of this questionnaire can be found in Appendix No.2 to this paper) was with the intention to identify strong and weak points and about the desired business future for SAGW, also from ICT perspective. These interviews were taken with 12 employees from different sectors and dealing with different affairs within SAGW like: cadastral information systems, land surveying, reference networks, human resources, local cadastral offices, and employees involved in different projects.

The second type of questionnaire was longer and with bigger attention on ICT domain. Interviews were performed with employees of SAGW which are most involved in ICT affairs.

The structure of this questionnaire is the same as the one for the external users (Appendix No.1 to this paper) but now posted to, and answered by internal users. Attention is paid to the level of ICT presence in SAGW, the automated processes, the usage of internet, the links to other organisations and to required activities to really develop an ICT function within SAGW.

The Interviewed persons have been asked on their opinion on how to improve the current quality and speed of delivery of digital products and services and, also, which new ones are required to be developed. The questionnaire finishes with the topic on on-line access: all interviewed persons agreed here that this is current and future trend and that SAGW should focus on developments in this area (more details can be found in the Appendix No.1 of (Todorovski, 2006)).

4. METHODOLOGY

After completing the questionnaires with previously chosen users, all answers were systematically stored in an electronic form. In order to be more certain in having correct answers from the interviewed persons, a methodology for validation of the answers has been developed:

- perform interviews based on questionnaires ('template'),
- analyse the findings from the interviews and questionnaires,
- sent the reports for revision to and ask for approval from interviewed persons,
- receive the approval from interviewed, and agreement on the findings in the reports.

From totally 31 interviewed persons, 24 replied and approved the findings in the reports. From the rest, three of them did not use internet as a source for communication and they did not supply feed back about the interviews. Others four did not answer on the request for approval. The majority accepted this methodology of working.

5. ANALYSES OF USER REQUIREMENTS

When all required data and information were collected within both the Business and the ICT domain, from external and internal user's perspective, they were adequately analysed using the method of comparing the received answers and by developing a SWOT analyses.

5.1 Method of Comparing - List of User Requirements

By using the method of comparing answers most similar answers can be pointed. They can show in which direction development of the organisation (when it is about products, work processes, services, etc.) should go and which steps should be taken for these developments. Based on this method a list of user requirements has been derived:

- transform SAGW into *customer oriented* organization, using marketing mechanisms identify and meet customers need,

- establish *functional ICT department* as soon as possible by involving skilled ICT staff for its maintaining and development. The ICT departments of Cadastral and Land Registration organisations are becoming the *core departments*,
- development and functional use of *digital products/services and delivery*. Internal users prefer to use digital data in every day working activities. External users have a preference that data should be ordered and delivered in *digital form*,
- most used SAGW products and services should get *priority* in development and digitalisation,
- develop *updating procedures* of digital graphical data in parallel with conversion of analogue data in digital,
- *access to the DB* of SAGW through *web based interface* with the possibility to extend it in future with a function for *remote or on-line access*, this would require implementation of *digital signatures, digital encryption*, etc., which will be useful while introducing and implementing *e-conveyancing*,
- a *digital data catalogue*, including *metadata*, is required to get an overview of the availability of data from SAGW,
- introduction of *DB concepts* and adaptation to working operations. Development and implementation of a *DBMS* concept too,
- test the functionality of the e-Cadastre system, present international consultants could be used, and implement it in every day working activities as soon as possible,
- work on development of integrated system which will combine and coordinate deliverables from various projects, production processes within SAGW and integration of textual and digital graphical datasets,
- coordination and cooperation between data producers within organisation, distribution of data to LCO and to the external customers,
- development of integrated system where *all the components of the system will be compatible*, use technology and standards for achieving this compatibility,
- *involve users* in development of data, products and services, processes and system specifications,
- introduction and implementation of *workflow management*, this allows flexible integration of internal and external data producers into organisational business processes,
- digitalisation of analogue maps could be executed (outsourced) by private companies, new law provides such an opportunity,
- development and standardisation of *automated links* for sharing data or exchanging geo-information with other organisations,
- *data protection***,** often an underestimated element, has to be considered as a critical factor and it should be basic element in the modern land information system.,

- improvement of *Strata titles/ownership of apartments***,** through developed simple mechanisms for massive registration (currently 60% of the apartments are not registered in the REC register),
- approach application of *new technologies and standards* more from economical then from technical perspective,
- keep and use the **'***cadastral parcel number'* as key parcel identifier or unique parcel reference number, apart from it: unique building identifier, apartment identifier, 'common area' or known area name identifier, right identifier and subject identifier,
- include scanned cadastral maps as a separate layer in the GIS of SAGW, firstly for internal use and later to develop a model for establishing GIS data via internet. This type of digital products requires specific attention,
- when most data and products are standardised, it is easier to provide *tailor made products*,
- guarantee *the delivery time*, connect services with time framework to be finished,
- develop and use new developed *simplified registration services*,
- conditions about *use and price* should be clearly stated and shown to the customer,
- development and functional use of *copyrights*,
- include *value of real estate* it into REC register, this element could be used by more customers, priority tax department Ministry of Finance,
- development of *E-payment* mechanisms.

In the near future, customers want to have access to information 24 hours a day, 7 days a week, at home, in the office, and in the field (Oosterom and Lemmen, 2002), this is very important for Macedonians living abroad.

5.2 SWOT Analyses

SWOT Analyses is a tool designed to be used in the preliminary stages of decision-making, often as a precursor to strategic planning. It is a common tool in performance analyses and in evaluation studies. The results of the SWOT Analyses can be summarized in the SWOT Matrix (Groenendijk, 2003). SWOT Analyses contains four basic steps.

1st Step: External analyses performed on external environment with focus on opportunities and threats, and they take in account potential trends and developments. These two factors are external facts or developments from which organisation can have advantage, benefit or contribution and substantial negative effect while realising its mission.
2nd Step: Internal analyses are carried out within the organisation, investigating the 'As-Is' situation with focus on strengths and weaknesses. These internal factors must be critically stated in order to better determine performance of the organisation. The strength factors are internal characteristics of the organisation that facilitates and contributes in achieving the mission. The weaknesses, also internal characteristic, defines weak points of the organisation that set restrictions in its functioning.

3rd Step: Generation of (alternative) strategies. By combining SWOT from external and internal analyses a number of alternative strategies can be derived.

> SO strategies aim at using the strengths to take the advantage of the opportunities.
> ST strategies consider the strengths as a way of avoiding threats.
> WO strategies attempt to take advantage of opportunities by overcoming weaknesses.
> WT strategies are basically defensive and act primarily to minimise weaknesses and avoid threats.

4th Step: Formulation of strategic choice. Organisations that perform successful usually use their strengths and take advantage of the opportunities. If organisations have a weaknesses they should make attempts to transform them into their strengths. If organisations are facing threats, strategies should be formulated to avoid and reduce influence of those threats and focus on advantages that can be derived from opportunities.

The basic principle in SWOT Analyses is the idea that a good strategy means ensuring a fit between the external situation or environment (threats and opportunities) and the internal qualities or characteristics (strengths and weaknesses) of the organization (Groenendijk, 2003).

For the requirements of development of the ICT strategy for SAGW two SWOT Analyses were performed. First, with focus on organisational, business domain (Appendix Table no.1) and the second one with focus on ICT domain (Appendix Table no.2). Findings showed that SAGW has a significant number of weak points in both domains from where it reveals that attempts should be made to take the advantage of opportunities to overcome weaknesses. But SAGW has a strength points too, so, combination of WO and SO could be the best selection when formulation strategic choices.

Insufficiently performing cadastral organizations supply incomplete, incorrect, out of date, not timely information on ownership, value and use of land and real estate, they cannot serve land tenure security, the land market and government functions like land taxation, land use planning and development and management of human resources (Molen, 2003b).

6. CONCLUSIONS

Meeting *user requirements - a critical success factor* - is becoming a bigger challenge for all business. Organisations which succeed in this are more efficient in their performance, their products and services are increasingly demanded which gives them opportunities for improvements and further development. Follow the motto: *Learn from the users what to do and how to do it.*

This study derived a list with current and possible future system and user requirements based on analyzing the results from interviews with internal and external users of product and services, and SWOT matrixes for business and ICT domain.

Provision of surveying services which are tailored based on user requirements using well organized and institutionalized ICT and following all available international standards are the first pre condition for the strategic integration of cadastral and surveying services.

REFERENCES

Groenendijk, L., 2003. Planning and Management Tools; A reference book. The International Institute for Geo-Information Sciences and Earth Observations (ITC), Enschede, the Netherlands.

Henderson, J. and Venkaterman, N., 1993. Strategic Alignment: Leveraging information technology for transforming organizations. IBM system journal, 32: 472-484.

Molen, P.v.d., 2003a. Six proven models for change, Organisational Streamlining by Customer Orientation. FIG Working Week 2003, Paris, France.

Molen, P.v.d., 2003b. Some Experiences on the Change of the Organizations for Mapping and Cadastre, 2nd Cadastral Congress, Krakow, Poland.

Molen, P.v.d. and Lemmen, C., 2003. Strategies for Renewal of Information Systems and Information Technology for Land Registry and Cadastre. FIG, Commission 7, Enschede , the Netherlans.

Oosterom, P.v. and Lemmen, C., 2002. Impact Analysis of Recent Geo - ICT Developments on Cadastral Systems, FIG XXII International Congress. FIG, Washington D.C. USA.

Sipman, A., 2005. Our customer-Presentation materials from the visit of Macedonian delegation to the Kadaster International, Kadaster International, 25.11.2005, Apeldoorn, the Netherlands.

Todorovski, D. 2006. Developing a ICT strategy for the State Authority for Geodetic Works in the Republic of Macedonia, MSc theses. ITC Enschede, the Netherlands.

UN/ECE, 1996. Land Anministartion Guidelines. United Nations, New York and Geneve.

BIOGRAPHICAL NOTES

Dimo Todorovski holds a diploma as a surveying engineer of the Faculty for Civil Engineering, at the University of Kiril and Metodij, R. Macedonia and obtains MSc degree in Geo-Information Management at International Institute for Geo-Information Sciences and Earth Observation ITC, the Netherlands in 2006. He is a head of digitizing department, Sector for Cadastral Information Systems at State Authority for Geodetic Works, R. Macedonia, and has a practical experience in fields of surveying and digital mapping, Cadastral Information Systems development, ICT and ICT Strategies. He is a Macedonian delegate of FIG Commission 7.

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APPENDIX NO.1

Questionnaire which will be used for analyses of user requirements for development of ICT strategy for SAGW.

Please provide Name and Address of your organization:

Tel:…… e-mail ……web-site:……..

1. What is your core business?
2. Do you have any automated processes performing in your organization?
3. Information or ICT policy?
4. Please list all Geo-Information related activities of your organization?
5. Do you have any automated links with other organizations for data sharing?

   Yes No

   Future Plans? Which org.?
6. Does your organization have intranet/internet facilities? (yes) (no)
7. Do you have your web site? (Please write it down):_____
8. For which purpose do you use it mostly?
9. Is this facility used for buy or sell products? (yes) (no)
10. Would you use internet to search needed data, order it, pay it and receive it?
11. Did you so far find browse and order any Land Information via internet?
12. Can you appoint some web site which has a digital data catalogue?
13. Is data modelling used when developing datasets architecture?
14. Are the standardized modelling languages (UML, xML, GML, OpenGIS) used for data modelling?
15. Please list which products and services do you use most frequently from SAGW? (graphic/cadastral data, data from land registry)

17. Authentic Data from SAGW or compulsory to use it? (by law)

18. Expected changes in regulations on Cadastral Part (registration of ownership)?

19. Expected changes in regulations on Graphical part?

20. How do you find out availability of the required data from SAGW?

Internet Phone call Personal visit
Through catalogue

21. How do you order the data from SAGW?

Internet	Phone call	Personal visit
Through catalogue	Through e-mail	Through letter

22. How would you like the data to be delivered:

1. digitally
2. paper
3. other media:_____

(If digitally, CD's, floppy, etc or internet?)

23. Do you use more scanned maps or vector maps for your business?

24. How many interactions do you have with SAGW (daily, weekly, monthly or yearly)?

25. How often are they used in your businesses?

26. Which GIS software are you using in your organization?

27. Do you have to make some conversions after receiving data form SAGW?

28. RESPONCE TIME???

29. Are you as a user involved in new data processes and system specification of the SAGW?

30. How do you evaluate access to the data in SAGW?

Low Medium High

31. How to improve in SAGW (focus on products and services)

32. If new products or services would come, how much time do you need to be ready to use them (estimation in months)

33 Do you expect support in training if new services are available/

34. Do you expect changes in land registration? Which? (input/output side)

35. Would you participate in user meetings? (to discuss standards, networks, security, developments, new products and services etc)

ON LINE ACCESS

36. Which way do you think is the most useful to search for certain map or information:
Parcel number and cadastral municipality?
Address, street and house number?
By zooming (in/out) and panning?

37. Availability on-line? 24h, 7h,.....

38. Do you have any payment mechanism meet so far in your business?

39. Is e-signature developed and used in your business? (or in your country)

40. Do you have any policy or mechanisms for data protection? SECURE LINES?

41. Support if on-line doesn't works?

42 Ideas on pricing if updates are per day or on line

43. Is pricing policy of SAGW and invoices clear/understandable?

44. Are the prices in SAGW realistic, do you get value for money?

Skopje, date
Dimo Todorovski

APPENDIX NO.2

Name:
Position in SAGW:
Sector/Department in SAGW

Please list 3-5 Strength points of SAGW from business perspective and with focus on ICT

-
-
-
-
-

Please list 3-5 Weak points of SAGW from business perspective and with focus on ICT

-
-
-
-
-

Please list 3-5 points of desired future for SAGW from business perspective and with focus on ICT

-
-
-
-
-

Skopje, date
Dimo Todorovski

SWOT Analyses SAGW – Business domain

Strengths (S):	Weaknesses (W):
• Integrated system of Cadastre and Land Registration by law under jurisdiction of SAGW. • All information about Legal Real Estate Rights and its map representation, including Geo-Spatial data on one place. • Reforms with a new law for geodetic works (outsourcing of field measurements, digitizing, etc.). • On going projects for accelerating the establishment of the REC on whole territory of RM (so far only 45%) and capacity building. • Unique basic products ready to add value on them and for further development. • Reliable REC data and accurate geometry/maps. • All original maps from archive scanned, systematically labeled and geo-referenced in state coordinate system, ready to be vectorised, compatible with WGS84 and GPS. • Rich base of data available, ready for building a base data infrastructure where SAGW would taka a lead. • Experience in cadastre, land registration and mapping, government and citizens relay on it. • Potential for development of new/innovative products. • Technically skilled land surveying and legal staff, within their domain. • Relatively young employees, willing to learn/improve. • In 60-80% staff capable for team work and to be transferred form one office/post to another.	• Monopoly over foundation Geo-Spatial, Cadastral and Ownership Data. • General organizational strategy in developing phase. • Very low awareness of user requirements and marketing culture. • Management of the resources (technical, human, etc.) within SAGW is in initial phase. • Divisional Structure, not flexible system. No willingness to co-operate between different departments within SAGW. • Very massive and long legal procedure's in land transactions (paper way of work, old and outdated working procedures). • Too many projects at the same time; non-optimal coordination between projects and every day jobs (Unwillingness to co-operate no corporative culture). • Backlogs: long respond time in search, access and delivery. • Very low motivation of the employees-concerning salaries. • By opportunity of outsourcing geodetic practice, skilled geodetic staff are leaving the SAGW. • Not all operations, working activities with standardized procedures (uncertainty makes employees insecure and leave space for corruption).

Opportunities (O):	SO-Strategies:	WO-Strategies:
• Independent Institution by direct jurisdiction and support from prime minister. • Growing market and number of new customers. • Demand for diverse and quality, Geo-Spatial products and services (customers ready to pay for it). • Value of data increase by use. • Availability of the enabling technology and standards on the market. • Cooperation with licensed private surveyors. • Possibilities to collaborate with other org. • Use opportunities given in the new law (outsourcing, etc.). • Cost recovery trends. • Trainings, education of the staff, capacity building.	• Adopt customer orientation using project resources. • Use governmental support for reforms, and development of SAGW. • Use outsourcing to improve efficiency. • Use technology and standards, WFM, to optimize data dissemination system. • Combine: surveying, available technology, staff and digital data for development of new/innovative products. • Expand provision of unique required by the society and GI market products, improve quality/quantity of digital products and service TQM. • Cooperate with certified private sector on PPP basics. • Use Projects resources for development of cost recovery study/strategy. • Upgrade staff with trainings education, capacity building, HRM.	• Develop marketing mechanisms for better identifying user requirements. • Develop/revise business strategies including ERM and with perspective of development of new products and services. • Improve quality of the products and speed up delivery of products, TQM. • Standardize working processes. Simplify and connect working processes that can be done together WFM, improve efficiency. • Educate/train staff and build managerial and human capacities. • Introduce HRM award best workers or teams. • Renew pricing policy with cost recovery in perspective. • Coordination of the projects and every day working activities, using technology and standards, work on integration of the components of system and deliverables. • Start collaboration and outsourcing with other org. to improve efficiency. • Use the government to support and promote governance of foundation Geo-Spatial and Land Information by SAGW. • Educate/train and highly motivate skilled geodetic staff to stay in SAGW.

Threats (T):	**ST-Strategies:**	**WT-Strategies:**
• Lack of political stability in the country. • Low confidence and reputation of the public services in RM, for SAGW too. • Growth of the dissatisfaction of the users. • After projects end, decreasing of budgetary support. • Security of the data, illegal data copying/duplications. • Growing competition by private sector; investments in spatial data provision and access. • Lack of awareness of LI by public and private sector.	• Advertise success stories based on the experience, reliable, accurate data in one place and reforms to avoid negative political effects and increase the low confidence in SAGW. • Develop marketing mechanisms for better identifying user requirements to satisfy users, offer new/innovative products. • Explore new markets/users. • Diversify products and services. • Involve users in new products and system specifications to improve reputation. • Use projects to develop cost recovery strategy. • Do not outsource critical activities. • Cooperate with certified private sector on PPP basics. • Use standards/copyrights and develop models TQM to secure data. • Use projects to increase awareness of LI. • Invest in upgrading/education of the young staff and sign long term contracts to secure their continuation to work for SAGW; HRM.	• Develop mid and long term business strategies, based on experience, all LI in one house, reliable and accurate data to avoid political instability. • Adopt customer orientation. • Improve management to increase low reputation, and avoid political effects. • Simplify and connect processes to reduce response time WFM. • Use projects to develop cost recovery strategy. • Use projects to educate staff. • Motivate staff with education and awards HRM. • Collaborate with private and public (partnership) org. dealing with similar data. • Start making SAGW employees aware of their desired contribution in the further development of SAGW.

Appendix Table no.1: SWOT Matrix – Analyses Business domain for SAGW

SWOT Analyses SAGW – ICT domain

Strengths (S):	Weaknesses (W):
• Initiatives for ICT improvement and developing adequate ICT strategy. • SAGW is most desirable institution to have automated link for retrieving Geo-Spatial Data. • Continues rising of the quantity and quality of ICT equip. • Relatively good ICT (no. of PC's) and geodetic instruments equipped LCO. • Availability of LAN network facilities in all offices. • Availability of ICT and Internet facilities. • New e-Cadastre system for registration of ownership rights in test and implementation phase. • All documents from archives concerning transactions scanned and in electronic archive (e-Cadastre system). • All original maps from archive scanned and geo-referenced in state coordinate system, ready to be vectorised. • Tested and successfully integrated alphanumeric and graphical data (implementation follows). • Potential for development of new/innovative digital products and services, as required from GI market. • Reforms with a new law for geodetic works – outsourcing included. • On going projects: e-Cadastre and SIDA for capacity building including trainings for using (geo) ICT. • Periodically training of the staff for using ICT and digitalization.	• Awareness of user requirements far from optimal, insufficient marketing. • Internal oriented ICT tradition, periodical development of ICT based on market trends (not with strategy development approach). • Not optimal alignment of business processes with ICT. • ICT not recognized as a discipline within SAGW; ICT is only recognized as a supporting activity to internal work processes. • ICT not represented at the highest level of decision making. • Risks of (internal) ICT implementation not recognized. • Insufficient management of technical and human recourses in the ICT area. • Not transparent E-Cadastre (big bang) project, speculations about outcome. • DB concept of working not applied while creating, processing, maintaining and dissemination of digital datasets. • Outdated system at the end of technical and operational life cycle; not capable to handle large volume of graphical datasets. • PC equipment without licensed software. • No timely connection between the main office and LCO for exchanging necessary data (periodical exchange of CDs, diskettes). • No automated link between Main office and or other Gov. bodies (CDs and floppy disc are used for exchange of datasets). • Not developed models for data exchange/sharing. • Unrecognized metadata. • Internet connection in main office on unsatisfactory level, no internet connection at all for LCO. • Internet not used for data distribution, (results with longer response time). • Digital graphical data not used of in every day working activities in LCO. • Data duplications Digital data in file system; difficult access, queering.. • Volume of data to be digitized (only 25%, and not in function of updating and every day working activities). • Not good coordination between projects and every day IT affairs. • Lack of skilled ICT and GIS staff.

Opportunities (O):	SO-Strategies:	WO-Strategies:
• Growing e-commerce, new market and number of customers. • Use other countries as an example. • Financial support from the government for ICT development. • Availability of Software/GIS and Hardware on the market. • Availability and enabling power of ICT and DBMS. • Power of Internet, and web based applications for data search, order, deliver. • Growing demand for diverse and, digital Geo-Spatial products and services (customers ready to pay for it). • Need for digital data remotely accessed. • Data metadata standards ISO/TC 211 • Opportunities that standards are offering nowadays UML, GML, OpenGIS, etc. • New law (outsourcing). • Initiatives for NSDI and cross organization data sharing/exchange. • Collaboration with other organizations on bases of private and public partnership. • Advanced and focused trainings about new ICT and GIS. • Scanned and geo-referenced original maps from archive of SAGW available on the GI market. • Taking the lead in standardization in information exchange • Being aware of the legal meaning of digital property data	• Adopt customer orientation/marketing. • Use technology and standards for creation of efficient integrated system where all components will be compatible. • Connect main office with LCO. • Use experience of international IT consultants for evaluation of current functionality of IS (e-cadastre) and giving main guidelines for the integrated system. • Optimize production system making use of available technology and staff ERP/WFM. • Develop internet portals for data distribution (use ISO/TC 211), satisfy and increase market and customers. • Use available H/S and ICT to increase percent of digital data and provide it to the market. • Use technology and standards to speed and connect working processes and for creation and offering of new/innovative products and services FWM. • Possibility to use outsourcing (by the new law) for digitizing maps. • Expand dissemination of quality/quantity digital products and service, be active in leading innovations, electronic signatures etc • Establish automated links with other organizations for sharing/exchange data. • Work on developing NSDI using project resources and reforms. • Upgrade skilled staff with advanced GIS and ICT trainings, HRM.	• Develop (e-) marketing mechanisms and customer orientation (lessons learned from other countries). • Recognise ICT as a discipline by educating staff and be aware of legal meaning of digital data. • Develop ICT strategy aligned with the business. • Invest in adequate licensed Software/GIS, Hardware and in applying DBMS. • Development of new ICT system with integrated text and graphic datasets. Connect main office with LCO. • Use experienced international ICT consultants for assessment of the efficiency of e-cadastre system. • Use ICT and DBMS to improve management of technical and human res. in ICT domain, HRM. • Develop Internet and web based application for dissemination of quality digital data and services, remote access. • Standardize working ICT processes WFM. • Use technology/standards, to simplify/connect work processes; increase efficiency, reduce response time WFM. • Possibility to use outsourcing for digitizing maps and use them in every day working activities. • Use ICT consultants, standards (metadata) for developing sharing/exchange models and establish automated links with other org, for data exchange. • Start efficient coordination between projects and every day working ICT activities ERP. • Upgrade skilled staff with advanced GIS and ICT trainings, increase motivation HRM. • Work on developing NSDI using standards, ICT consultants and take a leading role in NSDI and standardization in information exchange

Threats (T): • After projects end decreasing of budgetary support. • Digital vector data cannot be published on Internet. • Security of the data: Illegal data copying / duplications. • Copyrights not regular practice, especially if data from different sources are combined (liability). • If big demand for digital data and services, no supply and answer on the demand. • IT experience companies invest in spatial data provision and access. • Technology is changing very fast, SAGW don't have capacity to follow the ICT trends in relation to its business. • No legal framework for data sharing.	**ST-Strategies:** • Use current financial support to develop stabile quality ICT system and strategy. • Start using e-cadastre system to improve efficiency and satisfy users. • Develop Internet and web based application using standards and technology. • Use technology/standards/copyrights to secure data. • Establish automated links for data sharing, start cooperation with other public, private (partnership) organizations. • Do not outsource critical activities. • Diversify digital products and services. • Use available H/S and ICT to increase percent of digital data and provide it to the market. • Cooperate with private and other governmental IT sector.	**WT-Strategies:** • Learn from other countries, don't be isolated. • Aggressive marketing. • Develop ICT strategy in alignment of business strategy. • Connect main office and LCO using Internet as solution for data sharing/exchange. • DB concept could improve efficiency of work, security of data and avoid data duplications. • Set priorities and mass creation of digital data (use outsourcing). • Standardize working ICT processes. • Start using digital data as much as possible. • Use Internet for data dissemination. • Establish automated links for data exchange/sharing with other public private (partnership) competitive organizations and start collaboration. • Educate skilled ICT staff and motivate them to stay in SAGW. • Use consultants from on going projects for training and education of staff in ICT and GIS. • Contribute in ICT-related legislation (copyright, privacy, liability).

Appendix Table no.2: SWOT Matrix – Analyses ICT domain for SAGW