

# Experience of Cadastral Information Supply via Internet

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**Key words:** cadastre; e-Governance; information supply; land parceling.

## SUMMARY

One of the important tasks of the cadastral activity in Israel is the preparation of mutation plans, which serve as a principal instrument of block parceling change. The Survey of Israel (SOI) is responsible for supply of necessary cadastral information for mutation plans preparation.

In the past there was a specific form of recording the mutation plans sequence in the blocks. The purpose of this form was to list mutation plans ID, to record parcels numbers and to trace the origin of each parcel existing in block. For many years the recording procedure was based on managing of specific paper block cards.

A few years ago SOI has initiated and completed a development of a computerized information system that would store and provide information about block parcels and mutation plans. As time went by, this system became an important part of cadastral process.

In spite of a progress made, in order to obtain important information, a client was obliged to arrive personally to SOI office. After analysis of situation, SOI made a decision to expand the developed system accessibility by supplying its information via Internet. As a result of this innovation, now every professional, sitting in his office, may immediately obtain essential information concerning specific block, mutation plan or land parcel and get surveyors' contact details. The information is supplied at present free of charge.

SOI relates to the new experience as a first progressive step in direction of increasing its activity in data supply via Internet.

The paper presents the principal ideas of the project and outlines the perspectives of future development.

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## 1. INTRODUCTION

Systematic surveying and mapping activities began in Palestine in 1920, when the British mandate authorities established the Survey Department (the present Survey of Israel). Its main task was appointed as establishing of triangulation network to cover the populated area aiming to implement a legal cadastre in the country based on Torrens principles.

Today, the Survey of Israel is the top governmental institution in the country, setting standards, initiating legislation, licensing surveyors, supporting and initiating research and development, managing and maintaining national geodetic infrastructure and national GIS. SOI is also responsible for cadastral mapping; it supervises preparation of cadastral block maps and mutation plans and approves them, maintains and stores original records and drawings pertaining to the cadastral process.

One of the important tasks of the cadastral activity in Israel is preparation of mutation plans, which serve as an instrument of registered (statutory) block parceling change. According to the existing law, every mutation plan prepared by a licensed surveyor has to be checked and approved by SOI before starting with its registration procedure in the Land Registry Office. SOI is also responsible for supply of necessary cadastral information for mutation plans preparation.

In Israel, both private and public sectors are involved in the cadastral process, which has an inter-disciplinary character. The private sector includes, among others, surveyors, civil engineers, architects, urban planners, land assessors and lawyers. The public sector is represented by a number of governmental institutions carrying out the managerial and supervisory parts of the process. Almost every aforesaid person is interested in obtaining relevant cadastral information, stored in SOI as a result of its statutory activity of managing and supervising the cadastral process. Therefore, the task of implementing an effective data supply mechanism is on the agenda now, and it occupies central place in SOI efforts to make this service simple, available and reliable.

## 2. REGISTRATION METHOD AND CADASTRAL PROCESS

Land registration method in Israel (Registration of Titles) is based, as aforesaid, on the Torrens principles. That means, in practice, that the State is responsible for description of parcels' boundaries as registered in the Land Registry Office. The State (by the SOI) is also responsible for maintaining the geodetic control network which enables exact reconstruction of surveyed boundaries in the future.

According to the Torrens principles, the subject of registration is the land parcel. The parcel's boundaries and the objects situated inside the parcel (such as buildings, walls and fences) are thoroughly surveyed, and parcel's area is calculated. This type of registration ensures an effective and convenient way for proper real estate management, effective planning and land transaction.

Any change (merging or subdivision of existing parcels) in the original settlement of land rights has to be carried out by means of preparation of the mutation plans. According to the Israeli Law of Planning and Construction, mutation plans preparation has to be made on the basis of municipal plans (urban plans) approved by local authorities. The municipal plan, drawn on the background of a topographic map and existing land parcels destined to changing, sketches the approximate position of new cadastral boundaries and intended use of new parcels (e.g., residential area, industrial zone, public area etc.). The accurate boundaries position is defined in a mutation plan, on the basis of precise surveying.

Checking process of mutation plans starts in SOI in one of four District Surveyors' Offices, where the original cadastral drawings are kept and used for the mutation plan preparation by licensed surveyors. The most important part of the checking process concerns with the correct reconstruction of parcels boundaries according to available legal sources, while the registered area of original parcels is strictly preserved. Another important part of the check process deals with performing the computerized test of submitted work files, prepared according to pre-defined formats. These work files, after successful check procedure, are uploaded into the database of the cadastral GIS.

The surveyor provides the new parcels of a mutation plan with a temporary numbering (commonly, starting from number 1) and calculates new parcels areas. As soon as the plan is accepted by SOI as "approved for registration", it may be presented to the Land Registry Office, which provides the new parcels with final numbering (starting from the next number to the last parcel's number registered in the specific block), registers the new parcels areas and their ownership. The "final numbers" of new parcels are transferred then back to the SOI in order to update parcels numbering on the original mutation plan drawing, on the cadastral block map and in computerized databases.

### **3. CADASTRAL INFORMATION SUPPLY**

Historically, cadastral process, based on hand made maps and manual geodetic calculations, was always accompanied by registering basic information at the SOI for a succeeding data supply to professionals. Till now, providing this information by SOI is a starting point of the cadastral process. Before beginning of his work, the surveyor undertakes search actions in the SOI archives and data bases in order to define the mutation plans which determine the position of relevant existing parcels boundaries. At the final point of the cadastral process, when the mutation plan arrives, firstly, to the SOI for check performance and, afterwards, to Land Registry for statutory registration, plan's identification number, parcels temporary and final numbers are registered at the SOI.

In the past there was a specific form of recording mutation plans sequence in the blocks. Dual purpose of this form was a) to list mutation plans ID and b) to present the numbers of, so called, “basis parcels” (existing parcels planned to be changed in mutation plan) and the new ones (parcels to be created by means of a mutation plan and to be registered in the Land Registry Office). Additional use of the form was a) to trace the history of parcels included in the block, beginning from the primary settlement of land rights in the block, through mutation plans sequence during re-parceling activity, and b) to indicate about cancellation of whole blocks or about creation of new ones. For many years the recording procedure was paper card based; the details were recorded on so-called “block cards” made of hard paper (see Figure 1. **Historic block card.**).

Some years ago SOI initiated a project of developing a legally valid, dynamically changing computerized information system (which gained the name “Computerized Block Cards Index” - CBCI) based on continuously updating cadastral process that provides, after meticulous inspection, input of reliable information about block parcels and mutation plans. As a result of joint efforts of computerized system analysts, programmers and SOI personnel responsible for data entering and editing, the CBCI information system was developed. As time went by, it became an important part of the whole cadastral process supplying essential data to the professionals (not necessarily to surveyors but also to municipal plan designers, lawyers, land assessors and to some others specialists).

Today the CBCI system provides information concerning over 12,000 registered blocks, 70,000 mutation plans and hundreds of thousands of parcels. The system data form important component in the preparation process of the mutation plans. The CBCI system includes essential information about land parcels created in registration blocks in the process of original arrangement of rights and following re-parceling during mutation plans preparation. It includes, among other details, the number of the last parcel after original settlements of land rights in the block, and the number of the last parcel in the existing block. The existence of difference between the two values serves as indication about the existence of mutation plans in the block, changed the original parcels and created the new ones.

Cadastral data are entered into a database, as a routine action by check performers of SOI in the early stages of checking procedure. This database enables both to SOI employees involved in the process and to professionals coming from outside of SOI to receive relevant and identical information about existing parceling details or indication about occurring changes.

Each record line in the data base of CBCI system is related to a specific mutation plan, and its ID number serves as a key field. The reciprocal relation “block number - mutation plan ID” has “many-to-many” character. The ordinary situation is when there are several mutation plans prepared by the surveyors and approved by SOI in one block (“one-to-many” case). But a possible situation can also be that one mutation plan relates to more than one block, and its parcels, accordingly, are registered in several blocks. It happens when the mutation plan transfers parcels from one block to another. In this case, the plan ID will appear both in the initial block and in the target one. The need to do this arises when the old parcels, planned to

be changed, are located in different adjacent blocks, and there is a requirement to keep the new parcels, defined by the relating municipal plan, together in one block. A similar need arises when it is necessary to transfer the external parts of old parcels located outside the municipal plan peripheral boundaries. In aforesaid cases there is a specific action of parcel's transfer from one block to adjacent ones, and, correspondingly, in such cases one mutation plan will belong to more than one block. As a matter of fact, this action will be registered in Land Registry like every other action of parcels merging or subdivision.

#### 4. FREE INTERNET ACCESS TO CADASTRAL DATA – A NEW SERVICE

As have been emphasized in Statement 3 of “Cadastre 2014”:

“The distribution of information increasingly takes place with the help of data transfer possibilities. ... The Internet and its ability to facilitate worldwide data networks is playing an important role in the exchange of cadastral data. The exchange of data models will become common practice in the distribution of cadastral information.”

In spite of a progress made at SOI, one disadvantage still remained: in order to obtain important information, the interested person was obliged to arrive personally to SOI office. After analyzing the situation, SOI made a strategic decision to expand the new developed system accessibility by supplying its information via Internet. As a result of this action, today every professional, sitting in his office, in a push of a computer button may immediately obtain a list of mutation plans in the block, perform a search of specific mutation plan that created or canceled required parcel and even get surveyors contact details, if needed.

New information system named “Block / Parcel Index” (BPI) has been added to the set of data supply services provided by SOI to professional surveyors, to private persons and to governmental agencies engaged in cadastral process. The main goal of this step was the improvement of the essential cadastral data supply. The new system became an important part of the comprehensive e-Governance system which comprises various web services offered by different Israeli ministries and official institutions.

The BPI system enables to perform search operations according to the kind of information available to user: mutation plan ID number, block and parcel number (see Figure 2. **The BPI system main form – search options.**). On the basis of this information user can get the following data:

- Block details including list of mutation plans ordered in a sequential way according to year of their preparation, old parcels numbers, new parcels numbers, parcels transfer from one block to adjacent one (see Figure 3. **Block details form (sequence of mutation plans in block).**)
- Mutation plan details including block number, involved parcels numbers, surveyor's license number and his contact details (see Figure 4. **Mutation plan details form.**)

- Parcel's history details including the origin of the parcel (original arrangement or re-parceling) and, if exists, the mutation plan ID which canceled it (see Figure 5. **Parcel's history form.**)

One additional benefit of the BPI system is the prevention of uncoordinated preparation of mutation plans by two or more surveyors dealing with re-parceling of the same old parcels or adjacent ones. Many parceling works are initiated and carried out by the private sector or by governmental agencies belonging to different ministries. As a result, it happens sometimes that different surveyors make their job without required accordance in boundaries reconstruction of adjacent old parcels or in definition of new parcels. In the past, this situation was detected only by SOI check performers on the stage when the surveyors have already submitted their plans to the check of SOI, when their work is actually accomplished. The immediate consequence of this situation was taking back of the whole work by the surveyors to make required corrections which caused unnecessary time (and money) spending of surveyors and of SOI check performers. The usage of newly developed Internet service will prevent this situation, when the surveyor, sitting in his office, will be able to check up-to-date situation regarding the mutation plans in the block submitted by other surveyors to SOI and, correspondingly, to check existing parcels validity.

The BPI system started to operate, free of charge, in the beginning of 2006. In order to notify the users about new system came into operation, the relevant message was delivered to surveyors' community by different ways: e-mailing, SOI website and through Association of Licensed Surveyors.

## **5. USERS' COMMUNITY OF THE NEW INFORMATION SYSTEM**

There was one important question about who will be authorized to use the newly developed system. Initially it was planned to deliver the new Internet service only to licensed surveyors. In order to do this it was planned to provide each surveyor with a unique user name (e. g., license number) and password. The idea behind this decision was to supply the specific cadastral information only to specialists in the field of cadastre who are able to make sophisticated use of supplied data. But finally, after numerous discussions it was decided to enable admittance to BPI system data to every person interested in obtaining the relevant information. Notwithstanding, the relevant caption has been written on every form of the new system notifying that its information is dedicated for the use by surveyors' community.

The first experience has shown that it was a right decision. The potential users' community is largely broader than it was estimated preliminarily. The circle of interested persons (both private and those bearing official position) embraced different groups of professionals in different fields (not necessarily surveyors). Actually, the cadastral information, entered into the data base by SOI employees in the stage of checking procedures of surveyors' works, was highly interesting for many professionals involved in different stages of cadastral process. As has been mentioned above, the process starts from preparation of municipal plan defining approximate location of the new parcels' boundaries. The municipal plan, prepared, in most cases, by an architect assisted by a surveyor, has to specify existing statutory parcels destined

to canceling. The representatives of local authorities, mainly those who are responsible for municipal plan checking and approval, might be also interested in obtaining up-to-date information regarding existing parcels they confirm to change. The lawyers accompanying real estate contracts and land parcels transactions comprise one more important category of newly developed system users. The land assessors carrying out their job will be very pleased to obtain relevant information pressing computer keyboard button in their office regarding the validity of parcels which they make an assessment for. The SOI looks forward for widening of the new system usage and its absorption among different professional communities which have not yet applied it in their daily work.

## **6. USERS' REACTIONS**

In the process of new system development an option was programmed which makes the users possible to leave messages in a special post box built-in in the system. The initial intention was, first of all, to give a possibility to user to make a remark regarding system operation and data accuracy. It was taken into account in the data base development that occurrence of human errors can always take place and that fact can affect the reliability of the whole system in the eyes of the users' community. This situation urged the system designers to pay a special attention to message leaving issue. In addition, an option was programmed which enabled to SOI employees, dealing with responses, to enter the system built-in post box, to read and to sort received remarks and to direct them to a proper treatment: fixing of system data errors or sending received messages for information of the relevant SOI functionary.

Immediately after the new system has started to function in 2006, SOI began to receive users' reactions: comments, remarks, requests. All the reactions were very positive and included constructive proposals regarding improvement of the new system functioning or requests to expand this service over additional fields of cadastral information that have not yet been supplied by SOI through Internet.

It should be mentioned that as time went by, the amount of messages reduced. The conclusion was that the new system very quickly (even more quickly than it was estimated beforehand) became a "domestic" system in the offices of professionals, and its usage became an integral part of the routine professional work. The greater part of the messages was related to system functionality and not to system data accurateness, which has, apparently, satisfactory quality. Therefore the professional community adopted the new system as a routine tool and does not feel any need to change it excepting the need to expand information supply to additional kinds of cadastral data.

It became clear from users' reactions that non-surveying specialists are also interested in getting of system data, and they are using the system continuously.

Finally, we should mention an important fact, strongly appreciated by the users' community: the supplied cadastral information and data are available, at present, free of charge.

## 7. PERSPECTIVES OF A FURTHER DEVELOPMENT

SOI looks with a great satisfaction at the first experience of cadastral data supply through Internet. The success of a new developed information system urged its designers to think about the continuation of system development and adding of new options and possibilities.

One of the evident but missing options in data base is a possibility of saving actions of system data in desirable format. As for now, the user can only view the relevant data and to print it as a report in the built-in format; but he cannot get data in a digital form as a file (in text or data sheet format). Doubtlessly, the user is interested to get the relevant data in the digital format which will enable an effective following data processing.

The CBCI data base serves as a source of the Internet version (BPI system) and is available only to the “domestic” use in SOI. In addition to its direct use, it is connected to separate database of digital images of scanned cadastral materials. The latter database enables to internal SOI user (SOI employee or professional which arrived to SOI to purchase the required information) to view and to print a digital image of mutation plan or other cadastral documents (field books, calculation brochures etc.). There is a possibility in CBCI system to find the required mutation plan and to get its image from within the system. But this option does not exist in the Internet BPI system. Since there is a great demand from the professionals to be provided also by digital image information through Internet, the implementation of this option, obviously, will be one of the future development directions.

At the end of 2003, SOI initiated a comprehensive project aiming to establish better, highly standardized and homogeneously regularized cadastral practice. By now, in the process of project realization, the existing working procedures were critically studied and analyzed, and practical steps for their improvement were proposed. The project is in the stage of detailed designing of a software application which will be developed for control, follow-up, management and decision making. As a critical step, it was decided to extend SOI activity via Internet and, especially, about cadastral data supply as essential component of this activity.

Planning of future SOI cadastral activity is oriented strategically in the recent years towards strong GIS basis. By now, SOI is preoccupied by consolidation of all data bases (both alphanumeric and graphic), functioning in the main office and in regional branches, on technical platform of GIS technologies. Among other medium- and long-term plans, there is an intention to bind the BPI system (based on alphanumeric data) to the GIS data obtained in the process of computerized check of work files submitted by private surveyors to SOI approval. This step will cause, certainly, structural changes in the existing version of BPI system.

**רישום תמורה בגוש**

מספר החלקה האחרונה בגמרי ההסדר : 35

מספר הגוש 10080

מספר תמורה	מספר התכנית	מספרי החלקות		מספר התמורה	מספר התכנית	הערות	מספרי החלקות		מספר התמורה	מספר התכנית
		החדשות	הישנות				החדשות	הישנות		
1	1185/35	228	206	21	348/69	7/40	89	32, 16, 9, 7, 6	1	1185/35
2	1187/11	274	531/66	22	531/66		66-67	91	8	1187/11
3	1188/11	284	532/66	28	532/66		64-65	93	4	1188/11
4	1327/11	1	10081 ~ 21	24	598/89		40-63	117	31, 30	1327/11
5	2121/11	1-2	213	25	895/00			119	14	2121/11
6	213/11	283-299	241, 244, 273-278	26	862/00		36-39	123	15	213/11
7	919/38			27		השנה האחרונה	71-82	68-79	32	919/38
8	920/38			28		" "	83-93	80-90	9	920/38
9	921/38			29		" "	94-118	91-115	6	921/38
10	922/38			30		" "	119-134	116-131	16	922/38
11	923/38			31			135-159	156	7	923/38
12	930/38			32			160-161	158	120	930/38
13	931/38			33			162-181	178	71-73, 74-82, 92-93, 103-106, 111-119, 122-125, 135-136, 146, 147, 149-151	931/38
14	384/39			34			68-69	180	66	384/39
15	383/39			35			70	181	69, 180, 67	383/39
16	90/45			36			182-183	183	54	90/45
17	91/45			37			184-185	185	53	91/45
18	850/46			38			186-187	187	169	850/46
19	200/47			39			188-224	224	95, 110, 65, 1	200/47
20	453/52			40			281, 282	226	46	453/52

Figure 1. Historic block card.

**עדכן גוש/חלקה**

דבר המנכ"ל

המרכז למיפוי ישראל מאפשר לציבור המודדים לאתר פרטי גוש רישום, פרטי תכנית לצרכי רישום (תצ"ר) בגוש והיסטורית חלקה בגוש. לשם כך עליכם להזין את פרטי הנתון המבוקש וללחוץ על כפתור **אתר**.

**הערות:**

- השימוש ביישום הוא לקבלת מידע בלבד ובאחריות המשתמש.
- המידע באתר מבוסס על תהליכי העבודה במפ"י ואינו מהווה תחליף לביחור פרטי הרישום בלשכת רישום המקרקעין.
- היישום בהרצה, ייתכן מידע חסר, אשר יעודכן בהקדם.
- בשלב זה השייחית ניתן בחינם.

איתור גוש ?

א' תת גוש / מספר גוש  /   אתר

איתור תצ"ר ?

שנת תצ"ר / מספר תצ"ר  /  אתר

איתור הסטורית חלקה ?

א' חלקה / תת גוש / מספר גוש / סופית  /  /  /   אתר

מעודכן לתאריך: 17/11/2005 תגובות מענה

**Figure 2.** The BPI system main form – search options.

**פרטי גוש**

תת גוש / גוש 11550 /

שם מקום: מעק-זבולון / סטטוס:  נוצר בהסדר

חלקה אחרונה בהסדר:  105 חלקה חדשה סופית אחרונה:  137

חלקות חדשות		מגוש אחר			חלקות ישנות		תצ"ר	תמורה
סופיות	ארעיות	סופי	ארעי	גוש מוסר	סופיות	ארעיות		
106					96-97		16/1959	1
112-114					1-3,6-7, 11-12		289/1969	2
	1				60-62,64-65		792/1969	3
	1	93		11553			2/1974	4
	125				91,102-104	68-70	3/1974	5
107-111					58-61,64-65		7/1978	6
131		93		11553			609/1981	7
115-130,132					91,102-104		610/1981	8

ד 1 מתוך 2 כמות תמונות: 9 פרטי קבוצה פרטי מודד

**Figure 3.** Block details form (sequence of mutation plans in block).

**פרטי תצ"ר 611/1989**

תאריך נשר לרישום: 04/05/1997    רשיון: 276    שם: חפץ שאול    פרטי מודד

חלקות חדשות		מגוש אחר			חלקות ישנות		תת גוש	גוש	תמורה
סופ	ארעיות	סופי	ארעי	גוש תוסר	סופיות	ארעיות			
	1-13				33,36,38,69, 109-110, 116-117,138			10100	6
	5		11	10100				200א	3

1 ד    1 מתוך 1    כמות תמוחות: 2    פרטי גוש

Figure 4. Mutation plan details form.

**פרטי היסטורית חלקה**

פרמטרים

תת גוש    גוש    חלקה סופית:    33    /    10100    פרטי גוש

פרמטרים

מקור:    נוצר בהסדר

שימוש בחלקות ביסוס ב:

רשום	שם	רשיון	תאריך נשר לרישום	תצ"ר
לא	חפץ שאול	276	5/4/0097	611/1989

1

עמוד 1 מתוך 1 כמות רשומות: 1    פרטי תצ"ר    פרטי מודד

Figure 5. Parcel's history form.

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- Ossko, A., Cadastre, Land Administration Systems and e-Government. FIG Workshop on e-Governance, Knowledge Management and e-Learning, Budapest, Hungary, 2006.

## BIOGRAPHICAL NOTES

### **Michael Klebanov**

Academic experience:

M.Sc. and Engineer Degree (1985) - Civil Engineering Faculty, Technical University (Cheliabinsk, Russia).

Geodetic Engineering Studies (2000-2002, 2004- ) - Civil Engineering Faculty, Geodetic Engineering Division, Israel Institute of Technology (Technion).

Practical experience:

Cadastral mapping, cadastral boundaries restoration, system analysis and data base development.

Appointments at the Survey of Israel:

Coordinator of Survey Supervision and Public Housing Survey (1991-2001); Deputy Head of Survey Supervision Department (2001- 2004), Head of Survey Supervision Department (2004- ).

Member of Association of Licensed Surveyors in Israel.

Representative to FIG Commission 7.

**Dr. Joseph Forrai** was awarded M.Sc.(1974) and D.Sc.(1980) degrees at Technical University of Budapest, Hungary. Dr. Forrai was Lecturer and Senior Lecturer at TUBudapest, Tel Aviv University, Israel Institute of Technology (Technion) and Bar Ilan University (Tel Aviv) since 1976. Appointments at the Survey of Israel: Chief of Research Division (1987-1992); Head of Photogrammetry Department (1989-1993); Deputy Director General (1993-1994), Chief Scientist (1995-2003), Deputy Director General for cadastre (since 2003). Professional and research background (partial): crustal movement detection; photogrammetric data acquisition (national GIS topographic data base); permanent GPS station network; GPS support for geodynamics; improvement of national cadastral practice. Memberships of the Israeli Society of Photogrammetry and Remote Sensing (president between 1995-2001); Association of Licensed Surveyors in Israel (responsible for FIG relations); Israeli Cartographic Society.

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