

## **Seeds of Innovation at the Central Bureau of Statistics in Israel Data Collection using a Tablet Computer**

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### ***Abstract and Paper***

In 2017, the Central Bureau of Statistics in Israel conducted a preliminary survey, called "Tromifkad" (Pre-Census), in preparation for the future Population Census. This was an extended experiment conducted in 14 localities.

One of the main goals of the experiment was to examine the tablet as a new device for collecting data in field. When the first tablet was introduced to the market in Israel 11 years ago, it was hard to believe that within a few years this sophisticated technological "toy" would become a tool used by full-time field workers, who needed a reliable and secure mobile device to easily enter information. The Tablet use by field interviewers has led to an improvement in the efficiency their work and their conduct in the field.

This article will deal with the various benefits obtained from the new collection tool:

- Advantages of working with no paper.
- Advantages of working with advanced navigation systems and built-in GPS detection and computerized maps (digital).
- Advantage of interviewer's effective self-management in the field.
- Easy-to-use tool that provides the needs of field work.

In the business world, where organizations are constantly looking for novel devices that will provide them with increased flexibility, mobility and productivity, the tablet has become the main tool for many industries, such as logistics and operations personnel, suppliers and shippers, and sales personnel, who have become accustomed to working on small and lightweight screens. In light of the significant technological advances in tablet information security, even security organizations with the highest level of information security have begun to use tablets extensively.

In this article, Ms. Baron and Mrs. Lerner will discuss the advantages inherent in working on a tablet computer, as expressed in the pre-census experiment, and will examine the various needs this novel device has fulfilled during the field work for this survey.

# Seeds of Innovation at the Central Bureau of Statistics in Israel

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**Data Collection using a Tablet Computer**

**By Alice Baron & Noya Lerner**

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## **Abstract**

In 2017, the Central Bureau of Statistics in Israel (ICBS) conducted a preliminary survey, called "Tromifkad" (Pre-Census), in preparation for the future Population Census. This was an extended experiment conducted in 14 localities.

One of the main goals of the experiment was to examine the tablet computer as a new device for collecting data in field. When the first tablet was introduced to the market in Israel 11 years ago, it was hard to believe that within a few years this sophisticated technological "toy" would become a tool used by full-time field workers, who needed a reliable and secure mobile device to easily enter information.

Tablet use by field interviewers has led to an improvement in the efficiency of their work and their conduct in the field.

This article will deal with the various benefits obtained from the new collection tool:

- Advantages of working with no paper.
- Advantages of working with advanced navigation systems and built-in GPS detection and computerized maps (digital).
- Advantage of interviewer's effective self-management in the field.
- Easy-to-use tool that provides the needs of field work.

Organizations in the business world are constantly looking for novel devices that will provide them with increased flexibility, mobility and productivity. The tablet has become the main tool for many industries, such as logistics personnel, suppliers, shippers, and sales personnel, due to the advantage of its small lightweight screen. In light of significant technological advances in tablet information security, even security organizations with the highest level of information security have begun to use tablets extensively.

In this article, Ms. Baron and Mrs. Lerner will discuss the advantages of working on a tablet computer in the Pre-Census experiment, and will examine the various needs this novel device has fulfilled during the field work for this survey.

## **Literature Review**

Most professional research organizations, as well as commercial, government and academic organizations, are enthusiastically adopting new methods of computer assisted data collection.<sup>1</sup> Computer assisted telephone interviewing (CATI) is the most prevalent, and computer assisted personal interviewing (CAPI) is rapidly gaining in popularity. Also, new forms of electronic reporting of data using computers, telephones and voice recognition technology are emerging.<sup>2</sup>

A tablet computer is usually defined as a thin, small tool – a general purpose computer contained in a touchscreen panel, which is operated by fingers, or a stylus pen.<sup>3</sup> In a world that seeks a novel device, this is seemingly a new world of options. The main advantages are flexibility, mobility and productivity.

In 2000, Microsoft introduced a tablet version of Windows. However, Windows tablets were not widely used until 2012 with the game-changing Windows 8. Any program that runs on a Windows PC can run on a Windows 8 or Windows 10 tablet.<sup>4</sup>

Some experts thought that tablets would replace laptops. So far they have failed to live up to that expectation.<sup>5</sup>

When collecting data in the field on daily basis, one of the main things is to obtain the data in a system that will be novel yet long lasting. Unlike laptops, tablets have a long shelf life - that is a good thing for consumers.<sup>6</sup> It has resulted in a smaller pool to pick from, but it is not a coincidence that the manufacturers who make the best ones, such as Apple, Amazon and Google, are still churning them out - slowly, but surely.<sup>7</sup>

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<sup>1</sup> De Leeuw, Edith, and William Nicholls. "Technological innovations in data collection: acceptance, data quality and costs." *Sociological Research Online* 1.4 (1996): 1-15.

<sup>2</sup> Ibid

<sup>3</sup> Encyclopedia . Definition of: tablet computer.

<https://www.pcmag.com/encyclopedia/term/52520/tablet-computer>

<sup>4</sup> Ibid.

<sup>5</sup> Where have all the tablets gone? Commentary: To say it's been a slow year for tablets would be an understatement. What's the deal? Xiomara Blanco. April 10, 2016 6:00.

<https://www.cnet.com/news/tablet-market-2016/>

<sup>6</sup> Ibid.

<sup>7</sup> Ibid.

Product and business innovation are integral to corporate growth. Insights into improving the design and development process can help achieve better innovation outcomes.<sup>8</sup> Therefore, the tablet has become a main tool for many industries that find themselves as managers of the customer.

In addition to question wording, the design of CAPI instruments is a focus of evaluation and pretesting efforts while focusing both on interviewers and respondents.<sup>9</sup> Computer-assisted personal interviewing (CAPI) offers many attractive benefits over paper-and-pencil interviewing.<sup>10</sup>

Toward the last decade, mobile traffic has increased tremendously due to the deployment of smart devices such as smartphones and smart tablets.<sup>11</sup> These devices use various types of access networks such as 3G, WiFi, and mobile WiMAX. Network service providers also provide these access networks with various types of plans.<sup>12</sup>

In data collection much of our understanding of urban systems comes from traditional data collection methods such as surveys by person or phone. These approaches can provide detailed information about urban behaviors, but they are hard to update and might limit results to "snapshots in time".<sup>13</sup>

The article will deal with promising results using new data collection methods, allowing possibilities for improved customer service.

## **The Pre-Census – Background**

The Pre-Census, called "Tromifkad", was a small experiment that was part of the preparations for the future census, and it included 14 localities. The Pre-Census brought with it many innovations to the field work of the interviewers:

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8 Innovating for Effectiveness: Lessons from Design Firms. Marc H. Meyer and Tucker J. Arion Research Technology Management Vol. 53, No. 5 (September–October 2010), pp. 21-28

9 Couper, Mick P. "Usability evaluation of computer-assisted survey instruments." Social Science Computer Review 18.4 (2000): 384-396.

10 Watson, Nicole, and Roger Wilkins. "Design matters: the impact of CAPI on interview length." Field Methods 27.3 (2015): 244-264.

11 Carroll, Aaron, and Gernot Heiser. "An Analysis of Power Consumption in a Smartphone." USENIX annual technical conference. Vol. 14. 2010.

12 Joon-Myung Kang, Sin-seok Seo, James Won-Ki Hong, "Usage pattern analysis of smartphones", Network Operations and Management Symposium (APNOMS) 2011 13th Asia-Pacific, pp. 1-8, 2011.

13 Reades, Jonathan, et al. "Cellular census: Explorations in urban data collection." IEEE Pervasive computing 6.3 (2007).

- Two-stage work process: registration of all the dwellings and sampling of a sample fragment of each third apartment.
- New collection method - a questionnaire for online retrieval.
- Work processes as defined by the supervisor.
- Computerized systems that were built for the Pre-Census
- Tablet as a new tool.
- Use of digital maps for the first time.

## **Methodology - Two-Stage Sampling**

The 2017 Pre-Census was divided into two main stages:

### **1. Pre-collection stage**

The purpose of this phase was to cover the sampled area, create the sampling frame and the sample of dwellings of the 2017 Census, and then link the sampled dwellings to an Internet questionnaire. At this stage, the interviewers were required to survey the area and register all the buildings and their apartments. This stage included a **Reminder Stage** that its goal was to increase the online retrieval. At this stage, the interviewer gives reminder letters to the sampled apartment that have not yet responded on the Internet.

### **2. Collection**

The goal of this stage was to fill out questionnaires for all the dwellings in the sample that was used for households. At this stage, the interviewers were required to return to the sampled apartments whose residents had not yet responded to the web questionnaire. During their visit to the apartment, they interviewed the residents and filled out a questionnaire on their tablet.

The implementation of the Pre-Census took several months and during this period there might have been changes in the population. For example: babies are born, people die, and people move to the country or leave the country. In order to obtain a "snapshot" of the population at a certain point of time, the questionnaires were filled out in relation to a particular date. This day was called the "Effective Date", December 31, 2016.

## **Survey population**

The population enumerated in the census in Israel is the "Permanent Population" (de jure), which includes all residents living permanently in the country. Tourists and temporary residents are not included unless they have stayed in Israel continuously for a year or more.

## **The survey sample**

The survey sample was a two-stage sample that included field cells from which the dwellings were sampled. The purpose of the interviewer was to visit and collect data about all those living in the sampled dwellings.

## **Investigation unit – household**

In the survey discussed, dwellings were sampled but "households" were investigated. **Household** is defined as a group of people who live together in one dwelling on a regular basis and manage a common expense budget for food. In a dwelling in which two or more households lived, we requested data from all the households living in it and divided the dwelling accordingly.

## **Data collection methods**

The questionnaire is the main tool to collect data about the population. The Pre-Census used two methods of collection, online questionnaire and face-to-face interview. The respondents chose whether to answer the questionnaire themselves via the Internet, or to an interviewer that came to their apartment to fill out the questionnaire during the collection phase.

1. **Online response:** In the pre-collection phase, letters of inquiry containing access details to the census questionnaire via the Internet were given to the sampled dwellings. This option was open to all sampled dwellings from the time the letter of inquiry was received until the end of the survey period. This was the first time that Internet retrieval was tested in a field survey.
2. **Face-to-face interview:** At the collection stage, interviewers were sent to dwellings from which no questionnaire was received on the Internet, in order to fill out the questionnaire in a face-to-face interview.

## **Paperless Work Environment**

### **Green Environment**

Energy consumption is rising due to the information and network technology, as well as the rapid development and increase in the size of data centers. In consideration of a green environment, many companies are already eyeing the green store, hoping thereby to reduce their energy storage system.<sup>14</sup> Therefore today more than ever, the use of paper is being reconsidered; the use of tablets by interviews in the field saves paper and protects the environment.

Today, global warming is costing the world a lot of money, so a green environmentalist aims to promote policy and business that works for the environment.<sup>15</sup> Although paper is a recyclable material, only about one-fifth of all paper waste in Israel is recycled.

Paper is not originally the color white; a chemical process is required to whiten the paper's raw material. One of the chemicals used is dioxin – a highly toxic chemical compound that severely damages the environment.

Today, in the era of multiple and varied computer applications, many printed materials, such as letters, reports, lists, maps, questionnaires, can be converted into electronic files that do not pollute the environment as much and do not accumulate as waste. With slight changes in habits, large quantities of paper and many trees can be saved, and environmental quality can be improved.

### **Data Security**

Every document that has been saved, printed reports, letters and all the other office papers, contain a lot of information that has significant value to the organization's activities and ongoing work.

The management of information in the traditional method, without a technological platform and systematic methodology, creates heavy costs for organizations - loss of

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14 He, Qinlu, Zhanhuai Li, and Xiao Zhang. "Data deduplication techniques." Future Information Technology and Management Engineering (FITME), 2010 International Conference on. Vol. 1. IEEE, 2010.

15 Gupta, Ms Yuvika. "Carbon credit: a step towards green environment." Global Journal of Management and Business Research 11.5 (2011).

information, working with multiple versions of the same files, compartmentalization and exposure of employees and external people to information to which they are not supposed to be exposed.

Paper can easily and quickly be damaged; it is liable to damage by fire, moisture, and yellowing, and can easily be lost. Furthermore, personal data can get into the wrong hands and the data collected can be lost. The confidentiality of paper documents, compared with data collected in a system, becomes a complicated task.

### **Field Work and Appearance**

More paper for interviewers in the field leads to extra weight and load, and having many documents leads to disorganization in the field work that eventually affects the appearance of the organization to the public.

It is much easier to have a system that makes all the information accessible to the interviewers in their location. Organized management of information includes version management and comments by the various parties involved in the creation or handling of the document.

### **Saving Time and Resources**

Reducing the time used working with paper will decrease costs and make the work environment more modern and advanced. Storage of an organization's many documents in a document archive costs money, time and space. There can be a significant saving in the cost of printing and storage by eliminating paper. Paperless work has resulted in higher productivity and efficiency among interviewers and organizations in general. It shows the public a newer face and presents the organization in a more modern way.

### **Survey Management Application**

Currently, data collection at the ICBS involves various collection systems that do not "talk to each other". Each survey has its own specific management system, separate training and its own interviewers and coordinators.

Moreover, the existing management systems require paperwork management. The interviewers write the results of the enumeration on a paper "card of the sampled person" and are required to work at home in order to type the information into a computer and send it to the central database. There are still surveys and questionnaires filled out by paper.

Current surveys of households do not allow online retrieval. The retrieval is possible only by means of an interviewer who physically arrives at an apartment in the area.

Using the survey management application, the field interviewer presents a letter to the apartments sampled, which refers them to the website where they can fill out the Pre-Census questionnaire. The interviewer then records the apartments in his workload and scans the barcode/QR into the system. There is a link to the username and password in the letter.

This was the first time such letter was presented in field surveys. The letter contained the name of the website, the username and the password to fill out the questionnaire.

The survey management application on the tablet was used by the interviewer during all three stages of the Pre-Census: The pre-collection stage, the reminder stage, and the collection stage.

### **Pre-Collection Stage:**

The main goal of this stage is to create the survey sample by recording all the existing dwellings in the "cell area" and sample from them according to an algorithm that was defined in the system.

**Step one:** Tour the cell, identify and locate its contents, and make notes at the level of buildings that will help to identify the building.

**Step two:** Determine the most effective arrangement of the structure registration by marking the direction of the enumeration.

**Step three:** Registration of floors at the entrance => Registration of apartments on the each floor => Sample of apartments => giving a letter to the sampled apartments for retrieval (a letter will be scanned for them).

**Reminder Stage:**

At this stage, the interviewer gives reminder letters to the sampled apartment. Only sampled apartments that have not yet responded on the Internet will receive a reminder letter (a reminder letter will be scanned for them).

**Collection Stage:**

The main goal of this stage is to interview the dwellings who were sampled in the pre-collection stage and did not respond online. Every visit to the dwelling is recorded in the system.

The screens of the system were constructed on the following basis: The changes in each stage were adapted to the required work process as mentioned above, prior to the transfer of the requirements to the Development Department.

In a meeting conducted in the Tel Aviv and Haifa offices, the field coordinators expressed general satisfaction with the tablet application. Clearly, the application contained many functions that assisted in ongoing work in the field. At the same time, several suggestions were received for improving the collection tool in the field even before it was tested.

**Advanced Navigation Systems, Built-In GPS Detection and Computerized Maps (Digital)**

In this section we discuss the requirements that were defined in the Census Surveys Department, Geographical Information System (GIS) Department, and the Information Systems Department. The requirements for the digital maps used by the field interviewer were based on field tests and examination by the coordinators and the management. During these tests, the interviewer's needs were examined to maximize his work using a specifically designed tablet.

Two types of cell maps were required for the work of the field interviewer and field coordinator:

- Map of buildings and streets in 5 scales: 1: 10,000, 1: 5,000, 1: 2,500, 1: 1,250, 1: 650.
- An aerial image: in the same 5 scales defined for the maps of buildings and streets.

Both types of maps were accompanied by a legend of clear markers defined by a cartographer. In addition to these criteria, maps of buildings and streets and an aerial image were required, at the level of locality and cell, which are critical to the work of the interviewer.

**Points of Interest (POI):** The POI will be displayed on the polygons on the map:

- In all scales
- Font size legible according to scale
- The font is larger or different than the other fonts on the map
- Polygons with a POI will receive a unique color compared to the other polygons on the map (coloring any polygons which are non-residential).

After conducting field tests, the Surveys Department decided the POI are an essential tool in localities without an organized address number system, especially in the **Arab** localities.

**The following will be displayed on polygons on digital maps:**

Banks	Magen David Adom, MDA <sup>16</sup>	Hospitals	Health maintenance organization, HMO
Schools	Kindergartens and schools	Hotels and hostels	Sports centers
Mosques and religious structure	Public buildings	Cemeteries	Gas stations and their names
Railways and stations	Shopping centers	Police stations	Census institutions <sup>17</sup>

In addition, the digital maps display roads in all scales, with each type of road (urban, inter-urban). The roads will be marked differently, the street names will be easy to

<sup>16</sup> Magen David Adom (Israeli equivalent of the Red Cross first aid organization)

<sup>17</sup> The GIS will check with the Demography and Census Division whether it is possible to use a layer of command institutions.

identify and where there is no street name, the road sign number will be displayed. Green areas represented green areas, neighborhood names in all scales, polygons in scales 1: 5,000, 1: 1,250, 1: 650, and annotations at 1: 1,250, 650: 1 parallel to the street.

**The following table presents the data above for the polygon map:**

	<b>Scale 1:650</b>	<b>Scale 1:1,250</b>	<b>Scale 1:2500</b>	<b>Scale 1:5,000</b>	<b>Scale 1:10,000</b>
POI	✓	✓	✓	✓	✓
Roads	✓	✓	✓	✓	✓
Street names	✓	✓	✓	✓	✓
Green areas	✓	✓	✓	✓	✓
Neighborhood name	✓	✓	✓	✓	✓
Polygons	✓	✓	✓	✓	✗
Annotations	✓	✓	✗	✗	✗

✓ **Displayed on the map**

✗ **Not displayed on the map**

There also exists a kindergarten level, but the Ministry of Education must approve it for use.

The cell and its boundaries will be displayed in all scales by using borderline. The annotations and the Points of Interest (POI) will be displayed on buildings in all scales, roads as they are from aerial image, without any special addition, numbers of interurban roads. The names of the streets will appear in all scales, green areas will appear as they are in aerial image, without special addition, neighborhood names will be displayed in all scales, and annotations will appear in 1: 1,250, 1: 650 when not ascending and not exceeding the structure.

In addition to the data map that is used as the basis for recording data from the field for the interviewer, the Surveys Department requested an aerial image.

**The following table presents the data above for the ariel image map:**

	<b>Scale 1:650</b>	<b>Scale 1:1,250</b>	<b>Scale 1:2500</b>	<b>Scale 1:5,000</b>	<b>Scale 1:10,000</b>
POI	✓	✓	✓	✓	✓
Roads	✗	✗	✗	✗	✗
Street names	✓	✓	✓	✓	✓
Green areas	✓	✓	✓	✓	✓
Cell boundaries	✓	✓	✓	✓	✓
Neighborhood name	✓	✓	✓	✓	✓
Polygons	✗	✗	✗	✗	✗
Annotations	✓	✓	✓	✓	✓

✓ **Displayed on the map**

✗ **Not displayed on the map**

Throughout the Pre-Census process, the digital maps were an essential part of the interviewer's fieldwork, which enabled the work to be done properly. In addition, this was the first time they were used, and constituted one of the work innovations. Therefore, their use was continuously examined by the Surveys Department.

Following the use of digital maps, a huge improvement was achieved in comparison to the paper maps that were in the previous censuses and surveys. In feedback talks held at the end of the project, all the project players declared the maps were clear and worked great for everyone, from the staff coordinators to the interviewers.

After a time of adjustment and learning to use the maps, the interviewers were able to make efficient and correct use of them. The use of the two versions of the map, the "white" map with the polygons and the aerial image map complemented each other and helped the interviewers to familiarize themselves with the field and to accurately document the information from the field.

### **GPS Detection**

At the beginning of the work process with the interviewers and coordinators, the trainers were instructed to treat the GPS as an assisting tool and not to develop a dependency on it. This was due to findings from field tests that were conducted prior to the production work in the field. The tool was more essential for orientation in areas with an irregular array of addresses.

The interviewers reported in conclusion reviews that the GPS did not work 100% of the time, but when it did work it was very helpful in orientation. Some of the interviewers have become dependent on the GPS and when it did not work, they found it difficult to get around. In addition, it was found that when the interviewer left a residential building, the GPS app was required to reactivate due to disconnection from the local satellites.

### **Technological Easy-to-Use Tool**

As discussed in the previous section, working with a tablet means the computer is constantly on, unlike the previous use of a laptop computer. Thus, a map surveyor and a satellite navigation system that enables the interviewer to identify sites accurately in the field can be installed. This streamlines his work and increases the quality of the data received, and the identification errors are reduced. This is the main advantage of the tablet.

The device is thin, storage and carrying is incredibly comfortable, unlike most large, heavy laptops. The ease of carrying a tablet provides a world of useful benefits. Its weight and its support tools make it easy to use when walking and passing between addresses and apartments.

The tablet also provides convenience for management. All the functions of a computer are available on a tablet and it minimizes the need for the interviewer to work at home. When working on a laptop, the interviewer has added working time at home resulting from the need to enter all the data he filled in on paper during his working day to the computer and only then to transmit the data via the Internet at home. The activity of the interviewer at home is difficult to control in terms of the length of time it takes, and creates a great administrative difficulty in working with the interviewer's reports.

In order to accrue the above advantages with a tablet, it needs to meet the interviewer's field work conditions:

- Working in all weather conditions
  - In the sun (sun reflection)
  - In the rain (working with a wet screen)

- Work constantly. The duration of a typical survey work day is not less than 6 hours with the tablet on all the time
- A powerful and fast GPS that identifies satellites at a reasonable speed and does not interrupt the link sequence to the satellites
- A durable device adjusted to the interviewer's work
- Powerful screen lighting that will allow the interviewer to see the maps even in dark conditions conveniently and efficiently
- A fast processor that will allow software to be uploaded within a reasonable time as well as sufficient memory according to the needs defined

## **Heading to New Technology Era – New Future Projects at ICBS**

### **Generic Business Surveys**

As part of the innovation and technological progress, an extensive and innovative project is being led at the ICBS, which is now taking shape in the Surveys Department: "The Generic Business Project."

Its purpose is to consolidate all business surveys (32 surveys) into one advanced computerized system, which will be user-friendly. Today, the use of different systems and work interfaces creates difficulty in mobilizing the interviewers from a survey and complicates their work. The goal is that the interviewer will know and work in various surveys on one computerized system that supports online retrieval.

The preparation of the infrastructure for the use of Internet retrieval includes an array of question coding to prevent the repeated burden of answering the same questions in the various business surveys.

### **Agriculture Census**

As result of the efficient and effective use of the tablets during the Pre-Census as discussed in this article, it was decided to use it in the Agriculture Census. The tablet will be used by the interviewers, and this will be the first time that three interfaces will be simultaneously used and synchronized in an ICBS survey: the CAPI, the CATI and the CAWI.

## 1. The Census in the field:

- Most of the census is planned to be a telephone survey and an area survey is planned to cover approximately 6,000 units.
- Questionnaire - There are four questionnaires: for private farmers, for kibbutzim, for companies and for schools.
- Conducting a telephone survey in the generic system, the CAPI system and the Internet.
- Surveys Department will accomplish the following:
  - 1) Formulation of work processes for a telephone survey and survey of the area, including a procedure for transferring between land and telephone and vice versa.
  - 2) Writing guide book for interviewers.
  - 3) Training for interviewers.

The main innovation in the **agriculture census** is the work in three parallel interfaces: online retrieval, telephone (CATI) and field collection (CAPI). For the first time, an algorithm was built to synchronize these interfaces so that they will work parallel and will reach the Agricultural farms in different ways, and enabling all options that can be covered.

### **Digitization and Unification of Field Surveys - Regional Survey Project and Multi Survey System (MSS)**

The Regional Surveyor Project and the establishment of the Multi Survey System (MSS) are a derivative of the ICBS vision to provide accessible and qualitative data and to present an exhaustive picture of the Israeli society and economy in order to plan and implement policy.

The abovementioned was supported and studied in depth in the framework of the Twinning Project, in which the ICBS is a partner. The Twinning platform enables the ICBS to learn from the experience of other statistical offices in Europe, such as Denmark, France and Poland. Implementation of the project involves the implementation of organizational and conceptual changes, as well as the assimilation of technological innovation in all aspects of data collection in the field.

The essence of the project is the creation of **one system** for all field surveys carried out by the ICBS and all collection methods. This will improve the quality of the data collected, along with a reduction of costs. The project is being led by a senior department in full cooperation with the Information Systems Division and the Methodology Department of the Central Bureau of Statistics.

The interviewers will work on several surveys at the same time. Their work will be carried out with consideration for their area of residence, so that they will become **regional interviewers** who handle all of the sampled units who belong to their workload area. The work interface will be uniform and user-friendly. The data will be visualized using maps, graphs and tables. The systems will be assisted by tools such as GPS navigation, a computerized scanning camera, etc. (as was tested in the Pre-Census). The information will be updated online from the field, and will improve tracking of the progress and the quality of work, as discussed throughout this article.

## **Summary**

The advantages of working on a tablet computer in the pre-census experiment were found to be:

- No paper – increased security, saving time, cost, and improving appearances.
- Built-in GPS detection and computerized maps
- Interviewer's effective self-management
- Durability and efficiency of the device

Additionally, the tablet will be an essential tool in integrating all the surveys undertaken by the ICBS into one unified information system.

Following is a summary of the existing situation and the situation that the ICBS aims to achieve in the coming years:

<b>Existing Situation</b>	<b>Towards the Future</b>
Information system for each survey	Presentation of information – a general picture for all the surveys
A different collection system for each survey	One collection management system
For each survey a specific sample	General sample - division into areas
Each survey has a different management system	One management system for all surveys
Separate training for each survey	Generic training for all surveys + specialization specific to the survey
Designated interviewers and coordinators for each survey and each survey receives a different area	Permanent interviewers and coordinators - for a designated area, expert in a permanent geographic area
Internet back-up is possible in some surveys	Possible Internet retrieval and in all methods of collection in each survey
Work is on paper	The system will work online from the field without the use of paper and no work from home
Survey areas vary in terms of travel distances	Consideration of the area of the interviewer's residence and travel distances
Planning each survey separately	Generic planning of all surveys

## **Bibliography**

Carroll, Aaron, and Gernot Heiser. "An Analysis of Power Consumption in a Smartphone." USENIX annual technical conference. Vol. 14. 2010.

Couper, Mick P. "Usability evaluation of computer-assisted survey instruments." *Social Science Computer Review* 18.4 (2000): 384-396.

De-Leeuw, Edith, and William Nicholls. "Technological innovations in data collection: acceptance, data quality and costs." *Sociological Research Online* 1.4 (1996): 1-15.

Encyclopedia . Definition of: tablet computer.

<https://www.pcmag.com/encyclopedia/term/52520/tablet-computer>

Gupta, Ms Yuvika. "Carbon credit: a step towards green environment." *Global Journal of Management and Business Research* 11.5 (2011).

He, Qinlu, Zhanhuai Li, and Xiao Zhang. "Data deduplication techniques." *Future Information Technology and Management Engineering (FITME)*, 2010 International Conference on. Vol. 1. IEEE, 2010.

Joon-Myung Kang, Sin-seok Seo, James Won-Ki Hong, "Usage pattern analysis of smartphones", *Network Operations and Management Symposium (APNOMS) 2011 13th Asia-Pacific*, pp. 1-8, 2011.

Meyer, Marc H., and Tucker J. Marion. "Innovating for effectiveness: Lessons from design firms." *Research-Technology Management* 53.5 (2010): 21-28.

Reades, Jonathan, et al. "Cellular census: Explorations in urban data collection." *IEEE Pervasive computing* 6.3 (2007).

*Research Technology Management* Vol. 53, No. 5 (September–October 2010), pp. 21-28.

Watson, Nicole, and Roger Wilkins. "Design matters: the impact of CAPI on interview length." *Field Methods* 27.3 (2015): 244-264.

Where have all the tablets gone? Commentary: To say it's been a slow year for tablets would be an understatement. What's the deal?. Xiomara Blanco. April 10, 2016 6:00