Management Information System - Decision support in public administration. Case study of the Hungarian Central Statistical Office

dr. József KÁRPÁTI

Hungarian Central Statistical Office

Above a certain size of the organization, whether private or public, the decision making level of the management requires "digested" information to receive support in the form of exact and relevant data or reports. These data are a reflection of the most important strategic and operational elements of the specific organization, giving an overview of the activities and results of planning, production, marketing, sales, customer relations, cash flow etc. depending on the core activity of the company. The quality of these data is of the utmost importance, since the top management of large organizations derives its high level decisions mostly from such "digests" instead of going down in the depth of the core activity components. As the supporting Information Technology went through a significant development during the last decades, and business intelligence solutions were developed, more and more attention was drawn to these technologies in the private sector's companies and large or central public administration institutions as well. The article displays a brief case study of the design and implementation of such a management information system (MIS) in the Hungarian Central Statistical Office in detail. The implemented system had to comply with several expectations, where some of them were specified for public administration. As the daily application of an MIS is still rare in Hungarian public administration, the efforts of the office were almost exclusively based on international good practices and the definition of our own needs.

Keywords: Information technology, business intelligence, management information system, report, dashboard, OLAP, public administration, intranet, database, Key Performance Indicators.

1 Introductory notes

The need to manage an organization by examining the feedback information of its operation is an obvious demand of the top management of all organizations. This requirement itself is as old as the first truly "managed" societies and

organizations of several thousands of years ago. The way how the leaders of a society or an organization actually did this activity, went through an obvious development depending on the size of the managed structure and - certainly – the technical and scientific level of the given entity. The development of the discipline of (management-) controlling woke up always higher expectations and a permanently emerging burden on those organizational units, which had the responsibility of reporting on the activities to the top managers. For a very long time, this function was mostly and clearly considered as a specific sub-role of accounting, but the information requirements have progressively exceeded the limits of the financial / accounting areas. However, the lack of sufficient information and data integration did not make it possible to explore the opportunities of such information to the full.

As the modern Information Technology (IT) in the nineteen-seventies gave a broader opportunity for more and more companies to computerize several areas of their operation, including the already mentioned accounting, the inventories, even some demographic data on sales etc. the management discovered that they have a wide selection of historic business data like never before. It became clear that these data could be used for further purposes, but they'd require a certain filtering and prioritization.

The emerge of the integrated IT solutions for business companies like ERP systems, business process management and so on boosted the amount of information what a company produced about its own activities. This resulted in a completely new battlefield where response to information needs became more and more hard to find, since the complexity and fragmentation of the information was exponentially growing, as IT tools began serving such purposes in more and more sophisticated ways.

2   From business intelligence to the MIS

Fifty years of evolution in IT gave importance to a new definition called business intelligence.[1]   In the given context "business" was a collection of activities for whatever purpose, and "intelligence" was interpreted as "the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal." This definition is still acceptable for the activity it describes. The application of different business intelligence (BI) tools in the operation of an enterprise is becoming nowadays a key issue. Even small or medium size enterprises start discovering the opportunity of using the information, which is

---

[1] see H.P. Luhn 's referred pioneering article on business intelligence

produced during their own activities, on detailed customer analysis and sales forecasting from historical data for example.

Especially larger enterprises are those ones, where another level of information may also be needed, not for the operation itself, but for a summary of facts. This purpose is served by management information systems, which can really play an important role, as there's a natural demand from the top management to receive up-to-date or at least very timely, relevant information on the operation of the enterprise. This service was done on paper in the form of different reports for a very long time, and it is still being in use. The problem is that usually the top management requires a complex set of indicators, data or reports, which' content are mostly in the hands of several responsible units within the organization. So the term "MIS" is commonly used to refer to the group of several information management methods tied to the automation or support of human decision making, integrating different data sources. There's no common agreement on a more specific definition, since the content of management information systems is not really an object for standardization. A good MIS should rather refer to the actual needs of the specific users who are intended to use it. It may contain statistics, accounting information, payroll information, customer data and so on. There are only two assumptions: MIS's are to support decision making with their digested and integrated content, and they are not the systems where operators of different areas implement their actual activities.

Based on these statements we could agree on the following **definition**: *The management information system in the 21st century is an IT solution that extracts timely, relevant and wide ranging data from the transactional^2 systems of an enterprise, for the purpose of an integrated overview and matching of data from different sources, ready for analysis of the most important information and serving the goal of supporting the high level decision making.*

The best management information systems are comparable to the dashboard of a car, where the most important data during the operation are reflected by specific gauges. Although the outlook of MIS's may vary from very graphical to very dry tabular or even textual format, the comparison is reasonable.

---

[2]   We consider those systems „transactional" where the purpose of the IT system is to support an activity in the core production value chain or in the area of supporting administrative activities of an enterprise.

3 Managing information in the Hungarian Central Statistical Office

Public administration, especially in the Eastern or Central European countries was (and to some extent – still is) suffering from fragmentation, unclear responsibilities and insufficient information flow in the hierarchy of the organization. This situation resulted in several attempts and results at different public administration organizations in Hungary as well, as more and more decision makers realized in administration, that a more effective tool is required for better operation. This chapter will introduce the situation from an insider's point of view.

The Hungarian Central Statistical Office (HCSO) has launched a very comprehensive strategy from 2005. During the last years the development of subject matter areas in statistics and dissemination, the institutional relations and also the organizational and management reforms resulted in a more qualitative, effective and transparent statistics office. *A major role in institutional management was given among other plans to process management, a new, resource based program planning system, the evaluation and analysis of the performance of programs – in a significantly different way, in parallel with the central public administration requirements – and the introduction of a new management information system which was intended to collect and present different operational data and reports in a standardized way.* As this plan was set in the HCSO Strategy[3], the office had a countrywide organizational structure with 19 local (county) units and approximately 1800 employees. Although the organization went under a very major reform by creating 6 regional offices instead of the county office structure in 2005, and this was followed by the specialization of the regional offices for a given subject matter area with nationwide responsibility (!) in 2007, the size and structure of the organization of HCSO remained similar to a quite large enterprise.

The top management of HCSO has stated that for a more effective control on the different operations of such a large organization, a management information system would be useful. There were several actual reasons to underline this idea. First of all, the operational information was required more and more in a standardized form from top management, but the sources of information were very dispersed within the organization. We introduced new management techniques, taken from the market sector like starting projects for different development purposes, but the monitoring was not solved properly, yet. The further communication and feedback of presidential reports was also not solved – there was only a one way information flow within the organization with much

---

[3] HCSO Strategy 2005-2008

less feedback from top to down. Finally, there was an emerging demand to form a more transparent operation on mid-level management, too, which also required a solution of the information flow.

Based on these statements within the organization, the president of the office suggested to start a new development project, where the goal was to create a tailor made MIS for the management of HCSO. Since the resources were not sufficient for implementing the entire idea in practice, it was decided that the project would consist of two phases. The first phase was a preparatory phase, where the collection of MIS requirements, system planning and the framework concept were finalized.

The first phase of the project stated in Spring 2005 and was finished by that Autumn. During these months the first step was to sort out the different demands of the management, since the basic idea was to extend the use of the MIS to the heads of departments as well. Interviews with different management members were carried out, which resulted in a catalogue of a possible content.

In parallel with that, a definition study was prepared on the current status of information flow in practice, then a recommended scheme for reporting rules, technical solution and content was designed. It was continuously envisaged that the information should not serve as a tool of power but a fundament for good decision making. This approach was highly appreciated among the members of mid-management level and they were very supportive during the first phase.

The fundamental findings of the 2005 definition study could be summarized as the following:

a)   Information presence

All kinds of operational information are present, what usually managers of tasks would need for their work, but sometimes they are a bit hard to find, since some managers simply don't know about the existence of a specific information.

b)   Information definition and standardization

Some groups are well defined, but some groups are not standardized and are hard to compile in a useful format. That means that the owners of the data are usually forced to create unique queries and collections of data. This is also reflected in the behavior of the managers who require the information: they change their ideas on content very quickly avoiding the smallest chance of creating such a "stabile" query, which could result in some time series for analysis later on.

c)   Quality

Correlating with the previous point, the fulfillment of different quality aspects varied highly. There were some very timely but completely irrelevant operation information, but some of the most important are not possible to be presented in

real time, just in a given time lag. There were very accurate information or data, usually coming directly from a transactional system, but there were requirements which only could have been fulfilled by manual work, resulting in a greater risk of errors and discrepancies.

d)   Accessibility

There were several source IT systems with usually very different technical platforms, lots of ad hoc activities were required to produce reports even from automatized systems, and there was no single pipeline for information requests but usually managers needed to ask for specific information on their own.

This analysis pointed very quickly and clearly at those areas, where a development was to be achieved by the project and it fully confirmed that the demands of the top management were righteous.

Due to the mentioned lack of resources, the management information system was not constructed in the coming year of 2006. Instead, a "paper based MIS" was launched which meant that the top and mid-level management started receiving continuous standardized reports without asking for them at all. This practice had some very good consequences and looking backwards we can be really satisfied that this practice was introduced prior to the implementation of the IT system. The reasons were the following: during the launch period in the first months of the "Paper based MIS" the content, the format, the responsibilities and the frequency of the introduced reports were clarified. We implemented several changes in content based on the first feedbacks of the managers, who received these reports, and we were also able to define the real owners of the specific data, who were asked in writing by the president to fulfill the data requirements.

It took about a year to get acquainted with the reports and information. The entire process was coordinated by the Planning department, which is a unit with similar tasks as a controlling unit has at enterprises. This department became responsible for operating the paper based – and later on the IT supported – MIS.

4   Implementation of the MIS with IT support

Since some resources were revealed during 2006, the second phase of the project was able to be started in late Summer. By this time we already had some experience with the paper based operation and were able to refine and define the information needs of the upcoming users.

We had some basic decisions by this time which oriented the project in the direction of selecting a specific IT tool for the purpose, and these decisions were

connected to the parallel reconstruction of the Intranet site of HCSO. Since it was decided that the new Intranet portal will use a portal software which is highly usable for MIS purposes as well, the project accepted this environment as the starting point.

The project had to face several challenges during the automation process of the different data sources, since data were on heterogeneous platforms ranging from Oracle to Microsoft through unique developments. The essence of these data had to be integrated into one single database, which is an sql database with OLAP functionality[4]. On the other hand we also had easier tasks to solve, because we were offered to use the embedded services of the portal framework like document management, calendars for specific purposes, version history, survey and forum possibilities, so we started experimenting how different data could be presented in the best way.

On technical side, we realized that the new MIS is simple and easy to handle through a web browser, there is a personalization possibility and we can solve the full integration with the Microsoft Office environment in HCSO. The finalized MIS uses now the regular Intranet platform of the HCSO, being a chapter of it.

5   Main advantages of the IT based solution

We defined the main expected advantages of the MIS as the automatic creation and publication of reports with unified format and fixed content (standard reports), a platform to reach the detailed database and analyze it (in first line for helping analysts of MIS but it is open to all who are interested in details), the easy publication of tailor made analyses, the possibility to monitor key processes in a transparent way and distribute information in a very wide circle (news, documents, graphs, tables etc.) through the portal.

The main difference of the IT supported MIS compared to a paper based system is the fact that standard reports are now required through a single pipeline, the Planning department. If the top management considers an information requirement important, it becomes a standard report which will be developed and produced regularly from the time it was introduced. That means that the amount of single, direct information queries from managers to the owner of data was reduced and due to the common agreement on the content of reports, we are able to produce time series in specific areas.

---

[4]   For a detailed description see E.F. Codd's 12 rules on on-line analytical processing

We also succeeded to decrease the information distribution via e-mails, since sending documents for opinion and approval, and sending large report files with graphs and tables were a burden on the e-mail system. Now these files are stored on line on the server of MIS, ready to be reached.

We also are able to orientate the users to key topics, as MIS has an own starting page with a clear structure and a headlines-column.

Maybe the most important outcome is that the regular monitoring of the operational information is mostly automatized, and embedded into regular HCSO processes as a process quality aspect itself. The owners of information usually fulfill their obligation to give data without additional burden, since we introduced the standardized reporting on most areas to use at least mostly the templates they were already using for a different purpose, or to document their own work anyway.

6   The different participant roles in MIS

Basically four specific roles are separated in the HCSO for the management information system. The *"Database administrator"* is responsible for access management, operation supervision (log files etc.), hardware-software maintenance and updates, patches. He's the real IT specialist in the circle. The *"MIS Content administrator"* is the supervisor of automatized input processes, and is responsible for semi-automatic data conversion from standard files. The role also includes the management of news and documents, as a general content manager of MIS, so basically nobody else is entitled (with some exceptions below) to publish something or to insert some changes or new lines in the databases. The content administrator is also responsible for the support of users on the service, while we have to point it out, that this participant is not an IT specialist, rather a so called "power user" of the applications. There are further *"Subpage administrators"* in MIS, because some of the parts are maintained directly by separate persons. An example of that is the calendar of travels and subject matter meetings abroad, where the International division has the sole responsibility to maintain the embedded calendar directly. The fourth role is the *"Data owner"s* role who doesn't maintain MIS directly. Instead the data owner checks, or sometimes also sends their automatically produced datafiles or the manually created data table or documents to the MIS Content administrator, who disseminates the data on the portal after a check.

The system is based on a generally issued an open handbook , which explains in detail if which specific department of HCSO has to deliver which dataset, by

what frequency and deadlines, in what format. The handbook is also supplied with templates for the reporting obligations wherever possible.

7   Current content of HCSO's management information system

The MIS is under a systematic revision every year, inserting new demands and filtering out not required services from the content. The current setup of the MIS contains 6 chapters as indicated below in picture 1.

Since HCSO introduced a standardized nomenclature for its programs and the different steps of the workflow (activities) also, these nomenclatures became widely and obligatorily used for the identification of human resource and financial data in planning, the electronic working time registration (electronic time sheets), project monitoring and accounting also. The nomenclature codes as unique identifiers make it possible to survey the different programs from several aspects, as the different sources of information can be linked together by the use of these common identification codes. This is the basis for the comprehensive presentation of information.
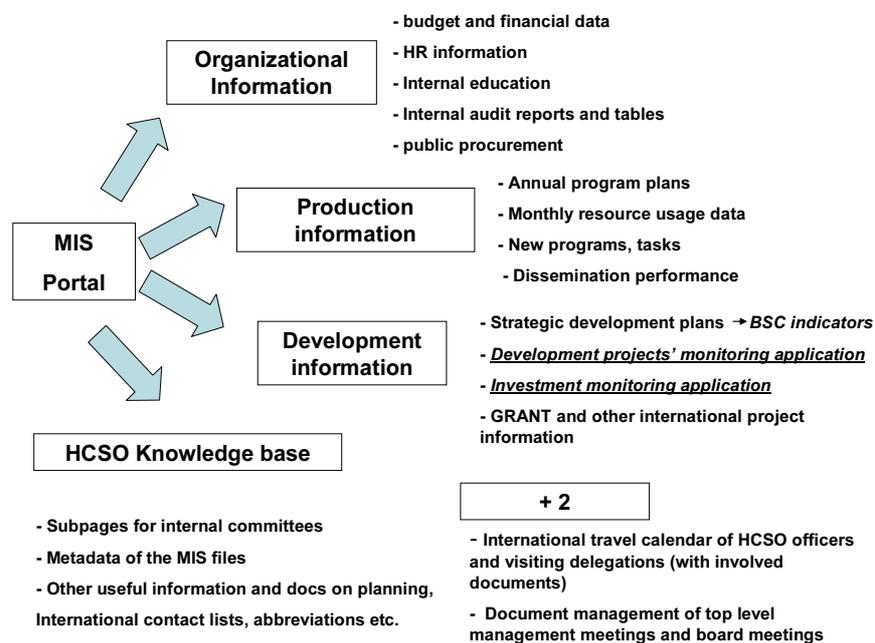
The presentation itself takes place in five different ways according to the type of content and the type of the data source. Most parts in MIS are covered with *standard reports*, which usually have only one dimension that can be changed, and that's the reference period (time). These reports are created from an OLAP database directly when you click on them, and their content in tabular format cannot be changed by the user.

For a more sophisticated analysis or for the creation of time series, the fundamental databases behind the standard reports can also be reached by a *dynamic OLAP tabulation query*, where the user is able to select different dimensions and combine them freely. Some of the information are also presented on graphs, where the restructuring of the table produces immediately a new graph also on the intranet page. The data from these tables can also be exported to Excel, but the MIS database certainly can not be overwritten.

The third form(s) of presentation are two, specifically developed embedded applications on the portal. In the case of the project monitoring system each project has a subpage with document library and several unique services, like automatic deadline monitoring for project tasks etc. In the case of investment monitoring all partner accounts and project accounts can be monitored at a glance, from the point of view of their financial investment requirements.

The fourth and most simple way of presentation is the case, when certain information can not be inserted in to a database, because it would make no sense to do so. In these cases we publish the *original source document* that can be a .doc or .xls or .pdf file etc.

The fifth way of presentation is through the *embedded services of the portal software*, in the case of the business travels for example, which I already mentioned.

Organizational Information
- budget and financial data
- HR information
- Internal education
- Internal audit reports and tables
- public procurement

MIS Portal

Production information
- Annual program plans
- Monthly resource usage data
- New programs, tasks
- Dissemination performance

Development information
- Strategic development plans → *BSC indicators*
- *Development projects' monitoring application*
- *Investment monitoring application*
- GRANT and other international project information

HCSO Knowledge base
- Subpages for internal committees
- Metadata of the MIS files
- Other useful information and docs on planning, International contact lists, abbreviations etc.

+ 2
- International travel calendar of HCSO officers and visiting delegations (with involved documents)
- Document management of top level management meetings and board meetings

Picture 1.

The chapters of HCSO's Management Information System

8 Experiences so far

During the project the top management has realized that the potential of the implemented system is much higher then expected. In order to that the final decision on the starting of MIS made it possible for every single member of staff in HCSO to use the system and look at its information. The purpose of that was

the fact, that HCSO – being a public administration organization – is committed to give a transparent overview on its operation for all employees and has no financially confidential information which is the case mostly in the private sector. So we currently have more than one thousand potential users. A part of the users (approximately 150) already have received a detailed training on the use of the system, and we still plan organizing more of that.

The wide use of the MIS is promoted internally, and the Planning department has also made comprehensive analysis documents from its content. A member of these – the annual report on HCSO's 2007 operation – is now under final editorial check and will also be published on HCSO's website, to enhance the transparency of the office reflected to the society.

The president and other managers are more and more used to the fact that they have a standard service in their hands, what they are using always more often. On the other hand, the employees of HCSO feel the importance of the gesture of making the system available for them, even though we clearly have to see, that this intention is far beyond a "management" information system, it's already rather an "Organizational Information Management System" which can be used for several purposes.

The evolution is going on – we always collect new demands from the users to find out how this service could even satisfy them even more for decision making or for just general information.

References

H.P. LUHN: „A Business Intelligence System", *IBM Journal*, October 1958.
online available at:
http://www.research.ibm.com/journal/rd/024/ibmrd0204H.pdf

HCSO Strategy 2005-2008, Hungarian Central Statistical Office, Budapest 2005
Download at:
http://portal.ksh.hu/portal/page?_pageid=37,595444&_dad=portal&_schema=PORTAL

E.F. CODD: Providing OLAP (On-line Analytical Processing) to User-Analysts: An IT Mandate written by Codd E.F., Codd S.B., and Salley C.T. , Codd & Date, Inc. 1993.
An abstract is available online at: http://www.fpm.com/refer/codd.html