

# THE MODERNIZATION OF THE PUBLIC SERVICE USING INFORMATION TECHNOLOGY

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*Abstract:* The use of information technology with modern tools is absolutely necessary in the new scenario of administration. Modern administration requires efficient tools to perform information management that allows for speed in its collection, tabulation, and analysis and that enables the manager to make decisions to solve problems or even prepare government programs. The association between modernization and traditional concepts of information technology and other areas of science are increasingly required for the conduction of the public manager's works to reach the set goals.

Key-Words: Automation, Education, Public Service, IT, Modern Tools, Public Management

## 1 Introduction

Through Municipal Decree No. 48.083/07, it was established that the municipal schools (EMEI and EMEF) maintenance program would be under the responsibility of the Municipal Infrastructure and Works Secretariat of São Paulo.

The program established that all schools should be submitted to maintenance works in five priority items, namely:

- ✓ Toilets;
- ✓ Pantry and kitchen;
- ✓ Electricity network;
- ✓ Roofs; and
- ✓ Asset security.

The Secretariat created a nucleus that would be responsible for executing the services and these would be contracted through Price Registry Schedules, in force at each of the 31 regional administration offices of the city.

The maximum amount of each work could not exceed the amount of R\$ 150,000.00,

and the number of simultaneous works would be of 100 per month. This, along 12 months, would give us a total of 1,200 schools submitted to interventions.

The disparity in their conditions was extreme. Many buildings had not had major maintenance for over 20 years.

Thus, establishing an equivalent sequence of works for all schools was impossible, even because the Municipal Secretariat of Education, which demanded the services, did not know, beforehand, the situation of each school.

There was a need for an integrated management of these services, both to make a first diagnosis of the pathology of the works and to define the logistic sequence of the schools that would have Orders of Service approved and, finally, to establish an audit after the works had been performed, so that the claimant could pay for them.

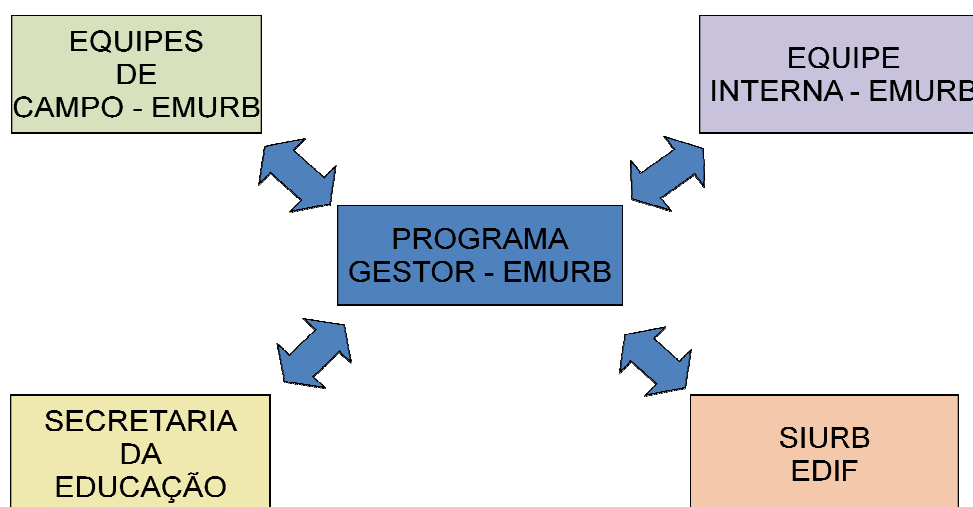
Such management service was assigned to EMURB, the Municipal Urbanization Company.

The nature of these services was not complex; on the contrary, they were simple and easy services. What made it difficult was the

number of schools included in the program and how regular these services should be identified and later audited.

It was obvious that the management could not be satisfactorily accomplished by the means traditionally used in Engineering and that the use of information technology (IT), associated to the employment of computing resources, would be indispensable.

In the figure 1, we have all the participants of this program.



## 2 Methodology

### 2.1 Traditional Methodology:

Through the analysis of the service required to meet the requested demand, the sequence of tasks, by using a traditional methodology, was found to result in the following activities:

1. Preparation of maps and scripts for inspections;
2. The person in charge would go to the headquarters to obtain the maps and scripts in which the inspections would be carried out;
3. The person in charge would go to the scheduled stops to carry out the inspections;

4. The person in charge would write down the occurrences and take their pictures at each stop;
5. The person in charge would upload the pictures to a PC and type the report;
6. The person in charge would send the report to his/her supervisor;
7. The supervisor would distribute the reports for the claimant, in accordance with the competences and urges, to send them to the performer of the works.

According to the company's experience, the term necessary for each inspection to be accomplished totaled 17 hours.

After the distribution of task 7, the conducting of the works would be under the responsibility of the Secretariat of Education that would send its priorities to the Schools Maintenance Nucleus of the Secretariat of Infrastructure and Works (SIURB).

The resumption of the works, in a same school, would occur after the completion of the works, restarting the cycle, but this time, for the execution of the audit.

With an average of 20 business days per month, we have, in a year, 240 working days. With a goal of 1,200 schools, the average would be of 10 schools per day or 200 schools per month, considering two visits to each school, that is: one for inspection and another for audit.

If, through the traditional method, it would take 17 hours to complete a work in each school, we would have the following need:

- Total worked hours per day: 8h;
- Total visits performed per day:  $8/17=0.47$  visits/day;
- Total visits performed per month:  $0.47 \times 20$  days= 9.4 visits/month per team;
- Required number of teams:  $200/9.4=21.3$  teams.

That is, 22 teams comprising:

- 01 Full Engineer;
- 01 Driver;
- 01 utility vehicle;
- 01 digital camera.

Besides computers, workstations and support personnel.

## 2.2 Methodology Used

With the impossibility of meeting such needs, whether because of the number of employees or the final cost of the service, a new format was chosen that would permit the execution of the services with quality, punctuality and that, at the end of the contract, would have an advantageous economic balance.

The initial idea for the execution of the contract would be a minimum possible team operating modern equipment in order to assure the full execution of the services.

In a former contract, EMURB had contracted a database program, which after a analysis of use, was found that it could also be used in this contract work, provided that some small adjustments would be performed and that secure and efficient hosting could be assured.

In addition, the professionals in charge of inspection and audit visits to the schools would be given a notebook with wireless Internet connection and a digital camera.

At EMURB offices, a nucleus for processing the information was implemented with computer stations, also connected to Internet.

Through the new conception of work, theoretically, the times necessary to perform all tasks were established, mainly according to a cost-benefit ratio that was acceptable for the reality of the contract.

The proposed times resulted in a 5-hour duration for each inspection. Thus, making the calculations regarding the required demand, of 200 inspections per month, we have:

- Total worked hours per day: 8h;
- Total visits performed per day:  $8/5=1.6$  visits/day;
- Total visits performed per month:  $1.6 \times 20$  days= 32 visits/month per team;
- Required number of teams:  $200/32=6.25$  teams.

From these calculations the work team was defined and 7 teams were formed, which comprise:

- 01 Full Engineer
- 01 Driver
- 01 utility vehicle
- 01 notebook with remote connection
- 01 digital camera.

## 3 Systematics of the Work

### 3.1 Teams

With the definition of the number of teams required to perform the works, the operating logistics was established, so that each team could be responsible for a number of schools located within a sector division of the city.

The city was divided into 7 areas so that, besides the physical proximity, there would also be a balanced number of units in each sector.

Thus, each sector included about 170 schools to be inspected.

For the definition of the external teams, professionals residing in their own working areas were sought. Such concern was in order for transportation periods to be reduced.

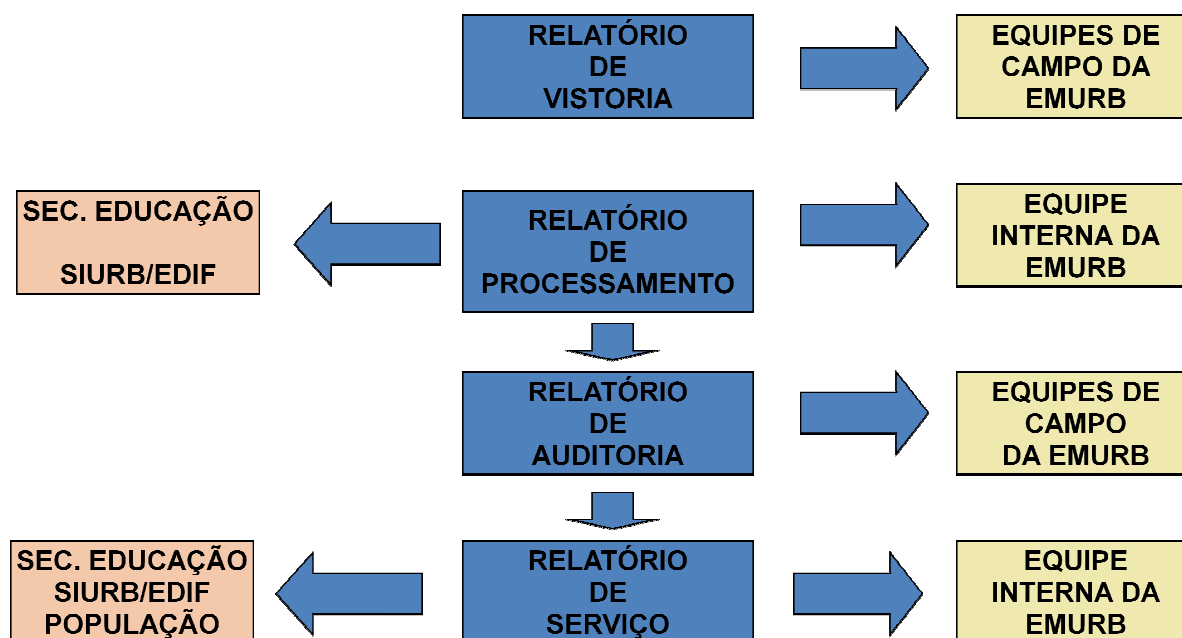
### 3.2 Systematics

The systematics is based on the issue of four reports, as follows:

- Inspection Report
- Processing Report
- Audit Report
- Service Report

The responsibility of the field teams is to prepare the inspection and audit reports, and the processing and service reports are made by EMURB's internal team.

In the figure 2 we have a representation of the workflow and its interfaces.



### 3.3 Reports

1) The Inspection Report comprises two distinct parts:

- Description of the works to be performed;
- Pictures of the works.

The description of the work is made in such a manner, that a brief state of the art is presented

and has a relation with the digital picture of this service, as well.

It is made by the field team and sent, to be processed, to EMURB's internal team.

2) The Processing Report summarizes the two parts of the Inspection Report and shows, in an ordered manner, the description of the service and its corresponding picture. All services surveyed must have a corresponding picture.

In this ordering, it must also be considered, its location in the distinct parts of the school.

This processing report is the main document to make the schedule, the logistics of execution of the works, the definition of the works, in function of the funds and other activities that the Secretariat of Education has to perform so

that they can, then, forward it to the Secretariat of Infrastructure and Works.

3) The Audit Report, as the Inspection Report, comprises two distinct parts.

The preparation of this report is different from the Inspection Report, as it is based on the evidence of execution of the works identified in the first visit.

Thus, the pictures are taken at the same place and at the same angle as those that were taken upon the first visit.

4) The Service Report is made by EMURB's internal team based on the Processing Report.

In this report the pictures of the audit are inserted, side by side, with those taken in the initial inspection, so that the execution of the service may be evidenced, by the simple before/after comparison.

All these reports are made available to the professionals involved, in real time, through login and password for access.

### 3.4 Managing program

The core of the system is the managing program, which allows the integration of all elements involved, from the field and office teams up to the parties requesting the services and parties executing the services.

Such integration will be described below and its criteria were established upon the conception of the works with the main assumptions: agility; reliability; quality; and saving and rationalization of resources.

The definition of the operating areas of the field teams came from the list of all schools that would be part in the program. This list was provided by the Secretariat of Education.

The list with the name of the schools, their corresponding addresses, coordination offices, regional administrations was, then, entered in the managing program and served as base for an operating logistics.

Some conditions were established to the structuring of the managing program with the purpose of executing a safe and quality routine.

Therefore:

1) To make the coding simpler, the reports had their names abbreviated, as follows:

- Inspection Report, coded as RV;
- Processing Report, coded as RP;
- Audit Report, coded as RA;
- Service Report, coded as RS.

2) The field teams were numerically designated from 01 to 07.

3) The schools intended to each team were divided and listed in the managing program.

4) The work sequence must be linear from the Inspection Report (RV), going to the Processing Report (RP), then, the Audit Report (RA), and finally the Service Report (RS).

5) The numbering of each set of RV, RP, RA and RS reports will be the same for each school visited, that is, the works related to an inspection visit will end only upon the submission of the final report, which is the Service Report (RS). Thus, the consultation related to the services requested will be easier, as the numbering of the reports is the same; what distinguishes one report from another is the initial acronym. To exemplify, observe this sequence:

- Inspection Report → RV 00 0001
- Processing Report → RP 00 0001
- Audit Report → RA 00 0001
- Service Report → RS 00 0001

6) The numbering of the report is automatically made by the managing program itself.

The command for generating the number is always given by the field professional by entering the report into the managing program made in the place of the inspection, through a notebook connected to Internet.

Thus, the management of the data related to the services performed by the involved teams is easy to understand, as the simple association of the name of the school leads to the condition of the works performed thereon.

7) As the field professional enter the report into the program, all the data pre-implemented in this program are automatically ordered, in a manner, that contains, besides the institutional data of the school, the type of report approached, the team that made it, its date of preparation, assuring the authentication and responsibility of the party executing the service.

This also provides for the manager of the services tabulating the data for the assessment

of the productivity of each team and the service as a whole.

8) The Visit Reports (RV) and Audit Reports (RA), despite having guaranties of authenticity, are open to the manipulation of the data by the EMURB's internal team and generate the Processing Report (RP) and Service Report (RS). The latter, after generated and entered in the system, cannot no longer be manipulated, but only consulted.

Even the manipulation of the RV and RA reports are only possible by professionals authorized to perform these services and such authorization was defined by access levels that are not released through login and password.

Whenever a report has its content manipulated, the hour, date and professional who performed this manipulation are immediately registered. In no case, can a report be manipulated without such data being registered in the system, assuring the responsibility network of the system.

The manipulation of the data will always be made in an environment outside the managing program, and only after its ending, can the entry occur.

9) A list was established of the professionals of the several areas involved that would have access to the program, that is, EMURB, SME and SIURB. All of them received login and password for access that automatically define the level of details that can be seen by each one.

For the preparation of the managing program, the sequence of all activities involved was discussed, and a flowchart was created, that allowed a summarized analysis of all acts involved and served as a basis for its first version.

#### **4 Content of the Reports**

The execution of the works has the following order:

The field team leaves for inspection, according to logistics established in a manner

that the schools visited on such day allow the minimum distance to be reached.

At the school, the professional inspects the five areas covered by the program: toilets, pantry and kitchen, electrical installation, roof, and asset safety.

Based on this inspection, he describes, in his notebook, the services required and also generates a photographic file of any abnormality found.

After this step, he enters this report in the managing program, originating the sequence already mentioned, thus, he can go to a new visit in another school.

The RV entered in the managing program is released to be processed by the EMURB'S internal team, that works in a sequential manner, according to the availability of professionals.

The processing services follow a pre-established pattern. Firstly, a technician opens the RV on top of the list and carries out its ordering in the patterns in which the Processing Report (RP) will be presented.

This work is made outside the environment of the managing program; before it is inserted in the network, it is inspected by the supervisor of the team that will provide his release password.

Thus, the authenticity is assured, as all professional involved have their electronic signature printed in the report.

After the RP is entered in the managing program, it can be visited by all agents having access guaranteed through login and password.

The ongoing of the works of such sequence of reports is interrupted by EMURB, and the completion of the services is under the responsibility of the Secretariat of Infrastructure and Works and is resumed, this time, as an Audit Report (RA), and finally, as a Service Report (RS).

The EMURB's internal team is comprises six technicians for processing, one full engineer for guiding the works, one senior engineer for supervising the works and interface with the field teams and, finally, the general manager of the program, who is responsible for the connection among the

entities and also for the control of the effectiveness of the teams

With this structure of internal team plus the field teams previously described, we have a total of 23 effective employees working in the program.

The managing program allows a critical analysis of the effectiveness of the teams. Its full content may only be consulted by the general manager, who has information of all activities of each employee.

The set of such information allows the preparation of follow-up charts for possible corrections. The manager has the opportunity to know which team is more or less efficient, and through monthly meetings, discusses the problems found and proposes solutions.

## 5 Difficulties Presented

Upon the creation of the flowchart of activities that would be implemented, the most part of the problems that could arise was anticipated, and a list of procedures was established to solve them as they appear.

Thus, for the selection of the teams, several technical professionals of EMURB were interviewed and those who best fitted the profile of this new challenge were chosen.

An extensive training program was implemented. The acquaintance with the managing program was one of the aspects required from the provider. Internally, the integration of the several teams according to the interfaces was sought.

After this training, lectures for disclosing the systematics of work together with professionals of other entities were carried out and guidance for the consultation of the results obtained were given.

Trials were made before the program startup with all personnel involved for the counting of time and to clarifying any possible doubt and suggesting solutions.

Even tough, unpredicted problems happened, although, most of which occurred due to the personality of the professionals and not due to technical problems of the system.

Some of them are listed below, and, although they are not of technical nature, they must be predicted in future contracts by the agent in charge.

### ➤ Network Congestion

This problem just appeared in the first month of work, as the field teams, even having been oriented as for the number of schools that should be visited per day, with no exception, did more than the expected, overloading the internal team and, thereafter, the managing program.

The solution was the interruption of the field activities and the more incisive and collective guidance to all involved.

### ➤ Difficulty of using the equipment

Such difficulty was not due to the lack of knowledge in using a notebook, but due to the refuse in using it; the technical capacity of some engineers was noticeable, as regards the pathology of the works problems; some of them have always been field engineers used to inspect and solve technical problems related to the execution of works.

As part of their works comprised the making of reports through electronic medium, their professional routine was modified, causing them to found and report the problems immediately.

This issue was solved by using Engineering, Architecture, or Technology trainees, together with these Engineers. The trainees provided the solution for the problem fast and with quality. The experience in works joined the ease of handling computing devices.

### ➤ False idea of freedom of action

The main novelty for the field teams was the freedom to develop their daily activities. Despite having been communicated that the program provided means for controlling at distance, two teams had their effectiveness far below the expected, with a practical result much lower than theoretical.

At the first meeting of analysis of the results, when their ratings were presented, they gave less-than convincing excuses.

The effectiveness was measured again at the second meeting and as the same results were kept and the same explanations were given, the solution was to discharge the professionals involved.

➤ **Difficulty of relationship with the company providing the managing program.**

With the evolution of the services, the relationship among the teams reached a very good quality level, mainly, because all employees have been employed at the EMURB's technical staff for a long time.

On the other hand, the relationship with the company providing the program started to present some difficulties, mainly with the feedback of requests made by EMURB for enhancement and corrections of trajectory, provided in the contract.

The solution for the problem was the preparation, through the computing team of EMURB itself, of a similar program, however, with characteristics already fitted to the needs of the project.

Such program was developed with the assumption that, when being put into practice, it would incorporate all data up to now stored in the first managing program contracted. In the executed contract, the interchange of data with future programs that could be developed by EMURB was predicted.

In fact, such thing has occurred and for thirty days the two programs worked in parallel and, from a stipulated date on, the new managing program started to work alone without any major problem.

## 6 Conclusion

The need to overcome challenges is one of the main factors that lead to the technological and administrative development.

This was demonstrated with the high result achieved by the team implemented upon

the analysis of the services at the end of the contract.

With the discharge of the professionals of two teams, as explained in the previous chapter, the works assigned to them were divided among the other five remaining teams.

Such thing was possible due to the intensive training of the professionals and the increasingly higher experience achieved throughout the process.

The rationalization of the services and the application of the knowledge achieved by the participants caused the execution of the works to be much faster, even with a lower number of teams than initially expected.

An operation level as good as two daily reports per team was achieved, which allowed for a new adjustment in the numbers, reaching a reduction of 4.25 times in relation to the time required to execute the project, if it was to be done by the traditional means.

Another major advantage was the standardization in the presentation of the results obtained.

The public manager has in the Information Technology the tools required to establish and apply parameters in the execution of the several activities of the management.

The program of the maintenance of schools of the municipality of São Paulo completed its first step in the beginning of 2009 with all schools being submitted to interventions in the five critical areas proposed.

The new step is expected to start in the first semester of 2010, with new challenges that will be addressed, now, with a management tool already totally known and enhanced.

This tool served as base for new applications in other contracts executed by the company with several clients.

The enhancement of the system is continuous and this assumption cannot be forgotten by the manager, since one program is the base for the other.

This open view is necessary so that the new challenges may be surpassed by using these modern and safe means of Information Technology, thus, meeting the demands required by the several sectors of the public



administration will be always possible, mainly, automating services systems.

In follow figures, some results of the program.



Figure 3: External Areas – Full Review – From Author



Figure 4: Internal Area. Bathroom door From Author

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