

Statistician as a Pastry Chef Making Statistical Cakes Using GSBPM

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Abstract

Everyone is aware that for making tasteful desserts the grandmother's cooking book, cookware, utensils, tools and the Pastry Chef are needed. On the first, it sounds very simple and realistic, but how this scenario can be implemented in the statistical world is an on-going issue. Obviously, the main tool in achieving sweet statistical cooking result is planetary known GSBPM solution which offers every statistician to be a Pastry Chef in doing statistical desserts as much as possible tasteful and attractive for the final user on a long-term.

Getting acquainted with all GSBPM main processes and its subprocesses requires time, knowledge, organisation, coordination, monitoring, patience and objective assessment not only within the kitchen but also in the pastry shop. Dealing with nitty-gritty GSBPM facts is never ending story which encourages the statistician to work on own development continuously. In order to achieve that, many years ago the Croatian Bureau of Statistics created the national version of GSBPM 5.1 with necessary explanatory notes for each process and its subprocesses. Based on this initial document, about three years ago the group of statisticians were working on the Instructions on Quality according to GSBPM, whose finalisation was done in 2022.

In 21. century, the product would not be completed if there would not be any software solution therefore the GSBPM module was created within the developed POMI quality database which beside quality reporting offers ongoing development of statistical desserts using GSBPM tool. The GSBPM tool offers statistician never to be angry at any point in the statistical subprocesses, but to be happy and to do what is at certain point of time possible. How this long story started and how it was developed during last two decades is presented in this document.

Bon appetite!

Keywords: GSBPM, quality, cooking book, statistician, life

1. Introduction

In the early 2000s, the Croatian Bureau of Statistics (hereinafter referred to as: CBS) started using the Generic Statistical Business Process Model – GSBPM in the framework of the Survey Processor, which is a part of the Integrated Statistical Information System – ISIS. The Survey Processor, a standalone application, allows the statistician to work on statistical survey with a

high level of security . This application offers many advantages, like editing, checking, comparing, processing, tabulating, archiving.

For the development of the standalone application, the following activities had to be carried out in three phases.

Phase I

During the first phase, the main emphasis was put on developing general methods and knowledge as regards IT architecture and development in general, and statistical information systems in particular. Furthermore, decisions were made in respect to methods and tools for classification management and the construction and functionality of a public macro database. Additionally, tools for internal and external dissemination of macro data were introduced. Moreover, software prototypes for general management of the data collection/data entry/validation/cleaning processes were developed and evaluated. In addition, the development of the first CBS meta database, CROMETA #1, was initiated, primarily focusing on metadata for automated processing and harmonisation/compliance with EU standards.

Phase II

Throughout the second phase of the project, more effort was spent on developing and implementing solutions in respect to metadata and macro data on the basis of the knowledge developed as well as decisions made during the first project phase. As regards metadata, supplementary emphasis was put on involving the statisticians in the metadata development, while at the same time the classification database in [KLASUS](#)¹ was further filled and built out. Additionally, methods and routines for classification maintenance were developed, and a common terminology model for metadata, Neuchâtel Reference Model™, which corresponds to [GSIM](#)², was introduced.

Furthermore, the terminology model mentioned was chosen as the base model for the metadata development. It was also decided that the specific methods and contents of CROMETA #1 and PC-AXIS SQL Macrometa model (2.0) would also be included as part of the future CBS metadata repository.

¹ KLASUS is a tool designed for use by all users of classifications, which enables browsing and searching of classifications by name and code, provides a presentation of individual elements of classifications, their headings, explanations or indices, if any, as well as correspondence tables between various versions of classifications. It also offers a possibility to download classifications in multiple formats with all their levels and elements.

² Generic Statistical Information Model (GSIM)

To enable the viability of this integration, the work of mapping the terminologies used in CROMETA #1 and PC-AXIS SQL Macrometa to the base terminology model was initiated. This could be regarded as the starting point for the development of CROMETA #2 – a CBS terminology/reference model on metadata.

Moreover, it was decided to implement CROMETA #2 on a relational database system (MS SQL Server) and therefore, in this respect, additional knowledge was developed within the area of conceptual data modelling and physical database design. Concerning macro data development, the first version of metadata-driven public macro database, CSD, was developed and implemented during the project phase. Furthermore, methods for using PC-AXIS and integrating it into the ISIS through its SQL part were developed. The first study to be available for internal (PC-AXIS) and external dissemination (CSD) using the new solution was the foreign trade survey. Finally, it was decided to freeze the further development of the public macro database while awaiting the completion of the metadata repository.

Phase III

In the third and the last phase of the project, the bulk of time was spent on the development and implementation of CROMETA #2. In fact, October 2004 is considered the actual starting point for the CROMETA #2 development. During the first part of the phase, the general concentration was gathered on development of methods for common metadata management, such as versioning, authorisation, language-handling, metadata object lifetime and lifecycle, etc. Moreover, it featured the completion of CROMETA #2 terminology/reference model on metadata, compiling the particulars of Neuchâtel Reference ModelTM, CROMETA #1 and PC-AXIS SQL Macrometa 2.0.

Even if the model has constantly been evolving, a foundation for its implementation laid ready at the beginning of 2005. From this point until the end of the project, almost all effort was spent on implementing the methodology as regards general metadata management as well as specific management of particular metadata objects. As the complete metadata solution also included a maintenance tool, the implementation work was quite naturally preceded by defining use cases for the metadata maintenance and practice. In addition to the use case definitions, a detailed interface storyboard was created to function as blueprint for the application development. Furthermore, the CROMETA #2 maintenance tool, as we know it today, was developed within this last project phase. Additionally, metadata were collected and entered into the metadata system for five prototype surveys and, moreover, the bulk of the metadata collected for CROMETA #1 was mapped and transferred to the metadata system. Furthermore, some development was carried out in respect to macro data. The main outcome

of this work was PXFileMaker, a NET-based assembly enabling dynamic creation of PX files (PC-AXIS files) on the basis of the metadata stored according to the PC-AXIS SQL Macrometa 2.0 model.

1.1 GSBPM in hands of a statistician

In 2012, the CBS started to work more intensively on quality issues. Following the rules prescribed by Eurostat, CBS began to work on the development of the POMI quality application and database and at that time had prepared the national version of the GSBPM. The general process model was tested on several statistical surveys internally and the national methodology on using the GSBPM was made available on CBS web site.



Figure 1: CROMETA #3

In 2022, the CBS finished the project under the name: System for Quality Management and Documentation of Quality of Statistical Surveys, which was predominantly oriented to the additional improvements of quality reporting functionalities, i.e. to adding the SIMS structure and the development of GSBPM module as a part of the application and POMI quality database.

The quality application and database POMI is considered to be the key tool used for the quality assessment, quality documentation and quality reporting for CBS surveys defined by the Annual Implementation Plan.

The database content is based on the exhaustive list of quality information, which is further based on accepted ESS structures, ESMS, ESQRS and SIMS. There are approximately 130 items included in the database. The list can roughly be divided in two parts:

The textual part contains information that is not directly connected to the quality assessment, but is rather aimed at describing the important characteristics of the survey and information which refers directly to the survey quality assessment.

Numerical information, also called the quality indicators, includes the key indicators, which should mandatory be calculated in all the surveys for which the quality assessment will be performed, and supportive indicators, which will be calculated in cases when the survey manager considers them important for the quality assessment of the particular survey.

After using the Quality Database – POMI for certain period of time in 2019, the statistician satisfaction survey on POMI functionalities was carried out to get feedback whether further improvements are needed or not. It came out that introduced functionalities were not fulfilling the statisticians' demands. Therefore, a new project was introduced with the intention to upgrade the application in terms of automating certain actions and procedures and improving functionalities.

The goal of upgrading the Quality Database – POMI application itself was to reduce manual entry, but to download as much data as possible from the existing resources available in CROMETA #3 and thus to automate as many procedures as possible.

Following the instructions for fulfilling the GSBPM template, the statistician is now able to enter the data about his/her own statistical survey in the interface created for GSBPM module. With this solution, the statistician is able to describe all processes and sub-processes for each statistical survey prescribed by the Annual Implementation Plan and to enrich the data with metadata.

Each description of the statistical survey can be exported in Excel, where it is visible if some data are missing. Also, when importing, the Excel file can be improved in cases where the shortcomings are noticed.

Actually, the application and quality database POMI is considered to be a focal point for quality issues because at one place the statisticians have available tools for quality improving and monitoring of each and every statistical survey prescribed by the Annual Implementation Plan.

On one hand, the functionalities offered by POMI quality database can show statisticians what the level of numerical indicators for each statistical survey is, while on the other hand, with the

use of GSBPM, the statistician, by checking the subprocesses, can see whether there is a space for further improvements.

The iteration can be done within any GSBPM processes and as many times as needed.

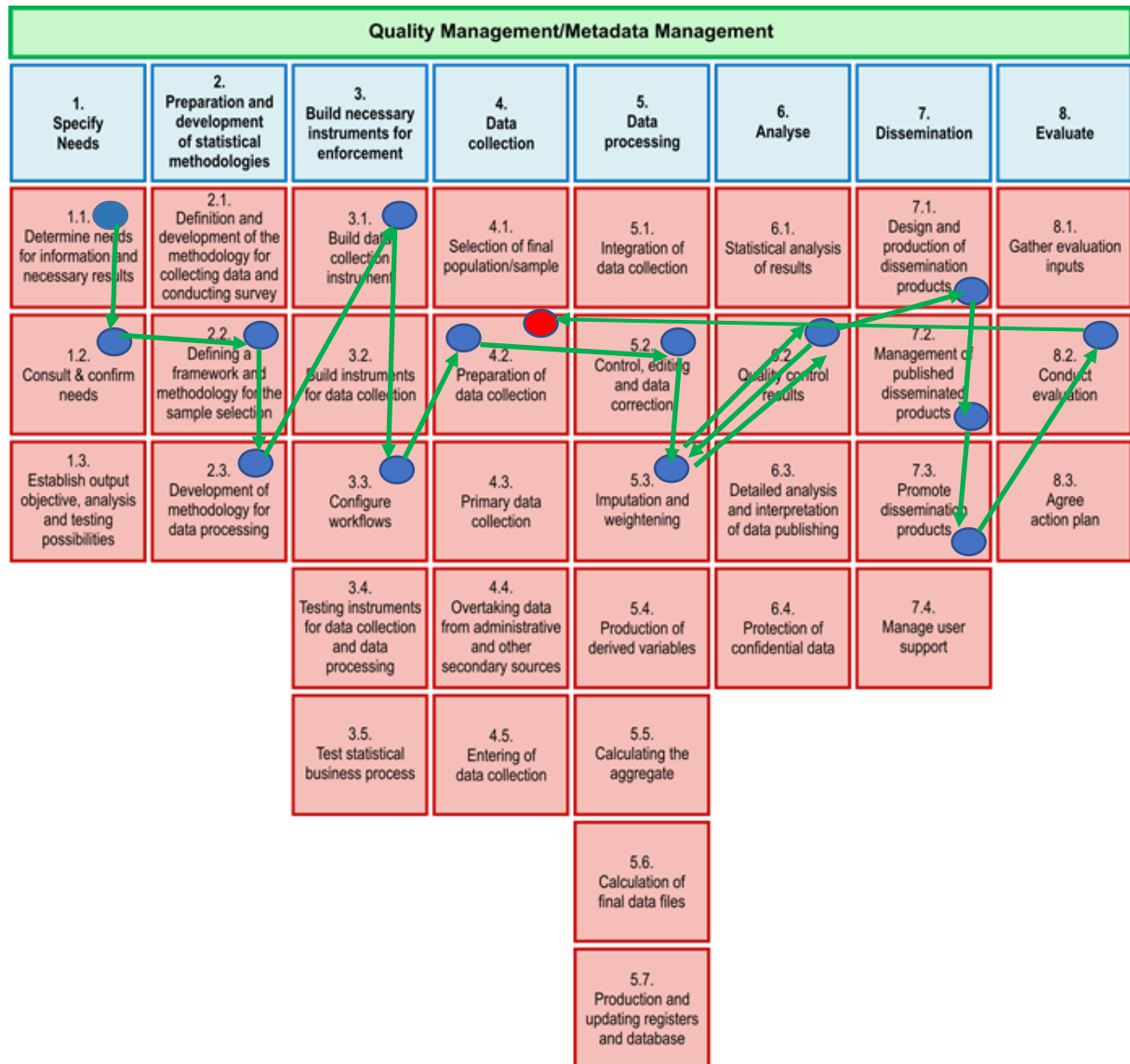


Figure 2: GSBPM National version

In order to get a complete picture of the whole production within the CBS, the Instructions on Quality according to GSBPM has been produced and published on the CBS website. When talking about the benefits of this system it can be stated that every statistical process is documented and collected at one place. The issued publication provides written guidelines on the steps to be taken as well as recommended best practices to implement in each phase of a statistical process.

2. Implementation of the Croatian GSBPM solution on the Portuguese sweet product

Talking about the, so to say, GSBPM philosophy in this paper, it is going to be elaborated that the planetary known model can be implemented on any situation and on any product the user is consuming.

Let us imagine that the survey on the Pastel de Belém is one of the statistical products registered in the CBS Annual Implementation Plan and that we want to describe the cake development according to the eight GSBPM processes.

Under the **Process 1.: Specify the needs**, we found out that *during the liberal revolution, the monks of the Jeronimos Monastery, located in Belém, created the original recipe of the first “pastéis de nata” as a way to ensure their survival. The monks sold the little custard tarts to tourists who arrived by steamboat to visit the monastery and the nearby Torre de Belém.*

The first, so to say user, needs were defined by the tourists, and later on, thanks to the merchant skills, it was spread to other dessert-lover consumers.

While mapping the processes needed for producing Pastel de Belém, we linked the **Process 2.: Preparation and development of statistical methodologies** with the methodological text on preparing the famous sweet.

Namely, we found out that, in 1837, the tarts started to be produced in new premises by pastry chefs, the only ones to whom the secret monastery recipe was passed on. Since then, the original recipe has not changed, and it is still a secret today, known by only a few, and kept in what is known as the “secret room”.

By implementing the GSBPM philosophy on the well-known cake, we concluded that the original recipe was still the same. It is the variation of the same cake, depending on the type of the consumer (vegetarian, vegan, sugar free, gluten free) or the cultural background of the country (the example of Argentina), that actually changed.

As the **Process 3.: Build necessary instruments for enforcement** is talking in more detail about the different tools used for statistical surveys, we have adjusted the text presenting the utensils and equipment usually used in the kitchen for preparing sweets.

For example, for preparing the Pastel de Belém, the following tools are needed:

- ✓ 12-hole non-stick muffin tray



- ✓ *glass tumbler of water or sugar thermometer*



- ✓ *cling film*



When organising the production of sweets in large quantities, the production is relying more on manual work and less on tools we are used to see in confectionary factories. Probably, the personal touch of each sweet maker has made the quality of the final product stable.

The GSBPM **Process 4.** is dedicated to the **Data collection.**

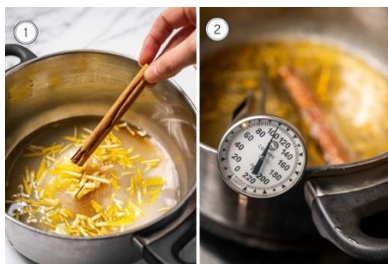
In this sweet scenario, we have linked data collection with ingredients that are necessary for preparing a cake, and these are:

- ✓ 1 package of frozen puff pastry (you can make it from scratch if you prefer)
- ✓ 1 litre of milk
- ✓ 1 lemon peel
- ✓ 1 cinnamon stick

- ✓ 400 g of granulated sugar
- ✓ 9 egg yolks
- ✓ 80 g. all-purpose wheat flour
- ✓ Cinnamon powder (optional)
- ✓ Flour to sprinkle
- ✓ Butter to grease

After collecting data/ingredients and checking the quality and the quantity, we can proceed to the next process.

The GSBPM **Process 5.: Data processing** is the most sensitive one. Following the pictures step by step and the instructions from the cook book, the Pastry Chef, together with his colleagues, can produce the final product.



- *Begin by making a sugar syrup. Combine the sugar, water, vanilla extract, lemon peel, and cinnamon stick in a saucepan.*
- *Cook over medium heat without stirring until the mixture reaches 220°F (100°C).*



- *In a separate saucepan, whisk the milk, flour, and salt together until well combined.*
- *Whisk constantly over medium heat until thickened, about 5 minutes. Remove from the heat and let cool for 10 minutes.*
- *Add the egg yolks.*
- *Whisk until well combined.*



- *Cut the sheet of puff pastry in half.*

- *Remove the cinnamon stick from the sugar syrup and slowly whisk it into the milk mixture.*
- *Strain the custard into a measuring cup with a spout to remove any lumps*
- *Place one half on top of the other, then roll into a tight log from one of the short ends. Cut the log into 12 equal pieces (not pictured)*



- *Press the 12 pieces of pastry into a greased muffin tin. Wet your thumb with cold water to keep the dough cool.*
- *Make sure the dough extends slightly past the top of the tin.*



- *Fill each cup $\frac{3}{4}$ of the way with custard.*
- *Bake at 550°F (290°C), or the highest your oven goes, for about 10-12 minutes. You want the custard to blacken a bit on top, as this is a sign of a true pastel de nata!*

6. Analysis

These analyses are oriented to spreading the product to other countries and enlarging the production on other continents. Doing a little research, we have found out that the standardisation is not easy to implement because some countries cannot fulfil requirements in sense of the required infrastructures and the productive process, as they are based on the country specifics. Therefore, it is necessary to consider its cultural differences.

It can be concluded that there are no equal country markets and neither standardised products, hence it is necessary to understand what consumers actually want. The key issue to have a prosperous business overseas is to take into consideration customers' cultural variations.

For example, the weather in Argentina is characterised by being very humid in opposition to Portugal, which plays an important role in the production process. If the factory does not have the right conditions for good isolation of the product, the custard tart does not get good. Also,

the ingredients vary depending on weather conditions. If the temperatures are too high, the butter, for instance, needs to be harder. Then, in what concerns to the product itself, from all the tasting experiences that were already made, consumers prefer the custard tarts less sweet than those made in Portugal.

Having said that, the original recipe had to be changed, and now, less sugar is used. Consequences regarding GSBPM methodology imply that all processes prior to the GSBPM Process 6. need to be updated due to the new circumstances.

7. Dissemination

Dissemination means making results available to the people that can best make use of them, e.g., scientific community, industry, other commercial players, policymakers, and others. Our consumers in this imaginary scenario are lovers of sweets, therefore we have found the method which provoked a creation of an internationally recognised product. How this has been managed, see in the next paragraph.



Figure 3: Pastéis de Belém

After many centuries, the famous cookie, the Pastel de nata, which just means cream pastry in Portuguese, has become an international hit. According to the article: The modern marketing machine behind Portugal's pastéis de nata, The Irish Times, informed the audience that the pastry even earned its own episode on the Great British Bake Off, the global hit that conquered the world with bunting and scones.

The small company, with five employees in 2017, hired marketing and branding professionals, something others had not done, and found foreign partners to help fuel expansion. Nata Pura received enthusiastic reactions at a food fair in London, where de Albuquerque sold it as a luxury but affordable product with a special history. It held pastry tastings and sponsored events like the London Coffee Festival and BBC Good Food.

The company now sells about 500 000 natas a month in 5 000 stores around the world. De Albuquerque says sales are between €1.5 million and €2 million a year, and he expects that to double that year. More than a third of their businesses comes from South Korea, where one of their customers, the CVS chain, will offer them in 12 500 stores.

Today, the café sells at least 20 000 natas per day and attracts thousands of visitors. It is the Lisbon's most popular attraction and one of the most popular eateries.

Obviously, smart organised campaign is a key of the business success.

8. Evaluate

Our starting information in the GSBPM journey is that the Pastel de Belém is a traditional Portuguese famous custard tart made of puff pastry, eggs, milk, sugar and the perfect blend of lemon and cinnamon.

Using the GSBPM methodology, we have travelled through all statistical processes as well as its subprocesses, pretending that we are carrying out a statistical survey on the Pastel de Belém which is registered in the CBS Annual Implementation Plan.

Our sweet journey with famous sweets will be finished with the certification. Usually, the consumer-recognised products are certified. The purpose of implementing the product quality certification is to ensure product quality, improve product reputation, protect the interests of users and consumers as well as promote international trade and the development of international cooperation in quality certification.

In order to promote transparent and clear business transactions and to ensure the safety of our final consumers, the sweet product example is made according to the parameters of the following certifications:



As we are now considering this product to be completely statistical and in line with the statistical standards, it can consequently be awarded the ESS certificate



Acknowledgment

Tools like the POMI quality and application database in combination with the GSBPM give the opportunity for each statistical survey to be improved if necessary. The POMI quality and application database was presented to the Peer Review team (Eurostat) during the mission to the CBS in March 2023. Additionally, it was presented to the OECD in the mission in February 2024. Both missions considered it as a great improvement.

Conclusion

Combining the GSBPM methodology on any situation we are living every day, the model shows its flexibility and offers the users to be all the time better and better. The model can be adjusted to the national specificities and improved at any subprocess within the main process. Sharing national model specificities between different countries might be the next step in improving national GSBPM versions. Spreading knowledge on practical implementation on statistical product varieties is a big challenge and future task for all of us that are working with different quality issues.

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