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**UNITED NATIONS STATISTICAL COMMISSION and  
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CONFERENCE OF EUROPEAN STATISTICIANS**

**EUROPEAN COMMISSION  
STATISTICAL OFFICE OF THE  
EUROPEAN UNION (EUROSTAT)**

**ORGANISATION FOR ECONOMIC CO-OPERATION  
AND DEVELOPMENT (OECD)  
STATISTICS DIRECTORATE**

**Meeting on the Management of Statistical Information Systems (MSIS 2011)**  
(Luxembourg, 23-25 May 2011)

## **REPORT OF THE MEETING ON THE MANAGEMENT OF STATISTICAL INFORMATION SYSTEMS**

**Prepared by the UNECE secretariat**

1. The Joint UNECE/Eurostat/OECD Meeting on the Management of Statistical Information Systems (MSIS) was held in Luxembourg, from 23 to 25 May 2011. Participants from the following countries attended the meeting: Australia, Austria, Bosnia and Herzegovina, Cambodia, Canada, Croatia, Cyprus, Estonia, Finland, France, Hungary, Iceland, Ireland, Italy, Latvia, Malta, Mexico, Mongolia, Netherlands, New Zealand, Norway, Poland, Republic of Korea, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Turkey, and United States of America. The European Commission was represented by Eurostat. Representatives from the following international organizations also attended: Institute for Statistics of the United Nations Educational, Scientific and Cultural Organization (UNESCO), United Nations Industrial Development Organization (UNIDO), United Nations Office on Drugs and Crime (UNODC), Organisation for Economic Co-operation and Development (OECD), International Monetary Fund (IMF), and Bank for International Settlements (BIS).
2. The agenda of the meeting (WP.1) consisted of the following substantive topics:
  - (i) Architectures, models and standards;
  - (ii) From local to corporate perspective (industrialization and standardization);
  - (iii) Innovation and related issues;
  - (iv) International cooperation/collaboration.
3. Mr. Rune Gløersen (Norway) was elected Chairman of the meeting. The preparation of the substantive work was organized by: Ms. Karen Doherty (Canada) and Branka Cimermanovic (Croatia) for Topic (i); Ms. Jolanta Stefanska (IMF) and Mr. Trevor Fletcher (OECD) for Topic (ii); Ms. Jenine Borowik (Australia) and Mr. Ron Bianchi (United States of America) for Topic (iii); and Messrs Marton Vucsan (Netherlands) and Carlo Vaccari (Italy) for Topic (iv).
4. Mr. Daniel Defays, Acting Director of Quality, Methodology and Information Systems at Eurostat, opened the meeting and welcomed participants. At the European Union level, Eurostat seeks to promote the integration of production systems to promote efficiency. At the UNECE level, the High-Level Group for Strategic Developments in Business Architecture in Statistics (HLG-BAS) aims to coordinate different initiatives to industrialize the statistical production process and to promote innovation. It is necessary to think in terms of interoperability of systems and define a common business architecture. This means a new

way to organize our work. To industrialize our processes, we must face new challenges, new developments, new IT environments, and a new role of statistics in decision making. This puts pressure on the statistical community. The HLG-BAS has developed a “vision” on how to meet these challenges. He noted that many interesting contributions are being presented, and he expressed his wishes for an excellent meeting.

5. In a special presentation outside the main topics of the agenda, Statistics New Zealand presented their experiences in disaster recovery following recent earthquakes in Christchurch. Several key functions of Statistics New Zealand are based in Christchurch, including the population census, and were severely disrupted by the earthquakes, leading to the cancellation of the 2011 population census. Key lessons learned included the importance of communication channels to reach staff, and the value of remote access solutions. The need to prioritize outputs highlighted the need for greater standardization of systems and tools to reduce dependency on individual knowledge and local systems. This experience highlighted the importance of thorough business continuity and disaster recovery plans.

## **RECOMMENDATIONS FOR FUTURE WORK**

6. Participants to the meeting identified the following topics for future work:

- Architecture
  - Integrated systems
  - Data integration in distributed statistical systems
  - Information models
  - Thin client / browser solutions
  - Relationships with subject-matter areas
- Local to corporate to community
  - Interoperable standards (DDI / SDMX by phase of the GSBPM)
  - Standards initiatives
  - Operationalize / progress towards industrialization
- Innovation
  - Linked data / Semantic web
  - By domain / process (e.g. national accounts)
  - Alternative data sources / collection
  - Showcase new ideas
- Collaboration
  - Mechanisms and modality
  - Update on initiatives
  - Acceptance standards
  - Coordination of expertise
  - Roadmaps for future development / maintenance of key products
- Relationship with HLG-BAS
  - Specific outputs required?

7. The IMF kindly offered to host the next MSIS meeting in Washington DC in the second half of May 2012, where these topics will be addressed.

8. In his summary the Chairman thanked Eurostat for hosting the meeting, the MSIS Organizing Committee and the UNECE secretariat for their work in preparing it. He addressed special thanks to Karen Doherty (Canada) for her contributions to the Organizing Committee and to the MSIS meetings. On behalf of the participants, the UNECE representative thanked the Chairman for his efficient chairing of the meeting.

**FURTHER INFORMATION**

9. The conclusions reached during the discussion of the substantive items of the agenda are contained in the Annex. All background documents and presentations for the meeting are available on the website of the UNECE Statistical Division (<http://www.unece.org/stats/documents/2011.05.msis.htm>).

**ADOPTION OF THE REPORT**

10. The participants adopted the draft report before the Meeting adjourned.

## ANNEX

**SUMMARY OF THE MAIN CONCLUSIONS REACHED DURING THE MEETING ON THE MANAGEMENT OF STATISTICAL INFORMATION SYSTEMS (MSIS 2011)****Topic (i): Architectures, models and standards**

Session Organizer/Discussant: Karen Doherty (Statistics Canada)

Papers by: Netherlands, Canada (2), Sweden, New Zealand, Estonia, Australia, Mexico

1. Over the years the architecture topic has evolved from descriptions of application design presented at the detailed level, to discussions on how to implement the new approaches to business architecture inherent in the use of the General Statistical Business Process Model (GSBPM) and descriptions of new ways to tackle system architecture. The papers presented under this topic covered these two aspects.
2. Many Statistical organizations have adopted the GSBPM to describe how the business of developing statistical products is conducted. The presentations by Netherlands, Canada, Sweden, New Zealand and Estonia dealt with various dimensions of making systems align with the GSBPM way of looking at the business of developing statistical products.
3. The paper from Statistics Netherlands considered the statistical process as a series of functions, which are generally, but not completely, common to all surveys. This approach moves the discussion about enterprise architecture towards developing sub-processes that can be used by multiple surveys. This leads to the view that it should be possible, in fact preferable, to build generic systems for these sub-processes. To do this you need to consider how data flowing in and out of the sub-processes are defined, the level of parameterization required, and the need for data repositories, either virtual or physical, to enable data flows between sub-processes. A data service centre provides the infrastructure to deliver data to the different sub-processes. The sub-processes can then be aggregated, like building blocks, into more complex functions.
4. The paper from Statistics Canada discussed implications on the organization of implementing processes and systems in the way described by Statistics Netherlands. Changing from a stovepipe approach where each survey has a process and a system that implements all or most of the survey steps, from collection through to the creation of the final data product, to a layered approach where survey data flows from one generic process step to another, is a major culture change both for the subject matter areas and for information technology (IT). The Canadian paper described the changes required and the progress made over the past two years, in the context of having to deliver cuts in IT resources.
5. Statistics Sweden presented a description of how different elements of a new generation of IT-architecture could be specified to increase the possibility for efficient international collaboration between statistical institutes that have adopted the GSBPM. The presentation considered the implication on system architecture of moving to the use of generalized systems for the process functions. The Triton platform provides a common interface for users to interact with the process-oriented model, and a dashboard to monitor and control data flows. However such a dashboard is likely to be influenced by national requirements and constraints, so the most suitable area for international collaboration is the development of applications and services. The inventory of statistical software maintained by the Sharing Advisory Board could be expanded to include information on the business objects required for different tools. SAB should be involved.
6. Statistics New Zealand described their platform approach to architecture for industrializing the processes and systems needed to align with the GSBPM, as part of a ten-year transformation programme. This includes the centralization of each of the phases described in the GSBPM model, from collection through to dissemination. They have mapped out a strategy for implementing the layers used to integrate the various steps and the systems needed to automate the process from end to end. They envisage three streams of data in the process and analyse phases, for business micro-data, economic aggregates, and social data.

OECD.Stat has been adopted as the standard tool for the dissemination phase, and the collect phase will be standardised next.

7. The representative from Estonia explained how they have developed a strategy to standardise the process phase of the GSBPM. They have developed a data processing system, VAIS, which is a collection of tools and technologies aimed at automating data processing (Phase 5 in GSBPM). It is built on freely available open-source components, linked by standard formats such as XDTL (eXtensible Data Transformation Language). This approach is metadata-driven, balancing automation and manual intervention. The VAIS system is documented in English, and is available for sharing under the European Union Public License (EUPL).

8. The second group of presentations described ways to develop architectures to meet specific dissemination needs within statistical organisations.

9. The presentations from Australia and Canada both described solutions to address the needs of data users outside the statistical organizations. Both described Real Time Remote Access solutions for controlled release of micro-data to researchers, aligned with their implementations of the GSBPM. They tackled similar issues including standardization of the data inputs, tabulation approaches and confidentiality. The Canadian approach uses risk management to balance data access against disclosure risks. The Australian approach is to replace several previous micro-data release systems with a standard approach in the context of their information management transformation programme.

10. The presentation from Mexico described their vision of how to build a national statistical and geographical information system which is a broader all inclusive approach to dissemination of national statistics, across different government agencies. This approach combines new and existing components through the implementation of standards such as SDMX (Statistical Data and Metadata eXchange) and DDI (Data Documentation Initiative). These standards have the benefit of improving interoperability, allowing the re-use of software, enhancing modularity and providing a homogenous process.

11. The approaches described in all eight presentations show a common pattern, specifically the implementation of processes and systems based on the GSBPM and emerging standards around information management, metadata, data description languages such as SDMX and DDI, and generalized processing tools. The challenge is therefore how to develop these processes and systems, without each organisation having to build everything itself.

12. Points raised in the discussion included:

- Applying various confidentiality rules in a remote access environment, and the possibility of consolidating these rules
- Maintaining the balance between data access and data security when providing remote access
- The possibilities that users may want to upload their own data and perform linking in remote access environments; the Australian Bureau of Statistics is working on principles about when data can be linked.
- Practical arrangements for service level agreements in Canada; sanctions for non compliance are difficult to enforce, so the emphasis is on collaboration and effective prioritisation
- Costing models to fund development work; Canada has a long-term investment plan, but many other countries do not, leading to risks of under investment and the need for annual priority setting.
- Developments in enterprise architecture can change the structure of IT in an organisation; several organisations reported trends towards more centralisation of IT functions to facilitate architecture changes. In fact centralisation is seen as an enabler for better IT planning, the application of, and conformance to, best practices and the adoption of reusable applications and processes. In some cases, although IT management is becoming more centralised, IT staff are still co-located with business areas.
- Streamlining statistics has an impact on the governance of IT and emphasizes the need to make efforts to improve information management.

**Topic (ii): From local to corporate perspective (industrialization and standardization)**

Session Organizers/Discussant: Trevor Fletcher (OECD), Jolanta Stefanska (IMF)

Papers by: Australia, Norway, United States of America, Republic of Korea, and IMF

13. This session featured five presentations covering interoperability and collaboration on different levels:

- as a network of national statistical agencies (Australia)
- within a federal government system (USA)
- within a country's decentralised system (Korea)
- as an implementation of a common system within an international organisation (IMF)
- a review of the impact of SDMX on inter-operability for all statistical agencies (Norway)

The presentations complemented those in the previous session "Architectures, models & standards" in that they continued along the theme of using major standards such as the Generic Statistical Business Process Model (GSBPM) and Statistical Data and Metadata eXchange (SDMX).

14. The presentation by Australia focused on implementing change through their information management transformation programme. In the Australian Bureau of Statistics (ABS) there is a need for fundamental changes not just because the systems are getting old but there is a risk of falling behind potential competitors. Some private companies are now providing consumer price statistics faster than ABS. The global financial crisis, global warming, and other new topics are changing the types of statistics required. As a result, rapid response and increased interoperability are important requirements. To facilitate this change the ABS is promoting international collaboration. There is a wealth of capability and ideas that can be shared effectively between organizations, this provides the rationale for the "Statistical Network", where several initiatives are shared between the six partner countries. This network may be expanded later if this approach proves successful.

15. The presentation by Norway discussed streamlining statistical production to address common challenges and interoperability for exchanging information. Standardization efforts have to be aligned and have to take into account the nature of the business in order to be successful. The GSBPM has proven that it is important to have high-level reference models, which can provide a framework to bridge different technical standards such as SDMX, DDI and commercial equivalents such as that used by Google. Other content-oriented standards, such as the Metadata Common Vocabulary can also play a role in the organizational, semantic and technological interoperability of technical standards. Standardisation is not a goal in itself; any standardisation effort must be based on well defined business cases, and must be aligned with the on going process oriented developments in statistical organisations. Success requires a top-down, management driven approach based on agreed high-level models, and the statistical community should act as an industry, not as individuals. Agreeing on common high-level models, creates opportunities for flexible, targeted and effective solutions on the detailed level, still harmonised within a standardised framework. The overall objective should be to encourage increased commercial attention to the industry of statistics.

16. The United States presented their challenges in consolidating IT resources across a federal system using the Statistical Community of Practice and Engagement (SCOPE). SCOPE provides an integrated means of identifying mutual challenges and opportunities, and then jointly developing and disseminating practical and effective solutions. Inter-agency collaboration and cooperation under SCOPE will benefit the data user community through: increased efficiency of statistical agency operations, resources; enhanced adoption of best practices; harmonization of definitions, metadata, dissemination and data visualization mechanisms while continuing to protect confidential data.

17. The Republic of Korea presented the development of their Generic Statistical Information System, which aims to centralize statistical production systems. The Korean statistical system relies heavily on outsourcing in statistical production, which raises issues of continuity when contactors change, and has potential implications for data security. The purpose of the GSIS is to support the entire statistical business process from survey planning to production, dissemination and data archiving for all the producers of official statistics in the Republic of Korea. They have developed the Korean Statistical Business Process

Model based on GSBPM, to describe the set of statistical business processes needed to produce official statistics.

18. The International Monetary Fund (IMF) showed how a generic tool for data management has been implemented in that organization. Economic data are collected for 187 countries, which were held in spreadsheets in an unstructured format with poor documentation. This approach meant that standards and guidelines could not be enforced. The solution was to migrate to structured databases, using the Database Management for Excel (DMX) system. This allows economists and research staff to manage effectively their data using Excel and to overcome the limitations of Excel as a time series database management system. It facilitates data storage, data manipulation and time series management. This approach also facilitates sharing and finding data. Excel is primarily used for viewing rather than analyzing data. A check in and check out function allows storage in an SQL database, but downloads can be taken to countries and worked on independently.

19. Points raised during the general discussion included:

- Developments in linked open data and semantic web initiatives are interesting to follow-up on. We don't know the direction or the pace of the semantic web. It could bridge the standards for data collection, but initial discussions should be at the conceptual rather than the technical level.
- A useful first step towards integrating standards would be to map the different terminologies, for example a joint vocabulary between DDI and SDMX, which could expand on the Metadata Common Vocabulary. This work should bring together different kinds of experts, and good coordination would be needed.
- There is a movement towards open data in Italy. SDMX could provide the format for dissemination, and semantic web standards may help to bridge terminology differences between SDMX and DDI.
- Mongolia uses DDI for documenting census data, but would also like to implement SDMX, so needs a tool to convert from DDI to SDMX.
- SDMX implementation may be held back by the lack of a global registry. Coordination of existing registries through a central registry or a federation of registries is needed. The new SDMX technical standards working group are looking at options.
- There are many SDMX Data Structure Definitions, but this highlights the need for higher level standardization. One option could be to lift the content-oriented guidelines out of SDMX and use them as a basis for standardization at a higher level, involving top management. The statistical standards would then be independent of technical standards, which are more likely to change over time.
- If the statistical community is successful in creating real global standards, there is greater potential to get these adopted by the software industry.
- It should be possible for statistical production systems to connect with the internet so that there is no need to hold local copies of the contents of registries.
- High-level agreement on standards will require all organizations to make compromises to realize the benefits.
- Benchmarking of standardization initiatives would be useful to compare experiences and identify good practices.
- Training materials would be useful for people involved in transformation programmes, to help them learn from the experiences of others.
- Any new software developments should be on the basis that they will be open for re-use by others in the future.

**Topic (iii): Innovation and related issues**

**Session Organizers/Discussants:** Jenine Borowik (Australian Bureau of Statistics) and Ron Bianchi (Economic Research Service, U.S. Department of Agriculture)

**Papers by:** Cambodia, Italy, Eurostat, IMF, and New Zealand

20. Decreasing budgets, IT consolidation and the impacts of external innovations are some of the issues that have an important impact on the management of statistical information systems for statistical offices. To respond to these pressures, there is a constant need for invention and innovation. Innovation was seen as the modification and enhancement of existing systems, whereas invention involves the creation of completely new tools and approaches.

21. The representative of Cambodia presented the data processing and dissemination technology used in the 2008 population census. The technologies used for the 2008 census data processing and dissemination were similar to those used for the 1998 census, except that a Community Profile System (CPS) and Dynamic online website were added. CSPro software was used for data capture and processing. Dissemination methods included paper, electronic support (on and off-line) and user workshops. CamInfo, an adaptation of the DevInfo software, was introduced for Internet dissemination.

22. The web is increasingly becoming a fundamental means for supporting several phases of the statistical data life cycle, particularly data acquisition and dissemination, however little interest has been devoted so far to use the web for publicly monitoring the acquisition process. Italy described the use of *web widgets* used to allow the public to monitor the 2010 Italian Agriculture Census data acquisition process. Web widgets can be easily inserted in web pages, and can be composed and organized in personalized dashboards. The use of widgets to monitor the agricultural census was judged to be a success and could provide an interesting way to disseminate other types of real-time data. It has the potential to improve response rates and timeliness by introducing an element of competition between respondent groups.

23. Eurostat presented the use of cloud computing concepts for statistical data editing near the source. The aim was to reduce the significant amount of resources used to validate and edit data coming from member countries, by facilitating standard edit checks by countries before data transmission. A metadata-driven tool called the “Editing Building Block” has been developed and made available for this purpose. Edit rules are stored in a metadatabase. The capacity to merge data is important, including historic data series and look-up tables used to support the edit rules.

24. The IMF presented their Principal Global Indicators dataset which was created to facilitate the monitoring of economic and financial developments of the G-20 group of countries. Data are made available as tables, charts and graphs via the Internet. Recently a mobile application has been developed, which retrieves data using the SDMX web service and displays them on mobile devices. A free version for Apple devices is already available, and an Android version is being developed. The IMF will consider the possibility of sharing these tools.

25. New Zealand presented their AGILE software development life cycle approach. This has proven to be more efficient by delivering software faster, and has increased software quality. This approach can be seen as an innovation that has changed the culture of the organisation, encouraging greater collaboration between functions and a more team-oriented approach to software development, increasing transparency and improving staff morale. Constant monitoring of progress and prioritisation of user requirements helps to control costs and scope creep. Following the success of pilot cases, the AGILE approach has become the primary method for software development.

26. The following points were raised during the discussion:

- There are many types of innovations in statistical information systems, future meetings could allow more opportunities to showcase a wider range of innovative tools and approaches.
- Subject-matter areas tend to be very conservative regarding innovation, it would be easier to convince them of benefits if new approaches can be demonstrated rather than just discussed.



- In the future, organisations such as Eurostat could potentially host shared components for on-line use by others in their statistical production processes. This would be more of an organisational than a technical challenge.

#### **Topic (iv): International cooperation/collaboration**

**Session Organizers/Discussants:** Marton Vuksan (Statistics Netherlands) and Carlo Vaccari (ISTAT)

**Papers by:** Eurostat, UNECE/Netherlands/Norway, Netherlands, Italy (2), Netherlands/United Kingdom, OECD and UNIDO.

27. The increasing rate of technological change offers an exciting future, but also a number of challenges, particularly as many statistical organisations are facing resource cuts. To address these challenges, it will be necessary to find new ways for organisations to collaborate and to intensify existing cooperation activities. This has been achieved in industries where those involved are commercial competitors, so should be easily possible in official statistics, where we are all part of a global community.

28. Eurostat presented their “vision for the next decade”, which they plan to achieve through a move from a business architecture mainly based on a product stovepipe model to a more integrated production system at the level of the European Statistical System (ESS). The new model for ESS business architecture is built on international initiatives and standards such as the GSBPM, the proposed GSIM, SDMX and DDI. It focuses on phases four to seven of the GSBPM (Collect to Disseminate), as Eurostat does not conduct surveys. Instruments to achieve the vision include research programmes, ESSNet (European Statistical System Network) projects, the development of common tools, VIPs (Vision Implementation Projects) and sponsorship groups.

29. The UNECE presented the strategic vision of the High-level Group for Strategic Developments in Business Architecture in Statistics (HLG-BAS). This group was created in 2010 by the Conference of European Statisticians (CES) to oversee and guide discussions on developments in the business architecture of the statistical production process, including methodological and information technology aspects. The HLG-BAS will present its strategic vision to the CES in June. This vision recognizes the need to re-invent products and processes to adapt to a changed world, and to industrialize statistical production based on common standards. A workshop will be held in the autumn to bring together at least 25 international groups and initiatives with the aim of developing a common strategy.

30. Statistics Netherlands presented the results of the work of the Sharing Advisory Board over the last year. The main outputs were the wiki, two newsletters, an expanded software inventory, and new materials to facilitate collaboration. The Sharing Advisory Board pages on the MSIS Wiki were demonstrated. The wiki is a tool for all MSIS participants and their input is important. The program of future work includes guidelines for multilingual software, a study on communication and collaboration tools for international projects, and a study on prerequisites for sharing. Case studies on sharing will be added to the wiki. The Sharing Advisory Board will work with the high-level group and take guidance and direction from them.

31. Italy presented a progress report on the ESSnet project on a Common Reference Environment (CORE). The project aims to provide an environment for the definition and execution of statistical processes. Workflows will be created by integrating components. CORE will define a very generic information model (CORE-IM) for the interface through which statistical services will communicate with each other, this work is closely coordinated with the development of the GSIM.

32. The representative of the Netherlands presented a joint paper with the United Kingdom on key IT indicators. The aim is to have a set of key business indicators (simple facts about the size and scale of the organisation and its IT operation) and key technical indicators (strategic direction for IT at the organisation) for different national and international statistical organisations. The information can be used for benchmarking purposes or to identify potential collaboration partners. Participants were invited to submit information about their organisation via a simple standardized template on the MSIS wiki.

33. To address the record linkage problem the Italian statistical organisation (ISTAT) has developed an open source tool called RELAIS (Record Linkage at ISTAT). It allows users to choose from various matching techniques and methods, and allows the possibility of adding new methods. RELAIS has been developed using open source technologies, namely Java and R as programming languages and MySQL as database management system. As a result it is considered to be open source and available for sharing. Several other statistical organisations have started using RELAIS or expressed an interest further collaborative work.

34. The OECD provided an update on the status of the sharing of its Statistical Information System (SIS) modules, and the associated collaboration community. They presented changes made to support the increasing demand from other organisations that have adopted the SIS modules, the challenges facing the group, and the changes are required by all members to ensure the long-term sustainability and success of the Statistical Information Systems Collaboration Community (SIS-CC), which met physically for the first time in March 2011.

35. UNIDO presented cooperation models for software development in official statistics, with a focus on licensing, position in the statistical business process model, ownership and governance, sustainability, methods for distributed software development and technical communication advances. This analysis was based on the software inventory maintained by the Sharing Advisory Board. Collaboration adds new dimensions of complexity in regards to administrative and legal procedures, but will substantially reduce costs and facilitate the harmonization of the software architectures. The adoption of international standards will help to reduce the costs for developing and maintaining statistical software and will improve user support and capacity building.

36. The following points were raised in the discussions:

- Different countries prefer different solutions for development platforms. Tools developed for Java are often difficult to implement in .Net and vice-versa.
- Tools designed to be modular can be more easily integrated into different environments.
- Statistical functions should be the objects that we share.
- It is not necessary to keep creating projects to develop tools. It might be better to concentrate on developing frameworks and architectures, in which some existing tools can be incorporated.
- ESSNet projects are very useful, but there is a risk they could lack a truly global perspective unless non ESS countries are involved.
- Making software available for a fee is sometimes criticised. One potential solution is to charge for specific services such as training and support rather than the software itself. However this will not work in all cases, as the provision of such services is outside the remit of some statistical organisations.
- It is usually more expensive to build and maintain in-house tools than to pay a license fee, particularly for smaller countries with limited IT resources.
- The risk of being expected to provide support discourages some organisations from sharing software.
- Procurement and accounting rules can be an obstacle to sharing between statistical organisations, and therefore make it difficult to save money. We should enlist the legal and accounting communities to help find solutions, rather than consider them the enemy. Perhaps the HLG-BAS could consider this.
- A research mechanism such as a funding consortium could target resources to fill in holes in architectures.

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