

REPORT OF THE EXPERT MEETING

1. The HLG-MOS Workshop on the Modernisation of Official Statistics 2023 was organized as part of the Conference of European Statisticians' work programme for 2023. It was held from 21-22 November 2023, hosted by UNECE in Geneva, Switzerland.
2. There were 80 participants, including representatives of national statistical offices and government agencies of the following countries: Albania, Australia, Austria, Azerbaijan, Belarus, Canada, Estonia, Finland, France, Greece, Hungary, Ireland, Italy, Republic of Korea, Latvia, Mexico, Netherlands (Kingdom of), North Macedonia, Norway, Poland, Portugal, Romania, Serbia, Sweden, Switzerland, and United Kingdom of Great Britain and Northern Ireland. The meeting was also attended by the Permanent mission of the Republic of Türkiye to the UN Office in Geneva.
3. In addition, there were representatives from the Bank of International Settlements (BIS), Interstate Statistical Committee of the Commonwealth of Independent States (CISSTAT), Eurostat, International Monetary Fund (IMF), Office for the Coordination of Humanitarian Affairs (OCHA), Organisation for Economic Cooperation and Development (OECD), and the United Nations Economic Commission for Europe (UNECE).
4. The expert meeting was organized under the responsibility of the HLG-MOS Executive Board and UNECE. The workshop was organised around following sessions:
 - HLG-MOS Projects Reporting
 - Generative AI and Official Statistics
 - Innovation Radar
 - HLG-MOS Modernisation Group Reporting and Plans, and
 - Setting Modernisation Agenda for 2024
5. Twenty-six substantive presentations were made within these sessions. The timetable, papers, presentations, and other output from the meeting are available at the UNECE website <https://unece.org/statistics/events/HLG2023>. The proposed activities and projects are listed in Annex I.
6. Some of key points and takeaways of the discussions are the following (more details in Annex II):
 - Adopting new technologies and tools (migrating to the cloud, using Generative AI) is more than a technological shift; it represents a complete business reset, requiring strong leadership and a cultural change within organisations. New tools can help collaborations and use of new data sources that would have not been feasible in traditional data centre model.
 - The interoperability topic is very relevant and valuable for statistical organisations. One should also consider outward view and pay attention to interoperability with external organisations.
 - The issue that the Carpentries project aimed to solve is knowledge interoperability - create knowledge in an interoperable and open way allowing it to be reused, traded and co-invested in, rather than having multiple disjointed efforts.
 - Given the rapid evolution of this domain, collaboration among statistical organisations remains pivotal. Sharing insights, exploring applications collectively, and exchanging experiences are critical in navigating this dynamic landscape.
 - It would be important to reflect where in the business processes and work flows of the statistical

organisations the AI co-pilot could provide assistance for.

- There are areas in digital twins where statistical community can explore more such as developing standards and guidelines. What DT allows us to do better than traditional models is the feedback: the model starts to refine itself based on data received. It might be time for NSOs to step back and think of the philosophical frame of the role of NSOs in the future (e.g., providing personalised, societal, real-time information vs. historical context).
- No organisation would say that they are not ethical, so it is important to understand what characteristics define ethical organisations and demonstrate them.
- On the two project proposals (Generative AI Project and Statistical Open-Source Software Project), participants suggested that the projects should dedicate some time in the beginning for the creation of repository of current tools, use cases and documentations. The repository can be accumulated throughout the project period; Challenges of moving from experiment/ideation to production should be in the mind at the beginning of projects. The lessons learned from other projects such as ML can be useful; Both are technical projects, so it will be important to have a diversity of talents in the projects (e.g., managerial level, connection with business and other parts of organisations horizontally);

Annex I. List of Proposed Projects and Activities for 2024

7. Projects

- [Generative AI Project](#);
- [Statistical Open-Source Software Project](#)

8. Activities under Modernisation Groups

- Applying Data Science and Modern Methods Group
 - a. [Advancing Responsible AI in Statistical Offices: Bridging Knowledge and Practice](#)
 - b. [Beyond Point Predictions: Ensuring Reliability in Official Statistics through Uncertainty Quantification](#)
 - c. [Graph Modeling and Graph Databases support across the Granular Data Lifecycle](#)
- Blue Skies Thinking Network: [Pitches and evaluation of project proposals; Digital twins for Field Force; Connecting with data collection expert meeting; Liaising with ESS Innovation Network](#)
- Capability and Communication Group
 - a. [Use of AI for official statistics – from communication perspectives](#)
 - b. [Ethics in Modern Statistical Organisations](#)
 - c. [Data Analytics Proposal](#)
 - d. [Evaluation of blended \(hybrid\) working](#)
 - e. [Extended work on the Generic Growth Model for complex organisational themes](#)
 - f. [Employer branding](#)
- Supporting Standards Group
 - a. [Core Ontology for Official Statistics : Version 2](#)
 - b. [Revision and update of the Common Statistical Data Architecture \(CSDA\)](#)
 - c. [Using SDMX, VTL and DDI to implement GSIM](#)
 - d. Revision of GSBPM and GAMSO

Annex II. Workshop Proceeding and Discussion Summary

9. The “HLG-MOS Projects Reporting” Session included the following presentations:
- Cloud for Official Statistics – John Conway (CSO Ireland) and Claude Julien (UNECE Project Manager)
 - Data Governance for Interoperability Framework (DAFI) Project – Juan Munoz (INEGI, Mexico) and Carlo Vaccari (UNECE Project Manager)
 - ModernStats Carpentries (phase 2 Meta Academy) – Eric Anvar (OECD), Jonathan Wylie (Statistics Canada) [online] and Andrew Tait (UNECE)
10. The points raised during the presentations and discussions include:
- Achieving interoperability during the cloud transition is a complex task that requires time and careful consideration taking into consideration factors such as diverse procedures and slow pace of adoption. It involves political and organisational initiatives including support from governments and procurement organisations. Overall, achieving interoperability is feasible but requires a comprehensive and gradual approach.
 - Understanding and classifying different types of data helps in maintaining control and ensuring flexibility to switch between cloud providers. The process often starts with applications with organisations gradually building confidence. Engaging with cloud service providers, securing data centres within specific jurisdictions, and implementing robust security and access controls contribute to maintaining control over the technology and data.
 - Training on cloud is crucial for staff members to understand and adapt to organisational changes. It involves effectively communicating the benefits, providing learning opportunities and demonstrating the practical advantages.
 - **Migrating to the cloud is more than a technological shift; it represents a complete business reset, requiring strong leadership and a cultural change within organisations.** Cloud can help collaborations and use of new data sources that would have not been feasible in the traditional data centre model.
 - Decision-making regarding cloud adoption should consider business needs, leadership commitment, resource allocation, and the willingness to adapt and adjust post-migration business practices.
 - Even within NSOs there are interoperability issues, thus the topic of data interoperability is very relevant and valuable. **One should also consider outward view and pay attention to interoperability with external organisations.** While DAFI project focused mostly on statistical organisations, many of the standards and tools listed in the document¹ are applicable beyond NSOs and can help enhancing interoperability with external bodies.
 - SDMX is an example that could help improving the interoperability. It is not just a file format, but also an information model and a set of processes that can be adopted and used as a basis to implement DAFI. The works of the Supporting Standards Group examining the relationship between DDI and SDMX through GSBPM is also expected to help statistical organisations to adopt and use these standards in a more interoperable way.
 - The European region might have more advantages than the other regions with the European Statistical System (ESS) supporting the coordination and interoperability by strong regulations. UNECE can also play an important role in developing guidance and standards to support the interoperability in the region and at the global level.
 - The ModernStats Carpentry initiative is a project designed to create a community of trainers and learners for data science skills in official statistics, based on the existing Carpentries model and platform². The intended outcome is to unlock national training programmes and connect them as an open ecosystem, enabling NSOs to develop an ecosystem of learning and evolve with the industry.
 - Given a multitude of (free) resources on Python, R, Git, the question on the value added of the carpentries platform and model was raised. Similar to interoperability in statistics, **the issue that the Carpentries project aimed to solve is knowledge interoperability - create knowledge in an interoperable and**

¹ <https://unece.org/sites/default/files/2023-11/HLG2023%20DAFI%20Draft%20Nov15.pdf>

² https://unece.org/sites/default/files/2023-11/HLG2023_S1_3_ModernStats%20Carpentry.pdf

open way allowing it to be reused, traded and co-invested in, rather than having multiple disjointed efforts.

11. The “Generative AI and Official Statistics” Session included the following presentations:
 - HLG-MOS White Paper on LLM/GPT – Cathal Curtin (Statistics New Zealand) [online]
 - Building a SAS to R translation assistant with ChatGPT – Florian Givernaud (Insee, France)
 - Transforming the Search for Public Information in Mexico with Advanced Language Models – Juan Munoz (INEGI, Mexico)
 - Can AI better satisfy users of statistical information? A case study in Istat – Michela Troia, Sara Letardi and Mauro Bruno (Istat, Italy)
 - The Promises of Generative AI and What It Means for the Modernisation of NSOs – Doug Smith (Microsoft) [online]

12. The points raised during the presentations and discussions include:
 - The capabilities of AI have made a significant leap forward in the last few years with the advance of large language models (LLMs). Bearing in mind the opportunities and the risks of transformative potential of LLMs for the statistical community, HLG-MOS Modernisation Groups - Blue-Skies Thinking Network (BSTN) and Applying Data Science and Modern Methods (ADSaMM) Group initiated to draft a white paper on LLMs in the context of official statistics. The white paper presents concrete use cases to for various areas of statistical production such as SAS to R translation, report generation and language-based data search, alongside their inherent risks such as ethical, legal and privacy concerns.
 - Given the rapid evolution of this domain, collaboration among statistical organisations remains pivotal. Sharing insights, exploring applications collectively, and exchanging experiences are critical in navigating this dynamic landscape.
 - Insee used LLMs (ChatGPT) to transform SAS scripts into R codes. In choosing which LLM to use, data protection aspects such as ownership (NSO should be able to delete the data at will as data should not be used to train a model that does not belong to the NSO), access control (access to the model must be restricted by a strong and secure authentication) and security (data must be encrypted and follow the GDPR provisions) were considered. “Custom GPT” was released early November and this is also being explored. Currently, GPT4 can take almost 10,000 tokens as context and it does not give any sign of losing context, thus it is generally a good practice to remind GPT of the context from time to time. **Overall, the experience of using ChatGPT for translating SAS scripts into R is positive**, keeping in mind the limitations of the LLM (e.g., outdated codes and training data, loss of content, quality of the input codes, AI errors).
 - INEGI used Advanced Language Models (ALM) to transform the delivery of public information in Mexico (search engine improvement), for modernising official statistics (coding of economic statistics) and integrating data sources (gender-oriented services analysis)³.
 - Understanding the implications and potential applications of generative AI in official statistics is crucial to harness its diverse opportunities and ensure its responsible use of it. Istat is experimenting with LLMs to improve user experience on its institutional website through the use of AI and developing a support system capable of answering natural language queries based on a ‘specific’ context (Istat documents), with a possibility of integrating ‘general’ information (from GPT models)⁴. Out-of-date information in the training data is often a concern for GPT, but this can be avoided by creating a knowledge base separately from GPT. The inappropriate content that might come through queries, is addressed through implementing thresholds to reject repeated or problematic questions.
 - Microsoft presentation highlighted that the age of AI is the fundamental paradigm and cultural shift. One key message to convey in the leader-to-organisation conversation is that AI is currently the most important tool transforming productivity and giving significant comparative advantages to those how to use.
 - **Generative AI is different than other AI tools that existed before because of the two components:**

³ https://unece.org/sites/default/files/2023-11/HLG2023%20ALMModels_Mexico.pdf

⁴ https://unece.org/sites/default/files/2023-11/HLG2023_S2_Italy_GenerativeAI-Istat.pdf

reasoning engine and the natural language interface (as opposed to click/drop/drag that we use to interact with computers). This is a powerful technology yet the key in the interaction is that the human is in the centre and AI is the tool to support human activities.

- Several other industries are adopting the AI co-pilot to boost productivity (e.g., health industry trying to free up time of doctors by providing natural language-based system where doctors could ask questions about patients). **It would be important to reflect where in the business processes and work flows of the statistical organisations the AI co-pilot could provide assistance for.**
- Microsoft Finance has a journey similar to the statistics industry; they started with process standardisation, changing to modern finance culture, unified data platform (e.g., data lakes) and adopting BI and AI. **Data remains very critical for AI journey; “garbage-in, garbage-out” is even more relevant now because AI can make the garbage looking good.**
- Many organisations are having an issue with scattered knowledge and information. Generative AI is reshaping an enterprise search tool. It can connect the internal knowledge base and users by, for example, generating vector search queries that humans usually cannot do well.
- More traditional ML-based capability will continue to be important as the generative AI is not so good at math.
- Although individual companies may not be making efforts to reduce switching costs (switching AI models and services) for users, the industry as a whole is moving in that direction. Prompts and standards are important to reduce the switching cost. The cloud platform is also very important part of the cost because inferencing requires GPU time. What should be avoided is to have data and AI on the separate clouds and try to make them work together – this will cost more.
- Division of power is an important principle for AI governance.
- The overall conclusion of the session was that the generative AI holds great potential and statistical organisations should carefully adopt these technological advancements while balancing ethical considerations, focusing on user needs, transparency and governance in AI development.

13. The “Innovation Radar” Session included the following presentations:

- Digital Twin and Official Statistics – Steve MacFeely (WHO)
- ESS Innovation – Jean-Marc Museux (Eurostat)
- Co-development of open source solutions: the .Stat Suite business case – Eric Anvar (OECD)
- HLG-MOS Blue Skies Thinking Network – Barteld Braaksma (Statistics Netherlands)

14. The points raised during the presentations and discussions include:

- The digital twin (DT) is a virtual representation of a physical entity or system, and its potential applications for official statistics are great, as it allows for improving accuracy, conducting real-time data analysis and making data collection and analyses more efficient. As a model, DT can enhance the predictive capabilities to support policy planning and gives the opportunity to simulate and assess impact of policies before implementation.
- There are areas where statistical community can explore more such as developing standards and guidelines (on the use of DT), establishing partnerships and collaborations, and conducting pilot projects and experiments. What DT allows us to do better than traditional models is the feedback: the model starts to refine itself based on data received. It might be time for NSOs to step back and think of the philosophical frame of the role of NSOs in the future (e.g., providing personalised, societal, real-time information vs. historical context).
- The Innovation Agenda is a strategic approach to foster and scale up innovation in ESS making official statistics that are more fit for the future and responsive to the challenges ahead. The agenda aims to strengthen the ESS ability to meet new and urgent user needs, augment products and service portfolio, realise efficiency gains and strengthen resilience to shocks and societal change.
- Statistical Information System Collaboration Community (SIS-CC) is a reference open-source community for official statistics, focusing on product excellence and delivering concrete solutions to common problems through co-investment and co-innovation. It aims to cover the full data lifecycle, embed a component-based architecture, through adding value and delivering open-source solutions.
- An example of SIS-CC product is the .Stat Suite which is a standard-based, componentised, open-source

platform for the efficient production and dissemination of high-quality statistical data. It was developed following the principles of inclusivity, collaboration, knowledge sharing, and capacity building among statistical organisations. One area of growing importance and interest is the user research. There is a long way to go to be truly user-centric and this perhaps has become even more challenging with AI aspects that go beyond our control.

- Blue Skies Thinking Network (BSTN) is the idea factory of HLG-MOS that identifies new opportunities, generates new ideas, develops/evaluates proposals and streamlines innovation. The 2023 BSTN events, the core and activity teams, as well as the activities and the ideas for 2024 were presented.
- Countries were invited to share proposals or join the Network. The main idea when setting the future activities is to balance the caution and optimism, keeping in mind the possible shortage of resources or work overload.

15. The “HLG-MOS Modernisation Group Reporting and Plans” Session included the following presentations:

- HLG-MOS Expert Meetings – InKyung Choi (UNECE)
- Applying Data Science and Modern Methods - Gary Dunnet (Statistics New Zealand) [online]
- Capabilities and Communication – Anna Borowska (Statistics Poland), Elaine O'Mahoney (CSO Ireland), Fabrizio Rotundi (Istat, Italy) and Jeremy Visschers (Statistics Netherlands)
- Supporting Standards - Flavio Rizzolo (Statistics Canada) [online]

16. The points raised during the presentations and discussions include:

- The Applying Data Science and Modern Methods Group (ADSaMM)⁵ was established in 2022 to identify opportunities to modernise business processes of statistical organisations. Currently, there are 41 members from 19 organisations. Three task teams have been formed to work on: Modelling, Editing, and Responsible AI. The group proposals for 2024 aim to cover practical application of the responsible AI, uncertainty quantification of ML, and graph modelling and databases.
- Since the realm of AI is changing very fast, it is important to be cautious before jumping into new projects. Discussing how to define these errors and modelling strategies is crucial. Prompt engineering is a growing area where concrete common solutions or approaches would be helpful. Additionally, individuals translating between real-world language and statistical concepts could be helpful in defining these prompts, guiding the user community.
- The Capabilities and Communication Group presented the results of activity of its task teams (Ethical Leadership, Future of Work and Communication)⁶ for 2023. It also presented the plans for 2024 such as ethics workshop, communication for AI, and HR data analytics, employer brand management and others. The importance of ethics, in particular with developments of advanced AI systems, was highlighted. **No organisation would say that they are not ethical, so it is important to understand what characteristics define ethical organisations and demonstrate them.** The ethics team is encouraged to be very specific and move things forward with some specific issues that NSOs likely to face.
- There are challenges around communicating ML/AI to public (e.g., how to communicate uncertainties around them?). Statistical organisations should be transparent about methodology and uncertainties; emphasise the societal benefits (e.g., for policymaking); be clear about alternatives and governance.
- Supporting Standards Group was set as a group of experts that develops, enhances, integrates, promotes, supports and facilitates the implementation of a range of standards that underpin the modernisation of official statistics.
- In 2023, the group worked on GSIM revision, use of SDMX/DDI with GSBPM, GAMS0/GSBPM revision and community engagement⁷. The future directions of work emphasise on the evolution and integration of ModernStats models, and building the ModernStats community of practice and interest, in particular, revision and alignment of GAMS0/GSBPM, using SDMX, VTL and DDI with GSIM, developing the Core Ontology for Official Statistics: Version 2 based on user needs and updating and

⁵ https://unece.org/sites/default/files/2023-11/HLG2023_S4_2_ADSaMM%20group%20presentation.pdf

⁶ https://unece.org/sites/default/files/2023-11/HLG2023_CapComm%20group%20presentation.pdf

⁷ https://unece.org/sites/default/files/2023-11/HLG2023_S4_4_SSG_Presentation.flavio.final_.pdf

revision of CSDA. Moreover, the Group is planning the ModernStats World Workshop as an in-person only event in 2024.

17. The “Setting Modernisation Agenda for 2024” Session included the presentation of project proposals (“Generative AI for Official Statistics” and “Statistical Open-Source Software”) and small group discussion on the proposals as well as the following soapbox presentations:

- Ethics Workshop – Fabrizio Rotundi (ISTAT)
- Files For Large (And Big) Data Dissemination – Romain Lesur (INSEE France)
- Quantum Computing – Osama Rahman (ONS UK)
- Metadata Handling – Olivier Sirello (Bank of International Settlements)
- The Mission and Identity of an NSO In a Complex and Diverse World – Jeremy Visschers (Statistics Netherlands)
- Evolving Use Case of Converting SAS to R Using LLMS – Vytas Vaiciulis (CSO, Ireland)
- Onyxia and the dream of CSPA – Trygve Falch (Statistics Norway)

18. Two project proposals were presented: Generative AI Project and Statistical Open-Source Software Project. During the small group discussion session, participants provided their feedback on the project proposals. The following comments are made for both projects:

- The projects should dedicate some time in the beginning for the creation of repository of current tools, use cases and documentations. The repository can be accumulated throughout the project period;
- Challenges of moving from experiment/ideation to production should be in the mind at the beginning of projects. The lessons learned from other projects such as ML can be useful. Guidelines or playbooks in this regard would be useful.
- Both are technical projects, so it will be important to have a diversity of talents in the projects (e.g., managerial level, connection with business and other parts of organisations horizontally);
- The projects should first focus on foundations needed in these spaces while developing and incorporating small relevant solutions to demonstrate the relevance and gaps in these foundations.

19. For the Generative AI Project:

- A repository of use cases for generative AI would be helpful. 3-5 top use cases could be selected from this repository to collaborate on concrete solution;
- The scope of use cases is not just limited to the production part (GSBPM) but goes beyond (GAMSO) areas such as HR and finance;
- Through common experiments, the project can help filtering out what can be done by others (e.g., private sector) and what we should do ourselves;
- Areas that can be worked together: prompt engineering (e.g., through Carpentries) and co-piloting;
- While quickly scanning for application areas where AI can bring benefits, it would be also important to consider “dos” and “don’ts” with AI;
- Confidentiality and security are big concerns for statistical organisations. Openness of algorithm and training data is also important aspect as public agency;
- Common quality assurance process (e.g., how to assess and validate the solution developed with AI) is needed;
- Engage with tech companies so that they can place different weights for official statistics when training the models;
- Develop playbook for developing next models and putting application in production (e.g., considerations for bias, ethics);
- There is strong connection with other initiatives (e.g., ESSNet One Stop Shop) and other modernisation groups (e.g., Responsible AI under ADSaMM group). Coordination will be important;
- Communicating to users how we use generative AI is vital;
- Given the fast-evolving nature of the field, it would be useful to share the progress of the project with the community more frequently than usual.

20. For the Statistical Open-Source Software Project:

- Distinction between using and producing open-source software is important. While some aspects are of common concern, there are issues more specific for one perspective (e.g., for the producer-perspective, issues around maintenance, governance, support are particularly important). The project could focus on one perspective first and move to the other one;
- Regardless of which perspectives are looked at, a lot of training and collaboration tools are required;
- It is important to consider the culture and change of mindset to get different parts of the organisation out of their comfort zone and consider open-source as an option from the beginning;
- Prompt engineering could be a use case that is covered joined by AI project;
- Analysis of real cost of doing open source;
- It is important to look at other open-source solutions and community outside official statistics to adapt and collaborate;
- Different levels of sharing (e.g., public, semi-public/among statistical organisations);
- The project should consider lessons learned from previous experiences (e.g., CSPA).