Cloud for Official Statistics

UNECE HLG-MOS project
## Acknowledgements

<table>
<thead>
<tr>
<th>Theme leaders &amp; main authors</th>
<th>Project experts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mihai Cosma</td>
<td>Adam Rumbold</td>
</tr>
<tr>
<td>Neville DeMendonca</td>
<td>Anne-Marte Krogsrud</td>
</tr>
<tr>
<td>Keith Scanlon</td>
<td>Blair Cardno</td>
</tr>
<tr>
<td>Branko Josipovic</td>
<td>Chris Penner</td>
</tr>
<tr>
<td>Roger Schuncken</td>
<td>Ken Rennoldson</td>
</tr>
<tr>
<td>Anton Örn Karlsson</td>
<td>Karl McKenzie</td>
</tr>
<tr>
<td>Ian Bale</td>
<td>Nebojsa Tolic</td>
</tr>
<tr>
<td>Andrew Sinkinson</td>
<td>Nemanja Trbojevic</td>
</tr>
<tr>
<td></td>
<td>Timo Rauta</td>
</tr>
<tr>
<td></td>
<td>Toni Räikkönen</td>
</tr>
<tr>
<td></td>
<td>Trygve Falch</td>
</tr>
<tr>
<td>Amilina Kipkeeva</td>
<td>Claude Julien</td>
</tr>
</tbody>
</table>

HLG-MOS / Mikko Lindholm

John Conway - Leader
Project Themes

- Service and Deployment Models
- Procurement
- Adoption
- Security and Privacy
- Capacity and Competencies
## Cloud Deployment Models

### Brief description

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Cloud</strong></td>
<td>Public cloud infrastructure is provided by third-party cloud service providers and is accessible to the general public over the Internet. Organizations <strong>share</strong> the same pool of <strong>resources</strong>.</td>
</tr>
<tr>
<td><strong>Private Cloud</strong></td>
<td>Private cloud infrastructure is solely <strong>dedicated</strong> to a <strong>single organization</strong>. It can be hosted on-premise using your own infrastructure or by a third-party cloud service provider.</td>
</tr>
<tr>
<td><strong>Community Cloud</strong></td>
<td>Community cloud infrastructure is a shared computing environment tailored to meet the needs of a specific community or industry.</td>
</tr>
<tr>
<td><strong>Multi / Hybrid Cloud</strong></td>
<td>Often organizations use services of <strong>multiple</strong> service providers and it can be an extension of the idea of <strong>hybrid</strong> working but with your <strong>own existing infrastructure</strong> and services hosted in more than one cloud service provider.</td>
</tr>
<tr>
<td><strong>On-premise / Legacy data center</strong></td>
<td><em>Is the traditional compute and storage hardware in your own IT Comms / data center. The dedicated hardware is often given special attention and care.</em></td>
</tr>
</tbody>
</table>
## Cloud Service Models - pizza analogy

<table>
<thead>
<tr>
<th>On-premise / Legacy DC</th>
<th>IaaS</th>
<th>PaaS</th>
<th>SaaS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>You manage</strong></td>
<td><strong>Vendor manages</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Made in house</td>
<td>Kitchen as a Service</td>
<td>Walk in and Bake</td>
<td>Pizza as a Service</td>
</tr>
<tr>
<td>Cook the Pizza</td>
<td>Cook the Pizza</td>
<td>Cook the Pizza</td>
<td>Cook the Pizza</td>
</tr>
<tr>
<td>Toppings</td>
<td>Toppings</td>
<td>Toppings</td>
<td>Toppings</td>
</tr>
<tr>
<td>Pizza dough</td>
<td>Pizza dough</td>
<td>Pizza dough</td>
<td>Pizza dough</td>
</tr>
<tr>
<td>Oven</td>
<td>Oven</td>
<td>Oven</td>
<td>Oven</td>
</tr>
<tr>
<td>Gas</td>
<td>Gas</td>
<td>Gas</td>
<td>Gas</td>
</tr>
<tr>
<td>Kitchen</td>
<td>Kitchen</td>
<td>Kitchen</td>
<td>Kitchen</td>
</tr>
</tbody>
</table>

- **On-premise / Legacy DC**: You manage everything, including the kitchen and all components.
- **IaaS (Infrastructure as a Service)**: You manage the kitchen and other areas, while the vendor takes care of the pizza dough and toppings.
- **PaaS (Platform as a Service)**: You manage the kitchen and the pizza dough, while the vendor handles the toppings.
- **SaaS (Software as a Service)**: You manage the kitchen, and the vendor manages the pizza dough and toppings.

### Components

- **Application**: Your code and its dependencies.
- **Data**: Your data storage.
- **Metadata**: Metadata for your application and data.
- **Runtime**: The environment that runs your application.
- **Operating System**: The operating system layer.
- **Virtualization**: Virtual machines or containers.
- **Servers**: Physical or virtual servers.
- **Storage**: Data storage infrastructure.
- **Network**: Network components.
- **DC facilities**: Data center infrastructure.
Recommendations

• Public Cloud Platforms can provide greater agility and scale
• However, national regulation and appetite continues to vary from country to country
• Undertake proof of concepts, leading to increased adoption over time
• SAAS services provide greater flexibility, but watch out for Terms and Conditions
Theme 2 Cloud Adoption

To explore the specific **barriers and challenges** faced by National Statistics Institutes in adopting cloud technology

To highlight **the experiences and lessons learned** from New Zealand, Canada, Ireland, and the Statistical Office of the Republic of Serbia

To understand **the behaviors** that support national statistical institutions’ adoption of cloud technologies
Barriers and Challenges

- **Legislation and Data Sovereignty**
  - Legal regulations
  - Regulatory constraints
  - Rights and interests of indigenous populations
  - Jurisdiction of data

- **Lack of Social License and Public Perception**
  - Public
  - Politicians
  - Stakeholders

- **Capability and Skills Gap**
  - Upskilling
  - Training programs

- **Cost Considerations**
  - Consumption cost model
  - Integration costs
  - Long-term budget planning

Adoption
Recommendations

- Collaboration with stakeholders
- Low Risk Approach
- Identify Easy Wins and Set Timeframes
- Agile Capability and Flexibility
- 7Rs of cloud Migration
- Cloud Centre of Excellence (CCoE)
Key Focus Areas for Success

• Foster a learning and innovation culture – making **time and space**
• Invest and prioritize training and talent upskilling
• Cloud centers of expertise
• Establish key skill sets and role

• Leverage open-source software and its culture
• Adopt agile and DevOps modern ways of working and thinking
• Manage change is essential
• Collaborate, collaborate, collaborate!
Establishing Key Roles

Build out skills for cloud in a tiered and intentional approach:

- Tier 1: Cloud Specialists with critical role in cloud operations
- Tier 2: Designed for technical staff who may have some need to deliver solutions using cloud services
- Tier 3: Designed for awareness and foundational skills, which can include members of both the IT and subject matter community

Establish key roles at opportune times along your cloud journey:

- Define formal training curriculums and certifications
- Create a pathway from traditional to new roles
- Continuous hiring mechanism to off-set attrition
- Plan for options to augment capacity
Recommendations

- Change management is foundational to your cloud journey.
- Ensure that upskilling is prioritized.
- Be intentional with capacity building and upskilling initiatives.
- Embrace an agile mindset.
- Capacity strategies must be continuous and assume attrition.
- Engage and collaborate!
Theme 4: Procurement

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Legal</th>
<th>Cloud adoption considerations</th>
<th>Security and privacy provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vendor lock-in and exit strategy</td>
<td>Budget management and cost optimisation</td>
<td>Environmental considerations</td>
<td>Cloud models impact</td>
</tr>
</tbody>
</table>
Legal Considerations

- Standard terms and conditions vs contractual terms and conditions
- Specific national/regional constraints might exist
- Intellectual property
- Data sovereignty
- Jurisdiction
Budget Management and Cost Optimisation

- Payment terms
- Spot capacity for interruptible jobs
- Long term reservation
- Auto-scaling Servers & Containers
- Tiered Storage
- Serverless
- Tagging strategy to track spend
- Cost controls, alerts, dashboards
- FinOps
- Opex not Capex
Legal and data sovereignty issues need to be considered and addressed first. This will create a boundary on what can be implemented in the cloud.

Long term strategy to realize identified business benefits and this may result in multiple work streams with differing objectives and timelines.

Implement FinOps and consider full lifecycle of the services, including migration to a different provider.
Theme 5: Security and Privacy

Security
- Measures to secure the infrastructure, processes and the data in the cloud

Privacy
- How data are kept in the cloud and to what extent the privacy of individual units are guarded

Main deliverable
- A list of recommendations for statistical agencies on what should be taken into account with regards to cloud computing when it comes to privacy and security

Topics Considered
- Data stewardship
- Marketplace
- Shared responsibility model
- Data sovereignty
- Data classification
- Encryption and key
- National cyber security authorities and data protection agencies
Recommendations

- Before moving to a cloud based environment, address the national legal environment.
- Keep in mind data sovereignty and make sure that the geographical location of the data centres of the cloud provider.
- Document the process and all decisions made during it when moving to the cloud.
  - Especially important for all aspects concerning privacy and security.
- Decide and present how staff is supposed to work within the cloud environment.
  - E.g. it must be clear how privacy issues will be tackled and what types of data can be processed in the cloud environment.
- All issues with regards with privacy and security have to be explicitly put forth in the agreement with the cloud provider, and the procurement.
- Key strategy for data encryption is important.
  - Remember that encrypted data without an encryption key is useless.
- Keep an open dialog with your local data privacy authority.
Conclusion

- The Cloud journey has started
- Many considerations for NSI’s
- Change is not easy
- Sovereignty key determinant for organisations
Appendix
Build a Cloud-Friendly Culture

- **Leadership support**: Leaders should champion cloud adoption.
- **Encouraging creativity**: Encouraging proposing new ideas, and experiment with cloud solutions.
- **Embracing failure as a learning opportunity**: Creating an environment where failures are viewed as valuable learning.
- **Empowering employees**: Providing employees with autonomy, decision-making authority, and opportunities to contribute to cloud.
- **Engage and collaborate**: Ensure that both IT and subject matter experts are brought together to explore new ways of thinking, operating and exploring.
- **Iterative approach**: Reinforce the practice of building, refining, and improving solutions continuously.
Vendor lock-in and Exit strategy

Using vendor specific technologies

Change in strategy

Actual data migration

Vendor specific skills and knowledge transfer
Project delivery

1. Webinars September and November 16
2. Document
   • Support sound informed decisions on adopting cloud
   • **What** managers need to know and **why** it is important
   • Examples of use of cloud
   • Key concepts and definitions
   • 70 - 80 pages; online in Dec; published in Feb
Next steps

- Promote the publication
- Determine if organizations wish to continue to share and learn
  - 4-6 meetings per year
  - Focus on how organizations are adopting cloud
Webinar - Your needs, cloud opportunities and challenges

01
Did we address the **needs** of your organisation that motivate the adoption of cloud solutions?

02
Did we address the **opportunities** can cloud solutions bring to your organisation in addressing these needs?

03
Did we address the main **challenges** or risks faced by your organisation in the adoption of cloud solutions?
Future

- Do NSOs need more to support them along their cloud journey?
- Do you, IT experts, need more?
- Do you need to know more on how NSOs are adopting cloud?
- Share and learn on actual practices and new developments
- Share and learn on more technical IT matters
- 50% are interested; the other 50% are maybe interested
- Do you have suggestions on how to continue the sharing and learning among you and your organisations?
Manage the Change, Accelerate Culture Evolution

Ensure that the cloud culture change is done **WITH** everyone, not **TO** everyone. Ensure proper change management approaches are in place to ensure success:

- Explaining the change
- Planning the change
- Managing the change
- Reinforcing the change
- Sustaining the change

How do we consider the impact to people?

<table>
<thead>
<tr>
<th>Storyline (Themes):</th>
<th>The case for Change</th>
<th>Understanding the Changes</th>
<th>Define How We Get There</th>
<th>Future State Benefits Realisation</th>
<th>Sustain-Optimising Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose:</td>
<td>Explain where we are going and <strong>Why</strong></td>
<td>Set expectations for change (<strong>What</strong>)</td>
<td>Manage uncertainty during transition</td>
<td>Shift the focus towards the future</td>
<td>Reinforce the new ways of working</td>
</tr>
<tr>
<td>Core message:</td>
<td>Explain why the organization needs Cloud, what's in it for me for Consumers, Service Enablement &amp; Delivery Teams (<strong>Who</strong>).</td>
<td>Setting the stage for the change and specific changes to Structure Role &amp; Responsibilities (by function and role).</td>
<td>Empathy for employees experiencing the change, detailing new product-centric cloud operating model, solutions and functions.</td>
<td>Highlight the benefits and successes that have evolved from the Cloud journey for Consumers, IT &amp; the organization as a whole</td>
<td>Explaining continuous improvement opportunities and dedication to the Cloud Program—Celebrate wins</td>
</tr>
<tr>
<td>Emotional Experience for change for employees:</td>
<td>Awareness</td>
<td>Denial &amp; Resistance</td>
<td>Exploration</td>
<td>Motivation</td>
<td>Confidence</td>
</tr>
<tr>
<td>Commitment Level</td>
<td>Awareness</td>
<td>Understanding</td>
<td>Acceptance</td>
<td>Commitment</td>
<td>Advocacy</td>
</tr>
</tbody>
</table>