Highlights from the workshop on improving the socio-economic impact of NWP data

ECMWF, 28 February to 1 March 2017

Highlights

1. **A forecast has no value until it is understood and changes behaviour.** The socio-economic value of open data has been measured in studies by the European Commission, but is generally lacking for NWP. There is a need for such studies to take place to support the case for the introduction of open data policies more widely. A Look, Take and Play approach should be adopted. “The use of data goes up by 1000-10000% when open.” “Copernicus environmental data could generate a financial benefit of 30 billion euros and generate 50,000 jobs by 2030.”

2. We need customer-centric propositions. “Drowned in data – starved of information.” Two significant surveys of user needs and obstacles were quoted at the workshop, one from the European Commission and one from the Belmont Forum, which provide valuable insight. Implementation of Open Data by just publishing vast amounts of data will not do. The data needs to be made digestible to users, and specific technical systems need to be built to ensure efficient delivery to users. Usability of the vast amounts of NWP data requires investment and it is important to consider how this is funded.

3. What does “Open” really mean? One definition of Government Open Data states that Open Data must be “complete, primary, timely, accessible, machine processable, non-discriminatory, non-proprietary and license free”. However, it is important to understand the specificity of environmental data users and what matters most to them. Data permanence and low usage costs should also be encouraged.

4. There is a need to safeguard NWP infrastructure costs for observations as well as NWP modelling advancement and research. New models for cost sharing and cost recovery are needed that will involve groups of NMSs working together, as well as private-public partnerships. Cooperation and co-funding with other public sector agencies (not just in meteorology) is another possibility (public-public partnership).

5. The meteorological market is changing: large IT companies have become active as data *aggregators* or *intermediaries*. There is consolidation of companies at the higher end of the NWP value chain (technology driven), and at the same time we see increasing numbers of small, often non-weather related companies, exploiting such information where it is easily accessible, understandable and low-cost.

6. New actors appear in the NWP value chain, and the traditional roles of the NMSs and other existing actors are challenged in the global information technology economy. The roles of the private and public sectors are evolving over time. There are funding issues in maintaining the basic meteorological infrastructure. The private sector exploits weather data and

contributes to realising its socio-economic value, with an ability to react quickly to users' needs and changes in the market. There are aggregators that do not necessarily have knowledge of meteorological data (the linked data concept).

7. The PSI and INSPIRE Directives of the EU apply to public-sector information in the majority of ECMWF Member and Co-operating States, i.e. those that are members of the EU. It can be argued that the directives are therefore relevant to ECMWF, although formally they do not apply to international organisations such as ECMWF. The directives seek to stimulate growth, innovation and value-creation in the digital economy through re-use of public-sector data, and 'weather' is part of it. Forecasts are a common good that should be available for use and re-use. The marginal costs of data delivery can be charged to the data users, in the form of handling charges.

8. Delivery Services with a service level agreement (SLA) can be a way to satisfy the private-sector's needs for reliable, timely, monitored provision of (large) NWP data sets. Companies are often willing to pay for the SLA of an operational and reliable delivery service, including for example access to a service help desk. It is important to remember that NWP data - providers' budgets are partly paid with sales of data, offsetting some of the NWP infrastructure costs. Any loss of income from data sales would need to be replaced by other revenue.

9. Barriers to start-ups in the weather market were identified: data costs, complex pricing, making sure that level playing field is maintained, complexity of products, and poor understanding of the products. There is often the need to link data from different sources and this can be challenging. Using common vocabularies (ontologies) and good documentation are key factors.

10. Drivers for new opportunities were also identified: improved forecast accuracy, combination of data sets from different disciplines, scalable computing resources (the Cloud), and public-private cooperation. There is also an increased recognition for investment in weather due to climate change, e.g. increased risk for unusual or extreme weather events.

11. The central role of ECOMET as the NMSs' link to the private sector in terms of communication, coordination and policy was emphasised. ECOMET provides a one-stop shop for observations and forecast data with harmonised licence conditions and tariffs. The workshop recognised that there is a need to review data policy, business model, data delivery methods and pricing.

12. Extreme weather events contribute to poverty with a long-term impact (~10 years). There is an increasing demand for full access to global NWP, to support activities in developing countries for the protection of life and property. Web-based IT is becoming more affordable. Significant socio-economic benefit to be derived is in the order of tens of billions US$. Availability drives demand.

13. Each step of the NWP value chain needs to be **sustainable** – by this we mean technically and financially viable, governed, reliable, quality assured. The "third-party partners" are key to making cloud-based solution work – they need data to realise a business opportunity, and that is what will pay for the cloud services (processing and storage and value adding e.g. format conversion). One way could be for such systems to be able to track contributions to the value chain so that service revenue can be shared appropriately up the chain.

14. Current challenges in the weather market: large, increasing data volumes, supporting customisation of data requests and data selection (sub-sectioning), as well as documentation, discovery and training. New pricing structures should be considered, reflecting service costs rather than information charges. Financing of each step of the value chain is required.

15. Opportunities: weather data is increasingly popular. Cloud-based technologies have emerged and are developing. They allow NMSs to off-load some data dissemination tasks and free resources, increase uptake and provide convenient user access. They provide platforms for the aggregation and combination of different data sources. Policy developments in Europe provide new opportunities. Improved data discovery and availability lead to increased socio-economic value of NWP!

16. The cloud-based ecosystem is a concept that featured at the workshop. It is about bringing together different players (data providers, end users, intermediaries), as well as the computing, the data storage and the data themselves, and working out compatible governance and distribution policies, contracts (SLAs), competition and finance. There is a variety of cloud service models. There are private, public and hybrid clouds and they provide different levels of services, usually represented as the cloud computing stack. It is of critical importance to study what may serve best the meteorological community.

17. The WIS-II will facilitate the exchange of weather data building on existing web-based technology. The WIS-II project will make WMO data more widely discoverable and accessible to NMHSs and the wider public.

18. EUMETSAT presented the drivers for their data services strategy: fast evolution of user needs and requirements, Member States' needs, efficient usage, flexibility, etc. The project consists of an Orientation and Set-up Phase, the Pathfinder Phase (exploring innovations) ending with a user validation readiness review, and the Operational Phase which will include third-party satellite data. In an exciting further development, the Copernicus DIAS project will bring together ECMWF, EUMETSAT and Copernicus data from all six Copernicus Services and disseminate to users.

Group activity discussions

Participants were given 4 scenarios and asked to build a sustainable value chain for each of them. Each scenario was defined only in terms of the starting point (ECMWF and Copernicus data) and the end point (the End User).

The point of the "game" was to understand challenges and opportunities of our current model of distributing data.

We discussed:

- Actors in the NWP value chain are becoming more diverse. We need to understand users' needs and actors' business models if we want to maximize our impact as data providers!

- When there is no business case, there will be no service provision (unless the services are provided by public agencies). Free and open data policy is not the end of the story!

- Small end users will in general not be able to pay (and indeed fully appreciate the value of) meteorological-based services. However, such services may be provided as an add-on to other services or goods. For instance, manufacturers or distributors of farm machinery and other expensive products may include a subscription to meteorological services for agriculture to their offers.
- The way meteorological information reaches the end user may not necessarily take the shortest or most obvious route. The case of civil protection in developing countries was discussed as an example of where sometimes more developed NMSs, via WMO coordination (e.g. the SWFDP), or other United Nations agencies provide information during environmental disasters.
- Dissemination timeliness and frequency of updates are paramount in certain applications, for instance transportation.
- A sustainable way for data providers to fund data provision may be to charge for different levels of service (SLAs).
- Some users will benefit from accessing data from intermediaries/aggregators such as cloud providers, by combining information from different sources. Cloud technology is promising, however, there is a variety of cloud service models and it is critical to study what may serve best the meteorological community. Do our data policies and data services support that?