

## English Version

On May 6th the Federal Ministry for Sustainability and Tourism (BMNT) organised in corporation with the BEV Federal Office of Metrology and Surveying a GeoPackage Hackathon with the aim to inform and educate the major GIS users and stakeholders in the country about the possibility, potential - but also the current limitation - of this OGC standardised data format. The format of the event was designed to give all participants the opportunity to test the presented solutions following each presentation and to discuss any questions with the panel of experts. The organisers prepared a USB stick for every attendant, which contained test data for the various topics as well as portable version of the software used (if available). Additional data could be downloaded from the national open data portal.

Topics relating to GeoPackage were presented by

- Markus Jobst - BEV
- Manuel Illmeyer - LFRZ
- Karin Wannemacher - EAA
- Thomas Rosman - EAA
- Lukas Künzl - msGIS

The Hackathon started with a general introduction, highlighting the GeoPackage's origin in a military environment, its roots in SQLite and the set of rules governed by the OGC. It was emphasised that while GPKG is a work and exchange format but does not lend itself to streaming data the way GeoJSON and GML do. On a national level, Austria is keen to promote the GeoPackage as an alternative format for data exchange, especially on (open) data portals where a significant number of data providers are already making use of the GPKG to provide large datasets such as raster images and maps. The GIS division of the Ministry of Sustainability and Tourism has replaced the shape file in their internal workflows.

As a data format, the GeoPackage's most prominent feature is its ability to store vector and raster data in a database along with its MIME encoded metadata while providing spatial indexing and R-Trees to enhance the performance, and the possibility to be extended to host other data types. Out of the box, it features a useful set of spatial functions, so that even without any GIS Tools, it is possible to work with the data on a database level. As an exchange format that only consists of one file, it is easier to use than other formats (shape, GDB) and does not require being zipped/unzipped and a maximum file size of around 140TB is adequate for the ever-growing amount of data needed for spatial solutions.

With a vast array of data types already available to GIS users - some proprietary, some free - getting the GIS community to GeoPackage is a challenge. Now it is just one of many formats available and its implementation in the leading GIS tools is still lacking or requires additional licences.

Looking at its core, the SQLite database and its use in mobile application, the GeoPackage could be extremely useful for spatial app development. Using the national base layer basemap.at, it was demonstrated that the format is a promising solution to store offline data as well.

Additional data types can be stored via extensions. The official 'Tiled Gridded Coverage Data' extension, for example, enables GeoPackage to work with elevation data and there are other 'Community Extensions' like the QGIS styling extension.

The level of implementation is changing rapidly and it's recommended to work with the most current versions, if possible. Support for extensions, especially community extensions, is limited.

In FME Desktop (v.2019) there are separate OGC GeoPackage and OGC GeoPackage Tiles Writers and Readers available that deal with vector and raster data respectively.

In ArcGIS (10.6.) and ArcGIS Pro (2.3) reading and writing GeoPackages is well implemented. Although the function to create a new GeoPackage is 'hidden' in the 'Create SQLite Database' Tool, managing and loading data from the Catalog pane is similar to Folder connections and other databases. In ArcGIS, tables without geometry are not displayed, and although - with an advanced licence - it is possible to create Views, the required entries in the geometry metadata tables are not set, so that the View is not recognised as containing geometries. The Software will recognize well-defined Views if they are available.

In version 3 of QGIS there have been many improvements regarding the GeoPackage. Reading and writing is very similar to other data formats so that no additional functions are needed ('Export as' will do in most cases). It is also possible to use the Database Manager to load and edit data, however here too the creating of Views is lacking and the metadata tables are only shown if the connection is made through the Spatialite driver.

Additionally, QGIS is using the GPKG database structure to offer the option of saving and loading styles as well as defining default styles, which means that the data is loaded in the correct format. This functionality greatly improves the exchange of project data.

In Geoserver GeoPackage can be used as a data store and an extension to use it as an output format for WFS/WMS services and WPS processing is available but requires JAVA. At the moment, it is not possible to automatically read SLD styles, stored in the GeoPackage s – that functionality would make it possible to package all the information needed for Viewing and Download services in one data store.

Accessing GeoPackage via Office applications (MS Office, Libre Office) is possible, but requires an ODBC driver and the Spatialite DLLs, while creating and working with GeoPackage via GDAL/OGR is efficient for both, raster and vector data.

A few examples of successful implementation of GeoPackage were shown. They included raster integration with the national base map, application for the national water department to test routines for hazardous areas, Office and mobile applications.

Feedback from the participants was overwhelmingly positive with many eager to further test the GeoPackage's potential and open to the idea of using it as a Shape file substitute. They were invited to keep the discussion going in the coming weeks and to feel free to contact the presenters if questions arise. The presenters encouraged the audience to actively get involved with further development on this data format.