4D mirror for the world

Over large periods of time society put huge efforts in accumulating and conserving objects from all over the globe in natural history collections. Making these objects and associated data accessible allows to travel back in time and reconstruct historical development of biological diversity on earth. Big data apporaches using these objects as a basis will enable us to make predictions on the future and contribute to balance biodiversity conservation versus ongoing and ever increasing human consumption.

The mission for collections in Europe in this context is clear: housing more than 1.5 billion objects representing ca. 80% of the global biodiversity currently known they need to provide access to their holdings and develop them by continued collecting activities.

Access today is best provided by digitization of objects and capture of associated data. Only if it is possible to check what is present in the collections, scientists will be able to address the urgent questions posed on them by the society funding them.

By permanently linking all physical objects to any form of digital representation, results become maximum reproducable and science more transparent. While the infrastructure for access is generated in course of large projects like iDigBio for biological and Deep-time Digital Earth (DDE) for crosslinks with geological data, providing content remains one of the great open challenges. To face this efficiently a European wide approach is needed to fully digitize all holdings of all collections.

Development by continued collecting is needed to guarantee time series represented by objects in the museums are not disrupted. Once an organism disappeared locally or globally there is no reproducable and reusable documentation if no representative specimen has been preserved. Therefore coordinated efforts are needed to develop a comprehensive collecting strategy and network all over Europe.

Botanical collections are destined to spearhead these efforts for various reasons:

(1) plants form the matrix for most terrestrial ecosystems (2) botanical specimens constitute a considerable fraction of the total number of objects (3) for botanical specimens the easiest and most advanced high troughput digitization techniques are available and specimens often come with complete metadata attached to the physical object. (4) In consequence complete digitization of botanical holdings is an achieveable goal in a calculable time at low cost whilst in other groups of organisms it might not be that straight forward. (5) Collecting procedures are well established, simple to learn and easy to employ. They may further be easily disseminated to the interested public for recruiting additional collectors.