First International Workshop on Mobilising Earth Science Data Berlin , 14 - 16 July 2005

Venue: Museum of Natural History (MfN), Berlin/Germany

Attendants:
- Adrian Rissoné (NHM, London),
- Charles Copp (Bristol)
- Dave Smith (NHM, London)
- Fedor Steeman (Natural History Museum, Copenhagen)
- Herman Goethals (Royal Belgian Institute for Natural Sciences, Brussels)
- Jens Klump (GeoForschungsZentrum Potsdam)
- Lutz Hecht (MfN Berlin)
- Markus Doering (BGBM, Berlin)
- Ralf-Thomas Schmitt (MfN, Berlin)
- Willem Renema (Naturalis, Leiden)
- Wolfgang Kiessling (MfN, Berlin)

Content

Workshop topics

This workshop focused on scientific issues associated with the extension of the ABCD schema for the geosciences. Technical, political and socioeconomic problems were not the focus, although the were also discussed.

Schedule
The workshop lastet three days. The first day was devoted to public presenations, specific scientific issues were discussed in separate working group during the second day, and on the third day we performed a joined discussion.

Presentations

Wolfgang Kiessling welcomed everyone to the workshop and gave a short introduction to the topics. He referred to the status of geoscientific collection databases, what has achieved so far in related projects and defined the goals of this workshop. Markus Doering and Charles Copp gave an extensive introduction to design principles and use of ABCD.
The other participants presented the status of collection databases at their respective institutions.
During the presentations additional staff of the MfN was present (not listed in the participant list). Jens Klump presented general perspectives on stratigraphic solutions for geoscience databases.

Working Groups

We have defined two working groups with different scopes:

(1)   Fossils & Stratigraphy: A. Rissoné, C. Copp, F. Steeman, W. Renema and W. Kiessling

(2)   Rocks & Minerals: D. Smith, H. Goethals, L. Hecht, M. Doering and R.-T. Schmitt

C. Copp and M. Doering joined the groups above all as technical advisors.
The groups focused on necessary extensions for ABCD and how to map them into the schema.
The day was finished by a tour through the collections of the MfN.

Results

On the basis of ABCD the participants developed a schema for a geoscientific database queries system. Outgoing from everybody's knowledge of ABCD, the results were the following:

General
The first decision was to make G*athering* higher in hierarchy rather than same rank as U*nit* and *Identification* as it is now. *Measurement* is on same rank as *Gathering.*
The next step was to add as new units of same rank as the biological units:
- *PaleonotologicalUnit,*
- *MineralogicalUnit,*
- *MeteoriteUni*t and
- *RockUnit*

Gathering Site problems (e.g., glacial erratics and meteorites whose origin may differ from gathering site) should be solved by mapping *PlaceOfOrigin* into *Gathering* and adding a referenced element *PlaceOfOrigin* to *PaleonotologicalUnit*, *MeteoriteUni*t and *RockUnit.*
KindOfUnit has to be added to each, to flag glacial erratics, ores, drill cores e.g. Furthermore *PartOfOrganism* and *ClassOfMaterial* have to be seperated to make the elements more formal.
Lithology (Lithologic Host Rock) as a repeatable unit maps into G*athering* and respective units. Within *PalaeonologicalUnit Lithology* is of equal rank as *Taphonomy* and *Stratigraphy.*
Lithology is defined by following data elements:
- *LithificationHostRock* (for choice *unlithified, poorly lithified, lithified),*

- *LithologyHostRock* (*sandstone, limestone, mudstone, etc.)* and
- *LithologyAttributesHostRock (argillaceous, cross-beddes, etc.)* as repeatable element

ModeOfOccurence maps as S*tratigraphy* into *Gathering* as well as into unit. *DepositionalEnvironment* and *TectonicSetting* become subunits of *Gathering*.

Taxonomic issues are very similar to biological collections for palaeontology but different for mineralogical and geological collections.

For taphonomy, working group 1 decided to take over the definitions of the Paleobiology Database (http://paleodb.org), which is based on years of exerpience.

Minerals & Rocks

MineralRockName has to be added to *NameAtomized* in *Identification.Identification* shall be used only for finest level of specification for a mineral (*ScientificNameString)*, for higher classification insert *HigherTaxa.*

To ***MineralogicalUnit*** have to be added (all as strings):
- *Hazard,*
- *Habit, Color,*
- *Twinning,*
- *Pseudomorph,*
- *Hostrock,*
- *Usage*
- *Weight*
- *Size*

To ***RockUnit*** map:
- *Hazard* (as string),
- *TextureStructure* (as multiple),
- *AlterationDegree* (for choice: unknown, none, low, medium, intense),
- *AlterationType* (as multiple),
- *ModeOfOccurence* (as multiple),
- *DiagenesisMetamorphism* (defined),
- *Hostrock* (as string), *FossilContent* (as multiple),
- *Color* (as string),
- *Petrology* (as freetext) and
- *Usage* (as string),
- *Weight*
- Size

To ***MeteoritUnit*** belong:
- *TextureStructure* (as multiple),
- *AlterationDegree* (for choice: unknown, none, low, medium, intense),
- *Color* (as string),
- *ShockmetamorphicGrade* and
- *PetrologicalGrade*
- *Size*
- *Weight*

Since rock age and minaral age may differ, rock age will be an element of *gathering*, mineral age an element of *measurement.* Chemical Composition is a measurement.

Paleontology & Stratigraphy

Stratigraphy maps into *gathering* as well as into units*.* It is often the same but as already mentioned above, it is quite common in geosciences that the gathering site is not identical with the place of origin, e.g. for glacial erratics: gathering stratigraphy is may be Pleistocene but the unit might be Ordovician. Chrono-, bio-, litho-, isotope and magnetostratigraphy have to be seperated. Age ranges should be

allowed and fields for oldest and youngest age estimates seperated. Chronostratigraphical and geochronological terms will be combined within ABCD, with preference for chronostratigraphical terms (eon, era, period, epoch, age) refering to a work from Zalasiewicz et al. 2004. So Early/Lower and Late/Upper will be treated the same way. Age estimates can be qualified: *early/lowerPart, MiddlePart, Later/UpperPart, Certainty (*for choice: *unknown, certain, uncertain, possibly).* As in Taxonomy, only the finest identified unit shall be mentioned.

The identifier for a type of biozone will be an extra point under *Biostratigraphy.*

Magneto- and isotope stratigraphy map into *Gathering* only, for it is impossible to achieve reliable zones from the unit alone. An element for full/subchrone name has to be added.

Generalizing lithostratigraphic issues caused no problems. For lithostratigraphy formal and informal formations have to be applied (as free text) and the full hierarchy of formal terms has to be allowed (*Supergroup, Group, Formation, Member, Bed).* The radiometric age was identified as a measurement rather than a stratigraphic term and should be mapped accordingly.

Taphonomy maps, equal ranked with *Stratigraphy,* into *PalaeontologicalUnit.* All data elements will be of equal rank:

- *FeedingPredationTraces* (as text),
- *Bioerosion* (predefined: u*nknown, none, occasional, frequent, intense* – extra point: *nature of bioerosion* as text),
- *Encrustration* (for choice $: u*nknown, none, occasional, frequent, intense* – extra point: *nature of encrustration* as text),
- *Orientation (*for choice: *unknown, in life position, toppled),*
- *Articulation* (for choice: *articulated, disarticulated),*
- *Completeness* (as text),
- *AssemblageOrigin* (for choice: *unknown, autochthonous, parautochthonous, allochthonous)*
- *PostBurialTransportation* (as text, e.g. glacial erratics, scree, river transport, reworking)
- *PreservationQuality* (for choice: *poor, medium, good, excellent),*
- *PreservationMode*, (body, mold/cast etc.)
- *PreservationAlteration. (original*, replacement minerals, recrystallisation).

Conclusion

This workshop was very productive and successful in defining paleontological as well as mineralogical and geological extensions for ABCD. The extended version of ABCD will be called **ABCDEFG** (Access to Biological Collection Data Extended For Geosciences).

Outlook

Charles Copp will be paid for one month from MfN-Synthesys funds to program the theoretical results into the ABCD-Schema.

During a Synthesys meeting in September 2005 the results of this workshop shall be presented by A. Rissone and discussed within a greater circle to get opinions and suggestions for improvements. In general the results have to be distributed to the masses for reaching acceptance and being confirmed as standard for geological collection databases.

It is planned to get ABCDEFG online and usable within one year.