



## **Ingredients for an Integrated Dinner: Parsley, Sage, Rosemary and Thyme**

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In 1966, Simon and Garfunkel combined the English traditional "Scarborough Fair" with a counter melody. This is one of the manifold techniques of the Kontrapunktik described by Bach around 1745 in "The Art of the Fugue": combining completely different and seemingly independent melodies (or motifs) into a coherent piece of music, pleasant for the audience.

This achievement, transposed into Computer Science, could be of great benefit for geo services as we look at the currently disparate situation: On the one hand, we have metadata - traditionally, they are understood as being small in volume, but rich in content and semantics, and flexibly queryable through the rich body of technologies established over several decades of database research, centering around query languages like SQL. On the other hand, we have data themselves, such as remote sensing and other measured and observed data sets - they are considered difficult to interpret, semantic-poor, and only for clumsy download, as they are the main constituent of what we today call Big Data. The traditional advantages of databases, such as information integration, query flexibility, and scalability seem to be unavailable.

These are the melodies that require a kontrapunctic harmonization, leading to a Holy Grail where different information categories enjoy individually tailored support, while an overall integrating framework allows seamless and convenient access and processing by the user.

Most of the data categories to be integrated are well known in fact: ontologies, geospatial meshes, spatiotemporal arrays, and free text constitute major ingredients in this orchestration. For many of them, isolated solutions have been presented, and for some of them (like ontologies and text) integration has been achieved already; a complete harmonic integration, though, is still lacking as of today.

In our talk, we detail our vision on such integration through query models and languages which merge established concepts and novel paradigms in a harmonic way. We present the EarthServer initiative which has set out to demonstrate flexible ad-hoc processing and filtering on massive Earth data sets.