

# **eHIS InterStore: E-Commerce With Environmental Data**

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## **Abstract**

A lot of environmental data is measured today, sometimes twice, because the data provider and the data consumer do not know each other. On the other hand the need for environmental data increases every year. eHIS InterStore offers a platform for distributing and selling environmental data via the Internet, using maps as an easy-to-use selection tool. eHIS InterStore uses state-of-the-art IT environments to make data evaluation, data delivery and optional payment as easy as possible. Although it does not seem so, this system even supports the Aarhus Convention!

## **1. Introduction**

Nowadays a lot of environmental data values are collected: on one hand to inform the public - like air pollution values -, on the other hand to have decision support for environmental projects – as during the planning of buildings and plants -, and last not least to fulfil public obligations – as is done for proof assurance at hydro power plants. For the last case Simutech has implemented the hydrological information system HIS<sup>3D</sup>, which is used e.g. at the river power plant Freudenau/Vienna (Simutech, 1996). It delivers all features necessary to load, administrate and evaluate hydrological data values, coming for example from several online measurement stations for water quality and quantity (R. Ruzicka, 2000).

But in the past, too, there have been collected lots of measurement data, leading back some decades ago, mainly from public offices, but as well from civil engineers for projects.

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## **2. Using data values more than once**

In most cases environmental data values are sampled only for one purpose and for a one-time evaluation. The measurement of environmental data values is very expensive. On the other hand those data values would be needed by other people, too.

Think for example of a civil engineer for hydrology, who implements a project for the government about water quality in one district. But in this district there are already measurement stations of a water energy company placed, which has collected the data values because of prescriptions around the building of the power plant. In most cases, these values (especially for water quality) are measured twice.

It would be much easier and cheaper for the civil engineer to buy the data values (or even evaluations on these values) from the energy company. And the energy company earns money for already measured data values.

## **3. Linking data provider and data customer**

How can the civil engineer – let call him the data customer – come in touch with the right man from the energy company – let call him the data provider? OK, an experienced customer knows the right contact person, but in general this is the problem: the data customer does not know the data provider and vice versa. An if he knows him, it costs much time for the provider to put all the needed values together, fix them on a disk and send them to the customer – and in our times man power is the most expensive part in the show!

## **4. An easy access to environmental data**

So let's use the blessings of modern IT: the data provider can sell his data values and many evaluations using electronic commerce. The data provider can deliver everything in an electronic format: the data values, evaluations, graphics can be sent in file formats or delivered directly over the Internet.

Using electronic data formats the data provider omits one of the great problems of e-commerce in general: the need for large delivery and shipping logistics. The data provider sends his evaluations and files to the customer per e-mail.

The data provider additionally goes the two next, deeper steps into e-commerce, which save him again time and money:

- Billing and payment is implemented as electronic payment, using e.g. credit cards.
- The customer relation ship is based on a fully automated mechanism.

The user selects the desired measurement points on a map in the shop internet side of the data provider (see Fig. 1). The map can be zoomed. When the user clicks at a

measurement point or an area, a list of available data values for this area is shown. Some additional information, on the type, the unit and the quality of the data value is displayed, too.

The customer can look at automatically displayed previews of the data, he is going to buy. He puts the data values and the desired formats and evaluations into his electronic shopping cart, enters his accounting information, like name, e-mail address, where the files should be sent, and his credit card information.

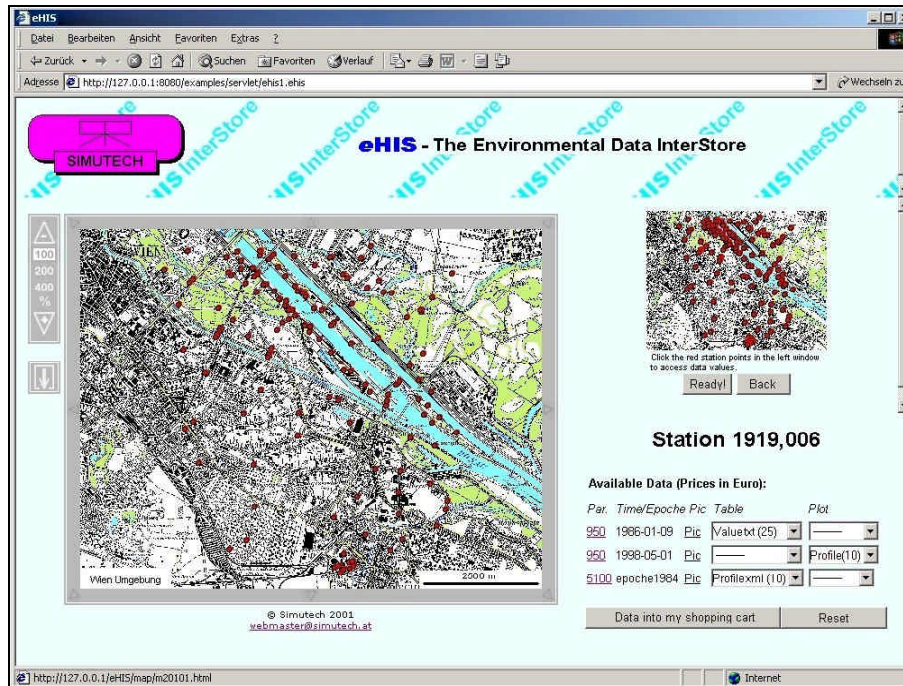


Fig. 1: User's view of the environmental data internet shop.

Then the system, we have named it “eHIS InterStore”, computes all tables, plots and evaluations automatically and sends them to the customer. And the money is remitted to the data provider's bank account automatically, too!

The kind and amount of data varies depending on the user's login account. Special users as well may access graphics and tables immediately without waiting for an e-mail. Some data values are available for free, others are not.

## 5. eHIS InterStore – the real tool

Simutech has implemented this whole environment in his tool **eHIS InterStore**. It consists of a database (which contains all data values and user information, as well as the meta data for displaying the list of available time series and curves for one measurement station), an internet server (containing the web site and the shop with the displaying logistics), a server application (computing plots, tables, evaluations and performing the automatic shipping) and a desktop application for the data and user maintenance. The last two are both based on HIS<sup>3D</sup>.

Therefore eHIS InterStore consists of several different software technologies:

- the central database for storing data and accounting information, e.g. from Oracle
- the website, e.g. based on an Apache web server
- a Java class library to access the database and react to the user entries, building up a dynamical website; including the dynamically created maps for selecting the measurement points
- the HIS<sup>3D</sup> environment for creating the desired graphics and tables (implemented in C/C++)

The data values can be input into the system in different ways, e.g. by ordinary, arbitrarily formatted data files, or even directly from online measurement stations.

Fig. 2 shows how everything works together.

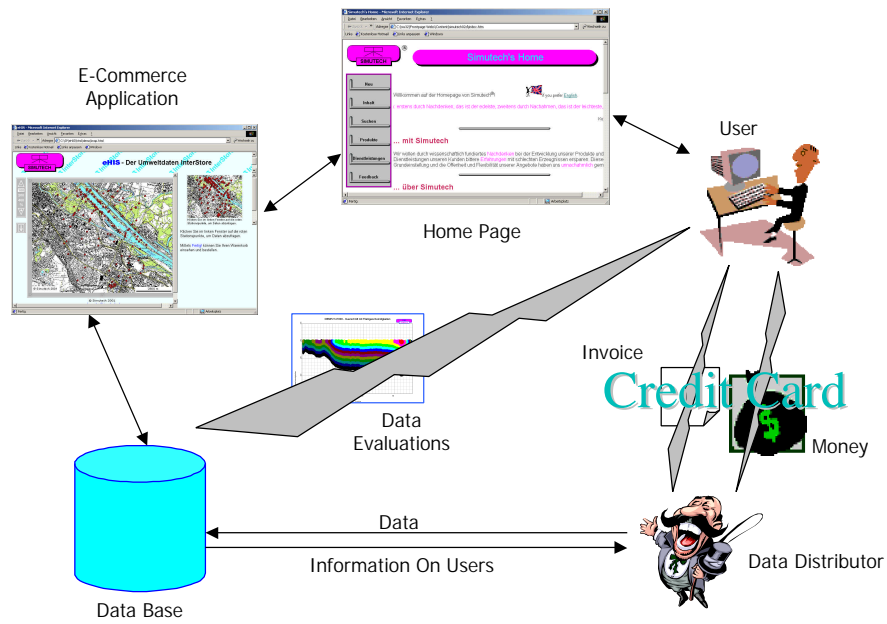


Fig. 2: Action chart of eHIS InterStore

The first real application is the installation for a provider of river profiles, the Austrian DonauTechnik. In this case Simutech plays the role of a *DSP* (data service provider), which offers an all-inclusive solution: the data provider only sends the data values and receives the money; everything else is done by Simutech, including server and database hosting. Fig. 3 shows typical evaluations, which the user receives per e-mail.

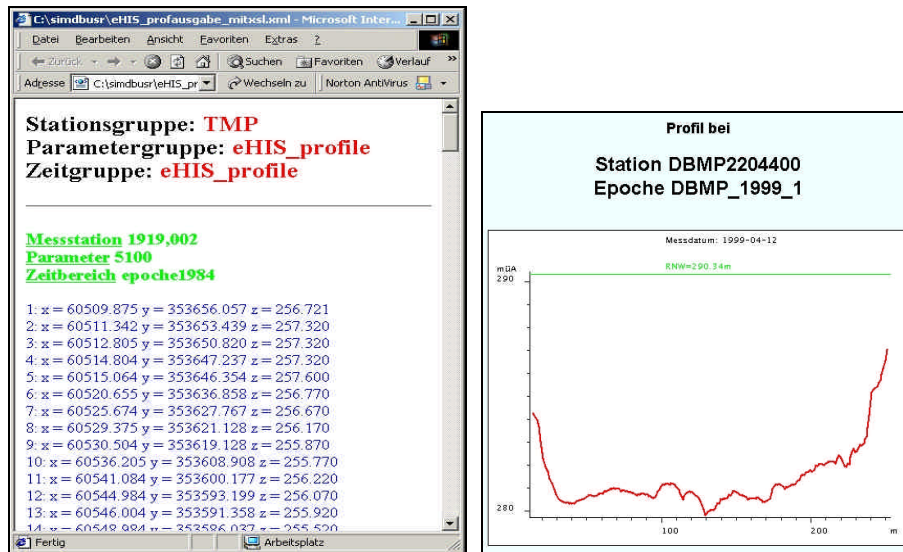


Fig. 3: Typical evaluations, which are sent to the customer per e-mail:  
XML-File and JPEG-graphic

## 6. Legal and security points

In different countries the legal state of measured environmental data is very different; in Austria for example, the data provider has to offer water quantity data values for free to everybody, who wants to receive the values. Nevertheless in this case the data provider using eHIS InterStore does not deliver only values, but delivers a service: the formatting of the data in a modern and easy to use format (like XML), draws plots or performs evaluations – but everything is computed automatically, after the customer has ordered his formats and evaluations.

On the other hand – and this is due to the new e-commerce laws in Austria and the EU as a whole – we had to bare in mind several levels of security. This starts at the server security, which is implemented using firewalls and server certificates, goes on with the security for the user (no credit card numbers are stored in the server, they are transmitted on secure channels and the user can even use the SET standard for paying), and ends up in the data security: that the user is secure to receive accurate values, that he receives the values at all, and that the data values itself are stored in a secure manner, not directly accessible. The last point is implemented using Java servlets – nobody from outside has direct access to the database.

## 7. eHIS InterStore and Aarhus

If we think of legal aspects, one has to bare in mind the so-called “Aarhus Convention”, too. This “Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters” has been signed on the 15<sup>th</sup> of June 1998 and has been ratified yet by sixteen countries.

The Aarhus Convention among others tries to enable the public citizen to get free access to environmental data, which is available to governmental and communal offices, for comments see (F. Scholles, 1997, 2002).

There are some bilateral and multilateral agreements between countries, which support this convention, like the “Übereinkommen über den Zugang zu Information, die Öffentlichkeitsbeteiligung an Entscheidungsverfahren und den Zugang zu Gerichten in Umweltangelegenheiten“ (agreement on the access to information, public participation in decision making and the access to courts in environmental matters) between Germany, Austria and Switzerland; can be found e.g. in (RKI, 2002).

### 7.1 Do those conventions and agreements oppose to the development and implementation of a system like eHIS InterStore?

In first sight it seems so, but if we go into detail, eHIS InterStore really supports the convention:

1. *Data accessibility*: As mentioned before, eHIS InterStore allows for the presentation of environmental data values in an easy to access manner on maps.
2. *Centralized access*: eHIS InterStore is not dedicated to a special kind of environmental data. So it can be used to offer a comprehensive access method to environmental data for the public.
3. *Free access*: eHIS InterStore supports paid and free access to the data values, depending of the kind and locality of data and the user, who queries the values.
4. *Variety of formats*: eHIS InterStore offers the data values in different formats and shapes and therefore helps the public user to receive data in a format, he can use. On the other hand, governmental offices need not spend lot of time to deliver the requested format (the convention requests the officials to deliver every format, which they are asked for!).
5. *Cost truths*: As shown in point 4. the delivery of environmental data can be very cost intensive – this fact must be paid attention to, especially in the time of desired 0-deficits and attempts to decrease public expenses. Here eHIS InterStore can help, too: it offers an easy-to-use accounting and payment (and creation!) mechanism for special evaluations (e.g. if customers not only need some data rows, but expressive graphics, this should be paid in my opinion).

On the other hand, if a civil engineer or a building company needs data values (and evaluations) within a project, for which he earns money: why should he not pay for the data, refunding the measurement and evaluation costs.

Cost refunding can help as well to increase the number and quality of collected data, which is a profit for the public again – starting the loop!

Generally said, eHIS InterStore has a more general view on environmental data. It is not only used for environmental data in a restricted sense, but also includes for example geodetic data (like river profiles). Additionally eHIS InterStore is not only dedicated to be used by public offices, but as well by private and commercial organizations.

## 8. Conclusion

E-Commerce with environmental data is the upcoming star on the horizon of treating environmental data. There are a lot of data values available, there are a lot of people, even in the general public, which want these values, if they can be accessed easily. And especially in our times, where governmental offices and every company have to save money and have to look for new money sources, this is a new and promising approach.

The next development Simutech has currently finished, is based on eHIS InterStore: the tool pocket eHIS allows for the mobile access to environmental data. Using a PDA handheld and a cellular mobile phone, everybody – who is allowed to! – can access environmental data in the field.

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