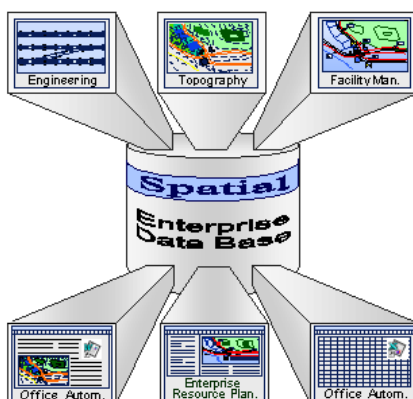## Spatial-it practical IT-challenges (1)

Introduction

Spatial-it as the new approach to Geo-IT has been introduced in previous issues of GeoInformatics. No longer will information systems that utilise (geo)graphic information be regarded as "the specialists system". This was (and often still is) the case with traditional Spatial Information Systems (including Geographic Information Systems, Asset Management & Facility Management systems and Land Information Systems) that offer specific functionality for a selective group of employees.

Spatial-it extends the usage of this spatial data to all employees in the Enterprise, allowing them to benefit from the powerful visual aspect it represents. Thus the Employees will have new ways to access information using the "where" option as well as the "what" option in their queries. Information presented in a geographic way, either complementing or maybe even replacing the alphanumeric data, results in faster comprehension of the information which will result in an improved efficiency of the operations and an optimisation of the decision support.

The GeoInformatics June issue, introduced Spatial-it as the concept for the next generation of Spatial Information Systems. The September issue explained how Spatial-it fits into the evolution of Information Systems, following technology drivers and supporting the data centricity structure of modern Enterprise information systems. The following picture was used in the June issue to illustrate the structure of the Spatial-it concept. It shows the merging of the traditionally technical environments via the Enterprise Data base with the other business applications. Benefits are found in the integration of the technical environment, but the main win of Spatial-it is found at the business application level.

In this issue we'll start looking at practical aspects that introducing this technology brings about. The focus today is on a software aspect, more concrete the role of the vendors of spatial components and on some typical challenges concerning the hardware .

Software requirements

Traditionally providing software that allowed the user to interactively work with graphic data was the domain of dedicated vendors. It started with CAD (where the D evolved from drafting to design). In the eighties systems for geographic manipulation of maps became more popular.

The nineties offered a range of software packages categorised as GIS, AM/FM, LIS or desktop mapping solutions. Due to the complexity of data and the available performance of computers at the time, the systems varied widely in both functionality, datastorage and development environment. These proprietary aspects resulted in a so called, vendor-lock-in meaning that changing from one vendor to the other meant hard labour in converting data and restoring the required intelligence, with a high price both in time and money.

Nowadays much progression can be seen in this arena. The proprietary barriers are one by one broken down. The *development environments* of most serious vendors are now open to utilise industry standard languages like Visual Basic or C alongside or in place of the vendors own development languages.
The *datastorage* is opening to a wider usage in the following ways:
✓ Through products like Intergraph's GeoMedia or AutoDesk's World that can access and integrate on the desktop geographic data from different sources, including the major GIS vendors formats.
✓ Storage of spatial data in industry standard database management systems. Using the power of the current databases, an important step forward in opening the spatial data was the introduction of storage options for spatial data in widely-used databases. In fact this forms the bases for the Spatial-it concept. These solutions started with pioneering, rather limited options, produced in out of the way development centres. Today the database vendors show more and more commitment to these solutions and Oracle's 8i spatial (formally known as Spatial Cartridge) is a full-fledged part of the new offerings. Other vendors follow this example and announce similar offerings like Sybase's SQS.

Changing business
For the software vendors this evolution has an enormous impact on their business. The "life-time-tie(-in)" with the customers is no longer evident. The market requires them to be open, to provide software that can be integrated with, and yes, in time easily be replaced by, other software. In stead of providing the total solution, containing the spatial functionality, the development environment, the datastorage and maybe even the hardware, today they are asked to focus on what must be their core business of the future. And this core business is providing excellent spatial functionality that allows organisations to collect, store, manipulate and retrieve spatial data. These products are customisable using industry standard development languages and methods like OLE/COM or CORBA to integrate with other business application. They will store the data in the spatial "layers" in the enterprise database. And they will run on the standard hardware of the enterprise.

The vendors of spatial software obviously are an important factor in successfully implementing the Spatial-it concept. Looking form the Spatial-it perspective the most important characteristics of the ideal spatial component are:
✓ Powerful graphic functionality
✓ Comprehensible User-Interface consistent with other applications
✓ Datastorage in Enterprise datawarehouse
✓ Easy integration with other applications.
Depending on the kind of application, we see that vendors are well capable of providing good new products based on the described new technology. On the point of integration with other business applications it is my opinion that the vendors need to rethink their strategy. Most modern spatial component do support technologies like OLE/COM to integrate with other "office" applications. But the kind of integration we're looking for when we implement the Spatial-it concept goes beyond that.

In typical GIS solutions data is show in seperate windows that pop-up when the user hits a spatial element or requests a report. This is where the improvements can be found. Spatial-it's prime benefit is supporting the employees in their day to day job by complementing their business applications with a spatial dimension. As I tend to explain it simplistically to customers, we redesign the existing screens, by shoving some of the alphanumeric fields a bit to the left or right in the thus created space we imbed a picture showing the associated spatial information.

Rethink the strategy

The main difference in this approach compared to how GIS vendors position their products is the leading environment. Spatial-it starts with the existing (alphanumeric) business application where traditional GIS solutions start with the graphic screen. A subtle difference you may think but it has a serious impact on building Spatial-it solutions. Business applications today are predominantly developed in a 4 GL environment, based on industry standard databases. Typical examples of these environments are Powerbuilder, Delphi, Uniface and Oracle Developer 2000. These development environments integrate third party objects in the application, often using OCX technology. That way truly integrated systems are created.

Technically this is very different to the way we were used to build Spatial Information Systems where we based the application on the spatial component and pulled additional information from other sources into this environment. With Spatial-it we follow the structure of business applications and integrate spatial "objects" into them. These objects contain specific spatial functionality and are build from the components provided by the spatial products. This requires the vendors to partly restructure their product so it can flexibly be remodelled from an out-of-the-box geographic information system into a collection of components.

Of the available "new generation" GIS products not many have this capability. Integration in a Visual Basic environment often is well possible, but moving to the mentioned 4GL environments most of them fail to give the right answer. A positive exception that we have implemented successfully at Vicrea Solutions is Spatial Information Systems from CadCorp. This product allows us to build objects with specific spatial functionality which are integrated in the 4GL environment.

As the vendors of spatial components continue to focus on their core business one can expect that they will modify their offerings to accommodate the described Spatial-it way of developing applications. The motivation to do so lies in the enormous group of potential users of spatial information that are opened to the by the Spatial-it concept.

Hardware requirements

On the hardware side, this time the focus isn't on the required internal memory or the minimum processor necessary to have the required performance to truly benefit from the advantages. The IT-infrastructure is continuously developing at a breathtaking pace. So although specifying the right hardware, as in any project, is an important aspect, it's no longer a potential show-stopper for Spatial-it projects. Today's hardware generally has the "power" we require.

The hardware challenge that I'd like to discuss is finding enough space on the screen to supply the user with the abundance of Spatial-it data. Traditionally the users of information systems utilising graphic information were easy to trace in an organisation. They were the persons with the large 19", 21" or maybe even bigger screens, filled with colourful graphic presentations and loads of complex looking icon- or status-bars.

In the envisioned new IT-infrastructure where application with a Spatial-it dimension, these big screens will still exist. A group of employees will work on a daily basis with spatial information, ensuring that spatial data is available (gathering and maintaining data) and has the right quality (geographically correct, proper structure, up-to-date etc.). For them a big screen is important for ergonomical reasons, accuracy and quality of the spatial data and efficiency purposes.
The majority of users of Spatial-it applications however, will do so on an ad-hoc base. Key to the success of introducing the Spatial-it concept is that everybody can have access to it. More concrete, that it is possible to run the applications on the standard desktop machine. A typical desktop machine has a 15" monitor, with the further introduction of Windows based system 17" monitors are more and more becoming the standard. On these relatively small screens we want to include loads of data. Not only the alphanumeric data that belonged to the traditional application, but on top of (or better beside) that, the graphical presentation of data including "navigation" buttons for zoom, pan en query purposes.

Often we're confronted with a resolution of maximum 600 by 800 pixels. In the example from one of the Vicrea Solutions project in the Netherlands (and so containing Dutch language) we show the original alphanumeric application (figure 1), some alternative approaches we've discussed with the customer (figure 2 and 3) and the final screen lay-out in which we succeeded in showing all information without the need for scroll bars.
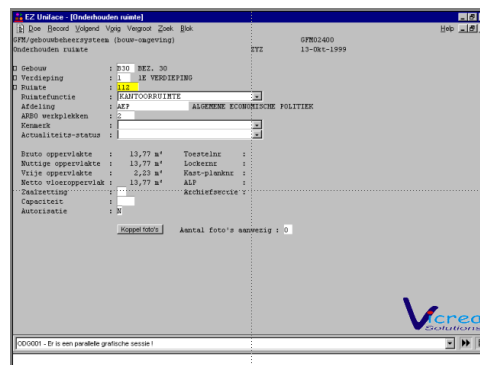

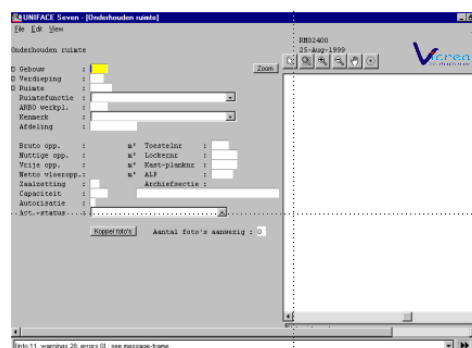*Figure 1, Base application with only alphanumeric data*

Figure 2, Maintaining size of alphanumeric datafields and looking for space via horizontal scroll bars.
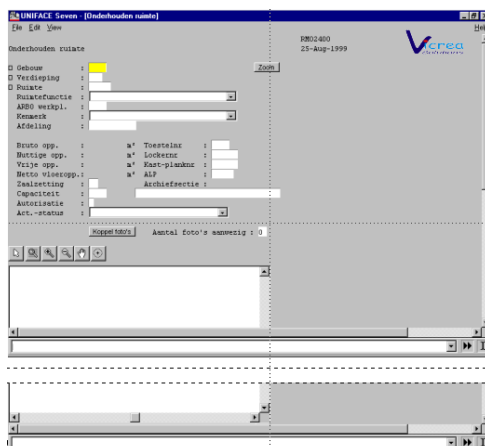
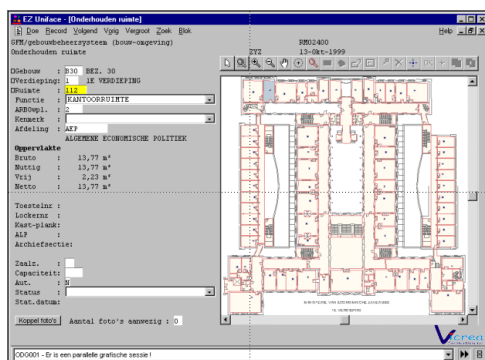*Figure 3, As figure 2, now looking for vertical "space"*

Figure 4, Final application, integrated alphanumeric and spatial data.

Obviously developing Spatial-it solutions in organisations that have migrated to a standard monitor of at least 17" with resolution of 1024 * 768 is easier as we have over 60% of additional space on the screen.

Looking at the hardware within the organisation one other aspect deserves our attention. As we provide nice "pictures" to a large user community, the logical next question is how to output this information, preferably in colour. As users will get accustomed to the spatial way of presenting information they will want to include that information in reports and consult the graphical picture while making decisions. Therefor a A4 or A3 (Colour) printer/plotter is a welcome addition to the IT-infrastructure.

There's more

We've looked at a couple of aspects of implementing Spatial-it based solutions. There are a lot of other challenges in a project. Think of the organisational aspects, who is responsible for what, the different requirements of different user groups, the introduction of this new technology in organisations etc. We'll look into those and probably some other aspects in a next article on Spatial-it.

As a conclusion to this article let me assure you that this information has no intention to scare you out of implementing Spatial-it in your organisation. On the contrary, implementation of Spatial-it has many benefits as was outlined in the previous articles. We just want to give you some background information to allow you to define the right strategy. Obviously you can find

professional partner organisations that can help you implementing this new technology. As Spatial-it fills the traditional gap between GIS solutions and the other business processes it's not obvious that every GIS-solution provider can do the job. Good knowledge of databases and development languages are essential, and probably above all a clear and well defined vision on Spatial-it.

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