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Smallworld Core Spatial Technology™ 4

Focusing on the user – using the small, focused application for task-based interaction

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Abstract

No one should underestimate the importance of the user. In a human-computer system, the points at which the human interacts with the computer are often those that can yield both the greatest benefits and the highest costs. An investment in technology might allow the ability to rapidly process vast amounts of data or distribute information seamlessly between many disparate systems, but the return is often diminished by a failure to recognise the importance of the role of the user and their goals. Technology must help a user to realise their goals, achieving greater productivity, improved customer service and reduced costs. Unfortunately, many GIS vendors have not championed the cause of the user, instead concentrating on introducing new technology that does little to address in a practical way the day-to-day needs of the user.

The Smallworld GIS architecture from GE Energy is based on years of experience in supplying GIS solutions to the enterprise. This experience has been complemented by software architects who realised that software solutions reliant on large, monolithic user interfaces no longer represented the best way to help the user, nor acknowledged the challenging environments that many businesses find themselves in today. In order to realise the vast array of users' goals, they believed the future would lay in easy to construct, small, focused applications. This new philosophy helped drive the re-thinking of the infrastructure required to support these new applications that, in turn, led to the development of the new component based Smallworld software architecture.

Big became ugly

After spending considerable finances converting their paper based data to a digital form that could be stored in a GIS, many businesses began to explore how they could begin to take best advantage of this large amount of information now available at their finger tips. Not surprisingly, many of the first applications were conceived in the engineering departments of utilities, since this was GIS's first home, and had a decidedly technical flavour. These applications often concentrated on a single engineer's task, for example electrical load analysis, with a user interface tailored to the small number of users that were to operate it. For these engineers, these applications were often very useful tools. To those not involved in their original design, these applications were often very mysterious. For Example, data was usually presented in a cryptic format that was only decipherable by the most experienced of users. Additionally its operation was often driven by a set of commands that reflected the preferences of those who had developed it. This approach has a number of problems:

- By supporting tasks that are performed in a colloquial as opposed to a generic way makes it difficult to train other users and, worse, often means that the application does not support the tasks of users who were not consulted.
- Designing an application for the most experienced people in an organisation often leads to a highly technical user interface that less experienced members of an organisation find confusing and difficult to learn.
- Applications that assume the greatest experience are also those most susceptible to the loss of that experience. Experienced engineers are highly valued members of an organisation and are least cost effective if confined to using a piece of software simply because they are one of a few who know how to operate it.
- Engineers are obviously not the only group of persons using computers, but restricting the design of applications to the knowledge held in this small community often ignores the advances

in usability made by other products and technologies inside (or outside) the organisation.

- Over time user interfaces often establish common best practises in design that allow software to be more easily used by a larger community of users, for example standardising on F5 as the accelerator key to refresh the screen.

Many of these issues were not apparent with the early use of GIS since the early applications often confined themselves to single departments. However, over time, businesses began to further exploit GIS. Other departments within the organisation began to be interested in the possibilities provided by the spatial functionality of a GIS. Marketing departments started to perform demographic analysis on existing customer locations. Budget planners started to use spatial data to predict future operational needs and plan capital expenditure. Executives began to demand digital dashboards indicating the operating status of the business.

The characteristic of the enterprise workforce also changed over time.

Businesses soon realised that committing highly trained engineers to the operation of software for routine tasks was not the most cost effective use of their time. It was much better to focus this talent on more business critical processes and let junior staff adopt this role. The objective here is to make the software so easy to use that a business could employ a person with the minimum level of training and quickly make that person productive.

Many utilities started out as publicly owned entities, but a growing trend of deregulation and privatisation soon exposed these businesses to fierce competition and the profit expectations of shareholders. Cost became an overriding concern together with the added burden of regulatory compliance.

These two trends: more widespread use of GIS and a more disparate user base conspired with the limitations of many GIS architectures to limit the effectiveness of business critical applications. Many businesses with a suite of existing GIS applications often found it cheaper in the short term, for example a financial quarter, to modify or augment an existing application rather than to build another dedicated application from scratch. This approach was often a quick fix to an immediate problem. However, as the business asked for more and more from these applications, the original user interface often mutated into an all encompassing affair that was complex, inconsistent and difficult to learn. As each new piece of functionality was added and after each user interface change applied, these monolithic applications developed a life of their own making it increasingly difficult and costly to replace them. Conventional GIS architectures were of little help. Architectures designed to support small applications were often not flexible enough to support these new business processes or users. All this led to large unwieldy applications that did too much very poorly and that were difficult to use and required expensive training.

Will the real user stand up

The best user interface design comes from understanding the users' goals, needs and expectations together with an understanding of how their goals and tasks fit with the goals and processes of their business. It is also vital to correctly identify the user. The user is not the budget holder of the project, the project manager or even a team leader. The real users are those who use the application on a day-to-day basis with the aim of making their job more productive.

Understanding the users' goals, needs and workflows is often a time consuming and expensive process that many GIS vendors and enterprises have avoided in an effort to reduce development costs and meet tight deployment deadlines. This is fundamentally the wrong strategy. True, this approach might be more

expensive initially and require more commitment in terms of resources, but this is viewed as a worthwhile investment as it leads to higher quality software for the customer: good user focused design ultimately leads to the business goals being achieved.

Small focused applications allow the user interface to be designed around the user. Only the functions that the user needs to perform in a business process are available. Other functions that are not applicable are simply not available thereby simplifying the user interface greatly. A simple user interface is quicker to understand and often leads to fewer mistakes by the user, since there are fewer opportunities to make them in the first place.

The powerful and flexible component based Smallworld GIS architecture from GE Energy allows applications to be constructed out of small reusable pieces. This is an important advantage not only for the application architect but also for the user interface designer as it implicitly encourages a more consistent user interface. Components with user interface elements (for example querying, browsing, editing and so on) can reappear in several applications engendering a familiarity that reduces training costs and allows a broader community of users to use a wider range of applications.

It is, however, important to note that despite the flexibility of this approach it does not negate the need for good user interface design: simply packing an application with a myriad of components and hoping for the best is not good enough.

A familiar face

Good user interface design is also about consistency. This consistency is not only between applications within the enterprise but also with those outside it. Computers are now so prevalent within so many organisations that there are many ideas and concepts that are well worth adopting by enterprise GIS applications. At the simplest level, it is recognition of the fact that most PCs run one form or another of the Microsoft® Windows® operating system. This inevitably means that people that use a computer have been implicitly trained to work with the look and feel of the Microsoft Windows user interface. This inherited set of easily transferable skills is a rich vein of invaluable computer experience that should be eagerly utilized. Consequently, one of the Smallworld software platform's user interface design goals is consistency with the Microsoft look and feel. For example, once a person knows that pressing F5 refreshes the screen, no additional training is required to learn how to refresh the screen in a GIS application. This commitment to consistency also has a number of indirect advantages. Many organisations consist of competing departments, each with their own acceptance standards. Agreeing on a common industry standard such as a Microsoft's look and feel is often an attractive way to facilitate roll-out of applications to departments that have limited budgets and competing agendas. Also, a trend toward mergers and acquisitions often results in the combined entity operating two systems. Having an industry accepted standard look and feel facilitates interoperability and allows existing staff to easily switch between the two systems.

This approach can be taken surprisingly far, but is not a complete solution: there is still a sufficient number of distinctly different operations that GIS requires that are not found in applications such as Microsoft Word or Microsoft Excel. It is here that the experience invested in the Smallworld software architecture can be fully exploited. Working with users, user interface designers can establish these new GIS specific design patterns for spatial operations such as selection, querying, navigation and so on, applying them consistently to a wide range of GIS applications. A user who is shown how to pan a map should not need to be taught this again when wanting to pan the map in a different application.

Conclusion

For many enterprises, the business benefit of using a new technology is often diminished by ignoring the importance of the user. This, in turn, frequently results in additional overhead costs that might not have been apparent at first: increased training, reduced productivity, more errors and so on. All of this contributes to a higher total cost of ownership.

Small focused applications aim to reduce the total cost of ownership by allowing enterprises to focus on the needs of the user. Constructing applications out of smaller standard and reusable components allows applications to be fine tuned to a particular user role. Users quickly gain a familiarity with these components that serves them well when they re-appear in other applications reducing costs and improving productivity. The steep learning curve associated with large monolithic user interfaces becomes a thing of the past.

A strategic commitment to good user focused design, the flexibility of its underlying component based architecture and years of experience in writing GIS applications allows the Smallworld software platform from GE Energy to provide the highly usable, task focused applications that help unlock the real productivity of the user and help enterprises attain their business goals.