SKY LEVEL

Andrea Baroni has realised his goal of having a high-level visual overview of operations at Zurich airport, any time, any day

“...They said it couldn’t be done. This is a new model and a true evolution of our relationship that we think customers will immediately find compelling because it delivers practical value by bringing two of their most important platform investments closer together”

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Unique, the operating company of Zurich Airport, has devised and implemented a visual business monitoring system. Andrea Baroni, head of airport operations, explains to Mark Webb how IT is helping his management team move to collaborative decision making.

Some of the most advanced examples of engineering, electronics and materials science fly in and out of today’s airports. While providing high-level technical support for this activity, an airport is fundamentally a people business. The airport and airline staff deal, sometimes fleetingly, with tens of thousands of customers per day. Every traveller expects every staff member to know what is going on.

Unique, the operating company of Zurich Airport, has planned and executed a new business system to help it meet travellers’ expectations. It is a private company owned by the province of Zurich and numerous private shareholders, and has a 50-year concession. Unique coordinates critical operational processes across different businesses and is responsible for travellers’ well-being in all respects.

Zurich Airport achieved ‘Best Airport in Europe’ for the second quarter of 2006 in the Airport Service Quality survey performed by Airports Council International. But Andrea Baroni, head of airport operations, still remembers the bad times.

When Swissair went bankrupt, the airport lost one third of its revenue overnight and Baroni lost his job. Swissair left behind a multitude of daughter businesses that handled catering, cargo and every other airport operation. The quality of the airport’s service rapidly dwindled as the under-resourced companies struggled to stay afloat. That’s when Unique was formed.

One of the problems facing Unique’s management was that they didn’t control the quality of the businesses that worked for the airlines, while nevertheless being responsible for the experience of travellers. Baroni, now working for Unique, was given the job of sorting it out. “At least I had a greenfield situation and could work from scratch,” he remembers.

Communications with the partner businesses relied on telephone and were slow and unreliable, says Baroni. He therefore decided to get everyone together and offered a seat in a central control room to all the main partners involved in operations, such as baggage handling, hub control management and security.

The representatives all sat in the same room with a window out to the tarmac but it remained difficult to give them an overview of what was going on across the airport. It was at this point, says Baroni, that he identified the need for a visual business system to steer the airport, and for every staff member to have the same level of knowledge.
Adrian Boss, Unique’s chief information officer, wasn’t convinced when the idea was first proposed. Having recently arrived and sorted out an ailing IT infrastructure, he wasn’t interested in maintaining a brand new system. He suggested using standard applications already on the market for which he could more easily provide support.

In 2005 the management brought in Microsoft Certified Partners NeuroPie and Zühlke with a view to building an integrated business monitoring system. The goal of the project was to provide a high-level visual overview of everything going on at the airport at any time, on any day.

Having learned what could be achieved and how the user interface would work, Boss changed his mind and became a whole-hearted supporter. Baroni confirms: “We wanted Microsoft technology. We wanted it to look and work like Windows and Office because everyone knows them.”

The system, named Zeus, was integrated with back-end IT so that real-time information, such as flight status and plane location, was visually depicted on a map of the airport. In 2006 the same team radically improved the system’s interactive display.

Several thousand events are monitored by Zeus and are managed by exception. Most go through unremarked but if a problem is detected, an alert informs the appropriate control room operator.

Baroni identifies transparency as a major achievement of Zeus. “It closes the gap between operations and top management,” he says. “Hierarchical levels filter out when something bad happens.

Punctuality was low but our CEO couldn’t see why. We now have live information on punctuality and processes such as baggage handling. Our CEO set a target of finding information in three clicks and under two minutes, which we have achieved.”

Zeus displays both current activities and upcoming bookings. Unique’s management is able to look ahead at peak times to identify potential bottlenecks. By analysing the data, the management company can distribute its resources more effectively to prevent problems. In addition, if problems arise frequently in specific areas, Unique can address them sooner. Baroni is still grappling with the airlines’ reluctance to provide passenger data but, in the opposite direction, Unique provides the airlines with full reports on aircraft movements, boarding times and gate allocations so that they work together to improve service levels.

The map-based model seems unusually intuitive for a facility management application. Juergen Weder, CEO of NeuroPie, says that the map idea anticipated other similar displays that are currently proving popular with users. Weder says that the vision is to make the map more useful by providing visual alarms and ‘heads-up’ displays relevant to the particular user. At the moment, the Zurich operators are happy to have audio alarms that they investigate on information grids.

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The increased visibility into processes has enabled Unique to accurately gauge which have been working well, and which need improvement. As an example of how Zeus has helped the airport to realise time savings, Baroni cites improvements in departure punctuality. By using Zeus, airport management could see that planes were regularly being boarded five minutes late, and Unique’s experience has shown that a late boarding process usually results in a delayed departure. Therefore, to improve punctuality, Unique implemented a process that alerts boarding agents through Zeus when it’s time to load a plane.

Baroni says: “Since January 2005, passenger wait time at Zurich Airport has been reduced by ten per cent. In terms of plane punctuality, we’re gone from ranking twenty-sixth out of the twenty-seven biggest airports in Europe to ranking eighth and, with the more robust Zeus system, I imagine this number will only get better.”

Baroni says: “Zeus linked together information from many different systems, including five separate enterprise applications. Zeus collected, combined, and then presented that data in a visual format. But the technique of the map wasn’t entirely satisfying. There were some technical limitations, and the information shown on the map wasn’t detailed enough.”

When Unique contacted NeuroPie and Zühlke in 2006 about expanding the map’s visualisation and interactive capabilities, the partners sought new, more flexible technology on which to build the solution.

To make Unique’s vision of a fully interactive map a reality, NeuroPie turned to the new Windows Presentation Foundation, the display engine and
managed code framework for the Windows Vista operating system. Windows Presentation Foundation enabled Zaliko to use Microsoft .NET Framework 3.0 application programming interface when they were building the next generation of Zeus. By using .NET Framework 3.0, they were able to migrate the logic of the previous version (which had been built on Microsoft .NET Framework 2.0) directly into Windows Presentation Foundation.

"We saw a demonstration of Windows Presentation Foundation combined with Windows Vista at Professional Developers Conference 2005. We immediately understood the potential of this technology, and how it could help expand Zeus's visualisation and interaction features, improving the user experience," says Weder. "The simplicity and power of the new development environment made the decision to switch very easy."

While much of the information available in the earlier version of Zeus came in the form of charts and grids, the new version incorporates that information directly onto a map of the airport. The updated system provides at-a-glance views of key operational information in real time, including passenger forecasts, plane location, flight data, environmental conditions, baggage loads, management summaries, and live reports.

Behind the scenes
The vector graphics created with Windows Presentation Foundation easily scale to match the resolution of a specific screen. For example, Zeus can be shown on a 19-inch monitor or on a 62-inch screen without degrading graphics quality.

In addition, explains Weder, "The native support of animation within Windows Presentation Foundation enables us to attach a few lines of code to a graphic rather than continually moving every element." This means Zeus can precisely, and graphically, mimic the movements of the aircraft on the runway. Users can zoom in on a plane, move the mouse pointer over it, and see a pop-up balloon of information about the flight.

Web services are the key to getting data from the airport's various proprietary systems into one place. Information about flight times, stand allocations, weather information, and the progress of baggage, is sent to Web services, from where it is picked up by a Windows client for display.

Andrea Baroni (left) and Adrian Boss with the Zeus business monitoring system
In this way the data becomes more valuable because it is also available to other services, for instance some information can be shown directly to the public on airport screens, or sent out as SMS messages to passengers' mobiles. NeuroPie has also tested the idea of management information on PDAs and Tablet PCs. Usability often depends on the work environment as much as the application, says Weder. Eventually everyone in uniform may have some kind of access to the information to respond to customers' questions.

If data needs to be changed, the process is reversed: data is changed at the Web services level and then in any original data source. At all times, the display is decoupled from the original data.

The application programming interface (API) for the new Windows Vista platform allows developers to create rich graphics directly in .NET Framework 3.0. "Because the API in Windows Vista is already integrated with .NET Framework 3.0, we can create an element on a map just as easily as we can click on a record in a database grid. It would have been a very big effort to create the same functionality under the old system, using SVG," says Weder.

Fully supported Microsoft Visual Studio 2005 Team System facilitated the relationship between NeuroPie and Zühlke. During the update, NeuroPie managed the project and translated Unique's wants into technically viable options. NeuroPie then collaborated with Zühlke, who completed the development work.

Microsoft Visual Studio 2005 Team Foundation Server enabled integrated work-item tracking between developers and project managers as well as version control, reporting capabilities, and unit testing. The features supported strong communication between the two Microsoft partners, enabling Zeus to be completed on time and within budget.

"Visual Studio 2005 Team System provided us with a comprehensive set of development tools," says Weder. "The most helpful being the easy-to-use version control which allowed us to track project changes."

At a glance
By adding plug-ins the map's information display can be extended. Recent additions are car park capacity, runway visibility and crew resources at security checkpoints. By consolidating critical airport operations information in a visual format, Unique is able to run Zurich Airport based on current facts and without needing to make any assumptions. Airport workers can customise their screens so they can concentrate on data relevant to their tasks. They can then use the interactive pop-ups to interrogate parts of the map more closely when required. Having real-time information means that they can make decisions promptly.

In Zurich they run a daily report that summarises the main events of the previous 24 hours concerning quality of production. This report is distributed to all managers and "anyone who wants one," says Baroni. Some features contribute to the planning and budgeting process. For example, Zeus displays and records when elevators and escalators haven't been working properly. Using that information later, the maintenance department can adjust its budget to improve the systems.

"The airport taking control of operations is fairly new," says Baroni. Airlines are now beginning to take a back seat. The moment is therefore right for a system like Zeus. Baroni lists three large airports in Europe, Africa and Asia that are trialling or in the process of buying the system. He says that London Heathrow Terminal 5, which will handle 30 million passengers per year from 2008, is among the UK airports that will use Zeus and will be the first to extend the staff information system to workers' PDAs.

Weder says that airports have been dinosaurs in terms of IT but many are now moving towards a service oriented architecture (SOA) approach. He thinks the interactive map may work equally well for passenger hubs on bus and train networks.

"My COO can fire up the system in the morning and see how the airport is doing; on things like punctuality and waiting times in front of security," says Baroni. "Transparency puts pressure on the team to do better. Zeus shows us a faulty process and involves top management. That is the secret of its success."