

Tessellations

News And Technical Updates From Tessella

Edition 56, Winter 2005/06

Space – time for discovery and dreams

Space continues to rise up the political agenda, with the US, Russia, China and India all increasing their public spending on space related activities. However, increased funding has been set against both a decline in the commercial market for space systems and an economic environment demanding increased competitiveness.

Around the globe

US space policy has been updated significantly, and now focuses on space exploration (with plans for a manned mission to the Moon after 2018) and space activities to support defence and homeland security. Of all the countries active in space, Russia launches more spacecraft than any other and is actively seeking to form alliances with other space powers. In China and India, space activities continue to boom.

Things are also moving apace in Europe, and in this article we highlight the work of the European Space Agency (ESA).

A European agenda

December 2005 saw the Government Ministers responsible for space in the 17 ESA member states, plus Canada, meet in Berlin and agree a coherent plan for space discovery and space competitiveness for Europe.

The Ministers endorsed the continuation of a set of ongoing programmes and agreed to undertake several new initiatives designed to give Europe a clear vision and tangible means to further strengthen its space exploration activities. They committed to boost progress in space science and to work to position Europe at the leading edge of space discovery. The ongoing programmes include participation in the International Space Station, the development of new generations of satellite launchers, and involvement with ARTES (the Advanced Research in Telecommunications Systems) which focuses on technologies, applications and mission demonstrations.

ESA is developing two key spacecraft, due for launch in late 2007/early 2008, whose prime purpose will be scientific measurement. 'Herschel' will be used to study the birth of galaxies and stars, and 'Planck' will be used to study the very early history of the Universe.

New initiatives, which ESA member states committed to support, include the European Space Exploration program 'Aurora', with its first exploration mission to Mars plus a core programme to prepare for future exploration of other planets.

Progress in navigation

Navigation is a key area of progress. The US Global Positioning System (GPS) and the Russian equivalent (GLONASS) were designed for military use, and are ideally suited for tracking troop movements and the like.

However, commercial users can be a little nervous about relying on these systems, as they are operated by the military and can be blocked for civilian use. Consequently, ESA is developing a global navigation system (named Galileo), which will give Europe an independent satellite-navigation system, designed specifically for non-military purposes.



ESA's Aurora mission will explore the solar system (Image: ESA)

An initial test satellite, GIOVE A, was launched in late December 2005. By 2008 there should be four operational Galileo satellites orbiting the Earth; the final system will consist of 30 satellites and be able to pinpoint an object to within one metre.

Supporting the space industry

The complexity of any space mission presents unique technical challenges. Coupled with these complexities, the space industry, probably more than any other, demands accuracy.

Analyticon, now part of the Tessella group, has substantial expertise in systems engineering, mission

analysis, control design, mathematical modelling and detailed analysis, providing a unique combination of skills to develop accurate solutions to meet the challenges of space.

Working closely with immediate client Surrey Satellite Technology Ltd, Analyticon designed the attitude and orbit control system for GIOVE A, including deriving the appropriate control laws, the consideration of sensor and actuator availability, together with orbit geometry, attitude control requirements and stability. Analyticon also took responsibility for the complete mission analysis, including the eventual 'graveyard' orbit to be implemented when the satellite comes to the end of its working life.

Analyticon specializes in satellite attitude control systems, guidance navigation and control systems, mission analysis and flight dynamics. The company has established and maintained an excellent reputation on a wide range of space missions.

Looking to the future

Within the space and defence industries there is a constant drive for better, faster and cheaper systems. Analyticon and Tessella have the skills to develop the necessary technical innovations within the constraints of the real world. We look forward with confidence to a bright future serving the needs of an expanded list of world-class clients. To find out more please email info@tessella.com

Stop press: In December 2005, **Analyticon Ltd** became a wholly owned subsidiary of **Tessella Support Services plc**. Analyticon's space and defence activities will enable Tessella to diversify into new market areas, whilst Analyticon's work in the pharmaceutical sector allows both companies to expand the range of services offered to life sciences clients.

Analyticon
The Right Answer

Tessella
Scientific software solutions

Making migration painless at Shell Global Solutions

When next filling up your car, look out for the increasing number of differentiated fuels available at the pumps. Offering benefits such as better performance, and cleaning and protecting your engine, these fuels are the result of extensive research and development programmes by the petrol companies.

Shell Global Solutions work at the forefront of advanced fuel development. At their research laboratories in Cheshire, UK, the Shell Engine and Vehicle Testing group (EVT) operate around 18 engine test beds, enabling the detailed investigation of the performance of fuels and lubricants within different engine technologies. Each test bed is equipped with a sophisticated range of data acquisition hardware for the real-time capture of multi-channel data (e.g. speed, oil temperature, fuel consumption). The types of engines tested range from standard production vehicle units through to dual-fuelled multi-cylinder research engines.

Over a number of years, Shell Global Solutions and Tessella have developed a strong relationship based on the successful delivery of numerous varied projects, ranging from long-term support and development of hazard management software for Shell's HSE Consultancy (see Tessellations 46), through to enterprise-scale, data-driven web applications for oil sample tracking.

Hence, when the computer hardware underpinning the data collection process in the EVT laboratories required updating, Shell asked Tessella to investigate. Tessella completed a short study, which confirmed the problems identified by Shell and offered an innovative way forward.

Updating critical functions

Each engine test bed has a dedicated data-logging computer for monitoring and storing the results of each individual engine test conducted. On a daily basis each engine may generate a large volume of data – depending on the type of test and the number of channels being measured. Factor in the number of engine test beds in the laboratory, and the round-the-clock operation, and you begin to appreciate that the management of the generated data is a major task which is critical to the operations of the EVT team.

At its time of installation in the mid-1990s, the data management system employed in the laboratory was considered to be state-of-the-art, and it had given reliable service for many years. At the end of each day, the results files from each of the test bed computers were sent – via a staging area PC – to a DEC Alpha VMS server, whose job it was to archive the binary results files to optical disk platters. The individual results files were then processed on the VMS server and the raw data uploaded to an Oracle database.

Two areas of the original system were identified as being in need of replacement. Firstly, the VMS server was becoming increasingly unreliable and expensive to maintain, leading to an unacceptable level of downtime. Secondly, the optical disk array had reached its storage capacity and it was becoming increasingly difficult to find replacement disks. Taken together, the VMS server and optical disk array were becoming progressively out-of-step with Shell's current global hosting infrastructure, which is built around a Windows server environment.



Working closely with the EVT management and Shell Global Solutions technologists, Tessella proposed a plan to migrate the data management system onto a Windows platform.

Something borrowed

The core of the existing application managing the archiving and data upload processes had performed well during its lifetime. Given the complex format of the binary results files, it was agreed that this core code should be incorporated into the new system. Re-writing this part of the application from scratch would have necessitated an extensive programme of testing to ensure that results were being read and uploaded to the database correctly.

The overall solution proposed by Tessella was based on developing a Windows

service to manage the transfer of results files from the staging area to the data management server. The files were then archived to a Storage Area Network. A 'wrapper' was written for the core of the original code to enable it to be integrated into the new Windows service application. This ensured that the data would continue to be read, and the database be populated, in a way that was wholly consistent with the many thousands of results files processed over the previous years.

The migration from the Alpha VMS has resulted in a new system which will be supported and possible to maintain longer term, and has delivered a number of other benefits. Instead of being processed in one batch at a set time each day, the results data are now processed as they arrive at the server – offering technicians a faster turnaround between running tests and viewing the results. The system is now more flexible; for instance, individual results files can now be loaded by the administrator at any time. Also, the system now has a more intuitive administration control panel.

Painless migration

Even when dealing with a mission critical system, migrating from a legacy platform such as VMS, to a modern system, does not have to be a painful process. By careful planning, and analysis of strengths and weaknesses, it is possible to give an existing system new life.

The approach described in this article may not be appropriate for every situation, but with 25 years' experience of developing systems for all major platforms Tessella is well placed to offer its clients a strong set of alternative solutions.

For more information or to discuss your potential requirements please contact info@tessella.com



John Rimmer
EVT Technician
Shell Global Solutions



Peter
Tessella
Software Engineer

For further information and free Technical Supplements please complete the enclosed form or email info@tessella.com

Life – a constant balance between risk and reward

All aspects of our lives involve the intuitive assessment and management of risk. We judge the risks involved in walking down a street to be generally acceptable, at least during daylight. We judge the risks involved in driving to be high enough to mitigate the consequences by demanding safer cars, with devices like seatbelts and airbags, but not so high as to make us give up the convenience of our cars.

Businesses also have to make decisions based on an assessment of risk. Risks may be to people, property or reputation, but all will include an element of risk to the health or survival of the business. While many decisions can be made based on the same intuitive basis as our everyday decisions, there are others which require a more rigorous approach.

We can take action to *reduce* the likelihood of a risk manifesting itself. By improving our knowledge we can be more confident that the likelihood is already low. *Mitigation* techniques can reduce the consequences to the point that the risk is acceptable. In some cases we can *transfer* the risk to someone else, and although this is most often thought of in terms of financial and contractual risks, it also applies to situations such as employing someone to clean the upstairs windows rather than climbing a ladder ourselves. Lastly we can either *accept* the risk as reasonable or *avoid* the risk altogether (probably at the expense of some benefits).

Decision tools

Modelling and *simulation* can be used to help assess either the sensitivity of a system to outside influences (and hence the chances of a problem occurring) or the consequences of such a problem. Accurate and timely *data collection* and *analysis* can help us to identify potential risk realization earlier or more accurately. In complex businesses, *decision analysis* tools can help by using rigorous mathematical treatments to balance many conflicting sources of information and aid in navigating through the maze of interconnected decisions and actions.

Real examples

Tessella and Analyticon have wide experience of supporting clients in their risk handling:

- The effect of agricultural chemicals on our environment is an area of growing concern. We have worked with both *pesticide developers* and *agricultural research* institutes to develop systems which model the fate of these chemicals in the fields. Combining this information with data on their toxicity (to humans and wildlife) allows recommended usage patterns, with acceptable levels of environmental impact, to be defined
- In order to minimize risk and maximize return, either within a project or across a portfolio of projects, *pharmaceutical* companies need to identify which set of options to pursue. We have developed customized software packages for a number of clients to aid with this process. The power of these packages derives from rigorous mathematical treatments of the available data and uncertainties, together with user-friendly interfaces
- Within the *petrochemical industries* the consequences of an incident (such as a spillage, fire or explosion) not only affect the assets of the company but can also reach far beyond the boundaries of the plant itself. We have developed several risk analysis software packages to calculate the risk levels around a site and to identify the major sources of risk. These applications allow engineering effort to be focused, and hence show the most cost-effective way to reduce the likelihood of an accident happening and to minimize the subsequent hazardous consequences



- For *ordnance storage* sites, consequence models of detonation have been developed covering casualties caused by a wide range of effects (debris, blast, thermal, weapon fragment)
- The risks involved in providing a *transport infrastructure* are extremely high profile and although incidents occur very rarely, the range of serious consequences (including loss of life) make the perceived risk of travelling much higher than it actually is. Safety is necessarily the overriding consideration for all involved in the industry. Whilst it is impossible to totally eliminate all risks to travellers, by using the HSE principle of ALARP ('as low as reasonably practicable') the most cost-effective measures for reducing risk can be implemented. Tessella are active in developing a better understanding of transport systems, vehicles and their behaviour so that improvements can be made without impacting passenger safety
- No matter how well you prepare, there can be a risk that, with the benefit of hindsight, someone will make a case that different decisions should have been made and will sue your organization. By preserving the evidence that supports the assertion that the decision made was reasonable, based on the evidence and techniques available at that time, one goes a long way to protecting oneself. In many areas of business, *Digital Archiving* is being pushed up the corporate agenda by both legislation and business necessity

Why not play it safe?

Risk management is the continual process of recognizing what risks exist, evaluating their consequences and likelihood, and planning how best to deal with each situation.

Organizations that continually 'play it safe' seldom innovate and grow, for risk is from where competitive advantage springs.

For more information on Risk Management please email info@tessella.com



Alan
Tessella
Associate Director

Supporting Life Sciences at every stage

In the highly competitive Life Sciences sector, companies of all sizes need an edge.

Biotechs may wish to focus on product design and development, and licensing agreements, to maintain investor confidence. Larger pharmas rely on efficient pipeline management and in-licensing products to deliver a steady stream of new products to market.

Tessella has been a leading independent supplier of software solutions to the pharmaceutical, biotech, medical and agrochemical communities for many years, priding ourselves on understanding our customers' business and technical requirements, and working with them to provide innovative, cost-effective solutions.

The newly expanded Tessella group, now incorporating Analyticon, can provide that competitive edge and help world-leading companies improve efficiency in drug discovery, development, risk analysis and portfolio management. Our combination of skills is powerful:

- Automation and robotics
- Drug discovery and development processes
- Image analysis
- Innovative software development
- Mathematical modelling
- Multivariate data visualization
- Regulatory processes
- Risk analysis
- Scientific database development and mining
- Simulation of processes, devices and mechanisms
- Statistical analysis

And have been applied to:

- Clinical trials simulations and live data management
- Data archiving
- Decision analysis and portfolio management
- Hepatotoxicity studies
- High Throughput Technologies
- *in silico* prediction of molecular properties
- Integrating LIMS and lab automation
- Pharmacokinetic and pharmacodynamic modelling
- Process Analytical Testing
- Sample tracking
- Tablet design and manufacture

To find out more about how Tessella and Analyticon can support your business please email info@tessella.com

Tessella and Analyticon

Following Tessella's acquisition of Analyticon, it's been a busy time for the staff of both companies. Analyticon's founder Steve Colling will be working with Tessella over the next few months to ensure a smooth and orderly handover.

Tessella's Managing Director Kevin Gell is working with Steve Colling and senior Analyticon staff to develop new business with both existing and new clients within the Space and Defence sector.

Lawrence Hopkins, Associate Director for Tessella's Cambridge and Stevenage offices, is managing new business development activities with Analyticon's Life Sciences clients.

Analyticon, and Tessella's Stevenage based staff, are now co-located in Analyticon's original offices.

Analyticon's services dovetail exceptionally well with Tessella's, and the expanded group will continue to use its unique blend of scientific, engineering and IT skills to solve the most complex of technical and business problems in a cost-effective way.

For more information on Analyticon please visit www.analyticon.co.uk

Digital Archiving News

The investigative phase of the 'UK Digital Preservation Needs Assessment' study, being undertaken for the Digital Preservation Coalition, is now complete. The final report is being compiled and will be released in February 2006.

Dr Robert Sharpe of Tessella will present on 'Digital Preservation: maintaining accountability of government and our cultural heritage' at the Effective Electronic Records and Information Management conference, 20 February 2006, in London. Other organizations presenting include the UK National Archives and UK Home Office.

During April-May 2006, the University College London School of Library, Archive and Information Studies, will stage a series of four public lectures on 'C21st Curation'. The sessions will cover 'Scholarly Communication' (26 April), 'Digital Resources in the Humanities' (3 May), 'Service Delivery in National Institutions' (10 May) and 'Curation and Access for Scientific Data' (17 May). Each lecture will be followed by a Tessella sponsored reception.

For further details please email info@tessella.com

Tessella – Providing innovative software solutions to scientific, technical and engineering problems

Tessella adds value to its clients' businesses through the application of scientific methods and information technology. Our services cover software design and development, IT consultancy, infrastructure support and project management. We are vendor independent and so can recommend 'best of breed' solutions, whether this involves custom software development or off-the-shelf solutions.

Formed in 1980, our enviable reputation for providing high-quality, low-risk, value for money services is backed up by many successful, high-profile projects for government and private organizations, plus a high level of repeat business. Our offices in the UK, US and the Netherlands, have built long-term relationships with organizations at the leading edge of the scientific and engineering world.

Tessellations is published by Tessella Support Services plc. Our aim is to provide you with interesting information on topical technology issues and to outline key projects which we hope you will find of use. We depend on the feedback from our readers to help us develop Tessellations and to maximize its usefulness. Your input is always appreciated; please send to The Editor (Alison Smith) at info@tessella.com

For further information please visit www.tessella.com, return the enclosed order form, or email info@tessella.com

Abingdon, UK (Head Office)

Tel: +44 (0)1235 555511

Burton upon Trent, UK

Tel: +44 (0)1283 553300

Cambridge, UK

Tel: +44 (0)1223 897770

Stevenage, UK

Tel: +44 (0)1438 731317 (Tessella)
Tel: +44 (0)1438 749886 (Analyticon)

Warrington, UK

Tel: +44 (0)1925 286800

Winchester, UK

Tel: +44 (0)1962 850055

Den Haag, the Netherlands

Tel: +31 70 354 2296

Boston, USA

Tel: +1 617 454 1220

Washington DC, USA

Tel: +1 240 235 6052

In Tessellations issue 51 we profiled the new **National Flow Forecasting System**, being developed by Delft Hydraulics and Tessella, which will allow the UK Environment Agency to improve its flood forecasting capability. The new system has been rolled out to three launch regions (Northeast, Midlands and Southern) and is now being extended to the five remaining regions, such that all of England and Wales will be covered by the end of 2006.