20 Years of ongoing vision, innovation, evolution and revolution

Forward - by Joan Lyman, CAST's Manager of Communications

The following article chronicles the last 20 years of innovation at CAST. While this is a review of technical achievement, we acknowledge that the inspiration and many of the ideas have emanated from you. We want to thank you, our Users, for your valuable input into every idea, development and revision. We take every bit of feedback seriously, whether it's an email, phone call or conversation at a trade show. So keep those comments coming – you never know what the next 20 years may bring.

Imagine: 20 years ago a vision to deliver a planning solution sprouted from an innovation that triggered an evolution that trigged a revolution in our industry, and promises to do so again. Here is the story of *wysiwyg's* origin. We think it's about time this achievement is penned for prosperity.

From: Gil Densham,
TV Lighting Designer
To: CBC,
Toronto 16 Nov 1991

"For a little over two years, CBC's Ligthing Department via Gil Densham and Steve Plotkin have been utilizing to great results our own program of lighting and plotting television shows, by using computers and the the Auto-CAD program as a design tool.
…

The future sees a Lighting Designer and an assistant in an office, building the whole show from start to finish on a computer with [this] lighting program, taking the disk into the show venue and shooting the whole show from start to finish.

We can actually simulate the lighting conditions onstage within the computer on the screen, finding out if what we propose for our lighting design will work … changes can be made with the push of a button and all production requirements can be made before costly production time is involved."
(Abstract)...

Back to the future

In the 80s, lighting design relied on thick binders (often several) of manual plots, patches, cues and drawings to prepare for a show, and perhaps 2D CADs. Not only was this incredibly time consuming, but it failed to portray any real representation of what the final output would actually look like.

Previsualization? Other than sketches, it did not exist.

Innovation and the automation of production technology and equipment began in earnest and was becoming more prevalent. The cost of upgrading technology was substantial and the results not always as predicted. The payback hurdle meant that the use of upgraded facilities had to be optimized. Shows had to move in and out quickly with minimum time for set up and tear down. Turning the venues as quickly as possible imposed time constraints on personnel and potentially undermined production quality. The cost of occupying a facility increased. At the same time, the demand for good quality production content was rising, increasing the competition for upgraded production facilities. Success depended on getting in, setting up, getting high quality programming done as quickly as possible, and tearing down fast.

As is so often the case, necessity is the mother of invention. The concept outlined in 1991 above became the codification and foundation for what would become "indubitably the industry standard". This vision realized, would forever change the way lighting design would be done.

How do we characterize the relevance? -- Perhaps this parallel: try to recall the era before desktops, let alone laptops.

Its Genesis

1991

For many years, veteran lighting designer Gilray Densham and assistant Steve Plotkin had been generating their designs using AutoCAD for the Canadian Broadcasting Company (CBC) in Toronto. In November that year, they produced a product concept document that became the first step in defining a 3D lighting design tool for professionals in the entertainment lighting production industry. The objective was simple enough – combine a CAD and the attributes of the lights to generate a plot (and corresponding paperwork) so that design, plotting and simulating the lighting could be done in an office on a computer to optimize and make better use of the expensive production facilities and personnel. The obvious objective was to create an offline solution so that "what you see is what you get" – *wysiwyg*.

1992

Robert Bell came to work at the CBC with Steve. He used CBC's 2D CAD program, combined lisp routines as a method to auto-number lighting fixtures,

LXMOV Animator Console - 1993

LXMOV Animator Console screen - 1993

LXMOV Animator Console screen - 1993

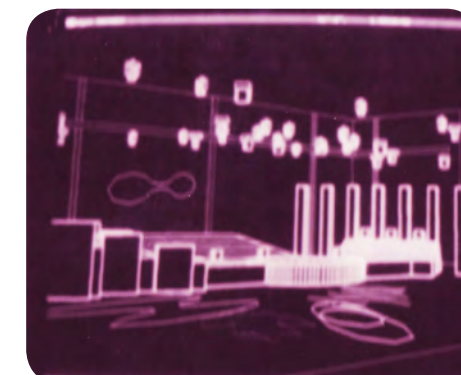and eventually inserted 2D beam characteristics. The concept was delivered.

1993

Over the next years the Team contiued refining this concept and in 1993, Gil said "If we can do it in a 2D static view, why not do it in a 3D virtual view as well". It sounded simple enough.

In addition to adapting the concept to 3D, the Team advanced their software model further by adding a DMX feed from an Animator, to be the first of many consoles. The successful combination of these ideas proved pivotal. This breakthrough could now show how lights interacted with surfaces in 3D – a first of its kind.

Not yet named, the CBC version was a concept called LXMOV and it was not for sale. But the point was that it worked, even if only once to prove the point that design plotting and previsualization could be done remotely using computer software. This was groundbreaking technology.

Claiming it didn't fall in line with their business roadmap, CBC shut down the LXMOV project.
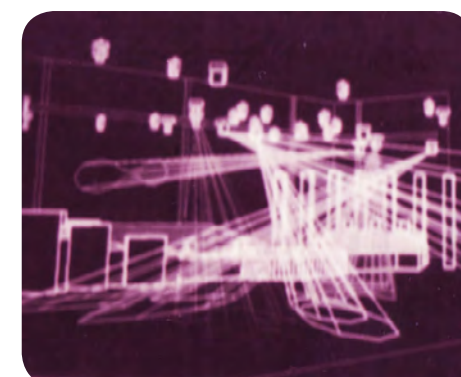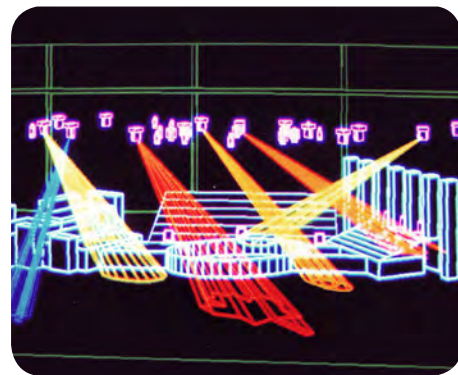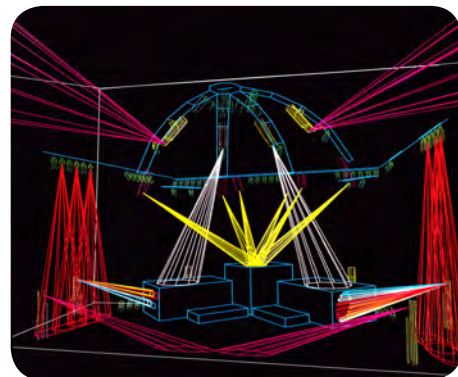
wysiwyg becomes real

1994

Once CBC abandoned the project, in April 1994 **C**omputer **A**nimated **S**tage and **T**elevision Lighting Limited – CAST – was formed. Densham and Bell from CBC and Rick Szijarto, a newly hired software developer, joined forces and wrote the source code for *wysiwyg*, Version 1 using wireframe images which
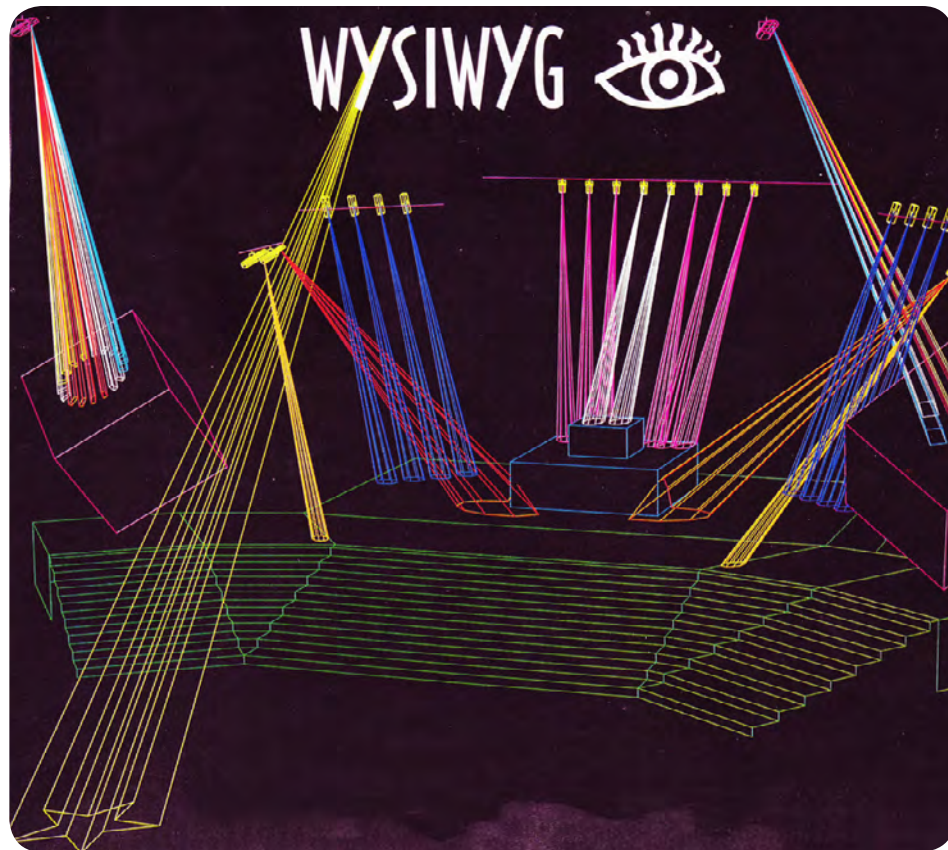
wysiwyg 1.0-1994

wysiwyg 1.0 - 1994

wysiwyg 3.0 - 1997

Tap Dogs rendering - 1998

was shown for the first time at PLASA 1994. Frankly, its reception was equivocal. Relateless, Densham, Bell and Szijarto continued to develop the technology further.

CAST teamed up with Flying Pig Systems who saw the enormous potential of *wysiwyg*, especially as it would work with their Whole Hog consoles. Flying Pig's involvement led to the introduction of David Leggett and AC Lighting in London, which began to promote and distribute *wysiwyg*.

Two of *wysiwyg*'s major attributes were also initiated at this time.

The first was the Library. It was clear that in order to have accurate representations onscreen, *wysiwyg* needed the exact measurements and photometrics of the lights being used. The Team knew that rigorous quality control over the information that *wysiwyg* would rely upon was essential for two reasons. Firstly, if anyone (other than CAST) input incorrect or incomplete data about a fixture, it would appear that the *wysiwyg* software was at fault. Secondly, if the software was to be robust and predictable, then it needed a database about each specific fixture, uniformly and rigorously measured for long-term consistency. What

is it they say: garbage in – garbage out. To this day, CAST remains just as vigilant about rigorously applying its standardized performance tests to ensure perfect, reliable results, and continues to "certify" lights to work in *wysiwyg*.

The other (accidental) phenomenon was that *wysiwyg*'s previsualization would make it one of the first "green" products in the industry. 10 years later being green became fashionable.

During 1995, CAST won a Gemini Award (the Canadian equivalent of an Emmy) for technical achievement for *wysiwyg*.

wysiwyg gets traction

1996

As *wysiwyg* was becoming better and more widely known, CAST, the Users and other technology providers were unanimous in that *wysiwyg* needed to connect with more hardware and new technologies. This

conclusion led to 3 results.

Firstly, until now *wysiwyg*'s growth relied on a limited number of 3rd party technologies – lights and lighting consoles. It was time to open the aperture. This reality imposed by the industry demanded that lighting designers produce designs for shows in various venues – not all venues used/had the same lights and certainly not the new light products; for that matter, not all board operators used the same consoles.

Accordingly, CAST adopted a tenant which underpins the business today; its software products will be non-partisan. CAST does not favour any particular manufacturer's technology. Indeed, as it was (and it is today) it was up to technology providers to sign up.

Secondly, building on the first, CAST developed its Registered *wysiwyg* Developer (RWD) program. Once the software and interface parameters were defined, 3rd party manufacturers could write Dynamic Link Libraries (DLLs) that connected their technology to *wysiwyg*. However, to ensure that data was sent and delivered in a predictable and usable manner, QA testing procedures were developed and imposed by CAST. It is relevant to highlight that while the decision to sign up and write the DLL is entirely up to 3rd party companies, by which they would

become RWDs, CAST retains overall responsibility for the integrity and reliability of the software shipped to Users and it is still equally relevant that working this way CAST would not become privy to any RWD's IP.

Thirdly, culminating from the foregoing, *wysiwyg*'s market was now growing as a direct result of AC Lighting's efforts, as well as the growing network and number of RWDs. The RWD programme became a win/win outcome – RWD's technology/hardware would be exposed to more industry professionals leading to more sales, and *wysiwyg*'s marketing reach would drill down through the RWDs to reach even more potential customers.

1997

Version 2 was released, taking *wysiwyg* from being DOS-based onto the Windows platform. It also now used Vision 2K or Vision 512 interface devices for the DMX input, provided by Artistic License, and AC Lighting sold *wysiwyg* *and* the input hardware as a package – a savvy move.

CAST and AC Lighting entered an exclusive distribution agreement whereby AC became the first official distributor of *wysiwyg*.

1999

wysiwyg Version 3 was released, which added yet more important innovations. Still using Vision drivers or any of the RWD's Ethernet connectivity solutions, now CAST added dongles for enhanced security and portability. *wysiwyg* Version 3 would not run without a dongle. As the ownership and entitlement to use *wysiwyg* was now vested in the dongle, Users could load the software on a number of computers at various locations, but only when they plugged in their dongle would *wysiwyg* start up. This portability immensely pleased the professional lighting community.
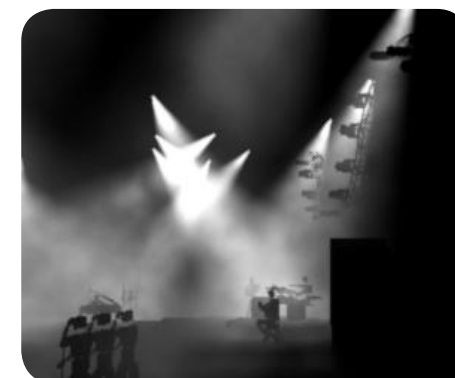
Bauhaus rendering - 1998

London Eye rendering - 1999

London Eye photograph - 1999

DJ Tiesto rendering - 1999

PLASA stand rendering - 2001

PLASA stand rendering - 2001

Idols TV Show rendering - 2003

That same year, CAST started building and selling its own interface device called the WYGIT one. (FYI - WYGITs are still around. They enable connectivity to the legacy DMX only consoles that did not have Ethernet capabilities.)

As well, CAST together with Joe Jeremy and Peter Sinkner from "Niscon" a (Canadian motion control console manufacturer) experimented with and introduced visualization of moving scenery. The addition was groundbreaking as it highlighted the potential for using *wysiwyg* in conjunction with other technologies for production elements. However, the idea of a much closer integration of moving sets and lighting would resurface a few years down the road.

wysiwyg continues to grow – in popularity and in the number of Users

2000

CAST released Version 3.5 when it-formed an exclusive distribution agreement with ETC. CAST commenced heavy development of *wysiwyg* Version 4 to coincide with the debut of the ETC Emphasis control console.

2001

CAST won a Prime Time "Technical Achievement" Emmy award for *wysiwyg* for having "Changed the industry and making it more efficient".

2002

wysiwyg Version 4 and the ETC Emphasis debuted at PLASA 02. This was the most monumental ground-up rebuild of *wysiwyg* to date. Indeed, it was so substantial – its features, architecture, and innovation were built so well – that this architecture is still being used today.

Another major enhancement in Version 4 was the change from direct DX3 to Open GL technology. There were many other major architectural changes included as well.

Since then CAST also extended motion control visualization and has added multimedia visualization (video) – all considered landmark innovations. Eventually CAST would describe its *wysiwyg* product as "Production Design Suite Software". While officially still only PC-based, *wysiwyg* also ran on the new Mac Intel machines using Mac's own Boot-Camp emulator.

During the next few years, CAST was entirely focused on innovation for *wysiwyg* as well as providing proprietary development code of new console products. This innovation won product awards and also produced a substantial increase in the rigorously tested Library objects.

Separately, CAST also started to investigate new opportunities to use the core code from *wysiwyg* in similar uses for other industries.

wysiwyg's growth continues and gets a baby sister (Vivien)

2005

CAST saw the potential to adopt the *wysiwyg* code beyond live entertainment into the meetings and special events industry, which was also serviced by a growing number of the same lighting designers. After 2 years of development, Vivien – the Virtual Event Designer was launched in April. Vivien is an intuitive, 2D / 3D event design and sales software, designed for the full spectrum of event professionals, who work in the special events and meetings industry. CAST took the original highly technical *wysiwyg* product and simplified it *plus* added wizards to make Vivien very easy to use for the events industry.

In 2005, CAST also brought home the total responsibility for marketing, selling and distributing. We changed it from a software-only development company into a full service one.

By now, the 10-year old CAST had grown from 3 to 23 employees (Gil is the only one who has been around since it all began) and has all the key development, selling, and administration functions under one roof.

2006

wysiwyg had an aggressive year of feature development and some great strides in innovation. At the beginning of the year, R16 introduced more of the Moving Scenery features (simulating movement of all objects in a live show environment), improved DWG/DXF import/exports, dramatically reduced file size for shows containing large numbers of polygons and Library objects, and increased Open GL performance for added speed in Shaded views. Then in December, R18 delivered a faster high speed Render Engine, giving Users the ability to create even more realistic images in less time and a more advanced way of treating smoke, resulting in more true to life lighting looks. CAST also introduced the Background Rendering Manager to queue render jobs and execute them in the background – without even requiring *wysiwyg* to run, or on a separate machine without the need for a dongle. R18 also delivered the creation of LED video walls, and other light emitting surfaces with new, multi-faceted wizards and tools.
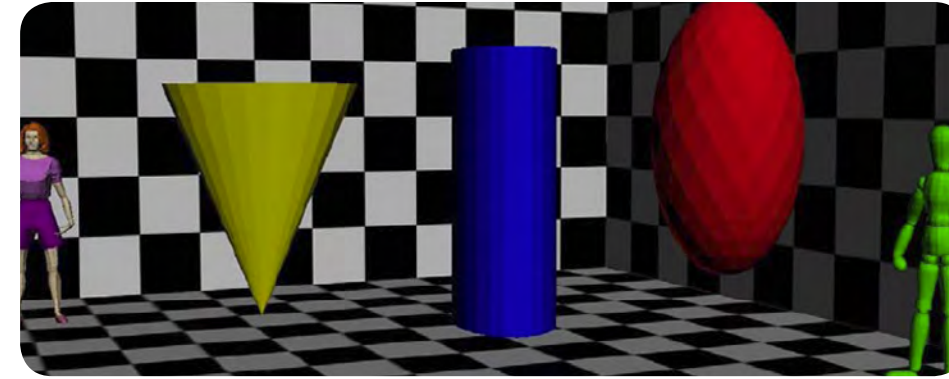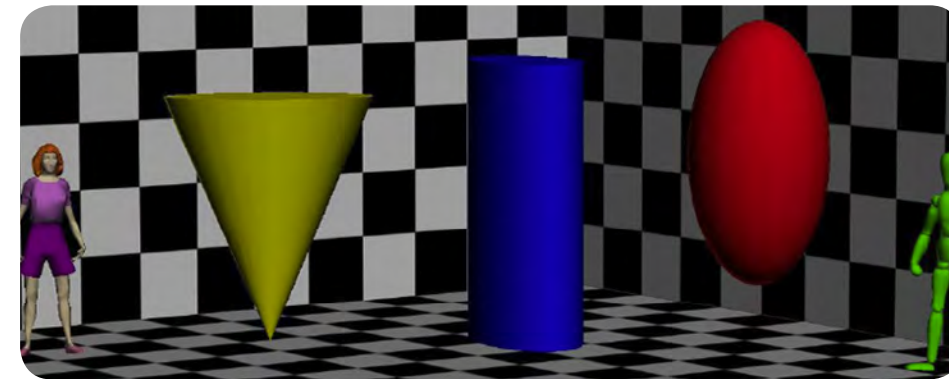
Oscar Ceremony rendering - 2006

TGV Train Launch rendering - 2007
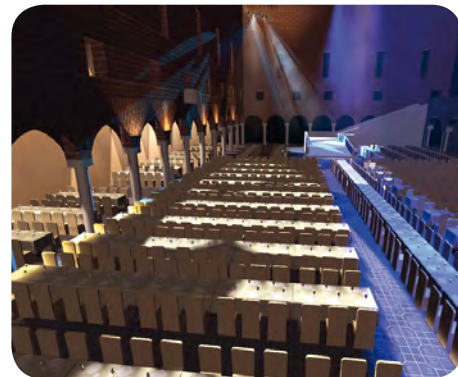
Nobel Peace Prize rendering - 2008

R23 polygonal objects

R24 smoothed rendered objects

The Dongle security system

As *wysiwyg* and now Vivien continued to make major growth in their markets, CAST was again considering new innovations – perhaps at tangent to the past but not to depart from it. What had we learned from over the years? Stick to your knitting – that is to say, continue to support your loyal customers and the mutual benefit of all industry professionals RWDs by developing new products for, into an industry that is already well understood.

The key therefore would be to conceive new ways to use the foundations that had made *wysiwyg* and Vivien unique, and extend them logically, ideally in the same market niche where they were already well known. Not that it was an epiphany, but the light grew brighter over time. The idea: Why not coordinate production design elements like 3D audio, motion control, lighting, video, media servers, performers, cameras, and other spontaneous elements? Is it possible to track, pinpoint the location of stationary and moving objects/people in 3D, and communicate that data in realtime to any technology connected to it?

Thus the first seeds of the BlackBox high speed communications system were planted. Research and development on this project required an independent team (for the sake of CAST's Members, we would

not divert resources and allow ongoing software engineering for *wysiwyg* and vivien) and the BB development continued over the next years.

Meeting Users' demands for new 3D objects; going green

2007

In March, a mere three months after the previous *wysiwyg* release, R19 hit the market, introducing the ability to import SketchUp files direct from Google's 3D warehouse, a vast and growing repository of 3D prebuilt items Users could now import realistic 3D models of many different types of objects from SketchUp into *wysiwyg* and Vivien. Later R20 introduced CAD Mode Enhancements including tools for 2D or 3D Boolean operations/merging objects.

Many of the enhancements for *wysiwyg* were also introduced into Vivien, which is possible since both share the same core code.

On a side note, in November the British Standards Institution (BSI) published a new standard BS 8901: Specification for a sustainable event management system with guidance for use, drawing worldwide attention to the growing concern of sustainability in the live event industry. The standard was enacted in anticipation of the 2012 Olympics in London and intended to manage the city's carbon footprint. Venues would earn tax breaks, rebates, reduced rates and grants in most other jurisdictions by upgrading facilities, promoting off-peak use of electricity, etc., that is by improving their carbon footprints to meet the new carbon standard.

As predicted at the time, this initiative has been mirrored around the world. It directly impacts the industry as today permit applications for special events and major productions require a calculation of environmental impact (carbon neutrality). *wysiwyg*, because of its powerful previsualization, readily reduces the carbon footprint by building and running the show virtually. Seeing it onscreen saves

countless hours of electricity, has become the chosen medium for doing this and is also being requested as an added item to the RFP's when submitted.

Inventing, innovating and developing

2008

In May, *wysiwyg* began what would be considered the trilogy of improvements and enhancements to its visualization. R22 began with enhanced Shaded Views for added realism, including softer-edge beams, beam flare at certain angles, realistic beam colour-mixing and atmospheric smoke (still or animated). R23 was already a work in progress.

Meanwhile, the first Alpha version of BlackBox debuted at PLASA 08. As initially envisioned, BlackBox gives formerly autonomous hardware/software controllers the ability to interact and cue off each other,

trigger pre-programmed commands (based on the dynamic positioning of moving or stationery objects), and deliver positional information for spatial audio (sound re-enforcement) -- live, and in realtime – a first in the industry. Whereas performers were originally committed to a script and (recurring) choreography in the past, BlackBox enables complete spontaneity (within the defined parameters of the space) while keeping lights and moving sets on track and providing added safety through its collision alert capabilities.

2009

wysiwyg R23 came out in February, delivering even further improved visualization in the Shaded Views and marking the second phase of the visualization upgrade project started in R22. This release included Improved Beam Footprints; Shadows; Hot Spots; Video in Beams; and an Improved Dongle Security System.

In August, *wysiwyg* R24 was released marking the crown of the trilogy. This release introduced the new LED Simulation Subsystem and Mesh Consolidation. It also

added Colour Temperature and Footprint Intensity Falloff features for Enhanced Beams, as well as Smoothing of Library Objects (People, Mannequins) and 3D Primitives.

R24 was debuted at PLASA 09 and won a PLASA Innovation Award.

The new dongle security system, already released in *wysiwyg*, was released in Vivien2010 meaning that Vivien Users share the same confidence in the security of their dongles and software.

The recession notwithstanding

2010

wysiwyg R25, released in April, enabled more advanced Video capabilities including Splitting Video into Sub-sources, displaying video sources and subsources on LED walls, and video could be projected and displayed on all CAD Primitive Objects. A few months later, in December 2010, R26 delivered a complete
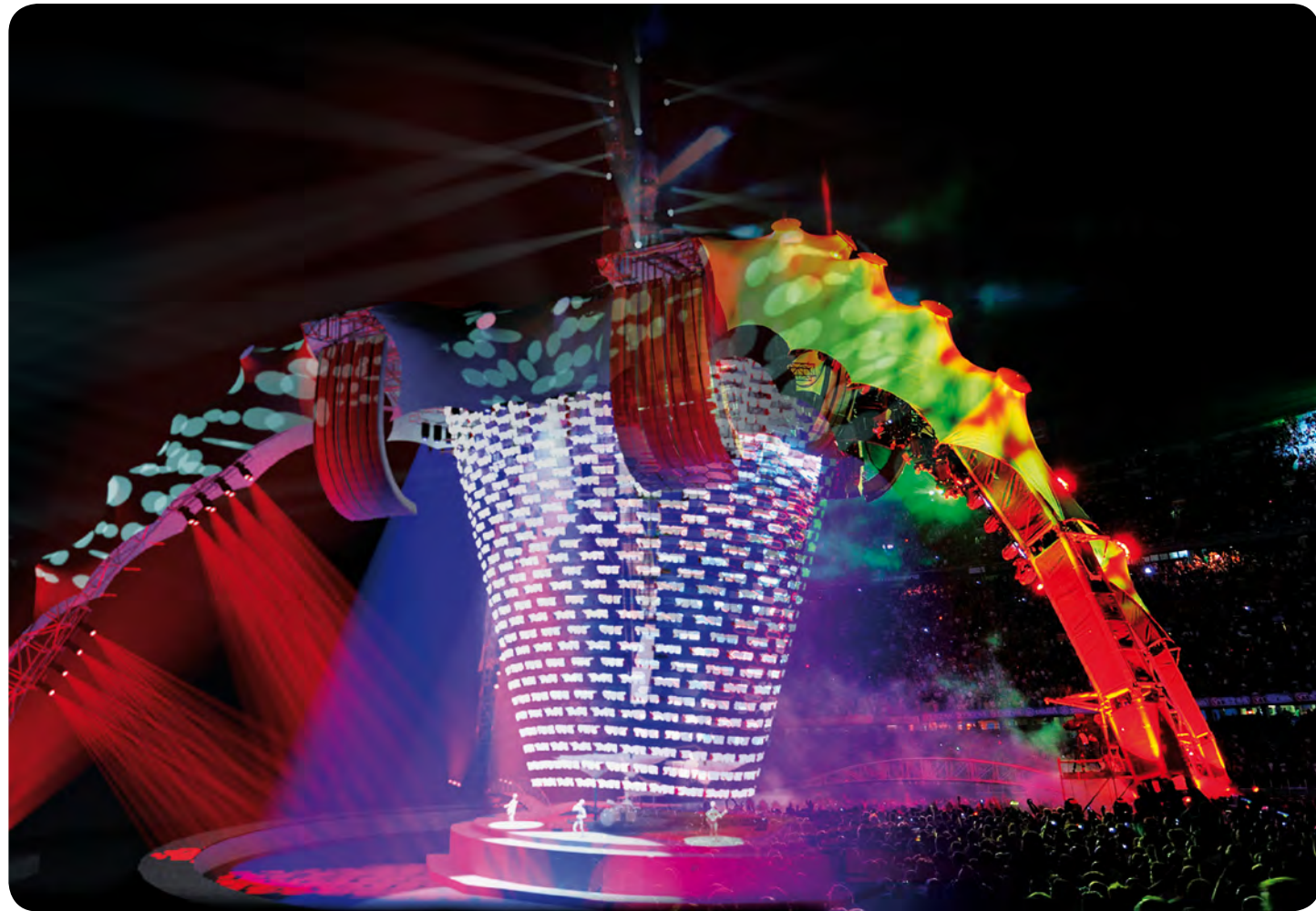
Rendering done for the U2 360 Tour - 2011

overhaul of spreadsheet functionality in the Reports and Worksheet tabs of PRES mode, plus New Reports with more functionality and even custom Reports.

Meanwhile, after many attempts over the past 2 years to find a third party live tracking system that was viable for the industry and that could work in realtime with BlackBox or a standalone. CAST decided to build its own and by PLASA 2010 in September, the first phase of the BlackTrax system was on display.

BlackTrax is a revolutionary realtime motion tracking system for people and objects, designed to work stand alone or with BlackBox. The BlackTrax system works using a proprietary sensor device that is placed on the moving object(s), giving tracking information in 3D (X, Y, Z) for the First Phase. Then the second Phase 2 will deliver the option of the full 6 Degrees of Freedom – X, Y, and Z coordinates, plus roll, pitch, and yaw angles. BlackTrax monitors the dynamic position of the object(s) in motion as well as giving important spatial relationships between objects and people in a 3D space BlackTrax monitors all of these parameters at a very high speed and with stunning accuracy.

The judges were impressed and BlackTrax won a PLASA Innovation Award.

Poised for the next revolution

2011

This year promised to be just as exciting as the last 20. We will begin shipping BlackTrax, release *wysiwyg* R27 and continue to innovate and develop more groundbreaking technology.

And it all started with the vision that became an innovation, which led to evolution, that led to a revolution, which came to be known as *wysiwyg*. Today *wysiwyg* is indubitably the industry standard. Here are

some stats

Four incredibly strong core products: *wysiwyg*, Vivien, BlackBox and BlackTrax

A comprehensive website including a Members Only support area

More than 130 distributors

More than 50 RWDs

More than 22,000 Library objects

More than 350 schools, colleges and universities teach with it

Oh, and we now have 30 employees…. and we still have Gil!

It began as a vision 20 years ago and has evolved into some of the most advanced innovations in the industry with plenty of directions to go in the future.

Stay tuned!