BD quality control - much beyond DVD

The Blu-ray disc format uptake offers ever-expanding ways for content to scale new heights in consumer experience. Achieving this isn't automatic, however. Authoring throws up many challenges. Think of the numerous complexities in DVD production – and square them – says PETER SCHOUWENAARS, Home Entertainment Business Line Manager at Testronic Labs Europe.

As with the launch of other multimedia formats, Blu-ray's advent has introduced a new range of features and processes for a publisher to consider. Consumer expectations of quality have leapt in sync. The publisher's challenge is now to release top quality, Blu-ray products, that meet lofty consumer expectations and preferably exploit the new format's manifold features to stand out against the crowd. And all of this through a stable supply chain and within stringent budgets. The impact of this on the authoring or replication process has been well documented, but what about QC? Is this just a big DVD with different video? Yes and no.

Dealing with HDMV and BD-Java

The format offers two approaches – HDMV version or BD Java. An HDMV title will give a publisher the chance to exploit new navigational and graphical options next to the high-definition video quality. Plenty of creative scope, and plenty of room on the disc for more content overall.

From a testing point of view, the majority of proven procedures from DVD testing can be applied to BD testing: (a) Similar stream QC and related encoding/playback artifacts; (b) Navigation QC processes across more menus, but based on upgraded checklists; (c) Compatibility testing on a range of devices and brands

There are some areas where it's clear that we're dealing with a new and different technology – compatibility across BD players is not yet at the level we got used to for DVD, and other elements of the supply chain have changed as they get to grips with BD.

Premium price points for BD mean extra pressure on the publisher. Client expectations are significantly higher and tolerance lower than with a DVD consumer – and the eyes of the industry are on every new title that is released. Clearly, qualified testlabs can leverage their DVD expertise on HDMV to ensure the same efficiency and reliability with BD very quickly and without too many headaches.

For BD-Java titles, it becomes a quite different ballgame. Java-based navigation opens up a whole new range of possibilities to developers, and requires a little more agility from the testing house.

BD consumers now expect smoother navigation and transitions as well as sophisticated interactive and dynamic features on the disc – even during the linear playback of the title. Menus are no longer single page graphics that link in a static way to other menus and can therefore no longer be mapped out easily. Title actions will now depend on a broad range of parameters and testing has to reflect that.

Title navigation can adapt to the players processing speed or version. Games may be unlockable or accessible – the scope for complexity is far greater, as the user experience becomes more sophisticated and interactive. As a result, the focus during testing has to change, and seeking new types of potential errors is essential. Among these are:

Response time errors With BD-Java, loading sequences are unavoidable. But where and how often do they occur? Are they of a duration that's acceptable for that situation? Tolerance for a 10-second loading time will vary dependent on whether it occurs just before loading the main menu or slows down navigation between different menu sections.
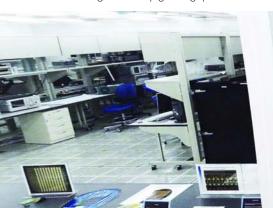
Playability It is generally accepted that the PS3 is the most powerful BD player in the market at present and is considered a reference by most authoring studios and publishers. But who wants his fancy game or functionality to become unplayable because a lower spec-ed player can't handle the user interaction quickly enough? This is where issues of usability and performance come in and a greater element of human judgment is injected into the setup of testing.

Player-dependent functionality BD players have been released with different profiles – not all players support the same functionality. Some players also have difficulty processing some of the heavier Java functionality implemented in some titles. For that reason, authoring studios will author different navigation levels to fit the player's capabilities. Correct handling from these different navigation variants will needs to be verified.

As a result, testing checklists for functionality and compatibility testing are three times more complex for a BD-J title compared to one using HDMV. For content-specific testcases, this level of complexity can be multiplied again.

BD testing is changing

Even the manner of testing has changed – testing the victory sequence when completing

the last level of a BD-J shooter game is a world away from a menu navigation check on a DVD. Random events, like hitting the jackpot on a slot machine game have to be factored into testplans. And since we are still dealing with a young technology, should we test this across multiple players to assure these new features are handled consistently?

To achieve this, testing houses who also provided non-DVD testing services have been able to entwine software testing techniques into their BD processes. Three main principles are the key planks of "cross-fertilisation" between software testing and BD testing:

Sample-based coverage is one of the key principles for testing of software. A tester will decide, based on a limited number of situations and not on all possible variants, if the application works or not. Unlike with DVD, where every different transition was a different hardcode link, BD-J transitions will be based on different parameters handled by the same piece of BD-J code.

Cheat codes Content validation in a multi-lingual title can become very time consuming if certain content requires specific conditions to be viewed. Many existing BDs already have shooter-games with the capacity to "unlock" levels or screens as a reward for play-through.

For the very first BD-J titles, getting there to test a couple of minutes of audio in each language of the disc could take hours. To increase efficiency in the testing, authoring houses were asked to introduce shortcuts (so-called "cheat codes") in the navigation to allow direct access to certain content.

New testing phases Traditionally the largest QC phase in DVD production was in the checkdisc phase. However, the publisher may not want to leave, for example, a cheat code on the final sample. Similarly, you can better cover all different screens of a quiz game before adding the random functionality to it. For these situations and many others, various types of tests have been moved to the emulation phase and out of the checkdisc phase.

Testing houses have divided their checklists into modules and can advise their clients which tests can be performed most efficiently in each phase of the development lifecycle.

Techniques like sample-based testing could be considered by some publishers as tricky shortcuts relying on luck and compromising a thorough service. With DVD the general rule was to "test everything." That isn't time or cost-effective for publishers anymore as BDs are in their most sophisticated manifestations far closer to large-scale software programmes. "Test everything" can't be the most efficient approach. Is this just looking for trouble? No! Take it from an experienced software testhouse, there are four reasons why:
■ You're no longer testing hard links, but recurring software routines.
■ Testing professionals know how to pick the right samples by splitting large ranges of situations into "blocks" of situations that each need to be covered.
■ Testing info (like cheat codes, flowcharts and info on new functions) can easily be provided by authoring houses to guide testing – the more insight into the functionality offered, the more efficient testing setup can be invented.
■ Testing for games or larger scale software programs has always been based on these principles. Testing professionals with experience in these markets, too, will master these techniques.

So far, so good. A little bit of software testing insight to set up accurate and reliable test processes, allied with existing content testing techniques perfected by DVD testers means quality in the blu-ray lifecycle is preserved.

BD-Live ups the stakes

Introducing BD-Live into a title will push this just one level further. Internet connected applications and features on the disc brings more elements to the testing table:
■ Content is changeable
■ Additional content can be downloaded
■ User-specific content (by region or by preference)
■ User-generated content
■ The lifecycle/development cycle gets extended
■ Different sources of content, new environment: disc and server

As a direct result, this will introduce some new principles to the testing:

Additional content If we test today the content on the disc, we have to test again with the content we can download. If content downloaded, where will it sit alongside the standard content and are navigation and menus adapted accordingly? If it replaces other content, like updated trailers, will all references to the old content disappear as

expected and will the new content fit the disc-based configuration?

Different content for different users A common situation with BD-Live is that some content is geographically restricted. Another option is that features are introduced to create different title reactions based on, for instance, the timezone you are in (e.g. nightview vs daylight view) and so forth. As testing traditionally happens from one location, during a specific period of the year and most likely during daytime, testhouses will need to manipulate servers to mimic the different variants of this functionality over the BD-live environment. This requires developer cooperation to tackle testing using staging servers that allow parameters manipulation.

User-generated content Testing of user-generated content, such as text chat or video chat features, has to focus on the handling of the content, rather than on the content itself. Is submitted content handled properly? How will it show in combination with the title content? Who should have access to it and who not?

The biggest concern with regards to the content itself is applying controls to what is submitted. How can we evaluate whether user-generated content is suitable for the intended audience? Where testing for inappropriate language can be done in a highly automated manner for text, this becomes a significantly bigger effort for video content.

Changed lifecycle With BD-Live it is possible to change your existing title as time passes, not only with respect to content, but also navigation and menu structure. As a result the design, authoring, testing, releasing process turns from a linear process into a recurring cycle. Where the development and testing stopped at the release with DVD, you now can have multiple maintenance testing phases long after the disc release date.

New environment, new sources of content Due to the download process, a range of new testcases are introduced. Specifically, the connection to the server, the download/streaming process itself and the storage of downloaded content require specific attention.

Around the server infrastructure decent testing needs to be considered. Is the server performance good enough to provide the users with an enjoyable experience? And will the server be able to handle peak traffic, whether that's event-based or simply coincides with the release of the big new title?

Load testing and performance monitoring have become new test procedures for the home video industry – another crossover from software and web testing and a specific skillset that some test houses have simply had to adapt from other areas of their business, and some have had to learn afresh.

Staying ahead of the QC game

Even since the launch of Blu-ray, lots of aspects of the testing lifecycle have changed. As ever in the early years of a product's lifecycle, functionality, players, tools and even format specifications have changed on a regular basis. Authoring and test houses need to stay abreast of these changes and make sure that their processes are as streamlined as possible for the client.

New features and functionality have led to a constant updating and expanding of test plans, an the new disciplines outlined earlier. For those not familiar with testing techniques outside of DVD this could conceivable result in some very inefficient work, and publishers need to be aware of the positive impact that testing procedures informed by software disciplines can yield.

The most significant change that all elements of the supply chain has had to embrace was to change the DVD project cycle from a mainly linear process (design, authoring/encoding, replication and only testing at the end) into a process were Quality Assurance has a role throughout the different phases.

This transition isn't complete in all areas of our industry – introducing testing companies in early project stages to provide testing consultancy and document features is essential for maximum efficiency at the end of the process. Sharing the right documentation and insight with test engineers, via test consultants embedded early in the cycle, could improve the process significantly.

As always, change and technology marches on. Blu-ray has been embraced by many consumers already, but it promises much more with the advent of 3D.

3D is next

What challenges does this bring with regards to testing ?

Based on initial projects and research, it's clear that the TV set starts to play a bigger role and handling of the different formats across the range of existing and new devices will require special attention. The matrix of discs, players and TVs will be bigger as backward-compatibility and competing 3D formats emerge. The Testronic Labs 3D testlab, in Burbank, California, is where research takes place alongside projects to keep our knowledge current in a fast-changing world.

For a company that also operates in the broadcast sector with cable TV networks, the advent of 3D channels and the whole next-generation ecosystem is core to our working life – our testers will quickly build up all-important experience with the new types of A/V bug, and the same goes for 3D games. It may be that games aficionados become the early adopters of 3D as a deluge of 3D games emerge for PS3 – our games testing facilities will be leveraging the knowledge of our BD home entertainment specialists, just as games insight supported test planning for BD-Java and BD-Live functionality as interactivity increased.

3D has the potential to insinuate itself across the entertainment spectrum both in-home and on the web – it's just one more example of how convergent technologies both benefit and challenge evangelists for quality. Just as software and games expertise has informed the new BD QC process, the future assurance of quality across a rapidly converging entertainment and digital media spectrum, 3D and all, will rely on broad and adaptable expertise across content, medium and device testing.

As consumption patterns are getting more complex and expectations continue to rise, safeguarding the consumer experience has never been more important.

BIOGRAPHY

PETER SCHOUWENAARS, Business Line Manager for Home Entertainment for Testronic Labs Europe, has over a decade of experience in providing independent testing services for consumer-oriented multimedia applications. Peter has also years of experience managing accounts for international clients that span the European publishing market segment for games and film. Contact: www.testroniclabs.com