software so that one's own definition of DCI defined terms do not conflict with another's. The need for methods by which competing vendors can access secure and private in-theater systems is now being addressed because it has become a real issue where the existing standards and specifications have remained somewhat mute on the topic. Despite the obvious and important need for companies to remain competitive and differentiate themselves as each competes for its share of the market, there is still ample opportunity for dialog. The entire industry benefits from this type of open interaction, and even more is needed.

The original plan called for two major upgrades, with some expectation of hot patches and minor enhancements along the way. The first upgrade planned for May/June was to come closer to DCI specifications by including the first phase of CineLink 2 and forensic watermarking. The second planned upgrade, targeted later in 2006, will be for FIPS compliance, the more secure and final implementation of CineLink 2 and other security issues are yet to be formally standardized. To date, there have been a number of interim patches and upgrades required to maintain interoperability while individual companies decide how they will interpret requirements and flex the system for its own objectives, and system limitations are determined. Upgrading systems can be a challenge in any environment, but in an accelerating rollout such as this, managing upgrades so that everything still works is daunting. Multiple studios and vendors have to be coordinated so that the right version of content and keys is married to the right version of software in the field. Upgrading 450+ systems cannot happen instantly, yet movies play all day, seven days a week, at every theater. There is nothing easy about it and yet it is happening with fairly little sacrifice as witnessed by the very small number of lost shows. This a testament to the people in this industry who have invested themselves and their companies in the effort. Although the problems have forced people to come together to work out solutions and even more interaction is required, the fact is that everyone is coming together. The new working groups are solving the last of the issues, and the transition is moving forward determinably, inevitably, and successfully.

At this year's NAB Convention, John Fithian said optimistically of digital cinema that what we have today is "beautiful chaos." Someone else once said, "From chaos comes order." If we look at where we are today, and at what everyone is doing, it is clear that order is coming—and with it the benefits of digital cinema for all participants.

Making Digital Cinema Happen

By Tim Partridge, Senior Vice-President and General Manager, Prof. Div., Dolby Laboratories

Digital cinema is playing movies throughout the world today. Although widespread adoption will happen in the future, our early installations have taught us valuable lessons. By improving the technology and installation process, we can plan for the long-term business of digital cinema. With more than 160 Dolby digital cinema systems throughout 12 different countries, Dolby has had a unique opportunity to survey this transition of the technology as well as the transition of traditional film business processes to support digital cinema.

In looking toward a massive rollout worldwide, the industry was concerned about cinema installers who work with film technology being capable of handling the integration of new digital systems. From Dolby's experience, the existing cinema installers are perfectly capable of installing our Dolby Digital Cinema systems with the related technology. As common practice for introducing new technologies, Dolby provided training courses to ensure installers were able to do all the preparatory work and much of the installation. Since this was the first time for many installing digital cinema equipment, a Dolby engineer visited each site and worked with the team of two or three installers to help with the integration. Also, given the urgency of the first major digital cinema rollout to get screens ready for the release of *Chicken Little* in digital 3-D on 84 screens, it

took extra effort on everyone's part to come together and make it happen.

The most time-consuming aspect of the installation was the building preparation work such as new portholes, power, and exhaust systems. Once that was completed, the actual equipment installation and setup was typically a one-day job. We learned that with large deployments, the installation bottlenecks are preparing sites and actually getting the equipment shipped to the theaters, some of which are quite remote. However, during an industry-wide rollout there would not be such a fixed deadline to meet as we had with the opening of *Chicken Little*. Although theaters share many commonalities, every site has its own unique issues, which need to be considered before starting each installation.

Once digital cinema systems are installed, the regular service technicians, who currently service projection booths, should be able to continue their job in the digital world with some additional training. Since technicians are very knowledgeable of the cinema environment, they will be able to determine quickly if there are any problems with the server, audio processor, amplifier, or speaker. Given these are all new products, there will be some growing pains, but this is expected with any new technology. As exhibitors review different digital cinema plans and technologies, it will be important that they find systems that come with reliable services and training programs to help them through any issues.

Our early installations have taught us lessons on what infrastructure is needed to get systems in place with exhibitors, but there are still multiple factors in progress that need to come together before widespread installation is feasible from a business perspective. Most important, the industry needs to embrace one digital cinema standard. With the SMPTE standards pending, the industry continues to work toward the DCI specification guidelines. Right now, the industry is focused on the JPEG-2000 format for manufacturers to meet today, to move toward interoperability. All server manufacturers and studios must come together in their support of the JPEG-2000 format so that exhibitors can install proper systems to present digital content and grow their business. Dolby helped achieve interoperability among the vendors, at the behest of the studios, for MPEG, and is in the same process for JPEG-2000. However, once JPEG-2000 is in place, there are still many aspects of the DCI specification that are vague enough to make interoperability still an issue. This is one reason why a compliance testing program is necessary.

Although interoperability is essential to ensure a viable business, security is also a key factor. Piracy is a growing concern with digital content, and the DCI specification actually focuses more on security than any other element of its guidelines. Under the DCI specification, all server manufacturers need to meet the Federal Information Processing Standard (FIPS), which can take up to a year to achieve. Watermarking is also an essential factor under the DCI specification. DCI calls for all content to have adequate forensic markings for tracing unauthorized copies.

As the standards are finalized, certification is needed to ensure that products meet the necessary criteria. What the industry needs is a test procedure, a certification process, and perhaps a viable industry body to oversee correct adherence to the test procedures. Although parts of the specification call for third-party certification, such as FIPS, ensuring third-party testing of every product for the entire standard would add significant costs to an already expensive system. Without such a program, there will definitely be chaos in the industry for a number of years, and the exhibitor will probably suffer the most from not knowing what to install.

We also need to remember that the server and projector are only components of a whole system that delivers a digital cinema experience. If that experience is to live up to its promise, and be attractive to cinemagoers, then the whole system should be state-of-the-art and nothing less.

Now that installations are happening throughout the world, it is important that we work together to find a balance in responding to customers, both studios and exhibitors, while the actual requirements for achieving full DCI compliance are not yet known. There will certainly be further changes to existing systems before the industry reaches a standard, and Dolby's goal is to help minimize the impact of those changes on the exhibitor. We are optimistic that by the end of the year we will have moved further along and there will be a real opportunity to improve the theater-going experience.