

# Slow train coming?

## The transition to digital distribution and exhibition in cinema

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### Abstract

Throughout the 1990s digital technology entered film production and rapidly altered both the production process and the audience's experience, as complex soundscapes and special effects became the hallmark of cinematic blockbusters. By 1999, the prospect of an end-to-end digital cinema, or cinema without celluloid, seemed to be in sight. Digital distribution and exhibition were extolled as particularly attractive prospects, and a number of test sites were established in the USA. However, the last four years have demonstrated that significant issues need to be resolved before there will be broader implementation of digital cinema. Working from a series of interviews with key industry practitioners in Australia and the United States, this article examines the struggles currently affecting the roll-out of digital cinema, and assesses the likely impact on Australian exhibition practices.



Throughout the 1990s cinema underwent a period of intense technological change as digital technology altered sound, picture editing, special effects and other aspects of post-production (McQuire 1997, 1999, 2000). Digital acquisition, distribution and exhibition were the next targets in the seemingly irresistible march towards cinema without celluloid. Following his 1999 experiment in equipping four US cinemas with digital projection systems for the premiere of *Star Wars Episode I: The Phantom Menace* (George Lucas, Lucasfilm, USA, 1999), George Lucas announced plans to show *Episode II* in digital format only (Goodale 2000: 15). Ambitious initiatives to fund the roll-out of digital projection systems were established by Technicolor Digital Cinema (formed in 2001 by film services group Technicolor and digital communications company Qualcomm) and aerospace giant Boeing. The benefits promised were numerous: improved image quality for audiences over the whole of a film's run, increased programming flexibility and the generation of new revenue streams for exhibitors, and substantial savings in distribution costs for distributors.

Midway through 2003, the only high-end digital projector in an Australian cinema is at the

Australian Centre for the Moving Image at Federation Square in Melbourne. None of the major exhibitors in Australia — and relatively few cinemas worldwide — have yet adopted digital projection systems as a replacement for 35mm film.<sup>1</sup> Although George Lucas shot *Star Wars Episode II: Attack of the Clones* (2002) using 24P high-definition digital cameras, the main form of release was still film.<sup>2</sup> Why has the transition to digital distribution and exhibition been slower than many first envisaged? The answer to this question reveals the complexity of managing technological change in a mature industry comprising different stakeholders with divergent interests.

### **Blocking the tracks**

While the initial forays using digital projection as a replacement for 35mm were popular with the *Star Wars* audience in 1999, they convinced few in the film industry.<sup>3</sup> Four years down the track, the major problem is no longer the lower image quality of digital projection. As Domenic Case (Group Technology Manager at film services group Atlab in Sydney) puts it:

I don't think image quality is where the argument is. [...] I've been watching video projection, if you like, or digital or electronic, since the early eighties. I think what I'm seeing now, to most audiences, is as sharp as they need it to be in terms of resolution. It probably does resolve as well as an average 35mm theatrical release. You see you have a hell of a lot of resolution on 35mm on negative, but you lose a lot of that in the duplicating and printing process, so what goes up in the cinema is only a small proportion of what's there resolution wise. I don't think a digital image is far short of that and most people are quite happy with it. Its tonal range is approaching that of film.<sup>4</sup>

While most people I interviewed for this project (with the strong exception of Steve Poster, current President of the American Society of Cinematographers) agreed that digital projection had now achieved equal quality to an average release print projected in commercial conditions, few felt this alone justified making a change. As Neil Pentecost (Chief operating and Administrative Officer, Reading Entertainment and President Cinema Owners Association of Australia<sup>5</sup>) put it: 'Unless it's a quantum leap over film, why would you invest?' With image quality roughly equal, attention is now focused squarely on the issue of cost. Ian Sands (Chairman of Roadshow Film Distributors) observes:

From an exhibition point of view, it's the cost. I think digital cinema as such has arrived at a point where it's comparable with 35mm. But it's about prices—how expensive is it to achieve that quality?

Given that high-end digital projectors were initially priced at around US\$250 000 and still sit at around \$US120 000, the difficulties facing exhibitors are obvious. Domenic Case makes the point:

Even the popcorn sellers would understand enough about business to say, I've got a Aust\$40 000 film projector that's already here, and running, and will go on running for 20 years. Why would I replace it with something that costs five times as much to buy, and that's going to need to maintenance and will probably be obsolete in two or three years?

Paul Johnson (CEO of Hoyts Cinemas) echoes the analysis:

In Australia, people have made investments in building cinemas equipped for 35mm, and they've spent Aust\$150 000 in installing and equipping, and they've made that investment thinking they've got that equipment for the life of their lease, or twenty years. Projectors, if well maintained, will last twenty or twenty five years. Other than well capitalised

companies, most exhibitors will say ‘I can’t afford to replace that projector’.

These comments highlight a basic problem facing the roll-out of digital exhibition and distribution. Developing a workable business model is complicated by the fundamental disjunction between where costs and benefits fall, with exhibitors facing potentially massive costs to re-equip theatres while the bulk of the savings would accrue to producers and distributors. Further complicating this situation is uncertainty over the ancillary benefits promised to exhibitors, who remain concerned that digital cinema may transform the exhibition business in unpredictable and even unwelcome ways.

### **Arguing the costs and benefits of digital cinema**

Putting aside for the moment the promise of scratch free screenings, the main benefits digital cinema offers to exhibitors are generally seen as: i) more flexible programming options; ii) productivity gains in running theatre operations, and; iii) access to new or improved revenue streams. I will deal with each of these issues in turn.

Most observers agree that digital cinema will offer significant advantages in terms of programming options. Exhibitors will be able to expand the number of screens devoted to a popular film without having to wait for extra prints to be shipped. They will also be able to improve the quality and versatility of pre-feature advertising, as the current practice of manually assembly of platters could be replaced by a computer controlled playlist. However, this new flexibility would come at a price. Paul Johnson notes:

[T]here’s no question that if we were able to use digital, the processing, programming, and labor involved would create productivity efficiencies. [...] Today a projectionist has to get a print delivered in 4-5 cans, pull that apart, join the film together, do a print check of the film to ensure the joins and its sequence is all correct. They have to add various presentation trailers, advertising content. Under digital, you could co-ordinate that far better. [...] You might make efficiencies of approximately 10-15%, but then you have added costs [...] So there might be savings on the surface, it may be in net result that you’re only saving 2%.

The ‘added costs’ to which Johnson refers come from the different skill sets needed to operate a digital cinema. Alaric McAusland (National General Manager at Atlab) comments:

[Exhibitors] would be required to train their projectionists, to take on staff they don’t have on site now, for example, IT specialists, systems support, just to keep projectors running. In relation to satellite or digital distribution you may need network specialists, and a whole plethora of people that they don’t have access to at the moment. It changes their skills set, and I think it’s recognised that that will probably cost them more than the projection teams they have currently. That doesn’t touch on installation costs.

Neil Pentecost foresees problems for smaller exhibitors, especially in regional Australia:

It’s not that they’re not interested, but they’re small business people, often they’re family operations, and for them to finance something like this would be considerable. The projectors we use these days are often many years of age, and they can just be refurbished, and kept going. It’s not unusual to find equipment in cinemas in Australia that’s 30 to 40 yrs old, and they’re tried and trusty things. They can break down, but the person operating them can take them apart and put them back together almost with their eyes closed. You’re asking people to step into a world they don’t really understand.

The efficiencies of digital cinema may prove equally elusive to multiplexes and megaplexes, at least until they are able to finance digital projectors for every screen. Most cinema complexes which have currently installed digital projectors have one screen, with a few offering two screens. However, the likely scenario of a mixed environment, which may persist for some time, presents its own logistical problems. Domenic Case comments:

[W]hat happens when your digital show is no longer filling the 400 seat room? Under normal conditions you'd put it down in theatre six, which is 150 seats, and put the newer film on the big one. But you've now got to change formats from digital to film. So you'd have to buy a print anyway.

While these transitional issues don't negate the possibility of productivity efficiencies, they do suggest that exhibitors are scrutinizing mooted savings closely.

Another major drawcard for digital cinema is the claim that it will enable exhibitors to broaden their operations from exclusive reliance on feature films towards a more varied diet. Once theatres are networked and able to display digital content delivered by cable or satellite, it becomes possible to use the big screen for live broadcasting. Gary Bouchard (Business Development Manager, Cinema Operations Worldwide at Kodak's Entertainment Imaging division) is enthusiastic about this prospect:

We say in a lot of our presentations there are not too many businesses that operate at 25% occupancy rate. But that's what the theatre business does. But with a digital network they're going to have the opportunities to incrementally raise that occupancy rate with the football matches on off times. When they have six people on certain nights they're going to have the opportunity to show things and program things they weren't able to before. It's much more of a broadcast mentality than a traditional cinema mentality.

While experiments have been conducted with some success during the 2000 Soccer World Cup, at this point most exhibitors don't see it as a major revenue opportunity. As Michael Karagosian (Digital Cinema Consultant to the National Association of Theatre Owners in the US) points out:

Sports would be really neat, except that sports has much better return for the buck on a satellite TV network. It's copyrighted and it's time valued. [...] Sports seems so interesting, but it's probably not practical, except for very special occasions.

Interestingly, making the shift to projecting alternative content such as live sport doesn't necessarily demand the kind of high end digital projection systems capable of replicating the quality of 35mm film. As Bob Mayson (General Manager Digital Systems and Vice President of Kodak's Entertainment Imaging) points out:

[Y]ou don't need a US\$150 000 projector to show sports. There are lots of projectors at US\$15 000, or US\$16 000 that do a really good job because you're projecting video, not a filmic experience. Those things are widely available. You don't have to have the brightness capability.

However, showing live content would demand significant change of focus for exhibitors, who would have to take on the promotional role currently performed for them by distributors. Mayson continues:

Fast forward to the ultimate content world and you decide you want to put Aussie rules football on in Melbourne. I can watch that at home or I can pay \$12 and go down to the

local cinema and get a glass of beer and watch it with fifty other people. Who's going to market that? And is that an experience I want to try, or will I just turn on the TV and watch it for free? Is there an opportunity to market that? That would be a sea change.

In fact, low end digital projection systems are currently making far greater inroads into cinemas than the more expensive high end systems. As Michael Karagosian notes:

While we're really struggling to get another fifty digital screens for digital cinema, we're going to see thousands of screens installed by year end, for advertising. [...].

The key difference is that the business case for low-end digital projectors is far more compelling to exhibitors, with smaller upfront costs directly offset by the ability to increase revenue. Digital programming not only cuts the cost of cinema ad campaigns, by eliminating the cost of multiple prints, but allows far greater targeting of specific audiences, making cinema more attractive to advertisers as viewers drift away from television. Karagosian comments:

[Advertisers] can start doing things like putting out an ad that really only wants be shown to an adult audience [...]. I haven't seen that done yet, but that's the next level. Electronics offers this whole level of interesting management of who you can target with your advertising. What that means to the exhibitor is more bucks for that ad, because of the higher the quality of those eyeballs he can sell.

This issue has greater potential significance in the US, where revenue from cinema advertising has historically been minimal compared to territories such as Europe or Australia.<sup>6</sup> Nevertheless, low end digital projectors are also being rolled out faster than high-end systems in Australia, replacing slides and telecines for delivering advertising content. For technology and service providers such as Atlab, this is offers a way of familiarising the industry with digital projection. Alaric McAusland reports:

We're migrating that [ad] business across to a digital platform. We see that as something that's going to give distributors an understanding of the digital process, distribution and display. It will also perhaps give them access to revenue streams they haven't had before at a localised level.

Establishing networks of low-end digital projectors raises the possibility that they could be used to screen alternative content such as lower budget films originated on DV cams, even in the absence of a shift to digital exhibition for mainstream feature films. Another possibility is the use of cinemas for interactive experiences such as multi-user gaming. Michael Karagosian comments:

There have been some experiments done in the UK with Ericsson, they've sponsored some tests on a cursor for a cell phone they make. The cursor can be transmitted from the cell phone to allow the owner of that cell phone to position the cursor on the screen. They got fifty kids playing on a system once with good results. [...] I suspect it's a great Saturday morning thing, drop the kids off. If you're in a trusted area, for keeping kids safe, etc, if they can work those details out, I think it could be a really interesting business. And it's off time business. It's not competing with Friday and Saturday night content.

### **Enter the third party intermediaries**

As interesting as these prospects are for the future of 'cinema', they remain side issues to the major content providers —the Hollywood studios who control the bulk of the material screened

in cinemas around the world. For them the main game is the replacement of 35mm film, which opens the door to massive savings in film print and distribution costs. However, the enormity of projected transition costs— between to US\$3-4bn to refit US cinemas alone at current prices— led to proposals from groups such as TDC and Boeing to fund the cost of digital projection systems in return for a share of revenue. Dave Elliott (President of Technicolor Digital Cinema) describes the thinking behind their plans:

When we announced our plan to launch digital cinema, we thought that it was going to take a kickstart in order for digital cinema to happen. There wasn't enough momentum being built by the content owner or the exhibitor and there were a number of questions being asked, like who will pay. We thought the only way to jumpstart digital cinema business was for us to take some significant risks. Those risks were to fund the deployments of up to 1000 units in the US at that time. So we made that announcement at ShowWest in March 2001.

However, with the new players from the computer and IT sectors came proprietary forms of encryption and compression, as well as custom hardware such as servers and digital projectors. This lack of standardisation presented a stark contrast to the universality standard of 35mm film. Digital cinema looked set to repeat the battles over analogue television, VHS and Beta video, and digital broadcasting. Julian Levin (Executive Vice-President Digital Exhibition and Special Projects at Twentieth Century Fox and Chairman of the Digital Cinema Initiatives consortium) recalls:

[S]uddenly in the US about a year ago, we had 50 or 60 systems, three different compression technologies required, at least two forced distribution channels through Boeing and Technicolor, having to provide your content in three or four different forms, and being forced to go through certain players at an expense that exceeds film to get the digital content to destination. So for the studios, and the distributors, it makes absolutely no sense.

The situation reminded exhibitors all too well of the introduction of digital sound with three competing formats. As Neil Pentecost remembers:

[I]n the early days for exhibition, it was horrendous trying to work out where to invest. Certain studios were going down one line, others going the other. Then it's hard to make your investment decision.

Given that digital sound systems offered audiences (and therefore exhibitors) marked improvements in sound quality at fairly modest prices, whereas digital projection simply replicated existing image quality with the potential for new efficiencies and revenue streams, the lack of enthusiasm from exhibitors becomes more understandable. As Alaric McAusland points out, without standardized equipment, basic confidence building measures are lacking:

[Y]ou have to prove to [exhibitors] that it isn't going to be superseded in two to three years time, that the running cost of that equipment is going to be maintained at the same level that photochemical equipment is now.

There was also suspicion of attempts by third parties such as TDC or Boeing to change the structure of the industry by positioning themselves between the traditional partners of distributor and exhibitor. Julian Levin is a strong advocate of not altering the existing business relationship:

I don't believe in interfering with what has been a great business from a business point of view. In other words, when we sell a film to an exhibitor, you almost have to look at it like it's sacred, because it's worked so well. You don't want to interfere with that. [...] You want to provide as efficient infrastructure to facilitate that and reduce costs where you can,

obviously, but it doesn't change what you're doing fundamentally. So, you can't lose sight of that. Boeing was losing sight of that, because they were trying to find some money from exhibition to pay back the systems they bought, and Technicolor and Qualcomm were trying to find some money from exhibition, maybe from a bit of advertising, etc. But it's never going to work. It's not viable.

Exhibitors on the whole agreed, as relatively few took up the offers by TDC and Boeing. Dave Elliott acknowledges:

We felt that if we took the 'who pays' issue off the table, there was going to be enough initiative developed to launch digital cinema. The fact of the matter was we were wrong.

### **Formation of Digital Cinema Initiatives**

The fundamental sticking points which emerged from the attempt to kick start digital distribution and exhibition between 1999-2001 were the lack of a standardized technology, and the concomitant difficulty of devising an economic model. Given that players such as TDC and Boeing had spent large sums of money trying to develop proprietary systems in order to leverage a new industry structure, the issue of standardization is undoubtedly thorny. From the studios' perspective, Julian Levin remains adamant that the key decisions need to be made by those who produce and distribute the product, and those who show it:

Boeing, Technicolor, Kodak, etc, can all say what they like. But they fit somewhere in between. They're not a pivotal part of anything. You've got distribution and product, and you've got exhibition. Everybody else is in the middle.

Levin led an initiative in March 2002 to form a consortium consisting of the seven major Hollywood studios to establish the system architecture for digital distribution and exhibition. Initially called Newco, now Digital Cinema Initiatives (DCI), its formation signalled a major change in the attitude of the content owners to digital cinema. Michael Karagosian comments:

The prototype systems were encouraged by one, two, three studios. Not the seven major studios. The seven major studios are now interested, which is the significance of DCI forming, that all seven are actually saying we need to get this together, and we need to get it together, together.

According to DCI CEO Chuck Goldwater:

DCI was formed to formalise and even galvanise the studios' commitment to contributing to the development efforts for digital cinema. Digital cinema was beginning to develop in different, not compatible directions, depending on who was the manufacturer, or the integrator of the system. Theatre owners had been through the digital stereo development issue, which resulted in three different and not compatible digital stereo systems and nobody wanted to see that happen again. This was an opportunity for the studios to bring focus to what they believe were objectives that everybody would find desirable and that is to ultimately develop a system with specifications and standards that were consistent and uniform in what they would produce.

While there are many good reasons to reproduce the universality of current film technology in the digital domain, the formation of DCI—with its eye on preserving existing business relationships—raised legal in the US. Levin is at pains to stress that DCI is not trying to establish a monopoly over the development of technology used or who manufactures it:

We're not inventing the technology—that's there. We don't want to be in the server or

projector manufacturing business. We're saying here's the system architecture, guys, so all you people if you can manufacture your components to this architecture, you're in business. [...]The company's major objective is to design the system architecture based on existing technology that will provide open competitive environment, the component units will be interoperable and swappable.

DCI are currently charged with setting a framework for a number of critical issues, including the resolution of digital projection systems, forms of encryption and compression, and the nature of the digital 'package' which will replace reels of film. Most of these issues, which have also been the subject of long debates by standards bodies including MPEG and SMPTE's DC 28, remain contentious. For instance, current digital projectors are based on a 1.3K (1300 line) resolution. Many in the creative community have argued this is too low to be mandated as a standard to replace film. Charles Schwarz, (Executive Director and CEO of USC's Entertainment Technology Centre, which runs the Digital Cinema Laboratory, the major testing facility for digital exhibition systems in Hollywood), observes:

We really should say, if digital cinema is going to be better than film, it has to be better than an answer print, a show print, a 'AA' print. [...] Do we want to throw out a hundred years of what is a really elegant format, for something less than that?

However, to image quality is only one side of the equation for DCI. For Chuck Goldwater:

The problem we have, is how do you try to put something in the theatre that would be scaleable and extensible at a cost that doesn't wreck the bank. That's the real issue.

Goldwater's emphasis on flexibility underlines the fact that the whatever architecture DCI specifies has to achieve a level of interoperability, and a degree of forward and backward compatibility, which is currently lacking. As Michael Karagosian points out, at present the colour standards of the two main projection systems (DLP and D-ILA) are different:

If we were to distribute for Texas Instruments projectors, will they play on D-ILA? No, they won't. They won't look the same. They won't look as good as a color corrected DLP. That's a big issue, and it's a technology gap we haven't crossed yet

The magnitude of DCI's task is highlighted by recent reports that they are considering endorsing a projection standard of more than 2K or 2000 lines of resolution (National Association of Theatre Owners, 2003). While this would be welcomed as a step in the right direction by cinematographers and others in the creative community, a 2K standard multiplies issues of data storage and handling, potentially pushing a wide roll-out of digital systems further into the future. Moreover, because the 2K chip is bigger than the 1.3K chip it replaces, it will be hard to retrofit the more than 150 older DLP projectors now in use. Exhibitors also raise concerns about the reliability of digital systems, fearing crashes will black out screens. Finally, as Goldwater points out, security is a key issue which also has a high potential to impact on exhibitors:

Security is high on the pyramid of what's going to get looked at. On the base level, encryption, the key management issues, then the subject of how hard do you enforce the key management activities. You could have one extreme that says that I just want to worry about the start date and close date, and you just use the keys in between as you see fit. But, then, oh by the way, I want really good audit trails of what you did. The other extreme is control every time you use the key. Those are the extremes you could use. It sure opens the door to a lot of discussion.

## Negotiating the numbers

DCI sees its role as facilitating these discussions by providing basic information. As Goldwater puts it:

Mostly what we're trying to do first is to establish the facts and figures of the situation you're describing so that when we get to those discussions, they'll be fully informed discussions, with nobody squaring off in the dark over something.

Julian Levin remains optimistic that this initiative will help to resolve the disjunction between exhibition and distribution:

The exhibitors are absolutely behind it [the formation of DCI]. Will they pay for the equipment? Probably not. Will they pay for some of it? Maybe. But I'm not concerned about the financing and leasing model, because once you've got studios, distributors and exhibition endorsing it, you'll work out the business model. It's no problem. You'll figure it out, as long as you've got those two pillars of interest to move it forward. We certainly do have exhibition's interest. They just want to make sure it gets done right.

A critical element of the on-going discussion is the cost of the digital systems weighed against the potential savings. According to Bob Mayson, the sums don't add up yet:

We've been telling people that if a print runs five weeks on average, you use about ten prints that go through a screen per year. So if it costs approximately US\$1500 a print, it takes US\$15 000 a year, more or less, to keep one screen healthy with prints. So if you could change equipment that you could amortise every five years, you'd need to get the equipment and infrastructure costs down to around US\$75 000. All these other people have been putting these systems up for US\$250 000. That's three times what the economics are saying you're even going to do for film, before you're going to get close. The cost of the whole system has to get down. When it reaches somewhere in that neighborhood, and it might actually hit somewhere over US\$75 000, it might be US\$100 000, because the studios see the long term overhaul as seven years as opposed to five, then it becomes more viable.

An even more conservative analysis was made by Huske and Vallières (2002: 14), who point out: 'All of the talk about the ability to save print costs never seems to mention the capital cost associated with deploying digital cinema'. Huske and Vallières calculated that even with a price tag as low as US\$50 000 per screen, savings from digital projection would be marginal.<sup>7</sup>

This isn't to say that the transition won't occur. These figures are necessarily estimates, and others do the sums quite differently, depending on how they factor in elements such as the discounts that studios get on film print costs for large print runs.<sup>8</sup> Moreover, as mentioned previously, there are other mooted advantages to digital cinema, including productivity gains, flexible screening practices and the creation of alternative revenue streams. These gains will be enhanced if digital acquisition becomes more common, as the costly and time consuming processes of digitizing film, and recording digits back to film, would be eliminated. However, these economic analyses do call into question the size of the pot of gold often thought to lie somewhere over the digital rainbow. Given that projector costs are still well over \$US100 000, the timetable for a broader roll-out may be further over the horizon than many think.

## Timeline

Given the dimming of expectations since the heady days of early 2001, most industry observers are understandably reluctant to commit to firm timelines for the rollout of digital exhibition. Neil Pentecost comments:

Two years ago people were saying it would be here by now, well it's not. [...] I think widespread digital is probable about three to five years away. If it comes sooner, well and good. [...] I'll be very surprised if in ten years we won't still be sitting around talking about conventional film stock, albeit there may be by then a whole heap of digital cinemas around as well. It's not going to transform overnight.

Critical to the timetable for the next phase of development is DCI. As Bob Mayson of Kodak acknowledges:

Inevitably, what [the formation of DCI has] done is everybody is going OK, there's no point doing any more until they come down from the mountain with the tablets of stone. So what you're seeing now from a technical point of view, certainly from some of the other manufacturers who've been there, is a downsizing, a holdback. There's no point doing any more until we know we're going to do it with the right equipment.

Julian Levin (Chairman of DCI) outlines a fairly ambitious timetable:

[T]he engineers are working really hard as we speak in designing that system architecture. Probably in the first or second quarter of next year [2003], we'll be able to discuss on a preliminary basis what that architecture is. [...] . Toward the end of next year, converge that preliminary architecture on a final architecture publication that will take place somewhere around the first quarter of 2004. Beyond that should be deployment.

Whether this timeline can be met is a moot point. System testing has the potential to be incredibly complex, as Charles Schwarz acknowledges:

When you start to think of all the tests you could do there, your head starts to spin. Every single variable: does it come from original film? Is it coming from a 24P digital, or a Sony more advanced camera, or a Thomson Viper camera? What's the source? That's a variable. How is the information prepared, whether it be film or digital, how is it scanned, how is it digitised? How is it encoded? At what data rate? You start to think of every possible variable, and if you want to test for one, you could end up with an Excel spreadsheet with 288 possibilities and different alternatives you can have.

Another factor to consider is that technological change in this sector is hampered by the fact that the market is relatively small. Even in the unlikely event of the majority of the world's 130 000 cinemas converting to digital exhibition, it remains a niche market in technology manufacturing terms. As Alaric McAusland notes:

[O]ne of the prime contributors to the cost at the moment is that we're not talking about a consumer product, like a VHS or DVD, where there's a huge market to draw. They're dealing with a relatively small number of screens. . It's a huge R and D cost for a supplier such as Barco or Christie to create a 2K or HD hybrid digital projection unit, and they're not going to get a huge return on it.

The issue of market scale helps to explain why hardware costs of high definition projectors have been relatively slow to come down. It also suggest why companies such as Texas Instruments, which produces the chips for DLP projector, have recently moved aggressively into the home cinema market, as a better means of realizing their investment.

### **Australian futures**

Any future roll-out of digital cinema in Australia will be heavily influenced by both the

timetable and the technological model adopted in the US. Alaric McAusland comments:

There will be certain elements of the distribution process we'll be able to tailor specifically to an Australian context, but the larger boxes are going to be delivered in adherence with US standards, and supplied to us, or acquired by us at a pretty much global cost.

What remains unclear is the impact the transition will have on the Australian cinema industry as a whole. In terms of the impact on smaller exhibitors, Neil Pentecost argues:

If the economics don't stand up in the big cinemas, they're unlikely to in smaller regional centres.

However, if the issue of the cost of infrastructure were somehow resolved, Domenic Case speculates that digital distribution could offer remote cinemas greater access to new release films:

The country cinemas at the moment can't afford to hire a print, or barely afford the shipping costs. Then there's the fact that the distributors say that the minimum deal is that you screen it twenty times, or whatever.

Digital cinema might provide impetus to renegotiate these practices. Case also argues that the impact on local films is ambiguous:

It may become harder for a small local production to fight against that [studio marketing power], particularly as local production works better by word of mouth. [...] But, on the other hand, the thing that's limited *Lantana* and others like it, *Two Hands*, etc, which deserved to do better than they did, is they can only afford twelve prints, so it's only on at twelve screens and you've got to hunt around to see it. [...] Maybe there's an opportunity for a local product to go big, but then the method of distribution becomes more crucial.

One hurdle is the cost of generating a digital master. While this is not a major item in terms of Hollywood budgets, it is potentially prohibitive for modestly budgeted local films. Alaric McAusland notes:

We're at a point where we might do 30-40 locally derived and locally funded pictures per year at a relatively moderate level of funding, and it's hard enough on occasion to accommodate the photochemical post production let alone for us to expense the technological improvements that are required to produce a digital master. I'd acknowledge that to be a challenge not just for us, but globally. Unless major changes to the funding methods for feature film are found.<sup>9</sup>

So are we approaching an end-to-end digital cinema in the near future? Answering the question depends to some extent on how one defines digital cinema. Derek Allsop (Head of Technology and Infrastructure at the Australian Film Television and Radio School) argues:

There are several trains of thought in respect to digital cinema. One is that digital cinema is anything where you can put 'D' in any of the boxes: capture,, mastering, distribution, exhibition, and archive. In which case digital cinema has been around for a long time, because there's been a lot of digital processing for many years. Another school of thought is that digital cinema is only when you can put D's in all the boxes

If this latter definition is accepted, there are still major hurdles to jump before we reach an end-to-end digital process. Even if we can tick off the first four boxes as technically possible, if not

yet commercially viable, Allsop argues 'it will be a long time before you can put a D into the archive box'. While this problem deserves more attention than I can give it here, archiving is a major issue often left out of the digital cinema equation. A good point to close on is the observation by Charles Schwarz:

I don't think there's anybody we've ever encountered in Hollywood who believes we're anywhere near where we want with using digital material as the archival master. [...] We asked that question of the Lucas people, and we know that they're going to archive on film. The value of *Episode II* is too great. Would we ever reach a place where people felt they could archive digitally? Possibly so. If we can solve the problems of media deterioration, and of software changes, etc. Those are huge problems. [...] In Sweden, they convened a conference of archivists of all kinds, and they posed a question: if you had mission critical information, and a hundred years from now you must have the greatest assurance that that information can be retrieved and understood, how would you archive it? The overwhelming answer was 'print it on acid free paper'.

The digital freight train rolls on, but some destinations are still a long way off.

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<sup>1</sup> At the time of writing, there are about 150 high-resolution digital projectors operating around the world, most in the USA.

<sup>2</sup> The day and date release strategy Lucas adopted meant a staggering 14 000 prints were made worldwide. An average Hollywood release involves around 3000 prints.

<sup>3</sup> The initial tests involved four projectors, two using Texas Instrument's DLP technology and two using Hughes-JVC's ILA technology. Subsequent versions of the DLP projector have become a de facto industry standard in existing digital cinema installations. A new projector based on JVC's D-ILA chips remains at prototype stage at the time of writing.

<sup>4</sup> Unless otherwise specified, all quotes in this article are from interviews conducted by the author in Melbourne, Sydney and Los Angeles between June and November 2002. Positions of interviewees are listed as they were at the time of the interview.

<sup>5</sup> Cinema exhibition in Australia is dominated by three large groups: Hoyts (and sister company Birch, Carroll and Coyle), Greater Union and Village Roadshow, which collectively controlled 55% of the screens in 2000. The Cinema Owners Association represents the independent exhibitors, of which recent entrant Readings is the largest (4%). (Gray and Curtis, 2002: 148).

<sup>6</sup> Katz, Frelinghuysen and Bhatia (2002) calculated advertising revenues at US\$22 000 per screen in Europe compared to US\$ 200 in the US, citing this gap as a major source of funding for the transition to digital cinema. (p. 3). However, they doesn't address the fact that digital advertising can be carried by far cheaper projection systems than those needed to replace 35mm feature films.

<sup>7</sup> Huske and Vallières (2002: 14-15) looked at the profit an intermediary would need to generate in order to justify their investment. Using the \$50 000 cost per screen, they calculated total cost of US conversion at US\$1.8bn. Based on an assumed interest rate of 15.9%, this would require an after tax profit of \$291million to service. To achieve the required profit, they estimated the intermediary would need to generate revenue of \$747m, whereas the current cost of film prints was \$680m in their analysis.

<sup>8</sup> For example, Katz, Frelinghuysen and Bhatia (2002), estimated the current cost of supplying a screen with film of around US\$27 000 per year, nearly double the estimate by Huske and Vallières.

<sup>9</sup> This is an issue raised in Screen Digest (2002: 44), which recommends that the British Film Council and other agencies consider supporting the costs of digital film mastering.



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