An Investigation into Alternative Media Wall Solutions for the UBC Faculty of Pharmaceutical Sciences

Andriy Fudimov, Michael Sayson, Sean Liu, Sebastian Lee

University of British Columbia

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Fudimov, Andriy

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Abstract

The UBC Pharmaceutical Sciences Building contains an interactive exhibit called, The Story of Medicine. Part of that exhibit consists of the UBC Impact Media Wall. The wall however, has problems relating to the component lifespan, energy consumption, display and software. As such, this report seeks to find an alternative Media Wall product to succeed the current Media Wall and by using a triple bottom line analysis, examining the environmental, economic and social impacts, to determine if the alternative product is a suitable replacement. Filtering through the various available Media Wall technologies using this criterion, three products: Christie MicroTiles; the Planar Clarity Matrix; and the NEC Ultra-Narrow Professional-Grade Large-Screen Display are suitable candidates for replacing the current Media Wall.

In doing further research this report recommends that the Planar Clarity Matrix is to be implemented as the new Media Wall for The Story of Medicine exhibit at the UBC Pharmaceutical Sciences Building.

Contents

List of Illustrations

1 Introduction

The high expense for part replacements, uneven light distribution, and ongoing software support for the current rear-view projection media wall has created a great concern for UBC. The purpose of this report is to find a solution to these problems through an alternative media wall product. By using triple bottom line analysis, we first examine some of the possible solutions without the need of replacing the current implementation, then explore the following different implementation: Planar Christie Microtiles- bright, crisp, eco-friendly displays, Planar Clarity Matrix- an inexpensive high performance system, and NEC Ultra-Narrow Professional-Grade Large-Screen Display- high performance, easy to implement displays.

The high expense for part replacements, uneven light distribution, and ongoing software support for the current rear-view projection media wall has created a great concern for UBC. By using triple bottom line analysis, we first examine some of the possible solutions without the need of replacing the current implementation, then explore the following different implementation: Planar Christie Microtiles- bright, crisp, eco-friendly displays, Planar Clarity Matrix- an inexpensive high performance system, and NEC Ultra-Narrow Professional-Grade Large-Screen Display- high performance, easy to implement displays.

2 Current System

The current rear-view projection based Media Wall that is in use by the UBC Pharmaceutical building consists of 6 Panasonic PT-DW6300ULS projectors connected to a Dell T3500 desktop projecting along with various other peripherals, outputs a 4800x1280 (NGX Interactive, 2012, p. 4) pixel resolution image to the 7ft x26ft (NGX Interactive, 2012, p. 13) glass media wall. With respect to its technical specifications, the Impact Media Wall is undoubtedly large enough, has a high resolution and currently has the software to accomplish the pharmacys goal of having a Media Wall to capture the attention of visitors that are new to their building, enticing them with facts to further explore their History of Medicine exhibit, and as well as provide other useful information for other audiences such as faculty members, students and staff. (NGX Interactive, 2012, p. 13) However, there are concerns involving the wall. The main concerns with it are as follows: The lamps used by the projector are unsustainable, having a very low life span and a high replacement cost; the screens display an uneven light distribution, which diminishes user immersion; the wall requires a significant amount of power to operate; the software used by the wall is proprietary and is leading to concerns about current and future support.

2.1 Economic Impact

Since the Impact Media Wall has already been bought and paid for, the remaining economic costs come from its power consumption, maintenance and part replacement. The power consumption of the wall (including the 6 projectors and the computer powering the display) comes out to 3620 watts per hour which is standard for a projector based Media Wall of this quality (Panasonic, 2009, p. 2). The power cost comes out to be an annual amount of about $796 per year assuming the wall is running for 40 hours per week year round, using BC Hydros step 2 rate. This however pales in comparison to the maintenance and part replacement costs of the wall which are coming from the projectors and projector lamps. Replacing projector lamps alone is costing the Pharmaceutical building $10,000-$12,000 (NGX Interactive, 2012, p. 7) annually and the projectors need to be overhauled every 4 years(NGX Interactive, 2012, p. 7) costing another $1000-$2000 depending on the condition of the projectors. Furthermore a projector can break, in which case, it will cost $5,000 to replace. This leads to an operating cost of a minimum of $45,000 over the span of 4 years.

2.2 Social Impact

To begin our assessment on the social impact, we conducted a survey on November 4th 2013 at the Pharmaceutical building. Asking a wide array of people including visitors, and students we received a variety of different responses. Some of the people we interviewed said that they only noticed the wall their first day there and thought that it should only be meant for visitors. They recommended that it should only be turned on for special events and ceremonies. An overwhelming majority of the people we interviewed mentioned that they found that the wall helped build the atmosphere of the building and was incredibly useful with the information and health tips it provided, especially its flu prevention tips,due to the fact it is flu season. The qualms, that people generally had with the wall were that they were annoyed by its uneven light distribution as well as how it is only on at certain random hours of the day. This was due to the Pharmaceutical building trying to increase the projector lamp life span. Finally people were disappointed in the variety of content that the wall displayed, where the solution is bottleneck by the problems that the wall is having with its proprietary software. It seems that having a Media Wall in itself is providing a useful tool for the Pharmaceutical building and the only problems that it is having right now are due to its poorly implemented technology, in any case simply turning the wall off is not an option.

2.3 Environmental Impact

As stated earlier the wall consumes 3620 watts per hour, although this is normal for projector based media walls of this quality, LED based media walls are much more efficient making this a significant issue. Furthermore UBC is replacing over 24 projector lamps per year ($12k/750$ per lamp) (Pureland Supply, 2013) and this is unsustainable due to all the energy that goes into making the new projector lamps as well as the disposal/recycling of the old ones. Finally these lamps are not manufactured locally which poses the problem of carbon emissions during transportation. Overall the UBC Impact Media wall could improve in many aspects environmentally wise.

3 Alternative Systems

3.1 Christie MicroTiles

Christie Microtiles is an alternative product in which utilizes both DLP (Digital Light Processing) and LED (Light-Emitting Diode) display technology. Christie Microtiles provides a long lasting, high resolution product which is the most environmentally friendly display that is offered in the industry. The Microtiles have a height of 306mm and width of 408 mm. In order to provide a similiar sized wall we would need 140 D100 Microtiles in a 20 wide by 7 high tile formation, which would be 26.7' x 7.0'(Christie Digital Systems USA, 2013b). There are several examples of where the Microtiles are being implemented. A list is provided at their site.(Christie Digital Systems USA, 2013d)

3.1.1 Economic Impact

We found that the total cost of the Christie Microtiles including, hardware cost, labor (both installation and maintence), power cost, and lifetime replacement and maintenance would be around $331,440. These are just estimates that we have gathered from Christie's online calculator(Christie Digital Systems USA, 2013a). The cost of each Microtile we found to be at $2090.30 from looking at a reseller from avalive.com(Avalive, 2013)

	MicroTiles	50" Cube	LPD
Number of units	140	27	91
Square meters per unit	0.125	0.666	0.194
Square meters of display area	17.48	17.98	17.65
Estimated total system hardware cost	292,600	0	0
Total system hardware cost divided by number of units	2090.30		
Salvage value at end of operating lifetime	15%	10%	10%
Amortized hardware replacement costs per year	2%	2%	6%
Warranty (years)	2	2	2
Installation labor, person-minutes per unit	60	180	240
Maintenance labor, person-minutes per service event	30	90	120
Average power consumption at max brightness	70	230	30
Average operating brightness level	80%	100%	100%
Total cost of ownership calculation	**MicroTiles**	**50" Cube**	**LPD**
Upfront hardware and labor costs	306,600		
Lifetime operating and cooling energy costs	19,560		
Lifetime replacement and maintenance costs	27,802		
Salvage value	-22,523		
Total cost of ownership (USD)	**331,440**		
Compared with benchmark			

Figure 3.1: Christie Microtiles Calculator Output

3.1.2 Social Impact

Christie Microtiles would solve all the problems that the current Media Wall is having as well as improve in certain areas and maintain all the benefits discussed in section 2.2. Since the tiles are a single piece that does not use any lamps or consumable parts this gets rid of the problem of having to spend money on lamps every year. Also since it is based on DLP and LED technology, it no longer has to deal with the uneven light distribution problem. The display is less seamless then the current Media Wall, since it has a seam between each display, but would provide an overall better experience. The seam between each display is also only 1mm wide, so at further distances it would

become less noticable. The overall experience of the Media Wall would be improved as there are less distractions for the users while it is in use. The display also would provide a better experience as it is at a much higher resolution of 720x540 giving a better defined display.(Christie Digital Systems USA, 2013b) The atmosphere also will be damaged during the installation process of the new technology as there will a downtime period.

3.1.3 Environmental Impact

The Microtiles are one of the most environmently friendly product that is being offered on the market currently. The power consumption of each tile is typically 70W per hour when in use. Since we have 140 Microtiles the total power consumption per hour would be 70W * 140 tiles = 9800W/hour. We also would consider how the products were being handled during manufactoring and recycling. Gathering information from Christie's site, the Microtiles are made from 90% of recoverable materials and is 80% recyclable. They are also made with non-hazardous materials which allows for an easier recycling process(Christie Digital Systems USA, 2013c). The Microtiles are made to last a long time, with a lifetime of 65,000 hours and if used 24 hours a day everyday would last for 7.4 years(65,000/(24hours*365days)). Considering the hours in which the Media Wall is operating, which is around 2920 - 5475 hours a year(8 to 15 hours a day), it will have a lifetime of 22 to 11 years. (65,000/2920 = 22 years to 65,000/5475 = 11 years)(Christie Digital Systems USA, 2013b)

3.2 Planar Clarity Matrix

3.2.1 Overview

The Planar Clarity Matrix is a system that utilizes an array of LED backlit LCDs. This system has the thinnest available LCD video wall on the market and is designed to have good image quality and simple maintenance. The implementation of the Planar Clarity Matrix that we chose, will have displays that are 47.84 inches by 27.01 inches (Planar Systems, Inc., 2013a). Therefore, in order to replace the current system we would need 6 screens by 3 screens. The economic, social, and environmental impacts are as follows.

3.2.2 Economic Impact

We estimated that the total cost for the Planar Clarity Matrix would be approximately $130,000. This was based off of hardware costs and estimated software and maintenance costs. We did not get an official quote on installation and maintenance costs, so for our calculations we assumed that it would cost approximately $20,000 which would be similar to Christie's price.

We could only find a few re-sellers that would ship to Canada, but contacting Planar would result in more options.

Re-Seller	Price	Shipping	Total
DirectDial.com(DirectDial, 2013)	$121,374.00	$56.00	$121,430.00
TouchBoards.com(Touchboards, 2013)	$107,892.00	$512.84	$108,404.84

Figure 3.2: Planar Re-Seller Pricing

Based off the retailers of the LX55HD display above, we found that the cost of the system with shipping would be $108,404.84. The total cost of the system would be the cost of the displays + maintenance so, it would be approximately $130,000.

3.2.3 Social Impact

The Planar Clarity Matrix would have all the benefits of the current display system discussed in section 2.2. It would also have a more crisp display resolution of 1920 by 1080 per display (Planar Systems, Inc., 2013a). This multiplied over 18 displays would result in a total resolution of 34,560 by 3,240. For the users this means a clearer and cleaner image than the current system provides. Planar's system would also eliminate the current system's light distribution problem. The use of LCD technology eliminates the uneven brightness that projector based systems can have. The problem with this implementation is that there would be small lines dividing the displays every 47.84 inches horizontally and 27.01 inches vertically. This is less immersive then a unified display, however the lines are only 5.5mm thick (Planar Systems, Inc., 2013a) so it is less distracting than the dim spots that the current system has. There would also be a significant down time while the system is installed. This would damage the atmosphere of the Pharmaceutical building while the system is replaced.

3.2.4 Environmental Impact

The Planar Clarity Matrix has many environmental benefits. Using Planar's Clarity Matrix Calculator , we found that a system of 18 displays would use 3270W/hr on average. If the system was on for 24 hours, 7 days a week, it would be on for 8,760 hours per year (24 * 365). This means that the system would use approximately 28.6 million watts per year. The lifetime of this display is 50,000 hours at half brightness (Planar Systems, Inc., 2013a). If the display was on 24/7 it would have a lifetime of 5.7 years. However, in the Pharmaceutical Sciences building the display would most likely be on for approximately 15 hours a day, 5 days a week. At this rate, the display would last 12.8 years and use 12.8 million watts per year.

3.3 NEC Ultra-Narrow Professional-Grade Large-Screen Display

The NEC Ultra-Narrow Professional-Grade Large-Screen Display (NECD) is a 46 inch LED-Backlit display that offers a full 1080p HD (1920x1080) resolution. The embedded TileMatrix^{TM} supports a 10 x 10 (100 displays) media wall. This display is currently

implemented in UBCs Journey of a Drug and Role of Pharmacy with a 2x2 configuration. This solution will utilize the same LCD technology but on a larger scale.

3.3.1 Economic Impact

The cost of each NECD is approximately $5,000 per display with a 3 year warranty. The life expectancy of each display is estimated to be around 100,000 hours (NEC Display Solutions, 2013a) To implement this solution on the IMW, it will require 26 displays in total with a 2 x 13 configuration (see device configuration). The total cost for the 26 displays is approximately $130,000 excluding installation and maintenance fee. The maintenance cost will be cheaper since there are fewer components to replace with respect to the current media wall. The software development cost will be minimized since we can modify the same software from the one utilized by Journey of a Drug and Role of Pharmacy by NGX.

3.3.2 Social Impact

By using NECD, it resolves the uneven light distribution in the current IMW. The sharper display quality and built-in speaker provided by NECD will enhance the user experience significantly. With respect to the current IMW implementation, the resolution will be enhanced from 4800x1280 (NGX Interactive, 2012) to 14040 x 3840 and the contrast ratio will be enhanced from 2,000:1 per display (Panasonic, 2009) to 3,500:1 per display (NEC Display Solutions, 2009). With the built in speakers, the display exhibit can engage the public further by incorporating audio to the exhibit and providing a better atmosphere to the surroundings. The trade off for using NECD is that for each display, there is a 5.6x6.1mm (NEC Display Solutions, 2009) frame space on each side. The total frame space between each monitor is 11.2x12.2mm.

3.3.3 Environmental Impact

All NEC products are environmental friendly. Most components are recyclable and all products are mercury free (NEC Display Solutions, 2013b). NECD is certified by Energy Star 5.1. The display contains a built in ambient light sensor, that adjusts its brightness according to the environment,it has a energy saving LED backlight, and a carbon saving meter to keep track of the carbon emission. The power consumption under normal operation is 120W, and 0.5W for power saving mode. Based on the power consumption, we calculated that the total power consumption of 26 displays is 5,200W/h. Despite that the NECD consumes more power than the current IMW, NECD's implementation reduces the waste produced because of the fewer parts needed to be replace compared to the current implementation.

4 Comparison of Systems

4.1 Economic Impact

All of the previously discussed items have a negative economic impact, but some of them have a more significant impact than others. In the following table we will compare the impact of the different solutions over a 10 year period.

UBC Impact Media Wall	Christie MicroTiles	Planar Clarity Matrix	NEC Displays
$112,500	$331,440	$130,000	$130,000 + maintenance

Figure 4.1: Comparison of Prices Over 10 Years

As you can see, sticking with the current implementation would have the greatest economic benefit, but the Planar's and NEC's products come very close.

4.2 Social Impact

All of the alternate solutions to the current Impact Media Wall have the same social impact. All three of them eliminate the current problems with uneven light distribution and all three have thin bezels that could potentially harm user experience. However on all of them the bezel is small enough that we think the benefits outweigh the losses. The biggest social issue for all three alternative displays is that the Pharmaceutical Building will have to take out the current implementation, so while an alternate solution is installed the atmosphere of the room will be damaged. However, we believe that long term the temporary damage to the atmosphere will be worth it. All three of the alternative implementations provide a good enough experience that we would recommend them all for social benefit over the current implementation.

4.3 Environmental Impact

The environmental impact of the above solutions varies quite a bit. For all of them the biggest concern is power, however there are other aspects such as life span and recyclable materials as well.

UBC Impact Media Wall	Christie MicroTiles	Planar Clarity Matrix	NEC Displays
3,260W/hr	9,800W/hr	3,270W/hr	5,200W/hr

Figure 4.2: Comparison of Power Consumption

As you can see the power consumption of the different products varies greatly, with Christie's solution taking approximately three times as much power as Planar's or the current system's. However don't let Christie's power draw fool you, it has a lot of other environmentally friendly aspects to it such as recyclability.

The lifespan of the devices is a little harder to compare. The Impact Media Wall needs bulb replacements every year, but Christie's, Planar's, and NEC's implementations have lifespans of 65,000, 50,000, and 100,000 hours.

5 Conclusion

Based off of the above comparisons, we would recommend installing Planar's Clarity Matrix in order to replace the current media wall system. We believe that the long term benefits in terms of social and environmental impact are worth the relatively small amount of extra money that would be needed to be spent over a 10 year period. It has an equally low power draw as the current implementation and a much longer lifespan and it fixes the issues that impede social immersion into the wall. The Planar Clarity Matrix is an overall good and relatively cheap solution that would benefit the Pharmaceutical Building long term.

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