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Designing Clinical Blended Spaces: A Biophilic Inspired Digitally Augmented Environment for use within a Child Protection Unit

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Abstract

This paper details the research, design and implementation process of a commissioned artist's integration of a biophilic design philosophy into the spatial and interaction design of Glasgow's new Child Protection Unit (CPU) facility helping children suffering from physical neglect, emotional and sexual abuse. It focuses on the blending of interactive digital augmentation and analogue elements of the design within two key spaces; the child's room and the family room.

The paper details the design direction emerging from an ethnographically informed study involving in situ workshops and interviews with a focus on the child's journey through the unit's spaces with two critical aims, relaxing and empowering the child. The Child's Room becomes the key space to relax and calm the child before examination, utilizing responsive digital adaptive imagery and audio embedded within a larger analogue biophilic scene creating a relaxing and calming environment as has been demonstrated to help well being (Ryan et al, 2014; Cramer & Browning 2008). The Family Room supports remote observation and facilitates clinically relevant adult-child interactions via a series of digital table applications grounded in Glaser's Evidence Based Approach for identifying and understanding attachment disorders (Glaser, 2011; Prior & Glaser 2006) whilst providing long term child/family support.

Keywords: biophilic design, blended spaces, interactivity,

Introduction

In 2014, the artist Alexander Hamilton was commissioned by the Yorkhill Children's Foundation to provide a specialist interactive design to deliver an engaging and therapeutic, biophilic inspired, technology intervention to the Child Protection Unit in the New South Glasgow Hospitals (NSGH). The project builds on the ideas and approach of an earlier biophilic commission delivered by Hamilton, Dignified Spaces NSGH, which was presented at the Design 4 Health 2014 (Fremantle *et al*, 2013).

Requirements Methodology Overview

To determine the functional and design specifications of the art-technology installation to be incorporated into the new GCPU, it was important to understand the current practice and, critically, identify the strengths and weaknesses of the current space in fulfilling those activities. Utilising Benyon and Mival's ethnographically informed design approach for the design of Blended Spaces (Benyon & Mival, 2015), a social-technological requirements review was carried out to examine the activities not simply from a technical or functional view, but from a *holistic* perspective of how the space, technology and people interact. Benyon (2014) defines a blended space as a space 'where a physical space is deliberately integrated in a close-knit way with a digital space' (p. 79). Blended spaces are spaces where a digital space has been designed and integrated with a physical space with the purpose of creating a novel user experience. Any technological deployment must always consider the social (i.e. human-centric) impact from both an end-user and administrator (i.e. maintenance, setup, configuration etc.) perspective (Benyon, 2014). Not framing the deployment in such a way is the primary cause for problematic and/or functionally inappropriate technologies entering workflow and hence user frustration and confusion (Benyon, 2013; 2012).

As part of the requirements and design process, three in situ workshops were undertaken in August 2014. The goal of these workshops was to understand current practice surrounding the GCPU's Fredrick Stone Unit, identify the various people involved and their specific roles (e.g. police officers, nursing staff etc.) and map the journey of a child through the various spaces within the unit. From these insights and understandings come requirements, both social and technological, which direct how best the artistic led technology intervention can be integrated. The participants were the three members of the Art-Technology intervention team, Dr Jean Herbison Clinical Director at the GCPU and independent researcher Leigh-Anne Hepburn. They took place at the GCPU unit on August 12th, 19th and 26th 2014, each lasting between two and three hours.

Workshop Findings

A fundamental philosophy emerged from the workshops which has driven and focused the installation work and design thinking:

“Relaxation of the child is clinically important”

The forensic role of the GCPU is clear and obvious, however there needs to be consideration of “transitions”: both physical and mental transitions. The moments of physical movement between spaces (specifically between the current “family” room and clinical examination room) are clearly related to the mental state (or readiness) of the child. Current practice has been influenced by the layout of current facility and is not optimal in enabling or supporting these transitions.

The Child Journeys

There are two discrete child journeys with two related but different functional requirements and associated activities to be supported by the project deliverables.

The pre-existing journey from “family” room to examination room for clinical forensic exam.

Key requirement for this journey are to engage, distract and relax the child (and potentially related adult) whilst enabling clinicians to determine an initial review of child-adult interaction and child’s mental state. There should be consideration of the “spill-over” space(s) to prevent crowding the child in scenarios when multiple adults are present. Subsequently it should facilitate and “soften” the physical transition from the “safe” non-clinical environment to the clinical examination space and enable some form of “cross-over” from one space to the other (e.g. via soundscapes, visual vistas or lighting).

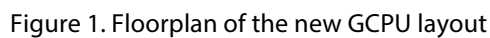
The envisioned therapeutic and child-adult interaction review journey.

Key requirements for this journey are to provide a comfortable, soft non-clinical space that facilitates and promotes child-adult and child-clinician interactions with the potential for ad-hoc, non-forensic physical examination. The space must be optimized for local and remote observation (and potentially recording) of these interactions.

Non-child Centric Requirements

There needs to be consideration of the booking/management and preparation/briefing processes. Currently these are relatively ad-hoc e.g. briefing protocol historically driven by experience and personal relationships between clinician and nurse. The lobby space should provide laptop tables and power sockets for waiting police officers should they require them. Configuration and reset of the unit’s technology deployment should be simple, achievable by non-technical staff and ideally mostly automated.

The proposed names for the rooms in the new build reflected the legacy consideration of their activities; Lobby, Family, Consult, Exam Treat, Observ., and Public Sh. (as shown in Fig1).



Therefore:

- ## The Biophilic Informed Design Approach

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homely. The model of Maggie's Centres creates a useful guide in ways that successful spaces can be set up to reduce anxiety and offer support. These spaces are not, however, within a clinical environment.

The effective use of art and design in the CPU Rooms within the hospital will be crucial to the success of this project. Creating environments which may affect emotions, experiences and sometimes also behaviour in a positive manner, in other words, these wellness factors increase the probability of the strengthening visitor response and supporting them through the conversation and physically examination process of the child.

The approach in preparing design ideas for these rooms has been to seek connections with nature, this approach can be called Biophilic Design.

Biophilic Design

Biophilic design principles can be applied in a variety of contexts allowing growth of both people and environment. Human psychology clearly benefits from contact with nature, and inviting nature into our buildings is the ideal way to insure the both the continuation of our modern lifestyle and assuagement our more primitive needs. Positive effects can especially be seen in the realm of healthcare. Its typically stressful atmosphere holds tremendous room for improvement, and numerous studies evidence nature's role in healing.

Biophilia Based Design

Three concepts serve as the tenets of biophilic design: **Nature in the Space, Natural Analogues,** and **Nature of the Space.**

Nature in the Space refers to the incorporation of plants, water and sunlight into the built environment. Examples include plants, water features, and courtyard gardens, as well as views to nature from the inside of a building. The prevalence of the courtyard in traditional architecture is a good example of our early attraction to incorporating nature directly into our built environment. These direct connections to nature—especially dynamic nature that incorporates movement, produce the strongest biophilic reactions. This will be important as the views from the CPU are very limited, looking onto a hard landscape courtyard with minimal planting.

Natural Analogues are one degree of separation away from true nature. Natural Analogues are materials and patterns that evoke nature and are characterized by four broad types: representational artwork, ornamentation, biomorphic forms, and the use of natural materials. Pictures of plants/flowers/trees, water, design elements that mimic shells and leaves, furniture with organic rather than geometric shapes, and visible wood grain fall under the umbrella of natural analogues. The focus has been to bring nature imagery inside the room, applying a Ginkgo

leaf design onto the walls of the Childs Room and use the leaf image to connect up other spaces; blending this graphic imagery within a wider digitally response to the space.

Nature of the Space refers to the way humans respond psychologically and physiologically to different spatial configurations. Spatial organization around us drives a major portion of our emotional and mental state. The design concepts of looking outwards with design and art elements configured to offer calming and protective spaces are examples of Nature of the Space. The room with the Blended approach offer empowerment to the child, scope for relaxation and clinical feedback for the staff.

Thinking about Biophilic design was at the centre of the approach to creating art and design for the CPU. To drive the requirements of Biophilic design, a process of co-design engagement was undertaken with the CPU Clinical Director. This enabled ideas on dignity and child and carer requirements to be considered in the setting of a CPU and what design elements should be incorporated to convey a sense of the natural environment, offering comfort and empowerment especially for the child.

Biophilic Art- Use of Designs from Natural Spaces- Hidden Gardens Glasgow- Ginkgo Tree

In comparing cultures, people across the board respond similarly well to natural views, making it all the more likely that an affinity for biophilia has been solidified within the gene pool (Kellert *et al*, 2008). Because people throughout the world associate biophilia with positive feelings, architects relying on biophilic design have the advantage of universal appeal. They also retain a high degree of flexibility and freedom, as biophilic design is not defined by one aesthetic. The application of the biophilic approach to art has been driven by artist's engagement with Hidden Gardens Glasgow and the use of the Ginkgo tree, located within the grounds. The leaf design from the tree has been used as the primary design unit to guide the incorporation of features within the CPU spaces.

The New GCPU - Design Directions

From the workshop findings a design direction emerged that focused on two critical functions, **relaxing** and **engaging** the child.

Whilst the whole unit plays a holistic and integrated role within this process, two key deployable components of the project installation were identified; a digitally augmented Play Pad within the Child's Room and an interactive Play Table within the Family Room.

The Child's Room – Design Ideation

The design philosophy of the child's room is composed of five parts, each inspired to enable the key function of the space, namely to *relax*, *distract* and *engage*:

- A configurable "soft space" providing apertures of view to...
- immersive, interactive projected digital content augmented with...
- a beautiful, relaxing and controllable audio soundscape, both of which emerge from...
- a modular physical hub embedded within...
- beautiful, biophilic inspired floor to ceiling scenes depicted on wallpaper.

The soft space is referred to as the Play Pad, a protective, soft and welcoming space for the child within the room. The Play Pad follows the existing unit's deployment of a plastic wendy-house which has been demonstrated to be a successful component of the existing space, but integrates and embeds digital aspects (e.g. interactive lighting, audio and video capabilities) to enhance the process of relaxing and engaging the child. The Play Pad will be abstract enough to promote imaginative and exploratory play by the child without discouraging interaction with the adults present. It will also be configurable and "buildable", being composed of multiple tessellating geometric shapes. A critical "mundane" design consideration for the Play Pad has been the need to meet strict infection control requirements which drives the consideration of surfaces and materials used in the project installation.

The child will be joined inside this tranquil, immersive and relaxing space by elegant interactive digital representatives of the natural world. For example, dragonflies, butterflies and birds may fly through the tumbling leaves drifting down from the ceiling. The child will be empowered by taking control of this space through simple physical interactions. These gestures are intuitive and age appropriate (for example clapping, pointing and waving) enabling simple, joyful interactions but also facilitating a deeper interaction and user experience through exploration or guidance for the more curious or older child.

The space will have an interactive and responsive soundscape devised by a specialist team which has drawn upon research into sound and play therapy. The audio will evolve via the child's interactions with the visual digital elements and will generate a soundtrack to the space that can be carried through into the other areas of the CPU and provide the child with a touch-point to the tranquil environment they have made their own.

The child can control and personalize their space (e.g. what audio is playing, the colour palette of the space or which vistas are displayed) through simple, physical interactions with the environment. The whole space will have an integrated design language following the biophilic

philosophy of the Artist. The whole environment (beyond just the Play Pad) will be responsive and adaptive, allowing ambient interactions (e.g. gestures such as waving at a screen) to change animations, lighting, audio etc. The child's personalization (audio, colour scheme, vista choice etc.) is carried through and integrated non-intrusively within the Examination room (N.b. lighting must not impinge on video colour white balance).



Figure 2. PlayPad and wall art within the Child's Room.

The Family Room – Design Ideation

The intended activities of the Family room (formerly the Consult room) are, in a broad stroke, to establish mental and emotional state through the observation of child-adult interactions and discussions. It will support remote observation and facilitate clinically relevant adult-child interactions via a series of digital table applications grounded in Glaser's Evidence Based Approach for identifying and understanding attachment disorders (Glaser, 2011; Prior & Glaser, 2006) whilst providing long term child/family support. It is hoped by staff that a dedicated play therapist could become part of this process at some stage.

The Ginkgo inspired biophilic theme will be continued as digital elements of the interactive Play Table, designed to interface within the Family room and will help inspire the user interface components and graphic design where appropriate. The apps on the table will facilitate and

encourage interaction between the child and adult (a key functional requirements to help the clinician explore the relationship dynamics) and will focus on promoting diagnostically useful conversation areas such as food, play activities, home life, friends etc.

Play Table Functional Considerations:

- Utilise a simple but powerful and scalable software platform for multi-person interaction.
- Serve as a talking and engagement point both between child-clinician and child-adult.
- Simple but engaging applications such as games, sorting tasks and drawing will enable observation and facilitate discussion of potential topics of interest, eg food, home activities, animals, sibling relationships etc.
- Activities that can be scaled to be appropriate for various ages and gender.
- Interacting with some physical artefacts on the table could be used to trigger certain effects either within the room itself (eg lighting or audio effects) or to events on the screen.
- It may require multiple languages or be language independent (eg non semantic UI).
- Enable scalability and the potential for important diagnostic research in the field of developing applications and methods for identifying mental states and potential emotional abuse.



Figure 3. PlayTable , facilitating diagnostically relevant Adult-Child interactions within the Family Room.

Technical Integration Considerations

Much of the integrated functionality will be driven through an internal wi-fi network. It is unlikely that this can use the wider hospital network and will therefore need to be standalone. To facilitate local and remote observation, the Family room (formerly Consult room) will need the integration of high quality discrete cameras and associated viewing software. A technical architecture of the two spaces is shown below in Figure 4.

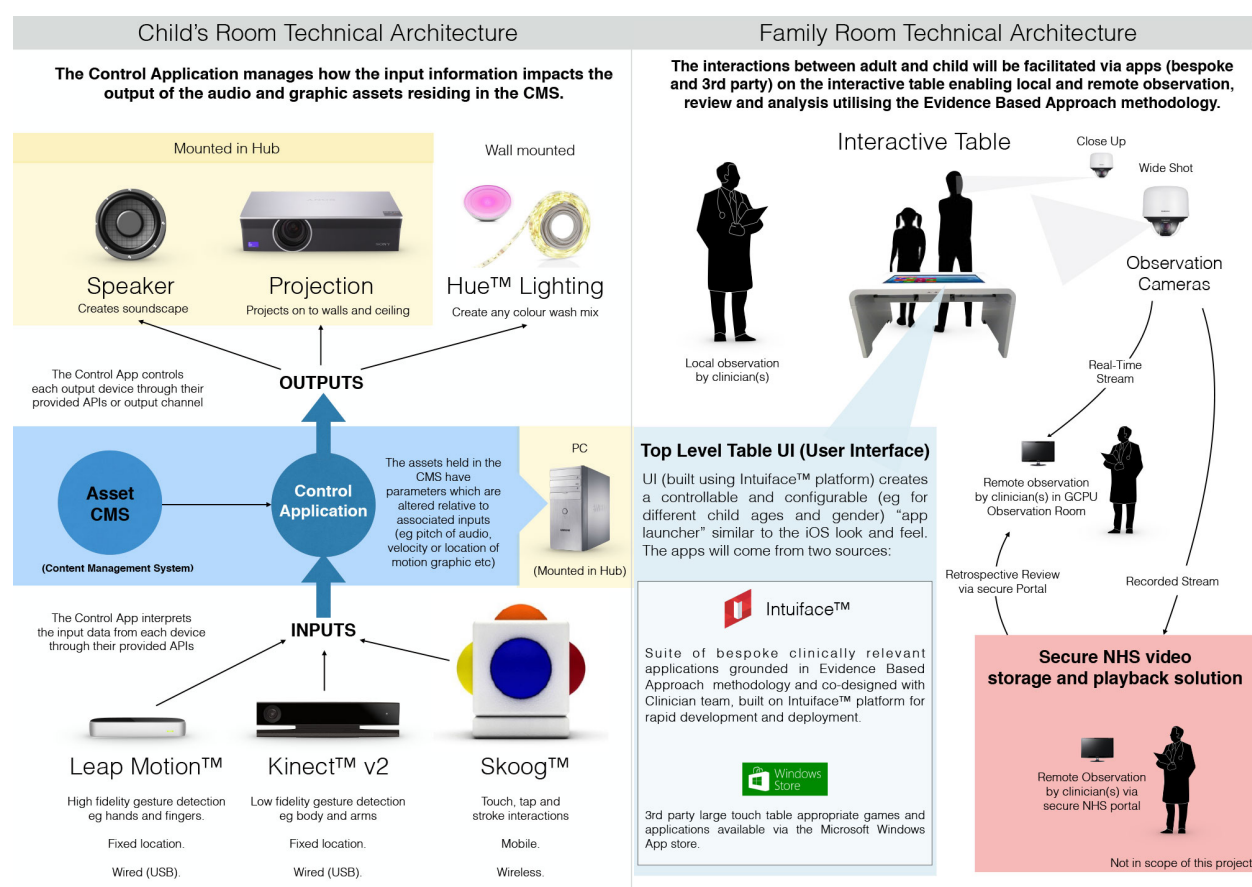


Figure 4. Technical architecture overview for the Child's Room and Family Room digital components.

Conclusions

The extended creative engagement process, supported by NHSGGC, Yorkhill Foundation, Edinburgh Napier University and Ginkgo Projects has resulted in an understanding of the practical requirements of Child Protection as described above. There is agreement on the importance of offering the child the space to offer a degree of control and creative engagement. This way of

blending spaces enables scope for creative engagement whilst maintaining the opportunity of clinical feedback for the medical staff.

References

- BENYON, D. R. (2014) *Spaces of Interaction, Places for Experience*. Morgan and Claypool.
- BENYON, D. R. (2013) *Designing Interactive Systems*. Pearson. 3rd edition
- BENYON, D. R. & MIVAL, O. (2015) Blended Spaces for Collaboration. *Journal of Computer Supported Cooperative Work*.
- BENYON, D. R. (2012) Presence in Blended Spaces *Interacting with Computers* 2012 24 (4) 219 - 226
- CRAMER, J. S., & BROWNING, W. D. (2008). Transforming Building Practices Through Biophilic Design (pp335–346). In S. F. Kellert, J. H. Heerwagen, & M. L. Mador (Eds.), *Biophilic Design*. Hoboken, NJ: Wiley.
- FREMANTLE, C., Hamilton, A & SANDS, J., (2013) Dignified Spaces: de-institutionalising spaces in the heart of the clinical environment, Proceedings of Design 4 Health. Sheffield
- GLASER, D. (2011) "How to deal with emotional abuse and neglect—Further development of a conceptual framework (FRAMEA)." *Child abuse & neglect* 35.10: 866-875.
- KELLERT, S., HEERWAGEN, J. & MADOR, M. (2008) *Biophilic Design: the Theory, Science, and Practice of Bringing Buildings to Life*. Wiley, New Jersey.
- RYAN, C. O., et al. (2014) "BIOPHILIC DESIGN PATTERNS: Emerging Nature-Based Parameters for Health and Well-Being in the Built Environment." *International Journal of Architectural Research: ArchNet-IJAR* 8.2: 62-76.
- PRIOR, V. & GLASER, D. (2006). *Understanding attachment and attachment disorders: Theory, evidence and practice*. Jessica Kingsley Publishers.
- WILSON, E. O. (2007) *Biophilia and the conservation ethic*. In *Evolutionary perspectives on environmental problems*. Edited by Dustin J. Penn, Iver Myrsetrud, p249-257.