

## AN ANALYSIS OF WELLBEING CENTRES IN NORTHERN IRELAND USING SPACE SYNTAX

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**THEME:** Spatial Cognition

### **Abstract**

*The advancement of the primary care typology has been emerging in Northern Ireland; with forty-eight new wellbeing centres proposed in 2008. By investing in primary care it is hoped the new 'one stop shop' healthcare model will provide a better work environment and improve wellbeing in the community by targeting health in a more holistic way. The traditional health centre has become outdated and there is now an emphasis on centralising services, whilst providing additional supportive therapies within the new typology. Careful consideration to the distribution of these new primary care centres must be given due to an ageing population and their impact on their neighbouring communities. This paper examined wellbeing centres recently built in Northern Ireland using Space Syntax analysis in order to evaluate new design typologies and establish whether these are legible and inclusive. The aim was to review the status and development of current primary healthcare in Northern Ireland and suggest design improvements for the shortcomings.*

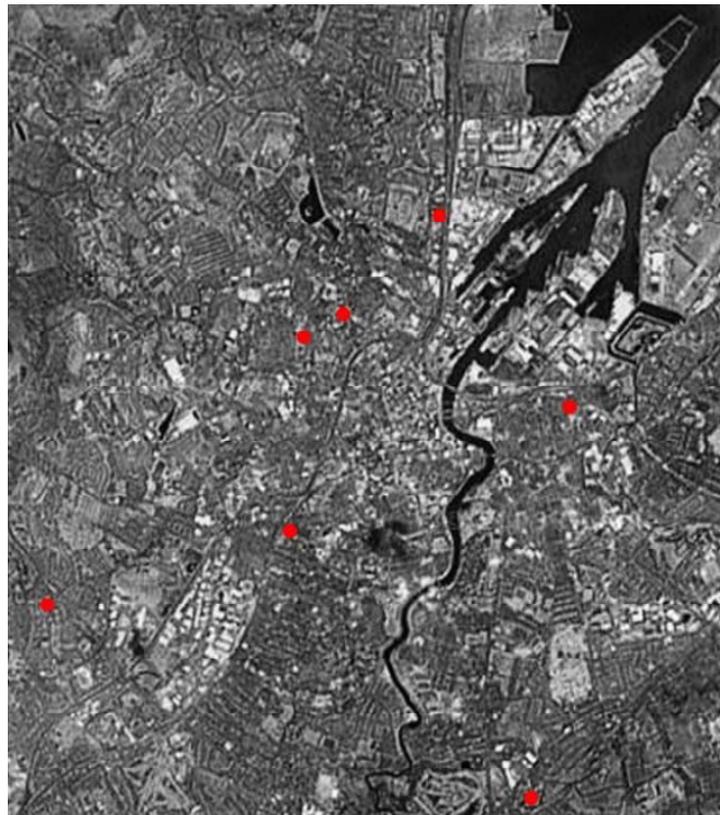
*Space Syntax was used as a quantitative methodology to understand the effectiveness of the wellbeing centres in delivering user satisfaction and the legibility of the environment. Space Syntax was used as a method to interpret the relationship between spaces and the success of the spatial configuration on promoting wayfinding. Visual Graphic Analysis (VGA) was used to create evidence based results and analysed the effectiveness of the spatial configuration and identifies areas of strength and weakness. Observations and interviews with architects and key decision makers were used as qualitative methods to provide a triangulation and support the evidence found from the VGA results. Space Syntax was used to assess the three case studies, using VGA to establish design deficiencies with regard to accessibility and movement for the users and whether they fully support the advantages of these new building prototypes. Field work involving observations and visits to these buildings were then carried out and were used to verify data produced from VGA and interviews. The interviews addressed the decision makers and designers.*

*Design deficiencies were identified in the existing built examples of wellbeing centres in order to generate recommendations which may help to improve the success and design of the new typology. Recommendations were based upon user friendliness, legibility and community integration. The Space Syntax methodology of*

*VGA and agent based analysis enables identification of strong and weak areas in terms of circulation and can therefore recognise successful and less effective areas in the design. Increased investment in primary health and by bringing together services under one roof can promote a more successful healthcare model. Legibility of space, which is important in this typology, was found to be improved with more generous circulation space. Using Space Syntax at an early stage can verify strengths and identify weaknesses at the design development phase.*

## 1. BACKGROUND

UK 'health centres' built by the government during the 1960s had the primary care team working together to offer a variety of services for the local community. Services offered in primary health care centres were reduced during the late 1980s; minor surgery and emergency moved into the hospital setting. The new 'one stop shop' facility provides services such as podiatry, physiotherapy and occupational therapy, places emphasis on community care and the idea of 'prevention rather than cure', this aspiration should lead to faster diagnosis and mitigate the need for hospitalisation (Miller and Swennson, 2002). This means a shift in the role of the primary care facility; removing the burden on hospitals, mitigating long term costs and improving the health of the nation by promoting synergies between different specialities (Potter 2008). Concerns have been raised about the new typology including hostility from GPs and the amalgamation and relocation of services out of town centres (Singmaster, 1997).



**Figure 1:** Map of Belfast indicating location of new CTCCs and the 'Ring of Health.' Clockwise from top; Grove, Hollywood Arches, Castlereagh, Andersonstown, Bradbury Centre, Shankill, Carlisle Centre (Faith, 2011).

'The Ring' of Health' (see figure 1) strategy was employed in Belfast to locate the new centres along arterial routes, convenient to neighbouring communities and close to existing civic buildings (Cole, 2008). Transport links, simple open plans, space for services and circulation are all key components in creating an adaptable building to suit the future demands of the NHS (Potter, 2008). Wellbeing centres, super-surgeries and community treatment and care centres (CTCC) are some of the terminology associated with the emerging primary care typology in the UK. The emphasis on quality design should contribute to the working environment for staff, healing process and patient experience and promote community welfare. Design of this typology must carefully consider two factors; the provision of a non institutional pleasant environment and creating good space standards (Cole, 2008). The social environment is also important in supporting these ideals and should provide an environment which supports dignity, privacy and comfort to the patients and staff. Spring (2006) identified flexibility as paramount in meeting the changing needs of health buildings in providing value for money.

Circulation is primarily functional in health buildings, moving people and objects to destinations, this can double-up as a meeting or waiting area and equipment storage (Carpman and Myron, 1993). Successful circulation in these complex buildings can promote wayfinding and reduce the incidence of the users becoming confused or lost. Clarity in the architectural composition and features can create a memorable journey and provide an understanding of the layout of these buildings upon entry (Kolb, 2008).

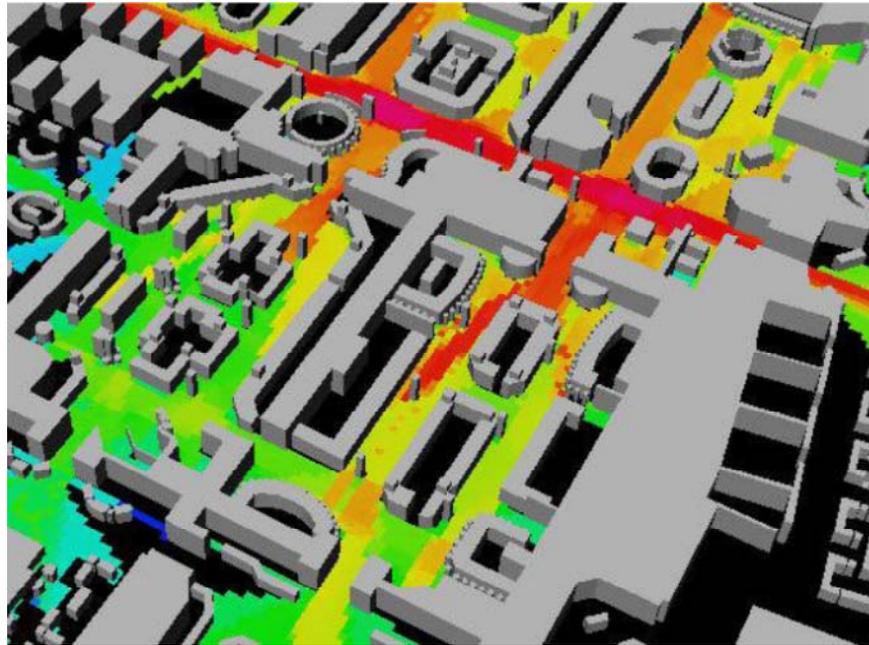
## **2. METHODOLOGY**

### **2.1 Introduction**

Space syntax was identified as an appropriate quantitative methodology for examining the extent of success in the design of the new primary care typology in supporting wayfinding. Space syntax tools model and comprehend space, there is an ability to predict the probable outcome of a spatial intervention, this can be done pre-construction phase and can prove economically and socially effective evidence based design (Ratti, 2004; Stonor, 2008; Penn & Turner, 2008).

Configured space relates to how humans inhabit space, giving it social meaning by turning continuous space into discrete connected units (Doxa et al, 2000; Bafna, 2003). This provides another level of architectural discourse, reflecting on the sociology of buildings and how the spatial configuration affects accessibility and wayfinding (Hillier and Hanson, 2003; Ratti, 2004; Stoner & Stutz, 2004; Batty, 2004).

Observed movement correlates with spatial integration, meaning more intelligible space is perceived as 'legible' by users (Penn, 2003). Integration is proportional to depth and influences movement which correlates with spatial configuration (Ratti, 2003; Choi et al, 1990).



**Figure 2:** Graph produced from VGA analysis of London department store. Areas coloured red, signify shallow and easily accessible routes, and blue indicates deep difficult to reach areas (Penn and Turner, 2000).

Visual graph analysis (VGA) creates a coloured graph, (figure 2) and illustrates successfully connected areas. Warm tones represent easily accessible or integrated (shallow) areas and cold tones (deep) signify segregated or less connected areas. Agent based analysis (human avatars) of the internal environment is possible using VGA and can predict movement which can be compared to observed movement. Avatars simulate movement within the plan based on two main assumptions: movement is purposeful and they have a perfect knowledge of the environment. Human behaviour is programmed including; stopping for conversation, looking around and also crowding (Penn & Turner, 2000).

## 2.2 Why VGA and not the axial map?

VGA provides a mutual view, measuring visual connection between nodes on the graph rather than predicting origin-destination route (Penn & Turner, 2000). This creates a more detailed graph than axial maps which can be limited as they use geometric formulation, relating to local properties so the link between the spatial environment and the visual field of the human is omitted (Doxa et al., 2000). VGA has potential for social interpretation, acknowledges how spaces are visually related unlike isovist (axial) data which fails to examine social and aesthetic relationships.

Steadman (2004) professes axial maps represent the shortest and fewest paths which is generally regarded by people as a means of conserving time and effort; however, this does not consider topological features, such as traffic and may therefore not be the shortest metric route (there may be more changes in direction).

VGA is more universally applicable than isovists (Desyllas and Duxbury, 2001). Information such as building heights can be a generator for movement and is considered arbitrary and are rejected by axial maps so there is no proof on a unique set of lines (Ratti, 2004). Axial maps are sensitive to boundary conditions and can be difficult to determine.

VGA was identified as an appropriate analysis method of primary care environments for providing a social understanding of these buildings in terms of wayfinding (Stoner & Stutz, 2004). This was used in conjunction with observations within the selected primary care centres and semi-structured interviews with designers and decision makers.

### 3. CASE STUDIES

The following recently built examples in Northern Ireland were selected based on size, budget and type of accommodation: the Carlisle Centre, Grove Health and Wellbeing Centre and Portadown CTCC. These will be evaluated in terms of wayfinding success and how these environments may be improved.

#### 4. ANALYSIS AND RESULTS: CARLISLE CENTRE

Architects	:	Todd Architects with Penoyre and Prasad Architects
Client	:	North and West Belfast Health and Social Services Trust
Location	:	Lincoln Avenue
Cost	:	£6.35 million
Area	:	3725m <sup>2</sup>
Completed	:	2007
Accommodation	:	Podiatry, physiotherapy, occupational therapy, child development suite, dentistry, family planning clinics, 10 bookable consulting rooms, large meeting room, staff offices, community rooms, café, tea points for staff, staff canteen and waiting bays dispersed nearby. No GPs are located within the building.
Brief description	:	Arranged off a landscaped courtyard, forming the garden with a brick wall enclosing the public car park. The split level follows an internal street idea, providing level access from the car park and Antrim Road (Hackett, 2007).



**Figure 3:** First Floor Interior View of Atrium (Watson, 2009).



**Figure 4:** Reception and Concourse View: Pods have been used to Screen Areas for Greater Privacy (Watson, 2009).

#### 4.1 Observations

The route through from the ground floor main entrance to the first floor car park entrance is a strong, street like connection, reducing corridors and providing a generous staircase encouraging the use of the stair. Staff offices use shared facilities such as tea points and quiet reading rooms. These are features in all the case studies. The ambient environment is relaxed and has low noise levels compared to a traditional health centre. Colour, art, planting, internal views and the fish tank are visible from the atrium, acting as distinct features to aid wayfinding. The open plan reception and waiting areas make it difficult to compose privacy and maintain privacy within the setting. There has been an attempt to incorporate screened off areas in the design, such as in the family planning clinic and the use of 'pods' throughout.



Figure 5: Elevations (Simpson, 2009)

#### 4.2 Summary: space syntax analysis

VGA graphs show a strong correlation in the entrance area of the atrium on ground and first floor levels. The main routes in the buildings appear as shallow and can therefore be interpreted as promoting ease of way-finding.

Cellular accommodation off these main routes appears as deep and can be seen as harder to reach, suitable because the type of accommodation situated here should be in a more private area. The agent based analysis supports this by showing that patterns of movement are reduced in these areas. However, the consulting rooms' location is not ideal as they are adjacent to a main route which is open to the public atrium.

The community wing could be improved on ground floor level if it had been opened up to the main circulation to improve use and visual access. This accommodation was placed here due to the site and budget restrictions. The community side is not fully operational but be accessed by a separate door and closed off from the main building at night.

The café concept is complimentary in this typology but this was only really used by building occupants, perhaps because the area already has several other established cafés which the community prefer to use. This could be an asset for the typology, potentially helping to promote social wellbeing.

#### 5. ANALYSIS AND RESULTS: GROVE HEALTH AND WELLBEING CENTRE

Architects	:	Kennedy FitzGerald and Associates with Avanti Architects
Clients	:	Belfast City Council Belfast Education and Library Board Belfast Health and Social Services Trust
Location	:	York Road, Belfast, BT15
Cost	:	£18 million
Area	:	10 080m <sup>2</sup>
Completed	:	2008
Awards	:	- Building Better Health Awards - Best Community Care Design Award 2008. - William Keown Trust Awards 2009 – Prestigious Access Award in recognition of its accessibility and user friendly environment.
Accommodation	:	Podiatry, physiotherapy, occupational therapy, child development suite, dentistry, family planning clinics, GP consulting rooms, large meeting rooms, staff offices, community rooms, café, tea points for staff, staff canteen and waiting bays dispersed nearby. Leisure side includes bowling alley, swimming pool, gym and crèche facility.
Brief description	:	The first of its kind in Northern Ireland to provide primary health care, information services (library) and leisure facilities under one roof, creating a new challenge in terms of amalgamating different facilities and dealing with scale. It

was identified as an innovative move for the three service providers to share facilities and the potential for synergies to be realised in the new typology (Furmston, 2008). The idea also facilitates the promotion of holistic health at a primary health care level, as set out by the World Health Organisation (Thompson, 2008).

The plan form is designed to control access to the individual services without perceived barriers. Health facilities are positioned to the left hand side on the ground floor main entrance over the three floors along a circulation spine. Larger volumes are situated on the other side and are linked with the library and café which are accessible from the first floor directly from the main staircase and rear entrance from the car park (Furmston, 2008, pp.6-7). Level Access may be achieved on ground or first floor from front and rear entrances. The second floor is devoted to staff, meaning access is controlled for visitors.



**Figure 6:** Building Arrangement Diagram (Kennedy FitzGerald and Associates, 2008).



**Figure 7:** Reception Area (Watson, 2008).



**Figure 8:** Reception for Trust Clinical Services (Avanti Architects, 2008).



**Figure 9:** Waiting Area for GPs and Treatment Area (Watson, 2008).



**Figure 10:** Atrium Space Overlooking the Entrance (Watson, 2008).

## 5.1 Observations

The Grove is larger than the Carlisle Centre and includes leisure facilities and a library. The café is perhaps more successful in this case due to the inclusion of these additional civic facilities, however, there is an opportunity to create a more 'health based kitchen' for the community.

Design cues were employed to aid wayfinding, subtleties in colour and features, such as landscaped courtyards, were included for a memorable journey. It seems to be relatively straightforward to traverse around with glazed voids and courtyards providing knowledge of where you are in the building. It is logical that leisure and health are co-located, especially considering the growing concern of the epidemic of obesity (Armstrong, 2009) which could lead to health complications and ultimately burden NHS resources.

## 5.2 Summary: space syntax analysis

VGA shows the main entrance on ground floor and staircase and lifts are shallow showing it is visually well connected. Circulation spines are not as strong and could be improved upon by increasing corridor width. This could be seen as a favourable attribute to these areas where consulting rooms should be more private. The hierarchy in the plan correlates with access. Visitors to the health side meet the reception/waiting areas and move further along the circulation spine to meet with the consultant. Since there are public facilities (leisure) existing alongside the health side it is even more pertinent to design to protect the privacy of the users. VGA results for the library is quite weak, however, from observation it appears to be busy. It is clear from the agent based analysis which routes are commonly used and this was reflected in the observations.

## 6. ANALYSIS AND RESULTS: PORTADOWN CTCC

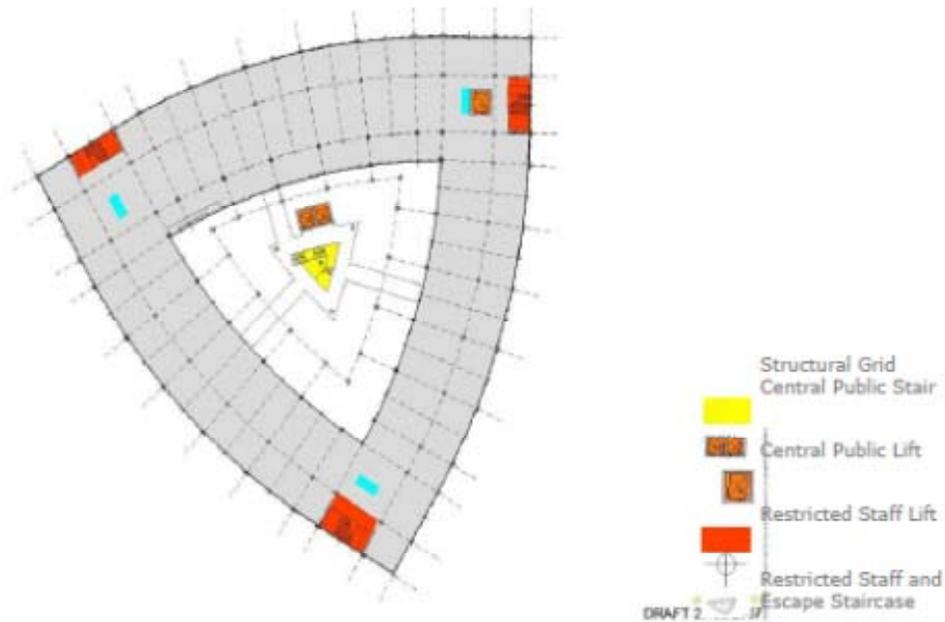
Architects	:	Kennedy FitzGerald and Associates with Avanti Architects
Clients	:	South Eastern Health and Social Care Trust
Location	:	Meadow Lane, Portadown
Cost	:	£12.9 million
Area	:	8750 m <sup>2</sup>
Completed	:	Due Completion January 2011
Awards	:	Building Better Health Awards - Best Future Design Concept 2006
Accommodation	:	Podiatry, physiotherapy, occupational therapy, child development suite, dentistry, family planning clinics, GP consulting rooms, large meeting rooms, staff offices, community rooms, café, tea points for staff, family counselling, crèche, pharmacy, staff canteen and waiting bays dispersed nearby.
Brief description	:	The plan form is three gently curving sides, based on an equilateral triangle. The basement contains non habitable service accommodation, such as the car park and plant rooms. An atrium is used to circulate to all areas with bridges set at different. The structural grid, allows for flexibility, where certain areas could

expand or reduce certain areas could expand or reduce to meet the changing needs of the building (Pearson, 2006).

The design follows the other case studies with podiatry and physiotherapy on ground floor for ease of accessibility and shared office space is set over the two upper floors. Social workers and assessment rooms have been placed on the second floor. It is hoped that this will achieve more privacy. There is a large circulation area to habitable room ratio, providing a pleasant environment and ejection and assisting wayfinding.

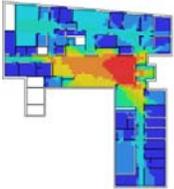
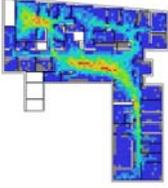
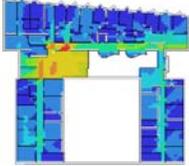
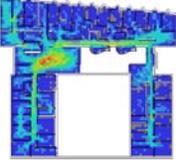
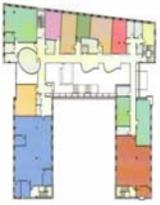
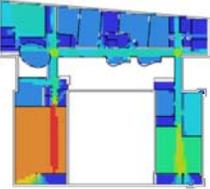
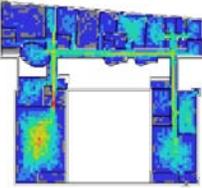
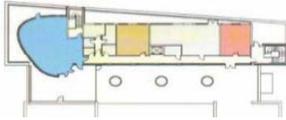
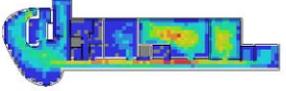


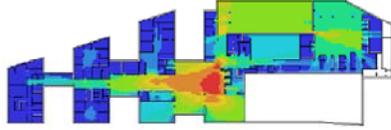
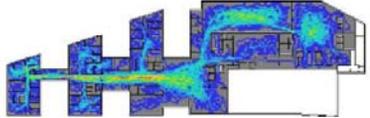
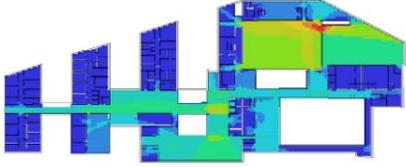
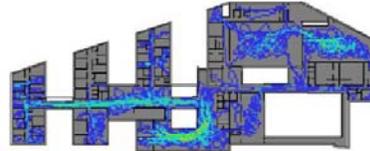
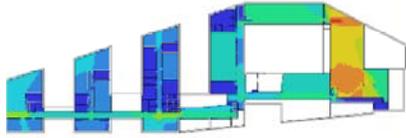
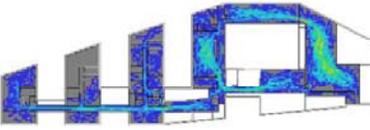
**Figure 11:** External View of the New Portadown CTCC  
(Kennedy FitzGerald and Associates, 2009).

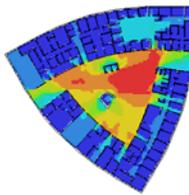
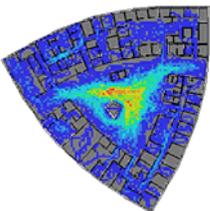
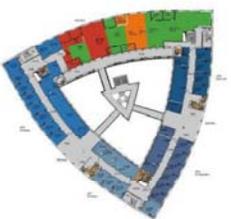
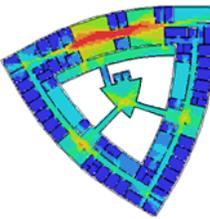
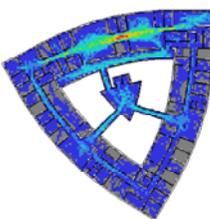
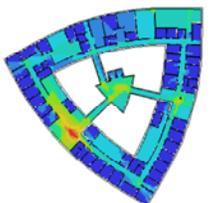
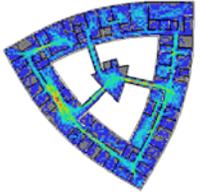


**Figure 12:** General Arrangement and Circulation Plan  
(Kennedy FitzGerald and Associates, 2009).



<b>Summary of Results:                      Carlisle Health Centre</b>	Design Trends	VGA	Agent Based Analysis
Level 0	 <ul style="list-style-type: none"> <li>-Physiotherapy, podiatry, interview rooms.</li> <li>-Café.</li> <li>-Community facilities.</li> </ul>	 <ul style="list-style-type: none"> <li>-Entrance and 'healthy stair' is shallow and strong foyer / waiting area. Lifts are in shallow zone and are therefore accessible.</li> <li>-Café (close to main entrance) is strong but not busy in reality.</li> <li>-Physiotherapy and podiatry are quite deep producing a more private environment.</li> </ul>	 <ul style="list-style-type: none"> <li>-Pattern of movement is mainly within atrium</li> <li>-Community facilities are deep but the corridor is quite busy with regards to movement.</li> </ul>
Level 1	 <ul style="list-style-type: none"> <li>-Occupational therapy, speech therapy, family planning clinic, consulting rooms, dentistry.</li> </ul>	 <ul style="list-style-type: none"> <li>-Entrance and reception are strong.</li> <li>-Consultations rooms are deeper creating a more private setting.</li> <li>-Main corridors are quite strong</li> </ul>	 <ul style="list-style-type: none"> <li>-Patterns of movement are mainly around the entrance / reception area and extend to therapy wing and family planning clinic.</li> </ul>
Level 2	 <ul style="list-style-type: none"> <li>-Staff shared facilities, Trust offices.</li> <li>-Multi purpose room, tea points.</li> </ul>	 <ul style="list-style-type: none"> <li>-Family and childcare open plan office is strong</li> <li>-Main circulation corridors could be stronger (best at intersections).</li> <li>-Other offices are deep,</li> </ul>	 <ul style="list-style-type: none"> <li>-Patterns of movement is mainly in open plan office areas and along main corridors</li> </ul>
Level 3	 <ul style="list-style-type: none"> <li>-Staff cafeteria, changing facilities.</li> <li>-Plant rooms.</li> </ul>	 <ul style="list-style-type: none"> <li>-Staff canteen onto corridor is a strong visual link.</li> <li>-Fire escape stairs are deep (weak).</li> <li>-Staff changing areas are quite deep.</li> </ul>	 <ul style="list-style-type: none"> <li>-Patterns of movement are strongest in the canteen and plant room areas.</li> <li>-The plant room would be seen as an anomaly since it is restricted access even to staff.</li> </ul>

Summary of Results: Grove Health and Wellbeing Centre	Design Trends	VGA	Agent Based Analysis
<p>Level 0</p>	 <ul style="list-style-type: none"> <li>-Dentistry, physiotherapy, podiatry, occupational therapy, pharmacy, procedures suite, interview rooms.</li> <li>-Bowling, swimming pool, café.</li> </ul>	 <ul style="list-style-type: none"> <li>-Strong entrance (lifts, stairs, pharmacy and administration are convenient to this).</li> <li>-Weak 'portals' and pool changing facilities enabling a more private environment for these activities.</li> <li>-Fire escape stairs are deep (weak).</li> <li>-Main circulation spine weakens (deeper) towards final 'portal'. This contains the procedures suite and some plant.</li> </ul>	 <ul style="list-style-type: none"> <li>-Main patterns of movement are along the circulation spine, at the main entrance, in bowling alley and in the pool changing facilities.</li> </ul>
<p>Level 1</p>	 <ul style="list-style-type: none"> <li>-GPs, elderly day care centre.</li> <li>-Sports Hall, fitness suite, library.</li> </ul>	 <ul style="list-style-type: none"> <li>-Sports hall is shallow and therefore strong.</li> <li>-'Portals' are very weak which aid confidentiality due to the nature of the spaces within being GP consulting rooms.</li> <li>-Library and main circulation spine are quite deep, but are stronger at stairway and entrance into library.</li> </ul>	 <ul style="list-style-type: none"> <li>-Main patterns of movement are the library, sports hall, circulation spine and fitness suite.</li> </ul>
<p>Level 2</p>	 <ul style="list-style-type: none"> <li>-Staff shared facilities, Trust offices.</li> <li>-Multi purpose room, plant room.</li> </ul>	 <ul style="list-style-type: none"> <li>-Plant room is shallow (this is an anomaly because this would be for restricted access only).</li> <li>-Circulation spine is deep but becomes shallow at end 'portal' where there is an open plan office.</li> </ul>	 <ul style="list-style-type: none"> <li>-Main patterns of movement are in the plant room, along the main circulation spine, through the multi-purpose room, staff shared facilities and the end open plan office 'portal'.</li> </ul>

<b>Summary of Results:                      Portadown CTCC</b>	Design Trends	VGA	Agent Based Analysis
Level 0	 <ul style="list-style-type: none"> <li>-Dentistry, physiotherapy, podiatry, occupational therapy, pharmacy, procedures suite, interview rooms, bookable consultation rooms.</li> <li>-Café and crèche.</li> </ul>	 <ul style="list-style-type: none"> <li>-Atrium and entrances are very strong (shallow).</li> <li>-The diagram is clear on where functions are located.</li> <li>-Fire stairs are in a deep location.</li> <li>-Cellular accommodation is deep.</li> </ul>	 <ul style="list-style-type: none"> <li>-Main pattern of movement is within atrium and dissipates out to the more minor corridor routes.</li> </ul>
Level 1	 <ul style="list-style-type: none"> <li>-GPs.</li> <li>-Offices</li> <li>-Sports Hall, fitness suite, library.</li> </ul>	 <ul style="list-style-type: none"> <li>-Strong link between open plan offices on north west of building. Bridges and central circulation are quite strong.</li> <li>- Reception and waiting areas are quite strong which serve the GP consulting rooms.</li> <li>-Cellular GP consulting accommodation is deep which may help to create a more private environment.</li> </ul>	 <ul style="list-style-type: none"> <li>-Bridges and central circulation and minor corridors have quite strong patterns of movement.</li> <li>-Main area of movement is the north west aspect open plan offices</li> </ul>
Level 2	 <ul style="list-style-type: none"> <li>-GPs.</li> <li>-Offices &amp; Conference Room.</li> <li>-Nursing and Social Care Work.</li> <li>-Minor Surgery</li> </ul>	 <ul style="list-style-type: none"> <li>- Bridges and central circulation are quite strong.</li> <li>- Social care rooms and GP consulting rooms are deep helping to promote confidentiality and privacy.</li> </ul>	 <ul style="list-style-type: none"> <li>-South west waiting area for GPs has a strong pattern of movement.</li> <li>-Bridges, central circulation core and main corridors remain strong in terms of patterns of movement.</li> </ul>

## 8. DISCUSSION

Space syntax methodologies used at an early design stage can prove beneficial in assessing the strengths and weaknesses. Further research on this topic could involve more in-depth observations to support the VGA and agent based analysis results. Future work would include interviews and focus groups with the users (staff, patients, and visitors) and provide an important understanding of their expectations of the typology.

Based on the case studies the new typology may be improved as follows, in terms of wayfinding:

- Compact plans with generous central circulation could improve legibility.
- The location of the entrance should be near to the central or main circulation.
- It is important with this typology that the use of the stair is promoted but also that the lifts are convenient for those who need it.
- Open plan and larger shared circulation spaces tend to work well and could help to reduce confusion within these buildings.
- Voids and atriums are successful as they allow for visual connection to spaces, providing an understanding of where you are in the building. These should not impinge upon private areas to maintain patient confidentiality.
- Care should be taken in setting up a hierarchy of public and private spaces in order to support confidentiality of the patients. This could be seen as a composition of shared public circulation or primary routes which lead onto secondary and tertiary routes with increasing privacy.
- Circulation should be a clear and simple diagram for ease of way-finding. Architectural devices such as planted courtyards could be utilised to create a more memorable journey.
- Avoid corridors that are too long or too narrow as this reduces the visual access along the route and may become confusing for the user as it is more difficult to locate where they are in the building.

With reference to the matrices summarising the results in section 7, it can be seen that each of the case studies have strong and weak areas. Portadown CTCC is the most successful of the three. This is due to the simple circulation diagram, compact building and generous central circulation within the atrium, which creates a user-friendly environment. The hierarchy of public and private spaces are defined in a logical manner, helping to maintain confidentiality. Portadown CTCC is perhaps more flexible and would enable future alterations, important to the changing needs of primary health care.

The challenge in these existing examples is that the synergies between the services are realised. The design of these buildings must therefore support the actions these synergies will carry out together and be designed to be flexible to suit the changing needs of the users.

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