CHAPTER 9

DESIGN

The design takes form within the concept of skin, as intangible theories are translated to tangible design. The chapter continues to explore the notion of creating an Optimal Healing environment that reflects a curing to healing continuum. Developing further the design opportunities identified in chapter 8 Spatial conventionalization, mentioned layers in design will be used interdependently as spatial enablers to create spatial literacy.
9.1 MACRO DESIGN ITERATIONS
Initial exploration of the building's form, starting to identify opportunities.

Diagram 9.1 Inner space stripping down to reveal potential (Author, 2016)
Diagram 9.2 Utilising landscaping (Author, 2016)
Diagram 9.3 Threshold connecting inner and outer environments (Author, 2016)

9.2 MICRO DESIGN ITERATIONS _ SPACE PROGRAMMING
Initial exploration of the placement of different programs.

9.2.1 LOWER GROUND FLOOR
Iteration 1

Diagram 9.4 Iteration 1 LGF (Author, 2016)

Iteration 2 _ implementation of spatial requirements as base informant
Diagram 9.7 Iteration 2 LGF (Author, 2016)

9.2.2 GROUND FLOOR
Iteration 1

Diagram 9.5 Iteration 1 GF (Author, 2016)
Diagram 9.8 Iteration 2 GF (Author, 2016)

9.2.3 FIRST FLOOR
Iteration 1

Diagram 9.6 Iteration 1 FF (Author, 2016)
Diagram 9.9 Iteration 2 FF (Author, 2016)
EXPLAINED AXONOMETRIC

DEFINING THE INTERACTION OF RELATED PROGRAMS

This is the final space programming, it is important to realise that the building as been design to work as a whole, although different programs are located on different levels according to how public or privately they operate.
In the following pages the design proposals for the lower ground and first floor are discussed briefly. Thereafter an in-depth discussion of the ground floor, which has been iterated and resolved in detail.

### 9.4.1 LOWER GROUND FLOOR

Lower ground floor, being a more public space dedicated to the cafe, information zone, gym/yoga studio, therapy rooms, and occupational therapy space. This public space is inspired by a more open floor plan, to encourage collaboration and community support. Containing more supportive therapies the lower ground floor acts as a mediator between the different programs throughout the building.
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Diagram 9.12 Sketch of information zone iteration (Author, 2016)

Diagram 9.13 Iteration of eastern courtyard (Author, 2016)

Diagram 9.14 Different options of controllable exterior skin of the building (Author, 2016)

Diagram 9.15 Main Entrance of the Oncology centre (Author, 2016)
First floor, dedicated to patient rooms, was designed to provide palliative inpatients with the best care and comfort. The strict design of single rooms was informed by theory, with priority on providing each patient with as much control as possible to achieve optimal interior conditions. This floor was designed in limited detail, focus mainly on space planning and numerous iterations were done:

- Considering different floor layouts (diag. 9.17);
- Creating stronger visual axis through building with outdoor water features (diag. 9.18);
- Material finishes and complexity was elaborated (diag. 9.21);

However, they were not taken further, as focus was placed on ground floor.

Private patient rooms, rather than semi-private ones, provide opportunities for confidential discussions (Schwister, et al., 2004:23).

Thorough research has been done on the importance of social support. Therefore, spaces have been designed to incorporate family throughout the entire medical course (Schwister, et al., 2004:23).

Quite space

Healing addresses body, mind, and spirit, this space addresses the spiritual needs of patients, families, and staff. To meet the need of a very diverse religious population, is a space that allows individuals to feel closer to nature (the most universal image of spirituality).

Balconies provide positive distractions with nature & seating that accommodates lounge, pastures (Steelcase, 2015:61).

Visual access to outdoor garden

Incorporate individual lighting and temperature adjustments to increase personal control and comfort (Steelcase, 2015:61)

Hospital design that provides opportunities for patient/staff interactions, such as decentralized nursing stations, may be useful (Schwister, et al., 2004:10).
Diagram 9.18 Northern balcony iteration (Author, 2016)

Diagram 9.19 Sketch of passage (Author, 2016)

Diagram 9.20 Eastern balcony iteration (Author, 2016)

Diagram 9.21 Material palette and perspective of patient room (Author, 2016)

Design Iterations

- **Light shafts allow for maximum infiltration of natural light**
- **Vertical wall, as well as landmark of orientation but also contains sensory attraction, creates lighting effects and allows for visual connection with nature at times.**
- **This balcony faces south-east and therefore will flower in the summer, as it is to be enjoyed in the fresh morning sun and cool shaded afternoons.**
- **Balcony spaces expose the patient to more natural contact and pleasures, creating an option of a different sensory experience**
- **Each balcony is designed to have a different intensity at different times of the year, therefore creates constant environmental complexity change**

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9.4.3 GROUND FLOOR

Focus is placed on ground floor and therefore additional design research is done regarding the emotional needs of the patient, making use of the cancer experience map (cf. Chapter 6 Typology) followed by design strategies and implementation to best support and accommodate the patient. In addition, Steelco, who creates, "safe and efficient spaces that deliver greater connection, empathy and wellbeing for everyone involved in the experience of health." (Steelcase, 2015:1). They incorporate studied observations with design principles to create a variety of different healthcare spaces, that are considered to be "ideal". These diagrams and principles are to be used as a foundation to be assisted according to regulations and implementation of optimal healing environment principles, with the ultimate objective being to create a healing environment. Following this additional research, a second interaction is done of the ground floor, which is taken along with all design features to further technification in chapter 11.
The infusion space is where chemotherapy is administered.

Chemotherapy (chemo) is a medication or a combination of medications prescribed to kill cancer cells which may also kill healthy cells. These medications are often called "anti-cancer" drugs. Chemotherapy treatments may be given in many ways:

- **Intravenous (IV):** through a catheter tube in the vein, typically placed in the arm. Sometimes, your doctor may recommend having an IV infusion device. The two most common are PICC (Peripherally Inserted Central Catheter) line and Ports. Both of these devices stay in longer than an IV catheter placed in your vein at the time of your infusion visit. Talk to your healthcare team for further information about what's best for you.

- **Orally:** taken by mouth as pills, capsules or liquids that you swallow.
- **Intramuscular:** given directly into a muscle area.
- **Topically:** placed on the skin where it is absorbed.
- **Intra-arterial (IA):** given directly into an artery (Cohen, 2010)

**TREATMENT STEPS:**

1. **Register at the chemotherapy center (like signing for a dental's appointment.)**
2. **Have the nurse who will be giving you the medicine.**
3. **Tell the nurse your blood pressure, pulse, temperature, & respiration rate taken.**
4. **Your height & weight will be recorded (for appropriate dose of medicine)**
5. **Can one call you if you don't have a port or catheter.** The chemotherapy medicine is given through the IV. Then you receive the medicine, the IV is taken out. If you have a port or catheter, you'll get your medicine through it if you won't generally need an IV.
6. **Tell the nurse the time as your number of red and white blood cells can be recorded (called a "blood count").**
7. **Your medical oncologist will examine you, look at the results of the procedures & test calculations & order the amount of medicine too need.**
8. **You may get some medicine (called "pre-chemotherapy medicine") to prevent nausea or an allergic reaction.** You also may be given fluids, which help certain chemotherapy medicines work effectively.
9. **The nurse will start the infusion process.** It can take up to several hours to finish the whole infusion process. Some chemotherapy medicines are given for a few different times. If the chemotherapy medicine is toxic, the chemotherapy and fluid are given as an infusion through an IV and the Cytoprotect is sometimes taken as a pill.
10. **When your chemotherapy session is done, the nurse will take out the IV & make sure your vital signs (pulse, heart rate, & respiration rate) are stable:**
11. **Your doctor or nurse will advise you on any side effects you might expect to have, how to manage them, and will usually give you medicine to ease nausea.** You'll talk to see if your doctor if you have any severe problems such as much nausea, nausea that doesn't go away even if you take the medicine, causes, or ways to control it.

**BENCHMARK ANALYSIS**

**GENERAL**

- No privacy: 0
- No space for family during treatment: 0
- No movable chairs for medical staff: 0
- Encourages opportunity for interaction & learning: 0
- No cabinets to reduce clutter: 0
- No exams (from treatment chair): 0
- No sensory stimulation: 0
- No natural light: 0

**Design**

- More privacy: 0
- More space for family during treatment: 0
- More movable chairs for medical staff: 0
- More opportunity for interaction & learning: 0
- More cabinets to reduce clutter: 0
- More exams (from treatment chair): 0
- More sensory stimulation: 0
- More natural light: 0
- No positive distraction: 0

**ST CHARLES**

- No privacy: 0
- No space for family during treatment: 0
- No movable chairs for medical staff: 0
- Encourages opportunity for interaction & learning: 0
- No cabinets to reduce clutter: 0
- No exams (from treatment chair): 0
- No sensory stimulation: 0
- No natural light: 0
- No positive distraction: 0

**ISRAELI CANCER CENTER**

- No privacy: 0
- No space for family during treatment: 0
- No movable chairs for medical staff: 0
- Encourages opportunity for interaction & learning: 0
- No cabinets to reduce clutter: 0
- No exams (from treatment chair): 0
- No sensory stimulation: 0
- No natural light: 0
- No positive distraction: 0

**Figure 9.1 Standard infusion space 1 (Dr. Luka Namozzi, Breast Cancer Support Group, 2013)**

**Figure 9.2 Standard infusion space 2 (2015)**

**Figure 9.3 Standard infusion space 3 (2012)**

**Figure 9.4 Standard infusion space 4 (2015)**

**Figure 9.5 Plan of Israeli cancer center (2015)**

**Figure 9.6 Standard infusion space 5 (2015)**

**Figure 9.7 Standard infusion space upgrades (Dr. Charles Health System, 2015)**

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9.4.3.2 INFUSION SPACE PERSONAL APPROACH

INFUSION SPACE Personal Approach (Author, 2016)

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Infographic 9.1 Infusion space personal approach (Author, 2016)
**9.4.3.3 INFUSION SPACE**

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**SEMI-OPEN TREATMENT AREA**

- A group setting
- Ample room for family members
- Interaction and information sharing

Analysis:
- Maintaining a sense of control
- Cabinets reduce clutter
- Moveable chairs for medical staff
- Spaces for family during treatment
- Teaching and learning opportunities

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**SMALL PRIVATE TREATMENT ROOM**

- A space where patients & family can read, enjoy entertainment, or rest & relax during an extended treatment.
- For more severe illness, patients are able to achieve better privacy & desired separation
- Personal consultations with medical staff, without external disruptions
- Integrated technology for collaborative learning as well as positive distraction

Analysis:
- Maintaining a sense of control
- Cabinets reduce clutter
- Moveable chairs for medical staff
- Spaces for family during treatment
- Teaching and learning opportunities
- Greater privacy (as choice)

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**SEMI-OPEN QUADRANTS**

- A cluster arrangement of "rooms within a room."
- This setting affords patient & family privacy as well as medical staff's needs for efficiency

Analysis:
- Maintaining a sense of control
- Cabinets reduce clutter
- Moveable chairs for medical staff
- Spaces for family during treatment
- Teaching and learning opportunities
- Privacy

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**ALONE/ TOGETHER TREATMENT AREA & COMMUNAL SPACE**

- A semi-open treatment area adjacent to a communal hub
- Allows patients to be at the edges of activity while the communal space is where family members can connect with others, focus on necessary tasks, or just rejuvenate while maintaining proximity to their loved ones.

Analysis:
- Less cabinets to reduce clutter
- Opportunity for interaction & learning
- Maintaining a sense of control
- Spaces for family during treatment
- Moveable chairs for medical staff
- Teaching and learning opportunities
- Privacy

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**IDEAL SPACE**

Combination of:

- Semi-open treatment area
- Small private treatment room
- Communal space

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9.4.3.5 Examination Rooms

EXAMINATION ROOMS

MULTIPURPOSE EXAM

- Fluid space sets the stage for improved interaction by replacing the traditional exam table with a recliner, putting everyone on the same level and making it easier to transition from one encounter to the next.

Figure 9.12 Multipurpose exam room (Steelcase Health, 2015)

DOUBLE-DOOR

- Access from a staff corridor means the care team can move themselves and their charting technology efficiently from room to room.
- While patients enter and exit from a separate corridor.
- The staff corridor is also a space where care team members can have private conversations before they enter the exam room.

Figure 9.13 Double-door exam room (Steelcase Health, 2015)

QUICK-CARE EXAM

- Compact quick-care spaces with minimal medical equipment are a convenient option for appointments that are straightforward and don’t require a full exam.

Figure 9.14 Quick-care exam room (Steelcase Health, 2015)

CONSULTATIVE CARE ROOM

- Not every medical appointment involves an exam.
- Sometimes scheduled time is spent reviewing images, test results and treatment options.
- This high-performance space maximizes confidential information sharing and personal connections.

Figure 9.15 Consultative care room (Steelcase Health, 2015)

CARE SUITE

- Separate spaces to handle the medical exam & consultation optimize the appointment, with each activity occurring in the best-equipped and supported space.
- Improving the experience for all participants. An entrance and a walkthrough provide multiple means of access.

Figure 9.16 Care suite (Steelcase Health, 2015)

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9.4.3.6 STAFF ROOM_PERSONAL AP

9.4.3.6 STAFF ROOM_PERSONAL APPROACH

MEDICAL STAFF

NEEDS
- stress
- need for restoration
- need for privacy
- need to break away
- need for reflection

STRATEGIES

ART
Attention Restoration Theory

Build on Attention Restoration Theory (Hassenzahl & Tractinsky, 2006) and (Lau & Hsiao, 2005) to explain the relationship between restoration and values.

Attention Restoration Theory (ART) (Hassenzahl & Tractinsky, 2006) contends that certain types of environments can help restore the necessary attributes of their occupants, including restoration, recovery, and value restoration.

To create environments that are restorative, it is important to understand which characteristics of settings can increase negative cognitions and benefits.

Natural environments turn out to be particularly rich in the characteristics necessary for restorative experiences, as by K-Feed.

Infographic 9.3 Staff room personal approach (Author, 2016)
9.4.3.7 STAFF ROOM

Located close to patient rooms, is a dynamic space that accommodates a variety of work needs, task & preferences. (Steelcase, 2015:48)

This space focuses on different kinds of information sharing, with semi-enclosed areas containing standing-height tables designed to encourage team work or teaching/learning exchanges. (Steelcase, 2015:48)

With medical staff often neglecting their own needs, an appealing retreat space, located close to the work hub, will be an investment in medical staff's health and wellbeing. Zones to accommodate different activities and levels of socializing will encourage staff to maximise their break time. (Steelcase, 2015:50)

Focused detail work is critical within the healthcare profession, small private spaces connected to the team hub, with provided focus and concentration for intended short-term, concentrated work as well as private conversations. (Steelcase, 2015:52)

Providing space that is visually and acoustically shielded, for collaboration as well as individual work, allows medical staff to share information openly in private conversations. (Steelcase, 2015:54)

TEAM HUB

analysis
- maintaining a sense of control
- cabinets reduce clutter
- more horizontal staff model, a team-oriented system
- encourage positive interaction among staff
- teaching and learning opportunities
- choice of different environments
- Implementation of Attention Restoration Theory

COLLABORATION SPACE

analysis
- maintaining a sense of control
- cabinets reduce clutter
- more horizontal staff model, a team-oriented system
- encourage positive interaction among staff
- teaching and learning opportunities
- choice of different environments
- Implementation of Attention Restoration Theory

RESPITE

analysis
- maintaining a sense of control
- cabinets reduce clutter
- more horizontal staff model, a team-oriented system
- encourage positive interaction among staff
- teaching and learning opportunities
- choice of different environments
- Implementation of Attention Restoration Theory

PRIVATE SPACE

analysis
- maintaining a sense of control
- cabinets reduce clutter
- more horizontal staff model, a team-oriented system
- encourage positive interaction among staff
- teaching and learning opportunities
- choice of different environments
- Implementation of Attention Restoration Theory

OUTPATIENT-TEAM CORE

analysis
- maintaining a sense of control
- cabinets reduce clutter
- more horizontal staff model, a team-oriented system
- encourage positive interaction among staff
- teaching and learning opportunities
- choice of different environments
- Implementation of Attention Restoration Theory

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After studying the recommended spatial layouts by Steelcase and taking into consideration the personal needs of the patient and medical staff lead to changes on the Ground Floor plan. These changes were implemented which to the final iteration seen below that is to be technically resolved in chapter 10.
9.4.5 SECTION A-A

The sections highlights and address problematic issues revealed on vertical plain. The infiltration of natural daylight is maximised (Diag.9.34), atrium is enlarged and enclosed (Diag.9.33) and ceiling detail is design to address exposed services (Diag.9.32), these specific designed elements undergo technical resolution in chapter 10.
The design of a window seat originated from a problem, namely that infusion patients are trapped in one Lazy boy chair with no space for family to sit. This lead to the design on a window seat, initial design exploration can be seen below, this is followed by a more in-depth technical resolution in Chapter 10.16.
9.4.7 LANDSCAPING

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Conclusion

By elaborating on all the conceptual intentions, responses, design problems and evidence based studies, a design basis is created. The importance of this chapter is to explore and show how the different interdependent elements of design (identified in Chapter 7) can be used together to create an OHE, that reflect intangible theories. The significance of this chapter is also to explain how the building functions as a whole, with interdependent supportive programs.
9.4.8 Using the Exterior Environment to Create Healthier Interior Environments

INTERIOR LANDSCAPING

Deciduous trees are chosen for the atrium, as the seasons change so will the atmosphere of the atrium as well as the amount of light and colours that filter into the space. Allowing patients that are confined to indoor to be exposed to seasonal change, this prevents disorientation and isolation, along with this acts as a positive distraction providing stimulation, to patients, staff and visitors.

FLOWERING BALCONIES

Different balconies have been designed to flower at different times of the year, encouraging patients to move around and use different spaces along with this comes being exposed to different environmental complexities and stimulations.

AUTUMN

WINTER

North-western balcony flowers in the winter as to be enjoyed with a warm afternoon sun in the winter and sunsets.

TREES

ACER SACCHARUM

Fagus Grandifolia

BETULA Papyrifera

OSTRVA VIRGINIANA

GROUND COVER

Adiantum capillus-veneris

(Maidenhair Fern)

30cm x 30cm
**INDOOR GARDENS**

Nature is able to grow through the exterior skin of the building as points, allowing patients to experience nature on a more intimate level from within the building and protected from exterior conditions.

**GREEN WALL**

Instead of looking straight onto the facade of the building, the implementation of a green wall creates a view and gives a more open feel to the passage as one approaches the Oncology Centre.

**ATRIUM**

Acting as the central spine of the building the atrium floods the interior with light and views of nature as deciduous trees grow and change colour.

**VISUAL AXIS CONNECTION INTERIOR AND EXTERIOR ENVIRONMENTS**

Visual axes created within the building connect to deciduous trees found in the surrounding landscaping. This creates constantly changing focal points for internal views.